

PROJECT NO.:
19-7100 (SEWER)

**CITY OF HOLLYWOOD
CONTRACT DOCUMENTS AND SPECIFICATIONS**

FOR

**REPLACEMENT OF HALLANDALE BEACH FORCE MAIN
AND LARGE USER METER LUM-07**

BID SET

SEPTEMBER 2020



Prepared by:



CA No.: 2429

4601 N. Sheridan Street, Suite 212
Hollywood, FL 33021

**BID SET
SUBMITTAL
FOR**

**REPLACEMENT OF HALLANDALE BEACH FORCE MAIN
AND LARGE USER METER LUM-07**

PROJECT NO.: 19-7100 (SEWER)

SUBMITTED BY: _____

SEPTEMBER 2020

BID PACKAGE CONTENTS AND REQUIREMENTS

SECTION	TITLE
00030	Notice to Bidders
00100	Instructions to Bidders
00200	Cone of Silence
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00495	Trench Safety Form
00500	Contract
00610	Performance Bond
00620	Payment Bond
00700	General Conditions
00800	Supplementary General Conditions

SUBMIT THIS COMPLETE PACKAGE AND ONE COPY WITH YOUR BID

CONTRACT DOCUMENTS

**REPLACEMENT OF HALLANDALE BEACH FORCE MAIN
AND LARGE USER METER LUM-07**

FOR

**CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES**

PROJECT NO.: 19-7100 (SEWER)

SEPTEMBER 2020





CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES
ENGINEERING AND CONSTRUCTION SERVICES DIVISION (ECSD)

SECTION 00030

NOTICE TO BIDDERS

PROJECT NAME:

REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

PROJECT NUMBERS: **19-7100**

NOTICE IS HEREBY GIVEN that the City Commission of the City of Hollywood, Florida, is advertising for sealed bids which shall be **submitted to the City Clerk's Office** (City Hall, 2600 Hollywood Blvd., Room 221) of the City of Hollywood, Florida, **until 2:00 p.m.**, local time, **November 5, 2020**. On **November 5, 2020 at 2:30 p.m.**, the bids will be opened and read publicly outside of Building A at Southern Regional Wastewater Treatment Plant, located at 1621 N. 14th Avenue, Hollywood, Florida.

A mandatory pre-bid conference will be conducted through WebEx telephone meeting on October 14, at 2:30 p.m. Any member of the public wishing to attend this conference must email the Senior Project Manager, Feng Jiang, P.E., FJIANG@hollywoodfl.org prior to 6:00 p.m. on October 12, 2020 and provide their name, company, telephone and email address. Those without internet access or who may need additional assistance, may call Public Utilities Engineering and Construction Services Division at 954-921-3930 prior to 6:00 p.m. on October 12, 2020.

The Bid Package and Contract documents can be downloaded at Demandstar website. Technical assistance shall be submitted in writing to the Senior Project Manager, Feng Jiang, P.E., FJIANG@hollywoodfl.org, no later than 6:00 PM on October 27, 2020.

Each bid must be accompanied by a Bid Security in an amount no less than ten percent (10%) of the bid amount. Said security shall be in the form of a Certified Check or Cashier's Check on a solvent National or State Bank, or a bid bond executed by the Bidder and a qualified Surety, satisfactory and payable to the City of Hollywood, Florida.

A Cone of Silence is in effect with respect to this bid. The Cone of Silence prohibits certain communications between potential vendors and the City. For further information, please refer to Section 30.15(F) of the City's Code of Ordinances.

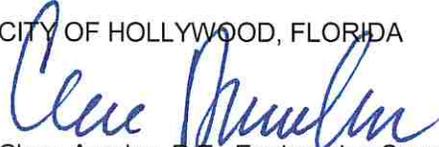
The City of Hollywood is strongly committed to ensuring the participation of local Hollywood vendors in the procurement of goods and services. For additional information about the City's Local Preference Ordinance, visit www.hollywoodfl.org.

It will be the Bidder's sole responsibility to hand-deliver or mail his/her proposal to the City Clerk's Office at City Hall on or before the closing hour and date for the receipt of bids as noted above.

The City Commission reserves the right to reject any or all bids, to waive informalities and to accept or reject all or any part of any bid, as they may deem to be in the best interest of the City of Hollywood, Florida.

Dated this September 28, 2020.

CITY OF HOLLYWOOD, FLORIDA


Clece Aurelius, P.E., Engineering Support Services Manager
Department of Public Utilities - ECSD

SECTION 00100

INSTRUCTIONS TO BIDDERS

1. PREPARATION OF BIDS:

Bids must be submitted on the separate and enclosed **BIDDING PACKAGE** forms, which shall be completed **by typewriter** or legibly handwritten in ink. The Bid price of each item on the form must be stated in words and numerals; in case of a conflict, words will take precedence. Where unit prices and extended totals are required, unit prices take precedence. Likewise, discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

If the Bid is made by an individual, he must sign his name therein and state his address. If the Bid is made by a firm or partnership, its name and address must be stated, as well as the name and address of each member of the firm or partnership. Bids by corporations must be signed by an authorized corporate officer (accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the Secretary or an Assistant Secretary of the corporation. The corporate address and state of incorporation shall be shown below the signature. When the state of incorporation is other than Florida, proof of registry with Florida must be attached.

2. RECEIPT AND OPENING OF BIDS:

The separate **BIDDING PACKAGE** consisting of the PROPOSAL, PROPOSAL BID FORM, APPROVED BID BOND, TRENCH SAFETY FORM, INFORMATION REQUIRED FROM BIDDERS AND LIST OF SUBCONTRACTORS AND/OR MATERIAL SUPPLIERS shall be completed, signed and sealed as required and must be delivered in a sealed, opaque envelope, addressed to the City Clerk of Hollywood, Florida, by the time called for in the Notice to Bidders and shall be properly identified on the face thereof.

Proposals will be publicly opened and immediately read aloud at the time and place designated in the Notice to Bidders. No proposal will be considered which is not based upon these Drawings and Specifications, or which contains any letter or written memorandum qualifying the same, or which is not properly made out and signed in writing by the Bidder.

3. PRE-BID CONFERENCE:

A **mandatory** Pre-bid Conference will be held at the Southern Regional Wastewater Treatment Plant, Bldg A 1621 N. 14th Avenue, Hollywood, Florida 33019, ECSD Conference Room, on **October 14, 2020** at 2:30 PM. All Contractors planning to submit a bid must attend the meeting. A mandatory field visit will follow the pre-bid conference. All Contractors planning to submit a bid must attend the meeting.

4. CONTRACT DOCUMENTS:

The Contract Documents give the location and description of the work to be done under this Contract and estimated quantities of each item of work for which Bids are invited, the time in which the work must be completed, the amount of the Bid Guaranty, if any, and the date, time and place of the receipt and opening of the Bids.

5. EXAMINATION OF CONTRACT DOCUMENTS AND SITE:

The Bidder is required to carefully examine the site of the work and the Contract Documents for the work contemplated. It will be assumed that the Bidder has investigated and is fully informed as to the requirements of the Contract Documents, laws, ordinances, codes and any other factors which may affect the performance of the work. Failure to be so informed will not relieve a successful Bidder of his obligation to furnish all material, equipment and labor necessary to carry out the provision of the Contract Documents and to complete the contemplated work for the consideration set forth in his Bid.

6. DIMENSIONS, QUANTITIES AND SUBSURFACE INFORMATION:

Dimensions, quantities and subsurface information supplied by the City are in no way warranted to indicate true amounts or conditions. Bidders/Contractors shall neither plead misunderstanding or deception, nor make claims against the City if the actual amounts, conditions or dimensions do not conform to those stated. Any "Outside" reports made available by the Engineer are neither guaranteed as to accuracy or completeness, nor a part of the Contract Documents.

7. ADDENDA - CHANGES WHILE BIDDING:

During the Bidding period, Bidders may be furnished addenda or bulletins for additions or alterations to the Plans or Specifications which shall be included in the work covered by the Proposal.

Any prospective Bidder in doubt as to the meaning of any part of the Drawings, Specifications or other Contract Documents may submit a written request to the Engineer for an interpretation. The Bidder submitting the request will be responsible for its prompt delivery. Any interpretation of the documents will be made by an addendum and a copy of such addendum will be mailed or delivered to each prospective Bidder who has received a set of documents. The City will not be responsible for any other explanations or interpretations of the proposed documents. **ALL INQUIRES MUST BE RECEIVED, IN WRITING, BY THE CITY OF HOLLYWOOD NO LATER THAN 5:00 P.M., October 21, 2020. ADDENDUM WILL BE ISSUED ON October 28, 2019.**

8. BID GUARANTY:

A Bid Guaranty in the form of a Cashier's Check, Certified Check or Bid Bond executed by the Bidder and a qualified Surety in the amount of **10%** of the Bid is required for this project in accordance with the Notice to Bidders.

9. TRENCH SAFETY FORM:

The Trench Safety Form included in the Bid Documents must be completed and signed. Noncompliance with this requirement may invalidate the bid.

10. QUALIFICATIONS AND DISQUALIFICATIONS OF BIDDERS:

The Contract will be awarded only to a Bidder, who in the opinion of the Engineer, is fully qualified to undertake the work. The City reserves the right before awarding the Contract to

require a Bidder to submit such evidence of his qualifications as it may deem necessary and may consider any available evidence of his financial status, technical qualifications and other qualifications and abilities. Any one of the following causes, among others, may be considered as sufficient justification to disqualify a Bidder and reject his Bid:

- A. Submission of more than one Bid for the same work by an individual, firm, partnership or corporation under the same or different names.
- B. Evidence of collusion.
- C. Previous participation in collusive Bidding on work for the City of Hollywood, Florida.
- D. Submission of an unbalanced Bid in which the prices Bid for some items are out of proportion to the prices Bid for other items.
- E. Lack of competency. The Engineer may declare any Bidder ineligible, at any time during the process or receiving Bids or awarding the Contract, if developments arise which, in his opinion, adversely affects the Bidder's responsibility. The Bidder will be given an opportunity, by the Engineer, to present additional evidence before final action is taken.

As part of SECTION 00420, the Bidder:

- 1. Must provide as part of their references a minimum of three (3) similar projects, as described below, performed within the last five (5) years. Resumes of individuals (especially Superintendent) performing the work must be provided. The Bidder must also state their proposed project manager by name and provide a minimum of two (2) similar projects managed by him/her with references, along with his/her resume. In addition, the bidder needs to meet and provide documentation of the minimum HDD required experience specified in Section 02665. Each project must be under a different contract. Only Bidders including their project manager and Superintendent, with the capabilities and experience on similar projects, will be considered qualified for bid consideration. Judgment of 'similar projects' is at the sole discretion of the City and Engineer. The successful Bidder cannot replace their project manager without providing a suitable replacement, which is determined under the sole discretion of the City.**
- 2. The projects must be similar in nature and size. A similar project is one which included the following successful and operational construction:**
 - 1. Over 3,800 feet of at least 16-inch diameter force mains.**
 - 2. Polyvinyl chloride pipe and high-density polyethylene pipe.**
 - 3. Horizontal directional drilling of force mains, 20-inch diameter, 500 feet minimum.**
 - 4. Large User Meter site improvements, including but not limited to, demo, removal and replacement of site structures, piping, meters, control panels, sump pumps, vaults, air release valves, telemetry, electrical equipment.**
- 3. Shall have current or recent contract with a local municipality to perform similar work.**

4. Must demonstrate extensive experience in public outreach and excellent customer service.

- F. Lack of responsibility as shown by past work judged by the Engineer from the standpoint of workmanship and progress.
- G. Uncompleted work for which the Bidder is committed by Contract, which is in the judgment of the Engineer, might hinder or prevent the prompt completion of work under this Contract.
- H. Being in arrears on any existing Contracts with the City, or any taxes, licenses or other monies due the City; in litigation with the City or having defaulted on a previous contract with the City.

12. LIFE AND WITHDRAWAL OF BID:

All Bids shall remain open for 90 days after the day of the Bid opening, however, the Engineer may, at his sole discretion, release any Bid and return the Bid Guaranty prior to that date. Any Bid may be modified or withdrawn prior to the time scheduled for the opening of Bids.

13. REJECTION OF IRREGULAR BIDS:

Bids will be considered irregular and may be rejected if they show omissions, alterations of form, additions not called for, conditions, limitations, unauthorized alternate Bids or other irregularities of any kind.

14. BIDDING ERRORS:

If after the opening of bids, a Bidder claims an error and requests to be relieved of the Award, or the Engineer believes that an error may have been made then, the Bidder shall present his work sheets and supplier quotations to the Engineer for verification. This information shall be presented on the same day as the bid opening or if the opening is in the afternoon then on the following business day. When the Engineer has suspected an error and requires the documents, Bidder's failure to produce them within the time specified shall make the Bidder non-responsive and thereby eligible for disqualification. Award may then be made to the next lowest responsive, responsible Bidder, or the work may be re-advertised or it may be performed by City forces, as the Commission desires.

15. AWARD OF CONTRACT:

The City Commission reserves the right to reject any or all Bids, or any part of any Bid, to waive any informality in any Bid, or to re-advertise for all or any part of the work contemplated. If Bids are found to be acceptable by the City Commission, written notice of award will be given to the lowest responsive, responsible Bidder.

16. EXECUTION OF CONTRACT:

The Bidder to whom the Contract is awarded shall, within ten days of the date of award, execute and deliver three (3) copies of the following to the Engineer.

- A. The Contract
- B. Performance and Payment Bond

- C. Evidence of required Insurance
- D. Proof of authority to execute the Contract
- E. Proof of authority to execute the Bond on behalf of the Awardee
- F. List of Subcontractors, estimated Contract Value for each and proof that such subcontractors possess all required Federal, State, County and/or municipality licenses, including but not limited to certified of competency and occupational license

The above documents must be furnished, executed and delivered before the Contract will be executed by the City. The Contract shall not be binding upon the City until it has been executed by the City and a copy of such fully executed Contract is delivered to the Contractor.

17. FAILURE TO EXECUTE CONTRACT, BID GUARANTY FORFEITED:

Should the Bidder to whom the Contract has been awarded refuse or fail to complete the requirements of Article 16 above within ten (10) days after Notice of Award, the additional time in days (including weekends) required to CORRECTLY complete the documents will be deducted, in equal amount, from the Contract Time, or the City may elect to revoke the Award. In the same manner as Article 13, the Bid Guaranty of any Bidder failing to execute the awarded Contract shall be retained by the City and the Contract awarded as the Commission desires.

18. GUARANTY OF FAITHFUL PERFORMANCE AND PAYMENT:

A Performance Bond and a Payment Bond each equal to 100 percent of the total Bid will be required of the Awardee. The Bond must be written through a company licensed to do business in the State of Florida and be rated at least "A", Class X, in the latest edition of "Best's Key Rating Guide", published by A.M. Best Company. As per Florida Statute Section 255.05, the Contractor shall be required to record the payment and performance bonds in the public records of Broward County.

19. INSURANCE:

Bidder must satisfy all insurance requirements as set forth in the Supplementary and General Conditions.

The insurance policy shall not contain any exceptions that would exclude coverage for risks that can be directly or reasonably related to the scope of goods or services in this bid/proposal. A violation of this requirement at any time during the term, or any extension thereof shall be grounds for the immediate termination of any contract entered in to pursuant to this bid/proposal. In order to show that this requirement has been met, along with an insurance declaration sheet demonstrating the existence of a valid policy of insurance meeting the requirements of this bid/proposal, the successful proposer must submit a signed statement from insurance agency of record that the full policy contains no such exception.

20. QUALIFICATIONS:

At the time of submission of the bid, Bidder must possess, and be able to provide City, any and all required Federal, State, County and/or municipal licenses, including but not limited to certificates of competency and occupational licenses. Moreover, upon receipt of the Award of

the Contract, Bidder must provide proof of valid licensing for all subcontractors and/or material suppliers hired by the Contractor as set forth in Article 16 above.

When the Bidder is a Joint Venture, in order to satisfy the construction licensing requirements one member of a Joint Venture must hold a valid state certificate as well as the appropriate county and city license. The Contractor shall be held responsible for assurance that all subcontractors and/or material suppliers hired by the Contractor have the appropriate state certificate and licenses.

21. PERMITS:

The Contractor and Subcontractors must obtain Building Permits required for all work covered under this Contract as well as any other permit required by any other regulatory agency. The Master Building Permit required by the City shall be obtained by the Contractor but paid for by the City. Any and all other permits required by the City, County, State of Florida, or any other regulatory agency shall be obtained and paid for by the Contractor.

The Contractor or Subcontractors shall also be responsible to call for all inspections as required in Section 105 (Inspections) of the latest edition of the Florida Building Code.

- END OF SECTION -

SECTION 00200



NOTICE OF IMPOSITION OF CONE OF SILENCE

On 12/20/18, the City of Hollywood, Florida Department of Public Utilities issued the following:

Project No. 19-7100

REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

Project Scope: The project consists of a force main replacement and large user meter (LUM-07) site improvements project: replacement of the existing Large User Meter LUM-07, air release valve, electrical components, vaults and site, also abandonment of approximately 4,900 LF of existing FM and construction of approximately 3,800 linear feet of 16-inch PVC force main via open cut and 500 linear feet of 20-inch HDPE force main via HDD from LUM-07, located on the south side of Pembroke Rd. and S. 18th Ct., to an existing 30-inch diameter force main connection located at the intersection of S. 15th Ave. and the alley between Rodman St. and Funston St.

Pursuant to Section 30.15(F) of the Code of Ordinances, a Cone of Silence has been imposed on the items set forth above. The Cone of Silence will continue until the City awards or approves a contract, votes to reject all bids or responses, or otherwise takes action which ends the solicitation. If the City Commission refers the item back to the City Manager and staff for further review, the Cone of Silence shall remain in effect until an award is made, a contract is approved, or the City Commission takes any other action which ends the solicitation.

c: City Commission Office
City Manager
City Clerk (sunshine board)
Affected department(s)/office(s)

END OF SECTION

SECTION 00300
PROPOSAL

1

TO THE MAYOR AND COMMISSIONERS
CITY OF HOLLYWOOD, FLORIDA

SUBMITTED 12/22/2020

Dear Mayor and Commissioners:

The undersigned, as BIDDER, hereby declares that the only person or persons interested in the Proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Proposal or in the Contract to be entered into; that this Proposal is made without connection with any other person, company or parties making a Bid or Proposal; and that it is in all respects fair and in good faith without collusion or fraud.

The BIDDER further declares that he has examined the site of the Work and informed himself fully in regard to all conditions pertaining to the place where the Work is to be done; that he has examined the Drawings and Specifications for the Work and contractual documents relative thereto, including the Notice to Bidders, Instructions to Bidders, Proposal Bid Form, Form of Bid Bond, Form of Contract and Form of Performance Bond, General, Supplementary and Technical Specifications, Addenda, Drawings, and Local Preference Program, Exhibit A, and has read all of the Provisions furnished prior to the opening of bids; and that he has satisfied himself relative to the work to be performed.

The undersigned BIDDER has not divulged to, discussed or compared his bid with other bidders and has not colluded with any other BIDDER of parties to this bid whatever.

If this Proposal is accepted, the undersigned BIDDER proposes and agrees to enter into and execute the Contract with the City of Hollywood, Florida, in the form of Contract specified; of which this Proposal, Instructions to Bidders, General Specifications, Supplementary Conditions and Drawings shall be made a part for the performance of Work described therein; to furnish the necessary bond equal to one hundred (100) percent of the total Contract base bid, the said bond being in the form of a Cash Bond or Surety Bond prepared on the applicable approved bond form furnished by the CITY; to furnish all necessary materials, equipment, machinery, tools, apparatus, transportation, supervision, labor and all means necessary to construct and complete the work specified in the Proposal and Contract and called for in the Drawings and in the manner specified; to commence Work on the effective date established in the "Notice to Proceed" from the ENGINEER; and to substantially complete all Contract Work within **244 days** with final completion within **274 days**, and stated in the "Notice to Proceed" or pay liquidated damages for each calendar day in excess thereof, or such actual and consequential damages as may result therefrom, and to abide by the Local Preference Ordinance.

The BIDDER acknowledges receipt of the following addenda:

No. <u>1 (One)</u>	Dated <u>10/29/2020</u>
No. <u>2 (Two)</u>	Dated <u>11/3/2020</u>
No. <u>3 (Three)</u>	Dated <u>11/10/2020</u>
4 (Four)	12/3/2020
5 (Five)	12/7/2020
6 (Six)	12/14/2020

1

And the undersigned agrees that in case of failure on his part to execute the said Contract and the Bond within ten (10) days after being presented with the prescribed Contract forms, the check or Bid Bond accompanying his bid, and the money payable thereon, shall be paid into the funds of the City of Hollywood, Florida, otherwise, the check or Bid Bond accompanying this Proposal shall be returned to the undersigned.

Attached hereto is a certified check on the

_____ Bank of _____

or approved Bid Bond for the sum of

10% of Bid Total Dollars (\$) according to the conditions under the Instructions to Bidders and provisions therein.

NOTE: If a Bidder is a corporation, the legal name of the corporation shall be set forth below, together with signature(s) of the officer or officers authorized to sign Contracts on behalf of the corporation and corporate seal; if Bidder is a partnership, the true name of the firm shall be set forth below with the signature(s) of the partner or partners authorized to sign Contracts in behalf of the partnership; and if the Bidder is an individual, his signature shall be placed below; if a partnership, the names of the general partners.

WHEN THE BIDDER IS AN INDIVIDUAL: **N/A**

(Signature of Individual)

(Printed Name of Individual)

(Address)

WHEN THE BIDDER IS A SOLE PROPRIETORSHIP OR OPERATES UNDER A TRADE NAME: **N/A**

(Name of Firm)

(Address)

(Signature of Individual) Belseri Comerford/President (SEAL)

WHEN THE BIDDER IS A PARTNERSHIP: **N/A**

(Name of Firm) A Partnership

(Address)

By: _____
(SEAL)
(Partner)

Name and Address of all Partners:

WHEN THE BIDDER IS A JOINT VENTURE: **N/A**

(Correct Name of Corporation)

By: _____
(SEAL)
(Address)

(Official Title)

As Joint Venture
(Corporate Seal)

Organized under the laws of the State of _____, and authorized by the law to make this bid and perform all Work and furnish materials and equipment required under the Contract Documents.

WHEN THE BIDDER IS A CORPORATION:



Southern Underground Industries, Inc

(Correct Name of Corporation)

By: *[Signature]*
(SEAL) Belseri Comerford

President/Secretary
(Official Title)

1454 SW 13th Court Pompano Beach, FL 33069
(Address of Corporation)

Organized under the laws of the State of Florida, and authorized by the law to make this bid and perform all Work and furnish materials and equipment required under the Contract Documents.

CERTIFIED COPY OF RESOLUTION OF BOARD OF DIRECTORS

Southern Underground Industries, Inc
(Name of Corporation)

RESOLVED that Belseri Comerford
(Person Authorized to Sign)

President/Secretary of Southern Underground Industries, Inc
(Title) (Name of Corporation)

be authorized to sign and submit the Bid or Proposal of this corporation for the following project:

CITY OF HOLLYWOOD

**REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND
LARGE USER METER LUM-07**

The foregoing is a true and correct copy of the Resolution adopted by Southern Underground Industries, Inc at a meeting of its Board of
(Name of Corporation)

Directors held on the 22nd day of October, 2019.

By: Belseri Comerford

Title: President



The Above Resolution MUST BE COMPLETED if the Bidder is a Corporation.

- END OF SECTION -



[Department of State](#) / [Division of Corporations](#) / [Search Records](#) / [Search by Entity Name](#) /

Detail by Entity Name

Florida Profit Corporation

SOUTHERN UNDERGROUND INDUSTRIES, INC.

Filing Information

Document Number	P08000043219
FEI/EIN Number	26-2521235
Date Filed	04/29/2008
State	FL
Status	ACTIVE
Last Event	AMENDMENT
Event Date Filed	10/28/2019
Event Effective Date	NONE

Principal Address

1454 SOUTHWEST 13TH COURT
POMPANO BEACH, FL 33069

Changed: 06/30/2020

Mailing Address

1454 SOUTHWEST 13TH COURT
POMPANO BEACH, FL 33069

Changed: 06/30/2020

Registered Agent Name & Address

COMERFORD, BELSERI L
3453 NW 44TH STREET
#205
OAKLAND PARK, FL 33309

Name Changed: 06/30/2020

Address Changed: 06/19/2014

Officer/Director Detail

Name & Address

Title PTD

COMERFORD, BELSERI L

3453 NW 44TH STREET, #205
OAKLAND PARK, FL 33309

Title Executive Secretary

COMERFORD, BELSERI L
1454 SOUTHWEST 13TH COURT
POMPANO BEACH, FL 33069

Annual Reports

Report Year	Filed Date
2019	04/03/2019
2019	10/16/2019
2020	06/30/2020

Document Images

06/30/2020 -- ANNUAL REPORT	View image in PDF format
10/28/2019 -- Amendment	View image in PDF format
10/28/2019 -- Off/Dir Resignation	View image in PDF format
10/16/2019 -- AMENDED ANNUAL REPORT	View image in PDF format
04/03/2019 -- ANNUAL REPORT	View image in PDF format
03/30/2018 -- ANNUAL REPORT	View image in PDF format
01/08/2017 -- ANNUAL REPORT	View image in PDF format
03/28/2016 -- ANNUAL REPORT	View image in PDF format
01/25/2015 -- ANNUAL REPORT	View image in PDF format
07/16/2014 -- ANNUAL REPORT	View image in PDF format
06/19/2014 -- Amendment	View image in PDF format
09/27/2013 -- ANNUAL REPORT	View image in PDF format
04/30/2012 -- ANNUAL REPORT	View image in PDF format
11/04/2011 -- REINSTATEMENT	View image in PDF format
05/02/2010 -- ANNUAL REPORT	View image in PDF format
10/20/2009 -- Amendment	View image in PDF format
06/02/2009 -- ANNUAL REPORT	View image in PDF format
04/29/2008 -- Domestic Profit	View image in PDF format

SECTION 00301
CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES
ENGINEERING & CONSTRUCTION SERVICES DIVISION
PROPOSAL BID FORM

Project Name: Replacement of Hallandale Beach Force Main and Large User Meter - LUM 07
Project No.: 19-7100

If this Proposal is accepted, the undersigned Bidder agrees to complete all work under this contract within 274 calendar days following the issuance of the Notice to Proceed. All entries on this form must be typed or written in block form in Ink.

BASE BID:

<u>No.</u>	<u>Description</u>	<u>Qty.</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total</u>
1	Mobilization, Bonds and Insurance	1	LS	114,115.00	114,115.00
2	Demobilization	1	LS	8,033.00	8,033.00
3	Maintenance of Traffic (MOT)	1	LS	14,250.00	14,250.00
4	Furnish and Install 16-inch DR-18 PVC Force Main	3,740	LF	124.00	463,760.00
5	Furnish and Install 20-inch DR-11 HDPE Force Main via Horizontal Directional Drill (HDD)	560	LF	224.00	125,440.00
6 Furnish and Install Plug Valves with Boxes (Various Sizes)					
6a	10-inch Plug Valves with Boxes	2	EA	5,999.00	11,998.00
6b	16-inch Plug Valves with Boxes	5	EA	8,210.00	41,050.00
7	Furnish and Install 4" Air Release Valve Assembly In Manhole	1	EA	9,367.00	9,367.00
8	Place Out of Service (Grout) Existing Force Mains (Various Sizes)	4,900	LF	8.00	39,200.00
9	Furnish and Install 30-inch Line Stop	1	EA	42,000.00	42,000.00
10	Furnish and Install 10-inch Tee	2	EA	10,100.00	20,200.00
11	Furnish and Install 16-inch x 30-inch Reducer	1	EA	37,000.00	37,000.00
12	LUM-07 Site Improvements	1	LS	316,730.00	316,730.00
13	Water Mains and Fittings Adjustments	1	LS	56,310.00	56,310.00
14	Remove Existing 8" Water Mains	1,620	LF	10.00	16,200.00
15	Milling and Resurfacing of 1.5" of Asphalt Pavement within FDOT Roadways	302	SY	42.00	12,684.00
16	Milling & Resurfacing of 1" of Asphalt Pavement within City of Hollywood Roadways	3,204	SY	13.25	42,453.00
17	Temporary Asphalt Restoration	3,124	LF	3.56	11,121.44
18	Furnish and Install Temporary Pavement Markings	1	LS	2,258.00	2,258.00
19	Replacement of Permanent Pavement Markings	1	LS	3,100.00	3,100.00
20	Removal and Replacement of Concrete Sidewalk	326	SY	95.00	30,970.00
21	Removal and Replacement of Concrete Curb and/or Gutter	100	LF	178.23	17,823.00
22	Alley Reconstruction	2,156	SY	55.00	118,580.00
23	Owner's Contingency (allowance)	1	LS	\$250,000	\$250,000
24	Consideration for Indemnification	1	LS	\$10	\$10
25	Density Testing (allowance)	1	LS	\$50,000	\$50,000
26	FPL (allowance)	1	LS	\$50,000	\$50,000
27	Permits, Licenses and Fees (allowance)	1	LS	\$50,000	\$50,000
28	As-Builts and Record Drawings (By land surveyor approved by City or EOR)	1	LS	\$20,000	\$20,000
BASE BID TOTAL FOR COMPLETE PROJECT					1,974,852.44

TOTAL BASE BID IN WRITING
 One Million Nine Hundred Seventy Four Thousand Six Hundred Fifty Two Dollars and Forty Four Cents

NOTES:

- SUBSTANTIAL COMPLETION TIME AND PROJECT CLOSEOUT TIME FOR THE CONTRACT SHALL BE AS DEFINED IN THE PROJECT SCHEDULE IN THE SUPPLEMENTARY GENERAL CONDITIONS (SGC'S).
- QUANTITIES PROVIDED ARE FOR INFORMATION PURPOSES. FULL DESCRIPTION OF THE PAY ITEMS ARE PROVIDED IN SECTION 01025 "BASIS OF PAYMENT"

SECTION 00410

APPROVED BID BOND

(Construction)

STATE OF FLORIDA

KNOW ALL MEN BY THESE PRESENTS:

That we Southern Underground Industries, Inc., as Principal, and Harco National Insurance Company, as

Surety, are held and firmly bound unto the City of Hollywood in the sum of Ten Percent
of Bid Proposal Submitted ----- Dollars (\$ 10% -----) lawful money
of the United States, amounting to 10% of the total Bid Price, for the payment of said sum, we
bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly
by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal has submitted
the accompanying bid, dated December 15, ----- 20 20 for

REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

NOW, THEREFORE, if the principal shall not withdraw said bid within 90 days after date of the
same and shall within ten days after the prescribed forms are presented to him for signature,
enter into a written contract with the CITY, in accordance with the bid as accepted, and give
bond with good and sufficient surety or sureties, and provide the necessary Insurance
Certificates as may be required for the faithful performance and proper fulfillment of such
Contract, then this obligation shall be null and void.

Approved Bid Bond

In the event of the withdrawal of said bid within the specified period, or the failure to enter into such contract and give such bond and insurance within the specified time, the principal and the surety shall pay to the City of Hollywood the difference between the amount specified in said bid and such larger amount for which the City of Hollywood may in good faith contract with another party to perform the work and/or supply the materials covered by said bid.

IN WITNESS WHEREOF, the above bound parties have executed this statement under their several seals this _____ 15th _____ day of _____ December _____, 20__20__, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

WHEN THE PRINCIPAL IS AN INDIVIDUAL:

Signed, sealed and delivered in the presence of:

Witness

Signature of Individual

Address

Printed Name of Individual

Witness

Address

Approved Bid Bond

WHEN THE PRINCIPAL IS A CORPORATION:

Attest:

[Signature]
Secretary Belseri Comerford

Southern Underground Industries, Inc.
Name of Corporation

1454 SW 13th Court
Business Address

Pompano Beach, FL 33069



By: [Signature]
(Affix Corporate Seal)

Belseri Comerford
Printed Name

President
Official Title

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, Belseri Comerford, certify that I am the secretary of the Corporation named as Principal in the attached bond; that Belseri Comerford who signed the said bond on behalf of the Principal, was then President/Secretary of said Corporation; that I know his signature, and his signature thereto is genuine and that said bond was duly signed, sealed and attested for and on behalf of said Corporation by authority of its governing body.

[Signature] (SEAL)
Secretary



Approved Bid Bond

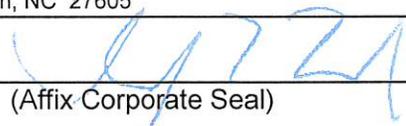
TO BE EXECUTED BY CORPORATE SURETY:

Attest: 

Secretary Gicelle Pajon

Harco National Insurance Company
Corporate Surety
P. O. Box 10800

Business Address
Raleigh, NC 27605

BY: 

(Affix Corporate Seal)

Charles J. Nielson
Attorney-in-Fact

Nielson, Hoover & Company
Name of Local Agency

8000 Governors Square Blvd., #101
Business Address

Miami Lakes, FL 33016



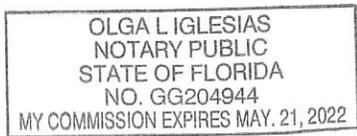
STATE OF FLORIDA

Before me, a Notary Public, duly commissioned, qualified and acting, personally appeared, _____
Charles J. Nielson to me well known, who being by me first duly sworn upon oath
says that he is the attorney-in-fact for the Harco National Insurance Company and
that the has been authorized by its President to execute the forgoing bond
on behalf of the CONTRACTOR named therein in favor of the City of Hollywood, Florida.
Subscribed and sworn to before me this 15th day of December, 2020.



Notary Public, State of Florida

My Commission Expires:



- END OF SECTION -

POWER OF ATTORNEY
HARCO NATIONAL INSURANCE COMPANY
INTERNATIONAL FIDELITY INSURANCE COMPANY

Bond # N/A

Member companies of IAT Insurance Group, Headquartered: 702 Oberlin Road, Raleigh, North Carolina 27605

KNOW ALL MEN BY THESE PRESENTS: That **HARCO NATIONAL INSURANCE COMPANY**, a corporation organized and existing under the laws of the State of Illinois, and **INTERNATIONAL FIDELITY INSURANCE COMPANY**, a corporation organized and existing under the laws of the State of New Jersey, and having their principal offices located respectively in the cities of Rolling Meadows, Illinois and Newark, New Jersey, do hereby constitute and appoint

JARRETT MERLUCCI, BRETT ROSENHAUS, CHARLES J. NIELSON, CHARLES D. NIELSON, JOSEPH P. NIELSON

Miami Lakes, FL

their true and lawful attorney(s)-in-fact to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, contracts of Indemnity and other writings obligatory in the nature thereof, which are or may be allowed, required or permitted by law, statute, rule, regulation, contract or otherwise, and the execution of such instrument(s) in pursuance of these presents, shall be as binding upon the said **HARCO NATIONAL INSURANCE COMPANY** and **INTERNATIONAL FIDELITY INSURANCE COMPANY**, as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by their regularly elected officers at their principal offices.

This Power of Attorney is executed, and may be revoked, pursuant to and by authority of the By-Laws of **HARCO NATIONAL INSURANCE COMPANY** and **INTERNATIONAL FIDELITY INSURANCE COMPANY** and is granted under and by authority of the following resolution adopted by the Board of Directors of **INTERNATIONAL FIDELITY INSURANCE COMPANY** at a meeting duly held on the 13th day of December, 2018 and by the Board of Directors of **HARCO NATIONAL INSURANCE COMPANY** at a meeting held on the 13th day of December, 2018.

"RESOLVED, that (1) the Chief Executive Officer, President, Executive Vice President, Senior Vice President, Vice President, or Secretary of the Corporation shall have the power to appoint, and to revoke the appointments of, Attorneys-in-Fact or agents with power and authority as defined or limited in their respective powers of attorney, and to execute on behalf of the Corporation and affix the Corporation's seal thereto, bonds, undertakings, recognizances, contracts of indemnity and other written obligations in the nature thereof or related thereto; and (2) any such Officers of the Corporation may appoint and revoke the appointments of joint-control custodians, agents for acceptance of process, and Attorneys-in-fact with authority to execute waivers and consents on behalf of the Corporation; and (3) the signature of any such Officer of the Corporation and the Corporation's seal may be affixed by facsimile to any power of attorney or certification given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seals when so used whether heretofore or hereafter, being hereby adopted by the Corporation as the original signature of such officer and the original seal of the Corporation, to be valid and binding upon the Corporation with the same force and effect as though manually affixed."

IN WITNESS WHEREOF, **HARCO NATIONAL INSURANCE COMPANY** and **INTERNATIONAL FIDELITY INSURANCE COMPANY** have each executed and attested these presents on this 31st day of December, 2018



STATE OF NEW JERSEY
County of Essex

Kenneth Chapman

Executive Vice President, Harco National Insurance Company
and International Fidelity Insurance Company

STATE OF ILLINOIS
County of Cook



On this 31st day of December, 2018, before me came the individual who executed the preceding instrument, to me personally known, and, being by me duly sworn, said he is the therein described and authorized officer of **HARCO NATIONAL INSURANCE COMPANY** and **INTERNATIONAL FIDELITY INSURANCE COMPANY**; that the seals affixed to said instrument are the Corporate Seals of said Companies; that the said Corporate Seals and his signature were duly affixed by order of the Boards of Directors of said Companies.



IN TESTIMONY WHEREOF, I have hereunto set my hand affixed my Official Seal, at the City of Newark, New Jersey the day and year first above written.

Shirelle A. Outley a Notary Public of New Jersey
My Commission Expires April 4, 2023

CERTIFICATION

I, the undersigned officer of **HARCO NATIONAL INSURANCE COMPANY** and **INTERNATIONAL FIDELITY INSURANCE COMPANY** do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Sections of the By-Laws of said Companies as set forth in said Power of Attorney, with the originals on file in the home office of said companies, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

IN TESTIMONY WHEREOF, I have hereunto set my hand on this day, December 15, 2020

A00143

Irene Martins, Assistant Secretary

SECTION 00420

INFORMATION REQUIRED FROM BIDDERS

GENERAL INFORMATION

The Bidder shall furnish the following information. Failure to comply with this requirement may cause its rejection. Additional sheets shall be attached as required.

1. Contractor's Name/Address: Southern Underground Industries, Inc
1454 SW 13th Court
Pompano Beach, FL 33069

2. Contractor's Telephone Number: 305-710-0470/305-216-0370
and e-mail address: Belseri1111@aol.com/Lisav@southernui.com

3. Contractor's License (attach copy): CUC1224635--CGC1511806
Primary Classification: Underground Utility Contractor
Broward County License Number (attach copy): 189-260262

4. Number of years as a Contractor in construction work of the type involved in this Contract: 12 Years

5. List the names and titles of all officers of Contractor's firm:
Belseri Comerford- President/Vice-President/Secretary

6. Name of person who inspected site or proposed work for your firm:
Name: Frank D'Alessandro
Date of Inspection: 10/30/2020

7. What is the last project of this nature you have completed?
City of Longwood- Transmission Main Project

8. Have you ever failed to complete work awarded to you; if so, where and why?

No

9. Name three (3) individuals or corporations for which you have performed work and to which you refer:

City Of Lake Worth Water Utilities Giles Rhodes (561-586-1640) grhoads@LakeWorth.org

Pinellas County Board Of Commissioners- Dale Laird, P.M. (727)464-8883 dlaird@pinellascounty.org

Pasco County Purchasing Department Ivan Martinez (813) 235-6189 imartinez@pascocountyfl.net

10. List the following information concerning all contracts on hand as of the date of submission of this proposal (in case of co-venture, list the information for all coventures).

Name of Project	City	Total Contract Value	Contracted Date of Completion	% Completion to Date
Pump Station 016 Park Blvd Force Main to South Cross Bayou Replacement	Clearwater	\$15,278,275.00		50%
Lincoln Park Water and Sewer Improvements	Arcadia	\$1,686,156.00		80%
Regional Sewer Air Release Valves	Ft. Lauderdale	\$1,619,905.00		6%
Boggy Creek-Narcoossee Road Water Main Extension	Kissimmee	\$3,874,825.00		35%

(Continue list on inset sheet, if necessary)

We currently have a project to perform similar work with The City of Tamarac- WTP Finished Water Meter

11. What equipment do you own that is available for the work?

** Please see attached equipment list**

12. What equipment will you purchase for the proposed work?

We own the equipment needed for this project but we will purchase equipment if needed.

NOTE:

If requested by CITY, the Bidder shall furnish a notarized financial statement, references and other information, sufficiently comprehensive to permit an appraisal of its current financial condition.

LIST OF SUBCONTRACTORS

The Bidder shall list below the name and address of each Subcontractor who will perform work under this Contract in excess of one-half percent of the total bid price, and shall also list the portion of the work which will be done by such Subcontractor. After the opening of Proposals, changes or substitutions will be allowed with written approval of the City of Hollywood. Subcontractors must be properly licensed and hold a valid Hollywood Certificate of Competency.

	Work to be Performed	Subcontractor's Name / Address
1.	Surveying	Apogee Services- 703 SW 24th Ave Boynton Beach, FL 33435
2.	Tapping and Line Stops	EA Tapping Services- 626 Cooper Industrial Pkwy Apopka, FL 32703
3.	Directional Drilling	Centerline Directional Drilling P.O. Box 2705 Labelle, FL 33975
4.	Fence	Tropic Fence 1864 NW 21st Street Pompano Beach FL, 33069
5.		
6.		
7.		
8.		
9.		
10.		

NOTE: Attach additional sheets if required.

- END OF SECTION -

SECTION 00435

N/A

LOCAL PREFERENCE

(EXHIBIT "A")

Pursuant to §38.50 of the City of Hollywood *Code of Ordinances*, the City shall grant a preference to local Hollywood vendors if their initial bid is within 5% of the bid of the lowest responsive responsible bidder that is a non-local Hollywood vendor. The preference shall allow the local Hollywood vendor to submit a second and final offer, which must be at least 1% less than the bid of the lowest responsive responsible non-local Hollywood vendor to be awarded. The local Hollywood vendor shall have the burden of demonstrating that it maintains a permanent place of business with full-time employees within the City limits and has done so for a minimum of one (1) year prior to the date of issuance of a bid or proposal solicitation within Hollywood, Florida. All supporting documentation (e.g. City of Hollywood valid local business tax receipt) for local preference eligibility must be received with the bid package prior to the bid opening date and time.



Similar Projects

PROJECT NAME	OWNER	CONTACT INFORMATION	CONTRACT AMOUNT	DESCRIPTION OF WORK
Transmission Main Project	City of Longwood 175 Warren Avenue Longwood, Florida 32750	Jeremy P. Jardell P.E. (321) 332-1097 jjardell@bfaenvironmental.com	\$3,722,162.40	Construction of approximately 17,270 linear feet of 16-inch wastewater force main connecting the City of Longwood's Wildmere Lift Station force main to the City of Altamonte Springs sanitary sewer system via open cut method.
Westside Water Main Expansion Loop	Broward County Board of County Commissioners 115 S Andrews Ave Fort Lauderdale, FL 33301	Luis Ramirez P.M. (954)557-2293 lramirez@broward.org	\$2,221,124.00	Installation of approximately 7,175 linear feet of 12-inch and 16-inch potable water transmission system including interconnects required for maintaining water use accessibility for the Broward County's FLL International Airport and related facilities within the airports service.
McMullen Booth Road and SR 580 Water Main Improvements	Pinellas County Board Of Commissioners 400 S. FT. Harrison Ave Clearwater, FL 33756	Dale Laird, P.M. (727)464-8883 dlaird@pinellascounty.org	\$1,255,203.00	Procure and install approximately 3,000 linear feet of 16-inch parallel water main from North of County's Valve 30JS-WV3003 to McMullen Booth Road and SR 580 intersection to the south and approximately 30-ft of 12-inch parallel water main at the intersection of McMullen Booth Road and SR 580. The pipe will be installed using open cut and horizontal direction drilling.
East Water Treatment Plant Renovations Raw Water & Concentrate Main, City of Miramar	City of Miramar Utilities Department, 13900 Pembroke Rd, Miramar, Florida, 33027	Robin E. Bain, P.E., BCEE, Assistant Director 954.883.6825, 623.217.7202, rebain@miramarfl.gov	\$2,137,169.00	This Design-Build project included the installation of seven directional drill of 14" and 18" HDPE totaling 5,000 LF and open cut installation of 5,520 LF of 10" to 24" PVC pipe for the raw water main and reject main needed to connect this WTP to the new wells drills by Wharton-Smith (Prime Contractor).
Waters Edge Residential and River Ridge Golf Course Reclaimed Water Transmission Main	Pasco County Purchasing Department 8919 Government Drive New Port Richey, FL 34654	Ivan Martinez (813) 235-6189 imartinez@pascocountyfl.net	\$2,826,605.00	Project included five directional drills of 18" HDPE (631 LF, 278 LF, 1003 LF, 1277 LF, and 302 LF) and open cut installation of 14,700 LF of 16" DIP for a critical reuse project along a busy corridor.

Simpson Road 30" Water Main Project	Tohopekaliga Water Authority 951 Martin Luther King Blvd 3rd Floor Kissimmee, FL 34741	Edwin Matos, P.E. (407)-944-5000 Ematos@tohowater.com	\$2,084,625.00	Installation of approx. 3200 LF of 30" DIP Water Main and 1300 LF of 30" Fusible PVC via HDD along an Osceola County Roadway.
Water Main Extension Connecting SR15 to SR80	Palm Beach Water Utilities Department 8100 Forest Hill Blvd. West Palm Beach, FL 33413	Joseph Tancredi, P.E. (561)- 493-6088 Jtanecredy@pbwater.com	\$687,900.00	Installation of approx. 6500 LF of a new 16" water main connecting to the existing 12" water main on State Road 15 to the 16-inch water main along State Road 80.

RESUME OF DAVID G. CACIQUE

- 2014 - PRESENT **SOUTHERN UNDERGROUND INDUSTRIES**
SUPERINTENDENT
Supervises all crews and specialty work on backflow preventors, pump stations, insertion valves, as well as all facets of pipeline construction from small to large diameter. Also brings expertise in dewatering and installation of wellpoint systems.
- 2008 -2014 **GLOBETEC CONSTRUCTION**
PIPELINE FOREMAN
Planned and supervised installation of large diameter pipelines, precast structures, wellpoints, and all facets of underground utility work. Worked on projects throughout Florida
- 2006 -2008 **DOWNRITE ENGINEERING**
PIPELINE FOREMAN
Supervise main line crew during construction of water Mains, sanitary sewers, and drainage installation, Furthermore, responsible for overseeing well-point Installation as well as cleaning structures and pipe lines.
- 2004 - 2006 **UNITED ENGINEERING CONTRACTORS**
PIPELINE SUPERINTENDANT
Managed crews installing water, sewer, and drainage improvements. Responsible to sequencing and scheduling of work to ensure maximum productivity.
- 2003 -2004 **FELIX ASSOCIATES**
PIPELINE FOREMAN
Supervise main line crew during construction of water Mains, sanitary sewers, and drainage installation,
- 2000 – 2003 **NORTHERN DIRT WORK UNDERGROUND**
TRACKHOE OPERATOR/FOREMAN
Began working as trackhoe operator installing water, sewer, and drainage pipeline and structures and transitioned into a leadership position as Foreman.
- 1997 – 2000 **MORA ENGINEERING**
LABOERER/OPERATOR
Began working as a laborer, assisting in the trenches with the installation of water, sewer, and drainage facilities and transitioned into a trackhoe operator position.

David G. Cacique - Pipe Foreman

Personal Work Experience

Project Name	Owner	Scope	Contract Amount	Time Period
Backflow & Bypass Domestic Water Project (SUI)	Jackson Memorial Hospital, FL	Installation of 4 dual backflow assemblies (8" size) around highly congested areas within hospital grounds. Included a 4" backflow protection system within a building.	\$ 354,000	2015-2015
High-Tide Mitigation Project (SUI)	Miami Beach, FL	Installation of approx. 100 Inline Tidal Control Valves throughout the City ranging in size from 8" to 48", including installation of 12 large precast structures at outfalls, a 42" Storm Water Collection System, 24" Force Main, and 16" Butterfly Valves.	\$ 1,748,315	2014-2015
South Service Area/East Service Area 36" Water Main and 20" Reclaimed Water Main	Orange County, FL	Installation of 24,500 LF of 36" WM, 14,500 LF of 20" RWM, 6" thru 16" water connection to existing distribution systems, construction of a 12 ft. wide stabilized access roadway, 410 LF of 54" Jack and bore, 2,130 FT of 36" HDD and one bridge crossing.	\$ 11,030,756	2012-2014
Dixie Wellfield Raw Water Pipeline Replacement	City of Fort Lauderdale, FL	Installation of 4,700 LF of 30" DI Raw Water Main, including isolation valves, ARV, fittings, concrete encasement, all flushing and testing, and pavement restoration.	\$ 1,906,016	2012-2012
Belcher Road 48-Inch Water Main Replacement	Pinellas County, FL	Replacement of existing 48" PCCP Water main with new 42" DIP water main (Approx. 15,000 LF)	\$ 7,759,299	2010-2012
Rolling Green Stormwater and Water Main Project	City of Boynton Beach, FL	Installation of 30,000 LF of 6" and 8" Water Main, 3,000 LF of 24" HDPE Exfiltration Trench, 35,300 LF Swale Construction, Including Tyoe C and E Inlet Structures, Pavement Milling and Resurfacing.	\$ 2,732,400	2009-2010
South Mainland Transmission Main	City of Cocoa, FL	Installation of 36,000 LF of 42" DIP Water Main, Incl. 4 Microtunnels (66" Steel - 1,000 LF) and a 42" Aerial Crossing (Steel, 700 LF)	\$ 17,399,700	2008-2009
Service Areas 4 & 6 Wastewater and Stormwater Project	City of Marathon, FL	Installation of 106,000 LF of Vacuum Sewer, 18,000 LF Force Main, 43,000 LF Storm Sewer, 1000+ sewer lateral connections, and 43 Drainage Wells	\$ 30,945,661	2007-2011

KATHERINE GRIFFITH, EI, MBA, PMP

Katgriffith74@gmail.com
Fort Lauderdale, Fl 33334
786-777-9265

SUMMARY

Project Management Professional/Program Manager with 20 years of leadership, engineering, construction and project/program management experience in civil engineering and construction management. Experience includes managing a portfolio of \$25+ million projects simultaneously including a \$15 million flow reduction program and trenchless technology projects such as CIPP and HDPE lining, pipe bursting and directional drilling as well as open cut utility installation, site development, and design of residential and commercial sites including wetland mitigation, grading, stormwater treatment systems, and water and wastewater distribution and collection systems. Strengths include development of high functioning teams, leading cross functional teams, internal and external coordination, budget control, schedule and quality management, change control, stakeholder presentations, sales development and permitting.

CUC#1225594

PMP#1910070

EXPERIENCE

Southern Underground Industries Pompano Beach, Fl

Project Manager September 2020-Present

Project Management of municipal water and sewer construction projects totaling over \$20 million utilizing open cut and trenchless installations. Developed tools to increase reporting and efficiency between the offices, field, and clients. Direct CEO report.

Earthtrades Apopka, Fl

Project Manager November 2019-September 2020

Managed a variety of site development projects for private and municipal clients including tilt wall school projects, demolition and development of sites inside existing developed properties, lift stations, residential subdivisions, and parking areas. Projects consisted of clearing, earthwork, stormwater, sanitary, water and flatwork and paving. Direct CEO report.

LMK Pipe Renewal Fort Lauderdale, Fl

Senior Program Manager September 2018-November 2019

Responsible for managing \$10+ million portfolio of civil construction projects and concurrent supervision of nine construction crews. Increased revenue 60% in less than 6 months through effective scheduling, change control, sales management, team building, and process improvements. Improved communication between in-house, remote teams, prime contractors and sub-contractors. Developed tools for high level reporting to executives and fixed communication gaps between executives, office staff and field personnel. Improved team morale through effective leadership, clear directives, measurable goals, team building and positive reinforcement. Direct CEO report.

DBE Utility Services | Loxahatchee Groves, Fl

Project Manager April 2018 – September 2018.

Project management of civil construction projects \$9+ million utilizing open cut and directional drill. Projects included contract management, permitting, specification and plan review, submittals, budget control, schedule development and control and project closeout. Stakeholder management included permitting agencies, clients, landholders, consultants, subcontractors. Led both traditional bid projects and combination design build projects.

City of Fort Lauderdale | Fort Lauderdale, Fl

Project Manager II 2014 – 2018

Management of design and construction Capital Improvement projects using Waterfall methodology. Projects coordination of City utility relocation within the Florida Department of Transportation Right-of-Way, \$25 million+ program to reduce Inflow and Infiltration in City sewer systems, repair and replace aging pressure pipe systems, concrete restoration, annual sewer repair, and replacement of piping affixed to a bridge in an environmentally sensitive area. Projects included contract management, specification writing, review of construction plans, project bidding and award, budget control and budget amendments, and management of consultants, contractors and subcontractors. Also worked in Agile team to increase functionality of in-house project management software and implementation of Oracle Unifier software.

Miami Dade Water and Sewer | Miami Fl

Engineer II 2009 – 2014

Contract position for development and implementation of the Water Supply Certification program. Led an Agile team to design a new website product to interface with existing municipal products. Served as product lead to specify design standards and provide beta testing and feedback on functionality and design of applications. Digitized project boundaries in a GIS environment, coordinated with retail and wholesale customers, processed applications, and trained new team members for adherence to established standards.

Engineering companies, various | Central Florida

Project Engineer 2002 – 2008

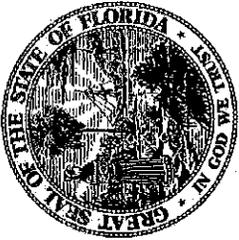
KATHERINE GRIFFITH

Managed corporate clients and planned residential, commercial, and mixed-use developments to ensure wetland mitigation, drainage, grading, and utility designs met applicable standards. Developed site layouts and hydraulic models. Performed civil design and modeling for residential and commercial sites including grading, drainage, reclaimed water, mitigation of protected species impact. Performed cost analysis to identify cost saving measures for clients.

SKILLS

- Project Management
- Program Management
- Cost Control
- Stakeholder Management
- Subcontractor Management
- Quality Control
- Schedule Control
- Hydraulic Modeling
- AutoCAD
- Microstation
- MSProject
- MS Office Suite
- GIS
- Sales Management
- Change Control
- Budget Planning, Prioritization, and Analysis
- Scheduling
- Team Development
- Leadership
- Program Management
- LACP/PACP/MACP Certified
- Process Improvement
- Agile
- Waterfall

KATHERINE GRIFFITH



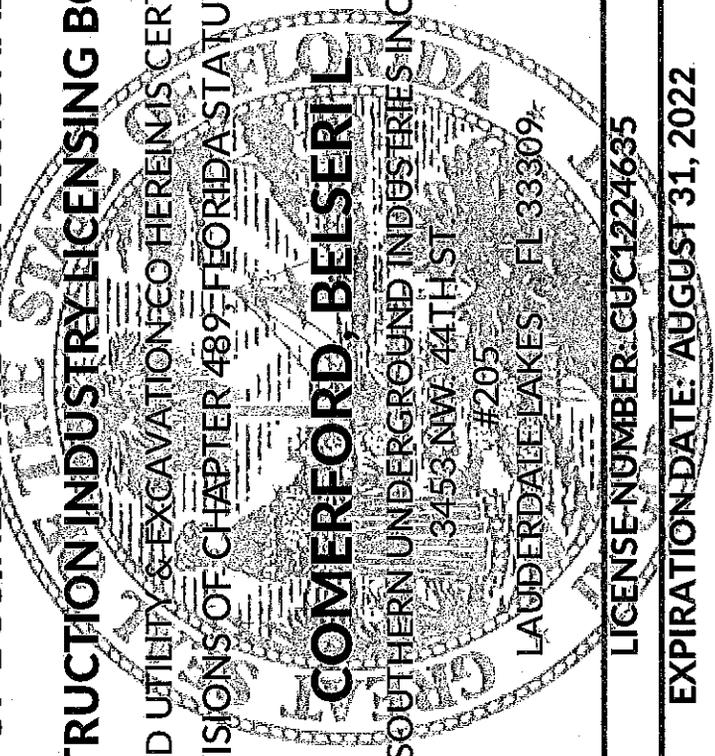
RICK SCOTT, GOVERNOR

JONATHAN ZACHEM, SECRETARY



STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION
CONSTRUCTION INDUSTRY LICENSING BOARD

THE UNDERGROUND UTILITY & EXCAVATION CO HEREIN IS CERTIFIED UNDER THE
PROVISIONS OF CHAPTER 489, FLORIDA STATUTES



LICENSE NUMBER: CUC1224635

EXPIRATION DATE: AUGUST 31, 2022

Always verify licenses online at MyFloridaLicense.com



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This is your license. It is unlawful for anyone other than the licensee to use this document.

Ron DeSantis, Governor



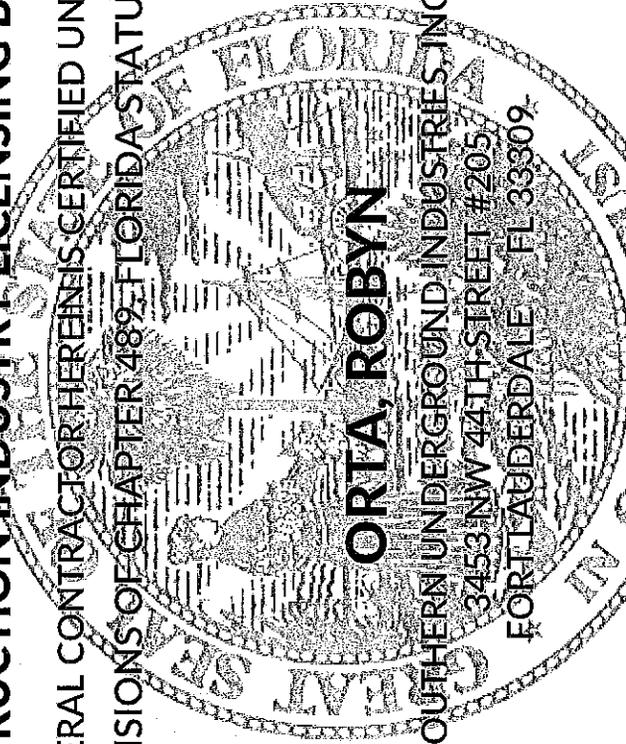
Halsey Beshears, Secretary



STATE OF FLORIDA
DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION

CONSTRUCTION INDUSTRY LICENSING BOARD

THE GENERAL CONTRACTOR HEREIN IS CERTIFIED UNDER THE
PROVISIONS OF CHAPTER 489, FLORIDA STATUTES



ORTA, ROBYN

SOUTHERN UNDERGROUND INDUSTRIES, INC.
3453 NW 44TH STREET #205
FORT LAUDERDALE, FL 33309

LICENSE NUMBER: CGC1511806

EXPIRATION DATE: AUGUST 31, 2022

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Equipment List

DESCRIPTION	MANUFACTURER	MODEL	MODEL YEAR
Backhoe Loader	John Deere	NA	2014
Skid Steer	John Deere	333E	2014
Excavator	John Deere	245G	2015
Excavator	John Deere	135G	2016
624K Wheel Loader 4WD	John Deere	624K	2016
96" x 72" Wheel Loader Forks	JRB	NA	2016
50 G Excavator	John Deere	50 G	2015
333G Skid Steer	John Deere	333G	2017
60G Mini Excavator & 24' HD Bucket	John Deere	24" Bucket 20619616	2017

Hydraulic Excavator	John Deere	135G	2018
Base Loader	John Deere	304K	2017
Wheel Loader with 96"x72" Forks	John Deere	524K-II	2018
60G Compact Excavator	John Deere	060GXFF	2018
60G Compact Excavator	John Deere	060GXFF	2018
3'11" ARM Triple SEMI	Hitachi	ZAXIS 345US	2019
344L	John Deere	344L	2019
12'4" ARM 800M PDS AUX	John Deere	345G LC	2019
4052R BROOM	John Deere	4052R	2020
72" Pick up Broom	John Deere	BP72	2018
ROPS, ISO CONTROLS STD HYD	John Deere	332G	2019
245G Excavator	John Deere	245G LC	2019
544G Wheel Loader	John Deere	544G	2018



Project Experience

PROJECT NAME	OWNER	CONTACT INFORMATION	CONTRACT AMOUNT	DESCRIPTION OF WORK
Neighborhood Road Program Year 1 - District 2 15th, 16th, 17th, & 18th Avenue North	City Of Lake Worth Water Utilities Administration 301 College Street Lake Worth, FL 33461	Giles Rhodes (561-586-1640 grhoads@LakeWorth.org	\$4,339,626.20	Construction of Roadway Potable Water and Sanitary Sewer Improvements
Transmission Main Project	City of Longwood 175 Warren Avenue Longwood, Florida 32750	Jeremy P. Jardell P.E. (321) 332-1097 jjardell@bfaenvironmental.com	\$3,722,162.40	Construction of approximately 17,270 linear feet of 16-inch wastewater force main connecting the City of Longwood's Wildmere Lift Station force main to the City of Altamonte Springs sanitary sewer system via open cut method.
Westside Water Main Expansion Loop	Broward County Board of County Commissioners 115 S Andrews Ave Fort Lauderdale, FL 33301	Luis Ramirez P.M. (954)557-2293 lramirez@broward.org	\$2,221,124.00	Installation of approximately 7,175 linear feet of 12-inch and 16-inch potable water transmission system including interconnects required for maintaining water use accessibility for the Broward County's FLL International Airport and related facilities within the airports service.
McMullen Booth Road and SR 580 Water Main Improvements	Pinellas County Board Of Commissioners 400 S. FT. Harrison Ave Clearwater, FL 33756	Dale Laird, P.M. (727)464-8883 dlaird@pinellascounty.org	\$1,255,203.00	Procure and install approximately 3,000 linear feet of 16-inch parallel water main from North of County's Valve 30JS-WV3003 to McMullen Booth Road and SR 580 intersection to the south and approximately 30-ft of 12-inch parallel water main at the intersection of McMullen Booth Road and SR 580. The pipe will be installed using open cut and horizontal direction drilling.

<p>E-3, E-4 AND G-9 WASTEWATER PUMP STATION IMPROVEMENTS</p>	<p>TOWN OF PALM BEACH 951 Okeechobee Road, Suite D, West Palm Beach, FL 33401</p>	<p>Jason Debrincat, P.E. (561 290 0956) jdebrincat@TownOfPalmBeach.com</p>	<p>\$1,190,050.00</p>	<p>Performed wastewater pump station improvements for Town of Palm Beach lift stations E-3, E-4 and G-9. Scope consisted of complete rehabilitation of the pumping sewer system including wetwells structures, valve vaults, installation of new mechanical piping, use of bypass pumps, installation of new electrical control panels and instrumentation, odor control, telemetry/RTU system, interior coating of the wetwell structures and general restoration.</p>
<p>East Water Treatment Plant Renovations Raw Water & Concentrate Main, City of Miramar</p>	<p>City of Miramar Utilities Department, 13900 Pembroke Rd, Miramar, Florida, 33027</p>	<p>Robin E. Bain, P.E., BOCEE, Assistant Director 954.883.6825, 623.217.7202, rbain@miramarfl.gov</p>	<p>\$2,137,169.00</p>	<p>This Design-Build project included the installation of seven directional drill of 14" and 18" HDPE totaling 5,000 LF and open cut installation of 5,520 LF of 10" to 24" PVC pipe for the raw water main and reject main needed to connect this WTP to the new wells drills by Wharton-Smith (Prime Contractor).</p>
<p>Upgrade of Sewage Pump No. 0843 & Installation of 8" Force main from PS 0843</p>	<p>Miami-Dade County Water & Sewer Dept 3071 SW 38th Ave, Miami, FL 33146</p>	<p>Kevin Keene, P.E. (786) 236-3503 kkeane@miamidade-psip.com</p>	<p>\$1,337,361.25</p>	<p>Upgrade of Sewage Pump & Force Main Installation</p>
<p>Upgrade of Sewage Pump Station No. 0506</p>	<p>Miami-Dade County Water & Sewer Dept 3071 SW 38th Ave, Miami, FL 33146</p>	<p>Kevin Keene, P.E. (786) 236-3503 kkeane@miamidade-psip.com</p>	<p>\$897,682.00</p>	<p>Rehabilitation of an existing sewer pump station. The lift station rehab required a 24 hour manned bypass and will require the removal and replacement of the existing 8 ft diameter wet well.</p>
<p>Upgrade of Sewage Pump Station No. 0836</p>	<p>Miami-Dade County Water & Sewer Dept 3071 SW 38th Ave, Miami, FL 33146</p>	<p>Nico Gage PM (954) 554-7149 Ngage@miamidade-psip.com</p>	<p>\$545,000.00</p>	<p>Rehabilitation of an existing sewer pump station. The lift station rehab required a 24 hour manned bypass.</p>
<p>Waters Edge Residential and River Ridge Golf Course Reclaimed Water Transmission Main</p>	<p>Pasco County Purchasing Department 8919 Government Drive New Port Richey, FL 34654</p>	<p>Ivan Martinez (813) 235-6189 imartinez@pascocountyfl.net</p>	<p>\$2,826,605.00</p>	<p>Project included five directional drills of 18" HDPE (631 LF, 278 LF, 1003 LF, 1277 LF, and 302 LF) and open cut installation of 14,700 LF of 16" DIP for a critical reuse project along a busy corridor.</p>
<p>Upgrade of Pump Station No. 0435</p>	<p>Miami-Dade County Water & Sewer Dept 3071 SW 38th Ave, Miami, FL 33146</p>	<p>Micheal Mazer PM (305) 446-7454 Mmazer@miamidade-psip.com</p>	<p>\$522,975.00</p>	<p>Rehabilitation of an existing sewer pump station. The lift station rehab required a 24 hour manned bypass and will require the removal and replacement of the existing 8 ft diameter wet well.</p>
<p>Upgrade of Sewage Pump Station 0076 & 10-inch Force Main on NW 24th Avenue</p>	<p>Miami-Dade County Water & Sewer Dept 3071 SW 38th Ave, Miami, FL 33146</p>	<p>Aaron Anderson PM (305) 446-7450 Aanderson@miamidade-psip.com</p>	<p>\$711,833.00</p>	<p>Rehabilitation of an existing sewer pump station including the installation of approx. 200 LF a new 10" DIP force main. The lift station rehab required a 24 hour manned bypass and was a dry pit/wet well configuration.</p>
<p>Simpson Road 30" Water Main Project</p>	<p>Tohopekaliga Water Authority 951 Martin Luther King Blvd 3rd Floor Kissimmee, FL 34741</p>	<p>Edwin Matos, P.E. (407)-944-5000 Ematos@tohowater.com</p>	<p>\$2,084,625.00</p>	<p>Installation of approx. 3200 LF of 30" DJP Water Main and 1300 LF of 30" Fusible PVC via HDD along an Osceola County Roadway.</p>

Water Main Extension Connecting SR15 to SR80	Palm Beach Water Utilities Department 8100 Forest Hill Blvd. West Palm Beach, FL 33413	Joseph Tancredi, P.E. (561)-493-6088 jtancredy@pbwater.com	\$687,900.00	Installation of approx. 6500 LF of a new 16" water main connecting to the existing 12" water main on State Road 15 to the 16-inch water main along State Road 80.
City-Wide High Tide Mitigation Project	City of Miami Beach Public Works Department - 1700 Convention Center Drive, Miami Beach, FL 33139	Eugene Egemba, P.E. (305)-673-7080 EugeneEgemba@miamibeachfl.gov	\$3,346,512.66	Installation of approximately 200 inline backflow prevention valves and 11 large drainage structures over the City's stormwater outfalls throughout the City also included the installation of small water mains and valves, and 400 LF of 42" RCP Drainage Piping.
Siesta Key Force Main Phase 1 and Water Main	Sarasota County Board of Commissioners 1660 Ringling Blvd. Sarasota, FL 33423	Matt Taylor, (941)-323-8624 Mataylor@sogov.net	\$4,370,000.01	Installation of approx. 10,000 LF of 20" HDPE force and water main across the Intracoastal Waterway from Siesta Key to Constitutional Blvd. and approx. 1000 LF of 20" PVC piping for connections.
Flamingo Road Reclaimed Water Main Project	City of Miramar Water Utilities Dept. 13900 Pembroke Road, Miramar, FL 33027	Stephen Glatthorn, P.E. (954) 883-5143 Sglatthorn@miramarfl.gov	\$1,260,000.00	Design-Build Project Included Installation of approx. 9,500 LF of 8-inch HDPE and PVC reclaimed water main along the Flamingo Road via Horizontal Directional Drill and via open cut.
C-14 Canal Force Main	Broward County Water & Wastewater Engineering Division 2555 W. Copans Road, Pompano Beach FL 33069	Michael Hagerly P.E. (954) 831-3217 Mhagerly@broward.org	\$1,915,200.00	Installation of approx. 3700 LF of 30-Inch DIP Force Main along the C-14 Canal Bank and 624 LF of 36" HDPE via Horizontal Directional Drill across Rock Island Road. Project also included a 30" and 20" Linestop with bypass to replace valves at the connection point.
NW 18th Street Force Main Construction	City of Margate Engineering Department 901 NW 66th Avenue, Margate, FL 33063	Kelly McAtee, P.E. (954) 972-0828 Kmcatee@margatefl.com	\$437,498.00	Installation of 2,690 LF of 8" DIP Water Main on NW 18th Street. Project also included a crossing of Rock Island Road, a directional drill across a canal, and roadway restoration in an urban environment.
Margate Design Build- 24" Force Main & 30" Force Main Canal Crossing	City of Margate Engineering Department 901 NW 66th Avenue, Margate, FL 33063	Jeanine Athias, P.E. (954) 972-0828 Jathias@margatefl.com	\$896,562.00	Design-Build Project included Installation of 216 LF of 30" DIP Water Main and 24" DIP Force Main, including 2- 30" Linestops and 2 - 24" Linestops with bypass to remove existing aerial and replace with buried pipelines.
17700 Collins Avenue- Residence Inn Marriott	17700 Collins Ave Owner, LLC 1065 Kane Concourse, Suite 201, Bay Harbor Islands, FL 33154	David Wolfe (954) 650-7437 Davidjwolfe@icloud.com	\$235,600.00	Installation of water, sewer connections for service to this development. Also installed stormwater improvements including several large well structures onsite.

<p>South Andrews Avenue & 17th Street Large Water Main Replacement Project</p>	<p>City of Ft. Lauderdale Water & Wastewater CIP 100 North Andrews Ave, Suite 500 Ft. Lauderdale, FL 33301</p>	<p>Jean Examond P. E. (561) 391- 2810 Jexamond@fortlauderdale.gov</p>	<p>\$408,869.50</p>	<p>Installation of approx. 350 LF of 20-inch DIP Water Main on NE 17th Street, just East of Andrews Ave. The project involved the installation of two 18-inch linestops to abandon the existing 20-inch main.</p>
<p>Water Main and Force Main Aerial Crossing Replacement</p>	<p>Palm Beach Water Utilities Department 8100 Forest Hill Blvd, West Palm Beach, FL 33413</p>	<p>Joseph Tancredi, P.E. (561)-493- 6088 jtancredi@pbwater.com</p>	<p>\$534,236.20</p>	<p>Project included Installation of 8-inch to 12-inch DIP water main and force main aerial crossing replacements on three bridges.</p>
<p>Roadway Improvements Various Project Areas</p>	<p>City of Miami Beach Public Works Department - 1700 Convention Center Drive, Miami Beach, FL 33139</p>	<p>Jose Rivas P.E. (305) 673-7080 JoseRivas@miamibeachfl.gov</p>	<p>\$650,253.00</p>	<p>Project Drainage Structure & Piping Installation to 24" diameter with full roadway reconstruction including curb & gutter & sidewalks.</p>

CENTERLINE DIRECTIONAL DRILLING SERVICES, INC.

COMPANY OVERVIEW



Transmission Line, FPL Project at Vero Beach, FL

Centerline Directional Drilling Services, INC
P. O. Box 2705 LaBelle, FL 33975 ~ Office: 863-674-0913 ~ Fax: 863-674-0912
License# CUC1225062
Email: cdirectionaldrilling@hotmail.com

Company Overview

Centerline Directional Drilling Services Inc. is a company dedicated to tackling challenging, large-scale underground directional drilling projects. With have a fleet of Horizontal Drill machines ranging from 2,000 to the 440,000 lbs. of pull-back, CDDS is able to drill from 2" pipe to 60" pipe in any ground conditions. While primarily working in Florida, CDDS is able to travel anywhere in the southeast and its neighboring states for projects specializing in horizontal directional drilling.

A contributing factor to CDDS success in the underground industry is its dedication to getting the job done. Not only by approaching every project prepared for any event and scenario, but through the value of taking ownership of the job from beginning to completion. While job scenarios can present varying obstacles, CDDS is able to see any job through to the end and has recorded continued success for over 8 years.

Service Capacity

Horizontal Directional Drills:

- (1) - American Anger 440T
- (1) - Vermeer 330x500
- (2) - 100x120 Vermeer
- (3) - 36x50 Vermeer
- (3) - 24x40 Vermeer
- (1) 9x13 Vermeer
- 8000 Gal Mud Technology Mud
Recycler
- 10,000 Gal Vermeer Mud System

Support Equipment:

- (6) - Vermeer Mixing tanks
- (6) - Mini-Excavators (Komatsu)
- (3) - Maxi-Excavators (Komatsu)
- (2) - Mud Reclaimers with built on Triplex
Pumps
- (2) - Stand-Alone Large to Mini Reclaimers
- (2) - Stand-Alone Triplex Mud Pumps
- (8) - 4,000 gallon Vacuum Trucks
- (10) - Flatbed trailers
- (4) - Semi-Trucks
- F5 Digitrak Locators

With its recent purchase of a Vermeer 1000x900, CDDS is know the owner of the largest drill in the state of Florida, making it truly capable of tackling any job thrown its way

CDDS currently owns more than 30 pieces of underground and support equipment along with a fully equipped shop and personal with over 15 years of experience in the underground construction industry including its own welders and mechanics. CDDS operates out of two shops with and attached office at 900 Elm St in Labelle, FL.

Licensing and Bonding

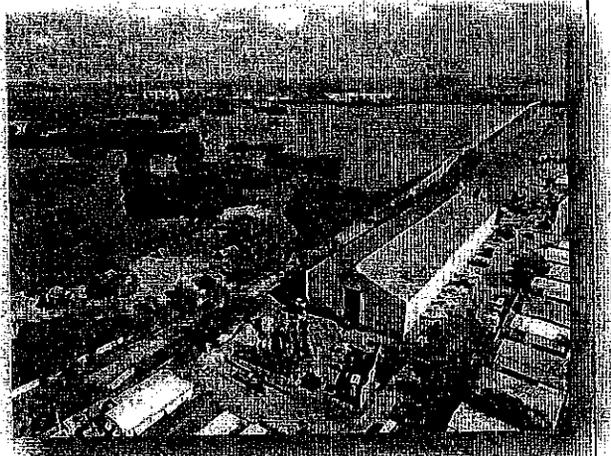
CDDS has been a licensed and registered Underground Construction company for over 8 years with the ability to bond upwards to \$10 million dollars. Provided at the end of this overview is a list of highlighted projects and scope of experience over the last 6 years

Employee Information

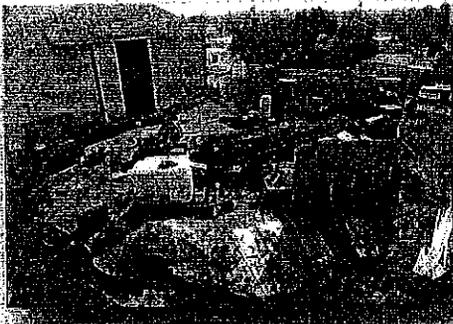
At CDDS we have 15 active field employees and 5 office personal operating out of our Case Rd and Oak St offices. These include 5 CDL driver's, 4 foremen's, 8 laborers who either locate, operate a mud-mixer/reclaimer, or help with rig operations and clean-up. Our average employee tenure is 8 years with an inflated employee turnover rate per year is 7%. CDDS believes in employing life-long personnel that exhibit respect for their work. This is the key aspect to CDDS exceptional service and job performance; quality personnel. CDDS retains a low turnover rate by offering employee benefits including Insurance, bonuses and a 401k package.

Boca Ciega Project Overview-4100 LF 24" FPVC

Drilling Operations on the Pinellas County Boca Ciega Subaqueous Crossing project in St. Pete was completed March 22, 2018. This project will deliver to the local community a new 24" force main that is 6500 LF with 4000 LF being subaqueous and will transmit sewage from one side of the bay to the other. The line will ultimately end at the County's wastewater treatment facility off 54th Ave. The body of water you see in the photo shows an overview of the Bayou crossed at a depth of 70 feet below the surface. TLC Diversified was the general contractor and Centerline Directional Drilling Services the subcontractor handling the pipe and the drill portion of this project.



This job was not without its own complications. Beginning the project on the island side near a highly trafficked marina as well as a retirement and vacation community, called for extra care on CDDS drilling



footprint and jobsite maintenance. A fully constructed wall was put around the jobsite to minimize decibel noise level and daily working restrictions on time of day meant a lot had to get done in a short amount of time. This job was successful at minimizing ground space by keeping all flow coming back to a central point helping to minimize settling under roadways



and lot by utilizing optimal drilling fluid technology, proper tooling and sit set up and proper control of penetration and flow rates. Care was also taken on minimizing environmental runoff and foot print (see picture to right of mud system).

Lastly, limited space on pulling side presented challenges as 12 mid welds had to be made making for a 36 hour total pipe pull. Care was taken on hole cleaning and stability of the formation during these static periods with a final pull back pressure not exceeding a third of the maximum pullback of the rig.

1 Section of 405' and 12 sections of 350' of pipe 24" FPVC ~ 4100 feet of pipe

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Job Highlights and Working Capacity

CCDS has a long line of experienced personnel and completed job profiles. However, some projects stand out over the rest. Below highlights not only the experience but the project scope capable.

Siesta Key 20" FM Rebab (2 Bores at 3000 LF each)



From the design phase months prior to mobilization to implementation and completion, Centerline was involved every step of the way. From inception, CCDS knew this would be a sensitive project. With more than 80% of the bores beneath the intracoastal, strict inadvertent return restrictions, settlement/vibration monitors on \$1M+ homes to small construction footprints confined to a cul de sac, CCDS not only met every challenge head on, but excelled in meeting customer and contractor expectation through proper planning and jobsite management. These are the reasons for our continued business. Our continued effort to let the work we do speak for itself is a key element in the CCDS business model.

Picture 1 shows the jobsite footprint and impact to neighborhood as minimal giving the scope and scale of this project. Large 36" Conductor casing was installed (Seen to the right of product pipe in picture 3), to help stabilize the hole and prevent inadvertent returns and potential settlement problems was a key element of the design phase of this bore and a large factor in the success of the overall project.

As seen from the pictures to the right, what made this job the most challenging was the small footprint to fit a lot of large equipment. With a 15 ft minimal easement, this made is exceptionally challenging to fit 2 bores, both with 26" conductor casing along with a mud system, power unit and 330k FLBs directional drilling rig. The job was successfully completed and both lines installed without complications even with the pipe separation shrunk from 8 ft of separation to only 2 ft.



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Preconstruction Measures

Prior to pipe installation, the crew checks the geological conditions of the area. They need to be assessed to determine the equipment and material needed. The crews walk the site to identify potential hazards, sources of interference, and special conditions. Visual inspection of site geology and soil characteristics at the entry and exit pits also provide information on local geology. They plan the bore with adequate setup area, separation from utilities and obstructions and cover. The crew members then assess what they need for down-hole equipment to be used to further verify the construction plan. Constantly double-checking and double-working allows for consistently met quality assurance.

Hazards, Obstructions and Utility Location

The installation of underground utilities using trenchless methods limits visual verification of conditions near and surrounding the installation. The crews use every means to locate and verify existing conditions. These means include contacting the local one-call service and area utilities, having a locating service locate utilities, using CDDS owned locating equipment such as ground penetrating radar (GPR) and electrical field sensing equipment to locate underground utilities and objects.

It is vital for us to make sure all lines are marked to prevent a utility hit. Prior to the installation, one of the crew members walk the bore path with the locating receiver to look for active electrical interference. When operating near existing utilities or potential hazardous conditions, they use potholing to verify the exact location of the existing utility and bore path.

In the unlikely event of a hit line, CDDS deploys it HIT action plan that all crew members are familiar with. While not required, it is also our practice to stay on-site in the event of a repair to assist, monitor and record anything involved with the damage.

Completed Installation

Once the job has been successfully installed. The jobsite is inspected to see if they followed the planned bore. This is accomplished by building an as-built that lays-out the path of the bore profile and the line installed. We check if they maintain the specified clearance from hazards and other utilities and if they stayed within the easement. Also checked is if they minimized and dealt with inadvertent drilling fluid returns and if they were able to install the product without damage at the surface or to the product itself.

In addition, we request a record from the driller, which is the bore log depth of each drill string, the drilling fluids used and any special conditions encountered in installation. This information provides a record for verification of pipe location and drilling operations.

References

References have been included on a separate page at the end of the document.

Quality Assurance

Quality Assurance plays an important role in our business. CDDS ensures that quality and standards are met by making sure the directional drilling installation is completed at the highest standards possible. These standards differ across the industry but CDDS has developed its own personal plan for success in its over 18 years of customer service to the Florida market. Included in this plan is a three step approach that outlines our commitment to quality. Also included is our methods for insuring quality is met through the use of Drilling Fluid Knowledge, Pre-Construction Planning and Installation Completion Measures

The first step of our quality assurance plan begins by making sure we have the right equipment to do the job and that everything can be laid out effectively to accomplish the goal. This is achieved through intense pre-planning and communication with the customer and assigned engineering personnel. Second, is ensuring that Safety on the jobsite is our most valuable tool. Through mandatory utilization of personal protective equipment, daily job briefings and checklist that measure and evaluate the crews' quality of work, CDDS has been able to define and improve its quality of work over its years of service. An example of this is our daily job briefings that consist of an accomplishment checklist for a specific job. This includes the location, task being performed, hazards associated with job and the method for completion. Lastly, CDDS seeks to employ the highest quality tools, industry support personnel and preconstruction planning process. This includes personnel dedicated to specific functions such as mud engineers locally sourced and dedicated personnel set to managing locate tickets and job succession measures. Through the utilization of these three steps, CDDS is able to ensure our quality and meet productivity goals.

Drilling Fluids and Minimizing Environmental Impact

CDDS utilizes high quality drilling fluid to stabilize the hole, cool the down-hole equipment, and remove the spoils from the hole. While drilling fluid stabilizes the hole, the hydrostatic impact force allows the product to be pulled-in more easily by removing cuttings and decreasing the coefficient of friction through lubrication.

It begins at the submittal phase, but the proper mix of drilling fluids is determined by the soil conditions provided from pre-site visits, through previous project history reports, or geotechnical data provided by our contractors. By employing drilling fluid delivery and recovery systems that are made up of tanks, mixing systems, pumps, and recyclers, CDDS is able to recycle fluids through a system of screens, filters, shakers, hydro-cyclone cones, etc. All of these units work together to remove spoils brought to the surface from the fluid. This allows for decreased haul offs of wet material and lessens CDDS's environmental footprint. Drilling fluid flow provides visual verification that the hole is open and that the fluids are not inadvertently escaping. The crew checks constantly that they have not lost circulation and employes pre-job verified drilling and recovery practices in the event of anything unanticipated.

Centerline Directional Drilling
Project References

Project Name	Contractor	Contact Information	Project Reference/Owner	Location	Length of Bore	Type	Product Size	Finish Date	Description
River Oaks	Garney Construction	Dan Smolik 321-221-2825	Hillsborough CO Public Utilities	River Oaks	~1600 LF ~1100 LF	PPVC	20"	May-17	PPVC line installed in road median along Lindbergh Rd; completed job in 3 weeks
C-14 Canal Force Main	Southern Underground	Janu Barreiros 854-680-4559	Broward County Public Works	North Lauderdale, FL	~800 LF	HDPE Force Main	30"	Jul-16	Successful bore completed in 1 working week
Esoto Bay Crossing	PFL	Norm Calicina 321-258-5156	PFL	Esoto Bay	2600 LF	HDPE WMA	24"	Mar-15	ICW crossing
Stacia Key PM and WMA Phase 1 ICW	Southern Underground	Janu Barreiros 954-680-4699	Sarasota County	South View Dr Stacia Key, FL	(2) ~900 LF	HDPE	20"	Mar-17	Crossings under ICW in Stacia Key, included both installation of a 20" PM and 20" WMA. Smaller 20" HD bore made this project total over 10,000 LF.
Southern BLVD WMA Rehabilitation	Felix and Associates	Ben Miller 772-220-2722	City of West Palm Beach	Southern BLVD	Bore 1 - ~1100 LF Bore 2 - ~1300 LF	HDPE	(1) 18" and (1) 2"	Oct-16	High profile bore along very highly trafficked road of West Palm Beach
Thana Verde Bridge GRBBY Rehabilitation	Metro Equipment Services INC	Jonie Pimenta 305-740-3393	City of St. Petersburg	SR 679	~1700 LF	HDPE	Bundled (3) 18" and (1) 8"	Sep-16	Bundled bore pulled together beneath sensitive ICW pipeline
Toho Water Replacement	Metro Equipment Services INC	Large Escame 305-740-3393	Toho Water Authority	Simpson Rd	~1100 LF	HDPE	30"	2016	36" casing installed and 30" was pulled through; completed successful pull and handled and fused all pipe
Westbase Reclaimed WMA Replacement	Westra Constructions Corp	Mike Beckens 941-725-1100	Hillsborough CO Public Utilities	Lindbergh Ave	Multiple bores totaling ~900 LF	HDPE	16"	Nov-17	12 bores total; longest ~1100 LF; large scale project completed within contract tolerance under challenging weather and supply conditions
TECO-Polk Power Station Rectifier Water PM 3 Replacement	Westra Constructions Corp	Mike Beckens 941-725-1100	TECO Maitson CO	Tampa, FL Cortez Rd	~1700 LF Bore 1 - ~1100 LF Bore 2 - ~2500 LF	PPVC HDPE	16" Bore 1 - 18" Bore 2 - 24"	Dec-17 Jun-18	Design build for Teco followed through entire phase of project Multiple of bores on this project totaling approximately 5000 LF
Boca Ciega BAY Subaqueous Crossings	TLC Diversified	TLC 813-830-5110	Pineelles CO Public Utilities	Pineelles Trail Tampa, FL	Bore 1 - ~650 LF Bore 2 - ~200 LF	HDPE for PM Reliab	Bore 1 24" Bore 2 24"	Mar-17	High profile bore under ICW completed with low pullback pressures not exceeding 55% of rig maximum capacity
Small Lake Rd Utility Improvement	Prince Contracting	Niel 305-753-8821	Orange County Utilities	Small Lake Rd	1400 LF	HDPE for PM	36"	Aug-16	Completed bore ahead of schedule in a difficult site location with minimal site and ROW access
NE 79th St Causeway SR 994	Metro Equipment Services INC	Daniel Gonzalez dq@metrius.com	Miami Dade Water and Sewer Dept.	NE 79th St	1100 LF	HDPE	30" HDD	Jun-15	High profile, highly trafficked crossing in a sensitive area
Lift Station R10 and Infrastructure Improvement Part C	Equadore of America	Burke Hedges 772-420-0515	Volusia County	Indigo DR and Bayliss BLVD	1300 LF	HDPE	36"	May-15	Installed beneath golf course
A-First Alumina Springs Redman Water Main	Youngs Construction	Steve Young 321-288-7492	City of Apopka	Apopka, FL	2100 LF each	HDPE	24" and 36" HDPE	Mar-15	W/O # 19-012
Fort Hamer Rd Water Main Crossing	Danelli Constructions	Rhipe Santillan 561-702-5695	Manatee County	Brentwood, FL	~9400 LF	HDPE	30" HDD	Oct. 2014	Identified site space made pulling pipe a challenge with over 10 mild trees before job completion
Waterway Estates Interconnect	Chabna Cont. of SWFLA	Mart Cabana 239-532-1665	Lee County	North R Myers, FL	~1100 LF	HDPE	30" HDD	May-12	Completed ahead of contractor schedule
Osceola Parkway Florida Temple, WMA	Andrew Stenewick, LLC	Rajni Andrew rajni@andrewstewick.com	Toho Water Authority	Keslinoe, FL	~1500 LF	PPVC	30" HDD	Jul-13	Large compound curve in bore
Victory Way Reclaimed Water System Improvements	Garney Construction	Dan Smolik 321-221-2825	Disney	Sarasota Spring FL	1800 LF	PPVC	30" HDD	Mar-14	Very successful bore completed under strict safety and construction guidelines
Victory Way Reclaimed Water System Improvements	Garney Construction	Dan Smolik 321-221-2827	Disney	Sarasota Spring FL	~1200 LF	PPVC	30" HDD	Mar-14	Very successful bore completed under strict safety and construction guidelines
Terra Verde to Ista Rd Soil Impassment Wall, WMA	Mac Driller	Chris Madrugalin chris@macdriller.com	Duke Electric	St. Petersburg, FL	~2700 LF	HDPE	24" HDD	Aug-15	Difficult soil conditions to combat with resulting pipe washed over and completed with low pulling force

Please Contact David Acevedo (Owner) for more information (888-537-1339)

Continuing Directional Drilling

Project Name	Contractor	Contact Information	Project Reference/Owner	Location	Length of Bore	Type	Product Size	Finish Date	Description
River Oaks	Ganey Construction	Dan Smolik 321-221-2626	Hillsborough CO Public Utilities	River Oaks	~1600 LF ~1100 LF	HDPE	20"	May-17	FPV/Cline installed in road median along Lineburg Rd completed job in 3 weeks
CJ4 Canal Force Main	Southern Hydro-sound	Juan Barreneche 954-550-4699 Nora Chikara 321-226-3136	Broward County Public Works	North Lauderdale, FL	~800 LF	HDPE Form Main	30"	Jul-16	Successful bore completed in 1 working week
Espero Bay Crossing	FIL		FIL	Espero Bay	2900 LF	HDPE W/M	24"	Mar-16	ICW crossing
Siesta Key FM and W/M Phase 1 ICW	Southern Underground	Juan Barreneche 954-550-4699	Sarasota County	South View Dr Siesta Key, FL	(2) ~3000 LF	HDPE	20"	Mar-17	Crossings under ICW in Siesta Key, included both installation of a 24" FM and 20" W/M. Smaller 20" HDD bores made this project total over 10,000 LF.
Southern Blvd W/M	Feld and Associates	Ben Miller 772-320-7722	City of West Palm Beach	Southern Blvd	Bore 1 - ~1100 LF Bore 2 - ~1800 LF	HDPE	(1) 16" and (1) 24"	Oct-15	High profile bore along very highly trafficked road of West Palm Beach
Tampa Verde Bridge Utility Replacement	Metro Equipment Services INC	Jorge Puentes 305-740-3903	City of St. Petersburg	SR 679	~1700 LF	HDPE	Bundle (1) 16" and (1) 8"	Sep-16	Buried bore pulled together beneath sensitive ICW jacking
Toho Water Replacement	Metro Equipment Services INC	Jorge Puentes 305-740-3903	Toho Water Authority	Simpson Rd	~1100 LF	HDPE	30"	2016	36" casing installed and 30" was pulled through completed successful pull and handoff and tied in pipe
Westchase Reclaimed W/M Replacement	Westco Constructors Corp	Mika Bautista 941-725-1100	Hillsborough CO Public Utilities	Lineburg Ave	Multiple bores totaling ~9500 LF	HDPE	16"	Nov-17	12 bores total, longest ~1100 LF; larger scale project completed within contract tolerance under challenging weather and supply conditions
TBOC Proliferation Station Reclaim Water	Westco Constructors Corp	Mika Bautista 941-725-1100	TECO	Tampa, FL	~1700 LF	FPVC	16"	Dec-17	Design build for Tecor followed through entire phase of project
FM 13 Replacement	Westco Constructors Corp	Mika Bautista 941-725-1100	Maricopa CO	Corona Rd	Bore 1 - ~1100 LF Bore 2 - ~2500 LF	HDPE	Bore 1 - 24" Bore 2 - 24"	Jun-18	Multiple 6" bores on this project totaling approximately 5000 LF
Bona Clara BAY Subaqueous Crossings	TLC/Verified	TLC 813-810-4510	Pinellas CO Utilities	Pinellas Trail Tampa, FL	Bore 1 - ~850 LF Bore 2 - ~4200 LF	HDPE for FM Rohbu	Both 24"	Mar-17	High profile bore under ICW completed with low pullback pressures not exceeding 35% of rig maximum capacity
Sand Lake Rd Utility Improvement	Prince Contracting	Niel 305-753-8621	Orange County Utilities	Sand Lake Rd	1400 LF	HDPE for FM	36"	Aug-16	Completed bore ahead of schedule in a difficult site location with minimal site
NE 79th St Caseway (for 994)	Micro Equipment Services INC	Daniel Gonzalez dgg@msinc.us	Miami Dade Water and Sewer Dept	NE 79th St	1100 LF	HDPE	30" HDD	Jun-15	High profile, highly trafficked crossing in a sensitive area
Lift Station R40 and Infrastructure Improvement Part I	Erskine of America	Burke Hedges 772-420-5515	Volusia County	Indigo Dr and Bayless Blvd	1300 LF	HDPE	36"	May-15	Installed beneath 80' course
Affix Alantone Springs Reclaim Water Main	Youngs Communication	Steve Young 321-288-7692	City of Apopka	Apopka, FL	2100 LF each	HDPE	24" and 36" HDPE	Mar-15	W/O # 13-021
Fort Hammer Rd Water Main Crossing	Daniels Constructions	Filipe Swallian 564-702-5666	Manatee County	Bradenton, FL	~3000 LF	HDPE	30" HDD	Oct. 2014	Under site space made pulling pipe a challenge with over 10 mid flues before job completion
Waterway Estates Interconnect	Cabana Const. of SWFLA	Mari Cabana 239-332-1655	Lee County	North Ft Myers, FL	~1100 LF	HDPE	30" HDD	May-12	Completed ahead of contractor schedule
Osceola Parkway, Florida Turnpike W/M	Andrew Sienewski, LLC	Rajni Andrew rajni@andrewsienewski.com	Toho Water Authority	Kissimmee, FL	~1500 LF	FPVC	30" HDD	Jul-13	Large compound curve in bore
Victory Way Reclaimed Water System Improvements	Ganey Construction	Dan Smolik 321-221-2626	Duval	Sarasota Springs, FL	1800 LF	FPVC	30" HDD	Mar-14	Very successful bore completed under strict safety and construction guidelines
Victory Way Reclaimed Water System Improvements	Ganey Construction	Dan Smolik 321-221-2627	Duval	Sarasota Springs, FL	~1200 LF	FPVC	30" HDD	Mar-14	Very successful bore completed under strict safety and construction guidelines
Thorn Verde to Isla Del Sol Interconnect Crossing	Mac Driller	Curtis Macdougall cdm7@macdriller.com	Duke Electric	St. Petersburg, FL	~2700 LF	HDPE	24" HDD	Aug-15	Difficult soil conditions to combat with resulting pipe washdown and completed with low pulling force

Please Contact Lvaro Acevedo (Owner) for more information (850-512-1353)

Lauro Acevedo

Lauro Acevedo

P.O. Box 2705, Labelle, FL 33975

PH: 863-674-0913, Fax: 863-674-0912

Cell: 863-517-1335

OBJECTIVE: Hardworking, determined and open to new challenges.

SKILLS & AREAS OF EXPERIENCE:

- Over 10 years' experience in underground drilling
- CDL Driver
- Machine Operator
 - Forklift
 - Backhoe
 - Vermeer Machines (underground directional drilling)
(440T American Augers Drill Machine)
- Foreman
- Supervisor
- Job Coordinator
- Project Manager
- Locator for underground utility tickets

COURSES & TRAINING:

- ITE Training with Sunshine State One Call of Florida
- HDPE Pipe Fusion Training
- First-aid & CPR
- Job safety Training
 - Weather
 - (PPE) Personal Protection Equipment
 - Fire
 - Driving
 - Excavation
 - & More...

REFERENCES:

	<u>NAME</u>	<u>COMPANY</u>	<u>PHONE</u>
1.	John Zorehof	Hypower, Inc.	(954) 917-1439
2.	Benny Puentes	Underground Utilities Services, Inc.	(941) 922-6706
3.	Gilberto Cruz	FP Excavation	(305) 491-6709
4.	Randall S. Bratcher	Trechless Specialties a division of Drillpro, LLC	(407) 426-9806

Jesus Beltran Aispuro

Resume

JESUS BELTRAN AISPURO
3775 HWY 29 S.
LABELLE, FL 33935

OBJECTIVE: Honest, dependable, hardworking; striving to get the job done, safely & efficiently.

SKILLS & AREAS OF EXPERIENCE:

- CDL License Class A (5+years)

- Drill Machine Operator with over 6 years' experience

COURSES & TRAINING:

- First-aid & CPR
- Job safety Training
 - Weather
 - (PPE) Personal Protection Equipment
 - Fire
 - Driving
 - Excavation
 - & More...

Jose I. Dimas

Resume

JOSE I. DIMAS
P.O. BOX 44
LABELLE, FL 33975

OBJECTIVE: Honest, dependable, hardworking; striving to get the job done, safely & efficiently.

SKILLS & AREAS OF EXPERIENCE:

- CDL License Class A

- Drill Machine Operator
& heavy equipment operator with over 10 years' experience

COURSES & TRAINING:

- First-aid & CPR
- Job safety Training
 - Weather
 - (PPE) Personal Protection Equipment
 - Fire
 - Driving
 - Excavation
 - & More...

Fidel Sanchez

Resume

FIDEL SANCHEZ
750 Case Road
LABELLE, FL 33935

OBJECTIVE: Honest, dependable, hardworking; striving to get the job done, safely & efficiently.

SKILLS & AREAS OF EXPERIENCE:

- CDL License Class A
Endorsement: N-Tank Vehicle, P-Passengers
- Locator with over 7 years' experience
- Foreman
- Equipment Operator

COURSES & TRAINING:

- Intermediate Work Zone Traffic Control (FDOT)
- First-aid & CPR
- Job safety Training
 - Weather
 - (PPE) Personal Protection Equipment
 - Fire
 - Driving
 - Excavation
 - & More...

Omar Geronimo Cortes

Resume

Omar Geronimo Cortes
6837 Santa Fe Street
Labelle, FL 33935

OBJECTIVE: Honest, dependable, hardworking; striving to get the job done, safely & efficiently.

SKILLS & AREAS OF EXPERIENCE:

- Locator
- Laborer
- Equipment Operator

COURSES & TRAINING:

- First-aid & CPR
- Job safety Training
 - Weather
 - (PPE) Personal Protection Equipment
 - Fire
 - Driving
 - Excavation
 - & More...

Alvaro Cerda

Resume

Alvaro Cerda
802 Lee Street
Immokalee, FL 34142

OBJECTIVE: Honest, dependable, hardworking; striving to get the job done, safely & efficiently.

SKILLS & AREAS OF EXPERIENCE:

- Locator
- Laborer
- Equipment Operator

COURSES & TRAINING:

- First-aid & CPR
- Job safety Training
 - Weather
 - (PPE) Personal Protection Equipment
 - Fire
 - Driving
 - Excavation
 - & More...



Directional Drilling Service, Inc.

P.O. Box 2705 Labelle, FL 33975, Tel: 863-674-0913

License#: CUC1225062

cdirectionaldrilling@hotmail.com

ATTN: JUAN BARRENECHE
SOUTHERN UNDERGROUND
TEL: 954-650-4699

Feb. 13, 2015

❖ EQUIPMENT LIST

- DD440TE AMERICAN AUGERS MACHINE
- 100X 120 VERMEER MACHINE
- 250 VERMEER MACHINE
- (6) VACUUM TRUCKS (4,000 GAL.)
- 2002 JOHN DEE BACKHOE
- KOMATSU WA 320-1 WHEEL LOADER

SECTION 00495

TRENCH SAFETY FORM

This form must be completed and signed by the Bidder.

Failure to complete this form may result in the bid being declared non-responsive.

Bidder acknowledges that the Florida Trench Safety Act, Section 553.60 et. seq., which became effective October 1, 1990, shall be in effect during the period of construction of the project. The Bidder by signing and submitting the bid is, in writing, assuring that it will perform any trench excavation in accordance with applicable trench safety standards. The Bidder further identifies the following separate item of cost of compliance with the applicable trench safety standards as well as the method of compliance:

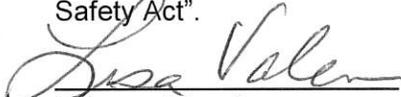
Method of Compliance

Cost

Total \$ 5,000.00

Bidder acknowledges that this cost is included in the applicable items of the Proposal and in the Grand Total Bid Price. Failure to complete the above will result in the bid being declared non-responsive.

The Bidder is, and the Owner and Engineer are not, responsible to review or assess Bidder'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 Florida Statute Section 553.60 et. seq. cited as the "Trench Safety Act". Bidder is, and the owner and Engineer are not, responsible to determine if any safety related standards apply to the project, including but not limited to, the "Trench Safety Act".



Witness Signature

Lisa Valencia

Witness Printed Name
1247 SW 87th Terrace
Plantation, FL 33069

Witness Address

12/13/2020

Date



Contractor's Signature

Belseri Comerford

Printed Name
President

Title

12/13/2020

Date

- END OF SECTION -

SECTION 00500

CONTRACT

THIS AGREEMENT, made and entered into, this ____ day of _____, A.D., _____, by and between the CITY OF HOLLYWOOD, Florida, a municipal corporation of the State of Florida, part of the first part, (hereinafter sometimes called the "CITY"), and

Southern Underground Industries, Inc.

party of the second part (hereinafter sometimes called the "CONTRACTOR").

WITNESSETH: The parties hereto, for the considerations herein- after set forth, mutually agree as follows:

Article 1. Scope of Work: The CONTRACTOR shall furnish all labor, materials, and equipment and perform all work in the manner and form provided by the Contract Documents, for:

**REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER
LUM-07
Project No. 19-7100**

Article 2. The Contract Sum: The CITY shall pay to the CONTRACTOR, for the faithful performance of the Contract, in lawful money of the United States of America, and subject to additions and deductions as provided in the Contract Documents, as follows:

Based upon the prices shown in the Proposal heretofore submitted to the CITY by the CONTRACTOR, a copy of said Proposal being a part of these Contract Documents, the aggregate amount of this Contract being the sum of **One Million Nine Hundred Seventy-Four Thousand Six Hundred Fifty-Two Dollars and 44/100 (\$1,974,652.44).**

Article 3. Partial and Final Payments: In accordance with the provisions fully set forth in the "General Conditions" of the "Specifications", and subject to additions and deductions as provided, the CITY shall pay the CONTRACTOR as follows:

- (a) On the 15th day, or the first business day thereafter, of each calendar month, the CITY shall make partial payments to the CONTRACTOR on the basis of a duly certified and approved estimate of work performed during the preceding calendar month by the CONTRACTOR, less ten percent (10%) of the amount of such estimate which is to be retained by the CITY until all work has been performed strictly in accordance with this Agreement and until such work has been accepted by the CITY; provided, however, that after 50 percent (50%) completion of the work covered by this Agreement, (i) the amount retained from each subsequent progress payment shall be reduced to 5 percent (5%) and (ii) upon presentation by the CONTRACTOR of a payment request for up to one-half of the retainage held by the CITY, the CITY shall promptly make

payment to the CONTRACTOR. The parties' rights and obligations regarding retainage are further specified in Florida Statute Section 218.735.

- (b) Upon submission by the CONTRACTOR of evidence satisfactory to the CITY that all payrolls, material bills and other costs incurred by the CONTRACTOR in connection with the construction of the WORK have been paid in full, and also, after all guarantees that may be required in the Specifications have been furnished and are found acceptable by the CITY, final payment on account of this Agreement shall be made within sixty (60) days after completion by the CONTRACTOR of all work covered by this Agreement and acceptance of such work by the ENGINEER and approved by the CITY.

Article 4. Time of Completion: The CONTRACTOR shall commence work to be performed under this Contract within ten (10) consecutive calendar days after date of written Notice To Proceed and shall fully complete the Contract in accordance within the Contract Documents and meet all intermediate milestone completion dates required after said date of written notice as set forth in the Proposal, as may be modified by Instructions to Bidders, and stated in the Notice to Proceed.

It is mutually agreed between the parties hereto, that time is the essence, and in the event that construction of the WORK is not completed within the Contract Time and per intermediate dates, as may have been modified solely in accordance with the General Conditions of this Contract, that from the compensation otherwise to be paid to the CONTRACTOR, the CITY is authorized and shall retain, for each day thereafter, Sundays and holidays included, the sum set forth in the Supplementary General Conditions of this Contract as liquidated damages sustained by the CITY in the event of such default by the CONTRACTOR, or shall withhold such compensation for actual and consequential damages as may be stated therein or contemplated therefrom.

Article 5. Additional Bond: It is further mutually agreed between the parties hereto, that if, at any time after the execution of this Agreement and the Payment and Performance Bonds required herein for the express purpose of assuring the faithful performance of the Contractor's work hereto attached, the CITY shall deem the surety or sureties' to be unsatisfactory, or, if for any reason, said bonds cease to be adequate to cover the performance of the work, the CONTRACTOR shall, at his expense, within five (5) days after receipt of notice from the CITY furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the CITY. In such event, no further payment to the CONTRACTOR shall be deemed to be due under this agreement until such new or additional security for the faithful performance of the work shall be furnished in manner and form satisfactory to the CITY.

Article 6. Contract Documents: All of the documents hereinafter listed form the Contract and they are as fully a part of the Contract as if hereto attached, or repeated in this Agreement:

- | | |
|--------------------------------------|--------------------------------------|
| 1. Notice to Bidders | 9. Contract |
| 2. Instruction to Bidders | 10. Performance Bond |
| 3. Proposal | 11. Payment Bond |
| 4. Proposal Bid Form | 12. General Conditions |
| 5. Bid Bond | 13. Supplementary General Conditions |
| 6. Information Required from Bidders | 14. Addenda |

- | | |
|-----------------------------------|--------------------|
| 7. Local Preference (Exhibit "A") | 15. Specifications |
| 8. Trench Safety Form | 16. Drawings |

Article 7. The rate of wages and fringe benefits, or cash equivalent, for all laborers, mechanics and apprentices employed by any contractor or subcontractor on the work covered by the contract shall be not less than the prevailing rate of wages and fringe benefit payments or cash equivalent for similar skills or classifications of work as established by the General Wage Decision by the United States Department of Labor for Broward County, Florida that is in effect prior to the date the city issues its invitation for bids. If the General Wage Decision fails to provide for a fringe benefit rate for any worker classification, then the fringe benefit rate applicable to the worker classification shall be the fringe benefit rate applicable to the worker classification with a fringe benefit rate that has a basic hourly wage closest in dollar amount to the worker classification for which no fringe benefit rate has been provided.

Article 8. No additional work or extras shall be performed unless the same be duly authorized by appropriate action of the City.

Article 9. That in the event either party brings suit for enforcement of disagreement, the prevailing party shall be entitled to attorney's fees and court costs in addition to any other remedy afforded by law.

Article 10. The Contractor shall guarantee the complete project against poor workmanship and faulty materials for a period of twelve (12) months after final payment and shall immediately correct any defects which may appear during this period upon notification by the City or the Engineer.

Article 11. The making and acceptance of the final payment shall constitute a waiver of all claims by the Contractor, except those previously made and still unsettled.

IN WITNESS WHEREOF the parties hereto have executed this Agreement on the day and date first above written in three (3) counterparts, each of which shall, without proof or accounting for the other counterparts, be deemed an original contract:

THE CITY OF HOLLYWOOD, FLORIDA
Party of the First Part

By: _____ (SEAL)
JOSH LEVY, MAYOR

ATTEST:

PATRICIA A. CERNY, MMC
City Clerk

WHEN THE CONTRACTOR IS A CORPORATION:

Attest:

Secretary

(Correct Name of Corporation)

BY: _____ (SEAL)
President

APPROVED AS TO FORM
AND LEGAL SUFFICIENCY
for the use and reliance of the
City of Hollywood, Florida only:

APPROVED AS TO FINANCE:

By _____
DOUGLAS R. GONZALES
City Attorney

By _____
MELISSA CRUZ
Financial Services Department Director

CERTIFICATE

**STATE OF FLORIDA)
COUNTY OF BROWARD)**

I HEREBY CERTIFY that a meeting of the Board of Directors of _____,
a corporation under the laws of the State of _____, was held on _____,
20__, and the following resolution was duly passed and adopted:

"RESOLVED, that _____ as _____ President of the corporation,
be and he is hereby authorized to execute the contracts on behalf of this
corporation, and that his execution thereof, attested by the Secretary of
the corporation and with corporate seal affixed, shall be the official act and
deed of this corporation."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of
the corporation, this _____ day of _____, 20__.

Secretary

- END OF SECTION -

SECTION 00610

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS:

That we _____,

Name

Address

Tel. No.

as Principal, and _____

Name

Address

Tel. No.

as Surety, are held and firmly bound unto the City of Hollywood in the sum of _____ Dollars (\$_____),

for the payment of said sum we bind ourselves, our heirs, executors, administrators and assigns, jointly and severally, for the faithful performance of a certain written contract, dated the _____ day of _____,

20____ entered into between the Principal and the City of Hollywood, Florida, for the

REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07, Project No. 19-7100.

A copy of said Contract, No. 19-7100, is incorporated herein by reference and is made a part hereof as if fully copied herein.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH, that if the Principal shall in all respects comply with the terms and conditions of said Contract and his obligations thereunder, including all of the Contract Documents (that include the Notice to Bidders, Instructions to Bidders, Proposal, Proposal Bid Form, Basis of Payment, Approved Bid Bond, Trench Safety Form, Information Required from Bidders, Contract, Performance Bond, Payment Bond, General and Supplementary General Conditions, Technical Specifications, Addenda and Drawings), therein referred to and made a part thereof, and such alterations as may be made in said Drawings and Specifications as therein provided for, and shall indemnify and save harmless the City of Hollywood against and from all expenses, damages, injury or conduct, want of care of skill, negligence or default, including patent infringement on the part of said Principal, his agents or employees, in the execution or performance of said Contract, including errors in the Drawings furnished by said Principal, and further, if the Principal shall promptly make payments to all who supply him, with labor and/or materials, used directly or indirectly by the Principal in the prosecution of the work provided for in said Contract, then this obligation shall be null and void; otherwise, the Principal and Surety, jointly and severally, agree to pay the City of Hollywood any difference between the sum that the City of Hollywood may be obliged to pay for the completion of said work, by Contract or otherwise, and the sum that the City of Hollywood would have been obliged to pay for the completion said work had the Principal properly executed all of the provisions of said Contract, and any damages, whether direct, indirect, or consequential, which the City of Hollywood may incur as a result of the failure of the said Principal to properly execute all of the provisions of said Contract.

AND, the said Principal and Surety hereby further bind themselves, their successors, executors, administrators and assigns, jointly and severally, that they will amply and fully protect the City of Hollywood against, and will pay any and all amounts, damages, costs

and judgments which may be recovered against or which the Owner may be called upon to pay to any person or corporation by reason of any damage arising from the performance of the said work, repair or maintenance thereof, or the manner of doing the same, or his agents or his servants, or the infringements of any patent rights by reason of the use of any material furnished or work done, as aforesaid or otherwise.

AND, the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications and Drawings accompanying the same, shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications and Drawings.

WHEN THE PRINCIPAL IS AN INDIVIDUAL:

Signed, sealed and delivered in the presence of:

(Witness)

(Signature of Individual)

(Address)

(Printed Name of Individual)

(Witness)

(Address)

WHEN THE PRINCIPAL IS A SOLE PROPRIETORSHIP OR OPERATES UNDER A TRADE NAME:

Signed, sealed and delivered in the presence of:

(Witness)

(Name of Firm)

(Address)

By: _____
(Seal)
(Signature of Individual)

(Witness)

Address

WHEN THE PRINCIPAL IS A PARTNERSHIP:

Signed, sealed and delivered in the presence of:

(Witness)

(Name of Partnership)

(Address)

By: _____
(Seal)
(Partner)

(Witness)

(Printed Name of Partner)

Address

WHEN THE PRINCIPAL IS A CORPORATION:

Attest:

(Secretary)

(Name of Corporation)

By: _____
(Seal)
(Affix Corporate Seal)

(Printed Name)

(Official Title)

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the corporation named as Principal in the within bond; that _____, who signed the said bond on behalf of the Principal was then _____ of said corporation; that I know his signature, and his signature thereto is genuine; and that said Bond was duly signed, sealed and attested for and on behalf of said corporation by authority of its governing body.

Secretary (SEAL)

TO BE EXECUTED BY CORPORATE SURETY

Attest:

(Secretary)

(Corporate Surety)

(Business Address)

By: _____
(Affix Corporate Seal)

(Attorney-In-Fact)

(Name of Local Agency)

(Business Address)

STATE OF FLORIDA

Before me, a Notary Public, duly commissioned, qualified and acting, personally appeared, _____ to me well known, who being by me first duly sworn upon oath, says that he is the attorney-in-fact for the _____ and that he has been authorized by _____ to execute the foregoing bond on behalf of the CONTRACTOR named therein in favor of the City of Hollywood, Florida.

Subscribed and sworn to before me this _____ day of _____, 20____.

Notary Public, State of Florida
My Commission Expires:

APPROVED AS TO FORM AND
LEGAL SUFFICIENCY
for the use and reliance of the
City of Hollywood, Florida only:

APPROVED AS TO FINANCE:

By _____
Douglas R. Gonzales
City Attorney

By _____
Melissa Cruz
Financial Services Department Director

- END OF SECTION -

SECTION 00620

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, _____
Name Address Tel. No.

As Principal and _____
Name Address Tel. No.

as Surety, are held and firmly bound to the CITY OF HOLLYWOOD, FLORIDA herein called the City, in the sum of _____

_____ Dollars (\$ _____) for the payment of said sum we bind ourselves, our heirs, executors, administrators and assigns, jointly and severally, for the faithful performance of a certain written contract dated the _____ day of _____, 20____, entered into between the Principal and the City of Hollywood, Florida for the **REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07, Project No. 19-7100**

Which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

THE CONDITION of this bond is that if Principal promptly makes payments to all claimants defined in Section 255.05 (1), F.S., supplying Principal with labor, materials or supplies used directly or indirectly by principal in the prosecution of the work provided for in the Contract, then this bond shall be null and void and of no further force and effect; otherwise to remain in full force and effect.

Said surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or any other changes in or under contract documents and compliance or noncompliance with any formalities connected with the contract does not affect Surety's obligation under this bond and Surety waives notice of any such change, extension of time, alteration or addition to the terms of the Contract or any other changes, compliance, or noncompliance to the terms of the Contract or to the Work or to the Specifications.

This bond is furnished pursuant to the statutory requirements for bond on public works projects being Florida Statute 255.05. Claimants are hereby notified that the Statute 255.05(2) specifically requires that notice be given to Contractor within 45 days after beginning to furnish labor, materials or supplies for the prosecution of the work that claimants intends to look to the bond for protection. Further notice is hereby given claimants that written notice of nonpayment within ninety (90) days after performance of the labor or after complete delivery of the materials or supplies must be delivered to the Contractor and to the Surety. Further notice is hereby given that no action for labor, materials or supplies may be instituted against the Contractor or the Surety on the bond after one year for the performance of the labor or completion of delivery of the materials or supplies.

Without modifying the foregoing, this bond shall be construed as requiring of the principal and surety no more and no less than is specified in F.S. 255.050.

SIGNED AND SEALED, this _____ day of _____, 20____.

PRINCIPAL:

ATTEST:

(Signature)

(Title)

(SEAL)

SURETY:

(Surety)

ATTEST:

(Signature)

(Attorney-in-Fact)

APPROVED AS TO FORM AND
LEGAL SUFFICIENCY
for the use and reliance of the
City of Hollywood, Florida only:

APPROVED AS TO FINANCE:

By _____
Douglas R. Gonzales
City Attorney

By _____
Melissa Cruz
Financial Services Department Director

- END OF SECTION -

SECTION 00700
GENERAL CONDITIONS

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SECTION 00700

GENERAL CONDITIONS

CITY OF HOLLYWOOD, FLORIDA GENERAL CONDITIONS FOR CONSTRUCTION CONTRACTS

ARTICLE 1 - DEFINITIONS

In the interpretation of these Contract Documents the following terms shall have the meaning indicated:

ADDENDA - Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the Contract Documents.

CHANGE ORDER - A written order to CONTRACTOR executed in accordance with City procurement procedures, as amended authorizing an addition, deletion or revision in the work, or an adjustment in the Contract Price or the Contract Time, issued after the date of Award.

CITY (OWNER) - The City of Hollywood, Florida.

COMMERCIALLY USEFUL FUNCTION - shall exist when the Local MBE/SBE is responsible for execution of the work for the contract and is carrying out the responsibilities by actually performing, managing and supervising the work involved. The Local MBE/SBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, and ordering the material, and installing. A commercially useful function is not performed if the role of the qualified Local MBE/SBE is that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of qualified local MBE or qualified local SBE participation.

COMMISSION - The City Commission of the City of Hollywood, Florida, being the legislative body of the CITY as set forth in the City of Hollywood Charter.

CONTRACT - The written agreement between the CITY and the CONTRACTOR covering the work to be performed in accordance with the other Contract Documents which are attached to the Contract and made a part thereof.

CONTRACTOR - The person, firm, or corporation with whom the CITY has entered into the Contract.

CONTRACT DOCUMENTS - The Notice to Bidders, Instruction to Bidders, Proposal, Information Required of Bidders, all Bonds, Agreement, and all supporting documents, these General Requirements and Covenants, the Specifications, Drawings and Permits, together with all Addenda and Change Orders issued with respect thereto.

CONTRACT PRICE - Total monies payable by the CITY to the CONTRACTOR under the terms and conditions of the Contract Documents.

CONTRACT TIME - The number of days agreed to in the Proposal, commencing with the date of the Notice to Proceed for completion of the work.

CONTROL - shall mean having the primary power, direct or indirect, to influence the management of a business enterprise. The controlling party must have the demonstrable ability to make independent and

unilateral business decisions on a day-to-day basis, as well as the independent and unilateral ability to make decisions which may influence and chart the future course of the business.

DATE OF SUBSTANTIAL COMPLETION - The date when the work on the project, or specified part thereof, is substantially completed in accordance with the Contract Documents, such that the CITY can occupy or utilize the project or specified part thereof for the use and purpose for which it was intended as determined and accepted by the Engineer.

DAYS - Calendar days of 24 hours measured from midnight.

DRAWINGS - The drawings which show the character and scope of the work to be performed and which have been prepared by the DESIGN ENGINEER approved by ENGINEER and are referred to in and are a part of the Contract Documents.

ENGINEER - The Director of Utilities of the CITY of Hollywood, Florida, or his authorized designee.

EXCUSABLE DELAY - Delay caused by the CITY, hurricane, tornadoes, fires, floods, epidemics or labor strikes.

GENERAL CONDITIONS - That segment of the Contract Specifications incorporating the Provisions common to all CITY Construction Contracts.

INEXCUSABLE DELAY - Any delay caused either (i) by events or circumstances within the control of the CONTRACTOR not specified in the definition of excusable delay.

INSPECTOR - The authorized field representative of the ENGINEER.

LIQUIDATED DAMAGES - The amount prescribed in the General Requirements to be paid the CITY, or to be deducted from any payments due the CONTRACTOR for each day's delay in completing the whole or any specified portion of the work beyond the Contract Time.

LOCAL BUSINESS – shall mean a business which is duly licensed and authorized to engage in the business at issue and which maintains a permanent principal place of operation with full time personnel within the corporate limits of the City of Hollywood, Florida. A Post Office Box(P.O. Box) shall not be sufficient to constitute a “local business.” The business has the burden of demonstrating that it meets this definition.

MINORITY – shall mean a person who is a citizen or lawful permanent resident of the United States and who is a Woman, Black American, Hispanic American, Native American, Asian Pacific American, Subcontinent Asian American or other minorities found to be disadvantaged by the SBA.

NOTICE OF AWARD - The written notice by the CITY to the successful Bidder stating that upon his execution of the Agreement and other requirements as listed therein within the time specified the CITY will sign and deliver the Agreement.

MINORITY BUSINESS ENTERPRISE – shall mean a currently functioning business enterprise which (a) is an independent for profit business concern that is a least 51% owned by minority group member(s); (b) is independently operated and controlled by the minority group member(s); (c) demonstrates the capability to perform a line of business; (d) provides a commercially useful function according to the customs and practices of the industry and (e) is qualified by the City of Hollywood, Florida.

NOTICE TO PROCEED - A written notice by the ENGINEER to the CONTRACTOR fixing the date on which the Contract Time will commence to run and on which the CONTRACTOR shall start to perform his obligation under the Contract Documents.

"OR EQUAL" - Equivalent or superior in construction, efficiency and effectiveness to a type, brand, model or process called out in the Contract Documents to establish a basis of quality as determined by the ENGINEER.

SHOP DRAWINGS - All certified affidavits, drawings, diagrams, illustrations, schedules and other data which are specifically prepared by CONTRACTOR, a Subcontractor, manufacturer, fabricator, supplier or distributor to illustrate some portion of the work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a manufacturer, fabricator, supplier or distributor and submitted by CONTRACTOR to illustrate material or equipment for some portion of the WORK.

SMALL BUSINESS ENTERPRISE – shall mean a currently functioning business enterprise which (a) is an independent for profit concern that is at least 51% owned by non-minority group member(s); (b) is independently operated and controlled by the non-minority group member(s); (c) demonstrates the capability to perform in a line of business; (d) provides a commercially useful function according to the customs and practices of the industry; and (e) is qualified by the City of Hollywood, Florida.

NOTE: In the event 50% of the local business is owned by a minority group member and 50% of the local business is owned by a non-minority group member, the designation selected on the Local Minority Business Enterprise and Local Small Business Enterprise Program application will be accepted.

SMALL BUSINESS NET WORTH SIZE STANDARD – The size standard for a minority business enterprise and a small business enterprise that participates in the City of Hollywood's Local MBE/SBE Program shall mean an independently owned and operated business concern that employs 50 or fewer permanent full-time employees and whose annual net worth does not exceed \$2,000,000. To determine the net worth, the City shall consider the most recent annual financial statement for the business or; in the case of sole proprietorships, annual financial statements for the business and the business owner. The applicant must provide documentation to demonstrate that the business employs 50 or fewer permanent full-time employees averaged over a two year period.

SPECIFICATIONS - Division 1 through 17 of these Contract Documents, consisting of administrative details and written technical descriptions of materials, equipment, standards and workmanship.

SUPPLEMENTARY CONDITIONS - Division 1 of the Contract Specifications incorporating the provisions peculiar to a specific project.

SUBCONTRACTOR - An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the work

SURETY - The person, firm or corporation responsible for the Bidder's acts in the execution of the Contract, or which is bound to the CITY with and for the CONTRACTOR to insure performance of the Contract and payment of all obligations pertaining to the work.

WORK - All the work materials or products specified, indicated, shown or contemplated in the Contract Documents to construct and complete the improvement, including all alterations, modifications, amendments or extension thereto made by Change Orders.

ARTICLE 2 - ORGANIZATIONAL ABBREVIATIONS

Abbreviations of organizations which may be used in these Specifications are:

AASHTO: American Association of State Highway and Transportation Officials

ACI: American Concrete Institute

AIA: American Institute of Architects

AISC: American Institute of Steel Construction

AITC: American Institute of Timber Construction

ANSI: American National Standards Institute

APWA: American Public Works Association

ASTM: American Society for Testing and Materials

ASCE: American Society of Civil Engineers

ASME: American Society of Mechanical Engineers

ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

AWPA: American Wood Preservers Association

AWWA: American Water Works Association

AWS: American Welding Society

BCEQCB: Broward County Environmental Quality Control Board

CRSI: Concrete Reinforcing Steel Institute

FDEP: Florida Department of Environmental Protection

FDNR: Florida Department of Natural Resources

FDOT: Florida Department of Transportation

FPL: Florida Power and Light

IEEE: Institute of Electrical and Electronic Engineers

NACE: National Association of Corrosion Engineers

NCPI: National Clay Pipe Institute

NEC: National Electrical Code

NEMA: National Electrical Manufacturers Association
NFPA: National Fire Protection Association
OSHA: Occupational Safety and Health Act
PCI: Prestressed Concrete Institute
SFBC: South Florida Building Code, Broward Edition, Latest Revision
SFWMD: South Florida Water Management District
SSPC: Structural Steel Painting Council
UL: Underwriters' Laboratories, Inc.
UNCLE: Utility Notification Center for Location before Excavation (1-800-432-4770)
USEPA: United States Environmental Protection Agency
USGS: United States Geological Survey
WWEMA: Water and Wastewater Equipment Manufacturers Association

ARTICLE 3 - MISCELLANEOUS PRELIMINARY MATTERS

3.1 Contract Document Discrepancies:

Any discrepancies, conflicts, errors or omissions found in the Contract Documents shall be promptly reported to the ENGINEER who will issue a correction, if necessary, in writing. The CONTRACTOR shall comply with any corrective measures regarding the same as prescribed by the ENGINEER.

3.2 Submissions:

Unless indicated otherwise in the Contract Documents, within seven days subsequent to the CONTRACTOR executing and submitting the required documents of Article 15 in the Instructions to Bidders, the CONTRACTOR shall submit to the ENGINEER an estimated progress schedule indicating the starting and completion days of the various stages of the work. A preliminary Schedule of Values and a preliminary schedule of Shop Drawing submissions may also be required by Section 01340 of Division 1 - General Requirements.

3.3 Pre-construction Conference:

The Contractor will be required to attend a mandatory Pre- Construction Conference for review of the above schedules, establishing procedures and establishing a working understanding among the parties as to the work.

3.4 Contract Time:

The Contract Time will commence on the date of the Notice to Proceed and shall exist for the total number of days as specified in the Proposal Bid Form as modified by any subsequent Change Orders, Unless the CONTRACTOR fails to complete the requirements of the Instructions to Bidders, the additional time in days (including weekends) required to correctly complete the documents will be deducted by CITY from the Contract Time specified by the CONTRACTOR in this Proposal.

3.5 Computation of Time:

When any period of time is referred to the Contract Documents by days, it shall be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a legal holiday, such day shall be omitted from the computation.

3.6 Commencement of Work:

The CONTRACTOR shall not perform work at the site prior to the date of the Notice to Proceed.

3.7 Extension of Contract Time:

Extensions of time shall be based solely upon the effect of delays to the work as a whole. Extensions of time shall not be granted for delays to the work, unless the CONTRACTOR can clearly demonstrate, through schedule analysis, that the delay to the work as a whole arose in accordance with Article 11, Changes in Contract Time and that such delays did or will, in fact, delay the progress of work as a whole. Time extensions shall not be allowed for delays to parts of the work that are not on the critical path of the Project schedule. Time extensions shall not be

granted until all float or contingency time, at the time of the delay, available to absorb specific delays and associated impacts, is used.

3.8 Notice and Service Thereof:

All notices, demands, requests, instructions, approvals and claims shall be in writing. Notices, demands, etc. shall be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the business address as defined at the Pre-Construction Conference.

3.9 Separate Contract:

The CITY reserves the right to let other Contracts in connection with this Project. The CONTRACTOR shall afford other Contractors reasonable opportunity for the introduction and storage for their materials and the execution of their work and shall properly connect and coordinate his work with theirs.

3.10 Assignments of Contract:

No assignment by the CONTRACTOR of the Contract or of any part thereof, or any monies due or to become due thereunder shall be made.

3.11 Patents:

It is mutually understood and agreed that without exception, Contract prices are to include all royalties and costs arising from patents, trademarks, and copyrights in any way involved in the work. It is the intent that whenever the Contractor is required or desired to use any design, device, material or process covered by letters, patent, or copyright, the right for such use shall be provided for by suitable legal agreements with the Patentee or Owner and a copy of this agreement shall be filed with the ENGINEER. However, whether or not such an agreement is made or filed as noted, the CONTRACTOR and the Surety in all cases shall indemnify and save harmless the CITY from any and all claims for infringement by reason of the use of any such patented design, device, material or process, to be performed under the Contract, and shall indemnify the said CITY from any costs, expenses, and damages which it may be obliged to pay, by reason of such infringement, at any time during the prosecution or after the completion of the work.

3.12 Federal Excise Tax:

The forms needed for applying for exemption certificates for materials and equipment, normally subject to the Federal Excise Tax, may be obtained from the Director of Internal Revenue, Jacksonville, Florida.

The CONTRACTOR is solely responsible for obtaining the desired exemption certificate from the Federal Government.

3.13 Savings Due to Excise Tax Exemptions:

The Bidder shall include in the Bid price the estimated cost of all goods, supplies and equipment which will be incorporated in the Work and the taxes that the Bidder would be required to pay if the Bidder were to purchase such goods, supplies or equipment. By subsequent Change Order(s), the parties shall reduce the Bid price to reflect any goods, supplies and equipment purchased directly by City and the resulting tax savings due to City's exemption from Excise Taxes.

CONTRACTOR shall pay all sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with the laws and regulations of the State of Florida and its political subdivisions. Consistent with the tax exemption for municipalities provided by state law, CITY and CONTRACTOR shall jointly operate so that CITY may purchase directly, goods, supplies and equipment which will be incorporated into the Work. The goods, supplies and equipment that will be purchased by CITY shall be approved in advance by the parties.

With respect to all goods, supplies and equipment to be purchased by CITY, CONTRACTOR shall, on behalf of CITY, take all actions necessary and appropriate to cause all purchases to be made and shall be responsible for delivery of all such goods, supplies and equipment, including verification of correct quantities and documents or orders, coordination of purchases and delivery schedules, sequence of delivery, unloading, handling and storage through installation, obtaining warranties and guarantees required by the Contract Documents, inspection and acceptance of the goods, supplies and equipment at the time of delivery, and other arrangements normally required for the particular goods, supplies or equipment purchased. Unless otherwise directed by CITY, such actions shall also include taking the lead in efforts to resolve any and all disputes with the vendor. CONTRACTOR shall ensure that each vendor of goods, supplies and equipment purchased by CITY agrees in writing to the terms and conditions contained in CITY'S standard purchase order, which terms and conditions are set forth in Section 00800 of the Contract Documents. Even though CITY may purchase such goods, supplies and equipment, the goods, supplies and equipment shall be stored at the site in the same manner as goods, supplies and equipment purchased by CONTRACTOR.

CONTRACTOR shall hold CITY harmless from delays in manufacturing, delivery, and other unforeseen conditions that may arise as part of the procurement of CITY-purchased goods, supplies and equipment.

3.14 Overtime Work:

The CONTRACTOR shall receive no additional compensation for overtime work, i.e., work in excess of eight hours in any one calendar day or 40 hours in any one calendar week, even though such overtime work may be required under emergency conditions and may be ordered by the ENGINEER in writing. Additional compensation will be paid the CONTRACTOR for overtime work only in the event extra work is ordered by the ENGINEER and the Change Order specifically authorizes the use of overtime work and then only to such extent as overtime wages are regularly being paid by the CONTRACTOR for overtime work of a similar nature in the same locality.

3.15 Inspections and Testing during Overtime:

The CONTRACTOR shall establish a normal work schedule which does not exceed eight hours per day in a normal work day nor forty hours per week in a normal work week. Normal work days shall be Monday through Friday. Whenever CONTRACTOR's work requires scheduled overtime,

unless such overtime work is specifically required by the Contract Documents, CONTRACTOR shall reimburse the CITY for the extra costs incurred for providing Inspectors. Overtime shall be scheduled only after CONTRACTOR obtains written permission from the CITY. A change order shall be prepared to cover the CITY costs. Inspector costs shall be charged to the CONTRACTOR at a rate of \$80.00 per hour with a minimum of four hours charged for weekends and holidays. If the CONTRACTOR has an overtime work force size of fifty or more persons a second Inspector will be required and the costs for two Inspectors will be \$160.00 per hour.

3.16 Nights, Sunday or Holiday Work:

Except upon specific permission of the ENGINEER, the CONTRACTOR shall not perform any work on Sundays or on legal State or Municipal holidays. In accordance with City of Hollywood Code of Ordinances, Section 21.49, no work between 6:00 p.m. and 8:00 a.m. will be permitted, except in case of an emergency, that violates Section 21.49 concerning noise levels. All costs of testing and inspection performed during night, Sunday or holiday work shall be borne by the CONTRACTOR. The CONTRACTOR shall notify all regulatory agencies, including but not limited to the City Police Department, Fire Department, and Code Enforcement Department.

3.17 Injury or Damage Claims:

Should CITY or CONTRACTOR suffer injury or damage to their person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim shall be made in writing to the other party within a reasonable time of the first observance of such injury or damage. However, nothing herein shall be deemed to affect the rights, privileges and immunities of City as are set forth in Section 768.28, Florida Statutes.

ARTICLE 4 - CONTRACT DOCUMENTS

4.1 Intent:

The Contract Documents comprise the entire Agreement between the CITY and CONTRACTOR concerning the work. The Contract Documents can be altered only by Change Order. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. It is the intent of the Contract Documents that the CONTRACTOR, for due consideration, shall furnish all equipment, material, supervision and labor, (except as may be specifically noted otherwise) required or necessary to complete the work in total accordance with said Documents. It is the intent of the Drawings and Specifications to describe the Project to be constructed in accordance with the Contract Documents. Any work that may reasonably be inferred from the Drawings or Specifications as being required to produce the intended result shall be supplied whether or not it is specifically called for.

4.2 Order of Precedence of Contract Documents:

In resolving differences resulting from conflicts, errors or discrepancies in any of the following Contract Documents, the order of precedence shall be as follows:

1. Permits
2. Change Orders
3. Contract Agreement
4. Specification
5. Drawings

Within the Specifications the order of precedence is as follows:

1. Addenda
2. Notice to Bidders
3. Instructions to Bidders
4. Supplementary General Conditions
5. General Conditions
6. Division 1, General Requirements
7. Technical Specifications
8. Referenced Standard Specifications

With reference to the Drawings the order of precedence is as follows:

1. Figures Govern over Scaled Dimensions
2. Detail Drawings Govern over General Drawings
3. Change Order Drawings Govern over Contract Drawings
4. Contract Drawings Govern over Standard or Shop Drawings

4.3 Reference To Standards:

Any reference to standard Specifications, manuals or codes of any organization or governmental authority shall mean the latest edition, in effect as of the Bid Opening Date.

ARTICLE 5 - BONDS AND INSURANCE

5.1 Bid Guarantee:

Bidders maybe required to submit a Bid Guarantee in an amount indicated in the NOTICE TO BIDDERS. This Guarantee may be a Certified or Cashier's Check on a solvent National or State Bank, or a Bid Bond written by a Surety licensed to do business in Florida and rated at least "A", Class X in the latest edition of "Best's Key Rating Guide" published by A.M. Best Company.

5.2 Performance and Payment Bond:

CONTRACTOR shall furnish Performance and Payment Bonds, in amounts equal to the Contract Price as Security for the faithful performance and payment of CONTRACTOR's obligations. The Bond or Bonds shall remain in effect one year after the date of final payment. The Surety must be qualified as specified above in Paragraph 5.1. However, the City reserves the right to require additional bonds as set forth in Article 5 of the Contract.

5.3 Signatures:

All Bonds signed by an Agent must be accompanied by a Certified copy of the authority to act, with said copy having been signed (not typed nor printed) by an Officer of the Surety and carrying the seal of the Surety.

5.4 Insurance Coverage:

Within ten days from Notice of Award the CONTRACTOR shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR's operations under the Contract or Contract Documents, whether such operations be by himself or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- A. Claims under Workmen's Compensation, Disability Benefit and other similar employer's liability acts;
- B. Claims for damages because of bodily injury, sickness or disease, or death, or death of his employees;
- C. Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;
- D. Claims for damages covered by personal injury liability which are sustained (1) by any person as a result of any offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person;
- E. Claims for damages, other than to the work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom; and
- F. Claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

5.5 Certificates of Insurance:

Within ten days of award, the Contractor shall obtain a Certificate of Insurance reflecting the necessary coverages as required by the Contract Documents. Certificates of Insurance shall contain a provision that coverages afforded under the policies will not be canceled until at least 30 days prior written notice has been given to the CITY. The City of Hollywood must be named as additional insured on all coverage with the exception of Workmen's Compensation. Policies shall be issued by companies authorized to do business under the Laws of the State of Florida. Policyholders and Financial Ratings must be no less than "A" and Class X respectively in the latest edition of "Best Key Rating Guide", published by A.M. Best Company.

5.6 Insurance Limits of Liability:

The insurance required by this Article shall be written for no less than the level of liability specified in "Insurance Requirements", Section 2 of the Supplementary General Conditions, or required by law, whichever is greater. The insurance shall include contractual liability insurance applicable to the CONTRACTOR's obligations under this contract.

The level required in Section 2 of the Supplementary General Conditions will not be reduced for any reason.

ARTICLE 6 - AVAILABILITY OF LAND; REFERENCE POINTS

6.1 Rights-of-Way:

Lands or Rights-of-Way for the work to be constructed under the Contract will be provided by the CITY. Nothing contained in the Contract Documents shall be interpreted as giving the CONTRACTOR exclusive occupancy of the lands or Rights-of-Way provided. Any additional lands or Rights-of-Way required for construction operations shall be provided by the CONTRACTOR at his own expense; provided, that the CONTRACTOR shall not; and the CITY nor the ENGINEER shall not be liable for any claims or damages resulting from the CONTRACTOR's unauthorized trespass or use of any such properties.

6.2 Permits:

When required by Article 21 of the Instruction to Bidders, the CONTRACTOR shall secure, from the agencies having jurisdiction, the necessary permits to create obstructions, to make excavations if required under the Contract, and to otherwise encroach upon Rights-of-Way, and to present evidence to the ENGINEER that such permission has been granted, before work is commenced. Regulations and requirements of all agencies concerned shall be strictly adhered to in the performance of the Contract. The enforcement of such requirements under the Contract shall not be made the basis for additional compensation.

6.3 Lines and Grades:

The CONTRACTOR shall furnish all grades and all other lines required for the proper execution of the work.

ARTICLE 7 - CONTRACTOR'S RESPONSIBILITIES

7.1 Laws/Regulations to Be Observed:

The CONTRACTOR shall familiarize himself and comply with all Federal, State, County and CITY laws, by-laws, ordinances or regulations controlling the action or operation of those engaged or employed in the work or affecting material used, and govern himself in accordance with them. He shall indemnify and save harmless the CITY and all of its officers, agents and employees against any claims or liability arising from or based on the violation of any such laws, by-laws, ordinances, regulations, orders or decrees, whether by himself or his employees or Subcontractors.

7.2 Indemnification of City:

- (a) CONTRACTOR shall, at all times hereafter, indemnify, hold harmless and defend CITY, its agents, servants and employees from and against any claim, demand or cause of action of any kind or nature arising out of error, omission or negligent act of CONTRACTOR, its agents, servants or employees in the performance of services under this Agreement.
- (b) CONTRACTOR further agrees, at all times hereafter, to indemnify, hold harmless and defend CITY, its agents, servants and employees from and against any claim, demand or cause of action of any kind or nature arising out of any conduct or misconduct of CONTRACTOR resulting from the performance of services under the Contract Documents.
- (c) The obligations of the CONTRACTOR above shall not extend to the liability of the City of Hollywood.
- (d) The provisions of (a) and (b) above shall survive the expiration or earlier termination of the Contract Documents.

7.3 Guarantee of Payments:

The CONTRACTOR guarantees the payments of all just claims for materials, supplies, tools, labor and other just claims against him, or any Subcontractor in connection with this Contract, and his bond will not be released by final acceptance and payment by the CITY unless all such claims are paid or released.

7.4 Permits and Licenses:

The CONTRACTOR shall obtain all permits and licenses required by the Contract Documents. A copy of the permit(s) and such conditions and requirements thereon are a part of the Contract Documents. Failure to obtain such permits or licenses shall subject the CONTRACTOR to the provisions of the South Florida Building Code, Broward Edition.

7.5 Emergencies:

In emergencies affecting the safety or protection of persons or the work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from ENGINEER or CITY, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give ENGINEER prompt written notice of any significant changes in the work or deviations from the Contract Documents caused thereby.

7.6 Substitutes or "Or Equal":

A. Substitutes or "Or-Equal" Materials or Equipment:

Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other Suppliers may be accepted by the ENGINEER if sufficient information submitted by the CONTRACTOR to allow the ENGINEER to determine that the material or equipment proposed is equivalent or equal to that named. The ENGINEER will be allowed 30 days within which to evaluate each proposed substitute. The ENGINEER will be the sole judge of acceptability, and NO SUBSTITUTE WILL BE ORDERED, INSTALLED OR UTILIZED WITHOUT THE ENGINEER'S PRIOR WRITTEN ACCEPTANCE which will be evidenced by either a Change Order or an approved set of Shop Drawings. Requests for review of substitute items of material and equipment will not be accepted by the ENGINEER from anyone other than the CONTRACTOR. The procedure for review by the ENGINEER is as follows:

If the CONTRACTOR wishes to furnish or use a substitute item of material or equipment, the CONTRACTOR shall make written application to the ENGINEER for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. In addition, the application shall

1. State that the evaluation and acceptance of the proposed substitute will not prejudice the CONTRACTOR's achievement of completion on time.
2. State whether or not acceptance of the substitute for use in the WORK will require a change in any of the Contract Documents to adapt design to the proposed substitute. The CONTRACTOR shall be responsible for any extra design adaptation costs associated with a proposed substitute.
3. State whether or not incorporation or use of the substitute in connection with the work is subject to payment of any license fee or royalty.

4. Provide complete substitute identification and description, including manufacturer's and local distributor's name and address, performance and test data, and reference standards.
5. Provide samples, as required by ENGINEER.
6. Provide name and address of similar projects on which the proposed substitute has been used, and date of installation.
7. Identify all variations of the proposed substitute from that specified.
8. Indicate available maintenance, repair and replacement service.
9. Submit an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other Contractors affected by the resulting change. The CONTRACTOR shall be responsible for the costs of redesign and claims of other Contractors.
10. Provide any additional data about the proposed substitute as the ENGINEER may require of the CONTRACTOR.

B. Substitute means, method, technique, sequence or procedure of construction:

If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, the CONTRACTOR may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to the ENGINEER, if the CONTRACTOR submits sufficient information to allow the ENGINEER to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by the ENGINEER will be similar to that provided in Paragraph 7.6 A.

- C. The CITY may require the CONTRACTOR to furnish at the CONTRACTOR's expense, a special performance guarantee or other surety with respect to any substitute.
- D. The ENGINEER will record time required by the ENGINEER and/or the ENGINEER's consultants in evaluating substitutions proposed by the CONTRACTOR and in making changes in the Contract Documents occasioned thereby. Whether or not the ENGINEER accepts a proposed substitute, THE CONTRACTOR SHALL REIMBURSE THE CITY FOR THE CHARGES OF THE ENGINEER AND THE ENGINEER's CONSULTANTS FOR EVALUATING EACH PROPOSED SUBSTITUTE.
- E. Any and all costs which result from changes to/adaptations of the work shall be paid by the CONTRACTOR including but limited to design, materials, installation, etc.

7.7 Shop Drawings:

Shop Drawing submittals shall be as follows:

- A. The CONTRACTOR shall submit a sufficient number of copies of each Shop Drawing to enable the ENGINEER to retain three copies unless additional copies are specified in the Contract Documents. Resubmissions of Shop Drawings shall be made in the same quantity until final approval is obtained.

- B. The CONTRACTOR shall submit Shop Drawings for all equipment, apparatus, machinery, fixtures, piping, fabricated structures, manufactured articles and structural components Manufacturer's Certified Affidavit that the item supplied complies with the design Specifications, and all other submittal requirements.
- C. Shop Drawings for structural components, electrical or mechanical systems shall be Certified by a Registered Engineer of the discipline involved.
- D. The CONTRACTOR shall thoroughly review and check the Shop Drawings, and each and every copy shall show his approval thereon. If the Shop Drawings show or indicate departures from the Contract requirements, the CONTRACTOR shall make specific mention thereof in his letter of transmittal. Failure to point out such departures shall not relieve the CONTRACTOR from his responsibility to comply with the Drawings and Specifications.
- E. No approval will be given to partial submittals of Shop Drawings for items which interconnect and/or are interdependent. It is the CONTRACTOR's responsibility to assemble the Shop Drawings for all such interconnecting and/or interdependent items, check them himself and then make one submittal to the ENGINEER along with his comments as to compliance, non-compliance, or features requiring special attention.
- F. If catalog sheets or prints of manufacturer's standard drawings are submitted as Shop Drawings, any additional information or changes on such Drawings shall be typewritten or lettered in ink.
- G. The CONTRACTOR shall keep one set of Shop Drawings marked with the ENGINEER's approval at the job site at all times.
- H. Where a Shop Drawing or sample is required by the Specifications, no related work shall be commenced until the submittal has been reviewed and approved by the ENGINEER.
- I. Approval of the Shop Drawings shall constitute approval of the subject matter thereof only, and not of any structure, material, equipment or apparatus shown or indicated. The approval of the Shop Drawings will be general and shall not relieve the CONTRACTOR of responsibility for the accuracy of such Drawings, nor for the proper fitting and construction of the work, nor for the furnishing of materials or work required by the contract and not indicated on the Drawings. Approval shall not relieve the CONTRACTOR from responsibility for errors or omissions of any sort on the Shop Drawings.

7.8 Personnel:

- A. Supervision and Superintendence:
 - 1. The CONTRACTOR shall supervise and direct the work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the work in accordance with the Contract Documents. The CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but the CONTRACTOR shall not be solely responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract Documents. The CONTRACTOR shall be

responsible to see that the finished work complies accurately with the Contract Documents.

2. The CONTRACTOR shall keep on the work at all times during its progress a competent resident Superintendent fluent in both oral and written communication in the English language, who shall not be replaced without written notice to the ENGINEER except under extraordinary circumstances. The Superintendent will be the CONTRACTOR's representative at the site and shall have authority to act on behalf of the CONTRACTOR. All communications given to the Superintendent shall be as binding as if given to the CONTRACTOR.

B. Workforce:

1. None but skilled workers shall be employed on work requiring special qualifications. When required in writing by the ENGINEER, the CONTRACTOR or any Subcontractor shall discharge any person who is, in the opinion of the ENGINEER, incompetent, disorderly or otherwise unsatisfactory, and shall not again employ such discharged person on the work except with the consent of the ENGINEER. Such discharge shall not be the basis of any claim for damages against the CITY or any CITY agents.
2. With respect to all skilled, semi-skilled and unskilled workers employed on the Project under this Contract, preference in employment shall be given to persons residing in Hollywood when such persons are available and qualified to perform the work to which the employment relates. No person shall be employed in violation of the State or National Labor Laws. No person under the age of 16 years shall be employed on a Project under the Contract. No person whose age or physical condition is such as to make his employment dangerous to his health or safety or to the health or safety of others shall be employed on the Project under this Contract; provided that this shall not operate against the employment of physically handicapped persons, otherwise employable where such persons may be safely assigned to work which they can ably perform. No person currently serving sentences in a penal or correctional institution and no inmate of an institution for mentally defective shall be employed on a Project under this Contract without specific approval of the ENGINEER.
3. No discrimination shall be made in the employment of persons on the work by the CONTRACTOR or by any Subcontractor under him, because of the race, color, sex, age or religion of such persons, and there shall be full compliance with the provisions of applicable State and Federal laws in this regard.

7.9

Safety and Protection:

A. Federal Safety and Health Regulations:

The CONTRACTOR and Subcontractors shall comply with the provisions of the Occupational Safety and Health Standards, promulgated by the Secretary of Labor under the "Occupational Safety and Health Act of 1970".

B. Responsibilities:

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:

1. All employees on the work and other persons who may be affected thereby.
2. All the work and all materials or equipment to be incorporated therein, whether in storage on or off the site.
3. Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocating or replacement in the course of construction.

C. Designated Safety Officer:

The CONTRACTOR shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the CONTRACTOR's Superintendent unless otherwise designated in writing by the CONTRACTOR to the ENGINEER.

D. Protection of the Work:

Until acceptance of the work by the CITY, it shall be under the charge and in care of the CONTRACTOR and he shall take every necessary precaution against injury or damage to the work by action of the elements or from the execution or from the non-execution of the work. The CONTRACTOR shall rebuild, restore and make good, at his own expense, all injuries or damages to any portion of the work occasioned by any of the above causes before its completion and acceptance.

7.10 Traffic Control, Public Safety and Convenience:

- A. The CONTRACTOR shall at all times conduct his work so as to assure the least possible obstruction to traffic and inconvenience to the general public, and provide adequate protection of persons and property in the vicinity of the work.
- B. WHEN THE NORMAL FLOW OF TRAFFIC WILL BE IMPAIRED OR DISRUPTED IN ANY MANNER ON ANY STREET, THE CONTRACTOR SHALL NOTIFY THE POLICE TRAFFIC SERGEANT AT (954) 921-3610 AT LEAST 48 HOURS IN ADVANCE.
- C. Streets shall not be closed, except when and where directed by the ENGINEER, and whenever a street is not closed the work must be conducted with the provision for safe passageway for traffic at all times. The CONTRACTOR shall make all necessary arrangements concerning maintenance of traffic and selection of detours required.
- D. When permission has been granted to close an existing roadway, or portion thereof, the CONTRACTOR shall furnish and erect signs, barricades, lights, flags and other protective devices as necessary subject to the approval of the ENGINEER. From sunset to sunrise, the CONTRACTOR shall furnish and maintain as many yellow lights as the ENGINEER may direct.
- E. During working hours the CONTRACTOR shall furnish watchmen in sufficient numbers to protect and divert the vehicular and pedestrian traffic from working areas closed to traffic, or to protect any new work. Failure to comply with this requirement will result in the

ENGINEER shutting down the work until the CONTRACTOR shall have provided the necessary protection.

- F. No separate payment will be made for such signs, barricades, lights, flags, watchmen or other protective devices as required, with all costs thereof deemed to be included in the prices bid for the various items scheduled in the bid.
- G. Sidewalks, gutters, drains, fire hydrants and private drives shall, insofar as practicable, be kept in condition for their intended uses. While the work is actually going on at any location, as much as half the street width at that location may be barricaded to exclude traffic entirely, but street traffic shall not be obstructed needlessly. Fire hydrants on or adjacent to the work shall be kept accessible to fire apparatus at all times, and no material or obstruction shall be placed within ten feet of any such hydrant.
- H. Construction material stored upon the public street shall be placed so as to cause as little obstruction to the general public as is reasonably possible.

7.11 Use of Explosives:

When the use of explosives is necessary for the prosecution of the work, the CONTRACTOR shall observe the utmost care so as not to endanger life or property, and whenever directed, the number and size of charges shall be limited. All explosives shall be stored in a secure manner and all such storage places shall be marked clearly "DANGEROUS EXPLOSIVES" and shall be in care of a competent watchman at all times. The CONTRACTOR must familiarize himself with all laws and ordinances pertaining thereto, and govern himself and his employees accordingly.

7.12 Loading of Structures:

The CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall the CONTRACTOR subject any part of the work or adjacent property to stresses or pressures that will endanger it.

7.13 Concerning Subcontractors:

- A. The CONTRACTOR, with his own forces, shall perform no less than 25% of the work as determined by the Contract price. Each Subcontractor shall be properly licensed for the type of work he is to perform.
- B. A copy of each Sub-Contract shall be filed promptly with the ENGINEER upon request. Each Sub-Contract shall contain a reference to the Contract between the CITY and the CONTRACTOR, and the terms and conditions of the Contract shall be made a part of each Sub-Contract. Each Sub-Contract shall provide for annulment of same by the CONTRACTOR upon written order of the ENGINEER if the Subcontractor fails to comply with the requirements of this Contract.
- C. The CONTRACTOR shall be responsible to the CITY and ENGINEER for the acts and omissions of his Sub-Contractors and their employees to the same extent as he is responsible for the acts and omissions of his own employees. Nothing contained in this Contract shall create any contractual relationship between any Subcontractor and the

CITY or ENGINEER nor relieve the CONTRACTOR of any liability or obligation under this Contract.

7.14 Materials and Equipment:

A. Material for the Work:

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 the work.
2. Unless otherwise specified, shown or permitted by the ENGINEER, all material and equipment incorporated in the work shall be new and of current manufacture. The ENGINEER may request the CONTRACTOR to furnish manufacturer's certificates to this effect.
3. The ENGINEER may require any or all materials to be subjected to test by means of samples or otherwise, at production points or after delivery. The CONTRACTOR shall afford such facilities as the ENGINEER may require for collecting and forwarding samples, which samples shall be furnished by the CONTRACTOR without charge. The CONTRACTOR shall furnish evidence satisfactory to the ENGINEER that the materials and finished articles have passed the required test prior to the incorporation of such materials and finished articles in the work. Unless otherwise provided, the cost of such inspection and testing shall be as provided in Article 12.2.
4. All packaged manufactured products for use on the work shall be delivered to the work in their original, unopened packages, bearing thereon the manufacturer's name and the brand name of the product.
5. Wherever any product or material is selected to be used on the work, all such products or material shall be of the same brand and manufacture throughout the work.
6. All equipment, tools and machinery used for handling material or executing any part of the work shall be maintained in a satisfactory working condition. All equipment utilized on any portion of the work shall be such that no injury to personnel, the work, adjacent property or other objects will result from its use.
7. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, supplier or distributor, except as otherwise provided in the Contract Documents.

B. Storage of Materials:

1. All materials and equipment including that ordered by the CITY designed for permanent installation in the work shall be properly stored by the CONTRACTOR to insure protection against deterioration of any type. These materials shall be placed as to cause a minimum of inconvenience to other contractors on the work and to the public. The storage piles shall be arranged to facilitate inspections, and any deterioration shall be grounds for rejection.

2. Materials stored in public Rights-of-Way, shall be stored in such a manner so as to be compatible with the Traffic Control requirements set forth in Paragraph 7.10. Materials shall be stored so as not to deny access to public or private property. Stored materials shall be adequately marked with barricades and/or flashing warning lights, where necessary, so as to protect the materials from damage and to protect the public health, safety and welfare.
3. Lawns, grass plots or other private property shall not be used for storage purposes without written permission of the Owner or Lessee of that private property. Should the CONTRACTOR desire to store equipment or materials of any kind on the property of the CITY, he must obtain permission from the ENGINEER. The CITY reserves the right to order materials to be removed or relocated in such approved storage areas, if necessary.
4. The protection of stored materials shall be the CONTRACTOR's responsibility and the CITY OF HOLLYWOOD shall not be liable for any loss of materials, by theft or otherwise, nor for any damage to the stored materials.

C. Salvage of Materials and Equipment:

The CITY reserves the right to retain title to all soil, sand, stone, gravel, equipment, machinery or any other material that was a part of the structure, site or Right- of-Way and which was developed from excavations or other operations connected with the work. The CONTRACTOR will be permitted to use in the work, without charge, any such material which meets the requirements of the Contract Documents. For that material which the CITY desires to retain the CONTRACTOR shall, at his expense, transfer to a site within the CITY as designated by the ENGINEER. That material which the CITY does not wish to retain shall be the property of the CONTRACTOR and removed from the site at CONTRACTOR's expense.

7.15 Temporary Utilities:

The CONTRACTOR shall provide and maintain at his own expense, all water, power, telephone and sanitary facilities as required to comply with State and/or local Codes and Regulations. If water, including that for testing is required, it is the CONTRACTOR's responsibility to arrange through the CITY Water Department for a water meter. A deposit to be paid by the CONTRACTOR is required for meter rental and all water shall be purchased at the prevailing rate.

7.16 Review of Records:

The CONTRACTOR shall allow and permit the ENGINEER or his duly authorized representative to inspect and review all payrolls, records of personnel, conditions of employment, invoice of materials, books of accounts and other relevant data and records pertinent to the CONTRACT and Sub-Contracts.

7.17 Use of Premises:

CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workmen to areas permitted by law, ordinances, permits or required by the Contract Documents, and shall not interfere with the premises or operation of the City Utilities

facilities with construction equipment or other materials or equipment. Construction which interferes with Plant Operations shall be fully coordinated and approved by the ENGINEER.

7.18 CONTRACTOR's Daily Reports:

Except where otherwise provided, the CONTRACTOR shall complete a daily report indicating manpower, major equipment, Subcontractors, etc., involved in the performance of the work. The daily report shall be completed on forms approved by the ENGINEER, and shall be submitted to the ENGINEER at the conclusion of each work day.

7.19 Record Documents:

The CONTRACTOR shall keep one record copy of all Specifications, Drawings, Addenda, Modifications, Shop Drawings and samples at the site, in good order and annotated to show all changes made during the construction process. These shall be available to ENGINEER for examination and shall be delivered to ENGINEER upon completion of the work.

7.20 Cleanliness of the Site:

During the progress of the work, The CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the work. At the completion of the work the CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials, and shall leave the site clean and ready for occupancy by the CITY. The CONTRACTOR shall restore to their original condition those portions of the site not designated for alteration by the Contract Documents.

7.21 Dust Control:

It shall be the CONTRACTOR's responsibility to control dust by watering as directed by the ENGINEER. The water used shall be paid for by the CONTRACTOR. Should the CONTRACTOR fail to control dust to the satisfaction of the ENGINEER, the CITY will control the dust by whatever means the CITY desires and the CONTRACTOR shall pay all expenses incurred by the CITY associated with the control of the dust.

7.22 Continuing the Work:

The CONTRACTOR shall carry on the work and maintain the Progress Schedule during all disputes or disagreements with the CITY. No work shall be delayed or postponed pending resolution of any disputes or disagreements, except as the CONTRACTOR and the CITY may otherwise agree in writing.

7.23 Indemnification:

In consideration of the amount listed in the Schedule of Prices Bid and other valuable consideration, the Contractor shall defend, indemnify and save harmless the CITY, its officers, agents, and employees from or on account of any personal injury, loss of life or damage to property received or sustained by any person or persons during or on account of any operations connected with the construction of this Project; or by or in consequence of any negligence (excluding negligence of the CITY), in connection with the same; or by use of any improper materials or by or on account of any use of any improper materials or by or on account of any act or omission of the said Contractor or his subcontractor, agents, servants or employees. Contractor agrees to indemnify and save harmless the CITY against any liability arising from or based upon the violation of any federal, state, county or city laws, by-laws, ordinances or regulations by the Contractor, his subcontractor, agents, servants or employees. Contractor

further agrees to indemnify and save harmless the CITY from all such claims and fees, and from any and all suits and actions of every name and description that may be brought against the CITY on account of any claims, fees, royalties, or costs for any invention or patent, and from any and all suits and actions that may be brought against the CITY for the infringement of any and all patents or patent rights claimed by any person, firm, or corporation.

The indemnification provided above shall obligate the Contractor to defend at his own expense or to provide for such defense, at the CITY's option, any and all claims or liability and all suits and actions of every name and description that may be brought against the Owner which may result from the operations and activities under this Contract whether the construction operations be performed by the Contractor, his subcontractor or by anyone directly or indirectly employed by either.

Nothing in this indemnification shall be deemed to affect the rights, privileges or immunities of the CITY as set forth in Section 768.28, Florida Statutes.

The CITY will pay to the Contractor the specific consideration, in the amount stated in the Schedule of Prices Bid. The Contractor shall acknowledge the receipt of payment and other good and valuable consideration from the Owner which has been paid to him as specific consideration for the indemnification provided herein and in accordance with the provisions of Chapter F.S.A., Section 725.06.

ARTICLE 8 - CITY'S RESPONSIBILITIES

8.1 Communications:

The CITY shall issue all communications to the CONTRACTOR through the ENGINEER.

8.2 Furnish Contract Documents:

The CITY shall furnish the number of Contract Documents as specified in the Supplementary General Conditions to the CONTRACTOR at no cost. Referenced Standard Specifications Manuals, guidebooks, etc., will not be provided.

8.3 Furnish Right-of-Way:

The CITY shall furnish the necessary land or Right-of-Way on which the work is to be accomplished, and will provide lines and grades as specified in Article 6.

8.4 Timely Delivery of Materials:

The CITY shall be responsible for the delivery of any CITY furnished material, equipment or labor as specified in the Contract Documents.

ARTICLE 9 - ENGINEER'S STATUS

9.1 Authority of the Engineer:

- A. The general supervision of the execution of this Contract is vested in the ENGINEER who is the CITY's sole representative during the construction period. The instructions of the ENGINEER are to be strictly and promptly followed in every case. The CONTRACTOR's representative (Article 7.8 A. 1.) shall be responsible for the execution of any instructions given by the ENGINEER during the absence of the CONTRACTOR.
- B. The ENGINEER is the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the work. Claims, disputes and other matters relating to the acceptability of work or requirements of the Contract Documents shall be referred in writing to the ENGINEER within 15 days of the event, with a request for a formal decision, which the ENGINEER will render in writing within a reasonable time. This rendering of a decision by the ENGINEER will be a condition precedent to any exercise by the CITY or CONTRACTOR of rights or remedies as either may otherwise have under the Contract Documents or at law in respect to any such claim, dispute or other matter.
- C. The ENGINEER will issue with reasonable promptness any written clarifications or interpretations of the Contract Documents as he shall deem necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If, as a result of a clarification or interpretation, either the CONTRACTOR or ENGINEER believes a Change Order is justified, it shall be submitted.
- D. The ENGINEER has approval authority over the acceptability of all material or equipment furnished, Shop Drawings, Change Orders, work performed and the rate of progress of the work. Verification of the quantities of work performed for pay purposes is the responsibility of the ENGINEER.
- E. The ENGINEER also has the authority to disapprove or reject work which is defective, and may require special inspection or testing of the work, whether or not it is fabricated, installed or completed.
- F. The ENGINEER has the authority to suspend the work wholly or in part for such period or periods as may be deemed necessary, due to the unsuitable prosecution of the work, or for such time as is necessary due to failure on the part of the CONTRACTOR to carry out orders given or perform any or all provisions of the Contract. The CONTRACTOR shall not suspend the work and shall not remove any equipment, tools, lumber or other materials without the written permission of the ENGINEER.

9.2 Access to the Work:

The ENGINEER is to have free access to the materials and work at all times for laying out, measuring or inspecting same, and the CONTRACTOR is to afford him all necessary facilities and assistance for so doing.

9.3 Limitations on The ENGINEER's Responsibilities:

- A. Neither the ENGINEER's authority to act under this Article or elsewhere in the Contract Documents nor any decision made by the ENGINEER in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of the ENGINEER

to the CONTRACTOR, any Subcontractor, any manufacturer, fabricator, supplier or distributor or any of their agents or employees or any other person performing any of the work.

- B. Whenever in the Contract Documents the terms "as ordered", "as directed", "as required", "as allowed" or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper" or "satisfactory" or adjectives of like effect or import are used, to describe requirement, direction, review or judgment of the ENGINEER as to the work, it is intended that such requirement, direction, review or judgment will be solely to evaluate the work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective never indicates that the ENGINEER has authority to supervise or direct performance of the work.
- C. The ENGINEER will not be responsible for the CONTRACTOR's means, methods, techniques, sequences or procedures of construction, nor the safety precautions and programs incident thereto, and the ENGINEER will not be responsible for the CONTRACTOR's failure to perform the work in accordance with the Contract Documents.
- D. The ENGINEER will not be responsible for the acts or omissions of the CONTRACTOR or of any Subcontractors, or of the agents or employees of any CONTRACTOR or subcontractor, or of any other persons at the site or otherwise performing any of the work.

9.4

Inspectors:

- A. Inspectors employed by the CITY assist the ENGINEER in ascertaining the work conforms to the Contract Documents and are authorized to inspect all work done and material furnished as representatives of the ENGINEER. Inspectors shall be stationed at the site of the work to report to the ENGINEER as to the progress of the work and the quality of workmanship and material.
- B. In case of any dispute arising between the CONTRACTOR and the Inspector, the Inspector shall have the authority to reject material or to suspend the work until the question of issue can be referred to and decided upon by the ENGINEER.
- C. If the CONTRACTOR refuses to suspend operation on verbal order, the Inspector shall issue a written order giving the reason for shutting down the work. After placing the order in the hands of the man in charge, the Inspector shall immediately leave the job. work done during the absence of the Inspector, after such written notice, will not be accepted nor paid for.
- D. Inspectors are not authorized to revoke, alter, enlarge, relax or release any requirements of these Contract Documents, nor to issue instructions contrary to them. Inspectors shall in no case act as foreman or perform other duties for the CONTRACTOR, nor interfere with management of the work by the latter. Any instructions which Inspectors may give the CONTRACTOR shall in no way be construed as releasing the CONTRACTOR from fulfillment of the terms of the Contract.
- E. The payment of any compensation, whatever may be its character or form, or the giving of any gratuity, or the granting of any valuable favor, by the CONTRACTOR to any Inspector, directly or indirectly, is strictly prohibited and any such act on the part of the CONTRACTOR will constitute a violation of this Contract and may subject the CONTRACTOR to other penalties provided for by law or ordinance.

9.5

Inspections:

- A. The ENGINEER will make, or have made, such inspections and tests as he deems necessary to assure that the work is being accomplished in accordance with the requirements of the Contract. In the event such Inspections or tests reveal non-compliance with the requirements of the Contract, the CONTRACTOR shall bear the cost of such corrective measures as well as the cost of subsequent reinspection and retesting.
- B. Work done in the absence of a prescribed inspection may be required to be removed and replaced under proper inspection. The entire cost of removal and replacement, including the cost of all material which may be furnished by the CITY and used in the work thus removed, shall be borne by the CONTRACTOR, regardless of whether the work removed is found to be defective or not. Work covered up without the authority of the ENGINEER, shall, upon order of the ENGINEER, be uncovered to the extent required, and the CONTRACTOR shall similarly bear the entire cost of performing all the work and furnishing all the material necessary for the removal of the covering and its subsequent replacement.
- C. Unless otherwise provided, the cost of inspection and all inspection fees imposed by public agencies other than the fees associated with the issuance of the Master Building Permit by the City of Hollywood shall be paid by the CONTRACTOR.
- D. No inspection nor any failure to inspect at any time or place shall relieve the CONTRACTOR from any obligation to perform all of the work in strict conformance with the requirements of the Contract Documents.

ARTICLE 10 - CHANGES IN THE WORK/CONTRACT PRICE

10.1 Changes in the Work or Terms of Contract Documents:

- A. Without invalidating the Contract and without notice to any surety CITY reserves and shall have the right, from time to time to make such increases, decreases or other changes in the character or quantity of the Work as may be considered necessary or desirable to complete fully and acceptably the proposed construction in a satisfactory manner. Any extra or additional work within the scope of this Project must be accomplished by means of appropriate Clarifications, Field Orders, or Change Orders.
- B. Any changes to the terms of the Contract Documents must be contained in a written document, executed by the parties hereto, with the same formality and of equal dignity prior to the initiation of any work reflecting such change.

This section shall not prohibit the issuance of Change Orders executed only by CITY as hereinafter provided.

10.2 Supplemental Instructions - Clarifications:

- A. The CITY, through the ENGINEER, shall have the right to approve and issue Clarifications setting forth written interpretations of the intent of the Contract Documents and ordering minor changes in Work execution, providing the Clarifications involve no change in the Contract Price or the Contract Time.
- B. The ENGINEER shall have the right to approve and issue Clarifications setting forth written orders, instructions, or interpretations concerning the Contract Documents or its performance, provided such Clarifications involve no change in the Contract Price or the Contract Time.

10.3 Field Orders / Change Orders:

- A. Changes in the quantity or character of the Work within the scope of the Project which are not properly the subject of Clarifications, including all changes resulting in changes in the Contract Price or the Contract Time, shall be authorized only by Field Orders or Change Orders approved in advance and issued in accordance with the provisions of the CITY Procurement Code, as amended from time to time.
- B. CONTRACTOR shall not start work on any changes requiring an increase in the Contract Price or the Contract Time until a Field Order or Change Order setting forth the adjustments is approved by the CITY. Upon receipt of a Change Order CONTRACTOR shall promptly proceed with the work set forth within the document.
- C. Field Orders shall be issued for change in Contract Price related to Cost Allowances specifically included on the Proposal Bid Form. Change Orders shall be issued when required for all other Contract Price Changes. Hereinafter, the term "Change Order(s)" shall be used to include "Change Orders" and "Field Orders" with the exception that Field Order shall not be used for any Contract Time adjustments.

- D. In the event satisfactory adjustment cannot be reached for any item requiring a change in the Contract Price or Contract Time, and a Change Order has not been issued, CITY reserves the right at its sole option to either terminate the Contract as it applies to the items in question and make such arrangements as may be deemed necessary to complete the disputed work; or the work shall be performed on the "cost of work" basis as described in Article 10.4.
- E. On approval of any Contract change increasing the Contract Price, CONTRACTOR shall ensure that the performance bond and payment bond are increased so that each reflects the total Contract Price as increased.
- F. Under circumstances determined necessary by CITY, Change Orders may be issued unilaterally by CITY.

10.4 Value of Change Order Work:

- A. The value of any work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:
 - A.1 Where the work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of items involved, subject to the provisions of Article 10.4.G.
 - A.2 By mutual acceptance of a lump sum which CONTRACTOR and CITY acknowledge contains a component for overhead and profit.
 - A.3 On the basis of the "cost of work," determined as provided in this Article, plus a CONTRACTOR's fee for overhead and profit which is determined as provided in Article 10.4.D.
- B. The term "cost of work" means the sum of all direct costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work described in the Change Order. Except as otherwise may be agreed to in writing by CITY, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in Article 10.4.C.
 - B.1 Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the work described in the Change Order under schedules of job classifications agreed upon by CITY and CONTRACTOR. Payroll costs for employees not employed full time on the work covered by the Change Order 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 the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' or workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay application thereto. Such employees shall include superintendents and foremen at the site. The expenses

of performing the work after regular working hours, on Sunday or legal holidays shall be included in the above to the extent authorized by CITY.

- B.2 Cost of all materials and equipment furnished and incorporated in the work, including costs of transportation and storage thereof, and manufacturers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless CITY deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to CITY. All trade discounts, rebates and refunds, and all returns from sale of surplus materials and equipment shall accrue to CITY and CONTRACTOR shall make provisions so that they may be obtained. Rentals of all construction equipment and machinery and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by CITY with the advice of ENGINEER and the costs of transportation, loading, unloading, installation, dismantling and removal thereof, all in accordance with the terms of said agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the work.
- B.3 Payments made by CONTRACTOR to Subcontractors for work performed by Subcontractors, If required by CITY, CONTRACTOR shall obtain competitive bids from Subcontractors acceptable to CONTRACTOR and shall deliver such bids to CITY who will then determine, with the advice of ENGINEER, which bids will be accepted. If the Subcontract provides that the Subcontractor is to be paid on the basis of cost of the work plus a fee, the Subcontractor's cost of the work shall be determined in the same manner as CONTRACTOR'S cost of the work. All Subcontractors shall be subject to the other provisions of the Contract Documents insofar as applicable.
- B.4 Cost of special engineers, including, but not limited to, engineers, architects, testing laboratories, and surveyors employed for services specifically related to the performance of the work described in the Change Order.
- B.5 Supplemental costs including the following:
The proportion of necessary transportation, travel and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the work except for local travel to and from the site of the work.

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 workmen, which are consumed in the performance of the work, and cost less market value of such items used but not consumed which remains the property of CONTRACTOR.

Sales, use, or similar taxes related to the work, and for which CONTRACTOR is liable, imposed by any governmental authority. Deposits lost for causes other than CONTRACTOR's negligence; royalty payments and fees for permits and licenses. The cost of utilities, fuel and sanitary facilities at the site. Receipted 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.

Cost of premiums for additional bonds and insurance required because of changes in the work.

C. The term "cost of the work" shall not include any of the following:

- C.1 Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, lawyers, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the site or in its principal or a branch office for general administration of the work and not specifically included in the agreed-upon schedule of job classifications referred to in this Article, all of which are to be considered administrative costs covered by CONTRACTOR's fee.
- C.2 Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the site.
- C.3 Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the work and charges against CONTRACTOR for delinquent payments.
- C.4 Cost of premiums for all Bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same, except for additional bonds and insurance required because of changes in the work.
- C.5 Costs due to the negligence or neglect of CONTRACTOR, any Subcontractors, 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.
- C.6 Other overhead or general expense costs of any kind and the cost of any item not specifically and expressly included in this Section.

D. CONTRACTOR's fee allowed to CONTRACTOR for overhead and profit shall be determined as follows:

- D.1 A mutually acceptable fixed fee or if none can be agreed upon,
- D.2 A fee based on the following percentages of the various portions of the cost of the work:

For costs incurred under Article 10.4.B.1, CONTRACTOR's fee shall not exceed ten percent (10%).

For costs incurred under Article 10.4.B.3 and B.4, CONTRACTOR's fee shall not exceed seven and one half percent (7.5%); and if a subcontract is on the basis of

cost of the work plus a fee, the maximum allowable to the Subcontractor as a fee for overhead and profit shall not exceed ten percent (10%);

No fee shall be payable on the basis of costs itemized under Article 10.4.B.5 and Article 10.4.C.

- E. The amount of credit to be allowed by CONTRACTOR to CITY for any such change which results in a net decrease in cost, will be the amount of the actual net decrease. When both additions and credits are involved in anyone change, the combined overhead and profit shall be figured on the basis of the net increase, if any, however, CONTRACTOR shall not be entitled to claim lost profits for any Work not performed.
- F. Whenever the cost of any work is to be determined pursuant to Articles 10.4.B and 10.4.C, CONTRACTOR will submit in a form acceptable to CONSUL T ANT an itemized cost breakdown together with the supporting data.
- G. Where the quantity of any item of the Work that is covered by a unit price is increased or decreased by more than twenty percent (20%) from the quantity of such work indicated in the Contract Documents, an appropriate Change Order shall be issued to adjust the unit price, if warranted.
- H. Whenever a change in the Work is to be based on mutual acceptance of a lump sum, whether the amount is an addition, credit or no change-in-cost, CONTRACTOR shall submit an initial cost estimate acceptable to ENGINEER and CITY.
 - H.1 Breakdown shall list the quantities and unit prices for materials, labor, equipment and other items of cost.
 - H.2 Whenever a change involves CONTRACTOR and one or more Subcontractors and the change is an increase in the Contract Price, overhead and profit percentage for CONTRACTOR and each Subcontractor shall be itemized separately.
- I. Each Change Order must state within the body of the Change Order whether it is based upon unit price, negotiated lump sum, or "cost of the work."

10.5 Notification and Claim for Chance of Contract Price:

- A. Any claim for a change in the Contract Price shall be made by written notice by CONTRACTOR to the CITY and to ENGINEER within five (5) calendar days of the commencement of the event giving rise to the claim and stating the general nature and cause of the claim. Thereafter, within twenty (20) calendar days of the termination of the event giving rise to the claim, written notice of the extent of the claim with supporting information and documentation shall be provided unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim and such notice shall be accompanied by CONTRACTOR's

written notarized statement that the adjustment claimed is the entire adjustment to which the CONTRACTOR has reason to believe it is entitled as a result of the occurrence of said event. All claims for changes in the Contract Price shall be in accordance with Articles 10.3 and 10.4 hereof, if CITY and CONTRACTOR cannot otherwise agree. **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.**

10.6 Notice of Change:

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 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. Failure of the CONTRACTOR to obtain such approval from the Surety may be a basis for termination of this Contract by the CITY.

10.7 Records:

The CONTRACTOR's representative and the ENGINEER shall compare records of extra work done at the end of the day. Such records shall be made in duplicate upon a form provided for such purpose by the ENGINEER and shall be signed by both the Inspector and the CONTRACTOR's representative, one copy being submitted to the ENGINEER and the other being retained by the CONTRACTOR.

10.8 Cancelled Items and Payments Therefore:

The CITY COMMISSION shall have the right to cancel those portions of the Contract relating to the construction of any item provided therein. Such cancellation shall entitle the CONTRACTOR to payment in a fair and equitable amount covering all items of cost incurred by him prior to the date of cancellation or suspension of the work. The CONTRACTOR shall be allowed a profit percentage on the materials used and on construction work actually performed, at the same rates as provided for "Extra Work", but no allowance will be made for anticipated profits. Acceptable materials ordered by the CONTRACTOR or delivered on the work, prior to date of such cancellation or suspension, may be purchased from the CONTRACTOR by the CITY at actual cost and shall thereupon, become property of the CITY, or may be returned to the manufacturer for a reasonable restocking charge.

10.9 Full Payment:

The Compensation herein provided shall be received and accepted by the CONTRACTOR as payment in full for all extra work done or costs incurred in event of cancellation.

ARTICLE 11 - CHANGES IN THE CONTRACT TIME

11.1 Change Order:

The Contract Time may only be changed by a Change Order. A FULLY EXECUTED CHANGE ORDER MUST EXIST PRIOR TO EXTENSION OR SHORTENING OF THE CONTRACT TIME.

11.2 Notification and Claim for Change of Contract Time:

- A. Any claim for a change in the Contract Time shall be made by written notice by the CONTRACTOR to the CITY and to ENGINEER within five (5) calendar days of the commencement of the event giving rise to the claim and stating the general nature and cause of the claim. Thereafter within twenty (20) calendar days of the termination of the event giving rise to the claim, written notice of the extent of the claim with supporting information and documentation shall be provided unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim and such notice shall be accompanied by CONTRACTOR's written notarized statement that the adjustment claimed is the entire adjustment to which the CONTRACTOR has reason to believe it is entitled as a result of the occurrence of said event. All claims for changes in the Contract Time shall be determined in accordance with Articles 10.3 and 10.4 hereof, if CITY and CONTRACTOR cannot otherwise agree. **IT IS EXPRESSLY AND SPECIFICALLY AGREED THAT ANY AND ALL CLAIMS FOR CHANGES TO THE CONTRACT TIME SHALL BE WAIVED IF NOT SUBMITTED IN STRICT ACCORDANCE WITH THE REQUIREMENTS OF THIS SECTION.**
- B. The Contract Time will be extended an amount equal to time lost on critical Work items due to delays beyond the control of and through no fault or negligence of CONTRACTOR if a claim is made thereafter as provided in Article 11.2. Such delays shall include, but not be limited to, acts or neglect by any separate contractor employed by CITY, fire, floods, labor disputes, epidemics, abnormal weather conditions or acts of God

11.3 Basis for Extension:

Extensions of time shall be considered and will be based solely upon the effect of delays to the work as a whole. Extensions of time shall not be granted for delays to the work, unless the CONTRACTOR can clearly demonstrate, through schedule analysis, that the delay to the work as a whole arose in accordance with Article 12.3 or Article 15.1, and that such delays did or will, in fact, delay the progress of work as a whole. Time extensions shall not be allowed for delays to parts of the work that are not on the critical path of the project schedule. Time extensions shall not be granted until all float or contingency time, at the time of the delay, available to absorb specific delays and associated impacts is used.

11.4 Change of Time Due to Contract Execution Problems:

Refer to Article 3.4 for a decrease in Contract Time when the CONTRACTOR fails to return the correctly executed Contract Documents within the time allowed.

11.5 Change of Time Due to Change Order Evaluation:

When evaluating a proposed Change Order, the ENGINEER shall have access to any available float or contingency time. Extension will only be considered in accordance with Article 11.3.

11.6 Change of Time and Inspection and Testing:

Neither observations by the ENGINEER, nor inspections, tests or approvals by others, passing or failing, will be cause for consideration of time extension.

11.7 Change of Time and Defective Work:

- A. If WORK is found to be defective, CONTRACTOR shall bear all remedial expenses including any additional costs experienced by CITY due to delays to others performing additional WORK. CONTRACTOR shall further bear the responsibility for maintaining schedule, and will be excluded from a time extension and the recovery of delay damages due to the uncovering.

- B. If the WORK is found to be defective per the Specifications, but the CITY chooses to accept it at its sole discretion, CONTRACTOR shall bear the responsibility for maintaining schedule, and will be excluded from a time extension and the recovery of delay damages due to the uncovering.

11.8 Liquidated Damages:

All time limits stated in the Contract Documents are of the essence. The provisions of this Article 11 shall not exclude recovery for damages by CITY as indicated in Section 3 of the Supplementary General Conditions.

ARTICLE 12 - WARRANTY AND GUARANTEE;
TEST AND INSPECTIONS;
CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

12.1 Warranty and Guarantee:

The CONTRACTOR warrants and guarantees to the CITY and the ENGINEER 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.

12.2 Tests and Inspections:

- A. The CONTRACTOR shall give the ENGINEER and, when appropriate, the Building Department and other regulatory authorities which have jurisdiction over the work, timely notice of readiness of the work for all required inspections, tests or approvals.
- B. All inspections performed as a result of the issuance of the Master Building Permit shall be performed by the CITY. All costs associated with such inspections shall be paid by the CITY, EXCEPT THAT should said test or inspection fail to pass the CONTRACTOR shall pay all costs associated with the rework and the retesting.
- C. When any other regulatory authority, by virtue of its rules or regulations, requires specific tests or inspections, the CONTRACTOR shall assume full responsibility for and pay all costs in connection with said tests and inspections.
- D. The CONTRACTOR shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with the ENGINEER's acceptance of a manufacturer, fabricator, supplier or distributor of materials or equipment proposed to be incorporated in the work, or of materials or equipment submitted for approval prior to ENGINEER's acceptance thereof for incorporation in the work and as otherwise specified in the Contract Documents.
- E. Neither observations by the ENGINEER nor inspections, tests or approvals by others shall relieve the CONTRACTOR from his obligations to perform the work in accordance with the Contract Documents.

12.3 Uncovering Work:

- A. If any work that is to be inspected, tested or approved is covered without written concurrence of the ENGINEER, it must, if requested, by the ENGINEER, be uncovered. Such uncovering and replacement shall be at the CONTRACTOR's expense.
- B. CONTRACTOR must contact all regulatory agencies issuing construction permits to make all necessary inspections. If CONTRACTOR fails to have the necessary inspections performed and such failure results in uncovering of work already performed, CONTRACTOR shall be responsible for all related time delays and monetary costs.
- C. If the ENGINEER considers it necessary or advisable that work previously covered with his permission or cognizance be observed, inspected or tested, the CONTRACTOR, at the ENGINEER's request, shall uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER 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. 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 therefor in accordance with Article 10.2 and Article 11.2.

12.4 City May Stop the Work:

If the work is defective, or the CONTRACTOR fails to supply sufficient skilled workmen or suitable materials or equipment, 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.

12.5 Correction or Removal of Defective Work:

If required by the ENGINEER, the CONTRACTOR shall promptly, without cost to the CITY and as specified by the ENGINEER either correct any defective work, whether or not fabricated, installed or completed, or if the work has been rejected by the ENGINEER, remove it from the site and replace it with nondefective work.

12.6 One Year Correction Period:

If within one year after the date of Substantial Completion or Final Completion as applicable, or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any work is found to be defective, the CONTRACTOR shall promptly without cost to the CITY and in accordance with the ENGINEER's written instructions, either correct such defective work, or if it has been rejected by the ENGINEER remove it from the site and replace it with nondefective 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 ENGINEER may have the defective work corrected or the rejected work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, shall be paid by the CONTRACTOR.

12.7 Acceptance of Defective Work:

If instead of requiring correction or removal and replacement of defective work, the ENGINEER prefers to accept it, he may do so. In such case, if acceptance occurs prior to the ENGINEER's recommendation of final payment, a Change Order shall be issued incorporating the necessary revisions in the Contract 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.

12.8

City May Correct Defective Work:

If the CONTRACTOR fails within a reasonable time after written notice of the ENGINEER to proceed to correct and to correct defective work or to remove and replace rejected work as required by the ENGINEER in accordance with Paragraph 12.5, or if the CONTRACTOR fails to perform the work in accordance with the Contract Documents, (including any requirements of the progress schedule), the CITY may, after seven 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, and suspend the CONTRACTOR's services related thereto, take possession of the CONTRACTOR's tools, appliances, construction equipment and machinery at the site and 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. The CONTRACTOR shall allow the CITY, the CITY's representatives, agents and employees such access to the site as may be necessary to enable the CITY to exercise his 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 ENGINEER, 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 limitations, compensation for additional professional services required and all 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 rights hereunder.

ARTICLE 13 - PAYMENTS TO THE CONTRACTOR

13.1 Basis of Payment:

Progress payments shall be based on the aggregate of the unit price amounts listed in the Proposal or in the Schedule of Values which have been incorporated in the work acceptable to the ENGINEER.

13.2 Unit Price Inclusion:

The unit prices stated in the Proposal include all costs and expenses for materials, labor, tools, equipment, transportation, commissions, patent fees and royalties, removing crossings or other obstructions, protection or maintaining pipes, drains, railroad tracks, buildings, bridges, or other structures furnishing temporary crossings or bridges, furnishing all supplemental construction stakes, batter boards, templates, common and ordinary labor for handling materials during inspection replacing any property damage, together with any and all costs or expenses for performing and completing the work as specified.

13.3 Schedule of Values: (Lump Sum Price Breakdown)

A Schedule of Values must be submitted within seven days subsequent to the CONTRACTOR executing and submitting the Documents required of Article 16 of the Instructions to Bidders. The schedules shall be satisfactory in form and substance to the ENGINEER, and shall include quantity and unit prices aggregating the Contract Price, and shall subdivide the work into component parts in sufficient detail to serve as the basis for progress payments during construction. Upon acceptance of the schedule of values by the ENGINEER, it shall be incorporated into a form of Application for Payment acceptable to the ENGINEER.

13.4 Changed Conditions: (Unit Price Only)

It is mutually agreed that due to latent field conditions which can not be foreseen at the time of advertising for bids, adjustments of the Plans to field conditions will be necessary during construction; and, therefore, such changes in the plans shall be recognized as constituting a normal and accepted margin of adjustment not unusual and not involving or permitting any change or modification of unit prices, in which case payment will be made for the revised quantities at the unit price bid in the Proposal.

13.5 Application for Progress Payment:

On the 20th day of the month or the first working day thereafter, the CONTRACTOR shall submit to the ENGINEER for review an Application for Payment form filled out and signed by the CONTRACTOR. The form shall be notarized, and shall cover the work completed as of the date of the application. The Application for Payment shall be accompanied by a Schedule of Values, and any other supporting documentation as the ENGINEER may reasonably require.

13.6 Payment for Materials:

If payment is requested on the basis of materials and equipment not incorporated in the work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by such data, satisfactory to the ENGINEER, as will establish the CITY's title to the material and equipment and protect the CITY's interest therein, including applicable insurance.

13.7 Affidavit Required:

All Applications for Payment shall include an Affidavit of the CONTRACTOR stating that all previous progress payments received on account of the work have been applied to discharge in full all of CONTRACTOR's obligations reflected in prior Applications for Payment. The amount of retainage with respect to progress payments will be 10%.

13.8 Retainage:

The amount of retainage with respect to progress payments will be 10% until 50-percent completion of the construction services purchased pursuant to the Contract. After 50-percent completion of the construction services purchased pursuant to the Contract, the CITY shall reduce to 5 percent the amount of retainage withheld from each subsequent progress payment made to the CONTRACTOR. For purposes of this paragraph, the term "50-percent completion" means the point at which the CITY has expended 50 percent of the total cost of the construction services purchased as identified in the Contract together with all costs associated with existing change orders and other additions or modifications to the construction services provided for in the Contract.

13.9 CONTRACTOR's Warranty of Title:

The CONTRACTOR warrants and guarantees that title to all work, materials and equipment covered by any Application for Payment whether incorporated in the Project or not, will pass to the CITY at the time of payment free and clear of all liens, claims, security interests and encumbrances (hereinafter in these General Conditions referred to as "Liens").

13.10 Review of Application for Payment:

The ENGINEER will, within seven (7) days, review the Application for Payment and either approve and submit it for payment or notify the CONTRACTOR of the deficiencies such that the CONTRACTOR may make the necessary corrections and resubmit in time for the month's payment. However, the ENGINEER may refuse to recommend the whole or any part of any payment if, in his opinion, it would be incorrect to make such representations. He may also refuse to recommend any such payment, or because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended to such extent as may be necessary in the ENGINEER's opinion to protect the CITY from loss because:

- A. The work is defective, or completed work has been damaged requiring correction or replacement.
- B. Written claims have been made against the CITY or Liens have been filed in connection with the work.
- C. The Contract Price has been reduced because of Change Order.
- D. The CITY has been required to correct defective work or complete the work in accordance with Article 12.8.

- E. The CONTRACTOR's unsatisfactory prosecution of the work in accordance with the Contract Documents.
- F. The CONTRACTOR's failure to make payment to Sub- Contractors, or for labor, materials or equipment.

13.11 Payment to the Contractor:

Payments are made only on the fifteenth day or first workday thereafter of each month.

ARTICLE 14 - SUBSTANTIAL COMPLETION, PARTIAL UTILIZATION,
FINAL CLEAN UP, INSPECTION, PAYMENT AND ACCEPTANCE

14.1 Substantial Completion:

When the CONTRACTOR considers the entire work ready for its intended use, the CONTRACTOR shall, in writing to the ENGINEER, certify that the entire work is substantially complete and request that the ENGINEER issue a Certificate of Substantial Completion. Within a reasonable time thereafter the CONTRACTOR and the ENGINEER shall make an inspection of the work to determine the status of completion. If the ENGINEER does not consider the work substantially complete, the ENGINEER will notify the CONTRACTOR in writing giving his reasons therefor. If the ENGINEER considers the work substantially complete, the ENGINEER will prepare and deliver to the CONTRACTOR a Certificate of Substantial Completion, which shall fix the date of Substantial Completion. There shall be attached to the certificate a proposed Punch List, developed by the CONTRACTOR, of items to be completed or corrected before final payment.

Within 10 days after delivery of the certificate, the CITY shall review the proposed Punch List and either approve it or contact the CONTRACTOR to commence good faith efforts to develop a Punch List that is satisfactory to both parties. If the parties are unable to resolve any differences they may have in the development of the Punch List, the ENGINEER shall resolve their differences. The parties shall expedite the process of developing the Punch List with the intent of finalizing the Punch List within 30 days after the date of Substantial Completion.

At the time of delivery of the Certificate of Substantial Completion the ENGINEER will deliver to the CONTRACTOR written notice as to division of responsibilities pending final payment between the CITY and the CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities and insurance, said responsibilities will be binding on the CITY and the CONTRACTOR until final payment. Unless otherwise stated herein or on the Certificate of Substantial Completion, all building, product, equipment, and machinery warranties will commence on the date of Substantial Completion. The CITY shall have the right to exclude the CONTRACTOR from the work after the date of Substantial Completion, but the CITY shall allow the CONTRACTOR reasonable access to complete or correct items on the Punch List.

14.2 Partial Utilization:

Use by the CITY of any finished part of the work which has specifically been identified in the Contract Documents or which the ENGINEER and the CONTRACTOR agree constitutes a separately functioning and usable part of the work that can be used by the CITY without significant interference with CONTRACTOR's performance of the remainder of the work, may be accomplished prior to Substantial Completion of all the work subject to the following:

- A. The ENGINEER at any time may request the CONTRACTOR in writing to permit the CITY to use any such part of the work which the ENGINEER believes to be ready for its intended use and substantially complete. If the CONTRACTOR agrees, the CONTRACTOR will certify to the ENGINEER that said part of the work is substantially complete and request the ENGINEER to issue a Certificate of Substantial Completion for that part of the work. The CONTRACTOR, at any time, may notify the ENGINEER in writing that the CONTRACTOR considers any such part of the work ready for its intended use and substantially complete and request the ENGINEER to issue a Certificate of Substantial Complete for the part of the work. Within a reasonable time after either such request, the CONTRACTOR and the ENGINEER shall make an inspection of that part of

the work to determine its status of completion. If the ENGINEER does not consider that part of the work to be substantially complete, the ENGINEER will notify the CONTRACTOR in writing giving the reasons therefore. If the ENGINEER considers that part of the work to be substantially complete, the provisions of Article 14.1 will apply with respect to Certificate of Substantial Completion of that part of the work and the division of responsibility in respect thereof and access thereto. It shall be understood by the CONTRACTOR that until such written notification is issued, all responsibility for care and maintenance of all of the WORK shall be borne by the CONTRACTOR. Upon issuance of said written notice of partial utilization, the OWNER will accept responsibility for the protection and maintenance of all such items or portions of the WORK described in the written notice.

14.3 Final Clean-Up:

Upon completion of the work and before final inspection shall be made, the CONTRACTOR shall clean and remove from the site, the Right-of-Way and adjacent property, all surplus and discarded materials, rubbish, and temporary structures; restore in an acceptable manner all property, both public and private, which has been damaged during the prosecution of the work; and shall leave the site and vicinity unobstructed in a neat and presentable condition throughout the entire area or length of the work under Contract. The placing of materials of every character, rubbish, or equipment on the abutting property, with or without the consent of the property owners, shall not constitute the satisfactory disposal. If the work is of such a character as may be done by block or sections, the CONTRACTOR may be required to promptly remove and dispose of accumulated rubbish, debris or surplus materials from blocks or sections as completed or partially completed. No separate payment will be made for final cleaning up and restoration of property, but all costs thereof shall be included in the prices bid for the various scheduled items of work.

14.4 Final Inspection:

Upon written notice from the CONTRACTOR that the entire work or an agreed portion thereof is complete and final clean-up has been completed, the ENGINEER will make a final inspection with the CONTRACTOR and will notify the CONTRACTOR in writing of all particulars in which this inspection reveals that the work is incomplete or defective. The CONTRACTOR shall immediately take such measures as are necessary to remedy such deficiencies.

14.5 Final Application for Payment:

After the CONTRACTOR has completed all such corrections to the satisfaction of the ENGINEER and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, marked-up record documents (as provided in Article 7.19 of the General Conditions and other documents; all as required by the Contract Documents and after the ENGINEER has indicated that the work is acceptable (subject to the provisions of Article 14.9) the CONTRACTOR may make Application for Final Payment following the procedure for progress payments. The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents, together with complete and legally effective releases or waivers (satisfactory to the CITY) of all Liens arising out of or filed in connection with the work. In lieu thereof and as approved by the CITY, the CONTRACTOR may furnish receipts or releases in full; an affidavit of the CONTRACTOR that the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and that all payrolls, material and

equipment bills, and other indebtedness connected with the work for which the CITY or the CITY's property might in any way be responsible, have been paid or otherwise satisfied; and consent of the Surety, if any, to final payment. If any Subcontractor or Supplier fails to furnish a release or receipt in full, the CONTRACTOR may furnish a Bond or other collateral satisfactory to the CITY to indemnify the CITY against any Lien.

14.6 Final Payment and Acceptance:

If on the basis of the ENGINEER's observation of the work during construction and final inspection, and the ENGINEER's review of the final Application for Payment and accompanying documentation, all as required by the Contract Documents, the ENGINEER is satisfied that the work has been completed and the CONTRACTOR's other obligations under the Contract Documents have been fulfilled, the ENGINEER will recommend payment. Thereupon the ENGINEER will give written notice to the CITY and the CONTRACTOR that the work is acceptable subject to the provisions of Article 14.9.

14.7 Payment of Retainage Without Final Completion:

If through no fault of the CONTRACTOR, final completion of the work is significantly delayed and if the ENGINEER so confirms, the CITY shall, upon receipt of the CONTRACTOR's final Application for Payment and recommendation of the ENGINEER, and without terminating the Agreement, make payment of the balance due for the portion of the work fully completed and accepted. If the remaining balance to be held by the CITY for work not fully completed or corrected is less than the retainage stipulated in the Agreement and if Bonds have been furnished as required in Article 5.2, the written consent of the Surety to the payment of the balance due for that portion of the work fully completed and accepted shall be submitted by the CONTRACTOR to the ENGINEER with the application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

14.8 CONTRACTOR's Continuing Obligation:

The CONTRACTOR's obligation to perform and complete the work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by the ENGINEER, nor the issuance of a Certificate of Substantial Completion, nor any payment by the CITY to the CONTRACTOR under the Contract Documents, nor any use or occupancy of the work or any part thereof by the CITY nor any act of acceptance by the CITY nor any failure to do so, nor any review and approval of a Shop Drawing or sample submission, nor the issuance of a notice of acceptability by the ENGINEER pursuant to Article 14.6, nor any correction of defective work by the CITY will constitute an acceptance of work not in accordance with the Contract Documents or a release of the CONTRACTOR's obligation to perform the work in accordance with the Contract Documents (except as provided in Article 14.9).

14.9 Waiver of Claims:

The making and acceptance of final payment will constitute:

- A. A waiver of all claims by the CITY against the CONTRACTOR, except claims arising from unsettled Liens, from defective work appearing after final inspection pursuant to Article 14.4 or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it will not constitute a waiver by the CITY of any

rights in respect of the CONTRACTOR's continuing obligations under the Contract Documents.

- B. A waiver of all claims by the CONTRACTOR against the CITY other than those previously made in writing and still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.1 City May Suspend Work:

The CITY may, at any time and without cause, suspend the work or any portion thereof for a period of not more than 90 days by notice in writing to the CONTRACTOR which will fix the date on which work will be resumed. The CONTRACTOR shall resume the work on the date so fixed. The CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension.

15.2 City May Terminate:

- A. Upon the occurrence of any one or more of the following events:
1. If the CONTRACTOR commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, 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.
 2. If a petition is filed against the CONTRACTOR under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against the CONTRACTOR under any other federal or state law in effect at the time relating to bankruptcy or insolvency.
 3. If the CONTRACTOR makes a general assignment for the benefit of creditors.
 4. 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.
 5. If the CONTRACTOR admits in writing an inability to pay its debts generally as they become due.
 6. If the CONTRACTOR persistently fails to perform the work in accordance with the Contract Documents (including, but not limited to, failure to supply a qualified superintendent or sufficient skilled workers or suitable materials or equipment or failure to adhere to the approved progress schedule revised from time to time).
 7. If the CONTRACTOR disregards laws or regulations of any public body having jurisdiction.
 8. If the CONTRACTOR disregards the authority of the ENGINEER.
 9. If the CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents.
- B. The CITY may, after giving the CONTRACTOR and the Surety seven days' written notice and to the extent permitted by laws and regulations, terminate the services of the CONTRACTOR, exclude the CONTRACTOR from the site and take possession of the

work and of all the CONTRACTOR's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by the CONTRACTOR (without liability to the CONTRACTOR 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 such case the CONTRACTOR shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the Contract Price exceeds the direct, indirect and consequential costs of completing the work (including but not limited to fees and charges of engineers, architects, attorneys and other professionals, and court and arbitration costs) such excess will be paid to the CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR, or CONTRACTOR's Surety, shall pay the difference to the CITY.

- C. Where the CONTRACTOR's services have been so terminated by the CITY, the CITY alone shall determine the scope and description of the work to be completed and the method and schedule for completing it.
- D. Where the CONTRACTOR's services have been so terminated by the CITY the termination will not affect any rights or remedies 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.
- E. Upon seven days' written notice to the CONTRACTOR the CITY may, without cause and without prejudice to any other right or remedy, elect to abandon the work and terminate the Contract. In such case the CONTRACTOR shall be paid for all work executed and any expense sustained plus reasonable termination expenses, which will include, but not be limited to, direct, indirect and consequential costs (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs).

15.3 Contractor May Stop Work or Terminate:

If through no act or fault of the CONTRACTOR, the work is suspended for a period of more than 90 days by the CITY or under an order of court or other public authority, or the CITY fails for 60 days to pay the CONTRACTOR any sum finally determined to be due, then the CONTRACTOR may, upon seven days' written notice to the CITY terminate the Contract and recover from the CITY payment for all work executed and any expense sustained plus reasonable termination expenses. In addition and in lieu of terminating the Contract, if the CITY has failed to make any payment as aforesaid, the CONTRACTOR may upon seven days' written notice to the CITY stop the work until payment of all amounts then due are paid. The provisions of this paragraph shall not relieve the CONTRACTOR of the obligations to carry on the work in accordance with the progress schedule and without delay during disputes and disagreements with the CITY.

- END OF SECTION -

SECTION 00800
SUPPLEMENTARY GENERAL CONDITIONS
INDEX TO ARTICLES

1. Project Schedule	00800-2
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5. Existing Facilities and Structures	00800-6
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11. Inspections and Testing During Overtime	00800-7
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13. Owner's Contingency	00800-8

General Note:

The General Conditions refer to specific section numbers in the Supplementary General Conditions. These reference numbers may not coordinate with the actual Article numbers utilized in the Supplementary General Conditions. The CONTRACTOR shall comply with all General Conditions and all Supplementary General Conditions as well as related conditions included in the General Requirements, Division 1 of the Technical Specifications. Incorrect cross-reference numbers shall not relieve this requirement.

1. Project Schedule

Time is of the essence for this work. The following defines the schedule for the project:

CONSTRUCTION WORK SCHEDULE
CONSTRUCTION / STARTUP / ACCEPTANCE:

<u>Major Milestones</u>	<u>Completion Time (calendar days)</u>
3. Substantial Completion ⁽¹⁾	244
4. Project Closeout ⁽²⁾	274

Failure to meet any of the above defined construction/startup/acceptance completion dates shall subject the CONTRACTOR to pay damages as specified in these Supplementary General Conditions in Article 3.

The 244 calendar days to substantial completion will include all holidays, and, all rain days, etc. No time extensions will be granted for rain delays and holidays, etc.

⁽¹⁾Substantial Completion

1. Refer to General Conditions Articles 14.1 and 14.2. (Certification of Substantial Completion Services appended to the Supplementary General Conditions).
2. Substantial Completion shall also include:
 - Completion of all construction work associated with the specific "Major Milestone" listed in the construction work schedule including completion of punch list items. "Completion of punch list items" shall be as determined by the Engineer in the field.
 - Record shop drawings and O&M submittals received and accepted by the Engineer.
 - Record drawing red-lines received and accepted by the Engineer.
 - Guarantee certifications, performance affidavits, and all other certifications received and accepted by the Engineer.

Contractor shall also conform to construction sequence constraints as defined on the Drawings and in Specifications.

(2)Project Closeout

1. Refer to Division 1 General Requirements, Section 01700 Project Closeout.
2. Project Closeout shall also include:
 - All requirements of substantial completion met plus the following
 - Site cleanup and restoration completed
 - All other sitework completed
 - Minor punch list items completed (minor as defined by the Engineer in the field)
 - Demobilization completed
 - Releases from all parties who are entitled to claims

The title "Engineer" utilized in these descriptions for substantial and final completion shall mean the City staff engineer assigned to this project, or his designated representative.

2. Insurance Requirements

The insurance required by Article 5.6 of the General Conditions shall be as follows:

1. BUILDERS RISK (BR 1) - Installation Floater:

The Contractor shall be required to purchase and maintain, throughout the life of the contract, and until the project is accepted by the City, Builder's Risk Insurance on an All Risk of Loss form. Coverage shall include:

Theft	Aircraft
Windstorm	Vehicles
Hail	Smoke
Explosion	Fire
Riot	Collapse
Civil Commotion	Flood

The policy limits shall be no less than the amount of the finished project and coverage shall be provided on a completed value basis.

Property located on the construction premises, which is intended to become a permanent part of the building, shall be included as property covered.

The policy shall be endorsed permitting the City to occupy the building prior to completion without effecting the coverage.

The City of Hollywood shall be named as Additional Insured and Loss Payee.

2. GENERAL LIABILITY (GL3):

Prior to the commencement of work governed by this contract, the Contractor shall obtain General Liability Insurance. Coverage shall be maintained throughout the life of the contract and include, as a minimum:

- Premises Operations
- Products and Completed Operations
- Blanket Contractual Liability
- Personal Injury Liability
- Expanded Definition of Property Damage

The minimum limits acceptable shall be:

\$2,000,000 Combined Single Limit (CSL)

If split limits are provided, the minimum limits acceptable shall be:

\$1,000,000 per Person
\$2,000,000 per Occurrence
\$100,000 Property Damage

An Occurrence Form policy is preferred. If coverage is provided on a Claims Made policy, its provisions should include coverage for claims filed on or after the effective date of this contract. In addition, the period for which claims may be reported should extend for a minimum of twelve (12) months following the acceptance of work by the City.

The City of Hollywood shall be named as Additional Insured on all policies issued to satisfy the above requirements.

3. GENERAL LIABILITY (GLXCU):

Recognizing that the work governed by this contract involves either underground exposures, explosive activities, or the possibility of collapse of a structure, the Contractor's General Liability Policy shall include coverage for the XCU (explosion, collapse, and underground) exposures with limits of liability equal to those of the General Liability Insurance policy.

4. VEHICLE LIABILITY (VL3):

Recognizing that the work governed by this contract requires the use of vehicles, the Contractor, prior to the commencement of work, shall obtain Vehicle Liability Insurance. Coverage shall be maintained throughout the life of the contract and include, as a minimum, liability coverage for:

- Owned, Non-Owned, and Hired Vehicles

The minimum limits acceptable shall be:

\$1,000,000 Combined Single Limit (CSL)

If split limits are provided, the minimum limits acceptable shall be:

\$500,000 per Person

\$1,000,000 per Occurrence

\$100,000 Property Damage

The City of Hollywood shall be named as Additional Insured on all policies issued to satisfy the above requirements.

5. WORKERS' COMPENSATION (WC2):

Prior to the commencement of work governed by this contract, the Contractor shall obtain Workers' Compensation Insurance with limits sufficient to respond to the applicable state statutes.

In addition, the Contractor shall obtain Employers' Liability Insurance with limits of not less than:

\$500,000 Bodily Injury by Accident

\$500,000 Bodily Injury by Disease, policy limits

\$500,000 Bodily Injury by Disease, each employee

Coverage shall be maintained throughout the entire term of the contract.

Coverage shall be provided by a company or companies authorized to transact business in the state of Florida and the company or companies must maintain a minimum rating of A-VI, as assigned by the A.M. Best Company.

The policy must be endorsed to provide the City with (30) days notice of cancellation.

If the Contractor has been approved by the Florida's Department of Labor, as an authorized self-insurer, the City shall recognize and honor the Contractor's status. The Contractor may be required to submit a Letter of Authorization issued by the Department of Labor and a Certificate of Insurance, providing details on the Contractor's Excess Insurance Program.

If the Contractor participates in a self-insurance fund, a Certificate of Insurance will be required. In addition, the Contractor may be required to submit updated financial statements from the fund upon request from the City.

3. Liquidated Damages

Liquidated damages shall be paid by the CONTRACTOR to the CITY for failure to complete work on time in accordance with the following schedule:

CONSTRUCTION/STARTUP/ACCEPTANCE:

<u>Major Milestones</u>	<u>Completion Time (calendar days)</u>	<u>Liquidated Damages</u>
1. Substantial Completion	244	\$5,000/day
2. Project Closeout	274	\$5,000/day

The CITY is hereby authorized to deduct the sums described above from the monies which may be due to the CONTRACTOR for the work under this contract. Liquidated damages shall be additive such that the maximum total which may be deducted shall be \$5,000/day. Other damages for failure to meet warranty conditions as defined in other sections of the Specifications shall also be added with liquidated damages for failure to meet completion times.

4. Restricted Area

The CONTRACTOR shall, in installing the new facilities, confine all activities within the CITY property, easement, and right-of-ways indicated.

5. Existing Facilities and Structures

All existing facilities shall be protected, and if damaged, shall be repaired by the CONTRACTOR at no additional cost to the CITY.

6. Explosives

Explosives shall not be used on this project.

7. Contract Documents

The CITY will provide the CONTRACTOR with 1 (1) set of Contract Documents after the Notice to Proceed.

8. Required Notifications

When provisions of the pertinent codes, standards or regulations conflict with this Specification, the more stringent shall apply.

Prior to any site work, the CONTRACTOR shall notify the Engineering and Construction Services Division Inspector at (954) 921-3930.

Prior to excavation at the site, the CONTRACTOR shall notify the appropriate utilities and Sunshine State One-Call of Florida, Inc. (formerly U.N.C.L.E.) at 1-800-432-4770 for locations of buried utilities.

Prior to closure of any CITY streets or alleyways, or other activity which requires the diversion of traffic, the CONTRACTOR shall notify and obtain the permission of the CITY of Hollywood Fire and Police Communications Section at (954) 967-4321.

9. Notice of Completion

See attached form.

10. Prevailing Wage Requirement

- A. The CONTRACTOR shall be responsible for ensuring payment of the rate of wages and fringe benefits, or cash equivalent, for all laborers, mechanics and apprentices employed by him/her or his/her SUBCONTRACTORS on the work covered by this contract which shall be not less than the prevailing rate of wages and fringe benefits payment or cash equivalent for similar skills or classifications of work as established by the General Wage Decision by the United States Department of Labor for Broward County, Florida that is in effect prior to the date the CITY issued the invitation for bids for this project (the prevailing rate of wages and fringes can be obtained at website <http://www.access.gpo.gov/davisbacon>).

If the General Wage Decision fails to provide for a fringe benefit rate for any worker classification, then the fringe benefit rate applicable to such worker classification shall be the fringe benefit rate that has a basic wage rate closest in dollar amount to the work classification for which no fringe benefit rate has been provided.

- B. Upon commencement of work, the CONTRACTOR and all of his/her SUBCONTRACTORS shall post a notice in a prominent place at the work site stating the requirements of this Article.
- C. As per the City of Hollywood Code of Ordinances, Prevailing Wage Requirements and Fringe Benefits are applicable to the following: (A) Utilities projects over \$1,000,000.00 (one million dollars) and (B) All other projects over \$500,000.00 (five hundred thousand dollars).

11. Inspections and Testing During Overtime

- A. The following supplement Article 3.15 and 3.16 of the General Conditions:

For weekend work, CONTRACTOR shall submit a written request to the CITY by the preceding Wednesday. A separate request is required for each week that the CONTRACTOR wished to work on a weekend. For evening and holiday work, CONTRACTOR shall submit a written request to the CITY 3 days in advance. The CITY will provide inspection services for all overtime work and the CONTRACTOR shall pay for inspection services per Article 3.15, no exceptions.

Similarly, holiday and other overtime work shall be requested a minimum of 36-hours in advance and CITY will provide inspection for all overtime.

- B. Exceptions to the hours and days of the week for work and other related limitations are allowed only for tie-ins during low flow periods / early morning hours, coatings that need to be applied during lower temperature times of the day and whenever the Documents specifically define that work shall be completed outside of the limitations for "normal" work hours, days, etc.

Inspection for tie-ins during low flow/early morning and specialty coating application performed during nighttime will not be cause for extra inspection costs unless such work is remedial in nature as a result of defective work.

12. Retainage

After 50-percent completion of the construction services purchased pursuant to this contract, CONTRACTOR may present to CITY a payment request for one-half of the retainage then held by CITY. CITY shall promptly make payment to CONTRACTOR, unless CITY has grounds for withholding the payment of retainage. CITY shall have grounds for withholding the payment of retainage with respect to any amounts that are the subject of a good-faith dispute, the subject of a claim brought pursuant to Florida Statute Section 255.05, or otherwise the subject of a claim or demand by CITY or CONTRACTOR.

At acceptance of Substantial Completion, CITY shall promptly make payment to CONTRACTOR of one-half of the retainage then held by CITY. At acceptance of completion of all punch list items, CITY shall promptly make payment to CONTRACTOR the balance of retainage then held by CITY.

13. Owner's Contingency

This allowance is in its entirety dedicated for the use of the Owner (The City of Hollywood) to address conditions (or work) associated with undefined conditions. All work resulting from undefined conditions shall be authorized in writing and in advance by the Owner, specifically the Director of Public Services, through the full execution of a Field Order. The actual amount to be paid per Field Order will be negotiated and agreed by both parties (the Owner and the Contractor). The final/negotiated amount of the field order will be deducted from the Owner's Allowance designated in the Bid Proposal and Schedule of Values. The Owner reserves the right to award none, any portion of, or all of the money associated with this allowance. By executing the CONTRACT between the City of Hollywood and the Contractor, the Contractor acknowledges that under no circumstances he or she should assume that he or she would be entitled to any amounts set aside by the City of Hollywood within the Owner's Allowance.

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT: REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

ENGINEER: Engineering Construction Services Division

TO:

CONTRACTOR:

CONTRACT FOR:

NOTICE TO PROCEED DATE:

DATE OF ISSUANCE:

PROJECT OR DESIGNATED PORTION SHALL INCLUDE:

Portions of the work performed under this Contract as described above, have been reviewed and found to be substantially complete. The Date of Substantial Completion of Project or designated portion thereof designated above is hereby established as _____ which is also the date of commencement of applicable warranties required by the Contract Documents for the noted area.

DEFINITION OF DATE OF SUBSTANTIAL COMPLETION

The Date of Substantial Completion of the work or designated portion thereof is the date certified by the ENGINEER ("Date of Issuance" above) when construction is sufficiently complete, in accordance with the Contract Documents, so the CITY can occupy or utilize the work or designated portion thereof for the use for which it is intended, as expressed in the Contract Documents.

A list of items to be completed or corrected, prepared by the CONTRACTOR and verified and amended by the ENGINEER, for the above referenced "Project or Designated Portion" is attached to this form (attached "Punch List" dated _____).

The failure to include any items on such list does not alter the responsibility of the CONTRACTOR to complete all work in accordance with the Contract Documents.

CERTIFICATE OF SUBSTANTIAL COMPLETION

Please note that in accordance with Article 14 General Conditions, the Contractor retains full responsibility for the satisfactory completion of all work regardless of whether the Owner occupies and / or operates a part of the facility and that the taking possession and use of such work shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents.

City of Hollywood ECSD

ENGINEER **BY** **DATE**

CONTRACTOR **BY** **DATE**

The CITY OF HOLLYWOOD, through the City's authorized representative, accepts the work or designated portion thereof as substantially complete and will assume full possession thereof at _____ (time) on _____ (date).

_____ **BY** **DATE**

- END OF SECTION -

SECTION 00900

ADDENDA

(Addenda are attached.)



**CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES**

ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33022
Phone (954) 921-3930 Fax (954) 921-3258

ADDENDUM NO. 1 (19-7100)

Date: **October 29, 2020**

FOR: **Hallandale Beach Force Main and Large User Meter LUM-07**

FILE NUMBER: **19-7100**

ALL BIDDERS BE ADVISED OF THE FOLLOWING CHANGES TO THE ABOVE REFERENCED PROJECT AS LISTED BELOW:

This addendum is issued as part of the Bidding Documents for the above described project. The changes incorporated in this addendum shall be considered as a part of the documents and shall supersede, amend, add to, clarify, or subtract from those conditions shown in the original documents dated September 2020. The bidder shall coordinate all modifications herein with all trades and disciplines related to the work. The Bidder shall acknowledge receipt of this addendum by addendum number and date on Section 00300, "Proposal". **Failure to do so may subject Bidder to disqualification.**

Item 1: Bidder Questions

1. See below for questions received in email No. 1:
 - a. Could you please confirm the estimated value for the above reference project?
Response: The budgeted estimated construction cost is \$1,848,000.
 - b. Can you please confirm the above reference project completion date?
Response: Substantial completion of the project must be within 244 days with final completion within 274 days. See attached revised Spec Section 00300.
2. What is the estimate cost of construction for this project?
Response: Refer to question 1a response above.
3. See below for questions received in email No. 7:
 - a. What are the approximate lengths, sizes and type of pipes to be replaced on the sewer?
Response: Refer to bid documents. Information requested is in bid documents.
 - b. Are there portions to be bored?
Response: Refer to bid documents. Information requested is in bid documents.



**CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES**

ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33022
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ADDENDUM NO. 1 (19-7100)

- c. Will the portions be directionally bored or jack and bored?
Response: Refer to bid documents. Information requested is in bid documents.
 - d. What are the lengths and sizes of the portions to be bored?
Response: Refer to bid documents. Information requested is in bid documents.
 - e. How much is the required bid bond for the project?
Response: Refer to bid documents. Information requested is in bid documents.
 - f. How much is the cost estimate of the project?
Response: Refer to question 1a response above.
 - g. Do you have any further details you wish to provide?
Response: No further details to provide.
4. In the interest of the City receiving at least 3 competitive bids, we request that the City approves Champion Controls as one of the System Supplier / Integrator (Instrumentation subcontractor) to provide the Utility Control Instrumentation as defined in Spec Section 13300. Champion Controls is a local Broward County CBE firm that meets the specification requirement and has prior experience providing similar systems to municipalities in Florida including Hollywood and Hallandale Beach in the past.
Response: Per Section 13300, the following system supplier/integration (instrumentation subcontractors) are to be Curry Controls of Lakeland, Florida, or CC Control Corp. of West Palm Beach, Florida.
5. Please advise the project estimate for subject project.
Response: Refer to question 1a response above.
6. The project plans and bid form, Bid Item #5, call out 20" DR11 HDPE FM for the Horizontal Directional Drill (HDD) segment of the project. Section 02665 – Horizontal Directional Drill, 2.01, specifies Fusible PVC and HDPE pipe. Can you please confirm 16" DR18 Fusible PVC® pipe is acceptable material for the FM HDD segment?
Response: The City will only allow HDPE for the HDD. FPVC is not acceptable.
7. See below for questions received in email No. 7:
- a. Please identify pipe material of existing 30" FM.
Response: Per City's GIS, the existing 30" FM material is DIP. The Contractor is to field verify and confirm.



CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES

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ADDENDUM NO. 1 (19-7100)

- b. Please provide as-built drawings of existing 30" FM.
Response: There are no available as-built drawings for the existing 30" FM.
- c. Please identify pipe material of existing 10" FM.
Response: Per City GIS, the existing 10" FM material is DIP. The Contractor is to field verify and confirm.
- d. Please provide as-built drawings of existing 10" FM
Response: There are no available as-built drawings for the existing 10" FM.
- e. How long can the 10" pipe segment, between proposed 10" line-stops at meter station, be off line once line stops are engaged? On page C-103 the proposed 10" line stops are drawn in as if they were "insertion valves" with corresponding riser and valve box. Please clarify that the proposed line stops are not insertion valves.
Response: Maximum allowed time for shutdown is 2 hours. Please refer to Exhibit 1 of this Addendum for revised sheets C-102, C-103 and C-201.
- f. On page C-103 there is a proposed 10" line stop just south of meter station and on Page C-102 there another 10" line stop just north of metering station. However, bid item # 10 shows only one line stop. Please clarify.
Response: Please refer to Exhibit 1 of this Addendum for revised sheets C-102 and C-103.
- g. On page C-209 there is a proposed single 30" "Linestop Alternate" at station 104+95. However, bid item # 9 reads Furnish & Install 30" "Double Line stops with Bypass". Please clarify.
Response: The correct item is Furnish & Install 30" Line Stop. Please refer to revised Sections 00301 and 1025. Also refer to revised sheet C-209.
- h. What is the engineer's estimate?
Response: Refer to question 1a response.
8. See below for questions received in email No. 8:
- a. Please provide approved paving details for all full depth roadway reconstruction.
Response: Only the Alley will require full roadway reconstruction. Refer to Exhibit 1 for additional detail on sheet C-501.
- b. Please provide the asphalt type and spec to be used in the 1" mill and overlay pay item.
Response: Refer to Section 02510 and City of Hollywood Pavement Restoration Detail on the plans.



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ENGINEERING AND CONSTRUCTION SERVICES DIVISION

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ADDENDUM NO. 1 (19-7100)

- c. Please provide details for Alley Reconstruction related to the asphalt type & thickness.
Response: Refer to Exhibit 1 for additional detail on sheet C-501
- d. Please confirm that permanent pavement restoration within the trench line is incidental to the installation of the force main.
Response: Confirmed.
- e. Spec section 2510 references Type S-III gradation testing as well as FDOT Superpave. Please provide clarification as to which is correct.
Response: Use Type SP-9.5.
9. Under which pay item is the replacement of concrete driveways to be paid?
Response: Driveways removal and restoration of different materials are to be paid under pay items Nos. 4, 5, 6, 7, 8, 9, 10, 11.
10. See below for questions received in email No. 10:
- a. Is 30" Existing Plug Valve located, at STA: 104+84.87 (on Page C-209), mechanical joint or flanged?
Response: Contractor to field verify existing valve.
- b. What water source is available for flushing/pigging?
Response: A fire hydrant metered water source is available for Contractor use. The Contractor must obtain a temporary meter through City customer service, provide all equipment for connection and pay for all construction water used.
- c. Is the existing 30" pipe restrained where the proposed line stop is to be installed?
Response: Contractor is to field verify if the existing piping is restrained and provide for restraint as necessary if it is not.
- d. Is the existing 10" pipe restrained where the proposed line stops are to be installed?
Response: Contractor is to field verify if the existing piping is restrained and provide for restraint as necessary if it is not.
11. In specification section 13300;2.01;B., there is an ultrasonic level transmitter specified for the application. The ultrasonic level transmitter cannot be located in the contract plans. Please advise.
Response: Ultrasonic level transmitter not required. Refer to revised section 13300.
12. I'm writing to graciously request the Permax-CTF™ lining system be added to your master specifications as an acceptable ductile iron pipe/fitting sewage conveyance lining system for complete protection from potential H₂S degradation
Response: Ductile Iron Pipe Fittings shall be lined per section 15060.



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13. The specification section 11305 does not provide construction details for the 10" magnetic flow meter. Please advise.

Response: See sheet C-103. Install per Manufacturer's specifications.

14. See below for questions received in email No. 14:

- a. On Sheet C-101, please clarify if the trees to be removed and replaced are to be replaced new or relocated and replanted. If has to be replaced new, please provide tree inventory with minimum size.

Response: The Contractor shall perform a site review to identify types and sizes of existing trees for removal. Existing trees that are removed and replaced must match the tree(s) in size and type.

- b. On Sheet C-205, please clarify if the trees to be removed and replaced are to be replaced new or relocated and replanted. If has to be replaced new, please provide tree inventory with minimum size.

Response: The Contractor shall perform a site review to identify types and sizes of existing trees for removal. Existing trees that are removed and replaced must match the tree(s) in size and type.

- c. Please provide an Item to Connect to existing 30" valve.

Response: Connection/reconnections are included in the FM LF bid item No. 4.

- d. Please clarify if Item 13 is for a 1" Mill and Overlay for FDOT ROW, usually FDOT requires 1.5" Mill with 1.5" Resurface with FC 9.5.

Response: 1.5" of milling and resurfacing in required within FDOT's ROW limits. Please refer to revised section 01025 and 00300.

- e. Please advise if this project requires ALL Domestic Material.

Response: Yes, domestic ductile iron pipe, fittings and valves are required per City Standards, as applicable.

- f. Please clarify that Builder's Risk Insurance is required for this project. Generally, it's not required for this scope of work.

Response: Builder's Risk Insurance is not required for this project. See revised Section 00800.

- g. Please advise if underground geotextile are required for this project.

Response: If there is existing geotextile material that is impacted, it must be restored/repared. Contractor is to field verify if there is existing geotextile fabric within the project limits.



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ADDENDUM NO. 1 (19-7100)

- h. For items 9 & 10, please advise if permanent insertion valves are required for this project.
Response: Linestops are intended to be temporary. Please refer to revised sections 00301 and 01025.
- i. Please advise if the security deposit for Broward County can be provided in the form of a bond.
Response: The Bid Bond is 10% of the bid price. Contractors can cut a 10% check to the City based on their bid price. However, the check will not be refunded until the contract is awarded.
- j. Please advise if working withing a Railroad ROW is required for this project. If yes, will the city reimburse contractor for required Railroad Flagmen.
Response: Per the project plans, there is no railroad ROW within the project limits.
- k. Please advise if PCCP is expected to be encountered on this project.
Response: PCCP facilities are not known to be within the project corridor but may be present.
- l. Please advise if the City will pay for asphalt and concrete testing as they are for Density testing.
Response: Yes, the City will pay for asphalt, concrete and density testing.
- m. Please advise if Asbestos Concrete Pipe is expected to be encountered on this project.
Response: AC pipe is not known to be within the project corridor but may be present.
- n. Please advise if Vibration Monitoring is mandatory for this project of left up to the discretion of the contractor.
Response: Vibration Monitoring is not anticipated as being required for this project as the project is within the ROW limits and/or an existing easement. It will be at the discretion of the Contractor.
- o. Please advise if Temporary Excavation System is mandatory for this project of left up to the discretion of the contractor.
Response: Yes, it is mandatory for this project.
- p. Please advise the quantity of test boxes are required for location wire for this project.
Response: There are no required test station boxes.
- q. Please advise if torque limiting device is required for this project.
Response: Yes, it is required for this project.



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ADDENDUM NO. 1 (19-7100)

- r. Please provide a contamination disposal allowance in order for the city to receive fair bid across all contractors being that it is more than likely contaminated ground water is within the Radius of Influence.

Response: Please see revised contaminated sites exhibit. Contractor to review. No contamination disposal allowance will be provided.

15. Which manufacturer is going to supply the control panel, flow meter, RTU, Antenna Tower Mast, Yagi, Radio, Transmitter, Rate Indicator, FIT.

Response: The General Contractor shall determine scope of supply between vendors and subcontractors. A complete system shall be furnished with equipment that is compliant with the specifications.

16. See below for questions received in email No. 16:

- a. After reviewing the bid documents, what is the Budget or Engineer's estimate?

Response: See response to 1a.

- b. Please clarify Bid Item # 9 the 30" Double Line Stop, is this an alternate as stated on sheet C-209? There is an existing 30" Valve which is closed, can't we make the connection then open valve? Do we need the line stop?

Response: The linestop is provided in case the valve is not operational. City staff should be coordinated with to ensure that the existing valve is operational or provide the linestop.

- c. What is happening at the end of the job on S 15 Ave with the existing 8" FM. It shows a cut and plug but there is no note. Please clarify.

Response: Existing 8" FM is being cut, capped and abandoned. Refer to revised sheet C-209.

- d. The pay Item Description for the Alley Reconstruction in the specifications calls out the removal of geotextile material, so are we also removing the base? the description contradicts itself, when it states to remove the existing asphalt and recompact the base, but in another sentence, we are removing geotextile which is normally below the base and above the sub base. What is the typical section for the reconstructed Alley?

Response: If there is existing geotextile material that is impacted, it must be restored/repared. Contractor is to field verify if there is existing geotextile fabric within the project limits. Please refer to additional detail for Alley reconstruction on sheet C-501.

- e. In order to determine where we will cut the existing force main to be grouted, we need to see the entire run of the existing force main. The plans have a missing portion of the existing run outside of the proposed new force main alignment. 5. Looking at the route for



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ADDENDUM NO. 1 (19-7100)

the force main we are no where near the Railroad R/W, why include MOT plans if working within railroad R/W? Are we missing something? Is it the abandonment of the existing force main?

Response: Survey is not available for the entire run of the existing force main to be grouted. Refer to Appendix F exhibit. Per the project plans, there is no railroad ROW within the project limits.

- f. The LUM-07 Site plan calls out for trees to be removed. Is there any information on the size and type of trees, looking at google earth they seem to be substantial trees with extensive root systems? Also, other trees are called to be removed and replaced. What are we to replace them with?

Response: The Contractor shall perform a site review to identify types and sizes of existing trees for removal. Existing trees that are removed and replaced must match the tree(s) in size and type.

- g. Is the City providing any of the Telemetry components, Antenna?

Response: No.

- h. For our MOT, will we be required to hire local police as part of the required MOT?

Response: The Contractor will be required to provide all means necessary to meet both City and FDOT MOT requirements.

- i. Are there locations along the project alignment that have contamination?

Response: Review the revised contamination exhibit in the Appendices and check FDEP's website as required per the contract documents for contaminated sites.

- j. After reviewing the bid documents, what is the Budget or Engineer's estimate?

Response: Refer to question 1a response above.

17. There is no detail for electrical equipment rack for Flow Meter Site Electrical. Can one be provided?

Response: Please see revised sheet E-101 on Exhibit 1 of this Addendum.

Item 2: Revisions/Additions to Drawings and Details

Please refer to Exhibit 1 of this addendum for revised plan sheets:

- C-102
- C-103
- C-201
- C-209
- C-501
- E-101



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ADDENDUM NO. 1 (19-7100)

Item 3: Specifications Revisions

Replace the following technical specifications with those contained in Exhibit 2 of this addendum.

- Section 00300
- Section 00301
- Section 00800
- Section 01025
- Section 01030
- Section 02510
- Section 02665
- Section 11312
- Section 13300

Item 4: Pre-bid Meeting Notes

Attached in Exhibit 3 are the mandatory pre-bid meeting notes.

Item 5: Contaminated Sites Exhibit

Attached in Exhibit 4 is the updated FDEP contaminated sites exhibit.

ALL OTHER TERMS, CONDITIONS AND SPECIFICATIONS SHALL REMAIN THE SAME.

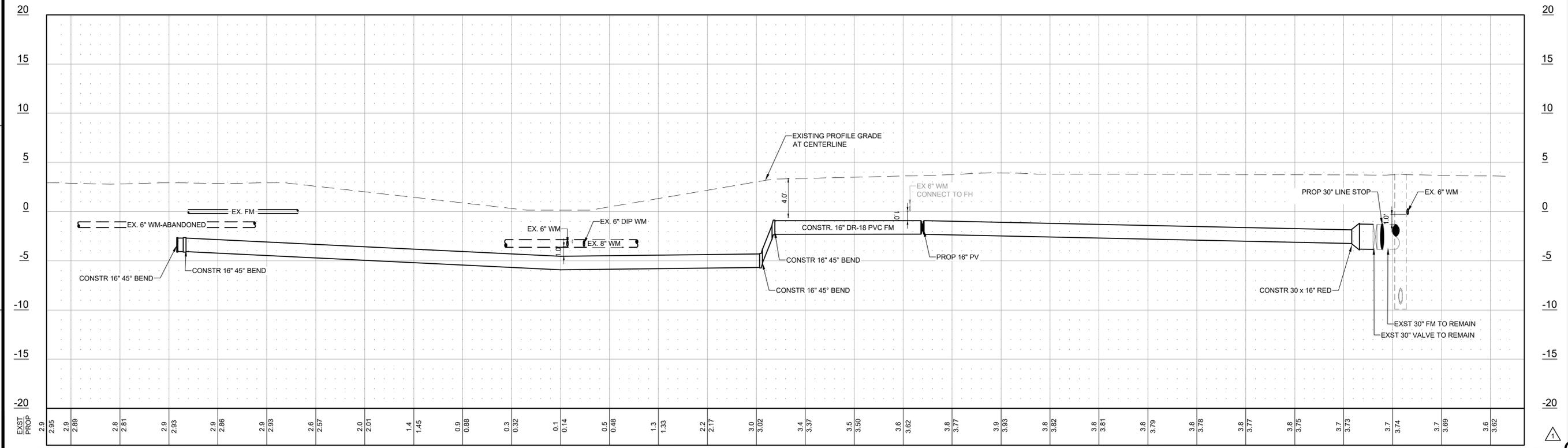
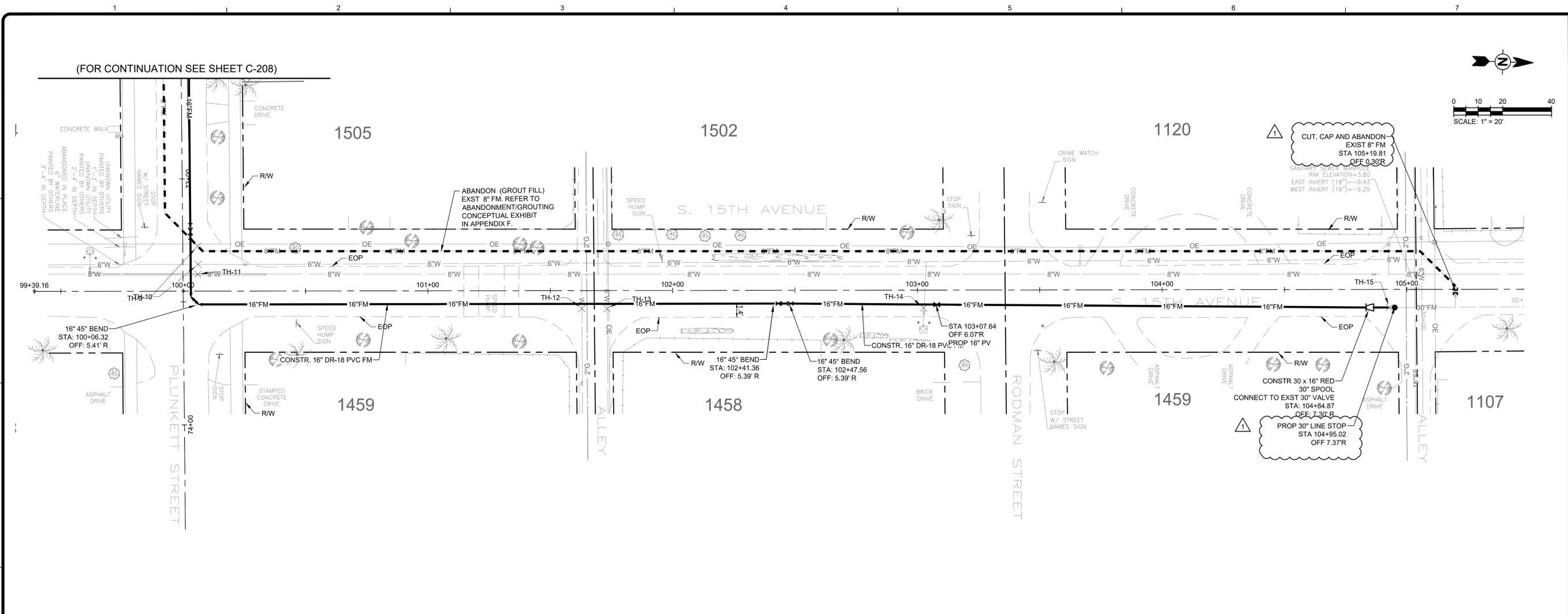
THIS ADDENDUM SHALL BE ATTACHED TO THE CONTRACT DOCUMENTS AND THE RECEIPT OF THE SAME SHALL BE NOTED IN THE PROPOSAL IN THE SPACE PROVIDED.

x 

Clece Aurelus, P.E., Engineering Support Services Manager
Department of Public Utilities – ECSD

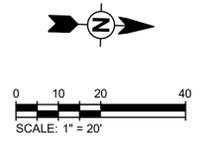
EXHIBIT 1 - REVISED PLAN SHEETS

10/28/2020 10:49:52 AM - C:\PROJECTS\ORLANDO\IER16428\200-16428-19001\CAD\SHSHEETFILES\C-209 SOUTH 15TH AVENUE PLAN\PROFILE.DWG - ESCAMILLACERO, ANGELA



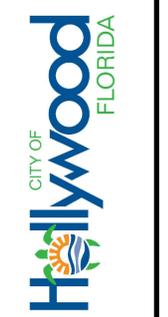
PROFILE SOUTH 15TH AVENUE
SCALE: HORIZ: 1"=20' VERT: 1"=5'

(FOR CONTINUATION SEE SHEET C-208)



TETRA TECH
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HOLLYWOOD, FLORIDA 33021
PHONE: (954) 364-1753

IANNE M. ALEXANDER, P.E.
P.E. No. 59244, FL
DATE



MARK	DATE	DESCRIPTION
1	10/23/20	ADDENDUM NO. 1

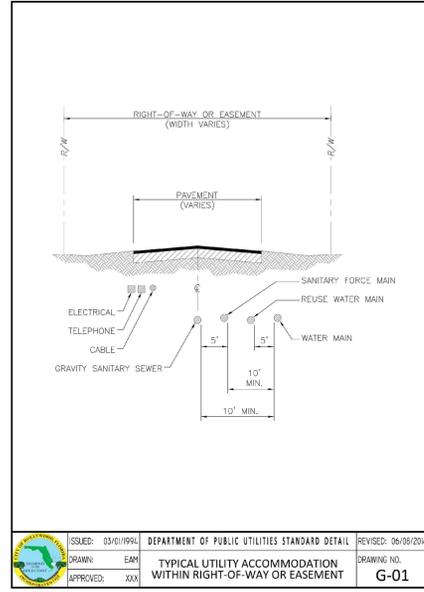
CITY OF HOLLYWOOD
REPLACEMENT OF HALLANDALE BEACH FORCE MAIN
AND LARGE USER METER - LUM 07
**SOUTH 15TH AVENUE
PLAN AND PROFILE**

Project No.: 200-16428-19001
Designed By: JMA
Drawn By: TMB/MM
Checked By: IMA/KC

C-209

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10/28/2020 10:49:20 AM - C:\PROJECTS\ORLANDO\IER16428\200-16428-19001\CADD\SHEETFILES\C-200 DETAILS DWG - ESCAMILLAACERO, ANGELA



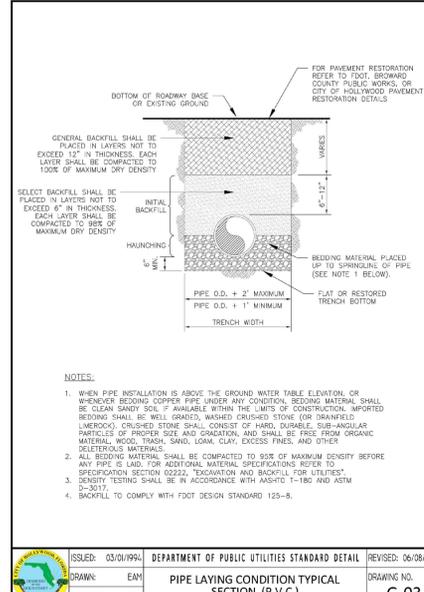
ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 06/08/2014
 DRAWN: EAM
 APPROVED: XXX
 TYPICAL UTILITY ACCOMMODATION WITHIN RIGHT-OF-WAY OR EASEMENT
 DRAWING NO. G-01

WATER MAIN SEPARATION IN ACCORDANCE WITH F.A.C. RULE 62-555.314

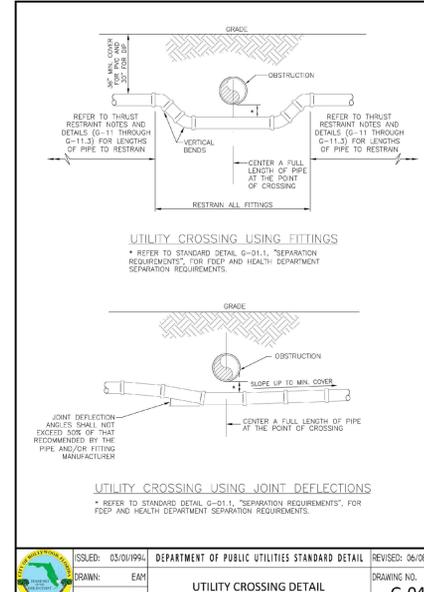
OTHER PIPE	HORIZONTAL SEPARATION	CROSSING (1), (4)	JOINT SPACING (FULL JOINT CENTERED) (8)
STORM SEWER, STORM WATER FORCE MAIN, RECLAIMED WATER	3 ft minimum	3 ft minimum	Alternate 3 ft minimum
GRAVITY SANITARY SEWER (2) SANITARY SEWER FORCE MAIN, RECLAIMED WATER	10 ft preferred (6 ft minimum)	10 ft preferred (6 ft minimum)	Alternate 6 ft minimum
ON-SITE SEWAGE TREATMENT & DISPOSAL SYSTEM	10 ft minimum		

- WATER MAIN SHOULD CROSS ABOVE OTHER PIPE, WHEN WATER MAIN MUST BE BELOW OTHER PIPE, THE MINIMUM SEPARATION IS 12 INCHES.
- RECLAIMED WATER REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.
- 3 FT FOR GRAVITY SANITARY SEWER WHERE THE BOTTOM OF THE WATER MAIN IS LAID AT LEAST 6 INCHES ABOVE THE TOP OF THE GRAVITY SANITARY SEWER.
- 18" VERTICAL MINIMUM SEPARATION REQUIRED BY CITY OF HOLLYWOOD, UNLESS OTHERWISE APPROVED.
- A MINIMUM 6 FOOT HORIZONTAL SEPARATION SHALL BE MAINTAINED BETWEEN ANY TYPE OF SEWER AND WATER MAIN IN PARALLEL INSTALLATIONS WHENEVER POSSIBLE.
- IN CASES WHERE IT IS NOT POSSIBLE TO MAINTAIN A 10 FOOT HORIZONTAL SEPARATION, THE WATER MAIN MUST BE LAID IN A SEPARATE TRENCH OR ON AN UNDISTURBED EARTH SHELF LOCATED ON ONE SIDE OF THE SEWER OR FORCE MAIN AT SUCH AN ELEVATION THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER, WHERE IT IS NOT POSSIBLE TO MAINTAIN A VERTICAL DISTANCE OF 18 INCHES IN A PARALLEL INSTALLATION, THE WATER MAIN SHALL BE CONSTRUCTED OF 6" AND THE SANITARY SEWER OR FORCE MAIN SHALL BE CONSTRUCTED OF 10" WITH A MINIMUM VERTICAL DISTANCE OF 6 INCHES. THE WATER MAIN SHOULD ALWAYS BE ABOVE THE SEWER. JOINTS ON THE WATER MAIN SHALL BE LOCATED AS FAR APART AS POSSIBLE FROM JOINTS ON THE SEWER OR FORCE MAIN (STAGGERED JOINTS).
- ALL JOINTS ON THE WATER MAIN WITHIN 20 FEET OF THE CROSSING MUST BE MECHANICALLY RESTRAINED.

ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 10/06/2017
 DRAWN: EAM
 APPROVED: XXX
 SEPARATION REQUIREMENTS F.D.E.P.
 DRAWING NO. G-01.1



ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 06/08/2014
 DRAWN: EAM
 APPROVED: XXX
 PIPE LAYING CONDITION TYPICAL SECTION (P.V.C.)
 DRAWING NO. G-03

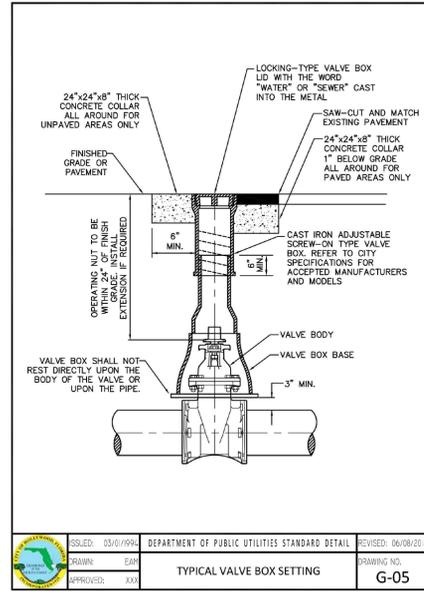


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 DRAWN: EAM
 APPROVED: XXX
 UTILITY CROSSING DETAIL
 DRAWING NO. G-04

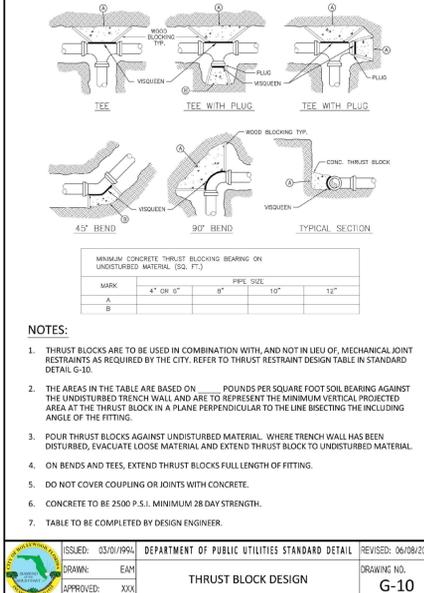
FLEXIBLE PAVEMENT RESTORATION NOTES:

- THE ABOVE DETAILS APPLY ONLY TO ASPHALT PAVEMENT RESTORATION OVER UTILITY TRENCHES CUT WITHIN CITY OF HOLLYWOOD RIGHTS-OF-WAY. FOR PAVEMENT RESTORATION WITHIN BROWARD COUNTY OR FOOT RIGHTS-OF-WAY REFER TO THE CORRESPONDING DETAILS FOR THOSE AGENCIES.
- LIMEROCK BASE MATERIAL SHALL HAVE A MINIMUM L.B.R. OF 300 AND A MINIMUM CARBONATE CONTENT OF 70%. REPLACED BASE MATERIAL OVER TRENCH SHALL BE A MINIMUM OF 12" THICK.
- LIMEROCK BASE MATERIAL SHALL BE PLACED IN 12" MAXIMUM (LOOSE MEASUREMENT) THICKNESS LAYERS WITH EACH LAYER THOROUGHLY ROLLED OR TAMPED AND COMPACTED TO 100% OF MAXIMUM DENSITY PER ASHTO T-180, PRIOR TO THE PLACEMENT OF THE SUCCEEDING LAYERS.
- STABILIZED SUBGRADE MATERIAL SHALL BE GRANULAR AND SHALL HAVE A MINIMUM L.B.R. OF 40.
- BACKFILL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH THE PIPE LAYING CONDITION TYPICAL SECTIONS IN DETAILS G-02 AND G-03, AND THE SPECIFICATIONS, BUT TESTING WILL BEGIN 12" ABOVE THE INSTALLED FACILITY.
- ALL EDGES AND JOINTS OF EXISTING ASPHALT PAVEMENT SHALL BE SAW CUT TO STRAIGHT LINES, PARALLEL TO OR PERPENDICULAR TO THE ROADWAY, PRIOR TO THE RESURFACING.
- RESURFACING (TYPING 2" FOR TEMPORARY PAVEMENT) AND SHALL BE APPLIED A MINIMUM OF TWO INCH IN THICKNESS.
- MILL AND BUTT JOINT TO EXISTING PAVEMENT.
- IF THE TRENCH IS FILLED TEMPORARILY, IT SHALL BE COVERED WITH A 2" ASPHALTIC CONCRETE PATCH TO KEEP THE FILL MATERIAL FROM RAVELING UNTIL REPLACED WITH A PERMANENT PATCH.
- REFER TO SPECIFICATIONS FOR DETAILED PROCEDURES.
- WHERE THE UTILITY TRENCH CROSSES EXISTING ASPHALT DRIVEWAYS, THE LIMEROCK BASE THICKNESS MAY BE A MINIMUM OF 6 INCHES THICK, REGARDLESS OF THE EXTENT OF IMPACT. THE ENTIRE DRIVEWAY SURFACE BETWEEN THE EDGE OF THE ROADWAY PAVEMENT AND PROPERTY LINE OR FRONT OF SIDEWALK SHALL BE OVERLAP USING 2 INCH THICK MINIMUM ASPHALTIC CONCRETE SURFACE COURSE WHERE INDICATED ON THE PLANS OR AS DIRECTED BY THE CITY ENGINEER.

ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 10/06/2017
 DRAWN: EAM
 APPROVED: XXX
 FLEXIBLE PAVEMENT RESTORATION NOTES
 DRAWING NO. G-12



ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 06/08/2014
 DRAWN: EAM
 APPROVED: XXX
 TYPICAL VALVE BOX SETTING
 DRAWING NO. G-05

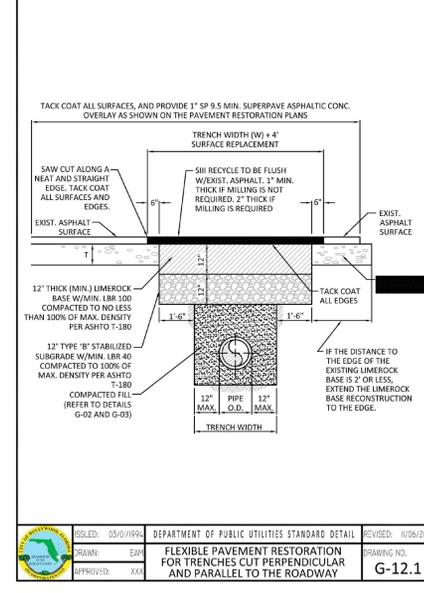


ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 06/08/2014
 DRAWN: EAM
 APPROVED: XXX
 THRUST BLOCK DESIGN
 DRAWING NO. G-10

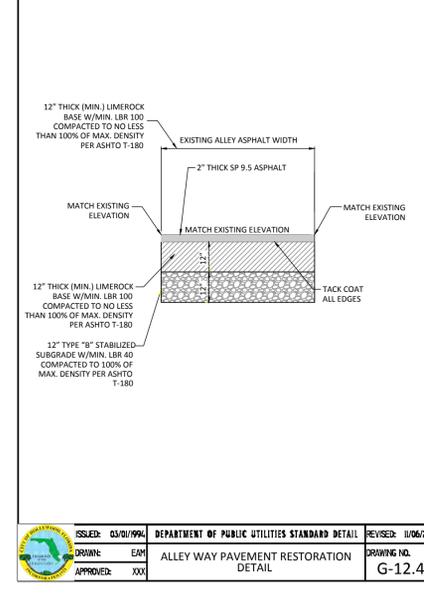
THRUST RESTRAINT NOTES:

- ALL JOINTS BETWEEN BENDS AT HORIZONTAL & VERTICAL OFFSETS SHALL BE RESTRAINED.
- MECHANICAL THRUST RESTRAINTS FOR D.I.P. FITTINGS ON D.I.P. OR P.V.C. PIPE SHALL BE MEGALUG AS MANUFACTURED BY EBA IRON, INC., OR APPROVED EQUAL.
- DUCTILE IRON FITTINGS UP TO 20 INCHES IN DIAMETER SHALL BE RESTRAINED BY MECHANICAL MEANS, I.E., MEGALUGS OR APPROVED EQUAL.
- DUCTILE IRON FITTINGS 24 INCH IN DIAMETER AND ABOVE SHALL BE RESTRAINED BY MECHANICAL MEANS, I.E., MEGALUGS OR APPROVED EQUAL, WITH THE ADDITION OF THRUST BLOCKS AND CONCRETE ANCHORS AT THE DISCRETION OF THE ENGINEER OF RECORD.
- ANY THRUST BLOCKS AND ANCHORS ARE TO BE DESIGNED BY THE ENGINEER OF RECORD, SIGNED AND SEALED. CALCULATIONS SHALL BE SUBMITTED TO THE CITY FOR APPROVAL PRIOR TO INSTALLATION.
- THRUST BLOCKS CONSISTING OF POURED-IN-PLACE CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2,500 PSI AFTER 28 DAYS.

ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 06/08/2014
 DRAWN: EAM
 APPROVED: XXX
 JOINT RESTRAINT DESIGN FOR PVC AND DIP THRUST RESTRAINT NOTES
 DRAWING NO. G-11



ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 10/06/2017
 DRAWN: EAM
 APPROVED: XXX
 FLEXIBLE PAVEMENT RESTORATION FOR TRENCHES CUT PERPENDICULAR AND PARALLEL TO THE ROADWAY
 DRAWING NO. G-12.1



ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 10/06/2017
 DRAWN: EAM
 APPROVED: XXX
 ALLEY WAY PAVEMENT RESTORATION DETAIL
 DRAWING NO. G-12.4

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 www.tetra.tech.com
 4601 SHERIDAN STREET, SUITE 212
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 PHONE: (954) 364-1753

JANINE M. ALEXANDER, P.E.
 P.E. No. 59244, FL
 DATE

CITY OF HOLLYWOOD
 FLORIDA

MARK	DATE	DESCRIPTION
1	10/28/20	ADDENDUM NO. 1

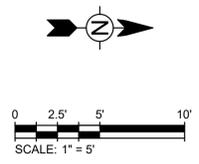
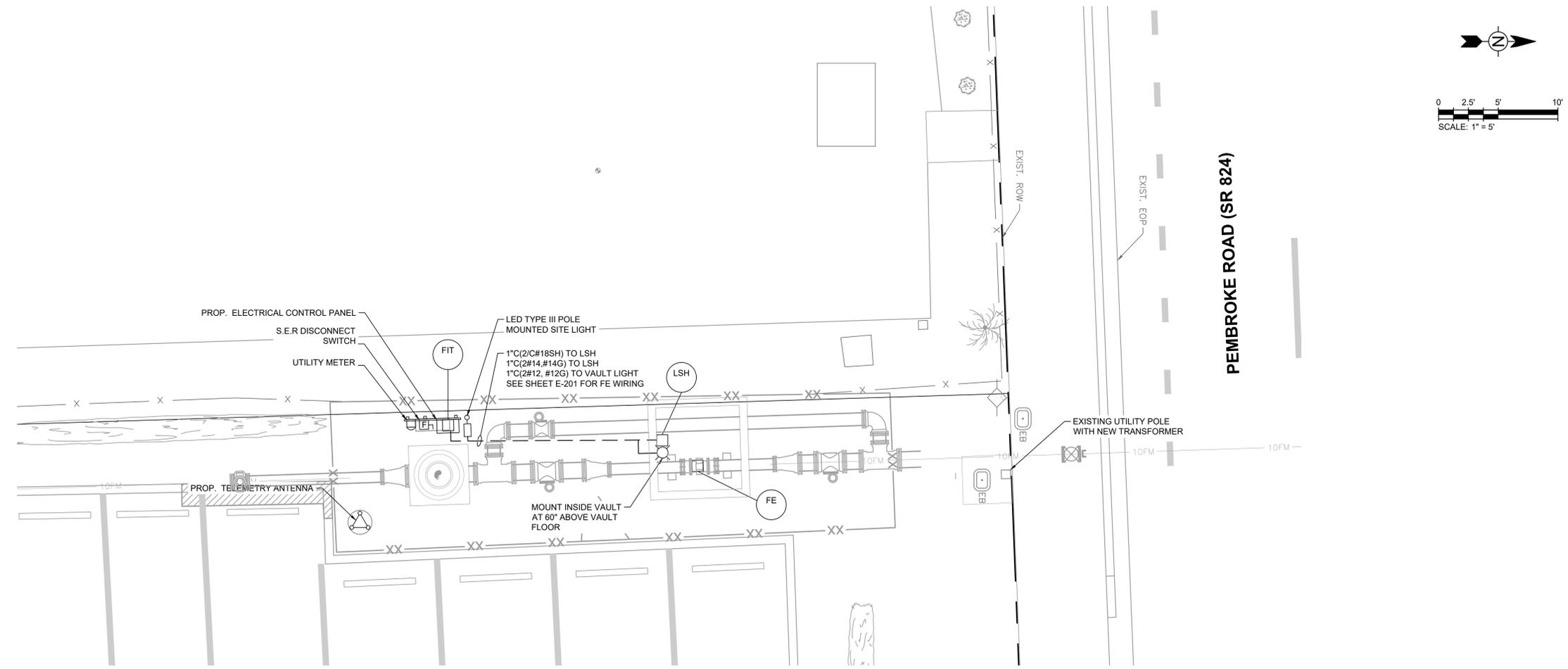
CITY OF HOLLYWOOD
 REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER - LUM 07
 GENERAL DETAILS

Project No.: 200-16428-19001
 Designed By: JMA
 Drawn By: TM/BMM
 Checked By: JMA/KC

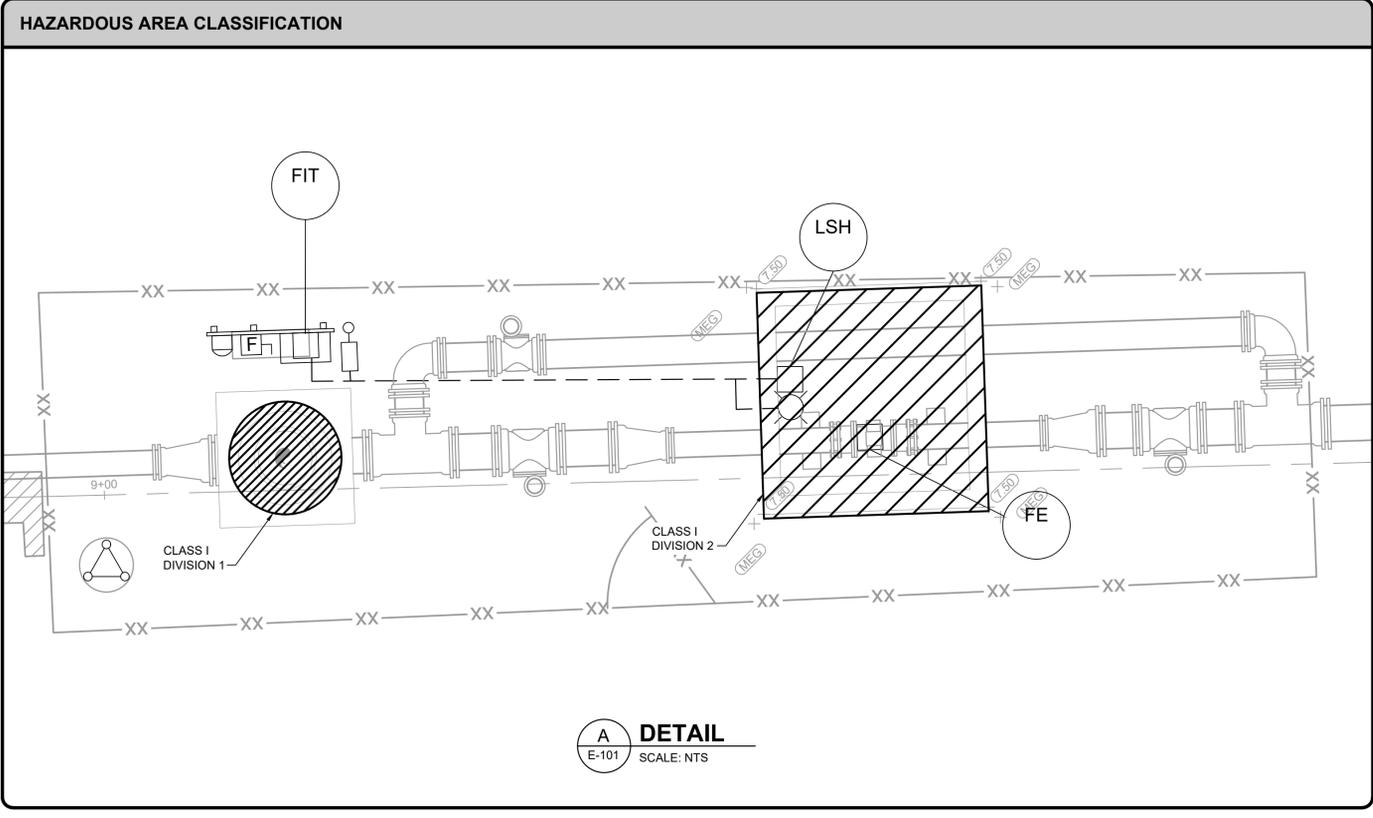
C-501
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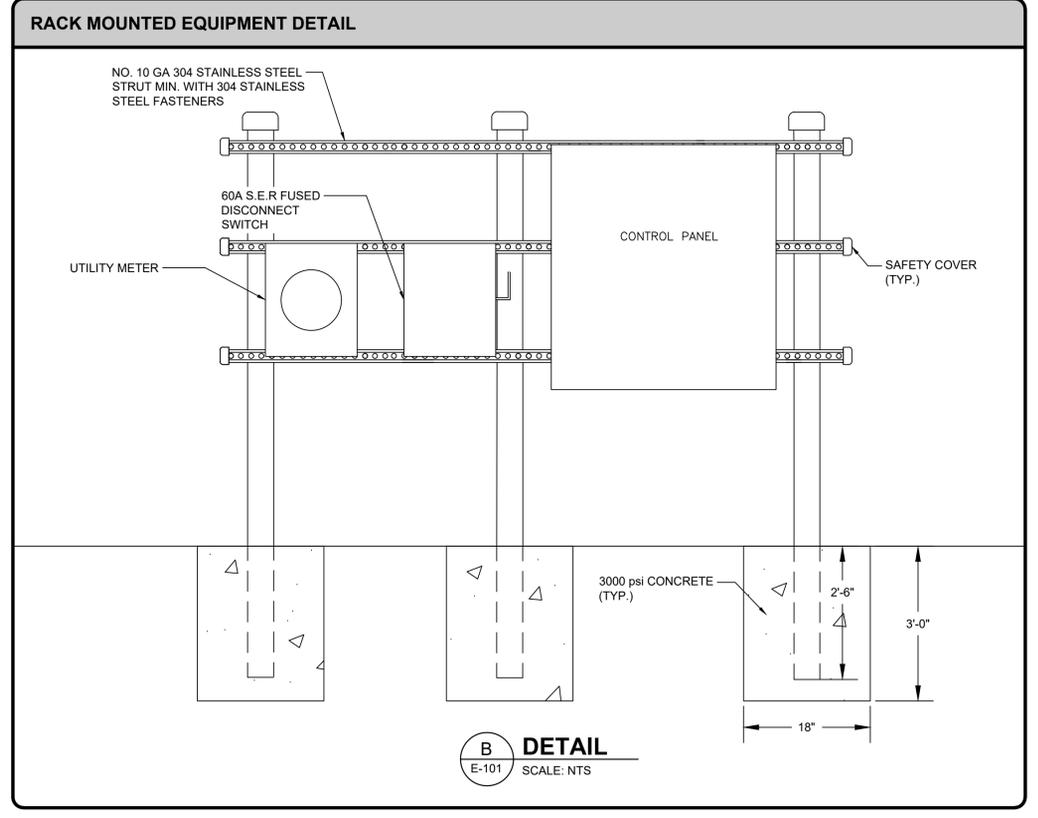
10/28/2020 12:15:02 PM - I:\LOCAL\PROJECTS\ORLANDO\IER16428200-16428-19001\CAD\SHEET\FILE\IE-101 ELECTRICAL OVERALL SITE PLAN.DWG - KIRBY, AURORA



SITE PLAN



A **DETAIL**
E-101 SCALE: NTS



B **DETAIL**
E-101 SCALE: NTS

TETRA TECH
www.tetra.tech.com
4801 SHERIDAN STREET, SUITE 212
HOLLYWOOD, FLORIDA 33021
PHONE: (954) 364-1753

CITY OF HOLLYWOOD
FLORIDA

MARK	DATE	DESCRIPTION
1	10/28/20	ADDENDUM NO. 1

CITY OF HOLLYWOOD
REPLACEMENT OF HALLANDALE BEACH FORCE MAIN
AND LARGE USER METER - LUM 07
ELECTRICAL OVERALL SITE PLAN

Project No.: 200-16428-19001
Designed By: AMR
Drawn By: AJT
Checked By: BRW

E-101

Bar Measures 1 inch

EXHIBIT 2 - REVISED SPECS SECTIONS

SECTION 00300

PROPOSAL

TO THE MAYOR AND COMMISSIONERS
CITY OF HOLLYWOOD, FLORIDA

SUBMITTED _____

Dear Mayor and Commissioners:

The undersigned, as BIDDER, hereby declares that the only person or persons interested in the Proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Proposal or in the Contract to be entered into; that this Proposal is made without connection with any other person, company or parties making a Bid or Proposal; and that it is in all respects fair and in good faith without collusion or fraud.

The BIDDER further declares that he has examined the site of the Work and informed himself fully in regard to all conditions pertaining to the place where the Work is to be done; that he has examined the Drawings and Specifications for the Work and contractual documents relative thereto, including the Notice to Bidders, Instructions to Bidders, Proposal Bid Form, Form of Bid Bond, Form of Contract and Form of Performance Bond, General, Supplementary and Technical Specifications, Addenda, Drawings, and Local Preference Program, Exhibit A, and has read all of the Provisions furnished prior to the opening of bids; and that he has satisfied himself relative to the work to be performed.

The undersigned BIDDER has not divulged to, discussed or compared his bid with other bidders and has not colluded with any other BIDDER of parties to this bid whatever.

If this Proposal is accepted, the undersigned BIDDER proposes and agrees to enter into and execute the Contract with the City of Hollywood, Florida, in the form of Contract specified; of which this Proposal, Instructions to Bidders, General Specifications, Supplementary Conditions and Drawings shall be made a part for the performance of Work described therein; to furnish the necessary bond equal to one hundred (100) percent of the total Contract base bid, the said bond being in the form of a Cash Bond or Surety Bond prepared on the applicable approved bond form furnished by the CITY; to furnish all necessary materials, equipment, machinery, tools, apparatus, transportation, supervision, labor and all means necessary to construct and complete the work specified in the Proposal and Contract and called for in the Drawings and in the manner specified; to commence Work on the effective date established in the "Notice to Proceed" from the ENGINEER; and to substantially complete all Contract Work within **244 days** with final completion within **274 days**, and stated in the "Notice to Proceed" or pay liquidated damages for each calendar day in excess thereof, or such actual and consequential damages as may result therefrom, and to abide by the Local Preference Ordinance.

The BIDDER acknowledges receipt of the following addenda:

No. _____ Dated _____
No. _____ Dated _____
No. _____ Dated _____

And the undersigned agrees that in case of failure on his part to execute the said Contract and the Bond within ten (10) days after being presented with the prescribed Contract forms, the check or Bid Bond accompanying his bid, and the money payable thereon, shall be paid into the funds of the City of Hollywood, Florida, otherwise, the check or Bid Bond accompanying this Proposal shall be returned to the undersigned.

Attached hereto is a certified check on the

_____ Bank of _____

or approved Bid Bond for the sum of

_____ Dollars (\$) according to the conditions under the Instructions to Bidders and provisions therein.

NOTE: If a Bidder is a corporation, the legal name of the corporation shall be set forth below, together with signature(s) of the officer or officers authorized to sign Contracts on behalf of the corporation and corporate seal; if Bidder is a partnership, the true name of the firm shall be set forth below with the signature(s) of the partner or partners authorized to sign Contracts in behalf of the partnership; and if the Bidder is an individual, his signature shall be placed below; if a partnership, the names of the general partners.

WHEN THE BIDDER IS AN INDIVIDUAL:

(Signature of Individual)

(Printed Name of Individual)

(Address)

WHEN THE BIDDER IS A SOLE PROPRIETORSHIP OR OPERATES UNDER A TRADE NAME:

(Name of Firm)

(Address)

(Signature of Individual) (SEAL)

WHEN THE BIDDER IS A PARTNERSHIP:

(Name of Firm) A Partnership

(Address)

By: _____
(SEAL)
(Partner)

Name and Address of all Partners:

WHEN THE BIDDER IS A JOINT VENTURE:

(Correct Name of Corporation)

By: _____
(SEAL)
(Address)

(Official Title)

As Joint Venture
(Corporate Seal)

Organized under the laws of the State of _____, and authorized by the law to make this bid and perform all Work and furnish materials and equipment required under the Contract Documents.

WHEN THE BIDDER IS A CORPORATION:

(Correct Name of Corporation)

By: _____
(SEAL)

(Official Title)

(Address of Corporation)

Organized under the laws of the State of _____, and authorized by the law to make this bid and perform all Work and furnish materials and equipment required under the Contract Documents.

CERTIFIED COPY OF RESOLUTION OF
BOARD OF DIRECTORS

(Name of Corporation)

RESOLVED that _____
(Person Authorized to Sign)

_____ of
(Title) (Name of Corporation)

be authorized to sign and submit the Bid or Proposal of this corporation for the following project:

CITY OF HOLLYWOOD

**REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND
LARGE USER METER LUM-07**

The foregoing is a true and correct copy of the Resolution adopted by

_____ at a meeting of its Board of
(Name of Corporation)

Directors held on the _____ day of _____, 20_____.

By: _____

Title: _____

(SEAL)

The above Resolution MUST BE COMPLETED if the Bidder is a Corporation.

- END OF SECTION -

**CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES
ENGINEERING & CONSTRUCTION SERVICES DIVISION**

PROPOSAL BID FORM

Project Name: Replacement of Hallandale Beach Force Main and Large User Meter - LUM 07
Project No.: 19-7100

If this Proposal is accepted, the undersigned Bidder agrees to complete all work under this contract within **274 calendar days** following the issuance of the Notice to Proceed. All entries on this form must be typed or written in block form in ink.

BASE BID:

<u>No.</u>	<u>Description</u>	<u>Qty.</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total</u>
1	Mobilization, Bonds and Insurance	1	LS	_____	_____
2	Demobilization	1	LS	_____	_____
3	Maintenance of Traffic (MOT)	1	LS	_____	_____
4	Furnish and Install 16-inch DR-18 PVC Force Main	3,790	LF	_____	_____
5	Furnish and Install 20-inch DR-11 HDPE Force Main via Horizontal Directional Drill (HDD)	510	LF	_____	_____
6	Furnish and Install Plug Valves with Boxes (Various Sizes)				
6a	10-inch Plug Valves with Boxes	2	EA	_____	_____
6b	16-inch Plug Valves with Boxes	5	EA	_____	_____
7	Furnish and Install 4" Air Release Valve Assembly in Manhole	1	EA	_____	_____
8	Place Out of Service (Grout) Existing Force Mains (Various Sizes)	4,900	LF	_____	_____
9	Furnish and Install 30-inch Line Stop	1	EA	_____	_____
10	Furnish and Install 10-inch Tee	2	EA	_____	_____
11	Furnish and Install 16-inch x 30-inch Reducer	1	EA	_____	_____
12	LUM-07 Site Improvements	1	LS	_____	_____
13	Milling and Resurfacing of 1.5" of Asphalt Pavement within FDOT Roadways	302	SY	_____	_____
14	Milling & Resurfacing of 1" of Asphalt Pavement within City of Hollywood Roadways	3,204	SY	_____	_____
15	Temporary Asphalt Restoration	4,390	LF	_____	_____
16	Furnish and install Temporary Pavement Markings	1	LS	_____	_____
17	Replacement of Permanent Pavement Markings	1	LS	_____	_____
18	Removal and Replacement of Concrete Sidewalk	326	SY	_____	_____
19	Removal and Replacement of Concrete Curb and/or Gutter	20	LF	_____	_____
20	Alley Reconstruction	2,156	SY	_____	_____
21	Owner's Contingency (allowance)	1	LS	\$250,000	\$250,000
22	Consideration for Indemnification	1	LS	\$10	\$10
23	Density Testing (allowance)	1	LS	\$50,000	\$50,000
24	FPL (allowance)	1	LS	\$50,000	\$50,000
25	Permits, Licenses and Fees (allowance)	1	LS	\$50,000	\$50,000
26	As-Builts and Record Drawings (By land surveyor approved by City or EOR)	1	LS	\$20,000	\$20,000
BASE BID TOTAL FOR COMPLETE PROJECT				_____	_____
TOTAL BASE BID IN WRITING				_____	_____

NOTES:

1. SUBSTANTIAL COMPLETION TIME AND PROJECT CLOSEOUT TIME FOR THE CONTRACT SHALL BE AS DEFINED IN THE PROJECT SCHEDULE IN THE SUPPLEMENTARY GENERAL CONDITIONS (SGC'S).
2. QUANTITIES PROVIDED ARE FOR INFORMATION PURPOSES. FULL DESCRIPTION OF THE PAY ITEMS ARE PROVIDED IN SECTION 01025 "BASIS OF PAYMENT"

SECTION 00800

SUPPLEMENTARY GENERAL CONDITIONS

INDEX TO ARTICLES

1

1. Project Schedule	00800-2
2. Insurance Requirements	00800-3
3. Liquidated Damages	00800-5
4. Restricted Area	00800-6
5. Existing Facilities and Structures	00800-6
6. Explosives	00800-6
7. Contract Documents	00800-6
8. Required Notifications	00800-6
9. Notice of Completion	00800-9
10. Prevailing Wage Requirement	00800-6
11. Inspections and Testing During Overtime	00800-7
12. Retainage	00800-8
13. Owner's Contingency	00800-8

General Note:

The General Conditions refer to specific section numbers in the Supplementary General Conditions. These reference numbers may not coordinate with the actual Article numbers utilized in the Supplementary General Conditions. The CONTRACTOR shall comply with all General Conditions and all Supplementary General Conditions as well as related conditions included in the General Requirements, Division 1 of the Technical Specifications. Incorrect cross-reference numbers shall not relieve this requirement.

1. Project Schedule

Time is of the essence for this work. The following defines the schedule for the project:

CONSTRUCTION WORK SCHEDULE
CONSTRUCTION / STARTUP / ACCEPTANCE:

<u>Major Milestones</u>	<u>Completion Time (calendar days)</u>
3. Substantial Completion ⁽¹⁾	244
4. Project Closeout ⁽²⁾	274

Failure to meet any of the above defined construction/startup/acceptance completion dates shall subject the CONTRACTOR to pay damages as specified in these Supplementary General Conditions in Article 3.

The 244 calendar days to substantial completion will include all holidays, and, all rain days, etc. No time extensions will be granted for rain delays and holidays, etc.

⁽¹⁾Substantial Completion

1. Refer to General Conditions Articles 14.1 and 14.2. (Certification of Substantial Completion Services appended to the Supplementary General Conditions).
2. Substantial Completion shall also include:
 - Completion of all construction work associated with the specific “Major Milestone” listed in the construction work schedule including completion of punch list items. “Completion of punch list items” shall be as determined by the Engineer in the field.
 - Record shop drawings and O&M submittals received and accepted by the Engineer.
 - Record drawing red-lines received and accepted by the Engineer.
 - Guarantee certifications, performance affidavits, and all other certifications received and accepted by the Engineer.

Contractor shall also conform to construction sequence constraints as defined on the Drawings and in Specifications.

(2)Project Closeout

1. Refer to Division 1 General Requirements, Section 01700 Project Closeout.
2. Project Closeout shall also include:
 - All requirements of substantial completion met plus the following
 - Site cleanup and restoration completed
 - All other sitework completed
 - Minor punch list items completed (minor as defined by the Engineer in the field)
 - Demobilization completed
 - Releases from all parties who are entitled to claims

The title "Engineer" utilized in these descriptions for substantial and final completion shall mean the City staff engineer assigned to this project, or his designated representative.

2. Insurance Requirements

The insurance required by Article 5.6 of the General Conditions shall be as follows:

~~1. BUILDERS RISK (BR 1) - Installation Floater:~~

~~The Contractor shall be required to purchase and maintain, throughout the life of the contract, and until the project is accepted by the City, Builder's Risk Insurance on an All Risk of Loss form. Coverage shall include:~~

Theft	Aircraft
Windstorm	Vehicles
Hail	Smoke
Explosion	Fire
Riot	Collapse
Civil Commotion	Flood

~~The policy limits shall be no less than the amount of the finished project and coverage shall be provided on a completed value basis.~~

~~Property located on the construction premises, which is intended to become a permanent part of the building, shall be included as property covered.~~

~~The policy shall be endorsed permitting the City to occupy the building prior to completion without effecting the coverage.~~

~~The City of Hollywood shall be named as Additional Insured and Loss Payee.~~

2. GENERAL LIABILITY (GL3):

Prior to the commencement of work governed by this contract, the Contractor shall obtain General Liability Insurance. Coverage shall be maintained throughout the life of the contract and include, as a minimum:

- Premises Operations
- Products and Completed Operations
- Blanket Contractual Liability
- Personal Injury Liability
- Expanded Definition of Property Damage

The minimum limits acceptable shall be:

\$2,000,000 Combined Single Limit (CSL)

If split limits are provided, the minimum limits acceptable shall be:

\$1,000,000 per Person
\$2,000,000 per Occurrence
\$100,000 Property Damage

An Occurrence Form policy is preferred. If coverage is provided on a Claims Made policy, its provisions should include coverage for claims filed on or after the effective date of this contract. In addition, the period for which claims may be reported should extend for a minimum of twelve (12) months following the acceptance of work by the City.

The City of Hollywood shall be named as Additional Insured on all policies issued to satisfy the above requirements.

3. GENERAL LIABILITY (GLXCU):

Recognizing that the work governed by this contract involves either underground exposures, explosive activities, or the possibility of collapse of a structure, the Contractor's General Liability Policy shall include coverage for the XCU (explosion, collapse, and underground) exposures with limits of liability equal to those of the General Liability Insurance policy.

4. VEHICLE LIABILITY (VL3):

Recognizing that the work governed by this contract requires the use of vehicles, the Contractor, prior to the commencement of work, shall obtain Vehicle Liability Insurance. Coverage shall be maintained throughout the life of the contract and include, as a minimum, liability coverage for:

- Owned, Non-Owned, and Hired Vehicles

The minimum limits acceptable shall be:

\$1,000,000 Combined Single Limit (CSL)

If split limits are provided, the minimum limits acceptable shall be:

\$500,000 per Person

\$1,000,000 per Occurrence

\$100,000 Property Damage

The City of Hollywood shall be named as Additional Insured on all policies issued to satisfy the above requirements.

5. WORKERS' COMPENSATION (WC2):

Prior to the commencement of work governed by this contract, the Contractor shall obtain Workers' Compensation Insurance with limits sufficient to respond to the applicable state statutes.

In addition, the Contractor shall obtain Employers' Liability Insurance with limits of not less than:

\$500,000 Bodily Injury by Accident

\$500,000 Bodily Injury by Disease, policy limits

\$500,000 Bodily Injury by Disease, each employee

Coverage shall be maintained throughout the entire term of the contract.

Coverage shall be provided by a company or companies authorized to transact business in the state of Florida and the company or companies must maintain a minimum rating of A-VI, as assigned by the A.M. Best Company.

The policy must be endorsed to provide the City with (30) days notice of cancellation.

If the Contractor has been approved by the Florida's Department of Labor, as an authorized self-insurer, the City shall recognize and honor the Contractor's status. The Contractor may be required to submit a Letter of Authorization issued by the Department of Labor and a Certificate of Insurance, providing details on the Contractor's Excess Insurance Program.

If the Contractor participates in a self-insurance fund, a Certificate of Insurance will be required. In addition, the Contractor may be required to submit updated financial statements from the fund upon request from the City.

3. Liquidated Damages

Liquidated damages shall be paid by the CONTRACTOR to the CITY for failure to complete work on time in accordance with the following schedule:

CONSTRUCTION/STARTUP/ACCEPTANCE:

<u>Major Milestones</u>	<u>Completion Time (calendar days)</u>	<u>Liquidated Damages</u>
1. Substantial Completion	244	\$5,000/day
2. Project Closeout	274	\$5,000/day

The CITY is hereby authorized to deduct the sums described above from the monies which may be due to the CONTRACTOR for the work under this contract. Liquidated damages shall be additive such that the maximum total which may be deducted shall be \$5,000/day. Other damages for failure to meet warranty conditions as defined in other sections of the Specifications shall also be added with liquidated damages for failure to meet completion times.

4. Restricted Area

The CONTRACTOR shall, in installing the new facilities, confine all activities within the CITY property, easement, and right-of-ways indicated.

5. Existing Facilities and Structures

All existing facilities shall be protected, and if damaged, shall be repaired by the CONTRACTOR at no additional cost to the CITY.

6. Explosives

Explosives shall not be used on this project.

7. Contract Documents

The CITY will provide the CONTRACTOR with 1 (1) set of Contract Documents after the Notice to Proceed.

8. Required Notifications

When provisions of the pertinent codes, standards or regulations conflict with this Specification, the more stringent shall apply.

Prior to any site work, the CONTRACTOR shall notify the Engineering and Construction Services Division Inspector at (954) 921-3930.

Prior to excavation at the site, the CONTRACTOR shall notify the appropriate utilities and Sunshine State One-Call of Florida, Inc. (formerly U.N.C.L.E.) at 1-800-432-4770 for locations of buried utilities.

Prior to closure of any CITY streets or alleyways, or other activity which requires the diversion of traffic, the CONTRACTOR shall notify and obtain the permission of the CITY of Hollywood Fire and Police Communications Section at (954) 967-4321.

9. Notice of Completion

See attached form.

10. Prevailing Wage Requirement

- A. The CONTRACTOR shall be responsible for ensuring payment of the rate of wages and fringe benefits, or cash equivalent, for all laborers, mechanics and apprentices employed by him/her or his/her SUBCONTRACTORS on the work covered by this contract which shall be not less than the prevailing rate of wages and fringe benefits payment or cash equivalent for similar skills or classifications of work as established by the General Wage Decision by the United States Department of Labor for Broward County, Florida that is in effect prior to the date the CITY issued the invitation for bids for this project (the prevailing rate of wages and fringes can be obtained at website <http://www.access.gpo.gov/davisbacon>).

If the General Wage Decision fails to provide for a fringe benefit rate for any worker classification, then the fringe benefit rate applicable to such worker classification shall be the fringe benefit rate that has a basic wage rate closest in dollar amount to the work classification for which no fringe benefit rate has been provided.

- B. Upon commencement of work, the CONTRACTOR and all of his/her SUBCONTRACTORS shall post a notice in a prominent place at the work site stating the requirements of this Article.
- C. As per the City of Hollywood Code of Ordinances, Prevailing Wage Requirements and Fringe Benefits are applicable to the following: (A) Utilities projects over \$1,000,000.00 (one million dollars) and (B) All other projects over \$500,000.00 (five hundred thousand dollars).

11. Inspections and Testing During Overtime

- A. The following supplement Article 3.15 and 3.16 of the General Conditions:

For weekend work, CONTRACTOR shall submit a written request to the CITY by the preceding Wednesday. A separate request is required for each week that the CONTRACTOR wished to work on a weekend. For evening and holiday work, CONTRACTOR shall submit a written request to the CITY 3 days in advance. The CITY will provide inspection services for all overtime work and the CONTRACTOR shall pay for inspection services per Article 3.15, no exceptions.

Similarly, holiday and other overtime work shall be requested a minimum of 36-hours in advance and CITY will provide inspection for all overtime.

- B. Exceptions to the hours and days of the week for work and other related limitations are allowed only for tie-ins during low flow periods / early morning hours, coatings that need to be applied during lower temperature times of the day and whenever the Documents specifically define that work shall be completed outside of the limitations for "normal" work hours, days, etc.

Inspection for tie-ins during low flow/early morning and specialty coating application performed during nighttime will not be cause for extra inspection costs unless such work is remedial in nature as a result of defective work.

12. Retainage

After 50-percent completion of the construction services purchased pursuant to this contract, CONTRACTOR may present to CITY a payment request for one-half of the retainage then held by CITY. CITY shall promptly make payment to CONTRACTOR, unless CITY has grounds for withholding the payment of retainage. CITY shall have grounds for withholding the payment of retainage with respect to any amounts that are the subject of a good-faith dispute, the subject of a claim brought pursuant to Florida Statute Section 255.05, or otherwise the subject of a claim or demand by CITY or CONTRACTOR.

At acceptance of Substantial Completion, CITY shall promptly make payment to CONTRACTOR of one-half of the retainage then held by CITY. At acceptance of completion of all punch list items, CITY shall promptly make payment to CONTRACTOR the balance of retainage then held by CITY.

13. Owner's Contingency

This allowance is in its entirety dedicated for the use of the Owner (The City of Hollywood) to address conditions (or work) associated with undefined conditions. All work resulting from undefined conditions shall be authorized in writing and in advance by the Owner, specifically the Director of Public Services, through the full execution of a Field Order. The actual amount to be paid per Field Order will be negotiated and agreed by both parties (the Owner and the Contractor). The final/negotiated amount of the field order will be deducted from the Owner's Allowance designated in the Bid Proposal and Schedule of Values. The Owner reserves the right to award none, any portion of, or all of the money associated with this allowance. By executing the CONTRACT between the City of Hollywood and the Contractor, the Contractor acknowledges that under no circumstances he or she should assume that he or she would be entitled to any amounts set aside by the City of Hollywood within the Owner's Allowance.

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT: REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

ENGINEER: Engineering Construction Services Division

TO:

CONTRACTOR:

CONTRACT FOR:

NOTICE TO PROCEED DATE:

DATE OF ISSUANCE:

PROJECT OR DESIGNATED PORTION SHALL INCLUDE:

Portions of the work performed under this Contract as described above, have been reviewed and found to be substantially complete. The Date of Substantial Completion of Project or designated portion thereof designated above is hereby established as _____ which is also the date of commencement of applicable warranties required by the Contract Documents for the noted area.

DEFINITION OF DATE OF SUBSTANTIAL COMPLETION

The Date of Substantial Completion of the work or designated portion thereof is the date certified by the ENGINEER ("Date of Issuance" above) when construction is sufficiently complete, in accordance with the Contract Documents, so the CITY can occupy or utilize the work or designated portion thereof for the use for which it is intended, as expressed in the Contract Documents.

A list of items to be completed or corrected, prepared by the CONTRACTOR and verified and amended by the ENGINEER, for the above referenced "Project or Designated Portion" is attached to this form (attached "Punch List" dated _____).

The failure to include any items on such list does not alter the responsibility of the CONTRACTOR to complete all work in accordance with the Contract Documents.

CERTIFICATE OF SUBSTANTIAL COMPLETION

Please note that in accordance with Article 14 General Conditions, the Contractor retains full responsibility for the satisfactory completion of all work regardless of whether the Owner occupies and / or operates a part of the facility and that the taking possession and use of such work shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents.

City of Hollywood ECSD

ENGINEER **BY** **DATE**

CONTRACTOR **BY** **DATE**

The CITY OF HOLLYWOOD, through the City's authorized representative, accepts the work or designated portion thereof as substantially complete and will assume full possession thereof at _____ (time) on _____ (date).

BY **DATE**

- END OF SECTION -

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 Department 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 Department. 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, he shall include the cost for that work in the last Bid Item for each construction package so that his proposal for the project does reflect his total price for completing the work in its entirety.
- F. The Contractor shall submit, with each Payment Request, a list of M/WBE Subcontractors that he is or will be utilizing for his contract. For each M/WBE Subcontractor, the following information shall be provided:
 - 1. Total sub-contract dollar amount.
 - 2. Amount paid to date.

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 01300, unless otherwise specified. A representative of the City shall witness all field measurements.

1.03 PAYMENT ITEMS

For purposes of describing items appearing in the Proposal Bid Form, pricing for each item shall include work and components described below:

- A. **Item No. 1 – Mobilization, Bonds, and Insurance** - The lump sum price for this item shall be full compensation for all mobilization/demobilization activities, including but not limited to bonds, insurance, transport of personnel, materials, equipment, and other incidentals to the site, preparation of submittals including schedule, permit packages, and others, temporary facilities and offices, safety equipment and first aid supplies, project signs including procurement, installation, and removal at the end of the project (City approved signs and locations), field surveys, sanitary and other temporary facilities required by the specifications, audio-video documentation of the existing site, any space required for staging, laydown, survey, storage, parking, etc.; preparation and submittal of shop drawings, preparation of a certified Stormwater Pollution Prevention Plan (SWPP) and BMPs 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, and removing the erosion and sedimentation control devices including but not limited to, turbidity barriers, synthetic hay bales, silt fencing, etc., necessary to comply with NPDES requirements, dewatering, groundwater sampling, treatment and disposal, all contamination permitting and compliance, and dewatering permit applications preparation, all fees and all permitting; and all other activities necessary for complete mobilization/demobilization requirement for the contract. **Pay Item No. 1 shall not exceed 3% of the sum of Bid Items Nos. 4 through 20.**

- B. **Item No. 2 – Demobilization** - The lump sum price for this item shall be full compensation for all demobilization activities, including but not limited to transport of personnel, materials, equipment, and other incidentals to the site, preparation of submittals including schedule, permit packages, and others, temporary facilities and offices, safety equipment and first aid supplies, project signs including procurement, installation, and removal at the end of the project (City approved signs and locations), field surveys, sanitary and other temporary facilities required by the specifications, audio-video documentation of the existing site, any space required for staging, laydown, survey, storage, parking, etc.; preparation and submittal of shop drawings; and all other activities necessary for complete demobilization requirement for the contract. **Pay Item No. 2 shall not exceed 2% of the sum of Bid Items Nos. 4 through 20.**
- C. **Item No. 3 – Maintenance of Traffic (MOT)** - Payment for all labor for the design and preparation of signed and sealed (FL Professional Engineer with Advanced MOT Certification) phased and detailed MOT plans, non-standard work hours or evening or weekend hours, all submittals and permitting through various regulatory agencies having jurisdiction over the ROW limits, MOT coordination with other stakeholders or Contractors for adjacent or other work within the work limits, lane closure submittals and approvals, traffic studies, flagman, police, all MOT pavement markings and striping, and installation and removal and/or relocations and maintenance of phased traffic control devices for the duration of the project and to final completion per applicable authority having jurisdiction regarding MOT (vehicular, pedestrian, etc.).
- D. **Items No. 4 - Furnish and Install 16-inch DR-18 PVC Force Main** - Payment for all labor, pipe, equipment and material for all work necessary and required the installation of new force mains and associated stub outs and connections or reconnections as shown on the plans. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thicknesses, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, tree and shrub protection, palm and tree removal and replacement, tree trimming or pruning, signage and mailbox protection, removal and replacement, fencing and gate protection and removal and replacement; Replacement of impacted traffic, signalization, and street lighting lines; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power

line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), removing and replacing fences, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, and bracing (all types required for underwater and/or canal crossings), piping of various materials and types, all domestic ductile iron poly wrapped fittings (shown and not shown), wet tapping, 316 stainless steel washers, nuts and bolts, 316 stainless steel restraining rods for mechanical joint fittings, restraining devices for proposed and existing force mains, painting, priming and coating of piping including special coatings as per the specifications and special piping preparation(s), Protecto 401 interior coating for all DIP force main piping and all bends, thrust blocks, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, connections and reconnections to existing force mains, locating grid, wiring and equipment, tracer wires, line locator, identification markers, pipe installation, clean fill/backfill material, reinforced concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, butt fusion welding, MJ adapters, miscellaneous fittings and transitions for various types of piping connections and reconnections, stiffening rings, work during restricted hours and night work as necessary per FDOT requirements or other jurisdictional requirements, full restoration and cleanup, sodding, grading and re-grading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, sidewalk removal and restoration, testing (including fees), flushing of piping, swabbing or pigging including entry and exit points, debris removal, water for swabbing/pigging, pigs and associated items for entire pipeline from point of connection to point of connection, pressure testing, exfiltration trench, drainfield and drainage piping removal, repair, and replacement, and all necessary accessories required for a complete installation, 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.

- E. **Item No. 5 – Furnish and Install 20-inch DR-11 HDPE Force Main via Horizontal Directional Drill (HDD)** Payment for pipe installed by means of directional drilling, successfully installed and complete will be at the Contract unit price per linear foot for furnishing and installing the size and type, which price and payment shall be full compensation for all clearing, grubbing, excavation, bedding, grading and regrading, dewatering, sheeting, shoring and bracing, entry and exit pits, all site restoration to equal or better condition, signs and lighting removal and replacement as well as other obstructions removal and replacement, street lighting support and protection, temporary pavement markings (other than for those paid for under MOT), permanent pavement markings and markers, thermoplastic stripping, all testing, temporary jumper connection(s), connections and reconnections to all existing piping, thrust blocks, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations; field verification of existing utilities, coordination with existing utility facility owners, coordination with property owners; removal,

disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), removing and replacing fences, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, test connections, **driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, sidewalk removal and restoration**, pigging and pig entry and exit locations, mandrel testing, mud for drilling, water for mud mixing, recycling of mud as applicable, removal and proper disposal of mud to a proper facility, groundwater sampling and testing, appurtenances, site cleanup and disposal of debris. Also included is all pipe, butt fusion welding, sleeves, mechanical joint adapters, stiffening rings (on a case-by-case approved basis only), buoyancy control, restraining devices for proposed and existing force mains, exfiltration trench drainfield and drainage piping removal, repair, and replacement; replacement of impacted traffic, signalization, and street lighting lines, signed and sealed submittals, calculations and approvals for the HDD installation, frac mitigation plan and all mitigation measures, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, flushing, swabbing or pigging including entry and exit points, debris removal, water for swabbing/pigging, pigs and associated items for entire pipeline from point of connection to point of connection, pressure testing, and all necessary accessories required for a complete installation, other restorations and other related work not defined in other Bid Package Items.

- F. **Item No. 6a and 6b – Furnish and Install Plug Valves with Boxes (Various Sizes)** - Payment for all labor, valves, equipment, and material for all work necessary and required for the installation of new plug valves, as shown in the plans, valve box, valve box extensions, operating nut extensions, ~~test station box and cap~~, valve wrenches, restraining devices, traffic rated covers, concrete collars. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings, 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, and removing the erosion control devices necessary to comply with NPDES requirements; tree and shrub protection, trimming, removal and replacement, signage and mailbox protection, removal and replacement, Replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of

geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s); protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, groundwater sampling, treatment and disposal, dewatering permit applications preparation and permitting, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, ~~test station box and cap~~, valve wrenches, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, restraining devices for proposed and existing force mains, polyethylene encasement for all domestic ductile iron fittings and valves, metallic tracer wire, line locater, identification markers, pipe and valve installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, sidewalk removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, 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.

- G. **Item No. 7 – Furnish and Install 4” Air Release Valve Assembly in Manhole** - Payment for all labor, valves, equipment, and materials for all work necessary and required for the installation of new stainless steel combination air release valve with corrosion protection, pipe and valve supports, air release valve manhole, all fittings and valves, aerial connections and supports, grout, manhole adjustments, traffic rated frames, traffic rated covers, also including but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thicknesses, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings; tree and shrub protection, trimming, removal and replacement, signage protection, removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement; removal, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, ~~test station box and cap~~, valve wrenches, restraining devices for proposed and existing force mains, traffic rated covers, concrete collars, all

restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s); protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, groundwater sampling, treatment and disposal, dewatering permit applications preparation and permitting, metallic tracer wire, line locator, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, sidewalk removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, 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.

- H. **Item No. 8 – Place Out of Service (Grout) Existing Force Mains (Various Sizes) –** Payment for placing out of service existing force mains of various sizes shall be made for cutting, capping and abandoning in place all existing force mains within the project limits as shown on the plans and grout filling the piping. This work shall include but not be limited to fittings, restraining of existing piping, grout, pumping equipment and appurtenances for grout, pressure/grout weep holes, dewatering, excavation, compaction, clearing and grubbing, removal and disposal of existing force main pipe contents, and cutting, capping and abandonment of existing piping which is considered incidental to the piping cost pay item removal, disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings; tree and shrub protection, trimming, removal and replacement, signage and mailbox protection, removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, groundwater sampling, treatment and disposal, dewatering permit applications preparation and permitting, all bypass piping and pumping equipment including noise

attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, ~~test station box and cap~~, valve wrenches, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), polyethylene encasement for all ductile iron fittings, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, and all debris removal and cleanup, other restorations and other related work not defined in other Bid Package Items.

- I. **Item No. 9 – Furnish and Install 30-inch Line Stop** – Payment for all labor, equipment and material for all work necessary and required for the installation of new line stop, isolation valves, to permanently or temporarily stop the flow within the indicated main at the locations, recovery of temporary valves and plugs; removal and disposal of wastewater, concrete support blocks/cradles for support, dewatering, tapping sleeve, plug, restraining devices, restraint of existing piping in accordance with the standards and requirements. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, ~~test station box and cap~~, valve wrenches, restraining devices for proposed mains, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, ductile iron fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, polyethylene encasement for all ductile iron valves, metallic tracer wire, line locater, connections to existing piping, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary

accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other restorations and other related work not defined in other Bid Package Items.

- J. **Item No. 10 – Furnish and Install 10-inch Tee** – Payment for all labor, equipment and material for all work necessary and required for the installation of new tees, as shown in the plans, recovery of temporary valves and plugs; removal and disposal of wastewater, concrete support blocks/cradles for support, dewatering, tapping sleeve, plug, restraining devices, restraint of existing piping in accordance with the standards and requirements. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, ~~test station box and cap~~, valve wrenches, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, ductile iron fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, polyethylene encasement for all ductile iron valves, metallic tracer wire, line locator, connections to existing piping, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other restorations and other related work not defined in other Bid Package Items.
- K. **Items No. 11 – Furnish and Install 16-inch x 30-inch Reducer** - Payment for furnishing and installing 16-inch x 30-inch reducer will be made at the Contract unit price per each fitting properly furnished and installed, which price and payment shall be full compensation for furnishing, installing, and testing all fittings including but not limited to, 16-inch x 30-inch reducer, polywrap of all DIP fittings where required, and P401 coating for all DI fittings. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and

removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, test station box and cap, valve wrenches, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, ductile iron fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, metallic tracer wire, line locator, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other related work not defined in other Bid Package Items.

- L. **Item No. 12 – LUM-07 Site Improvements** – This pay item consists of satisfactorily furnishing and installing all items for a fully functional and complete site including but not limited to; demolition and removal of site structures, piping, meters, control panels, fencing and gate, sump pumps, vaults, air release valves, telemetry, electrical equipment, and all associated infrastructure and any permitting required with the City of Hallandale for the site demolition, and new installations of all site improvements not limited to; structures, piping, meters, control panels, sump pumps, 8-foot high black iron fencing and gate, vaults, air release valves and manholes, telemetry, electrical equipment and all associated infrastructure and any permitting required with the City of Hallandale to provide a completely functional installation. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor, materials and equipment necessary for a complete functional meter infrastructure and site improvements including locating, protection and support of all existing utilities, coordination with all utility facility owners for locating and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities, excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, groundwater treatment and disposal, clean fill/backfill, compaction, grading and regrading, pipe supports, all testing, all conduit and wiring and electrical panel modifications, electrical meter connections, radio feasibility study report (test) for the telemetry antenna, coating/lining of meter vault, all coordination including coordination with the Owner operations staff, new aluminum hatches, hardware, new plug valves to isolate the meter, meter piping and meter bypass piping (316 stainless steel) and fittings, all couplings, 316 stainless steel bolts, fittings and special connectors, restoration, removal and replacement of existing pavers, sidewalks, curbs and gutters,

concrete slabs and pads, asphalt pavement, removal and replacement or removal only, landscaping removal and replacement or removal only, signage and street lighting, replacement of impacted traffic, signalization, and street lighting lines, as well as other obstructions removal and replacement, flow control and any associated bypass piping and pumping, new 57 stone and filter fabric, removal of existing site groundcover and replacement of clean fill prior to stone and fabric installation, ; hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, and all other items required for a complete, acceptable and operable installation; exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other related work not defined in other Bid Package Items.

M. **Item No. 13 – Milling and Resurfacing of 1.5” of Asphalt Pavement within FDOT**

Roadways - Payment for all labor, equipment and material for all work necessary and required for milling and resurfacing of **1.5”** of existing pavement of various thicknesses within FDOT roadways, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto, saw cutting, removal, and disposal of existing pavement of all thicknesses and types, any required field work by the Contractor to confirm existing pavement thicknesses prior to bidding (i.e. pavement cores, etc.), and replacement of **1.5”** of asphalt pavement to meet all FDOT standards and specifications, latest editions. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items to maintain a level driving surface and to match final grades. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Machine laid asphaltic concrete surface course for permanent paving, will be paid for at the unit price bid times the number of square yards (SY) of asphaltic concrete installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic concrete surface course installation and removal, and disposal of existing concrete and other materials, as required including all restoration efforts.

N. **Item No. 14 – Milling & Resurfacing of 1” of Asphalt Pavement within City of**

Hollywood Roadways - Payment for all labor, equipment and material for all work necessary and required for milling and resurfacing of **1”** of existing pavement of various thicknesses, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto, saw cutting, removal, and disposal of existing pavement of all thicknesses and types, any required field work by the Contractor to confirm existing pavement thicknesses prior to bidding (i.e. pavement cores, etc.), and replacement of **1”** of asphalt pavement to meet all City and Broward County standards and specifications, latest editions. Also included in this item is any adjustments of valve

boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items to maintain a level driving surface and to match final grades. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Machine laid asphaltic concrete surface course for permanent paving, will be paid for at the unit price bid times the number of square yards (SY) of asphaltic concrete installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic concrete surface course installation and removal, and disposal of existing concrete and other materials, as required including all restoration efforts.

O. **Item No. 15 – Temporary Asphalt Restoration** – For temporary asphalt restoration as follows:

- (a) 2-inch thick (min.) SP 9.5 asphaltic concrete structural course within City of Hollywood rights-of-way (with the exception of alleys) in accordance with Standard Detail G-12.1, where shown on the plans. For restoration in alleys refer to pay item 18.
- (b) 3-inch thick (min.) SP 9.5 asphaltic concrete structural course (Traffic B) within FDOT rights-of-way in accordance with FDOT Index 307, where shown on the plans.

Payment shall be at the unit price bid times the number of linear feet (in plan view) installed following the corresponding pavement restoration sections and meeting the compaction requirements provided on the Plans, Specifications and standard details (whichever is more stringent), completed and accepted by the City, Broward County and/or FDOT, with surface at the proper elevations. Greater widths, lengths and thicknesses are at the Contractor's option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete machine-laid asphaltic concrete surface course installation. Asphalt driveway sections shall include 6" thick (min.) compacted limerock base and 1" SP-9.5 asphaltic concrete surface course meeting all other asphalt pavement requirements shown on the plans and specifications. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Asphalt shall be restored over the entire driveway approach regardless of extent of impact.

P. **Item No. 16 – Furnish & Install Temporary Pavement Markings** - For temporary replacement of existing thermoplastic or painted pavement markings and messages, thermoplastic markings, reflective pavement markers, removed or obliterated by the Contractor's operation, or as indicated on the plans, in accordance with MUTCD, FDOT Standard Specifications for Road and Bridge Construction, and/or Broward County Public Works Department Standards, latest editions. Markings required for MOT operations shall be billed under the MOT pay item. Any remedial work that requires restoration of temporary pavement markings will be at no additional cost to the City. Payment shall be at the lump sum amount bid for the entire project.

- Q. **Item No. 17 - Replacement of Permanent Pavement Markings** - For replacement of existing thermoplastic or painted pavement markings and messages, thermoplastic markings, reflective pavement markers, and other associated permanent pavement markings that are removed or obliterated by the Contractor's operation, or as indicated on the plans, in accordance with MUTCD, FDOT Standard Specifications for Road and Bridge Construction, and/or Broward County Public Works Department Standards, latest editions. Markings required for MOT operations shall be billed under the MOT pay item. Any remedial work that requires restoration of permanent pavement markings will be at no additional cost to the City. Payment shall be at the lump sum amount bid for the entire project.
- R. **Item No. 18 – Removal & Replacement of Concrete Sidewalks** - This pay items consists of the removal, disposal, and replacement of existing concrete sidewalks, pedestrian curb ramps and miscellaneous concrete pavement impacted by the installation of the proposed sewer system improvements, and will be paid for at the unit price bid times the number of square yards (SY) of concrete pavement replaced, completed, ready for service and accepted by the Engineer, Broward County Public Works and/or FDOT. The price bid for this Pay Item shall include, but not be limited to, the following: saw-cutting, removing, hauling, and legally disposing of existing concrete pavement within the envelope of the utility trench typical section (in accordance with the plans or the detail on the plans) and up to the nearest adjacent control joints; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; protecting any existing concrete pavement to remain; furnishing and installing formwork, concrete, water and admixtures, reinforcing steel, and miscellaneous materials; placing, finishing, curing and protecting the finished concrete surface; replacing pedestrian curb ramps and detectable warning surfaces or other ADA requirements; Replacement of impacted traffic, signalization, and street lighting lines. Payment shall not be made for existing concrete pavement outside of the envelope of the utility trench excavation in accordance with the typical trench section provided on the plans. Measurement for payment shall be the number of square yards (SY) lying within the envelope of the utility trench typical section and up to the nearest adjacent control joints. All other replacement due to removal or damage as a result of the Contractor's operation shall be at the Contractor's expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation and all restoration efforts.
- S. **Item No. 19 – Removal and Replacement of Concrete Curb and/or Gutter** - This pay items consists of the removal, disposal, and replacement of existing concrete curbs and/or gutters and other miscellaneous concrete pavement impacted by the installation of the proposed sewer system improvements, and will be paid for at the unit price bid times the number of linear feet (LF) of curbs and/or gutters replaced, completed, ready for service and accepted by the Engineer, Broward County Public Works and/or FDOT. The price bid for this Pay Item shall include, but not be limited to, the following: saw-cutting, removing, hauling, and legally disposing of existing concrete curbs and/or gutters within the envelope of the utility trench typical section (in accordance with the plans or the detail on the plans) and up to the nearest adjacent control joints; removal,

disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; protecting any existing concrete pavement to remain; furnishing and installing formwork, concrete, water and admixtures, reinforcing steel, and miscellaneous materials; placing, finishing, curing and protecting the finished concrete surface; replacing pedestrian curb ramps and detectable warning surfaces or other ADA requirements; Replacement of impacted traffic, signalization, and street lighting lines. Payment shall not be made for existing concrete curbs and gutters outside of the envelope of the utility trench excavation in accordance with the typical trench section provided on the plans. Measurement for payment shall be the number of linear feet (LF) lying within the envelope of the utility trench typical section and up to the nearest adjacent control joints. All other replacement due to removal or damage as a result of the Contractor's operation shall be at the Contractor's expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation.

- T. **Item No. 20 – Alley Reconstruction** - Payment for all labor, equipment and material for all work necessary and required for removal and disposal of existing asphalt in alleys or portions of alleys, as shown in the Pavement Restoration Plans and Details. Included in this item is removal and disposal of existing asphalt, furnishing, installing and compacting disturbed base, and constructing 1.5" thick (minimum) machine laid asphaltic (SP 9.5) concrete surface course for permanent paving or matching existing pavement thicknesses in kind. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. This item will be paid for at the unit price bid times the number of square yards (SY) of asphaltic (SP 9.5) concrete overlay installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic (SP 9.5) concrete surface course installation and all re-grading and restoration efforts.
- U. **Item No. 21 – Owner's Contingency (allowance)** - Included in this contingency are works associated with undefined conditions or conflicts developing from undefined conditions. All work authorized for payment will be authorized in writing by the City in advance of commencement for this work. Amount to be paid per undefined conditions or conflict shall be negotiated or agreed to by both parties. The City reserves the right to award any, all, or none of the money associated with this allowance.
- V. **Item No. 22 – Consideration for Indemnification** - In recognition of the Contractor's indemnification obligations, the City will pay to the Contractor the specific consideration of ten dollars (\$10.00). Payment of said specific consideration shall be made at the time of the payment of the first progress estimate and the Contractor shall acknowledge payment of this consideration by letter to the City after receipt of the progress payment.

- W. **Item No. 23 – Density Testing (allowance)** - The allowance indicated for this item is to pay for all density testing for all piping installations to meet City, FDOT and Broward County standards. Density testing for multiple mobilizations due to limited testing as ordered by the Contractor will not be paid for by this allowance nor will stand-by time be paid for by this allowance. Any lack of Contractor coordination and scheduling which creates additional trips or downtime by the testing company will not be accepted or paid for by this allowance. The Contractor is to schedule and coordination all testing times to ensure efficiency. 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.
- X. **Item No. 24 – FPL (allowance)** – This allowance indicated for this item is to pay for all coordination, deactivation, activation, existing utilities verifications, protection and support, exploratory excavations, and all other items required for support, protection, guy wires removals and relocations for power systems and infrastructure within the entire project corridor.
- Y. **Item No. 25 – Permits, Licenses and Fees (allowance)** - The allowance indicated for this item is to pay for all sewer system permits, licenses and other fees as stated herein which are required of the Contractor to submit for and obtain from various agencies having jurisdiction (FDOT, Broward County, City of Hallandale, etc.) for construction of the project. Please refer to the Sewer Plan approval from the Broward County Highway Construction Engineering Division. Please take note of the required security amount of \$ _____ required of the Contractor, which will not be reimbursed by the City. The City will reimburse the ____% permit fee. The allowance shown on the Schedule of Bid Prices is an estimate of fees required. Payment will be based on the actual sewer permits, licenses or fees paid directly to agency, documented by paid receipts, specifically excluding any labor, mark-up, overhead and profit, administration and other costs involved in obtaining sewer permits or licenses or paying fees. This item also includes all notifications, coordination and permitting submittals and fees, flagmen and all necessary construction or inspection fees. Density testing for piping installations are also to be included in this allowance. Density testing for multiple mobilizations due to limited testing as ordered by the Contractor will not be paid for by this allowance nor will stand-by time be paid for by this allowance. Any lack of Contractor coordination and scheduling which creates additional trips or down-time by the testing company will not be accepted or paid for by this allowance. The Contractor is to schedule and coordinate all testing times to ensure efficiency. The Contractor is responsible for submitting and obtaining all necessary regulatory agency sewer permits other than those provided by the Owner and the Contractor is responsible for paying for all associated sewer 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.

- Z. **Item No. 26 – As-Builts and Record Drawings (By Land Surveyor approved by City or EOR)** - Measurement of various items for the As-Builts and Record Drawings will not be made for payment and all items shall be included in the lump sum price. Payment will be for full compensation to furnish as-built documentation and record drawings signed and sealed by a licensed PSM in hardcopy and electronic form and meeting City standards (PDF and AutoCAD) and an asset table at the completion and acceptance of work. In addition, for furnishing monthly as-builts and redlined drawings with pay applications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01030

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SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

~~1.01 WORK WITHIN RAILROAD RIGHT OF WAY (ROW) LIMITS~~

- ~~A. Contractor shall provide advanced notification(s) to the jurisdictional owners prior to all work efforts. Notifications shall be a minimum of 48 hours in advance of any proposed work efforts and shall be coordinated through the railroad ROW representatives.~~
- ~~B. The Contractor is responsible for coordination, exhibits and all associated documents for submitting, and securing approvals, for any necessary permits for work within the railroad ROW limits and for paying all associated permit fees.~~
- ~~C. FDOT standards and specifications, Broward County standards and specifications and the Owner's standards and specifications must be followed at all times. In areas where there are conflicting requirements, the most stringent requirements shall be required to be followed at no additional cost to the Owner.~~

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. The Contractor is required to submit a phasing plan for the Owner's review and approval prior to commencement of construction. In addition, the Contractor **will be required to provide multiple crews** to facilitate the work effort and to complete the project in the allotted amount of time.
- B. The Contractor may be required to coordinate with other Contractors within adjacent work limits. No additional compensation will be provided for any necessary adjustments or activities that create Contractor or construction downtime.

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. Sound levels measured by the Engineer shall not exceed 50 dBA from 7 P.M. to 7 A.M. or 60 dBA 7 A.M. to 7 P.M. This sound level shall be measured at the exterior of the nearest exterior wall of the nearest residence. Levels at the equipment shall not exceed 85 dBA at any time. 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 Owner for excessive noise shall not relieve the Contractor of the other portions of this Specification including, but not limited to, completion dates and bid

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amounts. Local jurisdictional requirements may vary from the above requirements. It is the Contractor's responsibility to identify and comply with all jurisdictional requirements for noise abatement, construction work hours and notifications.

- C. Work hours as required for the various jurisdictional agency project permits must be followed at all times. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.04 PCCP PIPING AND EXISTING UTILITIES

- A. Pipe Locations. All pipes shall be located substantially as indicated on the Drawings, but the Engineer or Owner reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Soft digs have been performed to field verify the approximate location of the existing piping; however, it is the Contractor's responsibility to field verify and confirm all existing utility locations, including allowing for utility coordination efforts for other utility facilities ~~within the railroad ROW limits~~ and to protect and support all existing utilities at no additional cost to the Owner.
- B. Utility Conflicts. Contractor must identify all locations where there is the possibility of conflicts with existing utilities. Contractor will promptly notify the Owner and Engineer in writing in accordance with these documents. Contractor acknowledges that resolving utility conflicts, can sometimes require permitting. The Owner will grant additional days to the Contractor to cover the length of unanticipated delay in writing. However, under no circumstances will the Contractor be eligible for remobilization costs.

1.05 ADDITIONAL TRAFFIC REQUIREMENTS

- A. Contractor will be responsible for submittal 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 construction proposed within the railroad ROW limits. Contractor shall be the responsible party relating to all aspects of railroad ROW 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 coordination, submittals, permitting, signed and sealed MOT plans to meet all regulatory agencies requirements, inspection services or costs nor any other fees ~~related to providing MOT within the railroad ROW limits.~~
- 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.

1.06 OPEN EXCAVATIONS AND RESTORATION

- A. Contractor shall be responsible for restoration of all disturbed areas during construction with equal or better quality, quantity, material and size. Items within the project limits that may require restoration due to the Contractor's means and methods and associated work or equipment movement, staging, etc., as well as those limits outside of the work limits, and not shown on the drawings, shall be the responsibility of Contractor to restore if impacted. In addition, timely restoration shall be required by the Contractor. The open trench excavation limits may be required to be limited to minimize risk or safety issues. **The Owner and Engineer, reserve the right to notify the Contractor of any areas that will be required to be backfilled, sheeted, shored or braced including providing restoration in advance of larger scale restoration efforts or other restoration efforts which may need to be performed in advance.**
- B. 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, sheeting, shoring, and bracing to minimize open trench excavation limits adjacent to the railroad ROW limits and to facilitate additional safety measures due to the active railroad.~~
- C. ~~Installations by open trench methods shall comply with AREMA Manual for Railway Engineering, Part 4, Culverts, Section 4.14, Assembly and Installation of Pipe Culverts where applicable for railroad crossings.~~
- D. ~~Sheeting, piles, shoring and bracing and associated signed and sealed design calculations by a licensed Professional Engineer are required to be submitted for work within the railroad ROW limits. All calculations, reviews, and permit approvals are to be provided by the Contractor at no additional cost to the Owner/TWA.~~

1.07 TEST PITS/HOLES

- A. Test pits and/or holes for the purpose of locating underground pipeline, utilities, 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 FDOT standards and specifications and meeting all AREMA guidelines. ~~Grouting of test holes is typically required if within the railroad right of way limits. The costs for such test pits and grouting of the test pits and/or holes shall be borne by the Contractor.~~

1.08 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, dated June, 1973, including any amendments thereto.

1.09 INCLEMENT WEATHER

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

1.10 COORDINATION OF WORK

- A. ~~The Contractor shall cooperate fully so as to eliminate or minimize the creation of conflicts with all other parties performing work within the active railroad ROW limits. Adjustments from time to time may be required in the Contractor's work location and/or schedule upon notice provided by the railroad representative, FDOT, or the Owner.~~

1.11 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 Owner or Engineer.
- B. Access to properties along the Project must be maintained at all times throughout the duration of the Project.

1.12 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.

1.13 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, (PL 91-596) and under Section 107 of the Contract Work Hours & Safety Standards Act (PL 91-54).
- B. All equipment furnished and installed under this Contract shall comply to Part 1910, Occupational Safety & Health Standards & Amendments thereto.

C. The Contractor shall comply with the Florida Trench Safety Act (90-96, Florida Law).

1.14 STATE AND FEDERAL PERMITS

A. The Contractor is required to comply with and meet all applicable State and Federal permits. The Owner 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.

1.15 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 Owner and Engineer shall be permitted access to any work area for the inspection of work and materials. The Owner 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 Owner 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.

1.16 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 Owner 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 Owner 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 Owner 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 Owner'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 Owner 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 Owner 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.
 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.
- 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 a legal manner.
- 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 Owner'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.

1.17 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 Owner 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.

1.18 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 Owner 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 Owner, the Owner will not be responsible for the inadvertent removal of material which the Contractor would not have disposed of had he effected the required cleanup.
- C. 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.

1.19 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.

1.20 CONTRACTOR'S USE OF PREMISES

- A. All project construction work will be accomplished on the Owner'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 Owner. 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 Owner.
- 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 Owner. 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. Construct all fill areas so runoff will not flood improved areas.
- F. All connections to existing piping systems shall be made as shown or indicated on the Drawings after consultation, cooperation, and coordination with the Owner. Some 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 Owner when tie-ins with the existing plant utilities are required.
- G. For major utility pipeline tie-ins and relocations, the Contractor shall submit a detailed

Plan of Action for review and approval by the Owner and the Engineer. No major utility relocation or tie-ins shall proceed until the Plan of Action for that Work is approved.

1.21 HAZARDOUS LOCATIONS

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

1.22 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.

1.23 DRAINFIELD AND FRENCH DRAIN RESTORATION

- A. Contractor shall restore all existing drainfields and French drains to equal or better condition if impacted during construction efforts. Laterals, services or other impacts to drainfields and French drains must follow FDOT standards and specifications for restoration.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The work specified in this section consists of the construction of asphaltic concrete surface course composed of a mixture of aggregates, mineral filler and asphalt cement properly laid upon a prepared base or a newly constructed and compacted, primed and tacked roadway base course, in accordance with these specifications and in conformity with the lines, grades, thickness and typical cross section shown on the Drawings. The Contractor shall furnish asphaltic concrete surface course in the locations and to the extent indicated on the Drawings.
- B. The Contractor is solely responsible for the cost of asphaltic concrete pavement to be provided at various locations within the project corridor, and at potentially varying thicknesses per jurisdictional requirements, or for replacement in kind, as applicable.
1. For new asphalt roadway pavement construction or reconstruction, provide asphaltic concrete structural surface course consisting of one of the following:
 - (a) "Superpave Asphalt Concrete" per FDOT Standard Specifications for Road and Bridge Construction.
 - (b) Or as otherwise required by the authority having jurisdiction over the roadway right-of-way and as indicated on the plans and Standard Details.
 2. Thickness of the asphalt course shall be two (2") inch thick minimum, or as specified on the Drawings, or by the regulatory agency having jurisdictional authority over the roadway right-of-way limits. In addition, asphaltic pavement may be required to be replaced in kind and to match existing thicknesses if deemed necessary by the agency having jurisdictional authority over the right-of-way. The Contractor should plan on doing any required due diligence (pavement corings) to identify existing pavement thicknesses as necessary.

1.02 QUALITY ASSURANCE

- A. Construction of asphaltic concrete surface courses shall be in accordance with the Standard Specifications for Road and Bridge Construction (current edition), of the Florida Department of Transportation, and supplements thereto, hereinafter referred to as FDOT Specifications, except as amended herein. The FDOT Specifications are hereby made a part of this contract to the extent they are applicable thereto and shall be as binding upon the Contractor as though reproduced herein.

1.03 RELATED SECTIONS

- A. Section 02332 - Limerock Base.
- B. Section 02507 - Prime and Tack Coats.
- C. Section 02582 – Raised Retro-Reflective Pavement Markers.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Bituminous Material: Asphalt cement, Viscosity Gard AC-20 or AC-30, shall conform to the requirements of FDOT Specifications.
- B. Coarse Material: Coarse aggregate, stone or slag shall conform to the requirements of FDOT Specifications.
- C. Fine Aggregate Material: Fine aggregate shall conform to the requirements of FDOT Specifications.
- D. Mineral Filler: Mineral filler shall conform to the requirements of FDOT Specifications.

2.02 GENERAL COMPOSITIONS OF MIXTURE:

- A. The bituminous mixture shall be composed of a combination of aggregate (coarse, fine, or mixture thereof), mineral filler, if required, and bituminous material. The several aggregate fractions shall be sized, uniformly graded and combined in such proportion that the resulting mixture will meet the grading and physical properties of the approved job mix formula.
- B. In all cases, the job mix formula shall be within the design ranges specified in the following table.

Gradation Design Range

<u>Sieve Size</u>	<u>% by Weight Passing</u> <u>Type S-III (SP 9.5 Equivalent)</u>
¾-inch	
½-inch	100
3/8-inch	88-100
No. 4	60-90
No. 10	40-70
No. 40	20-45
No. 80	10-30
No. 200	2-6

2.03 JOB MIX FORMULA

- A. No work shall be started on the specific project until the Engineer has approved the job mix formula. FDOT approvals will be required for all materials to be used within their ROW limits.
- B. The job mix formula shall conform to the requirements of FDOT Specifications. In addition, the job mix formula shall include test data showing that the material as produced meets the requirements of the following table:

Mix Type	Minimum Marshall Stability (%)	Flow (0.01 in)	Minimum VMA (%)	Air Voids (%)	Min Effective Asphalt Content (%)
SP-9.5	1,500	8 – 14	15	3 – 7	5.5

PART 3 - EXECUTION

3.01 TRANSPORTATION

- A. The mixture shall be transported in tight vehicles previously cleaned of all foreign material and, if necessary, each load shall be covered with a waterproof canvas cover of sufficient dimensions to protect it from weather conditions. The inside surface of the truck bodies may be thinly coated with soapy water, or a mixture of water with not more than five percent of lubricating oil, but no excess of either shall be used. After the truck bodies are coated and before any mixture is placed therein, they shall be raised so that all excess water will drain out. Kerosene, gasoline or similar products shall not be used to prevent adhesion.

3.02 LIMITATION FOR SPREADING

- A. The mixture shall be spread only when the surface is properly prepared and is intact, firm, cured and dry. No mixture shall be spread when the air temperature is less than 40-degree Fahrenheit, nor when the spreading cannot be finished and compacted during the daylight hours. The temperature of the mix at the time of spreading shall not be less than 230-degree Fahrenheit.

3.03 PLACING

- A. The mixture shall be placed in accordance with the requirements of FDOT Specifications. The new asphalt pavement shall be placed in two lifts. The second lift shall match the elevation of the adjacent pavement.

3.04 COMPACTING

- A. The mixture shall be compacted in accordance with the requirements of FDOT Specifications.

3.05 JOINTS

- A. Joints shall conform to the requirements of FDOT Specifications.

3.06 FIELD QUALITY CONTROL

- A. Surface Requirements: Depressions which may develop after initial rolling shall be remedied by loosening or removing the mixture and adding new material to bring the areas to a true surface. No skin patching shall be done. Such portions of the completed pavement which are defective in surface compaction or in composition, or that do not comply with all other requirements of these specifications, shall be taken up and replaced with suitable mixture, properly laid in accordance with these specifications and at the expense of the Contractor.
- B. Thickness Requirements: The thickness of the compacted asphaltic concrete surface course shall be no less than that shown on the Drawings as determined by coring. Thickness testing and correction of defective work shall be as specified in FDOT Specifications.
- C. "As-Built" limerock elevations shall be signed and sealed by a registered land surveyor and submitted to the Project Engineer for approval prior to placement of asphalt. Elevation shall be taken at high and low points, midpoint, intersections and breaks in grade at intervals not to exceed 50 feet. No separate pay item is included in bid form for this work. Include limerock as-built cost in asphalt section.
- D. Protection of Pavement: After the completion of the pavement, no vehicular traffic of any kind shall be permitted on the pavement until it has set sufficiently to prevent rutting or other distortion.

END OF SECTION

HORIZONTAL DIRECTIONAL DRILL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. This section shall include but not be limited to all labor, equipment, tools, materials, and incidentals required for the installation of below grade pipeline and/or conduit by the horizontal directional drilling (HDD) method. In addition, design calculations for all HDD installations must be signed and sealed by a Professional Engineer licensed in the State of Florida and submitted for approval by the Contractor as per the requirements listed herein. All pipe and appurtenances of similar type and material shall be furnished by a single manufacturer. Multiple submittals for the same materials will require that a single approvable manufacturer be selected by the Contractor and the Engineer and Owner notified for the final approved submittal to be provided.
- B. The Contractor shall be responsible for all maintenance of traffic (MOT) to maintain vehicular, pedestrian park, and all other access at all times. The project contains various land use areas, all of which must have detailed and specific MOT plans to allow for continuous operations and access at all times. The detailed MOT plans shall be submitted to the Owner/Engineer for approval prior to commencement of the work and address all work areas within the project corridor. The plan shall be in accordance with the Manual of Uniform Traffic Control Devices. The MOT plans are required to be signed and sealed by a professional engineer licensed in the State of Florida and shall meet all Florida Department of Transportation (FDOT), City and County standards and specifications. Comments from all required jurisdictional agencies and the Owner must be addressed prior to the MOT plans being approved and implemented by the Contractor. The Contractor must provide all necessary advanced notifications prior to implementing MOT plans. MOT may be required to be during non-peak hours/dates and times and shall meet all Owner requirements at no additional cost to the Owner.
- C. The Contractor shall coordinate all staging areas with the Owner and jurisdictional authorities, prior to commencement of staging of equipment or materials. Screening or other approved visual barriers, noise attenuation, protection of existing structures and features, maintaining accessways including the use of temporary stabilized access roads or platforms, matting or other necessary improvements to protect wetlands, vehicular and pedestrian protection and MOT, and all other necessary safety precautions to protect and minimize disruptions, and/or other necessary measures as directed by the Owner and others will be required and must be pre-approved by the Owner and jurisdictional authorities prior to installation or implementation. These measures are considered incidental to the Work and due to the surrounding areas of the Work and will be at no additional cost to the Owner.
- D. The Contractor shall use means and methods as necessary to minimize the unintentional release of drilling fluids (aka "frac-out"). A frac-out contingency plan shall be submitted by the Contractor and a minimum of at least one vac truck must be maintained on site at

all times. An example plan is included in the Appendices for reference but more specific information is required to be provided by the Contractor such as number of vac trucks on site, response plan and timeline, emergency contacts, etc. Potential means and methods to minimize frac-outs are at the discretion of the Contractor and may include, but are not limited to; pressure relief or weep holes, bore tracking systems, wire grid installations for tracking, monitoring of drilling fluid pressures and flows, installation of conductor casings at entry and/or exit pit locations, or other means and methods measures as deemed necessary by the Contractor.

- E. Additional or supplemental geotechnical borings shall be the responsibility of the Contractor. Limited geotechnical borings were initially performed by the Owner and are intended to be supplemented with sufficient geotechnical borings being performed by, and paid for by, the Contractor. No claims for unknown soil conditions will be approved, nor will any cost changes be acceptable to the Owner. The Contractor must obtain all necessary soil borings for the locations and depth(s) of their performed installations, at no additional cost to the Owner, and provide all necessary tooling for the various types of soils potentially encountered during the drilling operation.

- F. The Contractor is to field verify all existing utilities prior to commencement of drilling operations. Limited subsurface utility excavations have been performed by the Owner to assist the Contractor in locating existing facilities; however, it is the Contractor’s sole responsibility to verify and confirm all existing utility sizes, depths and locations. In addition, all utility coordination and locating of existing facilities is to be performed by the Contractor prior to commencement of any HDD operations to ensure that all existing utility facilities are located, protected and supported as necessary at all times. Any impact to existing utilities shall be repaired and replaced by the Contractor at their expense and at no cost to the Owner.

- G. The Contractor’s operations shall be in conformance with the Directional Crossing Contractors Association (DCCA) published guidelines (latest edition) and pipe manufacturer’s guidelines and recommendations and use standard engineering practices for all HDD calculations, methods, installations and safety precautions.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. This specification references the following Specifications, which form a part of this specification to the extent specified herein. In any case of conflict, the most restrictive specification shall apply.

1.	Submittals	Section 01330
2.	Quality Assurance/Quality Control	Section 01440
3.	Erosion and Sediment Control	Section 01575
4.	Dewatering	Section 02240
5.	Excavating and Backfilling for Utilities	Section 02320
6.	Bentonite Management Plan	Appendix C

1.03 DEFINITIONS

- A. Horizontal Directional Drilling (HDD): a steer-able system for the underground installation of pipes, conduits and cables using a surface launched rig. A pilot bore is drilled using a rotating drill string and then is enlarged by a back reamer to the size required for the product pipe. The necessary deviation during pilot boring is provided by a slanted face to the drill head, an asymmetric drill head, eccentric fluid jets or a combination of these, usually in conjunction with an aboveground electronic locator or a remote guidance system.
- B. Maxi (Conventional) HDD: typically used for the largest diameter pipelines/conduits and longest length installations. Pipe diameters are typically 18 inches or larger, lengths can exceed 1000 feet and the pullback force is typically in excess of 70,000 pounds. Remote tracking of the drill string is usually provided from sensors near the leading end of the drill string.
- C. Mini HDD: typically used for the smaller diameter pipelines/conduits and for shorter distances. Pipe diameters are typically 6 inches or smaller, lengths less than 600 feet, and pullback forces are up to 20,000 pounds. Tracking of the drill string is typically achieved with a surface held walkover transmitter/receiver.
- D. Midi HDD: typically used for intermediate sizes and lengths of pipelines/conduits. Pipelines are typically between 6 inches and 18 inches diameter, lengths up to 1000 feet and pullback forces from 20,000 to 70,000 pounds. Midi HDD equipment may employ similar capabilities to the Maxi HDD rigs, but have more limitations on capacity. Tracking of the drill string is typically achieved with a surface held walkover transmitter/receiver.

1.04 SUBMITTALS

- A. Submittals shall be submitted to the Engineer and Owner for review and acceptance prior to construction. Submittals for HDD operations are to include, but not be limited to:
 - 1. Detailed work plan including at a minimum: HDD layout showing entry and exit angles, bend radius, existing utilities and separation distances, entry and exit pit locations, pipe layout/stringing, any deviations from the HDD plan and profile in the Contract Documents/plans, means and methods for the HDD submittal and all other pertinent information to perform the HDD. See below for additional requirements.
 - 2. Pipe Material.
 - 3. Couplings / Sleeves.
 - 4. HDPE mechanical joint adapters.
 - 5. Training and experience of directional boring machine operator.
 - 6. Bentonite Management Plan
 - 6. Directional drilling equipment specifications including calibration records.

B. Prior to beginning Work, the Contractor must submit a detailed work plan to the Owner and Engineer detailing the procedure and schedule to be used to execute the Project. The Work plan should, but not be limited to, the following:

1. A description of all equipment to be used.
2. Additional or supplemental geotechnical boring locations and depths.
3. Down-hole tools.
4. A list of personnel and their qualifications and experience.
5. List of Subcontractors.
6. A schedule of work activity.
7. A safety plan and traffic control plan (if applicable).
8. An environmental protection plan.
9. Contingency plans for possible problems/inadvertent fluid release

C. Equipment/Personnel

1. **Contractor is to submit specifications and signed and sealed calculations showing that all directional drilling equipment to be used is sufficient to handle the pullback forces and to ensure that the equipment will be adequate to complete the work. A variance may be requested by the Contractor for submittal of calculations that are not signed and sealed; however, the Contractor remains at their own risk for any deficiencies or issues with the HDD construction, including all costs with any failed HDD operations or construction issues.** Equipment shall include, but not be limited to, the following:

- a. Drilling rig of sufficient capacity to perform the bore and pullback operations.
- b. Identify location and timing for securing a back-up rig if needed.
- c. A drilling fluid mixing, delivery, and recovery system of sufficient capacity. In addition, a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused.
- d. Mud motors (if applicable).
- e. Down-hole tools.
- f. A magnetic guidance system to accurately guide boring operations.
- g. Rig safety systems.
- h. Identify location and timing for securing a back-up rig if needed.

- i. Method of logging depth including grid system/wiring, tracking or other methods. The method must be sufficient to obtain accurate information for the depth and length of the bore.
- j. Vacuum trucks of sufficient capacity to handle the drilling fluid volume.
- k. Trained and competent personnel who are experienced must operate the system
- l. **Industry standard calculations to ensure that the HDD rig and equipment is capable of performing the HDD.**

1.05 QUALITY ASSURANCE

A. Technical Guidance

- 1. PPI TR-4: Recommended Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) or Minimum Required Strength (MRS) rating for thermoplastic piping materials or pipe.
- 2. PPI TR-3: Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) or Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.
- 3. PPI TR-2 PVC Range Composition Listing of Qualified Ingredients.

B. Reference Standards (this listing is not all-inclusive of all required standards)

- 1. ASTM D1248 Polyethylene Plastics
- 2. ASTM D1785 Schedule 40, 80 and 120 plastic pipe
- 3. ASTM D3035 Polyethylene Pipe based on Controlled Outside Diameter
- 4. ASTM D3350 Polyethylene Plastics Pipe and Fittings Materials
- 5. ASTM D3261 Butt Heat Fusion Polyethylene Plastic Fittings for Polyethylene Plastic Pipe and Tubing
- 6. ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
- 7. ASTM F2160 Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD)
- 8. ASTM F1962 Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings
- 9. ASTM D1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- 10. ASTM D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

11. ASTM D2152 Test Method for Degree of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion
12. ASTM D2241 Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR PR)
13. ASTM D2665 Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
14. ASTM D3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
15. ASTM F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe
16. ASTM F679 Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings
17. ASTM F1057 Standard Practice for Estimating the Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by the Heat Reversion Technique
18. ASTM F1417 Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
19. ANSI/AWWA C104/A21.4 – Standard for Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water
20. ANSI/AWWA C105/A21.5 – Standard for Polyethylene Encasement for Ductile Iron Pipe Systems
21. ANSI/AWWA C110/A21.10 American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids
22. ANSI/AWWA C111/A21.11 American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
23. ANSI/AWWA C150/A21.50 – Standard for the thickness design of Ductile Iron Pipe
24. ANSI/AWWA C151/A21.51 – Standard for Ductile Iron Pipe, Centrifugally Cast, for Water
25. ANSI/AWWA C153/A21.53 AWWA Standard for Ductile-Iron Compact Fittings for Water Service
26. ANSI/AWWA C600 -- Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
27. AWWA C605 Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
28. AWWA C651 Standard for Disinfecting Water Mains
29. AWWA C900-16 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 60 in. (100mm Through 300mm), for Water Distribution and Transmission

30. AWWA M23 AWWA Manual of Supply Practices PVC Pipe—Design and Installation, Second Edition
31. ASTM C923 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
32. UNI-B-6 Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe
33. UNI-PUB-08 Tapping Guide for PVC Pressure Pipe
34. NSF-14 Plastics Piping System Components and Related Materials
35. NSF-61 Drinking Water System Components--Health Effects

C. Inspection Upon Delivery

1. All pipe, fittings, and appurtenances shall be subject to visual inspection by the Owner's Representative at the point of delivery and again just before being lowered into the trench. All materials found to be defective due to manufacture, or damaged in transit shall be rejected and shall be immediately removed from the job site. Damaged piping may be rejected at the Owner's discretion, whether it meets or exceeds the manufacturer's minimum recommended standards for damages along the surface of the piping. All rejected piping must be replaced by the Contractor at no additional cost to the Owner.
2. The Owner's Representative may perform or cause to be performed all tests as specified in the applicable Standards, to ensure conformance with the standard. In the case of failure of the pipe or appurtenances to comply with such standards, the responsibility for replacement of the defective materials becomes that of the Contractor.
3. The entire product of any manufacturer may be rejected when, in the opinion of the Owner's Representative, the methods of manufacture fail to secure uniform results, or where the materials are such as to produce pipe and/or fittings of inferior quality.
4. All piping must be from a single manufacturer for each individual item submitted. Multiple manufacturers for the same product or item will not be acceptable.

1.06 EXPERIENCE

- A. The Contractor or his qualified subcontractor shall have no less than ten (10) years of experience in the installation and construction of horizontally directionally drilled pipeline of the same piping material(s), with the same nominal piping diameter(s) at a minimum, and of at least the same minimum length as the longest bore length for this specific project. Piping installations must be pressurized piping for water, reclaimed water or force main piping only, and
- B. The Contractor shall provide documentation to the Owner/Engineer of his experience in similar projects and provide the names and contact numbers/addresses of at least five (5) successfully completed HDD examples within the past ten (10) years. Conventional open

trenching experience, bore and jacking experience, or other types of experience not specific to HDD installations will not be acceptable substitutes for horizontal directional drilling experience, and

- C. The documentation for experience shall include but not be limited to the following:
1. Name and description of the projects.
 2. Resumes of Project Manager, Superintendent and driller assigned to the specific project. As noted below, all key employees whose resumes were submitted must remain on the project site throughout the duration of the HDD installations. Swapping out of key personnel will not be acceptable. Any key personnel swapped out must be approved by the Owner and Engineer of Record prior to commencement of the HDD operation.
 3. Pipe material, type, diameter and length of each HDD installation.
 4. Bore diameter and equipment used.
 5. Soil conditions encountered.
 6. Start and completion dates.
 7. Contact names, numbers and addresses, and
- D. Successful installation of the piping is required as well as good references for consideration of performing this project. Bidders must notify their submitted references and all references must be able to be reached to confirm prior project completion. It is the sole responsibility of the Contractor to provide references who are responsive and able to be reached to confirm each project reference. Non-responsive or references that are not able to be reached are grounds for rejection of the submitted bid. In addition, the referenced skilled employees as submitted by the Contractor for the HDD operations are required to be on site throughout the HDD installations, and
- E. The Contractor's operations shall be in conformance with the Directional Crossing Contractors Association (DCCA) published guidelines (latest edition) and pipe manufacturer's guidelines and recommendations.

PART 2 – PRODUCTS

~~2.01 FUSIBLE POLYVINYLCHLORIDE PIPE (FPVCP)~~

- A. ~~Fusible polyvinylchloride pipe for potable water shall conform to AWWA C900, AWWA C905, ASTM D2241 or ASTM D1785, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types. Pipe shall be marked verifying suitability for potable water service per NSF 61.~~
- B. ~~Fusible polyvinylchloride pipe for non potable water or pressurized wastewater not conforming to AWWA C905 dimensionality shall conform to AWWA C900, ASTM D2241~~

or ASTM D1785 for standard dimensionality, as applicable. Testing shall be in accordance with the referenced AWWA standards.

- C. ~~Fusible polyvinylchloride pipe for non potable water or pressurized wastewater conforming to AWWA C905 dimensionality shall conform to AWWA C905.~~
- D. ~~Fusible polyvinylchloride pipe for non-pressure storm or wastewater conforming to AWWA C905 dimensionality shall conform to AWWA C905.~~
- E. ~~Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.~~
- F. ~~Fusible polyvinylchloride pipe shall be manufactured in a standard 40' nominal length or custom lengths as specified.~~
- G. ~~Fusible polyvinylchloride pipe shall be blue in color for potable water use. Fusible polyvinylchloride pipe shall be purple in color for reclaim, reuse, or other non-potable use. Fusible polyvinylchloride pipe shall be green in color for wastewater use. Fusible polyvinylchloride pipe shall be white in color for surface or storm water use.~~
- H. ~~Pipe shall be marked as follows:
 - 1. ~~Nominal pipe size.~~
 - 2. ~~PVC.~~
 - 3. ~~Dimension Ratio, Standard Dimension Ratio or Schedule.~~
 - 4. ~~AWWA pressure class, or standard pressure rating for non-AWWA pipe, as applicable.~~
 - 5. ~~AWWA standard designation number, or pipe type for non-AWWA pipe, as applicable.~~
 - 6. ~~Extrusion production record code.~~
 - 7. ~~Trademark or trade name.~~
 - 8. ~~Cell Classification 12454 and/or PVC material code 1120 may also be included.~~~~
- I. ~~Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.~~
- J. ~~Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The fusion technician shall follow the pipe supplier's guidelines for this procedure. All fusion joints shall be completed as described in this specification.
 - 1. ~~No piping shall be allowed to be pulled until all required fusing of the piping has been completed for that bore, nor shall the initial reaming operations be~~~~

~~performed without close coordination and timing with the fusing operation such that potential hole collapse may not occur. In lieu of having two fusing machines on site, no reaming shall be performed until all piping has been fused for each associated bore, this includes intermediate fusing of piping, as applicable.~~

2.01 PIPE AND FITTINGS – HDPE

- A. Materials used for the manufacture of polyethylene pipe and fittings shall be PE 3408 High Density Polyethylene (HDPE), meeting the ASTM D3350 cell classification of 345434E or 345434C. The material shall be listed in the name of the pipe and fitting manufacturer in PPI TR-4.
- B. The material shall have a minimum hydrostatic design basis of 1600 psi at 73°F when tested in accordance with PPI TR-3.
- C. Polyethylene pipe and fittings shall be manufactured in accordance with AWWA C906, ASTM F714, ASTM F 2160, ASTM D3035 and ASTM 3350.
- D. Pipeline shall be identified by providing co-extruded longitudinal stripes at three separate locations along the length of the pipe – at 120 degrees, 240 degrees and at 0/360 degrees. Stripes shall be a minimum of 2 inches wide, except on pipe sizes under 6 inch nominal diameter. Background color of the pipe shall pigmented gray color or black and at least a 2% carbon black. Stripes shall be of the same material as the pipe and must comply with FDEP standards for color coding of the fluid that the piping is conveying and shall not be painted or printed on the outside of the pipe wall.
- E. Fittings shall be made from the same material as the pipe and meet the same requirements as that for the pipe. All fittings shall be pressure rated to match or exceed the pressure rating of the pipe to which they are joined.
- F. Fittings shall meet the requirements of ASTM D3261, where applicable. Molded fittings shall have butt fusion compatibility with the pipe to which they are joined.
- G. Pipe and fittings shall be joined by the method of butt fusion, as outlined in ASTM D2657. The pipe manufacturer’s fusion procedures shall be followed at all times as well as the recommendations of the Fusion Machine Manufacturer.
- H. Water and wastewater HDPE piping shall be DR-11 HDPE piping at a minimum, or as otherwise shown on the plans.
- I. Pipe used for electrical conduit or fiber optic systems shall be DR-7, minimum. Piping to be installed within the same trench for all open cut work and to be pulled as part of a bundled HDD with all HDD installations.

2.02 PIPE AND FITTINGS – DUCTILE IRON PIPE

- A. The bore path alignment and design for HDD shall be based on the construction plan drawings and specifications, Contractor constructability review, site conditions and other factors specific to the project corridor. Some of these factors are the pipe bell and barrel

diameters, the optimum individual pipe length, pipe weight and buoyancy, profile depth, bore path inside diameter, and allowable deflection capabilities of the joint (see Table 1 below for a general guideline).

Table 1. Design Data for HDD

Size (in)	Pipe OD (in)	Barrel OD (in)	Weight Lined Pipe PC250 (lb/ft)	Buoyancy in Water (lb/ft) net*	Allowable Pulling Force (lb)	Allowable Deflection (Degrees)	Min Curvature

Note: Allowable deflections are based on 50% of manufacturer’s maximum recommendations. Deviations from the recommendations in this table shall require the approval of the EOR

*Buoyancy is based on empty, cement lined pipe immersed in water. The Contractor shall use the above table for reference only and shall be required to follow all manufacturer’s specific recommendations as applicable.

- B. Pipe and Fittings shall meet the requirements of AWWA/ANSI C151/A21.51 and ANSI/AWWAC153/A21.53, respectively. Pipe used for directional drilling shall be Class 250 ductile iron pipe, or as specified by the Engineer, with pipe manufacture designed restrained joints.
- C. Ductile Iron Pipe and Fittings for water or sewer transmission shall be lined with a cement mortar lining and have a protective exterior and interior coating. Protective exterior and interior coating shall conform to ANSI/AWWA C151/A21.51 and shall be a bituminous paint with a 1 mil minimum thickness. Ductile Iron Pipe for sewer application shall be lined with Protecto 401 (P401).
- D. Joints used for directional drilling shall be boltless, flexible, restrained. Pipe and joint seals, when properly assembled and installed, shall be capable of dependably handling the specified internal pressure, as well as vacuum and external pressures that can occur in pipeline operation. Joints shall exhibit such performance attributes in straight alignment or at maximum rated joint deflection. Pipe pulling bell assemblies shall be designed and furnished by the pipe manufacturer. The pulling bell assembly shall have the same performance characteristics as the pipe to which it is connecting. It shall also be fabricated with filling/testing ports, of appropriate size, for testing of the pipe after it is pulled through the bore path. For pipe that is installed using the Assembled Line method, described as follows, the pulling bell may also be used as one of the two (2) bulkheads required for a low pressure air test of the pipe string prior to pull back. After complete installation, the pulling head may also be helpful, with or without further connection of piping, in normal higher pressure hydrostatic testing of the installed piping.
 - 1. The Manufacturer shall have representative proof-of design tests of flexible restrained pipe joints as well as of the pipe pulling bell assemblies that establish the basis for the maximum allowable pulling loads (see Table 1).

2. If the soils in the vicinity of the HDD are determined to be historically corrosive or through direct soil testing it is determined that the pipe requires external corrosion protection the pipe shall be encased with either a single or double polyethylene wrap or as specified by the Engineer. The polyethylene wrap system shall conform to ANSI/AWWA C105/A21.5. Any polyethylene wrap which is damaged during the construction process shall be repaired prior to pulling the pipe through the bore hole.
3. Ramp Method: The ramp method is the pre-assembly of multiple joints of pipe into a long pipe string prior to pulling through the bore hole. With this method the Contractor provides a ramp leading into the bore hole to assure that the joint deflection never exceeds the maximum allowed per the manufacturer. With this method extra care shall be taken to assure that all piping, including any polyethylene wrapped pipe, is not damaged prior to pulling through or as the pull is underway. The means and methods of the installation shall be the Contractor's responsibility for the installation and shall follow approved manufacturers guidelines for the piping installation.
4. Cartridge Assembly: This method is achieved by the assembly of individual joints of pipe within a pit. This method allows for an assemble and pull method, where a joint of pipe is connected then pulled into the bore hole the length of the section of pipe, then the next section etc. This process is repeated until the string of pipe reaches the opposite end of the bore hole. The means and methods of the installation shall be the Contractor's responsibility for the installation and shall follow approved manufacturers guidelines for the piping installation.

2.03 BORING EQUIPMENT

- A. Boring equipment shall be matched to the conditions of the project, but in no circumstances, shall the equipment have a pulling force less than twice (2X) the maximum calculated peak-pulling requirement as calculated by proprietary software (such as DrillPath™) for this purpose for the particular job requirements. Signed and Sealed calculations must be submitted and approved by the Engineer.
- B. Boring equipment shall have a mechanical drilling rig with a controlled directional boring head using either a fluid or mechanical cutting head (or combination of both), assisted and cooled by an approved drilling fluid of low pressure and volume.
- C. Contractor shall provide to Owner/Engineer a description of the rig proposed for the project at each location, showing the method of control of the boring head, head type, pulling force of the equipment, age, reamer type(s), manufacturer type and other germane information. Approved boring equipment shall be that manufactured by American Augers, Case Construction, Charles Machine Works (Ditch Witch), Straight Line, Tulsa Rig Iron, Vermeer, or approved equal with approval from the Engineer and Owner.
- D. The location/tracking system employed for determining the location of the drilling head during the pilot bore shall include, but not be limited to: the position of the boring head, the roll angle, the tilt angle, depth below grade, temperature of data transmitter and remaining battery life.
- E. The type of proposed drilling fluid shall be submitted to the Owner/Engineer for approval prior to the commencement of the work. Potable water or reclaimed water will be made available to the Contractor, provided it is within a reasonable distance from the project site. Consumption of this water will be metered and invoiced to the Contractor at the current effective rate.

- F. For all carrier pipelines larger than 6 inches in diameter and prior to commencement of the work, the Contractor shall submit to the Owner/Engineer the results of the proposed drill path profile analysis for approval. The analysis shall include as a minimum, the following:
1. Proposed profile/drill path including separation distances from all existing utilities that have been field verified
 2. Proposed entry and exit angles
 3. Proposed radii of curvature for all directional changes
 4. Pipe deflection and pipe buckling calculations
 5. External pressure and comparison to expected fluid pressure
 6. A graph showing the calculated stresses along the entire path of the proposed profile
 7. Method of buoyancy control (if required/utilized)
 8. Entry and Exit pits, pipe layout and stringing areas
 9. All MOT for associated staging and HDD drilling areas must be signed and sealed, submitted and approved by all jurisdictional agencies having authority over the various ROW limits. City, County and FDOT standards must be provided for all MOT.
- G. For pipelines 4 inches and smaller, the requirements of 2.02 F (above) shall be determined on a case-by-case basis. The Engineer may waive these requirements if the conditions of the project so warrant.
- H. No work or drilling shall commence until the Contractor has submitted the required information and received written approval from the Engineer of the drill path and related procedures.
- I. Any proposed deviations to the HDD drill must be noted and approved by the Engineer and Owner. If the Contractor chooses to construct the HDD deeper than what is shown on the plans, the Owner is not required to, and shall not, pay the Contractor for a longer HDD installation unless documentation is provided, reviewed and approved by the Engineer and Owner justifying a change in the HDD layout and depth of the bore, prior to commencement of construction. Pressure relief/weep holes may be required to be performed by the Contractor to reduce inadvertent mud release rather than constructing the HDD unnecessarily deeper. The Contractor assumes all risks for the HDD installation and for their means and methods to perform the HDD installation.

2.04 LOCATING WIRES

- A. Locating wire shall be 8 gauge insulated solid copper wire plus an 8 gauge insulated copper clad steel core wire bundle. Color coding shall be consistent with pipeline identification colors. A minimum of two (2) bundled locating wire(s) shall be attached with nylon wire ties at different radial locations around the pipe to ensure continuity in at least wire bundle subsequent to installation. Thus, there will be a minimum total of 4 wires for every HDD installation. Contractor shall be required to provide as many wires as necessary to maintain continuity throughout the length of each directional bore. If rock

is identified in the HDD limits, the wire will be required to be installed in a DR-7 HDPE conduit or casing as part of a bundled HDD installation. Failure of continuous continuity in the locating wire shall result in abandonment and reinstallation of the directional drill, at the discretion of the Owner, and at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 DIRECTIONAL DRILLING

- A. The installation of the pipeline by horizontal directional drilling (HDD) shall be accomplished within the limits indicated on the drawings. The site supervisor for the HDD operation is required to be on site for the entire duration of the HDD operation. Alternate staffing will not be acceptable to be provided to the Owner for the HDD operation.
- B. The Owner shall be notified a minimum of 48-hours in advance to starting the HDD operations. All MOT is to be established prior to commencement of any construction efforts. The HDD operation shall not begin until the Owner has been notified and is present on the job site. The Contractor shall be responsible for the satisfactory completion of a successful HDD installation. The Owner will not pay for any unsuccessful HDD installations or associated costs.
- C. No HDD installations will be allowed to commence on a Friday or on any non-business days due to the potential of an emergency situation occurring. Contractor shall coordinate their timing and HDD installations to ensure that the HDD can be installed in a timely fashion and that restoration and clean up can be performed, prior to non-business or working days. No delay claims will be acceptable for the Contractor's lack of planning or any field issues that cause the HDD installations to have to be rescheduled such that they do not occur on a Friday or other non-standard work days. In addition, the contractor should familiarize themselves with the various holiday/non-work and moratorium periods for which no work is allowed and plan their schedule(s) accordingly.
- D. Before commencement of the drilling operation, all erosion control devices and dewatering shall be in-place and functional in accordance with the contract documents.
- E. All existing utilities shall be field verified prior to commencement of construction by the Contractor such that the work effort is not delayed and there are no utility interruptions. The drawings show existing utilities believed to be near the HDD installation; however, there is no guarantee that these utilities are located as shown or that other utilities are not present. The Contractor must perform all required utility due-diligence including coordination with utility Owners, locating utilities, soft digs, GPR, and all other necessary field verifications prior to commencement of construction to ensure that conflicts with existing utilities do not exist and that no existing utilities are impacted with the construction efforts.
- F. The entire drill path and limits adjacent to the HDD shall be accurately surveyed with entry and exit stakes placed at the appropriate locations for the HDD limits and within the limits specified on the plans.
- G. The Contractor shall comply with all applicable local, state and federal safety regulations and all operations shall be conducted in a safe manner. Additional Owner requirements, permitting and approvals as well as coordination will be the responsibility of the Contractor for all work efforts, and will be at no additional cost to the Owner.
- H. Entry and exit angles of the installed pipeline shall not exceed manufacturer's recommendations for the specific type of piping used nor for the drill rod bending radius

for the HDD operation. Documentation of entry and exit angles shall be provided to the engineer of record and the Owner.

1. The Contractor is to provide HDD equipment that meets the requirements of the HDD bore path and as bid on for the HDD installation. Providing equipment that cannot meet the HDD as designed and as bid by the Contractor will not be acceptable for any change orders or additional compensation. The Contractor is to provide an RFI for any potential issues or concerns that they may have, prior to bidding and submitting on the HDD.
- I. The Contractor shall take precautions to protect the pipeline from damage and marring during the installation and pull back operation. Such precautions shall include but not be limited to: the use of rollers, pulleys, idlers and trunnions.
- J. The boring rig shall be sufficiently and adequately anchored for the task. The machine shall have a capacity to adequately complete the drilling and piping installation including all pullback forces. Signed and Sealed calculations must be provided.
- K. A pilot hole shall be drilled for all installations of 6-inch diameter pipe and larger diameters. The pilot hole shall be conducted with a wire line guidance system. The pilot hole shall follow the designed bore path and shall not exceed the horizontal design plane in either direction by more than two (2) feet, nor more than one (1) foot in either direction, in the vertical plane. The boring shall be conducted using a mechanical boring head, assisted by and cooled by drilling fluid of low pressure and volume. In the event that the pilot hole does deviate from the bore path by more than the above stated requirements, the Contractor shall notify the Engineer immediately and the Engineer may require the Contractor to pull-back and re-drill from the location along the bore path before the deviation.
- L. The Contractor shall provide MSDS sheets for all drilling slurry compounds and additives.
- M. The Contractor shall submit, at a minimum, calculations and data indicating the proposed path of the pilot bore, entry and exit angles, stresses on the pipeline during pull back throughout the length of the bore (both pull back and bending stress), external pressure throughout the length of the pull, proposed drilling flow rates, drilling pressures (maximum), radii of curvature for all directional changes, a chart showing the plan and profile of the proposed installation, and charts comparing the installation tension and tensile stress of the pipe to the calculated conditions during pullback. A buoyancy modification plan is required. This plan shall include the means of providing and applying water to the pipe during installation. Adequate review time for the submitted calculations must be provided after submittal and prior to commencement of the work. All calculations must be signed and sealed by a Professional Engineer.
- N. Installed radius of curvature (in feet) for polyethylene pipe shall be a minimum of 25 times the exterior diameter of the pipeline to be installed (in inches) or as otherwise recommended. Actual radii utilized will be dependent on the specific job conditions. ~~For FPVCP and DIP, the radii shall be greater than the minimum allowable bend radius as provided by the pipe manufacturer. For alternate pipe materials, consultation with the Engineer shall be required for approval.~~
- O. Total maximum force applied to the pipeline during pull back shall not exceed the safe allowable pull strength of the pipeline as calculated or provided by the pipe supplier.
- P. The pulling force of the drilling rig shall be at least twice that required of the maximum stress force calculated for the pull. The Contractor shall provide documentation of the

drilling rig to be used for the work effort and that it meets this requirement. All calculations must be signed and sealed by a Professional Engineer.

- Q. Upon completion of the pull, the Contractor shall provide as-built information of the installed pipeline, including entry and exit locations and elevations (per the WDW Grid coordinate system and NGVD, respectively), and similar location information at 10-foot intervals along the entire length of the profile for profiles under non-submerged surfaces. For profiles under submerged surfaces (such as a lake, stream, canal or river) the frequency of the location interval shall be at a minimum of 20 foot increments. This information shall be provided to the Owner/Engineer within seven calendar days of the completion of each bore path.
- R. Back reaming shall be required for all bores for pipelines exceeding 6 inches in nominal diameter. Back reaming shall be conducted in single or multiple passes of the borehole and shall enlarge the borehole to at least 1.4 times the outer diameter of the pipeline to be installed. The number of back reaming passes shall be proposed by the Contractor and approved by the Engineer prior to commencement of the work. Larger reaming may be required dependent on subsurface conditions encountered.
- S. In the event significant differing soils or strata (from those provided in the geotechnical data and reports) are encountered during the course of the pilot boring, the Contractor shall be responsible for changing the drill head, slurry and other means as may be appropriate for completion of the bore. The Owner shall not be responsible for underground obstacles (such as boulders, tree stumps, loose and unconsolidated soils, hard rock, or other utilities) or structures that may be encountered during the course of the work. During assembly and pull back of the pipe, the pipe must be laid out in such a way as to minimize disruption to and interference with vehicular and pedestrian traffic or other operational conflicts that the Owner/Engineer may identify. Additionally, the pipe must be laid out such that the radius of curvature (in feet) for HDPE pipe of any segment is less than 25 times the outer diameter of the pipe (in inches). ~~For FPVCP and DIP, the pipe should not exceed the minimum allowable bending radius as provided by the pipe supplier.~~
- T. The Contractor shall be responsible for all maintenance of traffic (MOT) to maintain vehicular, pedestrian park, and all other access at all times. The project contains various land use areas, all of which must have detailed and specific MOT plans to allow for continuous operations and access at all times. The detailed MOT plans shall be submitted to the Owner/Engineer for approval prior to commencement of the work and address all work areas within the project corridor. The plan shall be in accordance with the Manual of Uniform Traffic Control Devices. The MOT plans are required to be signed and sealed by a professional engineer licensed in the State of Florida and shall meet all Florida Department of Transportation (FDOT), City and County standards and specifications. Comments from all required jurisdictional agencies and the Owner must be addressed prior to the MOT plans being approved and implemented by the Contractor. The Contractor must provide all necessary advanced notifications prior to implementing MOT plans. MOT may be required to be during non-peak hours/dates and times and shall meet all Owner requirements at no additional cost to the Owner
- U. The boring profile shall be deep enough to preclude hydraulic fracture or frac-out (loss of drilling fluid to the surface), and the Contractor shall calculations signed and sealed by a Professional Engineer submit calculations to verify that the selected profile provides reasonable assurance to preclude fracture. Contractor is to perform additional geotechnical borings as necessary to ensure that soils within the HDD limits have been adequately identified and analyzed prior to HDD operations. All supplemental geotechnical borings are to be at the Contractor's expense. Should hydraulic fracture occur, the Contractor shall repair all related damages, including cleanup of fluids, and make corrections to preclude future events. A sample frac-out mitigation contingency

plan for HDD is located in the Appendix; however, the Contractor must provide their own site specific and detailed plan. Such corrections may include, but not be limited to: re-profiling the bore or changing the viscosity of the drilling fluid or plugging the fracture or a combination of these. In the event the borehole is abandoned and an alternate route is chosen, the abandoned borehole shall be filled with excavatable flowable fill. There shall be no additional compensation to the Contractor for these efforts, if required or deemed necessary, to complete a successful HDD installation.

- V. Where construction activities are in close proximity to or under water bodies (lakes, creeks, canals, retention basins) or wetlands, special attention shall be given to the proposed profile to insure that hydraulic fracture does not occur under the water feature. Additionally, silt fences, turbidity barriers, mats or platforms to minimize impacts, and similar approved erosion control devices shall be used to protect the water body(s) from the construction activities. Underwater divers will be required to be provided by the Contractor during the entire drilling operation for bores that are subaqueous in nature. This includes pre reaming and pipe pull back operations and all operations up until the time that the final piping is pulled into place complete. The divers must notify the Owner, the Owner's inspector, the Engineer and all other required jurisdictional authorities prior to commencement and immediately if any issues occur with the HDD operation.
- W. The Contractor shall maintain logs of the construction progress at the job site and shall be provided to the engineer of record and the Owner. Such logs shall include a Guided Drilling Log, Mud Log and Driller's Log. The Guided Drilling Log shall record the progress of the pilot bore including location and depth every 10 feet over the course of the bore. The locator/tracker system shall, at a minimum, have the following data: position, roll angle, tilt angle and depth. The Mud Log shall record the quantity and quality of the drilling mud, pressure, flow rate and temperature of the mud. The Driller's Log shall record the progress of the reaming operation. Samples of each log sheet shall be submitted to the Owner/Engineer for approval prior to commencement of the work.
- X. For HDPE, upon completion of the pull back, the Contractor shall "rest" the pipe segment to allow for any contraction and shrinkage for at least 24 hours. No additional work on the pulled pipeline segment shall be allowed during the resting period. ~~There is no rest period required for FPVCP or DIP.~~

3.02 DRILLING FLUIDS AND THEIR DISPOSAL

- A. The drilling fluids shall provide stabilization of the bore hole during the pilot and reaming operations, transport cuttings to the surface, cool the drill bit and controller, and lubricate the pipe during pull back. The drilling fluids shall be a bentonite slurry, polymer slurry, water or some combination of these. Bentonite is the preferred material for most applications, and use of water or a polymer will require the approval of the Owner/Engineer prior to commencement of the work.
- B. Drilling fluids that are petroleum based or that contain additives that may contaminate the surrounding soils or groundwater will not be allowed.
- C. The Contractor shall adjust the viscosity of the drilling fluid to match the conditions of the project. The Owner shall bear no responsibility for loss of drilling fluid or loss of drilling equipment should an obstacle or unknown condition be encountered during the course of the work.
- D. The Contractor shall be responsible for transporting, containing and storing any water required for the drilling operations, cleanup and other needs.
- E. All drilling fluid excess shall be contained in entry and/or exit pits and pumped/treated/stored as needed so as to preclude spills and escape to the surrounding

environment. Ensure that entry and exit pits are of sufficient size and volume to contain the expected return of drilling fluids and cuttings. All excess fluids shall be properly disposed in an approved method and off site of the work limits.

- F. Upon completion of the pipe installation, restore the pits, drill rig anchors and all impacted work areas to their pre-construction or better condition. Sod all areas disturbed by the drilling operations.

3.03 THERMAL BUTT FUSION FOR HDPE

- A. Fusion Technician shall be qualified by the pipe supplier to install HDPE of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project, and shall be documented by the pipe supplier.
- B. All HDPE-fusion equipment operators shall be qualified to perform pipe joining using the means, methods and equipment employed by the Contractor. Fusion equipment operators shall have current, formal training on all fusion equipment used on the project. Training received more than two years prior to operation of the fusion equipment shall not be considered current. The Contractor shall submit written certification(s) of training provided by the fusion equipment manufacturer.
- C. The pipe shall be warranted for one year per the pipe supplier's standard terms. In addition to the pipe warranty, the fusion services shall be warranted for one year per the fusion service provider's standard terms.
- D. Pipe shall be off-loaded, loaded, installed, handled, stored and stacked per the pipe supplier's guidelines. These guidelines include compliance with the minimum recommended bend radius and maximum safe pull force for the specific pipe being used.
- E. Pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's guidelines. If pipe is damaged during handling, the Engineer and/or Owner has the ability to reject the piping from being used and at no additional cost to the Owner.
- F. Pipe supplier's procedures shall be followed at all times during fusion operations.
- G. Each fusion joint shall be recorded and logged by an approved electronic monitoring device (data logger) connected to the fusion machine, which utilizes a current version of the pipe supplier's recommended and compatible software.
- H. A data logger shall be used to record and document all butt weld fusion processes. A record shall be made of every fusion weld made. The data logger shall be a rugged, handheld computer as the recording device connected to a data collection device. All data shall be recorded and transmitted to the handheld computer where the joint report will be stored, viewed, printed, or transferred to a desktop computer for archiving. The operator associated with the fusion process shall utilize the data logger report as one means to confirm a complete and proper weld. This data shall be made immediately available to the Owner and Engineer, upon request, and shall be submitted with the project close-out documents. The initial submittal is to be submitted to the Owner and Engineer, within 10 working days after the fusion weld process for review and approval. If a potential defect fusion weld is suspected by the Owner or Engineer or the Contractor, the work shall stop and a mutually acceptable corrective action plan shall be executed. Data logger equipment shall be McElroy Datalogger, Model No. DL6303, DL6304, or Owner approved equal with approval from the Engineer and Owner.

- I. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. This includes requirements for safety, maintenance, and operation with modifications made for HDPE as required for the project.
- J. No piping shall be allowed to be pulled until all required fusing of the piping has been completed for that bore, nor shall the initial reaming operations be performed without close coordination and timing with the fusing operation such that potential hole collapse may not occur. In lieu of having two fusing machines on site, no reaming shall be performed until all piping has been fused for each associated bore, this includes intermediate fusing of piping, as applicable.

3.04 CHECKING AND CLEANING

- A. The pipe shall be checked prior to its insertion and pull back for any flaws in manufacturing and for any potential impacts to the piping during moving and/or pipe layout, etc.
- B. After pull back is complete, but before connections are made to adjoining piping, the pulled section shall again be checked for acceptable roundness by passing a segmented mandrel of no less than 1/2 inch of the smallest pipe section ID, including the interior fusion bead from the thermal butt fusion process. Pipe failing this required roundness check shall be removed and repaired or abandoned and replaced at no additional cost to the Owner. The mandrel size and type must be submitted to, and approved by, the Engineer or Owner prior to use.
- C. The installed and successfully checked pipeline shall be cleaned with stiff brushes followed by a swabbing mandrel sufficient to remove all debris including soils.

3.05 AS BUILTS

- A. As-builts must be submitted for all HDD installations including a detailed bore log as stated herein. As-built variance from the designed bore path shall not exceed plus or minus 1-foot in the vertical plane and plus or minus 2-feet in the horizontal plane. The Contractor shall submit any proposed deviations from the design bore path(s) with submittals, prior to commencement of construction and prior to installing said deviations. FDEP separations must be maintained at all times.
- B. If as-built plans are submitted that indicate that FDEP separation requirements have not been maintained, the Contractor will be required to relocate any facilities that do not meet the separation requirements at their cost. The Contractor is to bring any potential conflicts with existing utilities to the Owner's and Engineer's attention prior to commencement of construction.

END OF SECTION

COLLECTION SYSTEM BYPASS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The work covered by this Section consists of providing all temporary bypassing to perform all operations in connection with the flow of wastewater around sections requiring bypass. 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 overflows 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 and will be based on phased construction, as necessary. In addition, noise attenuation, maintenance, MOT and permitting for bypass pumping operations will be required at no additional cost to the City.
- B. The LUM site requires bypass flows and a maximum allowable time shut does is 2 hours and must be coordinated with the City of Hallandale Beach and the City of Hollywood and done during non-peak hours and/or during the night when flows are low.

PART 2- PRODUCTS

2.01 GENERAL

- A. The Contractor shall provide and maintain adequate equipment, piping, bypassing, tankers and other necessary facilities and 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, linestops with bypass piping as needed, backup generators, plugs, 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.

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, accessways, and alleys. This requirement may necessitate temporary trenching or bypass ramps. Ingress and egress to adjacent properties shall be maintained at all times. Ramps, steel plates or other methods shall be deployed by the Contractor to facilitate traffic over the bypass or surface piping. High traffic commercial properties may require alternate methods. The Contractor is required to provide maintenance of traffic (MOT) for all bypass piping operations including, but not limited to, permitting, approvals, fees and phased construction at no additional cost to the City.

3.03 BYPASS PLAN

- A. The Contractor shall submit a comprehensive written plan according to the submittal specifications, 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 for each area around which flows are being bypassed. The plan shall include any proposed materials and equipment; including but not limited to, tankers, pumps, bypass piping, all fittings, backup plan and equipment, linestops and bypass piping, ramps, work schedule, phasing, monitoring log for bypass pumping, noise attenuation, monitoring plan of the bypass pumping operations and maintenance of traffic 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. **Maximum allowable time for shut down is 2 hours and must be coordinated with the City of Hallandale Beach and the City of Hollywood and done during non-peak hours and/or during the night when flows are low.**

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 notify City operations (Hallandale and Hollywood) 72 hours prior to commencement of bypassing and to allow time for

coordination as necessary. 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 workdays (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 appurtenances to accomplish the bypass and for any and all damage that results directly or indirectly from the bypass pumping equipment, piping and/or appurtenances. 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

UTILITY CONTROL INSTRUMENTATION SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide and test the instrumentation and control system, furnished by a single System Supplier / Integrator (instrumentation subcontractor). Provide fabrication of control panel, RTU panel, antenna tower, and antenna and antenna cable, equipment, installation, programming and other services, and appurtenances required to achieve a complete, integrated, and fully operational system for control and data transmission to the Division Control Center (DCC).
1. The system supplier/ integrator shall fabricate the UL labeled RTU panel including PLC, radio, power supply, AC-UPS, battery, surge suppressors for all analog signals entering the RTU, terminal blocks and other equipment required for a complete operating system to communicate between the control panel and the Division Control Center.
 2. The system supplier/ integrator shall fabricate the UL 698A and UL508A labeled Control Panel (CP) incorporating monitoring panels or relays as provided by manufacturers and other equipment as specified and shown on the drawings.
 3. Provide programming of the PLC as specified and shown on the drawings.
 4. Prepare a radio feasibility study report (OR TEST) to determine the height for mounting the antenna and to determine the proposed location that will allow communication with the DCC.
 5. Provide antenna tower base and tower, erection of tower, antenna and cable for a complete and operating installation.
- B. The system supplier/ integrator (instrumentation subcontractor) for this project is limited to:
1. Curry Controls of Lakeland, Florida, or
 2. CC Control Corp. of West Palm Beach, Florida
- C. Furnish full technical details of all instrumentation offered.
- D. The Supplier of this specification shall be responsible for the coordination of all other equipment furnished in this contract with overall control system requirements.

1.02 RELATED WORK

- A. Division 11: Equipment
- B. Division 16: Refer to applicable sections of electrical for conduit and wiring between panels and field-mounted devices to be furnished and installed.
 - 1. 16900: Electrical Controls and Miscellaneous Electrical Equipment

1.03 REFERENCES

- A. Underwriter's Laboratories, Inc. (U.L.):
 - 1. UL 508A - Standard for Safety Industrial Control Panels
 - 2. UL 698A - Standard for Safety Industrial Control Panels Relating to Hazardous (Classified) Locations
- B. National Electrical Manufacturers Association (NEMA):
 - 1. ICS 1: Industrial Control and Systems General Requirements
 - 2. ICS 2: Industrial Controls and Systems Controllers, Contactors, and Overload Relays Rated 600 Volts.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA-70 National Electrical Code (NEC).
- D. The Instrumentation, Systems, and Automation Society (ISA)
 - 1. ISA-5.2: Binary Logic Diagrams for Process Operations
 - 2. ISA-5.4: Instrument Loop Diagrams

1.04 SYSTEM DESCRIPTION

- A. Equipment, cabinets and other devices furnished hereunder shall be suitable for continuous use in the intended application. The system shall consist of current production products of a single manufacturer wherever possible. Equipment shall be of a design that allows field maintenance and modification.
- B. Terminations:
 - 1. Provide terminations for all inputs and outputs of the PLC in the RTU panel, and for all field wiring between panels and from the CP to field.

2. Provide 4-20mADC signal wiring separated from digital inputs and outputs and power.
 3. Provide continuous conductor from field for all signal wiring.
 4. Provide terminal strips numbered with the signal termination numbers as indicated on the shop drawings. Provide wire numbers on wires at terminal blocks and all connections.
 5. Terminal numbers shall be sequential on the terminal blocks. Provide 10 percent spare terminal blocks for each type of signal.
 6. Partition intrinsically safe wiring separately from all other wiring. Provide a protective cover with labeling to cover the intrinsically safe wires.
- C. Run grounding wires with special care to provide the least possible resistance.
- D. Provide electronic equipment of the manufacturer's latest design and coated to prevent its contamination by dust, moisture, or fungus. Provide field mounted equipment and system components suitable for dusty, humid, corrosive, and hazardous classified conditions specific to the installation location.
- E. Design all instrumentation equipment to operate on 120Vac, +/-10%, at 60Hz, except as specifically noted.
- F. Provide electronic type solid-state instrumentation utilizing linear transmission signals of 4-20mADC, (milliampere direct current), except as specifically noted. Instruments within the same panel or enclosure may be operated by 1-5 Vdc, (volts direct current), provided it is derived from a 4- 20mADC signal.
- G. Provide 4-20mADC outputs capable of driving a 750-ohm load from all transmitters, controllers, and signal processing devices. Inputs to controllers, recorders, indicators, signal processing devices shall be 4-20mADC, or 1 to 5 Vdc derived from a precision 250-ohm resistor in series with the signal loop.
- H. Convert nonstandard signals into compatible standard signals at their source. Zero based signals are not acceptable.
- I. Number wiring in accordance with the numbering system used on the instrument submittal drawings.
- J. Group wiring within the panel according to function, and harness together, or place within ducts and secure to the panel structure.
- K. Equipment installed in designated hazardous areas shall meet Class, Group, and Division as shown on the Contract Electrical Drawings, to comply with the National Electrical Code.
- L. Provide each instrument with mounting hardware, floor-stand, wall bracket, or

instrument rack as shown on the drawings or in manufacturers installation instructions and as approved in the submittals or as required.

- M. Design the system and equipment used therein, to resume normal operation without manual intervention, following resumption of power after a power failure.
- N. Provide UL listed or labeled materials and equipment.

1.05 SUBMITTALS

A. Submit the following in accordance with Section 01300:

1. Submittals shall be bound in Cardinal, Wilson Jones, National, or equal, 8-1/2 x 11 inch three-D-ring binders with hardback; two-inch maximum ring size. If multiple binders are used, correlate data into related consistent groupings. All drawings shall be provided with reinforced punched binder tabs.
2. Instrument Submittals:
 - a. Sales bulletins and other general publications are not acceptable as submittals except where necessary to provide supplemental technical data.
 - b. Submit six sets each of:
 - (1) Component manufacturing data sheets indicating pertinent data and identifying each component by tag number and nomenclature as indicated on drawings and in specifications.
 - (2) System piping schematic and wiring schematic each on single drawing with full description of operation (component identification on schematic as indicated in part a. above).
 - (3) Component drawing showing dimensions, mounting, and external connection details.
 - (4) Provide instrument loop diagrams in accordance with ISA-5.4. Identify range of all analog devices. Identify all termination cabinet and panel terminal numbers. Show all loops in their entirety including control wiring within the Control Panel (CP) and between all field devices including those devices furnished under other Divisions. Clearly identify which selector switch contacts are closed in each selector switch position. Identify normally open or normally closed status for all relay and switch contacts. Assign each wire a unique wire number. Show all power sources, grounding, isolation and lightning protection. Show both analog and discrete signals on a single loop diagram. Show where the analog signal ground shield shall be cut and taped. Submit

loop diagrams on 11 inches by 17-inch sheets. The loop diagrams shall be bound in a 3-ring 11 inch by 17-inch binder. The loop diagrams shall be sequential by facility and loop number. The title shall include the facility and loop number. Submittals which are not properly ordered will not be reviewed.

- (5) Front and interior panel layout and any other panel surface containing instrumentation.
 - (6) List of all spare parts. All manufacturer recommended spare parts shall be supplied in addition to specified spare parts.
 - (7) Loop/equipment protective devices as required, and their proposed application.
 - (8) Shop test plan and results specified in paragraphs 2.08 and 3.02.
- c. Identify any specification section where exceptions are being taken or an "or equal" piece of hardware is being proposed.
 - d. Any changes or modifications to previously submitted materials shall be resubmitted prior to installation.
3. Radio Tower Submittals:
 - a. Submit signed and sealed tower base drawings.
 4. Panel Test Forms:
 - a. Factory test procedure see 3.02.
 - b. Field acceptance test see 3.04.
 5. Operation and Maintenance Manuals:
 - a. Submit operating and maintenance instructions and separate parts lists separately from instrumentation submittal. Incorporate functional description of entire system.
 - b. Submittal shall include the following:
 - (1) Data sheet describing each element in detail, including manufacturer, part number, calibration values, and all information pertaining to the element. Include brief description of each device.
 - (2) Manufacturer specification sheets for each element. All specification sheets shall be properly annotated.

- (3) Complete spare parts list.
 - (4) Submittal shall be in the same form as the Instrumentation Submittal.
 - (5) All information shall be in one submittal.
6. Submit "record copy" of all drawings previously submitted for review within 30 days after completion of system installation as part of operating and maintenance instructions. Show all changes and modifications made during installation. Define special maintenance requirements particular to system along with special calibration and test procedures.
7. Submit brief description of calibration procedures listing actual calibration and test equipment. Include typical calibration sheet and description of loop check procedures, provide typical loop check sheet.
8. Provide manufacturer's certified statement of installation approval containing authorization to energize system.
9. Provide an electronic version of the final O&M manual. All drawings in the manual shall be provided in AutoCAD as well as pdf formats.
 - a. Electronic files shall conform to the following minimum requirements:
 - (1) Electronic Files: AutoCAD R2012 or higher, drawn to scale.
 - b. Submit electronic files on CD or DVD.
- B. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations and clarifications from the specified requirements.
 1. If deviations and clarifications from the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
 2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in rejection of the entire submittal with no further review and consideration.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. Instrumentation shall be furnished complete by one manufacturer.

- C. Work of system manufacturer's service personnel coordinated by Contractor.
- D. Substitutions on functions specified will not be allowed. To assure interchangeability of parts, maintenance of quality, and ease of interfacing the various subsystems, strict compliance with the specifications shall be maintained.
- E. The Contractor shall have system supplier coordinate with mechanical and electrical systems suppliers to identify any signal isolation, signal boosting devices or auxiliary relays that may be required to complete the system.
- F. Provide auxiliary devices for proper operation, such as transducers, relays, current/current isolators, and signal boosters for interfacing with equipment provided under this and other sections of this specification.
- G. Upon completion of installation, provide competent service personnel for a period of not less than one (1) 8-hour day per station, excluding travel time, for field check-out of the System in the presence of the Owner, for calibration and start-up of equipment. Include one additional service call of one (1), 8-hour working day for use within the first year's operation.
- H. Upon completion of the start-up, provide competent training personnel for a period of not less than one (1) 8-hour working day, excluding travel time, for training of personnel in the use, operation and maintenance of the instrumentation and control system. Training to utilize the submitted operation and maintenance manuals and record copy drawings as reference materials. Training to be for four (4) personnel in each class. Each class to be of four (4) hour duration.
- I. Instrument Calibration: Calibrate electronic and pneumatic test equipment within 6 months prior to use. Accuracies of test equipment shall be traceable to Bureau of Standards.
- J. Instrumentation accuracy shall be in accordance with manufacturer's standard, unless otherwise stated herein.
- K. Calibrate all instrumentation in the presence of the Owner. Provide calibration tag to all calibrated instruments. The calibration tag shall have the name and phone number of the supplier/integrator who performed the calibrations with the date of calibration and the date of the next calibration. The tag shall be signed by the individual that performed the calibration. Linkage or range adjustments sealed by colored lacquer immediately following calibration. Provide calibration records to the Engineer prior to substantial completion.
- L. System energizing not allowed prior to receipt of certified statement from Contractor and supplier approving system and authorizing energizing of system. Exception, system supplier's representative.
- M. Protect materials and equipment against damage in storage and during construction.

- N. Replace damaged materials or equipment as determined by the Engineer at no additional cost to the Owner.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600 and as specified.

- B. Packing and Labeling:

1. Prior to shipment, each component shall be tagged to identify the lift station location, tag number, and system function. Identification shall be prominently displayed on the outside of the package.
2. Firmly attach permanent stainless-steel, or other durable non-corrosive tag to the equipment. Mark tags with the instrument tag number shown in the Instrumentation Data Sheets and/or Instrument Drawings.

- C. Delivery:

1. Following completion of shop assembly, factory test, and approval of all equipment by the Engineer, the panels, cabinets, and consoles and equipment shall be shipped. Provide protection for equipment from handling and the environment.
2. Provide the packed weights conspicuously shown, and instructions for unloading, transporting, storing, and handling at the jobsite.
3. Deliver spare parts at same time as pertaining equipment. Deliver to Owner after completion of work.

- D. Storage:

1. The equipment shall not be stored outdoors. Equipment, including in-line equipment, shall be stored in dry permanent shelters, and shall be protected against mechanical damage. Any damaged equipment shall be replaced by the Contractor at his own expense.

- E. Handling:

1. Install in accordance with manufacturer's printed instructions, locate as shown on the drawings, and as approved by the Engineer.

PART 2 - PRODUCTS

2.01 NEW PRODUCTS

A. Remote Terminal Unit (RTU)

1. Provide a new RTU enclosure similar to the panel shown in the drawings and as specified in 2.06 below and in Section 16900.

~~B. Ultrasonic Level Transmitter~~

- ~~1. Provide Pulsar Ultra 3 Series - NEMA 4X IP65 enclosure for inside panel mount, 115VAC power supply, 4-20ma DC output, intrinsically safe.~~
- ~~2. Provide transducer dB10 for 1 to 15 Ft measurement range, approved for operation in Class 1, Division 1, Groups C and D area.~~

C. Level Switch (Float Type)

1. Provide Anchor Scientific Roto-Floats.

D. Control Panel (CP)

1. Provide a control panel as specified below and in Sections 11304 and 16900.

E. Radio Antenna

1. Provide MDS Yagi Antenna.
2. Provide Times Microwave Systems or Andrew heliax antenna cable with lightning and surge protection to connect the antenna to the radio. Surge protection shall be similar to listed and meet requirements of UL 497E. Polyphaser IS-50NX-C2 shall be similar to listed and meet requirements of UL 497E.
3. Provide a connector / splice weatherproofing kit for the connector at the antenna, and where antenna cable leaves the conduit at the base of the antenna tower.
4. Provide grounding of the antenna mast and the coaxial cable to the grounding electrode.
5. Provide antenna tower base section and tower (height as required). Tower shall be Rohn or equal.

2.02 GENERAL

A. Instrumentation

1. Provide 4–20mADC signal wiring separated from digital inputs and outputs.
2. Provide terminal strips numbered with the signal termination number plus additional characters to identify each individual conductor.
 - a. Analog inputs and outputs: Provide the character + appended to the terminal number for the positive signal wire. Provide the character – appended to the terminal number for the negative signal wire. Provide the character S appended to the terminal number for the signal shield.
 - b. Digital inputs: Provide the character C appended to the terminal number for the unpowered (common) conductor. For inputs identified as having a CONTACT TYPE of OPEN, provide the character NC appended to the terminal number for the conductor to be powered. For inputs identified as having a CONTACT TYPE of CLOSED, provide the character NO appended to the terminal number for the conductor to be powered.
 - c. Digital outputs: Digital outputs have 1 to 4 contacts per signal point. Provide the character C appended to the common terminal for single contact outputs. Provide the character C followed by a number 1 thru 4 appended to the common terminal for each contact output of multiple contact outputs. Provide the character P appended to the powered terminal for single contact outputs. Provide the character P followed by a number 1 thru 4 appended to the powered terminal for each contact output of multiple contact outputs.
3. Terminal numbers will be sequential on the terminal blocks.
4. Provide terminals for all spare conductors of cables in conduits which are run to the termination cabinet. Locate terminals for spare shielded wires immediately below the last analog output terminals. Locate terminals for spare nonshielded wires immediately below the last digital output terminals. Provide an additional 10% spare terminal blocks of each type of signal.
5. I/O points are identified by type on the drawings.
 - a. AI – analog input.
 - b. AO – analog output.
 - c. DI – digital input.
 - d. DO – digital output.

6. Provide digital inputs with a contact state as shown on electrical or required for fail-safe operation. The contact state shall be identified as OPEN or CLOSED. A contact state of OPEN indicates that the input to control system is an open contact. A contact state of CLOSED input to control system is a closed contact.

2.03 COMPONENTS

- A. Provide protection to electronic devices from lightning and/or power surges induced in signal and powerlines entering and leaving the panels. The limiting-level shall not interfere with the normal operation of the system and shall be below the electronic devices' surge withstand rating. Enclose all instruments within an appropriate NEMA rated housing properly grounded to the panel in which it is mounted.
- B. Individually connect ground wires for all surge protectors to a common, good earth ground.
- C. Mount surge protectors within RTU and CP. Protectors manufactured by Edco, Joslyn, Telecommunications Industries, or Harger.
- D. Provide lightning and surge protection devices for analog transmitters. Provide devices which will protect the instrument against 10 kilo-ampere surges. The device shall provide two-stage common-mode protection by means of arrestor reactor and varistor in combination and differential mode protection by means of gas arrestor, reactor and zener diode in combination. Devices as manufactured by Edco, Telematic, Harger, or Entrelec.
- E. Where required to maintain intrinsically safe rating, passive devices designed for the purpose, shall be installed according to the equipment, or device manufacturer's printed instructions. Safety barriers shall not require any external voltage supply, and shall include series resistors and fuses, and shunting zener diodes that will limit the transfer of energy to levels classified as "intrinsically safe" by Factory-Mutual.
- F. Provide Factory-Mutual approved barriers, as manufactured by R. Stahl, Inc. or acceptable equivalent products.

2.04 FABRICATION INFORMATION

- A. Mount all panel components to allow easy access for servicing, calibration, adjustments, testing and removal, without the removal of other equipment.
- B. Provide internal panel components mounted directly on removable plates made of the same material and finish as the panel, of a thickness to provide rigid support for mounted components.
- C. Attach identification labels to all internal components. Provide nameplates attached with clear pressure sensitive tape for continuous bond equal to 3M VHB assembly tape.
- D. Unless specified otherwise, pushbuttons shall be of oil-tight, heavy-duty momentary

contact pushbuttons, rated for 10 amperes at 120 volts ac unless specified otherwise. Supply with the quantity of poles required for the application.

- E. Unless specified otherwise, rotary selector switches used for controlling 120 volts ac, shall be oil-tight, heavy-duty, maintained contact type rated for 10 amperes at 120 volts ac. Rotary switches used for low level control signals shall have gold or other precious metal contacts rated for "dry contact" duty.
- F. Provide oil-tight, heavy-duty, LED cluster type pilot lights, with average life of 40,000 hours, minimum, unless otherwise specified.
- G. Provide sealed relays DIN rail mounted with indicating light to indicate its operation. Contacts shall be rated for 10 amperes at 120 volts, ac. Life expectancy shall be 50 million operations, minimum.
- H. Provide electronic timer delay of the plug-in, digital type with output contacts rated for 10 amperes @ 120 volts ac. Life expectancy shall be 20 million operations.
- I. Provide all relays from a single manufacturer.
- J. Power and low-level signal wires shall be routed in separate wireways. Crossings of the two system's wires shall be at right angles. Parallel runs of the two system's wires shall be separated by a minimum of 12 inches.
- K. Provide 18 AWG wire minimum, type XHHW-2 inside the panel, stranded and insulated for 600 volts minimum unless otherwise specified.
- L. Provide terminal blocks of corrosion proof material such as nickel-plated copper. Provide AC and DC control terminals suitable for 12 AWG (4 mm) or larger wire. Provide terminals for DC analog signals suitable for 16 AWG (1.5 mm) wire.
- M. Provide screw-clamp single level terminals with captive screws; secure the wire connector with a clamp in contact with wire connector. Terminals which secure the wire directly from the screw are not acceptable. Provide all terminal blocks from a single manufacturer.
- N. Provide terminal blocks for every input/output wire. Include terminals for signal cable shields.
- O. Wire colors shall be assigned as follows; unless supplier has similar color-coding standard:

AC Power	Black	
AC Neutral or Common	White	
AC Control	Yellow	
DC Control (Digital)	Purple	
DC Control (Analog 4-20mA)	Blue	Equipment or Panel Ground
Externally Powered Circuits	Red	Green
- P. Provide shielded cable pairs for all analog signals internal and external to the panels.

Provide minimum conductor size of 16 AWG (1.5 mm) for analog wiring internal to the panel.

- Q. Terminate all wiring at a central terminal array consisting of rigid terminal strips with numbering identical to the wire numbers. The terminal strips shall contain 10% spare terminals. Arrange the terminal blocks vertically and separate the terminal blocks into functional groups:
 - 1. Group one consists of power wiring.
 - 2. Group two consists of DC signals.
 - 3. Group three consists of alarm/status wiring.
- R. Provide internal wiring troughs of the plastic, open-side type with snap-on covers. The open sides shall permit wire movement without disconnecting it.
- S. Wire connectors shall be the hook-fork type, with non-insulated barrel to allow easy inspection of crimp integrity.
- T. Direct interlock of equipment without auxiliary relaying shall not be allowed.
- U. Use only one side of each terminal block row for internal wiring. Use the other side for field wiring. Do not locate terminal blocks within 6 inches (150 mm) of any right angle panel surface.
- V. Wiring troughs shall not be filled to greater than 60% capacity. Provide snap-on covers marked to identify their locations. Any component identification on the covers shall be repeated on the sub-panel to allow component identification with snap-on cover not in place.
- W. Provide a plug-in header with flexible leads for instrument power supplies.
- X. Provide identification for all wiring to panel components powered externally from the panel power circuit breaker inside the panel.
- Y. Identify all relays not provided by others but required for properly providing the control function defined in this section or indicated on the drawings. An example of this requirement is: ON and OFF pilot lights may be controlled by a single pair of wires from a single contact for both conditions; a relay will therefore be required to provide NO and NC contact for both pilot lights. Such relays shall be mounted in their respective control cabinets and shall be clearly marked as being powered outside of the panel's normal circuit breaker.
- Z. Provide all instrument power from the instrument panel or termination panel for the control system. Provide power to the instruments from the same panel that receives the signal. Provide each instrument requiring 120 VAC power or DC power with an individual fused disconnect or circuit breaker. The number of 120 VAC feeds to a panel shall be shown on the electrical drawings. Provide power to the 24vDC field instruments utilizing

a separate power supply and monitor the same utilizing the programmable logic controller (PLC). Instrument power shall not be commingled with panel power for other panel devices. Label all devices with circuit numbers or device tag names. Locate current limiting devices in two separated groups within the panel, one group for AC devices and the other group for DC devices.

- AA. For all signals to be transferred to/from another panel, provide current isolators (analog) or dry relay contacts (discrete) wired out to terminal blocks.

2.05 CONTROL PANEL (PCP) and REMOTE TERMINAL UNIT (RTU):

- A. Provide panels of Type 316 stainless steel for hazardous locations.
- B. Access doors (or access panels), shall have stainless-steel hinges, with latching or fastening means fabricated from Type 316 stainless-steel with adequate internal bracing for structural rigidity and strength.
- C. Surfaces containing instruments shall be fabricated from metal not less than 11-gauge Type 316 stainless steel, reinforced to prevent wracking or distortion.
- D. Provide panels with doors extending the full width for full access to panel- rear mounted components. Panel enclosure shall be NEMA 4X Type 316 stainless steel. Provide formed doors of sheet metal with 180 deg. hinges, gasketed to preserve NEMA rating. Provide inside surface of door or removable panel equipped with a drawing pocket to hold as built and service documentation. Provide door stop kits for outer door and any swing out panel.
- E. Instruments and accessories mounted, wired or piped to terminal strips or bulkhead fittings, and properly identified to assure ease of field connections.
- F. Provide lamicoid nameplates, White with Black engraved legends. Provide nameplates attached with clear pressure sensitive tape for continuous bond equal to 3M VHB assembly tape.
- G. Provide in each panel section 120Vac supply fused disconnect switch, 20A GFCI rated duplex service outlet, and switchable fluorescent lamp and guard with equivalent light output of a 100-watt incandescent lamp.
- H. Remote terminal unit panels shall include the following major components. Other items required for a complete operable UL rated panel shall be provided.
 - 1. NEMA 4X Type 316 stainless steel. Minimum enclosure size shall be 30”H x 24” W x 12”D. RTU panel shall include:
 - 2. Modicon M340 PLC with BMX P34 2020 CPU with minimum eight slot rack, and BMXCPS2010 power supply. The PLC shall be provided with the latest firmware upgrades – minimum version 2.20 is required for proper communication with the radio.

3. I/O cards as required – BMX DDI 1602 – digital input module, BMX DRA 0805 Relay output module, and BMX AMI 0410 analog input module. Removeable cage clamp terminal block BMXFTB2000 for I/O cards.
 4. 900 MHz Radio (MDS SD Series 9710B High Performance Data Transceiver) Model MDSSD9CESNNSNN for Ethernet and Serial communication traffic to be compatible with the existing SCADA system.
 5. Surge Protective Device for power.
 6. Surge protective devices for signal lines.
 7. Circuit breakers
 8. Fuses
 - a. AC-UPS – Sola Model SDU500 with battery.
 - b. Switching Power supply to provide 24VDC for the PLC boards: Manufacturer: Sola, Model: SDN-5-24-100C.
- I. control panel shall include main circuit breaker, additional circuit breakers, and control circuitry as shown on the drawings and specified in Section 11305.

2.06 SPARE PARTS AND TEST EQUIPMENT

A. Spare Parts:

1. Provide spare parts of the type and quantity as specified herein:
 - a. Provide four (4) each of the float switches.
 - b. Provide one (1) each of the following:
 - (1) Modicon M340 PLC with BMX P34 2020 CPU with minimum eight slot rack, and power supply.
 - (2) BMX DDI 1602 – digital input module, BMX
 - (3) DRA 0805 Relay output module
 - (4) BMX AMI 0410 analog input module
 - (5) Removable cage clamp terminal block BMXFTB2000 for I/O cards.
 - (6) AC-UPS – Sola SDU500 with battery.
 - (7) Switching Power supply: Manufacturer: Sola, Model:
 - (8) SDN-5-24-100C

(9) 900 MHz Radio (MDS SD Series 9710B High Performance Data Transceiver) Model MDSSD9CESNNSNN

c. Three sets of each size fuse.

2. Spare parts equal to at least 25% of the field replaceable system components (minimum of two) shall be supplied.

B. All spare parts shall be carefully packed in cartons, labeled with indelible markings, and suitable for prolonged storage. Complete ordering information including manufacturer's part number, part ordering information including manufacturer, part number, part name, and equipment name and number(s) for which part is to be used shall be supplied with the required part. The spare parts shall be delivered and stored in a location by the Client.

C. Contractor shall provide an itemized price list of the delivered spares for the purchase of additional components. Prices shall be honored for a period of one year from substantial completion of the system.

2.07 SHOP TESTING

A. Provide a shop, factory and field test plan outlining the System Supplier's procedures for testing all field primary devices, final control elements, local control panels, control system, PLCs at the factory prior to shipment. This plan shall demonstrate the system performs as specified and as indicated.

B. Submit the shop test plan with the shop drawings as specified in paragraph 1.05. Submit results of test to Engineer.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

A. Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's printed instructions and approved shop drawings. The locations of equipment, transmitters, alarms and similar devices are diagrammatic only. Exact locations shall be determined by the system supplier during development and fabrication of systems. Obtain in the field, all information relevant to the placing of the process equipment and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials to complete the work in an approved manner at no additional cost to the Owner.

B. The drawings indicate the intent and not the precise nature of the interconnection between the individual instruments. Provide final equipment interconnections by the system supplier during development and fabrication of systems.

- C. Provide process control system hardware configured to achieve the functional requirements as specified herein and as indicated.
- D. Where specific installation details are not specified or indicated, installation recommendations from the equipment manufacturers or American Petroleum Institute (API) shall be followed as applicable.
- E. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded as directed by the instrument manufacturer or Engineer but in no case shall more than one ground point be employed for each shield.
- F. Once installed, remove lifting rings from cabinets/assemblies. Permanent plugs shall be provided for the holes of the same material and color as the cabinet.
- G. All work shall be executed in full accordance with codes and these contract documents. Should any work be performed contrary to said rulings, ordinances and regulations, the Contractor shall bear full responsibility for such violations at no additional cost to the Owner.
- H. All equipment, raceway, and wiring used in areas designated as hazardous shall be designed for the Class, Group and Division as indicated on the Electrical Drawings for the locations.
- I. Provide local electrical shutoffs and disconnects for all 4-wire field instruments requiring 120 VAC power. Electrical disconnects shall be rated disconnect switches or manual motor starters as specified under Division 16.
- J. Provide all brackets, hangers, and miscellaneous metals for mounting of equipment. Mounting hardware shall be installed in accordance with the manufacturers printed recommendations and not interfere with any other equipment.
- K. The system supplier and/or the equipment manufacturer shall provide qualified manufacturer representative to oversee the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices, subject to the Owner's approval. Provide on-site services for a minimum period of one (1) 8-hour day, excluding travel time. The system supplier shall certify that all field wiring for power and signal circuits are correctly installed and terminated in accordance with best industry practice and provide for all system grounding to insure a satisfactory functioning installation. The system supplier shall schedule and coordinate work under this section with that of the electrical work specified under applicable Sections of Division 16.

3.02 FACTORY TESTS

- A. The system supplier shall test all equipment at the factory prior to shipment. Unless otherwise specified in the individual specification sections, all equipment provided by the system supplier shall be tested at the factory as a single fully integrated system.

- B. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and upon the system's or subsystem's producing the correct result (effect), the specific test requirement will have been satisfied. The system supplier shall provide a detailed step by step test procedure for review and approval by the Engineer.
- C. All tests shall be conducted in accordance with prior Owner and Engineer approved procedures, forms and checklist. Each specific test to be performed shall be described and a space provided after it for sign off by the appropriate party after its satisfactory completion.
- D. Copies of these sign off test procedures prepared by system supplier, forms, and checklists will constitute the required test documentation.
- E. The system supplier shall provide all special testing materials and equipment, including all interconnecting wires and cables between equipment to be tested, required to conduct the test in accordance with these specifications. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment and data, provide an approved means of simulation. Define these simulation techniques in the test procedures. Test the functionality and communication of the PLC with the telemetry radio at the RTU panel.
- F. The system supplier shall coordinate all testing with the Engineer and Owner.
- G. The Engineer and Owner reserve the right to test or retest all specified functions whether or not explicitly stated in the prior approved Test Procedures without additional cost.
- H. The Owner's decision shall be final regarding the acceptability and completeness of all testing.
- I. No equipment shall be shipped until the Owner has received all test results and approved the system is ready for shipment.

3.03 INSTRUMENT INSPECTION AND CALIBRATION

- A. Provide letter from instrument manufacturer certifying instrument has been installed based on the manufacturer's installation instructions. The letter shall include digital pictures of the installed instrument.
- B. Provide manufactures written calibration procedures that will be used for instrument calibration. Calibrate instrument with calibration tools that conform to NIST traceability chain. Calibration instruments shall be twice as accurate as the instrument being calibrated but as a minimum the calibration instrument shall have a measurement uncertainty of 0.02 percent.
- C. Provide calibration of instruments at 10%, 50%, 80%, and 100% of measured span. Provide calibration tag for all calibrated instruments. Provide calibration tag with name, phone number, date, and signature of the person and company performing the calibration. Provide linkage or range adjustments sealed by colored lacquer following

calibration. Provide written calibration records to the engineer prior to substantial completion

3.04 FIELD TESTS

- A. Provide a Functional Acceptance Test (FAT).
 - 1. Provide written notification to the Engineer of the scheduled FAT 2 weeks prior to the intended start date.
 - 2. Provide FAT following installation, calibration, inspection, and preliminary testing.
- B. The Fat shall be conducted in accordance with prior Owner and Engineer accepted procedures, forms and checklist. Each specific test to be performed shall be described and a space shall be described on the documentation forms. A space shall be provided for sign off by the appropriate party after its satisfactory completion.
- C. Signed copies of the test procedures, forms and checklists, prepared by the System Integrator (SI), will constitute the required test documentation.
- D. The SI shall provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment and data, provide suitable means of simulation. Define these simulation techniques in the test procedures.
- E. Functional Acceptance Test:
 - 1. Prior to the Functional Acceptance Test, the entire installed instrument and control system shall be certified by the SI that it is ready for operation. All preliminary testing, inspection, and calibration shall be complete. The FAT shall prove the installed system operates in accordance with the Specifications. The FAT shall verify the completeness of all system components.
 - 2. The FAT shall be performed on the complete system to demonstrate that it is operating and in compliance with these specifications. Each specified function shall be demonstrated on a paragraph by paragraph and loop by loop basis.
 - 3. Provide loop specific and non-loop specific tests.
 - a. Loop/Component Inspections and Tests: The entire system shall be checked for proper installation, calibrated and adjusted on a loop by loop and component by component basis by the system supplier following field installation, to demonstrate and document the system is in conformance with related submittals and these specifications. The Contractor is required to confirm that the system is properly wired, terminated and tagged from the field wiring nearest to the primary elements or equipment to the DCS and/or PLC I/O.

- b. The system supplier shall maintain the Loop Status Reports and Components Calibration sheets at the jobsite and make them available to the Owner and/or Engineer at all times.
 - c. The Owner reserves the right to witness and sign off all tests conducted by the system supplier. The Owner shall review and initial all Loop Status Sheets and Component Calibration Sheets and spot check their entries periodically and upon completion of the tests. Any deficiencies found shall be corrected. Final versions of these test sheets shall be submitted to the Owner and/or Engineer and be available at all times.
- 4. In the event of rejection of any part or function of a system, the repairs or replacement shall be provided within 10 days and at no additional cost to Owner.
 - 5. Updated versions of the documentation specified to be provided for during the functional acceptance tests shall be made available to the Owner and Engineer at the job sites both before and during the tests. In addition, one copy of all O & M Manuals shall be made available to the Owner and Engineer at the job sites both before and during testing.
 - 6. Test the functionality and communication of the PLC with the telemetry radio at the RTU panel and the existing owner system master Radio and the SCADA computer.

3.05 START-UP TESTING

- A. After completion of the Functional Acceptance Test, the Instrumentation and Control System shall be tested as a component of the Start-up Testing. All furnished hardware and software shall operate for a period of 30 consecutive days, under conditions of full process operation, without a single non field repairable malfunction.
- B. During this test, Owner operations personnel and SI personnel shall be available. For this test, the SI is expected to provide personnel who have an intimate knowledge of the hardware and the SI provided software of the system. The facilities are not staffed. Coordinate staffing requirements during the 30-day test to coincide with normal shift operations as much as possible. Off-shift emergencies shall be fully supported by SI staff. Provide SI staff with cell phones and/or pagers to ensure that support staff is available by phone and/or on-site within four hours of a request by operations staff.
- C. While the start-up testing is proceeding, the Owner shall have full use of the system. Only plant operations personnel shall be allowed to operate equipment associated with live plant processes. Facility operations shall remain the responsibility of the Owner, and the decision of plant operators regarding plant operations shall be final.
- D. During Start-up Testing, the SI shall have available, within 4 hours of notification; personnel who have an intimate knowledge of the hardware and SI furnished systems.
- E. Any malfunction to SI's system during the tests shall be analyzed and corrected by the SI. The Owner shall determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.

- F. Any malfunction attributed to the SI during the Start-up Testing which cannot be corrected within 24 hours of occurrence by the SI's personnel, or more than two similar failures of any duration, will be considered as a non-field repairable malfunction.
- G. Upon completion of repairs by the SI, the associated test shall be repeated as specified herein.
- H. In the event of rejection of any part or function, the SI shall perform repairs or replacement within 10 days and at no additional cost to the Owner.
- I. The total availability of the system shall be greater than 99.5 percent during this test period. Availability shall be defined as:

$$\text{AVAILABILITY} = (\text{TOTAL TIME} - \text{DOWN TIME}) / (\text{TOTAL TIME}) * 100\%$$
- J. Upon successful completion of the 30-day startup operation test and subsequent review and acceptance of complete system final documentation, the system shall be considered Substantially Complete, after acceptance by Owner and Engineer.

3.06 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

EXHIBIT 3 - PRE-BID MEETING NOTES



CITY OF HOLLYWOOD

Department of Public Utilities Engineering & Construction Services Division

REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER (LUM-07)

**City Project No.: 19-7100
Tetra Tech Project No.: 200-16428-19001**

**Pre-Bid Conference Notes
October 14, 2020 at 2:30 PM**

1. Introduction

Attendees who called in where requested to email Tetra Tech their name, company, email and phone number. Other attendee information was pulled from the meeting sign-in and based on the recorded meeting.

The City of Hollywood is the owner and operator of the facilities. The City's Project Manager is Feng Jiang, P.E., Senior Project Manager.

**City PM Contact Information:
Feng Jiang, P.E., Senior Project Manager.
954.921.3930 (Office)
FJIANG@hollywoodfl.org**

All questions need to go to the City's Project Manager and copy the EOR and that this process must be followed per the bid documents.

2. Scope of Project – Reviewed and Discussed in Meeting:

The project consists of a force main replacement and large user meter (LUM-07) site improvements project: replacement of the existing Large User Meter LUM-07, electrical components, meter and meter vault and site improvements, demolishing of existing site items, restoration, abandonment of approximately 4,900 LF of existing 8" and 10" force main (you will see in the appendices of the project manual, the approx. orientation. It does go slightly outside of our existing work limits) piping and construction of approximately 3,800 linear feet of 16-inch PVC force main via open cut and a directional drill of about 500 linear feet of 20-inch DR-11 (that is crossing US1 Federal Highway) HDPE force main via HDD from LUM-07. The LUM-07 site is located on the south side of

Pembroke Rd. and (south slightly east) S. 18th Ct., heading north and east to an existing 30-inch diameter force main connection located at the intersection of S. 15th Ave. and the alley between Rodman St. and Funston St.

The budgeted estimated construction cost for this project is \$1,838,448.

3. Bidding Document Description Items Reviewed/Discussed below:

- ***Bidding Contract Document Package consists of:***
 - ***Bid Opening Day***
 - ***Project Completion Time***
 - ***Work Hours***
 - ***Specifications***
 - ***Drawings and associated details***
 - ***Following City Standards and Requirements***
 - ***Bidders are required to confirm that they have a complete Contract Document package if they printed the bid documents from advertisement website.***

- ***Bidding Package includes:***
 - ***Proposal (Section 00300)***
 - ***Proposal Bid Form (Section 00301)***
 - ***Approved Bid Bond (10%)***
 - ***Information Required from Bidders and a List of Subcontractors (Section 00420)***
 - ***Trench Safety Form (Section 00495)***

4. Design and Specs Comments and Highlights Discussed:

- ***LDs will be \$5,000/day if the project is not completed within the time frame of 244 days for Substantial Completion and 274 days for Project Closeout.***
- ***Contractor qualifications requirements must be met. They are identified in section 00100. You'll also see required directional drill qualifications in section 02665. You must have a qualified driller that has done projects with the same minimum length and diameter. We will check the quals in detail. Review sections 00100 and 02665 for those requirements. If you do not provide those requirements or if we cannot identify them, you will be deemed non-responsive on this Bid.***
- ***Bid Set includes large user meter site (LUM-07) demolition, mechanical, electrical and structural plans for a new LUM-07 site, force main piping. If you look at the plans you will notice it is a long narrow site "snug". There will also be a requirement for temporary construction easement and standard restoration requirements for the temporary and final pavement and markings and all associated restoration.***

In the Specifications are the existing permits that have been obtained already by the Owner are as follows:

- ***Work in Florida Department of Transportation (FDOT) Right of Way – Submitted/under review.***
- ***Work in the City of Hollywood (COH) Right of Way – Contract will be responsible for***
- ***Work in City of Hallandale Beach Right of Way – Tetra Tech will submit. Due to timing they want to make sure that they get any comments/modifications/questions flushed out before submitting to their building department, however there are no existing comments for the city.***
- ***Stainless Steel nuts, bolts, washers and restraining rods required***

- **Horizontal Directional Drilling (HDD) installation to cross under S. Federal Hwy. (US 1) at Plunkett St. – Required to be butt fusion welded.**
- **Varying pavement thicknesses should be anticipated. It is suggested that pavement corings be performed by the Contractor prior to bidding. Pavement thicknesses must match existing thicknesses. Suggested to do pavement corings. Just because the minimum thickness is identified on the plans doesn't mean that it's all you'll have to provide for any open cut or adjacent pit area and crossings. Thickness must be matched in kind.**
- **Contractor is required to perform all necessary due diligence including but not limited to, utilities verifications and coordination, SUEs, GPR, exploratory excavations, additional geotechnical borings (to verify there are no potential issues. The specs do indicate supplemental geotechnical borings being required. If a contractor feels like they need more information on soils they are required to get those at their cost.) Utilities to be located, verified, protected and supported.**
- **Excavatable flowable fill may be required if utilities have less than 36 inches of cover.**
- **Dewatering/Discharge (must use sediment tanks)**
- **Contaminated Sites – must meet DEP/County requirements – In project manual appendices, please review.**
- **Permitting: FDOT, COH, BC-FDEP, City of Hallandale Beach. Any dewatering, permitting, NPDES, NOI, SWPPP will also be on the Contractor.**
- **Staging areas – Contractor will provide documentation for approved staging areas like all other jobs. There is potential because it's in a fairly open parking lot, you can have discussions with the adjacent property owner and potentially have staging in close proximity to the LUM site.**
- **Maintenance of Traffic must meet FDOT, City(s) and County standards and specifications. Pull and submit your MOT plans to FDOT to the city and county for their approvals prior to commencement.**
- **FDOT working hours – follow permit conditions – Coordinate with FDOT. Most likely non- peak hours and/or any plating if it's acceptable to them. Keep in mind I do not have authority to say if they will allow that or not. Usually it's on a case to case basis.**
- **All streets need temporary restoration the same day that work is done. Pembroke Road and US 1 are especially critical. This is a strict requirement to ensure everything is broomed, tracking is minimized, any dust transmittals minimized and the restoration is done on the same day, at least temporary restoration.**
- **Notice to Proceed (NTP) - Timing will be provided and obviously do to the aggressive nature of the LD's, the contract dates will need to be maintained. We may provide this to you at the pre-con meeting and we will anticipate an aggressive commencement and schedule accordingly.**
- **As-builts and Record Drawing Requirements – Provide redlined as-builts with each pay request and submittal. Will also require asset tables. These will be required to have the coordinates for the assets, separation distances and ensure we are meeting DEP requirements for separation. When the time comes I will share the excel spreadsheet but there will be detailed surveying that will also need to be provided. It's not just red-lines and plans being thrown at us they will also have to be in CAD.**

5. Bid Document questions/Technical questions

All questions must be submitted to Feng Jiang, P.E., in writing, no later than **October 27, 2020** at 5:00 PM. Addendum will be issued on October 28, 2020.

6. Completion Times were discussed as per below:
The Bid Documents require Substantial Completion (defined in the Supplementary General Conditions) as:

<u>Major Milestones</u>	<u>Completion Time (calendar days) *</u>
1. Substantial Completion	244
2. Project Closeout	274

**From Notice to Proceed*

7. General Questions from Contractors – N/A
8. *Pre-bid Conference (Mandatory): The mandatory pre-bid conference was documented for each attendees' contact information from the pre-bid meeting. Any attendees that did not attend this mandatory meeting are deemed as non-responsive.*



CITY OF HOLLYWOOD - REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

October 14, 2020; 2:30 P.M.

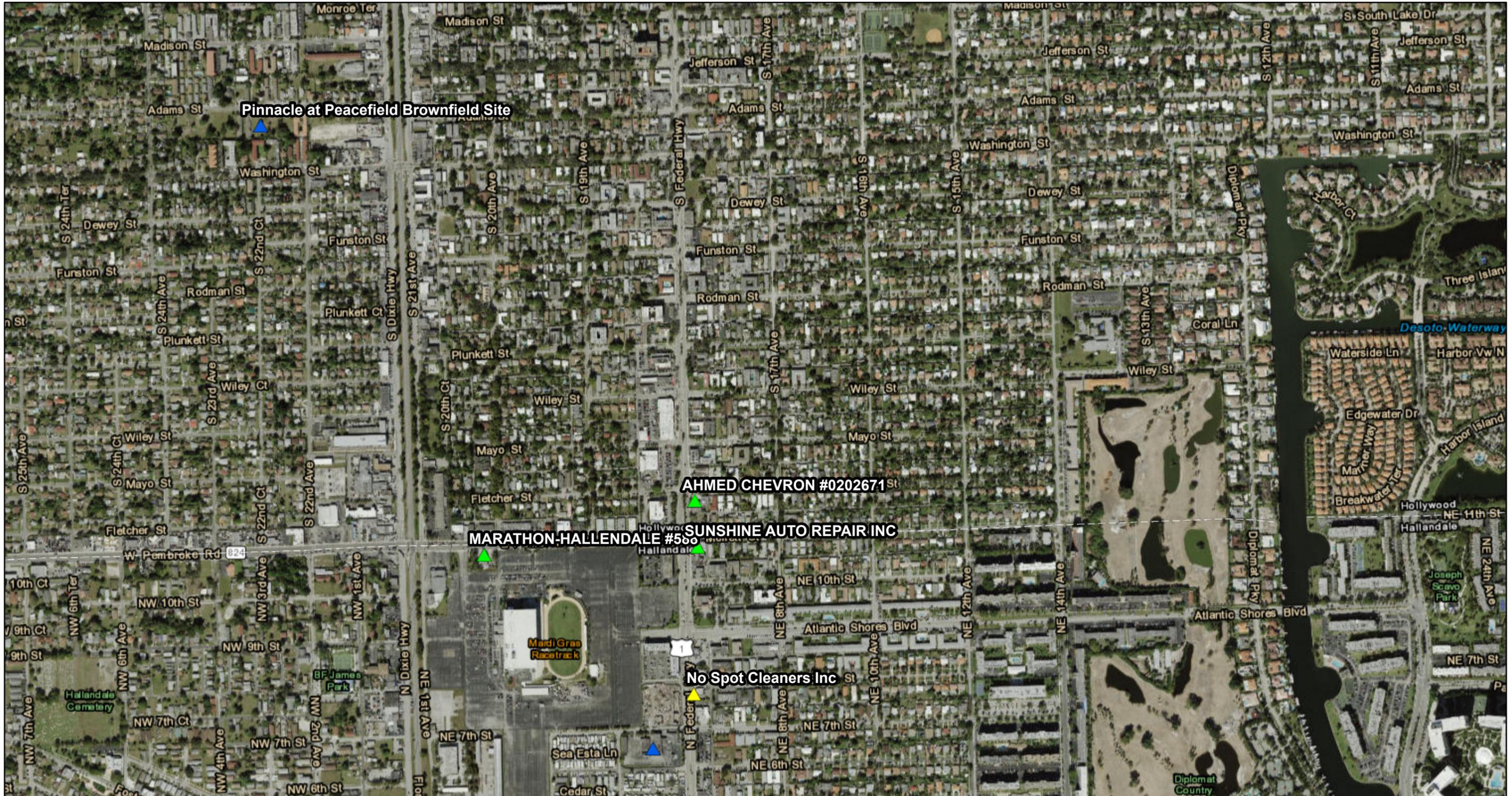
Name	Company	Phone Number	E-Mail Address
Feng Jiang	COH – ECSD	954-921-3930	FJIANG@hollywoodfl.org
Janine Alexander	Tetra Tech	321-388-5178	janine.alexander@tetrattech.com
Amy Blackwelder Ganey	TB Landmark	904-751-1016	amyb@tblandmark.com
Kirk Roberts	CJGeo	757-592-0452	kirk@cjgeo.com
Jorge Valdes	Ric-Man Const	786-758-7272	jvaldes@ric-man.com
Alphonso Brown	R.P Utility	305-498-2587	abrown@rpucorp.com
Ram Chilakalapalli	Lanzo Const	954-979-0802	RamC@Lanzo.org
Bob Henning	Giannetti	954-972-8104	Bob@gianneticorp.com
Clece Aurelus	COH – ECSD		CAURELLUS@hollywoodfl.org
Eddie Dominquez	Southeastern Eng Cont.	305-557-4226	Eddie@southeasterneng.com
	Lanzo Const	954-979-0802	estimating@lanzo.org
			evilchez@shc-us.com
Genesis Cruz			gacruz@SHC-US.com
Jorge Fonte			jfonte@mesinc.us
Jose Carlos Perello	Southeastern Eng Cont.	305-557-4226	jc@southeasterneng.com
		954-472-8846	jpaz@kailascontractors.com
Kate Long	Mancon	561-866-0490	katel@mancon.ws
Luis Sanchez	Solution Const	786-621-8550	luis@solutionconstruction.net
Freddy Vargas	Southeastern Eng Cont.	305-557-4226	fred@southeasterneng.com

Name	Company	Phone Number	E-Mail Address
Chad Bumb	Ric - Man		
Jose Vega			
Carl Morsch	Man-Con	561-866-0490	
Jose Sierra			
	CW Pipeline	305-681-0027	
	C W		
Roberto Ponce De			
Nicholas Lazzari			
Miguel Cabranes	Caribe Utilities	305-596-0141	
Eli Zayas			
Ivan Leal			
Lisa Valencia			
Robert Tatum	Underground Solutions	941-320-2440	rtatum@aegion.com
	Pabon Eng.	305-258-1460	

X: Attended. This meeting was held via conference call.

EXHIBIT 4 - REVISED FDEP CONTAMINATED SITES EXHIBIT

Contamination Locator Map (CLM) Embedded Map

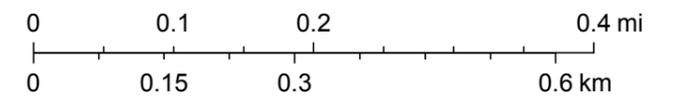


October 28, 2020

DEP Cleanup Sites - Contamination Locator Map

- ▲ BROWNFIELD SITES
- ▲ PETROLEUM
- ▲ SUPERFUND
- ▲ OTHER WASTE CLEANUP

1:9,028



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, Garmin, (c) OpenStreetMap contributors, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, FDEP

Map created by Map Direct, powered by ESRI.

Florida Department of Environmental Protection makes no warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.

Search Results

DEP Cleanup Sites: 5 found.

AHMED CHEVRON #0202671

1625 S FEDERAL HWY
HOLLYWOOD, FL 33020

Facility Id: 8502228

PENDING Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

Atlantic Village Green Reuse Site

601 North Federal Highway
HALLANDALE BEACH, FL 33009

Facility Id: BF061804001

ACTIVE Brownfield Cleanup

[Watch This Site](#)

[Documents](#)

MARATHON-HALLENDALE #588

200 E PEMBROKE RD
HALLANDALE BEACH, FL 33009

Facility Id: 8502749

ACTIVE Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

No Spot Cleaners Inc

716 N Federal Hwy
Hallandale Beach, FL 33009

Facility Id: ERIC_4066

OPEN Other Cleanup

[Watch This Site](#)

[Documents](#)

SUNSHINE AUTO REPAIR INC

1010 N FEDERAL HWY
HALLANDALE, FL 33009

Facility Id: 8841523

PENDING Petroleum Cleanup

[Watch This Site](#)

[Documents](#)



CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES

ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33022
Phone (954) 921-3930 Fax (954) 921-3258

ADDENDUM NO. 2 (19-7100)

Date: **November 3, 2020**

FOR: **Hallandale Beach Force Main and Large User Meter LUM-07**

FILE NUMBER: **19-7100**

ALL BIDDERS BE ADVISED OF THE FOLLOWING CHANGES TO THE ABOVE REFERENCED PROJECT AS LISTED BELOW:

This addendum is issued as part of the Bidding Documents for the above described project. The changes incorporated in this addendum shall be considered as a part of the documents and shall supersede, amend, add to, clarify, or subtract from those conditions shown in the original documents dated September 2020. The bidder shall coordinate all modifications herein with all trades and disciplines related to the work. The Bidder shall acknowledge receipt of this addendum by addendum number and date on Section 00300, "Proposal". **Failure to do so may subject Bidder to disqualification.**

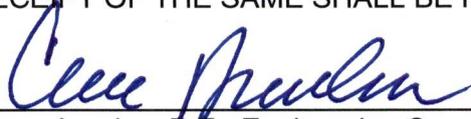
REVISIONS TO BID OPENING DATE

Item 1: Change Bid Opening Date

Sealed bids shall be **submitted to the City Clerk's Office** (City Hall, 2600 Hollywood Blvd., Room 221) of the City of Hollywood, Florida, **until 2:00 p.m.**, local time, **November 17, 2020**. On **November 17, 2020 at 2:30 p.m.** the bids will be opened and read publicly outside of Building A at Southern Regional Wastewater Treatment Plant, located at 1621 N. 14th Avenue, Hollywood, Florida.

ALL OTHER TERMS, CONDITIONS AND SPECIFICATIONS SHALL REMAIN THE SAME.

THIS ADDENDUM SHALL BE ATTACHED TO THE CONTRACT DOCUMENTS AND THE RECEIPT OF THE SAME SHALL BE NOTED IN THE PROPOSAL IN THE SPACE PROVIDED.

x 
Clece Aurelus, P.E., Engineering Support Services Manager
Department of Public Utilities – ECSD



CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES

ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33022
Phone (954) 921-3930 Fax (954) 921-3258

ADDENDUM NO. 3 (19-7100)

Date: **November 10, 2020**

FOR: **Hallandale Beach Force Main and Large User Meter LUM-07**

FILE NUMBER: **19-7100**

ALL BIDDERS BE ADVISED OF THE FOLLOWING CHANGES TO THE ABOVE REFERENCED PROJECT AS LISTED BELOW:

This addendum is issued as part of the Bidding Documents for the above described project. The changes incorporated in this addendum shall be considered as a part of the documents and shall supersede, amend, add to, clarify, or subtract from those conditions shown in the original documents dated September 2020. The bidder shall coordinate all modifications herein with all trades and disciplines related to the work. The Bidder shall acknowledge receipt of this addendum by addendum number and date on Section 00300, "Proposal". **Failure to do so may subject Bidder to disqualification.**

REVISIONS TO BID OPENING DATE

Item 1: Bid Opening Date Postponement

Bid opening date is postponed and new date will be identified when Addendum No. 4 is issued.

ALL OTHER TERMS, CONDITIONS AND SPECIFICATIONS SHALL REMAIN THE SAME.

THIS ADDENDUM SHALL BE ATTACHED TO THE CONTRACT DOCUMENTS AND THE RECEIPT OF THE SAME SHALL BE NOTED IN THE PROPOSAL IN THE SPACE PROVIDED.

x 

Clece Aurelius, P.E., Engineering Support Services Manager
Department of Public Utilities – ECSD



**CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES**

ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33022
Phone (954) 921-3930 Fax (954) 921-3258

ADDENDUM NO. 4 (19-7100)

Date: **December 3, 2020**

FOR: **Hallandale Beach Force Main and Large User Meter LUM-07**

FILE NUMBER: **19-7100**

ALL BIDDERS BE ADVISED OF THE FOLLOWING CHANGES TO THE ABOVE REFERENCED PROJECT AS LISTED BELOW:

This addendum is issued as part of the Bidding Documents for the above described project. The changes incorporated in this addendum shall be considered as a part of the documents and shall supersede, amend, add to, clarify, or subtract from those conditions shown in the original documents dated September 2020. The bidder shall coordinate all modifications herein with all trades and disciplines related to the work. The Bidder shall acknowledge receipt of this addendum by addendum number and date on Section 00300, "Proposal". **Failure to do so may subject Bidder to disqualification.**

REVISIONS TO BID OPENING DATE

Item 1: Change Bid Opening Date

Sealed bids shall be **submitted to the City Clerk's Office** (City Hall, 2600 Hollywood Blvd., Room 221) of the City of Hollywood, Florida, **until 2:00 p.m.**, local time, **December 14, 2020**. On **December 15, 2020 at 2:30 p.m.** the bids will be opened and read publicly outside of Building A at Southern Regional Wastewater Treatment Plant, located at 1621 N. 14th Avenue, Hollywood, Florida.

Item 2: Revisions/Additions to Drawings and Details

Please refer to Exhibit 1 of this addendum for revised plan sheets:

- C-101 – C-102
- C-201 – C-209
- C-501, C-507 and C-508
- P-203

Item 3: Specifications Revisions

Replace/Add the following technical specifications with those contained in Exhibit 2 of this addendum.

- Section 00300
- Section 00301
- Section 01025



**CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES**

ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33022
Phone (954) 921-3930 Fax (954) 921-3258

ADDENDUM NO. 4 (19-7100)

- Section 02510

Item 4: Engineer's Opinion of Probable Construction Cost Revision

The Engineer's OPCC has been updated to **\$2,171,973**

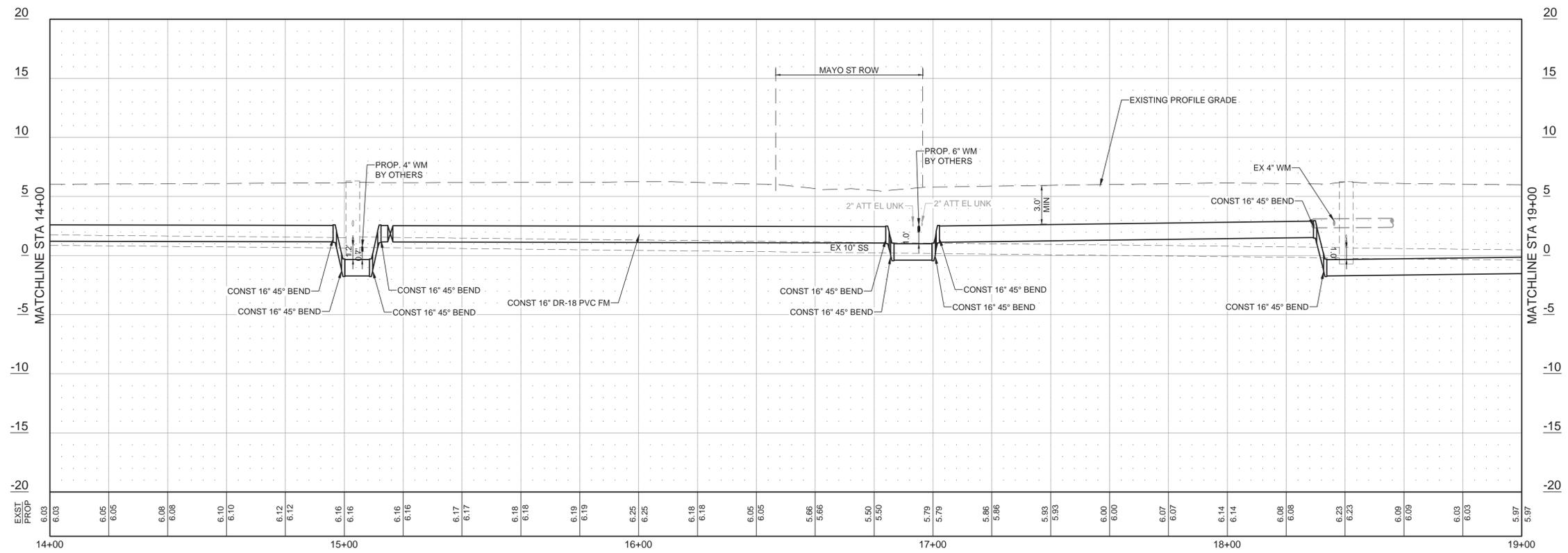
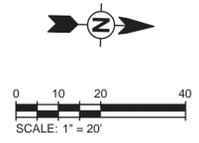
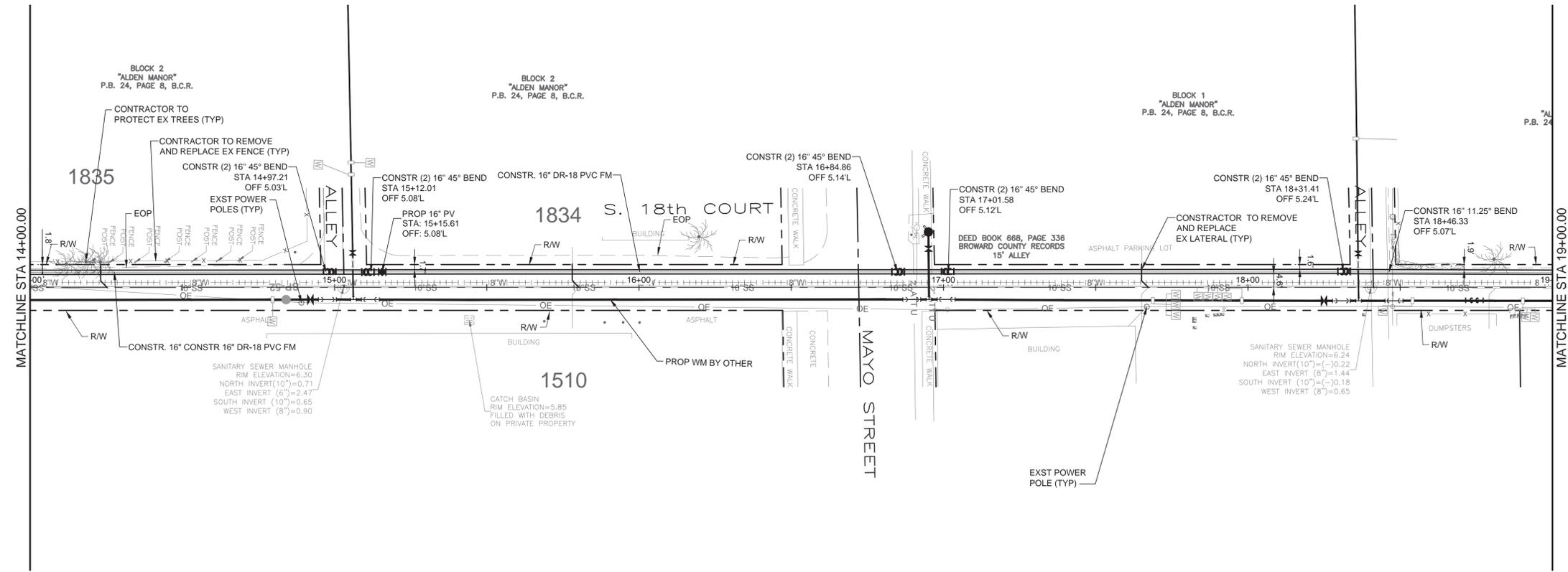
ALL OTHER TERMS, CONDITIONS AND SPECIFICATIONS SHALL REMAIN THE SAME.
THIS ADDENDUM SHALL BE ATTACHED TO THE CONTRACT DOCUMENTS AND THE
RECEIPT OF THE SAME SHALL BE NOTED IN THE PROPOSAL IN THE SPACE PROVIDED.

x 

Clece Aurelus, P.E., Engineering Support Services Manager
Department of Public Utilities – ECSD

EXHIBIT 1

12/3/2020 10:58:44 AM - O:\PROJECTS\ORLANDO\16428\200-16428-19001\CAD\SHEETFILES\C-201 SOUTH 18TH COURT PLAN-PROFILE.DWG - ESCAMILLACERO, ANGELA



PROFILE SOUTH 18TH COURT
SCALE: HORIZ: 1" = 20' VERT: 1" = 5'

NOT FOR CONSTRUCTION



JANINE M. ALEXANDER, P.E.
P.E. No. 59244, FL
DATE



BY	DATE	DESCRIPTION

CITY OF HOLLYWOOD
REPLACEMENT OF HALLANDALE BEACH FORCE MAIN
AND LARGE USER METER - LUM 07
**SOUTH 18TH COURT
PLAN AND PROFILE**

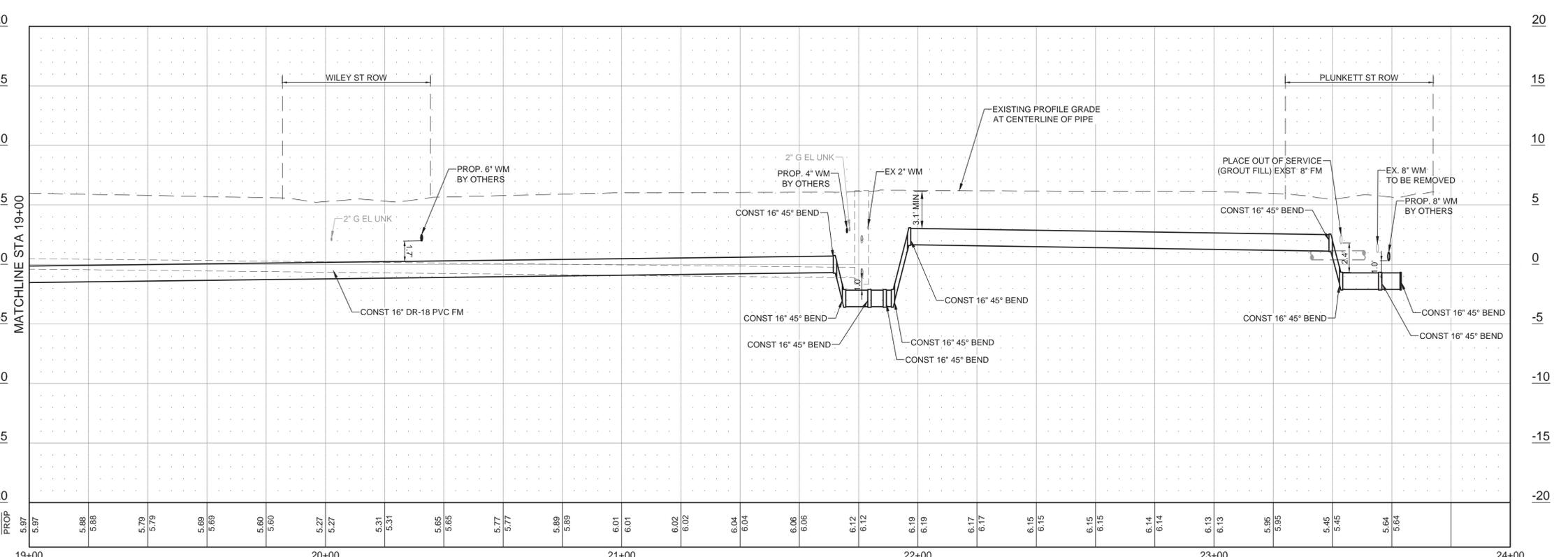
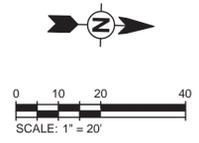
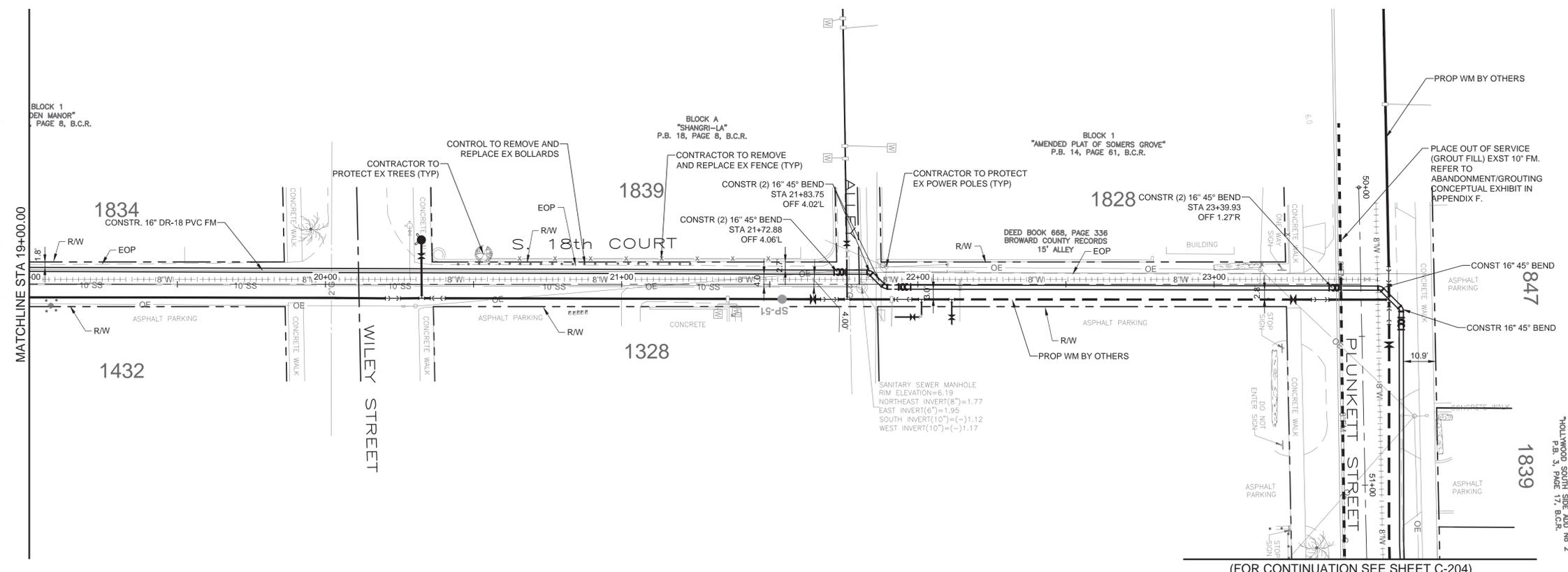
Project No.: 200-16428-19001
Designed By: JMA
Drawn By: TMB/MM
Checked By: JMA/KC

C-202

Bar Measures 1 inch

Copyright: Tetra Tech

12/3/2020 10:58:54 AM - O:\PROJECTS\ORLANDO\16428\200-16428-19001\CAD\SHEETFILES\C-201 SOUTH 18TH COURT PLAN-PROFILE.DWG - ESCAMILLACERO, ANGELA



PROFILE SOUTH 18TH COURT
SCALE: HORIZ: 1" = 20' VERT: 1" = 5'

NOT FOR CONSTRUCTION



TETRA TECH
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www.tetratech.com
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HOLLYWOOD, FLORIDA 33021
PHONE: (954) 364-1753

JANINE M. ALEXANDER, P.E.
P.E. No. 59244, FL

DATE _____



BY	DATE	DESCRIPTION

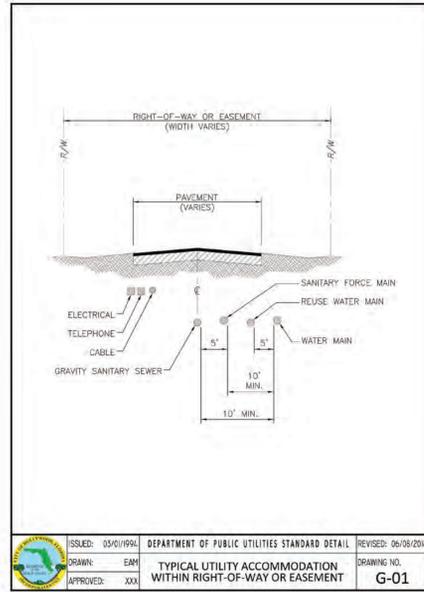
CITY OF HOLLYWOOD
REPLACEMENT OF HALLANDALE BEACH FORCE MAIN
AND LARGE USER METER - LUM 07

**SOUTH 18TH COURT
PLAN AND PROFILE**

Project No.: 200-16428-19001
Designed By: JMA
Drawn By: TM/BMM
Checked By: JMA/KC

C-203

Copyright: Tetra Tech
Bar Measures 1 inch

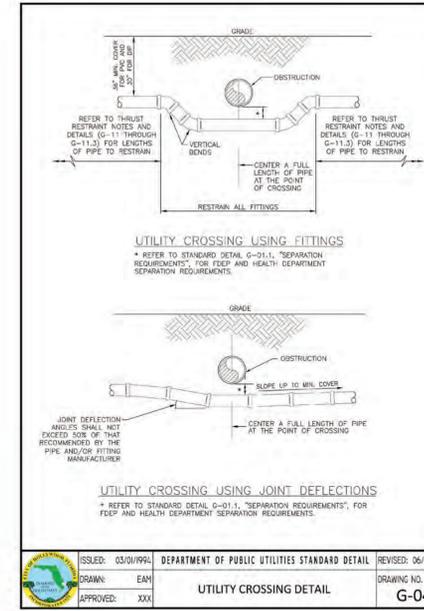
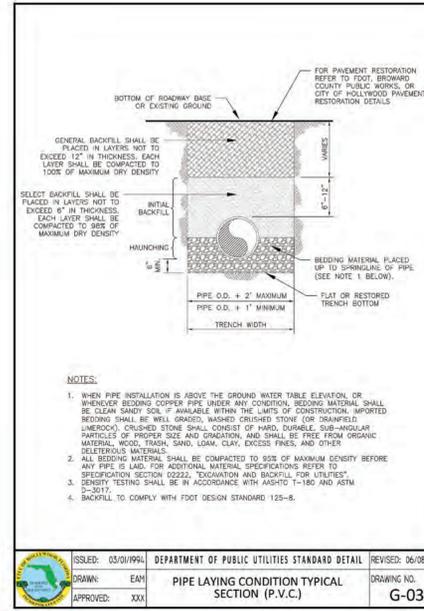


WATER MAIN SEPARATION IN ACCORDANCE WITH F.A.C. RULE 62-555.314

OTHER PIPE	HORIZONTAL SEPARATION	CROSSING (1), (4)	JOINT SPACING @ CROSSING (FULLJOINT CENTERED) (6)
STORM SEWER, STORM WATER FORCE MAIN, RECLAIMED WATER (2)	18" MINIMUM	3" MINIMUM	6" MINIMUM
GRAVITY SANITARY SEWER (3), SANITARY SEWER FORCE MAIN, RECLAIMED WATER	18" MINIMUM	3" MINIMUM	6" MINIMUM
ON-SITE SEWAGE TREATMENT & DISPOSAL SYSTEM	18" MINIMUM		

1. WATER MAIN SHOULD CROSS ABOVE OTHER PIPE, WHEN WATER MAIN MUST BE BELOW OTHER PIPE, THE MINIMUM SEPARATION IS 12 INCHES.
 2. RECLAIMED WATER REGULATED UNDER PART IV OF CHAPTER 62-516, F.A.C.
 3. 3 FT. FOR GRAVITY SANITARY SEWER WHERE THE BOTTOM OF THE WATER MAIN IS LAID AT LEAST 6 INCHES ABOVE THE TOP OF THE GRAVITY SANITARY SEWER.
 4. 18" VERTICAL MINIMUM SEPARATION REQUIRED BY CITY OF HOLLYWOOD, UNLESS OTHERWISE APPROVED.
 5. A MINIMUM 6 FOOT HORIZONTAL SEPARATION SHALL BE MAINTAINED BETWEEN ANY TYPE OF SEWER AND WATER MAIN IN PARALLEL INSTALLATIONS WHENEVER POSSIBLE.
 6. IN CASES WHERE IT IS NOT POSSIBLE TO MAINTAIN A 30 FOOT HORIZONTAL SEPARATION, THE WATER MAIN MUST BE LAID IN A SEPARATE TRENCH OR ON AN UNDISTURBED EARTH SHELF LOCATED ON ONE SIDE OF THE SEWER OR FORCE MAIN AT SUCH AN ELEVATION THAT THE BOTTOM OF THE WATER MAIN IS AT LEAST 18 INCHES ABOVE THE TOP OF THE SEWER.
 7. WHERE IT IS NOT POSSIBLE TO MAINTAIN A VERTICAL DISTANCE OF 18 INCHES IN A PARALLEL INSTALLATION, THE WATER MAIN SHALL BE CONSTRUCTED OF 9" AND THE SANITARY SEWER OR FORCE MAIN SHALL BE CONSTRUCTED OF 10" WITH A MINIMUM VERTICAL DISTANCE OF 6 INCHES. THE WATER MAIN SHOULD ALWAYS BE ABOVE THE SEWER. JOINTS ON THE WATER MAIN SHALL BE LOCATED AS FAR APART AS POSSIBLE FROM JOINTS ON THE SEWER OR FORCE MAIN (STAGGERED JOINTS).
 8. ALL JOINTS ON THE WATER MAIN WITHIN 30 FEET OF THE CROSSING MUST BE MECHANICALLY RESTRAINED.

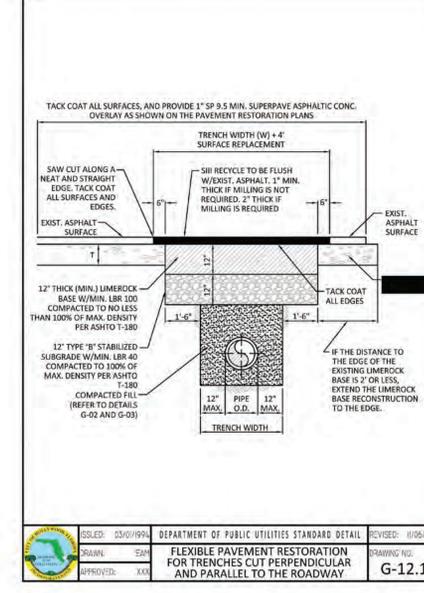
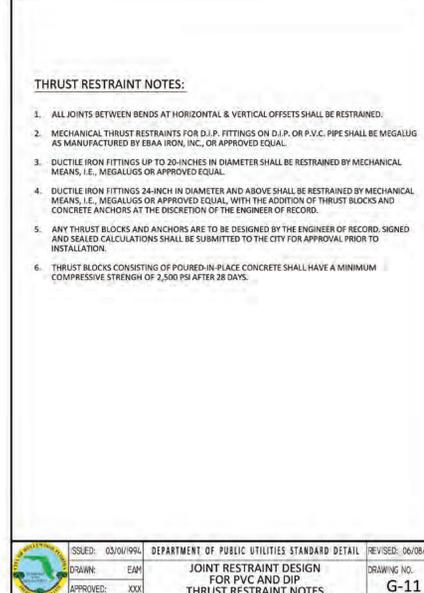
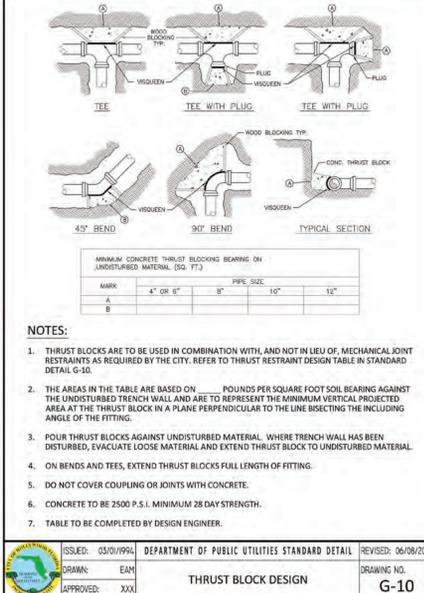
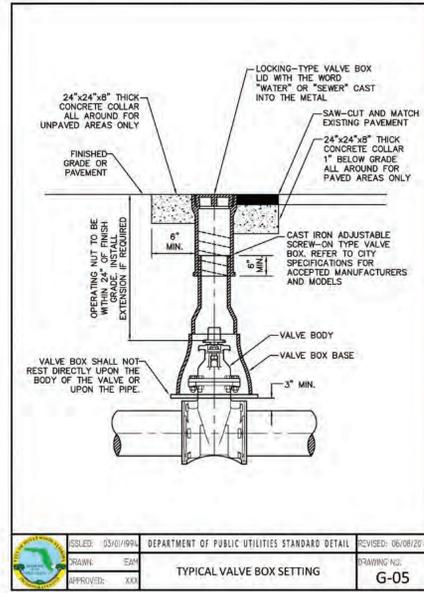
ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 06/08/2014
 DRAWN: EAM APPROVED: XXX
 DRAWING NO. G-01.1



FLEXIBLE PAVEMENT RESTORATION NOTES:

- THE ABOVE DETAILS APPLY ONLY TO ASPHALT PAVEMENT RESTORATION OVER UTILITY TRENCHES CUT WITHIN CITY OF HOLLYWOOD RIGHTS-OF-WAY. FOR PAVEMENT RESTORATION WITHIN BROWARD COUNTY OR FOOT RIGHTS-OF-WAY REFER TO THE CORRESPONDING DETAILS FOR THOSE AGENCIES.
- LI-MEROCK BASE MATERIAL SHALL HAVE A MINIMUM L.B.R. OF 100 AND A MINIMUM CARBONATE CONTENT OF 70%. REPLACED BASE MATERIAL OVER TRENCH SHALL BE A MINIMUM OF 12" THICK.
- LI-MEROCK BASE MATERIAL SHALL BE PLACED IN 12" MAXIMUM (LOOSE MEASUREMENT) THICKNESS LAYERS WITH EACH LAYER THOROUGHLY ROLLED OR TAMPED AND COMPACTED TO 100% OF MAXIMUM DENSITY PER ASTM T-99, PRIOR TO THE PLACEMENT OF THE SUCCEEDING LAYERS.
- STABILIZED SUBGRADE MATERIAL SHALL BE GRANULAR AND SHALL HAVE A MINIMUM L.B.R. OF 40.
- BACKFILL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH THE PIPE LAYING CONDITION TYPICAL SECTIONS IN DETAILS G-02 AND G-03, AND THE SPECIFICATIONS, BUT TESTING WILL BEGIN 12" ABOVE THE INSTALLED FACILITY.
- ALL EDGES AND JOINTS OF EXISTING ASPHALT PAVEMENT SHALL BE SAW CUT TO STRAIGHT LINES, PARALLEL TO OR PERPENDICULAR TO THE ROADWAY, PRIOR TO THE RESURFACING.
- RESURFACING SHALL BE 2" FOR TEMPORARY PAVEMENT AND SHALL BE APPLIED A MINIMUM OF TWO INCH IN THICKNESS.
- MILL AND BUTT JOINT TO EXISTING PAVEMENT.
- IF THE TRENCH IS FILLED TEMPORARILY, IT SHALL BE COVERED WITH A 2" ASPHALTIC CONCRETE PATCH TO KEEP THE FILL MATERIAL FROM RAVELING UNTIL REPLACED WITH A PERMANENT PATCH.
- REFER TO SPECIFICATIONS FOR DETAILED PROCEDURES.
- WHERE THE UTILITY TRENCH CROSSES EXISTING ASPHALT DRIVEWAYS, THE LI-MEROCK BASE THICKNESS MAY BE A MINIMUM OF 6 INCHES THICK, REGARDLESS OF THE EXTENT OF IMPACT, THE ENTIRE DRIVEWAY SURFACE BETWEEN THE EDGE OF THE ROADWAY PAVEMENT AND PROPERTY LINE OR FRONT OF SIDEWALK SHALL BE OVERLAP USING 2-INCH THICK MINIMUM ASPHALTIC CONCRETE SURFACE COURSE WHERE INDICATED ON THE PLANS OR AS DIRECTED BY THE CITY ENGINEER.

ISSUED: 03/01/1994 DEPARTMENT OF PUBLIC UTILITIES STANDARD DETAIL REVISED: 06/08/2014
 DRAWN: EAM APPROVED: XXX
 DRAWING NO. G-12



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TETRA TECH
 CA No.: 2429
 www.tetra-tech.com
 4601 SHERIDAN STREET, SUITE 212
 HOLLYWOOD, FLORIDA 33021
 PHONE: (954) 364-1753

JANINE M. ALEXANDER, P.E.
 P.E. No. 59244, FL
 DATE

CITY OF HOLLYWOOD
 REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER - LUM 07
GENERAL DETAILS

MARK	DATE	DESCRIPTION
1	10/28/20	ADDENDUM NO. 1

Project No.: 200-16428-19001
 Designed By: JMA
 Drawn By: TM/BMM
 Checked By: JMA/KC

C-501

Copyright: Tetra Tech
 Bar Measures 1 inch

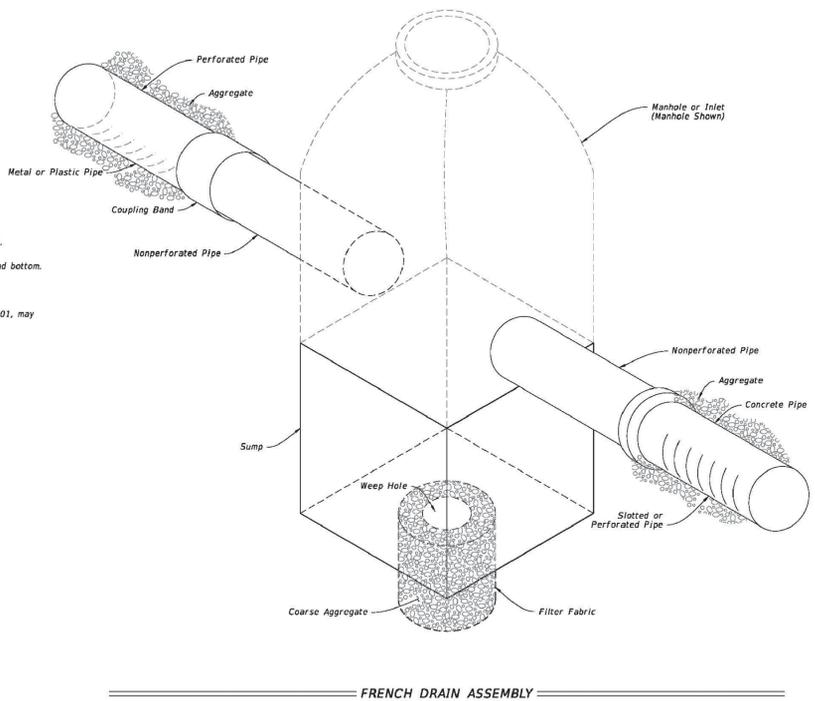
NOT FOR CONSTRUCTION

GENERAL NOTES:

1. Install light duty cast iron cover and frame in accordance with Specifications 962.
2. Use Class I concrete. Use No. 3 bars (Grade 60) on 8" centers both ways, sides and bottom.
3. Furnish covers with pick holes. Do not use fitted lifts or handles.
4. Manhole Type P Alternate A, Index 425-010, Type I Frame and Cover, Index 425-001, may be used in lieu of the box detailed in this Index.

TABLE OF CONTENTS:

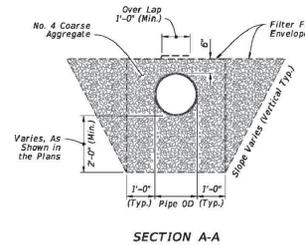
Sheet	Description
1	General Notes and Contents
2	Typical Inspection Box Installation
3	Typical Urban, Slope, and Top Adjustment Installations



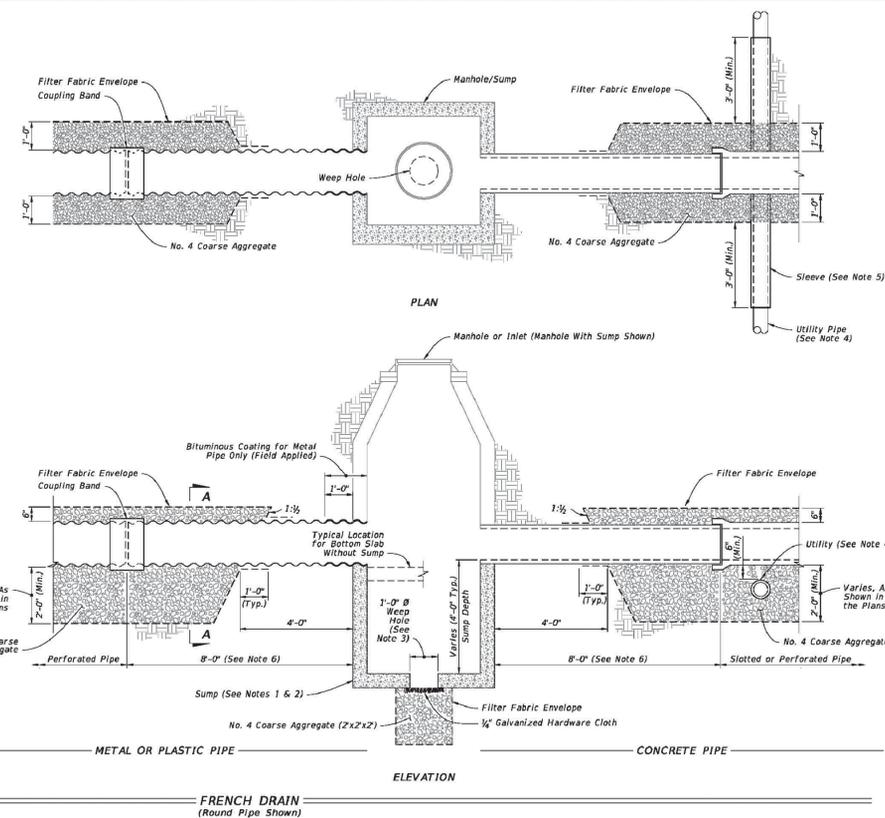
FRENCH DRAIN ASSEMBLY

NOTES:

1. Construct sumps unless excluded in the Plans.
2. For additional sump bottom information see Index 425-001.
3. Construct weep holes only where called for in the Plans.
4. Only cast and ductile iron sanitary sewer, or cast iron, ductile and steel water mains will be allowed to pass directly through french drain (without sleeve).
5. Use only steel, cast or ductile iron sleeves.
6. No slots or perforations.



SECTION A-A



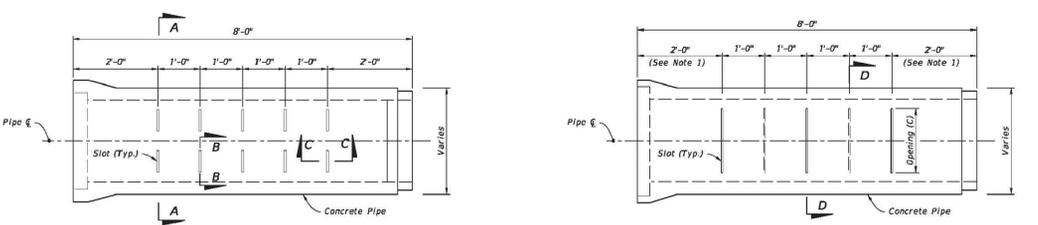
FRENCH DRAIN (Round Pipe Shown)

FRENCH DRAIN SYSTEM

LAST REVISION 11/01/19	DESCRIPTION:	FDOT	FY 2020-21 STANDARD PLANS	FRENCH DRAIN	INDEX 443-001	SHEET 1 of 3
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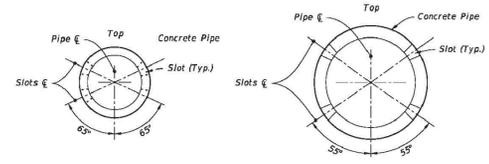
LAST REVISION 11/01/19	DESCRIPTION:	FDOT	FY 2020-21 STANDARD PLANS	FRENCH DRAIN	INDEX 443-001	SHEET 2 of 3
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ALL IMPACTED FRENCH DRAINS MUST BE REPAIRED AND RECONSTRUCTED TO EQUAL OR BETTER CONDITION AND COMPLY WITH THIS DETAIL REQUIREMENTS



SIDE VIEW

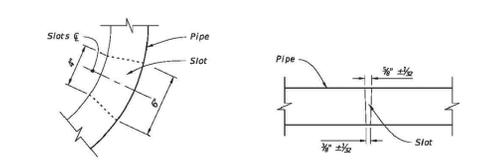
SIDE VIEW



SECTION A-A

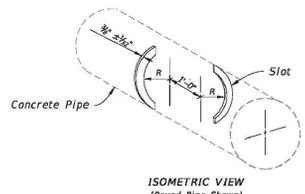
ROUND PIPE

ELLIPTICAL PIPE



SECTION B-B

SECTION C-C



SECTION D-D

- NOTES:**
1. 2'-0" for 8'-0" joints of pipe; 2'-0" for 12'-0" joints of pipe
 2. A curved cut is acceptable provided the control dimension is maintained.

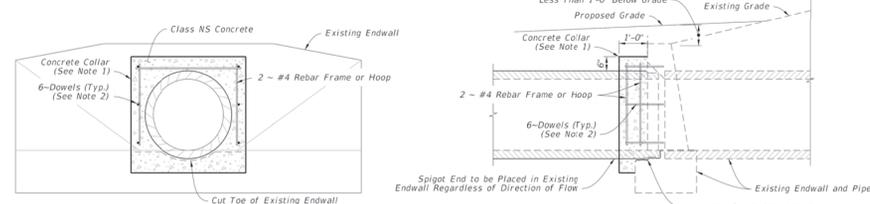
Pipe Size	Slot Cut Opening (C)	
	Min.	Max.
15"	12"	14"
18"	12"	14"
24"	16"	18"
30"	16"	18"
36"	22"	24"
42"	22"	24"
48"	22"	24"
54"	24"	26"
60"	24"	26"
66"	24"	26"
72"	24"	26"

Pipe Size	Slot Cut Opening (C)	
	Min.	Max.
14"x23"	10"	12"
19"x30"	14"	16"
24"x38"	14"	16"
29"x45"	20"	22"
34"x53"	20"	22"
38"x60"	20"	22"

CONCRETE SLOTTED PIPE OPTIONS

LAST REVISION 11/01/19	DESCRIPTION:	FDOT	FY 2020-21 STANDARD PLANS	FRENCH DRAIN	INDEX 443-001	SHEET 3 of 3
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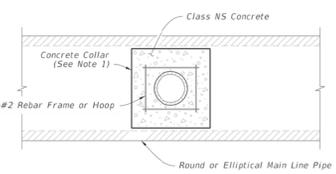
NOT FOR CONSTRUCTION



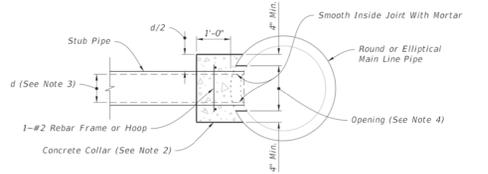
END ELEVATION

SIDE ELEVATION

EXTENSION OF EXISTING PIPE CULVERTS



STUB END ELEVATION



SIDE ELEVATION

JOINING MAINLINE PIPE TO STUB PIPE

- NOTES:**
1. The collar may be formed by any method approved by the Engineer.
 2. Install 1/2"x16" dowels in adhesive bond material.
 3. Stub Pipes maximum diameter: 1/2 of a round main line pipe diameter, or 1/2 the height of elliptical main line pipes.
 4. Opening by Pipe Manufacturer.
 5. Install riser reinforcement using #5 Bars @ 18" centers vertically and 8" centers horizontally. Bend pipe steel to riser.
 6. Reinforced concrete top required when inlet, manhole or junction box riser is less than 4 feet in diameter; or when 3'-6" alt. b inlet, manhole or junction box riser is used; or when rectangular inlet is used.
 7. See Index 425-001 for optional construction joints.

LAST REVISION 11/01/20	DESCRIPTION:	FDOT	FY 2021-22 STANDARD PLANS	MISCELLANEOUS DRAINAGE DETAILS	INDEX 430-001	SHEET 4 of 7
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 HOLLYWOOD, FLORIDA 33021
 PHONE: (954) 364-1753

CITY OF HOLLYWOOD FLORIDA

BY	DATE	DESCRIPTION

CITY OF HOLLYWOOD
 REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER - LUM 07
FDOT FRENCH DRAIN DETAILS

Project No.:	200-16428-19001
Designed By:	JMA
Drawn By:	TM/BMM
Checked By:	JMA/KC

C-507

Bar Measures 1 inch

EXHIBIT 2

REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

4

TABLE OF CONTENT

Section

Title

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01010	Summary and Phasing of Work
01025	Basis of Payment
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01300	Submittals
01400	Testing and Inspection
01410	Contractor's Health and Safety Plan
01500	Construction Considerations
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01530	Protection of Existing Facilities
01550	Site Access and Storage
01560	Special Controls
01570	Traffic Regulations and Maintenance of Traffic
01600	Equipment and Materials
01700	Project Closeout
01720	Project Record Documents and Survey
01740	Permits

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02140	Dewatering
02160	Temporary Excavation Support Systems
02210	Earth Excavation, Backfill, Fill and Grading
02220	Excavation, Backfill and Compaction
02222	Excavation and Backfill for Utilities and Structures
02223	Screened Gravel
02225	Contaminated Soils and Groundwater
02260	Finish Grading
02332	Limerock Base
02500	Landscaping
02510	Pipeline Removal and Abandonment
02507	Prime and Tack Coats
02510	Asphaltic Concrete Pavement
02526	Concrete Pavement, Curb and Walkway
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REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

Section

Title

DIVISION 2 – SITEWORK (cont'd.)

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03300	Concrete
03375	Flowable Fill
03420	Precast Reinforced Concrete Structures
03600	Grouting

DIVISIONS 4 – 8 (NOT USED)

DIVISION 9 – FINISHES

09940	Painting
09960	High Performance Coatings

DIVISION 10 (NOT USED)

DIVISION 11 – EQUIPMENT

11305	Flow Meter and Appurtenances
11312	Collection System Bypass

DIVISIONS 12 (NOT USED)

REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

Section

Title

DIVISIONS 13 – SPECIAL CONSTRUCTION

13300 Utility Control Instrumentation System

DIVISIONS 14 (NOT USED)

DIVISION 15 - MECHANICAL

15060 Piping and Fittings
15068 PVC Force Main
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15995 Pipeline Testing
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16450 Grounding
16900 Electrical Controls and Miscellaneous Electrical Equipment
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APPENDICES

APPENDIX A – Geotechnical Report
APPENDIX B – Permits Obtained by Owner
APPENDIX C – Bentonite Management Plan Example
APPENDIX D – FDEP Contaminated Sites Listing
APPENDIX E – Subsurface Utility Excavation (SUE) Reports
APPENDIX F – Conceptual Layout for Grouting Exst. FM.

**CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES
ENGINEERING & CONSTRUCTION SERVICES DIVISION
PROPOSAL BID FORM**

Project Name: Replacement of Hallandale Beach Force Main and Large User Meter - LUM 07
Project No.: 19-7100

If this Proposal is accepted, the undersigned Bidder agrees to complete all work under this contract within **274 calendar days** following the issuance of the Notice to proceed. All entries on this form must be typed or written in block form in ink.

ASE BID:

<u>2.</u>	<u>Description</u>	<u>Qty.</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total</u>
1	Mobilization, Bonds and Insurance	1	LS	_____	_____
2	Demobilization	1	LS	_____	_____
3	Maintenance of Traffic (MOT)	1	LS	_____	_____
4	Furnish and Install 16-inch DR-18 PVC Force Main	3,740	LF	_____	_____
5	Furnish and Install 20-inch DR-11 HDPE Force Main via Horizontal Directional Drill (HDD)	560	LF	_____	_____
6	Furnish and Install Plug Valves with Boxes (Various Sizes)				
6a	10-inch Plug Valves with Boxes	2	EA	_____	_____
6b	16-inch Plug Valves with Boxes	5	EA	_____	_____
7	Furnish and Install 4" Air Release Valve Assembly in Manhole	1	EA	_____	_____
8	Place Out of Service (Grout) Existing Force Mains (Various Sizes)	4,900	LF	_____	_____
9	Furnish and Install 30-inch Line Stop	1	EA	_____	_____
10	Furnish and Install 10-inch Tee	2	EA	_____	_____
11	Furnish and Install 16-inch x 30-inch Reducer	1	EA	_____	_____
12	LUM-07 Site Improvements	1	LS	_____	_____
13	Water Mains and Fittings Adjustments	1	LS	_____	_____
14	Remove Existing 8" Water Mains	1,500	LF	_____	_____
15	Milling and Resurfacing of 1.5" of Asphalt Pavement within FDOT Roadways	302	SY	_____	_____
16	Milling & Resurfacing of 1" of Asphalt Pavement within City of Hollywood Roadways	3,204	SY	_____	_____
17	Temporary Asphalt Restoration	3,124	LF	_____	_____
18	Furnish and install Temporary Pavement Markings	1	LS	_____	_____
19	Replacement of Permanent Pavement Markings	1	LS	_____	_____
20	Removal and Replacement of Concrete Sidewalk	326	SY	_____	_____
21	Removal and Replacement of Concrete Curb and/or Gutter	100	LF	_____	_____
22	Alley Reconstruction	2,156	SY	_____	_____
23	Owner's Contingency (allowance)	1	LS	\$250,000	\$250,000
24	Consideration for Indemnification	1	LS	\$10	\$10
25	Density Testing (allowance)	1	LS	\$50,000	\$50,000
26	FPL (allowance)	1	LS	\$50,000	\$50,000
27	Permits, Licenses and Fees (allowance)	1	LS	\$50,000	\$50,000
28	As-Builts and Record Drawings (By land surveyor approved by City or EOR)	1	LS	\$20,000	\$20,000
BASE BID TOTAL FOR COMPLETE PROJECT					_____

TOTAL BASE BID IN WRITING

NOTES:

SUBSTANTIAL COMPLETION TIME AND PROJECT CLOSEOUT TIME FOR THE CONTRACT SHALL BE AS DEFINED IN THE PROJECT SCHEDULE IN THE SUPPLEMENTARY GENERAL CONDITIONS (SGC'S).

QUANTITIES PROVIDED ARE FOR INFORMATION PURPOSES. FULL DESCRIPTION OF THE PAY ITEMS ARE PROVIDED IN 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 Department 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 Department. 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, he shall include the cost for that work in the last Bid Item for each construction package so that his proposal for the project does reflect his total price for completing the work in its entirety.
- F. The Contractor shall submit, with each Payment Request, a list of M/WBE Subcontractors that he is or will be utilizing for his contract. For each M/WBE Subcontractor, the following information shall be provided:
 - 1. Total sub-contract dollar amount.
 - 2. Amount paid to date.

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 01300, unless otherwise specified. A representative of the City shall witness all field measurements.

1.03 PAYMENT ITEMS

For purposes of describing items appearing in the Proposal Bid Form, pricing for each item shall include work and components described below:

- A. **Item No. 1 – Mobilization, Bonds, and Insurance** - The lump sum price for this item shall be full compensation for all mobilization/demobilization activities, including but not limited to bonds, insurance, transport of personnel, materials, equipment, and other incidentals to the site, preparation of submittals including schedule, permit packages, and others, temporary facilities and offices, safety equipment and first aid supplies, project signs including procurement, installation, and removal at the end of the project (City approved signs and locations), field surveys, sanitary and other temporary facilities required by the specifications, audio-video documentation of the existing site, any space required for staging, laydown, survey, storage, parking, etc.; preparation and submittal of shop drawings, preparation of a certified Stormwater Pollution Prevention Plan (SWPP) and BMPs 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, and removing the erosion and sedimentation control devices including but not limited to, turbidity barriers, synthetic hay bales, silt fencing, etc., necessary to comply with NPDES requirements, dewatering, groundwater sampling, treatment and disposal, all contamination permitting and compliance, and dewatering permit applications preparation, all fees and all permitting; and all other activities necessary for complete mobilization/demobilization requirement for the contract. **Pay Item No. 1 shall not exceed 3% of the sum of Bid Items Nos. 4 through 22.**

- B. **Item No. 2 – Demobilization** - The lump sum price for this item shall be full compensation for all demobilization activities, including but not limited to transport of personnel, materials, equipment, and other incidentals to the site, preparation of submittals including schedule, permit packages, and others, temporary facilities and offices, safety equipment and first aid supplies, project signs including procurement, installation, and removal at the end of the project (City approved signs and locations), field surveys, sanitary and other temporary facilities required by the specifications, audio-video documentation of the existing site, any space required for staging, laydown, survey, storage, parking, etc.; preparation and submittal of shop drawings; and all other activities necessary for complete demobilization requirement for the contract. **Pay Item No. 2 shall not exceed 2% of the sum of Bid Items Nos. 4 through 22.**
- C. **Item No. 3 – Maintenance of Traffic (MOT)** - Payment for all labor for the design and preparation of signed and sealed (FL Professional Engineer with Advanced MOT Certification) phased and detailed MOT plans, non-standard work hours or evening or weekend hours, all submittals and permitting through various regulatory agencies having jurisdiction over the ROW limits, MOT coordination with other stakeholders or Contractors for adjacent or other work within the work limits, lane closure submittals and approvals, traffic studies, flagman, police, all MOT pavement markings and striping, and installation and removal and/or relocations and maintenance of phased traffic control devices for the duration of the project and to final completion per applicable authority having jurisdiction regarding MOT (vehicular, pedestrian, etc.).
- D. **Items No. 4 - Furnish and Install 16-inch DR-18 PVC Force Main** - Payment for all labor, pipe, equipment and material for all work necessary and required the installation of new force mains and associated stub outs and connections or reconnections as shown on the plans. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thicknesses, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, removal and replacement of existing gravity sewer piping with SDR 26 PVC piping and rigid couplings when in close proximity to new force main piping installation, tree and shrub protection, palm and tree removal and replacement, tree trimming or pruning, signage and mailbox protection, removal and replacement, fencing and gate protection and removal and replacement; Replacement of impacted traffic, signalization, and street lighting lines; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; hiring of power company to hold and support

power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), removing and replacing fences, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, and bracing (all types required for underwater and/or canal crossings), piping of various materials and types, polyethylene encasement for all domestic ductile iron pipe and fittings, wet tapping, 316 stainless steel washers, nuts and bolts, 316 stainless steel restraining rods for mechanical joint fittings, restraining devices for proposed and existing force mains, painting, priming and coating of piping including special coatings as per the specifications and special piping preparation(s), Protecto 401 interior coating for all DIP force main piping and fittings, thrust blocks, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, connections and reconnections to existing force mains, locating grid, wiring and equipment, tracer wires, line locater, identification markers, pipe installation, clean fill/backfill material, reinforced concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, butt fusion welding, MJ adapters, miscellaneous fittings and transitions for various types of piping connections and reconnections, stiffening rings, work during restricted hours and night work as necessary per FDOT requirements or other jurisdictional requirements, full restoration and cleanup, sodding, grading and re-grading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, sidewalk removal and restoration, testing (including fees), flushing of piping, swabbing or pigging including entry and exit points, debris removal, water for swabbing/pigging, pigs and associated items for entire pipeline from point of connection to point of connection, pressure testing, exfiltration trench, drainfield and drainage piping removal, repair, and replacement, and all necessary accessories required for a complete installation, 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.

- E. **Item No. 5 – Furnish and Install 20-inch DR-11 HDPE Force Main via Horizontal Directional Drill (HDD)** Payment for pipe installed by means of directional drilling, successfully installed and complete will be at the Contract unit price per linear foot for furnishing and installing the size and type, which price and payment shall be full compensation for all clearing, grubbing, excavation, bedding, grading and regrading, dewatering, sheeting, shoring and bracing, entry and exit pits, all site restoration to equal or better condition, signs and lighting removal and replacement as well as other obstructions removal and replacement, street lighting support and protection, all testing, temporary jumper connection(s), connections and reconnections to all existing piping, thrust blocks, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations; field verification of existing utilities, coordination with existing utility facility owners, coordination with

property owners; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), removing and replacing fences, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, test connections, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, sidewalk removal and restoration, pigging and pig entry and exit locations, mandrel testing, mud for drilling, water for mud mixing, recycling of mud as applicable, removal and proper disposal of mud to a proper facility, appurtenances, site cleanup and disposal of debris. Also included is all pipe, butt fusion welding, sleeves, mechanical joint adapters, stiffening rings (on a case-by-case approved basis only), polyethylene encasement for all domestic ductile iron pipe and fittings, 316 stainless steel washers, nuts and bolts, 316 stainless steel restraining rods for mechanical joint fittings, restraining devices for proposed and existing force mains, painting, priming and coating of piping including special coatings as per the specifications and special piping preparation(s), Protecto 401 interior coating for all DIP fittings, buoyancy control, restraining devices for proposed and existing force mains, exfiltration trench drainfield and drainage piping removal, repair, and replacement; replacement of impacted traffic, signalization, and street lighting lines, signed and sealed submittals, calculations and approvals for the HDD installation, frac mitigation plan and all mitigation measures, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, flushing, swabbing or pigging including entry and exit points, debris removal, water for swabbing/pigging, pigs and associated items for entire pipeline from point of connection to point of connection, pressure testing, and all necessary accessories required for a complete installation, other restorations and other related work not defined in other Bid Package Items.

- F. **Item No. 6a and 6b – Furnish and Install Plug Valves with Boxes (Various Sizes)** - Payment for all labor, valves, equipment, and material for all work necessary and required for the installation of new plug valves, as shown in the plans, valve box, valve box extensions, operating nut extensions, valve wrenches, restraining devices, traffic rated covers, concrete collars. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings, 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, and removing the erosion control devices necessary to comply with NPDES requirements;

tree and shrub protection, trimming, removal and replacement, signage and mailbox protection, removal and replacement, Replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s); protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, dewatering permit applications preparation and permitting, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, restraining devices for proposed and existing force mains, polyethylene encasement for all domestic ductile iron valves, metallic tracer wire, line locator, identification markers, pipe and valve installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, sidewalk removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, 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.

- G. **Item No. 7 – Furnish and Install 4” Air Release Valve Assembly in Manhole** - Payment for all labor, valves, equipment, and materials for all work necessary and required for the installation of new stainless steel combination air release valve with corrosion protection, pipe and valve supports, air release valve manhole, all domestic iron fittings and valves, aerial connections and supports, grout, manhole adjustments, traffic rated frames, traffic rated covers, also including but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thicknesses, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings; tree and shrub protection, trimming, removal and replacement, signage protection, removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement; removal, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, restraining devices for proposed and

existing force mains, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s); protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, dewatering permit applications preparation and permitting, metallic tracer wire, line locator, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, sidewalk removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, 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.

- H. **Item No. 8 – Place Out of Service (Grout) Existing Force Mains (Various Sizes) –** Payment for placing out of service existing force mains of various sizes shall be made for cutting, capping and abandoning in place all existing force mains within the project limits as shown on the plans and grout filling the piping. This work shall include but not be limited to fittings, restraining of existing piping, grout, pumping equipment and appurtenances for grout, pressure/grout weep holes, vents and venting piping, dewatering, excavation, compaction, clearing and grubbing, removal and disposal of existing force main pipe contents, cutting of existing piping, capping and abandonment of existing piping which is considered incidental to the piping cost pay item removal, domestic ductile iron fittings, disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings; tree and shrub protection, trimming, removal and replacement, signage and mailbox protection, removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, dewatering permit applications preparation and permitting, all bypass piping and pumping

equipment including noise attenuation for all pumping equipment, materials and operations, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), polyethylene encasement for all domestic ductile iron fittings and valves, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, and all debris removal and cleanup, other restorations and other related work not defined in other Bid Package Items.

- I. **Item No. 9 – Furnish and Install 30-inch Line Stop** – Payment for all labor, equipment and material for all work necessary and required for the installation of new line stop, isolation valves, to permanently or temporarily stop the flow within the indicated main at the locations, recovery of temporary valves and plugs; removal and disposal of wastewater, concrete support blocks/cradles for support, dewatering, tapping sleeve, completion plug/cap, restraining devices, restraint of existing piping in accordance with the standards and requirements. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, restraining devices for proposed mains, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, polyethylene encasement for all domestic ductile iron fittings, metallic tracer wire, line locater, connections to existing piping, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other restorations and other related work not defined in other

Bid Package Items.

- J. **Item No. 10 – Furnish and Install 10-inch Tee** – Payment for all labor, equipment and material for all work necessary and required for the installation of new tees, as shown in the plans, recovery of temporary valves and plugs; removal and disposal of wastewater, concrete support blocks/cradles for support, dewatering, tapping sleeve, plug, restraining devices, restraint of existing piping in accordance with the standards and requirements. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, domestic ductile iron fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, polyethylene encasement for all domestic ductile iron fittings, metallic tracer wire, line locator, connections to existing piping, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other restorations and other related work not defined in other Bid Package Items.
- K. **Items No. 11 – Furnish and Install 16-inch x 30-inch Reducer** - Payment for furnishing and installing 16-inch x 30-inch reducer will be made at the Contract unit price per each fitting properly furnished and installed, which price and payment shall be full compensation for furnishing, installing, and testing all fittings including but not limited to, 16-inch x 30-inch domestic ductile iron reducer, polyethylene encasement for all domestic ductile iron fittings, and Protecto 401 coating for all DI fittings. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, restraining devices, traffic rated covers, concrete collars, all restrained

mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, metallic tracer wire, line locater, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other related work not defined in other Bid Package Items.

- L. **Item No. 12 – LUM-07 Site Improvements** – This pay item consists of satisfactorily furnishing and installing all items for a fully functional and complete site including but not limited to; demolition and removal of site structures, piping, meters, control panels, fencing and gate, sump pumps, vaults, air release valves and all needed enclosures or vaults, telemetry, electrical equipment, and all associated infrastructure and any permitting required with the City of Hallandale for the site demolition, and new installations of all site improvements not limited to; structures, piping, meters, control panels, sump pumps, 8-foot high black iron fencing and gate, vaults, telemetry, electrical equipment and all associated infrastructure and any permitting required with the City of Hallandale to provide a completely functional installation. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor, materials and equipment necessary for a complete functional meter infrastructure and site improvements including locating, protection and support of all existing utilities, coordination with all utility facility owners for locating and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities, temporary utility construction easements, excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, clean fill/backfill, compaction, grading and regrading, pipe supports, all testing, all conduit and wiring and electrical panel modifications, electrical meter connections, radio feasibility study report (test) for the telemetry antenna, coating/lining of meter vault, all coordination including coordination with the Owner operations staff, new aluminum hatches, hardware, new valves to isolate the meter, meter piping and meter bypass piping (316 stainless steel, etc) and fittings, all couplings, 316 stainless steel bolts, fittings and special connectors, restoration, removal and replacement of existing pavers, sidewalks, curbs and gutters, concrete slabs and pads, asphalt pavement, removal and replacement or removal only, landscaping removal and replacement or removal only, signage and street lighting, replacement of impacted traffic, signalization, and street lighting lines, as well as other obstructions removal and replacement, flow control and any associated bypass piping and pumping, new 57 stone and filter fabric, removal of existing site groundcover and

replacement of clean fill prior to stone and fabric installation, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, and all other items required for a complete, acceptable and operable installation; exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other related work not defined in other Bid Package Items.

- M. **Item No. 13 Water Mains and Fittings Adjustments** – Payment for all labor, equipment and materials for all work necessary and required for water mains and fitting adjustments as shown in the plans. This work shall include but not be limited to: phasing, clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities, preparation and submittal of shop drawings, 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, and removing the erosion control devices necessary to comply with NPDES requirements, removal and replacement of impacted exfiltration systems and drainfields, tree and shrub protection, trimming, removal and replacement, Replacement of impacted traffic, signalization, and street lighting lines; signage and mailbox protection removal and replacement, fencing and gate protection and removal and replacement, power pole and guy wire support and relocation, removal and replacement (including coordination and applicable fees), irrigation system protection or removal and replacement, piping trench excavation (including all exploratory equipment and excavations), sheeting, shoring, bracing, dewatering, dewatering permit applications preparation, fees and permitting, furnish and install line stops and bypass piping for line stops including thrust blocks, pipe (Class 52 domestic ductile iron, C-900 or C-905 PVC), 316 stainless steel washers, nuts and bolts, and restraining rods for mechanical joint fittings, stainless steel restraining devices for proposed and existing water mains, connections and reconnections, cut-ins or tie-ins to existing water mains (including any required due to phasing) and all necessary coordination, all temporary water main relocations, polyethylene encasement for all domestic ductile iron pipe and fittings, metallic tracer wire, line locator, identification markers, pipe installation, clean fill/backfill material, reinforced concrete slabs and/or excavatable flowable fill to be installed as directed by EOR, bedding, removal and disposal of unsuitable soils, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and re-grading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, bacteriological sampling and testing (including all fees, permit and expediting fees), pressure testing, flushing devices including risers or canons

and valves, and all necessary accessories required for a complete installation, 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.

- N. **Item No. 14 Remove Existing 8" Water Mains** - Payment for all labor, equipment and materials for all work necessary and required for the removal of existing water mains, fittings and associated services/stub outs, regardless of the material. This work shall include but not be limited to: phasing, clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities, preparation and submittal of shop drawings, 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, and removing the erosion control devices necessary to comply with NPDES requirements, removal and replacement of impacted exfiltration systems and drainfields, tree and shrub protection, trimming, removal and replacement, Replacement of impacted traffic, signalization, and street lighting lines; signage and mailbox protection removal and replacement, fencing and gate protection and removal and replacement, power pole and guy wire support and relocation, removal and replacement (including coordination and applicable fees), irrigation system protection or removal and replacement, remove and replace sanitary sewer laterals of various diameters on various size gravity mains with single and double laterals and provide new SDR 26 PVC piping, cleanouts and fittings, piping trench excavation (including all exploratory equipment and excavations) sheeting, shoring, bracing, dewatering, dewatering permit applications preparation, fees and permitting, cutting and capping, hauling and legal disposal of pipes removed, removal of valve boxes and covers and delivering to the City; clean fill/backfill material, reinforced concrete slabs and/or excavatable flowable fill to be installed as directed by EOR, bedding, removal and disposal of unsuitable soils, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and re-grading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, furnishing and installing caps or plugs and all necessary accessories required for a complete removal, 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 the complete removal of existing water mains.
- O. **Item No. 15 – Milling and Resurfacing of 1.5" of Asphalt Pavement within FDOT Roadways** - Payment for all labor, equipment and material for all work necessary and required for milling and resurfacing of **1.5"** of existing pavement of various thicknesses within FDOT roadways, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto, saw cutting, removal, and disposal of existing pavement of all thicknesses and types to match thickness in kind, any required

field work by the Contractor to confirm existing pavement thicknesses prior to bidding (i.e. pavement cores, etc.), and replacement of 1.5" of asphalt pavement to meet all FDOT standards and specifications, latest editions. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items to maintain a level driving surface and to match final grades. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Machine laid asphaltic concrete surface course for permanent paving, will be paid for at the unit price bid times the number of square yards (SY) of asphaltic concrete installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic concrete surface course installation and removal, and disposal of existing concrete and other materials, as required including all restoration efforts.

- P. **Item No. 16 – Milling & Resurfacing of 1" of Asphalt Pavement within City of Hollywood Roadways** - Payment for all labor, equipment and material for all work necessary and required for milling and resurfacing of 1" of existing pavement of various thicknesses, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto, saw cutting, removal, and disposal of existing pavement of all thicknesses and types, any required field work by the Contractor to confirm existing pavement thicknesses prior to bidding (i.e. pavement cores, etc.), and replacement of 1" of asphalt pavement to meet all City and Broward County standards and specifications, latest editions. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items to maintain a level driving surface and to match final grades. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Machine laid asphaltic concrete surface course for permanent paving, will be paid for at the unit price bid times the number of square yards (SY) of asphaltic concrete installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic concrete surface course installation and removal, and disposal of existing concrete and other materials, as required including all restoration efforts.

- Q. **Item No. 17 – Temporary Asphalt Restoration** – For temporary asphalt restoration as follows:

- (a) 2-inch thick (min.) SP 9.5 asphaltic concrete structural course within City of Hollywood rights-of-way (with the exception of alleys) in accordance with Standard Detail G-12.1, where shown on the plans. For restoration in alleys refer to pay item 18.
- (b) 3-inch thick (min.) SP 9.5 asphaltic concrete structural course (Traffic B) within FDOT rights-of-way in accordance with FDOT Index 307, where shown on the plans.

Payment shall be at the unit price bid times the number of linear feet (in plan view) installed following the corresponding pavement restoration sections and meeting the compaction requirements provided on the Plans, Specifications and standard details (whichever is more stringent), completed and accepted by the City, Broward County and/or FDOT, with surface at the proper elevations. Greater widths, lengths and thicknesses are at the Contractor's option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete machine-laid asphaltic concrete surface course installation. Asphalt driveway sections shall include 6" thick (min.) compacted limerock base and 1" SP-9.5 asphaltic concrete surface course meeting all other asphalt pavement requirements shown on the plans and specifications. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Asphalt shall be restored over the entire driveway approach regardless of extent of impact.

- R. **Item No. 18 – Furnish & Install Temporary Pavement Markings** - For temporary replacement of existing thermoplastic or painted pavement markings and messages, thermoplastic markings, reflective pavement markers, removed or obliterated by the Contractor's operation, or as required for phasing or maintenance of traffic for the work and in accordance with MUTCD, FDOT Standard Specifications for Road and Bridge Construction, and/or Broward County Public Works Department Standards, latest editions. Markings required for MOT operations shall be billed under the MOT pay item. Any remedial work that requires restoration of temporary pavement markings will be at no additional cost to the City. Payment shall be at the lump sum amount bid for the entire project.
- S. **Item No. 19 - Replacement of Permanent Pavement Markings** - For replacement of existing thermoplastic or painted pavement markings and messages, thermoplastic markings, reflective pavement markers, and other associated permanent pavement markings that are removed or obliterated by the Contractor's operation, or as indicated on the plans, in accordance with MUTCD, FDOT Standard Specifications for Road and Bridge Construction, and/or Broward County Public Works Department Standards, latest editions. Markings required for MOT operations shall be billed under the MOT pay item. Any remedial work that requires restoration of permanent pavement markings will be at no additional cost to the City. Payment shall be at the lump sum amount bid for the entire project.
- T. **Item No. 20 – Removal & Replacement of Concrete Sidewalks** - This pay items consists of the removal, disposal, and replacement of existing concrete sidewalks, pedestrian curb ramps and miscellaneous concrete pavement impacted by the installation of the proposed sewer system improvements, and will be paid for at the unit price bid times the number of square yards (SY) of concrete pavement replaced, completed, ready for service and accepted by the Engineer, Broward County Public Works and/or FDOT. The price bid for this Pay Item shall include, but not be limited to, the following: saw-cutting, removing, hauling, and legally disposing of existing concrete pavement within the envelope of the utility trench typical section (in accordance with the plans or the detail on the plans) and up to the nearest adjacent control joints; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging

portions of geotextile fabric to remain; protecting any existing concrete pavement to remain; furnishing and installing formwork, concrete, water and admixtures, reinforcing steel, and miscellaneous materials; placing, finishing, curing and protecting the finished concrete surface; replacing pedestrian curb ramps and detectable warning surfaces or other ADA requirements; Replacement of impacted traffic, signalization, and street lighting lines. Payment shall not be made for existing concrete pavement outside of the envelope of the utility trench excavation in accordance with the typical trench section provided on the plans. Measurement for payment shall be the number of square yards (SY) lying within the envelope of the utility trench typical section and up to the nearest adjacent control joints. All other replacement due to removal or damage as a result of the Contractor's operation shall be at the Contractor's expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation and all restoration efforts.

- U. **Item No. 21 – Removal and Replacement of Concrete Curb and/or Gutter** - This pay items consists of the removal, disposal, and replacement of existing concrete curbs and/or gutters and other miscellaneous concrete pavement impacted by the installation of the proposed sewer system improvements, and will be paid for at the unit price bid times the number of linear feet (LF) of curbs and/or gutters replaced, completed, ready for service and accepted by the Engineer, Broward County Public Works and/or FDOT. The price bid for this Pay Item shall include, but not be limited to, the following: saw-cutting, removing, hauling, and legally disposing of existing concrete curbs and/or gutters within the envelope of the utility trench typical section (in accordance with the plans or the detail on the plans) and up to the nearest adjacent control joints; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; protecting any existing concrete pavement to remain; furnishing and installing formwork, concrete, water and admixtures, reinforcing steel, and miscellaneous materials; placing, finishing, curing and protecting the finished concrete surface; replacing pedestrian curb ramps and detectable warning surfaces or other ADA requirements; Replacement of impacted traffic, signalization, and street lighting lines. Payment shall not be made for existing concrete curbs and gutters outside of the envelope of the utility trench excavation in accordance with the typical trench section provided on the plans. Measurement for payment shall be the number of linear feet (LF) lying within the envelope of the utility trench typical section and up to the nearest adjacent control joints. All other replacement due to removal or damage as a result of the Contractor's operation shall be at the Contractor's expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation.
- V. **Item No. 22 – Alley Reconstruction** - Payment for all labor, equipment and material for all work necessary and required for removal and disposal of existing asphalt in alleys or portions of alleys, as shown in the Pavement Restoration Plans and Details. Included in this item is removal and disposal of existing asphalt, furnishing, installing and compacting disturbed base, and constructing 1.5" thick (minimum) machine laid asphaltic (SP 9.5) concrete surface course for permanent paving or matching existing pavement thicknesses in kind. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items; removal, disposal, and replacement of existing

underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. This item will be paid for at the unit price bid times the number of square yards (SY) of asphaltic (SP 9.5) concrete overlay installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic (SP 9.5) concrete surface course installation and all re-grading and restoration efforts.

- W. **Item No. 23 – Owner’s Contingency (allowance)** - Included in this contingency are works associated with undefined conditions or conflicts developing from undefined conditions. All work authorized for payment will be authorized in writing by the City in advance of commencement for this work. Amount to be paid per undefined conditions or conflict shall be negotiated or agreed to by both parties. The City reserves the right to award any, all, or none of the money associated with this allowance.
- X. **Item No. 24 – Consideration for Indemnification** - In recognition of the Contractor’s indemnification obligations, the City will pay to the Contractor the specific consideration of ten dollars (\$10.00). Payment of said specific consideration shall be made at the time of the payment of the first progress estimate and the Contractor shall acknowledge payment of this consideration by letter to the City after receipt of the progress payment.
- Y. **Item No. 25 – Density Testing (allowance)** - The allowance indicated for this item is to pay for all density testing for all piping installations to meet City, FDOT and Broward County standards. Density testing for multiple mobilizations due to limited testing as ordered by the Contractor will not be paid for by this allowance nor will stand-by time be paid for by this allowance. Any lack of Contractor coordination and scheduling which creates additional trips or downtime by the testing company will not be accepted or paid for by this allowance. The Contractor is to schedule and coordination all testing times to ensure efficiency. 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.
- Z. **Item No. 26 – FPL (allowance)** – This allowance indicated for this item is to pay for all coordination, deactivation, activation, existing utilities verifications, protection and support, exploratory excavations, and all other items required for support, protection, guy wires removals and relocations for power systems and infrastructure within the entire project corridor.
- AA. **Item No. 27 – Permits, Licenses and Fees (allowance)** - The allowance indicated for this item is to pay for all sewer system permits, licenses and other fees as stated herein

which are required of the Contractor to submit for and obtain from various agencies having jurisdiction (FDOT, Broward County, City of Hallandale, etc.) for construction of the project. Please refer to the Sewer Plan approval from the Broward County Highway Construction Engineering Division. Please take note of the required security amount of \$ _____ required of the Contractor, which will not be reimbursed by the City. The City will reimburse the ____% permit fee. The allowance shown on the Schedule of Bid Prices is an estimate of fees required. Payment will be based on the actual sewer permits, licenses or fees paid directly to agency, documented by paid receipts, specifically excluding any labor, mark-up, overhead and profit, administration and other costs involved in obtaining sewer permits or licenses or paying fees. This item also includes all notifications, coordination and permitting submittals and fees, flagmen and all necessary construction or inspection fees. Density testing for piping installations are also to be included in this allowance. Density testing for multiple mobilizations due to limited testing as ordered by the Contractor will not be paid for by this allowance nor will stand-by time be paid for by this allowance. Any lack of Contractor coordination and scheduling which creates additional trips or down-time by the testing company will not be accepted or paid for by this allowance. The Contractor is to schedule and coordinate all testing times to ensure efficiency. The Contractor is responsible for submitting and obtaining all necessary regulatory agency sewer permits other than those provided by the Owner and the Contractor is responsible for paying for all associated sewer 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.

- BB. **Item No. 28 – As-Builts and Record Drawings (By Land Surveyor approved by City or EOR)** - Measurement of various items for the As-Builts and Record Drawings will not be made for payment and all items shall be included in the lump sum price. Payment will be for full compensation to furnish as-built documentation and record drawings signed and sealed by a licensed PSM in hardcopy and electronic form and meeting City standards (PDF and AutoCAD) and an asset table at the completion and acceptance of work. In addition, for furnishing monthly as-builts and redlined drawings with pay applications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

PIPELINE REMOVAL AND ABANDONMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work specified in this Section consists of furnishing all labor, equipment and materials and performing all work connected with the removal and/or abandonment of existing pipelines.
- B. Applicable Codes, Standard and Specifications:
1. American Water Works Association (AWWA) and American National Standards Institute (ANSI) latest edition: ANSI/AW\VA C 1 10 /A2 1.10 - Ductile Iron Gray Iron Fittings; ANSI/AWWA C153/A21.53 - Compact Ductile Iron Fittings
 2. All work associated with asbestos material shall be performed in accordance with the standards listed below and all other applicable local, State, or Federal standards.
 - a. Florida Administrative Code, Chapter 1 7-25 1, "Asbestos"
 - b. National Emission Standards Hazardous Air Pollution (NESHAP), 40 CFR 61, subpart M.
 - c. Occupational Safety and Health Act, 29 CFR
 - d. Environmental Protection Agency (EPA) Asbestos Abatement Worker Protection Rule
 - e. Florida Statute 455.300
- C. Definitions:
1. Pipeline Abandonment - isolate from active pipelines, remove from service, dispose of pipeline contents, grout pipeline, cap or plug pipeline ends, leave pipe in place.
 2. Pipeline Removal - isolate from active pipelines, remove from service. Dispose of pipeline contents, remove pipe, valves, fittings, cap or plug pipeline ends, dispose or stockpile removed materials as required.

1.02. QUALITY ASSURANCE

- A. All work associated with the removal or taking out of service of existing asbestos cement pipelines shall be performed by a licensed asbestos abatement contractor or subcontractor registered in the State of Florida.

1.03 SUBMITTALS

- A. Shop Drawings: Shop Drawings shall be submitted in accordance with Division 1. 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 data, grout samples and test data.
 - 2. Asbestos abatement contractor/subcontractor licensing and qualifications, if necessary.
 - 3. Pipeline grouting contractor/subcontractor licensing and qualifications.

PART 2 PRODUCTS

2.01 FITTINGS

- A. Fittings shall be manufactured of domestic ductile iron, conforming to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53.
- B. All fittings shall be Class 250.

2.02 CONCRETE GROUT

- A. Provide grout with minimum 28 day compressive strength of 1000 psi, minimum slump of 5 inches, maximum slump of 9 inches. The grout mixture per cubic yard shall be:
 - 1. Cement - 5 00 pounds
 - 2. Fly Ash - 500 pounds
 - 3. Water - 350 pounds (42 gallons)
 - 4. Sand - 2248 pounds
 - 5. Air entrainment admixture (Darex or equal) - 3 ounces
 - 6. Bentonite - 6 pounds (to be mixed with sufficient water to form colloidal mixture, added at the job site)

2.03 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.

2.04 ASBESTOS PIPE REMOVAL AND DISPOSAL PROCEDURES

- A. General. The Contractor will be responsible for permitting, removal and disposal of asbestos-cement (A-C) pipe segments required to perform the Work as shown on the Drawings. The following paragraphs briefly summarize permitting, field procedures and disposal activities related to the A-C pipe. In these discussions, certain local, state and federal laws have been referenced. The Contractor must comply with all applicable local, state and federal laws/regulations whether or not such laws/regulations are referenced in these specifications.
- B. The Contractor shall provide evidence of experience of proper procedures in removal, handling and disposal of asbestos-cement pipe materials within the past five (5) years. References from at least three completed projects shall be provided at the Preconstruction Conference. If the Contractor proposes to utilize the services of a duly qualified Subcontractor for this portion of the work, these same requirements shall be met.
- C. Permitting. The Contractor shall apply for and obtain all permits related to removal of the A-C pipe segments. In accordance with Florida Department of Environmental Protection (FDEP) Rule 62-257.30 1 of the Florida Administrative Code (FAC), the Contractor must submit a "Notice of Asbestos Removal Project" form with a copy to the Engineer. The Contractor will submit the form to FDEP in a timely manner in accordance with the schedule contained in Rule 62-257. The agencies that may require permits for this project are not necessarily limited to the FDEP.
- D. Field Procedures. The Contractor is responsible for all procedures, including safety and health procedures, which will be used when handling A-C pipe segments. The Contractor's handling of A-C pipe segments shall be in conformance with 29 CFR 1926.58 (OSHA Safety and Health Standards).
- E. Cutting of A-C pipe shall be done in conformance with the recommended practices contained in the American Water Works Association's (AWWA) Manual No. M-16. Cutting methods should be used which minimize the production of airborne dust.
- F. Preparation of Transport of Materials. The Contractor will remove the pipe sections from the ground in whole pieces without fracturing, breaking or otherwise damaging pipe. The A-C pipe segments shall be carefully loaded onto the transport vehicle without damaging the pipe. The transport vehicle shall totally enclose the A-C pipe segments so

that wind and rain cannot disperse dust from the pipe material. Transport of the A-C pipe segments shall also meet the requirements of the waste disposal agency.

- G. Waste Disposal. As stated in Rule 62-701.520(3), the FDEP indicates that asbestos containing waste materials can be accepted at a permitted Class I, II or III landfill. The regulations also indicate that the waste generator (the Contractor) shall make arrangements with the landfill operator before disposal of the asbestos containing waste materials and inform the operator of the quantity of the waste and the scheduled date the shipment will arrive at the landfill. The Contractor shall provide the Engineer and the Owner a manifest immediately following disposal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Traffic control measures shall be implemented prior to construction.

3.02 PERFORMANCE

- A. Pipe Isolation:

1. Where indicated on the Drawings, line stops shall be utilized to isolate portions of pressurized mains.
2. In lieu of line stops, the use of existing valves may be used to isolate portions of the pipeline. Submit work plan showing existing valves to be closed to provide isolation. Review of plan will be conducted by Engineer and Utility to determine affected area. In no case will service to residences and businesses affected by the isolation be allowed to be interrupted by more than 1 hour.
3. Line stops shall be completed while the pipelines are pressurized.
4. Line stops shall consist of a line stop fitting, stopping valve, blind flange for installation after stop is completed, and 1-inch equalization/purge fitting.
5. Provide additional pipe restraining in the vicinity of the line stop for preventing pipe movement due to any unbalanced forces created by the line stop and subsequent cutting and removal of existing pipe adjacent to any line stop.
6. In the event a pressurized potable water pipeline that will remain in service loses pressure to less than 20 psi, disinfect the water main and submit bacteriological test results to the Florida Department of Environmental Protection. Satisfactory test results are required to be submitted for tests conducted on two consecutive days.

- B. Pipe Cutting and Plugging:
1. Cut all pipe as necessary. Cut sections of pipe shall be cleared and smoothed. The contents of the pipe are to be removed and disposed as allowed by local rules and regulations.
 2. Plug ends of pipe to remain in accordance with the following:
 - a. Remaining pressurized pipe - install ductile iron plug fitting. Install restraining devices to prevent pipe movement.
 - b. Remaining non-pressurized pipe - grout ends of pipe or install ductile iron cap fitting.
- C. Pipeline Abandonment: Limits of removal and/or abandonment (take out of service) shall be in accordance with information shown on the Drawings. Abandonment shall be in accordance with the following:
1. Pipes under roadways or less than five feet from the edge of pavement, 2-inches and larger, shall be fully grouted along entire length. Pipe sizes less than 2-inches shall be capped or grouted at the ends of the pipe.
 2. Pipes outside of roadways five feet or greater from the edge of pavement, 2-inches and larger, shall be fully grouted along entire length. Pipes sizes less than 2 inches shall be capped or grouted at the ends of the pipe. All ductile iron pipes shall be capped or grouted at the ends of the pipe.
- D. Pipeline Grouting:
1. 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.
 2. 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.
 3. 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".
 4. 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.

5. One set of the 3 inch x 6 inch sample test cylinders shall be made for each grout mix preparation.
6. After the ends of each section of pipe are exposed, the entire space, not to exceed 500 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.
7. 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.
8. The pump used for grouting shall be a continuous flow positive displacement model with a pugmill type mixing vat having a minimum shaft speed of 60 rpm and incorporated as an integral part of the equipment. Alternate equipment may be used subject to the approval of the Engineer. The rate of pumping shall not exceed 6 cubic feet per minute.

E. Restoration

1. All areas disturbed as a result of pipeline removal and abandonment shall be restored to equal or better condition than the existing condition.

3.03 FIELD QUALITY CONTROL

- A. The quality of the grout, application of the equipment and installation techniques is 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.
- B. Contractor shall coordinate with the Owner to shut-off all system valves. Only the Owner's staff may operate valves. All valves shall be shut-off and service(s) or other feeds off of the existing piping must be verified for all customers in the affected area prior to grout being injected.

END OF SECTION



CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES

ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33022
Phone (954) 921-3930 Fax (954) 921-3591

ADDENDUM NO. 5 (19-7100)

Date: **December 7, 2020**

FOR: **Hallandale Beach Force Main and Large User Meter LUM-07**

FILE NUMBER: **19-7100**

ALL BIDDERS BE ADVISED OF THE FOLLOWING CHANGES TO THE ABOVE REFERENCED PROJECT AS LISTED BELOW:

This addendum is issued as part of the Bidding Documents for the above described project. The changes incorporated in this addendum shall be considered as a part of the documents and shall supersede, amend, add to, clarify, or subtract from those conditions shown in the original documents dated September 2020. The bidder shall coordinate all modifications herein with all trades and disciplines related to the work. The Bidder shall acknowledge receipt of this addendum by addendum number and date on Section 00300, "Proposal". **Failure to do so may subject Bidder to disqualification.**

Item 1: Correction on the Bids Submittal Date

Sealed bids shall be **submitted to the City Clerk's Office** (City Hall, 2600 Hollywood Blvd., Room 221) of the City of Hollywood, Florida, **until 2:00 p.m.**, local time, **December 15, 2020**. On **December 15, 2020 at 2:30 p.m.** the bids will be opened and read publicly outside of Building A at Southern Regional Wastewater Treatment Plant, located at 1621 N. 14th Avenue, Hollywood, Florida.

ALL OTHER TERMS, CONDITIONS AND SPECIFICATIONS SHALL REMAIN THE SAME.

THIS ADDENDUM SHALL BE ATTACHED TO THE CONTRACT DOCUMENTS AND THE RECEIPT OF THE SAME SHALL BE NOTED IN THE PROPOSAL IN THE SPACE PROVIDED.

x 

Clece Aurelus, P.E., Engineering Support Services Manager
Department of Public Utilities – ECSD



**CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES**

ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33022
Phone (954) 921-3930 Fax (954) 921-3591

ADDENDUM NO. 6 (19-7100)

Date: **December 14, 2020**

FOR: **Hallandale Beach Force Main and Large User Meter LUM-07**

FILE NUMBER: **19-7100**

ALL BIDDERS BE ADVISED OF THE FOLLOWING CHANGES TO THE ABOVE REFERENCED PROJECT AS LISTED BELOW:

This addendum is issued as part of the Bidding Documents for the above described project. The changes incorporated in this addendum shall be considered as a part of the documents and shall supersede, amend, add to, clarify, or subtract from those conditions shown in the original documents dated September 2020. The bidder shall coordinate all modifications herein with all trades and disciplines related to the work. The Bidder shall acknowledge receipt of this addendum by addendum number and date on Section 00300, "Proposal". **Failure to do so may subject Bidder to disqualification.**

Item 1: Change Bid Opening Date

Sealed bids shall be **submitted to the City Clerk's Office** (City Hall, 2600 Hollywood Blvd., Room 221) of the City of Hollywood, Florida, **until 2:00 p.m.**, local time, **December 22, 2020**. On **December 22, 2020 at 2:30 p.m.** the bids will be opened and read publicly outside of Building A at Southern Regional Wastewater Treatment Plant, located at 1621 N. 14th Avenue, Hollywood, Florida.

Item 2: Revisions/Additions to Drawings and Details

Please refer to Exhibit 1 of this addendum for revised plan sheets:

- G-002
- C-201
- C-202
- C-203
- C-204

Item 3: Specifications Revisions

Replace the following technical specifications with those contained in Exhibit 2 of this addendum.

- Section 00301
- Section 01025

Item 4: Additional Bidder Questions



CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES

ENGINEERING AND CONSTRUCTION SERVICES DIVISION

1621 N. 14th Avenue
Hollywood, FL 33022
Phone (954) 921-3930 Fax (954) 921-3591

ADDENDUM NO. 6 (19-7100)

I. See below for questions received in email No. 1:

- 1) The plans do not clearly show where the 1500 LF of removal of existing 8" water main?
Response: The existing 8" water main was hatched for removal. Additional notes have been added to clarify further removal of existing 8" water main limits. Refer to revised sheets C-201 through C-204 in Exhibit 1 of this Addendum.
- 2) Plans show new water main by others, so is the 1500 LF of removal the old pipe being replaced by new one shown on the plans?
Response: Correct.
- 3) Item 13 is described in the specification as relocating a water main, is this the small portion on Pembroke Road?
Response: Correct.

II. See below for questions received in email No. 2:

- 1) Several of the plan sheets are notated in red in the bottom right corner that these plan sheets are "NOT FOR CONSTRUCTION" is it the intent of the city and engineer to have contractors submit pricing based on a unapproved for construction set of plan sheets?
Response: The plans provided are for bidding. The bid set will be updated prior to construction, incorporating any changes during the bidding, to create a conformed set, which will be utilized for construction.
- 2) The new proposed alignment of the 16" force main looks to be nearly un-constructable as shown in its current alignment. Has the engineer taken into account that the excavation and equipment space requirements to install the force main as shown in the revised plans? Has the City received approval or temporary construction easements along the alley way in the event portions of construction equipment have to operate on private property due to the width of the alley and keeping the excavator centered along the trench line?
Response: The proposed alignment for the 16" force main in the alleyway has been reviewed for constructability. The contractor is required to use smaller equipment and means and methods as necessary to construct the mains as shown. If temporary occupation of private property is needed, the contractor must secure temporary construction easements. In addition, all restoration costs must be included to ensure that the properties are restored to equal or better condition.
- 3) At Sta 11+65.36 the plans show the proposed 16" Force Main being routed under and existing gravity sewer main. What is the pipe material of this gravity sewer pipe and is it lined?



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ADDENDUM NO. 6 (19-7100)

Response: Replacement of portions of the existing gravity sewer piping, if necessary, are incidental to the force main construction and included in that pay item. Review pay item. The sewer is not lined.

- 4) At Sta 11+65.36 the plans show the proposed 16" Force Main being located approximately 1.4' laterally and 2.7' vertically below an existing gravity sewer manhole. Please provide details reflecting the intended Support of Excavation (SOE) which the engineer and city are requiring to prevent this structure from shifting during construction operations including the intended SOE for any subbase improvements associated with the manhole in question.

Response: It is the contractor's means and methods to protect and support the manhole.

- 5) At Sta 11+76.95 the plans show the proposed 16" Force Main crossing into the same alignment as the existing Watermain. Will this watermain be abandoned prior to the installation of the force main? Furthermore, throughout the alley the plans call for the proposed force main to be installed in close proximity to the existing water main. What is the pipe material type of this main, and has the city taken into account health code proximity/separation requirements in the alley area of work?

Response: Plans require the existing WM to be removed in the alleyway. Refer to revised sheets C-201 through C-204 in Exhibit 1 of this Addendum.

- 6) At Sta 12+41 the plans indicate that the contractor is to remove and replace a sanitary sewer lateral connecting a private structure to the existing gravity sewer. However, at this location the proposed force main and gravity sewer have similar flow lines. How does the city intend for contractor to maintain the required rate of fall on this lateral replacement to ensure proper flow and utilization?

Response: Force main deflection is acceptable so long as it meets the manufacturer's recommended requirements. Connect to existing lateral maintaining the existing slope.

- 7) At approximately Sta 13+70 to Sta 14+30 the plans call for the contractor to protect existing trees which are located less than 2' off the proposed force main. In order for the force main to be constructed these trees will have to be removed to allow for the required trench widths and equipment access. Is the property owner aware of this and what is the cities intent for how restoration is to be handled?

Response: Given the size of the existing trees, contractor can protect and support them. Alternatively, if the trees are impacted, contractor must remove and replace existing trees in kind and size per Section 01025. The contractor shall be responsible, with assistance from the City, to coordinate with property owner.



**CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES**

ENGINEERING AND CONSTRUCTION SERVICES DIVISION

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Phone (954) 921-3930 Fax (954) 921-3591

ADDENDUM NO. 6 (19-7100)

- 8) At Sta 14+97.21 the plans show the proposed 16" Force Main being routed under and existing gravity sewer main. What is the pipe material of this gravity sewer pipe and is it lined?

Response: See response to Question 3.

- 9) At Sta 14+97.21 the plans show the proposed 16" Force Main being located approximately 2.5' laterally and 2.7' vertically below an existing gravity sewer manhole. Please provide details reflecting the intended Support of Excavation (SOE) which the engineer and city are requiring to prevent this structure from shifting during construction operations including the intended SOE for any subbase improvements associated with the manhole in question.

Response: It is the contractor's means and methods to protect and support the manhole.

- 10) At Sta 14+24 the plans indicate that the contractor is to remove and replace a sanitary sewer lateral connecting a private structure to the existing gravity sewer. However, at this location the proposed force main and gravity sewer have similar flow lines. How does the city intend for contractor to maintain the required rate of fall on this lateral replacement to ensure proper flow and utilization?

Response: Force main deflection is acceptable so long as it meets manufacturer's recommended requirements. If the lateral is replaced, it must be replaced to its existing slope.

- 11) At Sta 15+80 the plans indicate that the contractor is to remove and replace a sanitary sewer lateral connecting a private structure to the existing gravity sewer. However, at this location the proposed force main and gravity sewer have similar flow lines. How does the city intend for contractor to maintain the required rate of fall on this lateral replacement to ensure proper flow and utilization?

Response: See response to Question 10.

- 12) At Sta 18+31.41 the plans show the proposed 16" Force Main being routed under and existing gravity sewer main. What is the pipe material of this gravity sewer pipe and is it lined?

Response: See response to Question 3.

- 13) At Sta 18+31.41 the plans show the proposed 16" Force Main being located approximately 2.5' laterally and 1.5' vertically below an existing gravity sewer manhole. Please provide details reflecting the intended Support of Excavation (SOE) which the engineer and city are requiring to prevent this structure from shifting during construction operations including the intended SOE for any subbase improvements associated with the manhole in question.

Response: See response to Question 9.



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ADDENDUM NO. 6 (19-7100)

14) At approximately Sta 20+52 the plans call for the contractor to protect existing trees which are located less than 2' off the proposed force main. In order for the force main to be constructed these trees will have to be removed to allow for the required trench widths and equipment access. Is the property owner aware of this and what is the cities intent for how restoration is to be handled?

Response: See response to Question 7.

15) At Sta 21+83.75 the plans show the proposed 16" Force Main being routed under and existing gravity sewer main. What is the pipe material of this gravity sewer pipe and is it lined?

Response: See response to Question 3.

16) At Sta 21+83.75 the plans show the proposed 16" Force Main being located approximately 2.5' laterally and 2.5' vertically below an existing gravity sewer manhole. Please provide details reflecting the intended Support of Excavation (SOE) which the engineer and city are requiring to prevent this structure from shifting during construction operations including the intended SOE for any subbase improvements associated with the manhole in question.

Response: See response to Question 9.

17) Has FDOT been made aware of the alignment shift of the proposed force main located within their right of way?

Response: Yes, permit application has been resubmitted.

18) What is the material of the existing water main we have to go under at approximately Sta 9+60 located in the FDOT Right of Way?

Response: The contractor to field verify material of existing water main. Current City GIS does not show material.

19) Has the city received permission from the property owner to remove the existing fence located on private property located at approximately Sta 12+00

Response: The contractor shall be responsible, with assistance from the City, to coordinate.

20) Has the city received permission from the property owner to remove the existing fence located on private property located at approximately Sta 13+75

Response: The contractor shall be responsible, with assistance from the City, to coordinate.

21) Has the city received permission from the property owner to remove the existing fence located on private property located at approximately Sta 14+25

Response: The contractor shall be responsible, with assistance from the City, to coordinate.



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ADDENDUM NO. 6 (19-7100)

22) Has the city received permission to remove the bushes and shrubs located at approximately Sta 18+50 from the private property owner to allow for construction of the force main, and how is this area to be restored?

Response: The contractor shall be responsible, with assistance from the City, to coordinate.

23) Has the city received permission from the property owner to remove the existing fence and bollards located on private property located at approximately Sta 21+25

Response: The contractor shall be responsible, with assistance from the City, to coordinate.

24) At Sta 17+50 the plans indicate that the contractor is to remove and replace a sanitary sewer lateral connecting a private structure to the existing gravity sewer. However, at this location the proposed force main and gravity sewer have similar flow lines. How does the city intend for contractor to maintain the required rate of fall on this lateral replacement to ensure proper flow and utilization?

Response: See response to Question 3.

III. See below for questions received in email No. 3:

1) Addendum 4 added bid item 13 in which the measurement and payment references "payment for all labor, equipment and materials for all work necessary and required for WM and fittings adjustments Shown In The Plan"; however, the plans provided in addendum 4 does not show this scope of work. The material supply companies nor can the contractors can provide a price for this item without knowing what adjustments are required. Also, bid item 14 states removal of 1500 LF of existing water main; however, the plans provided does not show this scope of work. The contactors can not provide an accurate price without know where the existing WM to be removed is located.

Response: Callouts were provided for linestop, bends, rotated tee, DIP LF, and connection to existing gate valve in the intersection of Pembroke Road and S 18th Ct. Please refer to sheet C-201.

IV. See below for questions received in email No. 4:

1) Please clarify new Bid Item 14 in addendum # 4, is the water main to be removed an asbestos cement pipe? If yes, this will require a specialized contractor that is certified in asbestos removal to handle this removal and proper disposal.

Response: Water main material is not known. Requirements for asbestos cement (AC) pipe are included in the contract documents.



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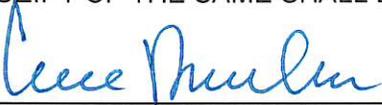
ADDENDUM NO. 6 (19-7100)

- 2) What are the limits of this removal and are any connected stubs to remain clearly shown on plans to be capped?

Response: Limits of the removal of existing water main are shown and now called out in the plans. Please refer to sheets C-201 to C-204. Any additional caps necessary for removal are incidental to the LF cost of the removed water main and must be provided by the contractor.

ALL OTHER TERMS, CONDITIONS AND SPECIFICATIONS SHALL REMAIN THE SAME.

THIS ADDENDUM SHALL BE ATTACHED TO THE CONTRACT DOCUMENTS AND THE RECEIPT OF THE SAME SHALL BE NOTED IN THE PROPOSAL IN THE SPACE PROVIDED.

x 

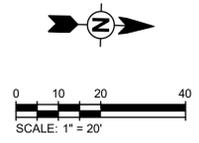
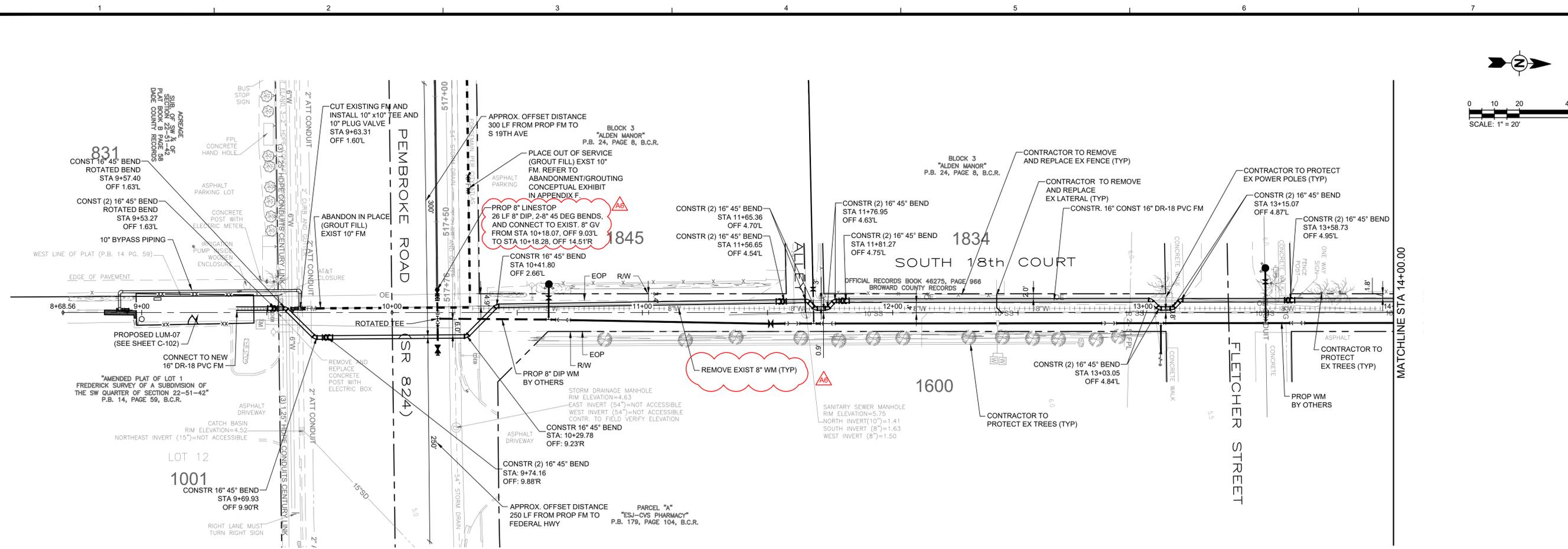
Clece Aurelus, P.E., Engineering Support Services Manager
Department of Public Utilities – ECSD

EXHIBIT 1

LIST OF STANDARD ABBREVIATIONS

ABBREVIATION	ABBREVIATED TERM	ABBREVIATION	ABBREVIATED TERM	ABBREVIATION	ABBREVIATED TERM	ABBREVIATION	ABBREVIATED TERM
A	AAP ALARM ANNUNCIATOR PANEL	E	EAST	M	METER	S	SOUTH
AARV	AUTOMATIC AIR RELEASE AIR VALVE	EA	EACH	MAINT	MAINTAIN OR MAINTENANCE	SA	SAMPLE
AAV	AUTOMATIC AIR VENT	ECC	ECCENTRIC	MAN	MANUALLY	SAN	SANITARY
AB	ANCHOR BOLT	EF	EACH FACE	MAS	MASONRY	SCHED	SCHEDULE
ABAN	ABANDON(ED)	EFF	EFFLUENT	MATL	MATERIAL	SC	SECTION CORNER
ABRSV	ABRASIVE	E	EASEMENT LINE	MAX	MAXIMUM	SD	STORM DRAIN
ABS	ACRYLONITRILE BUTADIENE STYRENE	EL	ELEVATION	MB	MAILBOX	SE	SOUTHEAST
ABV	ABOVE	ELAST	ELASTOMERIC	ME	MOTOR CONTROL CENTER	SECT	SECTION
AC	ALTERNATING CURRENT	ELEC	ELECTRICAL	MCC	METERED END	SEFF	SECONDARY EFFLUENT
ACMP	ASPHALT-COATED CORRUGATED METAL PIPE	EM	ELECTRIC METER	ME	METERED END	SF	SQUARE FOOT OR FEET
ACP	ASBESTOS CEMENT PIPE	EMER	EMERGENCY	MECH	MECHANICAL	SH	SPRINKLER HEAD
ADDM	ADDENDUM	ENC	ENCASEMENT	MEG	MATCH EXISTING GRADE	SHT	SHEET(ED)(ING)
ADH	ADHESIVE	ENGR	ENGINEER	MFR	MANUFACTURE(R)	SIG	SIGNAL
AF	ABOVE FINISHED FLOOR	EP	EDGE OF PAVEMENT	MG	MILLION GALLONS	SIM	SIMILAR
AFG	ABOVE FINISHED GRADE	EPDM	ETHYLENE PROPYLENE DIENE MONOMER	MGD	MILLION GALLONS PER DAY	SL	SLUDGE
AFS	ABOVE FINISHED SLAB	EPRF	EXPLOSION PROOF	MH	MANHOLE	SLV	SLEEVE
AHD	AHEAD	EQUIP	EQUIPMENT	MI	MILES	SM	SHEET METAL
AL	ALUMINUM	ER	ECCENTRIC REDUCER	MIN	MINIMUM	SOLN	SOLUTION
ALT	ALTERNATE	ESMT	EASEMENT	MIN	MINUTE(S)	SP	SPACE(ING)
AMP	AMPERE	EST	ESTIMATE(D)	MISC	MISCELLANEOUS	SPC	SPECIFICATION
AMT	AMOUNT	ET	ELECTRIC TRANSFORMER	ML	MIXED LIQUOR	SPIG	WATER SPIGOT
ANT	ANTENNA	EW	EACH WAY	MO	MASONRY OPENING	SPT	SUPPORT
APRX	APPROXIMATE(LY)	EXC	EXCAVATE	MON	MONUMENT	SS	SANITARY SEWER
ARCH	ARCHITECTURAL	EXP	EXPANSION	MPT	MALE PIPE THREAD	SSE	SUBSTANDARD EFFLUENT
AS	ALUM SOLUTION	EXST	EXISTING	MS	MOTOR STARTER	SST	STAINLESS STEEL
ASPH	ASPHALT	EXST GR	EXISTING GRADE	MSP	MOTOR STARTER PANEL	STA	STATION
ASSY	ASSEMBLY	EXT	EXTERIOR	MTD	MOUNTED	STD	STANDARD
ATJ	AUTOMATIC TRANSFER SWITCH	EXTN	EXTENSION	MV	MOTORIZED VALVE	STK	STACK
AVE	AVENUE	F	FOUND	MWP	MAXIMUM WORKING PRESSURE	STL	STEEL
A/C	AIR CONDITIONING	FAB	FABRICATE(D)	MWL	MEAN WATER LEVEL	STR	STRAIGHT
AVV	AIR/VACUUM AIR VALVE	FAC	FLANGED ADAPTER COUPLING	N	NORTH	STRUCT	STRUCTURAL
B	BAFFLE	FAC	FLANGED ADAPTER COUPLING	ND	NAIL & DISK	SURF	SURFACE
BAF	BAFFLE	FB	FLAT BAR	NL	NAIL	SV	SANITARY SEWER VALVE
BCV	BALL CHECK VALVE	FCV	FLOW-CONTROL VALVE	NE	NORTHEAST	SVCE	SERVICE
BCR	BROWARD COUNTY RECORDS	FD	FLOOR DRAIN	NE	NORTHWEST	SW	SOUTHWEST
BF	BLIND FLANGE	FDN	FOUNDATION	NL	NAIL	SWD	DEPTH
BFV	BUTTERFLY VALVE	FE	FILTER(ED) EFFLUENT	NR	NON-RISING SYSTEM	SWH	SURFACE WASH
BFP	BACKFLOW PREVENTER	FF	FINISHED FLOOR	NS	NORTH	SYM	SYMBOL
BHP	BRAKE HORSEPOWER	FH	FIRE HYDRANT	NO	NOT IN CONTRACT	SYM	SYMMETRICAL
BI	BLACK IRON	FO	FIBER OPTIC	NO	NUMBER	SW	SIDEWALK
BITUM	BITUMINOUS OR BITUMASTIC	FIG	FIGURE	NOM	NOMINAL	T	TANGENT
B	BUILDING	FIN	FINISH FLOOR	NOM	NOMINAL	TAN	TANGENT
BLK	BLACK	FIN FL	FINISH FLOOR	NPF	NATIONAL PIPE THREAD	TB	TELEPHONE RISER
BM	BENCH MARK	FIN GR	FINISH GRADE	NPT	NATIONAL PIPE TAPER (THREAD)	TBM	TEMPORARY BENCH MARK
BOC	BACK OF CURB	FL	FLORIDE	NPW	NON-POTABLE WATER	TB-xx	TEST BORING-xx (e.g. TB-1)
BO	BOTTOM	FLG	FLANGED	NRS	NON-RISING SYSTEM	TD	TRENCH DRAIN
BP	BASE PLATE	FLG	FLANGED	NT	NOT TO SCALE	TDH	TOTAL DYNAMIC HEAD
BRG	BEARING	FLTR	FILTER	NW	NORTHWEST	TE	TOTALLY ENCLOSED
BSP	BLACK STEEL PIPE	FM	FORCE MAIN	N/A	NOT APPLICABLE	TEFC	TOTALLY ENCLOSED FAN COOLED
BV	BOTH WAYS	FPK	FOUND P/K NAIL & DISK	O	OXYGEN	TELV	TOTALLY ENCLOSED NON-VENTILATED
BWV	BACKWASH WATER	FRP	FIBERGLASS REINFORCED PLASTIC	O2	OXYGEN	THK	THICKNESS
C	CAPACITY	FT	FOOT OR FEET	OD	OUTSIDE DIAMETER	TLM	TOP OF CURB
CAP	COMPRESSED AIR	FUT	FUTURE	ODP	OPEN DRIP PROOF	TOT	TOTAL
CAV	COMBINATION AIR VALVE	FW	FINISHED WATER	OF	OUTSIDE FACE	TP	TRAVERSE POINT
CB	CATCH BASIN	FWP	FACTORY WIRED PANEL	OHV	OVER HEAD WIRE	TOS	TOP OF SLOPE
CCC	CHLORINATED EFFLUENT	F/F	FACE TO FACE	OPT	OPPOSITE	TOT	TOTAL
CE	CHLORINATED EFFLUENT	G	GAS	O.R.B.	OFFICIAL RECORDS BOOK	TS	THICKENED SLUDGE
CFM	CUBIC FEET PER MINUTE	GA	GAGE	OSY	OPERATION AND MAINTENANCE	TSC	TRAFFIC SIGNAL CONTROL
CFS	CUBIC FEET PER SECOND	GAL	GALLON(S)	O&M	OPERATION AND MAINTENANCE	TSP	TRAFFIC SIGNAL POLE
CI	CHECK VALVE	GALV	GALVANIZED	P	PER PLAT	TV	TELEVISION
CI	CAST IRON	GALV	GALVANIZED	PI	PROCESS AIR	TV	TELEVISION
CIP	CAST IRON PIPE	GALV	GALVANIZED	PA	PROCESS AIR	T&B	TOP AND BOTTOM
CISP	CAST IRON SOIL PIPE	GALV	GALVANIZED	PB	PLAT BOOK	U	UNDERDRAIN
CJ	CONSTRUCTION JOINT	GAS	GAS METER	PC	POINT OF CURVE	UE	UNDERGROUND UTILITY LINES
CKT	CIRCUIT	ND	NATURAL GAS	PCM	PERMANENT CONTROL MONUMENT	UEC	UNDERGROUND ELECTRIC CABLE
CL	CENTER LINE	GND	GROUND	PE	PLAIN END	UG	UNDERGROUND
CL2	CHLORINE GAS	GPD	GALLONS PER DAY	PG	PRESSURE GAGE	UL	ULTIMATE
CLF	CHAIN LINK FENCE	GPH	GALLONS PER HOUR	PI	POINT OF INTERSECTION	UN	UNION
CLR	CLEAR OR CLEARANCE	GPM	GALLONS PER MINUTE	PK	PLATE	UNOT	UNLESS OTHERWISE NOTED
CLVT	CULVERT	GPM	GALLONS PER MINUTE	PL	PLATE	UTC	UNDERGROUND TELEPHONE CABLE
CM	CONCRETE MONUMENT	GPT	GALLONS PER TON	PL	PLATE	UTD	UNDERGROUND TELEPHONE DUCT
CMP	CORRUGATED METAL PIPE	GRTG	GRATING	PL	PLATE	UTL	UTILITY
CMPA	CORRUGATED METAL PIPE ARCH	GS	GALVANIZED STEEL	PL	PLATE	V	VOLT(S)
CMU	CONCRETE MASONRY UNIT	GSP	GALVANIZED STEEL PIPE	PL	PLATE	VAC	VACUUM
CND	CONDUIT	GSR	GROUND STORAGE RESERVOIR	PL	PLATE	VAR	VARIABLE
CNR	CORNER	GST	GROUND STORAGE TANK	PL	PLATE	VC	VERTICAL CURVE
CO	CLEAN OUT	GT	GATE VALVE	PL	PLATE	VCP	VITRIFIED CLAY PIPE
CO2	CARBON DIOXIDE	H	HOSE BIBB	PL	PLATE	VEL	VELOCITY
COAG	COAGULANT	HB	HOSE BIBB	PL	PLATE	VERT	VERTICAL
COL	COLUMN	HD	HEAVY-DUTY	PL	PLATE	VFD	VARIABLE FREQUENCY DRIVE
COM	COMMON	HDD	HORIZONTAL DIRECTIONAL DRILL	PL	PLATE	VOL	VOLUME
CONC	CONCRETE	HDPE	HIGH-DENSITY POLYETHYLENE	PL	PLATE	W	WATER
CONN	CONNECTION	HDR	HYDRAULIC	PL	PLATE	WAS	WASTE ACTIVATED SLUDGE
CONSTR	CONSTRUCTION	HGR	HANGER	PL	PLATE	WCD	WALL CLEAN OUT
CONT	CONTINUOUS	HGT	HEIGHT	PL	PLATE	WF	WIDE FLANGE
CONTR	CONTRACT(OR)	HNDRL	HAND RAIL	PL	PLATE	WH	WOODEN HUB
COORD	COORDINATE	HGA	HAND-OPERATED AUTO	PL	PLATE	WL	WATER LINE
CO	COMPANY	HORIZ	HORIZONTAL	PL	PLATE	WM	WATER MAIN
CP	CONCRETE PIPE	HP	HORSEPOWER	PL	PLATE	WP	WATER PROOF(ING)
CPA	CONCRETE PIPE ARCH	HPA	HIGH PRESSURE AIR	PL	PLATE	WSP	WATER SURFACE
CPLG	CORRUGATED PLASTIC PIPE	HR	HOUR	PL	PLATE	WT	WEIGHT
CPVC	CHLORINATED POLYVINYL CHLORIDE	HVAC	HEATING, VENTILATION, AND AIR CONDITIONING	PL	PLATE	WW	WATER TREATMENT PLANT
CR	CONCENTRIC REDUCER	HWL	HIGH WATER LEVEL	PL	PLATE	WWV	WASH WATER
CS	CHLORINE SOLUTION	HWH	HIGH WATER LEVEL	PL	PLATE	WWF	WELDED WIRE FABRIC
CSG	CASING	HWY	HIGHWAY	PL	PLATE	WWT	WASTEWATER TREATMENT PLANT
CTV	CABLE TELEVISION	HZ	HERTZ	PL	PLATE	W/	WITH
CY	CUBIC YARD	I	INSIDE DIAMETER	PL	PLATE	W/O	WITHOUT
CYL	CYLINDER	ID	INSIDE DIAMETER	PL	PLATE	X	TRANSFER
C&G	CURB AND GUTTER	IN	INCHES	PL	PLATE	XC	X CUT
C/C	CENTER TO CENTER	INF	INFILTRANT	PL	PLATE	Y	YARD(S)
D	DATUM	INT	INTERSECTION	PL	PLATE	YH	YARD HYDRANT
DBL	DOUBLE	INTR	INTERIOR	PL	PLATE	YR	YEAR(S)
DC	DIRECT CURRENT	INVT	INVERT	PL	PLATE	R	RADIUS
DCDA	DOUBLE CHECK DETECTOR ASSEMBLY	IP	IRON PIPE	PL	PLATE	RAS	RETURN ACTIVATED SLUDGE
DEMO	DEMOLITION	IPS	INTERNATIONAL PIPE STANDARD	PL	PLATE	RC	REINFORCED CONCRETE
DEPT	DEPARTMENT	IR	INTERNAL RECYCLE	PL	PLATE	RCB	REINFORCED CONCRETE BOX
DESC	DESCRIPTION	IRRV	IRRIGATION VALVE	PL	PLATE	RCF	REINFORCED CONCRETE PIPE
DET	DETAIL	IRW	IRRIGATION WATER	PL	PLATE	RCPA	REINFORCED CONCRETE PIPE ARCH
DH	DIESEL FUEL	J	JUNCTION BOX	PL	PLATE	RD	REDUCER
DH	DRILL HOLE	JB	JUNCTION BOX	PL	PLATE	REBAR	REINFORCING STEEL
DI	DUCTILE IRON	JB	JUNCTION BOX	PL	PLATE	REF	REFERENCE
DIA	DIAMETER	JB	JUNCTION BOX	PL	PLATE	REINF	REINFORCE(D)(ING)(MENT)
DIF	DIFFUSER	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DIM	DIMENSION	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DIP	DUCTILE IRON PIPE	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DISCH	DISCHARGE	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DIR	DIRECTION	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DMH	DROP MANHOLE	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DN	DOWN	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DR	DRAIN	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DV	DIAPHRAGM VALVE	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DW	DRIVEWAY	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DWG	DRAWING	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
DWV	DRAIN, WASTE, AND VENT	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EAST	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EACH	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ECCENTRIC	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EACH FACE	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EFFLUENT	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EASEMENT LINE	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ELEVATION	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ELASTOMERIC	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ELECTRICAL	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ELECTRIC METER	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EMERGENCY	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ENCASEMENT	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ENGINEER	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EDGE OF PAVEMENT	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ETHYLENE PROPYLENE DIENE MONOMER	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EXPLOSION PROOF	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EQUIPMENT	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ECCENTRIC REDUCER	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EASEMENT	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ESTIMATE(D)	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	ELECTRIC TRANSFORMER	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EACH WAY	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EXCAVATE	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EXPANSION	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EXISTING	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EXISTING GRADE	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EXTERIOR	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
E	EXTENSION	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
F	FOUND	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
F	FABRICATE(D)	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
F	FLANGED ADAPTER COUPLING	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
F	FLAT BAR	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
F	FLOW-CONTROL VALVE	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
F	FLOOR DRAIN	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
F	FOUNDATION	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
F	FILTER(ED) EFFLUENT	JB	JUNCTION BOX	PL	PLATE	REIN	REINFORCE(D)(ING)(MENT)
F	FINISHED FLOOR	JB	JUNCTION BOX	PL	PLATE	REIN</	

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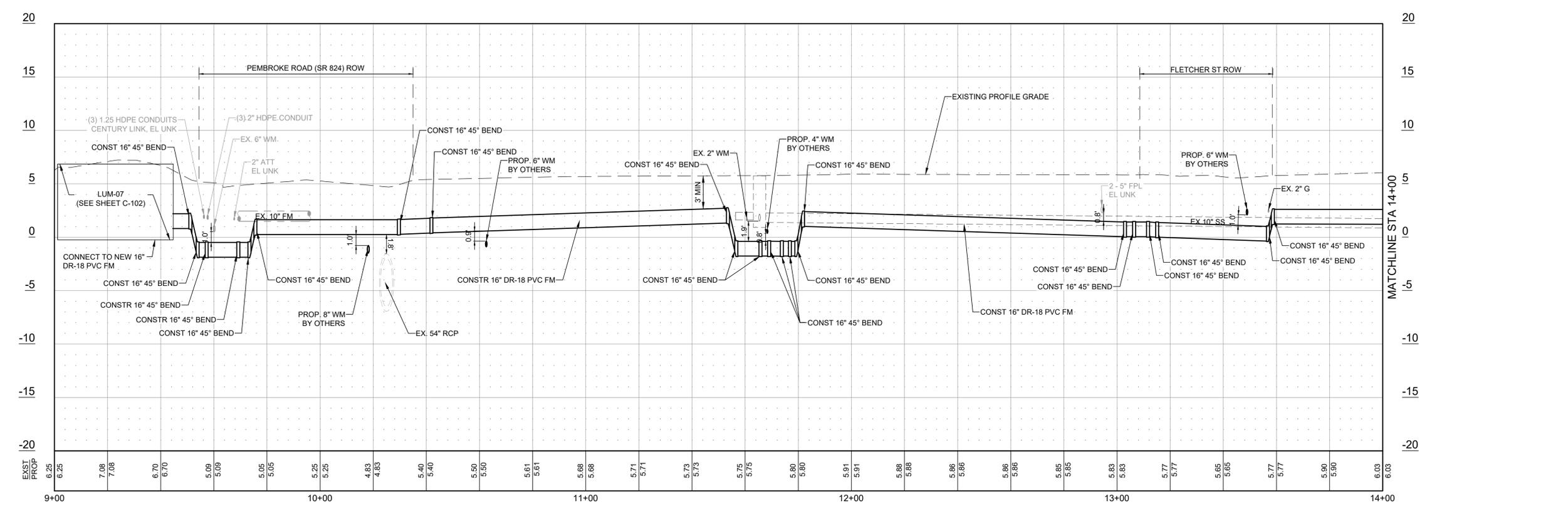


TETRA TECH
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 PHONE: (954) 364-1753

JANINE M. ALEXANDER, P.E.
 P.E. No. 59244, FL

DATE

CITY OF HOLLYWOOD FLORIDA



PROFILE SOUTH 18TH COURT
 SCALE: HORIZ: 1" = 20' VERT: 1" = 5'

NOT FOR CONSTRUCTION

MARK	DATE	DESCRIPTION
A1	10/29/20	ADDENDUM 1 DESIGN MODS
A4	12/03/20	ADDENDUM 4 DESIGN MODS
A6	12/11/20	ADDENDUM 6 CALLOUTS ADDED

CITY OF HOLLYWOOD
 REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER - LUM 07

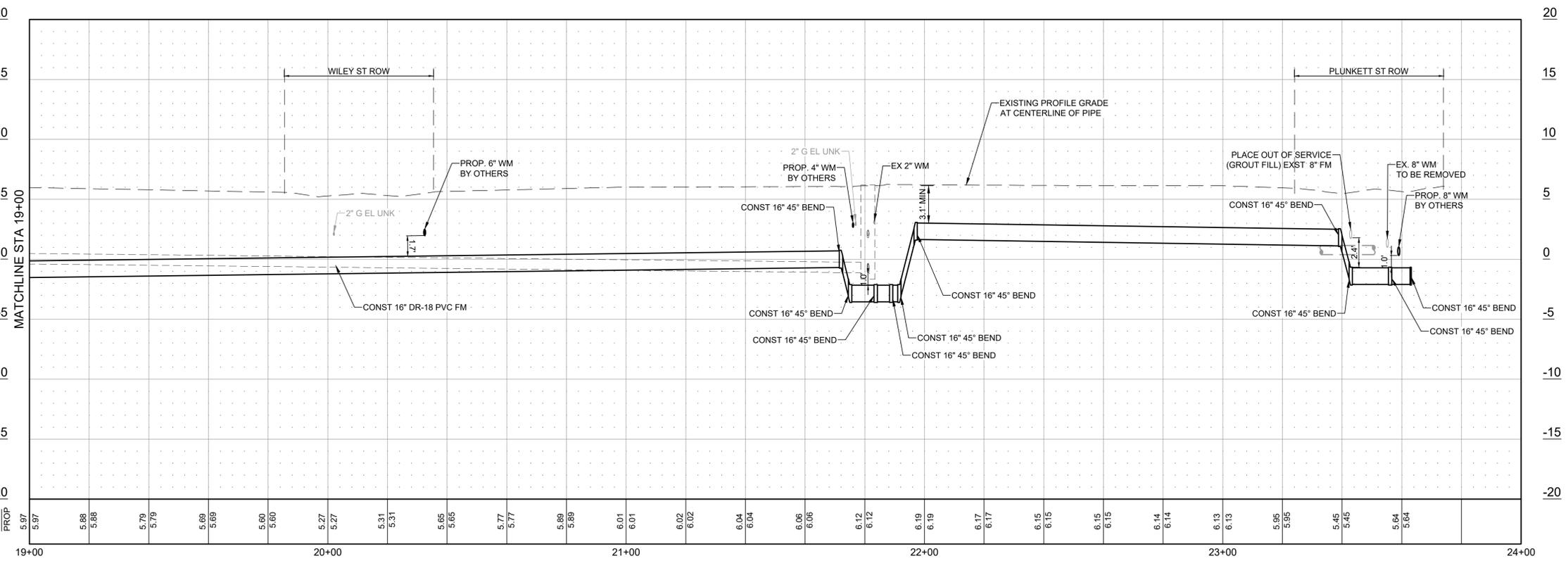
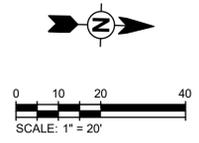
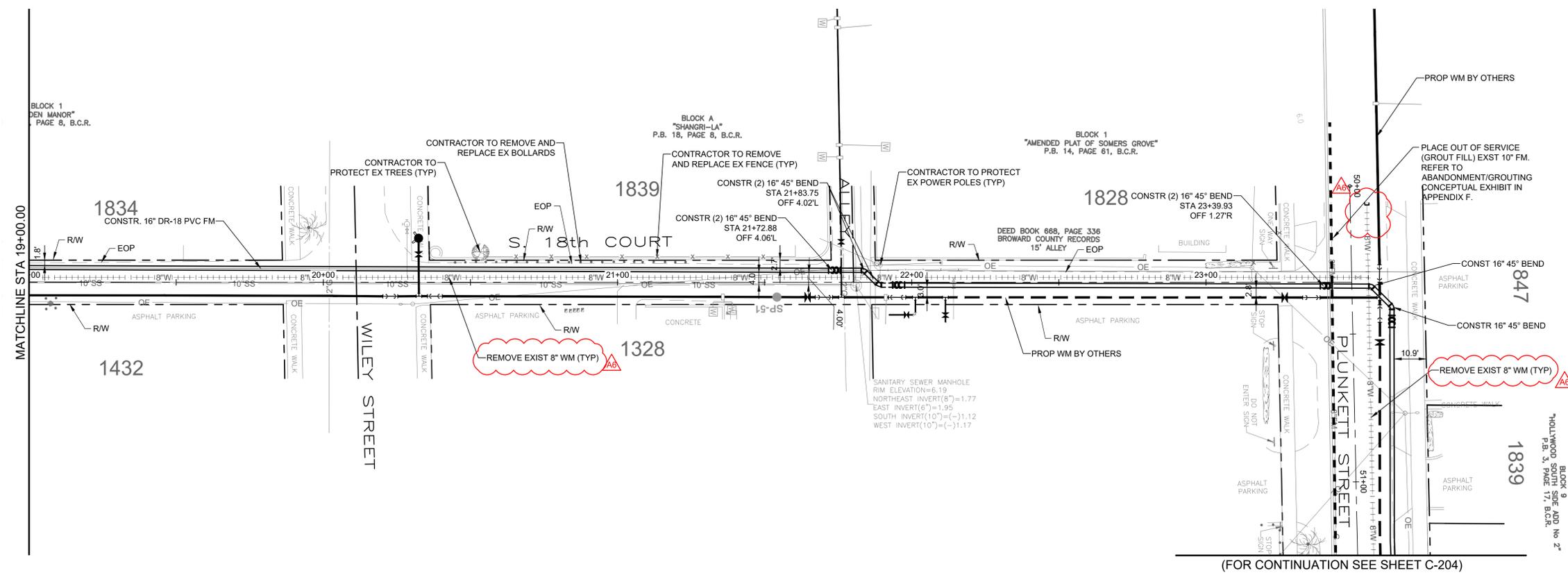
SOUTH 18TH COURT PLAN AND PROFILE

Project No.: 200-16428-19001
 Designed By: JMA
 Drawn By: TMB/MM
 Checked By: JMA/KC

C-201
 Bar Measures 1 inch

Copyright: Tetra Tech

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PROFILE SOUTH 18TH COURT
SCALE: HORIZ: 1" = 20' VERT: 1" = 5'

NOT FOR CONSTRUCTION

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P.E. No. 59244, FL
DATE

CITY OF HOLLYWOOD
FLORIDA

MARK	DATE	DESCRIPTION
A4	12/03/20	ADDENDUM 4, DESIGN MODS
A6	12/11/20	ADDENDUM 6, DESIGN MODS AND CALLOUTS ADDED

CITY OF HOLLYWOOD
REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER - LUM 07
**SOUTH 18TH COURT
PLAN AND PROFILE**

Project No.: 200-16428-19001
Designed By: JMA
Drawn By: TM/BMM
Checked By: JMA/KC

C-203

Copyright: Tetra Tech

Bar Measures 1 inch

EXHIBIT 2

SECTION 00301
CITY OF HOLLYWOOD
DEPARTMENT OF PUBLIC UTILITIES
ENGINEERING & CONSTRUCTION SERVICES DIVISION
PROPOSAL BID FORM

Project Name: Replacement of Hallandale Beach Force Main and Large User Meter - LUM 07
Project No.: 19-7100

If this Proposal is accepted, the undersigned Bidder agrees to complete all work under this contract within **274 calendar days** following the issuance of the Notice to Proceed. All entries on this form must be typed or written in block form in ink.

BASE BID:

<u>No.</u>	<u>Description</u>	<u>Qty.</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total</u>
1	Mobilization, Bonds and Insurance	1	LS	_____	_____
2	Demobilization	1	LS	_____	_____
3	Maintenance of Traffic (MOT)	1	LS	_____	_____
4	Furnish and Install 16-inch DR-18 PVC Force Main	3,740	LF	_____	_____
5	Furnish and Install 20-inch DR-11 HDPE Force Main via Horizontal Directional Drill (HDD)	560	LF	_____	_____
6	Furnish and Install Plug Valves with Boxes (Various Sizes)				
6a	10-inch Plug Valves with Boxes	2	EA	_____	_____
6b	16-inch Plug Valves with Boxes	5	EA	_____	_____
7	Furnish and Install 4" Air Release Valve Assembly in Manhole	1	EA	_____	_____
8	Place Out of Service (Grout) Existing Force Mains (Various Sizes)	4,900	LF	_____	_____
9	Furnish and Install 30-inch Line Stop	1	EA	_____	_____
10	Furnish and Install 10-inch Tee	2	EA	_____	_____
11	Furnish and Install 16-inch x 30-inch Reducer	1	EA	_____	_____
12	LUM-07 Site Improvements	1	LS	_____	_____
13	Water Mains and Fittings Adjustments	1	LS	_____	_____
14	Remove Existing 8" Water Mains	1,620	LF	_____	_____
15	Milling and Resurfacing of 1.5" of Asphalt Pavement within FDOT Roadways	302	SY	_____	_____
16	Milling & Resurfacing of 1" of Asphalt Pavement within City of Hollywood Roadways	3,204	SY	_____	_____
17	Temporary Asphalt Restoration	3,124	LF	_____	_____
18	Furnish and install Temporary Pavement Markings	1	LS	_____	_____
19	Replacement of Permanent Pavement Markings	1	LS	_____	_____
20	Removal and Replacement of Concrete Sidewalk	326	SY	_____	_____
21	Removal and Replacement of Concrete Curb and/or Gutter	100	LF	_____	_____
22	Alley Reconstruction	2,156	SY	_____	_____
23	Owner's Contingency (allowance)	1	LS	\$250,000	\$250,000
24	Consideration for Indemnification	1	LS	\$10	\$10
25	Density Testing (allowance)	1	LS	\$50,000	\$50,000
26	FPL (allowance)	1	LS	\$50,000	\$50,000
27	Permits, Licenses and Fees (allowance)	1	LS	\$50,000	\$50,000
28	As-Builts and Record Drawings (By land surveyor approved by City or EOR)	1	LS	\$20,000	\$20,000
BASE BID TOTAL FOR COMPLETE PROJECT					_____

TOTAL BASE BID IN WRITING

NOTES:

- SUBSTANTIAL COMPLETION TIME AND PROJECT CLOSEOUT TIME FOR THE CONTRACT SHALL BE AS DEFINED IN THE PROJECT SCHEDULE IN THE SUPPLEMENTARY GENERAL CONDITIONS (SGC'S).
- QUANTITIES PROVIDED ARE FOR INFORMATION PURPOSES. FULL DESCRIPTION OF THE PAY ITEMS ARE PROVIDED IN SECTION 01025 "BASIS OF PAYMENT"

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 Department 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 Department. 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, he shall include the cost for that work in the last Bid Item for each construction package so that his proposal for the project does reflect his total price for completing the work in its entirety.
- F. The Contractor shall submit, with each Payment Request, a list of M/WBE Subcontractors that he is or will be utilizing for his contract. For each M/WBE Subcontractor, the following information shall be provided:
 - 1. Total sub-contract dollar amount.
 - 2. Amount paid to date.

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 01300, unless otherwise specified. A representative of the City shall witness all field measurements.

1.03 PAYMENT ITEMS

For purposes of describing items appearing in the Proposal Bid Form, pricing for each item shall include work and components described below:

- A. **Item No. 1 – Mobilization, Bonds, and Insurance** - The lump sum price for this item shall be full compensation for all mobilization/demobilization activities, including but not limited to bonds, insurance, transport of personnel, materials, equipment, and other incidentals to the site, preparation of submittals including schedule, permit packages, and others, temporary facilities and offices, safety equipment and first aid supplies, project signs including procurement, installation, and removal at the end of the project (City approved signs and locations), field surveys, sanitary and other temporary facilities required by the specifications, audio-video documentation of the existing site, any space required for staging, laydown, survey, storage, parking, etc.; preparation and submittal of shop drawings, preparation of a certified Stormwater Pollution Prevention Plan (SWPP) and BMPs 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, and removing the erosion and sedimentation control devices including but not limited to, turbidity barriers, synthetic hay bales, silt fencing, etc., necessary to comply with NPDES requirements, dewatering, groundwater sampling, treatment and disposal, all contamination permitting and compliance, and dewatering permit applications preparation, all fees and all permitting; and all other activities necessary for complete mobilization/demobilization requirement for the contract. **Pay Item No. 1 shall not exceed 3% of the sum of Bid Items Nos. 4 through 22.**

B. **Item No. 2 – Demobilization** - The lump sum price for this item shall be full compensation for all demobilization activities, including but not limited to transport of personnel, materials, equipment, and other incidentals to the site, preparation of submittals including schedule, permit packages, and others, temporary facilities and offices, safety equipment and first aid supplies, project signs including procurement, installation, and removal at the end of the project (City approved signs and locations), field surveys, sanitary and other temporary facilities required by the specifications, audio-video documentation of the existing site, any space required for staging, laydown, survey, storage, parking, etc.; preparation and submittal of shop drawings; and all other activities necessary for complete demobilization requirement for the contract. **Pay Item No. 2 shall not exceed 2% of the sum of Bid Items Nos. 4 through 22.**

C. **Item No. 3 – Maintenance of Traffic (MOT)** - Payment for all labor for the design and preparation of signed and sealed (FL Professional Engineer with Advanced MOT Certification) phased and detailed MOT plans, non-standard work hours or evening or weekend hours, all submittals and permitting through various regulatory agencies having jurisdiction over the ROW limits, MOT coordination with other stakeholders or Contractors for adjacent or other work within the work limits, lane closure submittals and approvals, traffic studies, flagman, police, all MOT pavement markings and striping, and installation and removal and/or relocations and maintenance of phased traffic control devices for the duration of the project and to final completion per applicable authority having jurisdiction regarding MOT (vehicular, pedestrian, etc.).

D. **Items No. 4 - Furnish and Install 16-inch DR-18 PVC Force Main** - Payment for all labor, pipe, equipment and material for all work necessary and required the installation of new force mains and associated stub outs and connections or reconnections as shown on the plans. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thicknesses, locating, protection and support of all existing utilities, **temporary utility construction easements**, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, removal and replacement of existing gravity sewer piping with SDR 26 PVC piping and rigid couplings when in close proximity to new force main piping installation, tree and shrub protection, palm and tree removal and replacement, tree trimming or pruning, signage and mailbox protection, removal and replacement, fencing and gate protection and removal and replacement; Replacement of impacted traffic, signalization, and street lighting lines; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; hiring of

power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), removing and replacing fences, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, and bracing (all types required for underwater and/or canal crossings), piping of various materials and types, polyethylene encasement for all domestic ductile iron pipe and fittings, wet tapping, 316 stainless steel washers, nuts and bolts, 316 stainless steel restraining rods for mechanical joint fittings, restraining devices for proposed and existing force mains, painting, priming and coating of piping including special coatings as per the specifications and special piping preparation(s), Protecto 401 interior coating for all DIP force main piping and fittings, thrust blocks, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, connections and reconnections to existing force mains, locating grid, wiring and equipment, tracer wires, line locator, identification markers, pipe installation, clean fill/backfill material, reinforced concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, butt fusion welding, MJ adapters, miscellaneous fittings and transitions for various types of piping connections and reconnections, stiffening rings, work during restricted hours and night work as necessary per FDOT requirements or other jurisdictional requirements, full restoration and cleanup, sodding, grading and re-grading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, sidewalk removal and restoration, testing (including fees), flushing of piping, swabbing or pigging including entry and exit points, debris removal, water for swabbing/pigging, pigs and associated items for entire pipeline from point of connection to point of connection, pressure testing, exfiltration trench, drainfield and drainage piping removal, repair, and replacement, and all necessary accessories required for a complete installation, other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.** The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation.

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- E. **Item No. 5 – Furnish and Install 20-inch DR-11 HDPE Force Main via Horizontal Directional Drill (HDD)** Payment for pipe installed by means of directional drilling, successfully installed and complete will be at the Contract unit price per linear foot for furnishing and installing the size and type, which price and payment shall be full compensation for all clearing, grubbing, excavation, bedding, grading and regrading, dewatering, sheeting, shoring and bracing, entry and exit pits, all site restoration to equal or better condition, signs and lighting removal and replacement as well as other obstructions removal and replacement, street lighting support and protection, all testing, temporary jumper connection(s), connections and reconnections to all existing piping, thrust blocks, all bypass piping and pumping equipment including noise

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attenuation for all pumping equipment, materials and operations; field verification of existing utilities, **temporary utility construction easements**, coordination with existing utility facility owners, coordination with property owners; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), removing and replacing fences, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, test connections, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, sidewalk removal and restoration, pigging and pig entry and exit locations, mandrel testing, mud for drilling, water for mud mixing, recycling of mud as applicable, removal and proper disposal of mud to a proper facility, appurtenances, site cleanup and disposal of debris. Also included is all pipe, butt fusion welding, sleeves, mechanical joint adapters, stiffening rings (on a case-by-case approved basis only), polyethylene encasement for all domestic ductile iron pipe and fittings, 316 stainless steel washers, nuts and bolts, 316 stainless steel restraining rods for mechanical joint fittings, restraining devices for proposed and existing force mains, painting, priming and coating of piping including special coatings as per the specifications and special piping preparation(s), Protecto 401 interior coating for all DIP fittings, buoyancy control, restraining devices for proposed and existing force mains, exfiltration trench drainfield and drainage piping removal, repair, and replacement; replacement of impacted traffic, signalization, and street lighting lines, signed and sealed submittals, calculations and approvals for the HDD installation, frac mitigation plan and all mitigation measures, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, flushing, swabbing or pigging including entry and exit points, debris removal, water for swabbing/pigging, pigs and associated items for entire pipeline from point of connection to point of connection, pressure testing, and all necessary accessories required for a complete installation, other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.**

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- F. **Item No. 6a and 6b – Furnish and Install Plug Valves with Boxes (Various Sizes) -** Payment for all labor, valves, equipment, and material for all work necessary and required for the installation of new plug valves, as shown in the plans, valve box, valve box extensions, operating nut extensions, valve wrenches, restraining devices, traffic rated covers, concrete collars. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, locating, protection and support of all existing utilities, **temporary utility construction easements**, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings, preparation of

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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, and removing the erosion control devices necessary to comply with NPDES requirements; tree and shrub protection, trimming, removal and replacement, signage and mailbox protection, removal and replacement, Replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s); protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, dewatering permit applications preparation and permitting, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, restraining devices for proposed and existing force mains, polyethylene encasement for all domestic ductile iron valves, metallic tracer wire, line locator, identification markers, pipe and valve installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, sidewalk removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.** The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation.

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- G. **Item No. 7 – Furnish and Install 4” Air Release Valve Assembly in Manhole** - Payment for all labor, valves, equipment, and materials for all work necessary and required for the installation of new stainless steel combination air release valve with corrosion protection, pipe and valve supports, air release valve manhole, all domestic iron fittings and valves, aerial connections and supports, grout, manhole adjustments, traffic rated frames, traffic rated covers, also including but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thicknesses, locating, protection and support of all existing utilities, **temporary utility construction easements**, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners),

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temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings; tree and shrub protection, trimming, removal and replacement, signage protection, removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement; removal, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, restraining devices for proposed and existing force mains, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s); protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, dewatering permit applications preparation and permitting, metallic tracer wire, line locator, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, sidewalk removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.** The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation.

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- H. **Item No. 8 – Place Out of Service (Grout) Existing Force Mains (Various Sizes) –** Payment for placing out of service existing force mains of various sizes shall be made for cutting, capping and abandoning in place all existing force mains within the project limits as shown on the plans and grout filling the piping. This work shall include but not be limited to fittings, restraining of existing piping, grout, pumping equipment and appurtenances for grout, pressure/grout weep holes, vents and venting piping, dewatering, excavation, compaction, clearing and grubbing, removal and disposal of existing force main pipe contents, cutting of existing piping, capping and abandonment of existing piping which is considered incidental to the piping cost pay item removal, domestic ductile iron fittings, disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, **temporary utility construction easements**, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings; tree and shrub

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protection, trimming, removal and replacement, signage and mailbox protection, removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, dewatering permit applications preparation and permitting, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), polyethylene encasement for all domestic ductile iron fittings and valves, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, and all debris removal and cleanup, other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.**

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- I. **Item No. 9 – Furnish and Install 30-inch Line Stop** – Payment for all labor, equipment and material for all work necessary and required for the installation of new line stop, isolation valves, to permanently or temporarily stop the flow within the indicated main at the locations, recovery of temporary valves and plugs; removal and disposal of wastewater, concrete support blocks/cradles for support, dewatering, tapping sleeve, completion plug/cap, restraining devices, restraint of existing piping in accordance with the standards and requirements. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, **temporary utility construction easements**, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, restraining devices for proposed mains, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, 316 stainless steel nuts, washers and

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bolts, 316 stainless steel restraining rods for mechanical joint fittings, polyethylene encasement for all domestic ductile iron fittings, metallic tracer wire, line locator, connections to existing piping, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.**

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- J. **Item No. 10 – Furnish and Install 10-inch Tee** – Payment for all labor, equipment and material for all work necessary and required for the installation of new tees, as shown in the plans, recovery of temporary valves and plugs; removal and disposal of wastewater, concrete support blocks/cradles for support, dewatering, tapping sleeve, plug, restraining devices, restraint of existing piping in accordance with the standards and requirements. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, **temporary utility construction easements**, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, domestic ductile iron fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, polyethylene encasement for all domestic ductile iron fittings, metallic tracer wire, line locator, connections to existing piping, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited**

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to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.

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- K. **Items No. 11 – Furnish and Install 16-inch x 30-inch Reducer** - Payment for furnishing and installing 16-inch x 30-inch reducer will be made at the Contract unit price per each fitting properly furnished and installed, which price and payment shall be full compensation for furnishing, installing, and testing all fittings including but not limited to, 16-inch x 30-inch domestic ductile iron reducer, polyethylene encasement for all domestic ductile iron fittings, and Protecto 401 coating for all DI fittings. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, **temporary utility construction easements**, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, metallic tracer wire, line locator, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.**

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- L. **Item No. 12 – LUM-07 Site Improvements** – This pay item consists of satisfactorily furnishing and installing all items for a fully functional and complete site including but not limited to; demolition and removal of site structures, piping, meters, control panels, fencing and gate, sump pumps, vaults, air release valves and all needed enclosures or vaults, telemetry, electrical equipment, and all associated infrastructure and any permitting required with the City of Hallandale for the site demolition, and new installations of all site improvements not limited to; structures, piping, meters, control panels, sump pumps, 8-foot high black iron fencing and gate, vaults, telemetry, electrical equipment and all associated infrastructure and any permitting required with the City of Hallandale to provide a completely functional installation. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor,

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materials and equipment necessary for a complete functional meter infrastructure and site improvements including locating, protection and support of all existing utilities, coordination with all utility facility owners for locating and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities, temporary utility construction easements, excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, clean fill/backfill, compaction, grading and regrading, pipe supports, all testing, all conduit and wiring and electrical panel modifications, electrical meter connections, radio feasibility study report (test) for the telemetry antenna, coating/lining of meter vault, all coordination including coordination with the Owner operations staff, new aluminum hatches, hardware, new valves to isolate the meter, meter piping and meter bypass piping (316 stainless steel, etc) and fittings, all couplings, 316 stainless steel bolts, fittings and special connectors, restoration, removal and replacement of existing pavers, sidewalks, curbs and gutters, concrete slabs and pads, asphalt pavement, removal and replacement or removal only, landscaping removal and replacement or removal only, signage and street lighting, replacement of impacted traffic, signalization, and street lighting lines, as well as other obstructions removal and replacement, flow control and any associated bypass piping and pumping, new 57 stone and filter fabric, removal of existing site groundcover and replacement of clean fill prior to stone and fabric installation, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, insulated conducting/tracer wire(s), protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, and all other items required for a complete, acceptable and operable installation; exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.**

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M. **Item No. 13 Water Mains and Fittings Adjustments** – Payment for all labor, equipment and materials for all work necessary and required for water mains and fitting adjustments as shown in the plans. This work shall include but not be limited to: phasing, clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, locating, protection and support of all existing utilities, **temporary utility construction easements**, coordination with all utility facility owners for locating and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities, preparation and submittal of shop drawings, 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, and removing the erosion control devices necessary to comply with NPDES requirements, removal and replacement of impacted exfiltration systems and drainfields, tree and shrub protection, trimming, removal and replacement, Replacement of impacted traffic, signalization, and street lighting lines;

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signage and mailbox protection removal and replacement, fencing and gate protection and removal and replacement, power pole and guy wire support and relocation, removal and replacement (including coordination and applicable fees), irrigation system protection or removal and replacement, piping trench excavation (including all exploratory equipment and excavations), sheeting, shoring, bracing, dewatering, dewatering permit applications preparation, fees and permitting, furnish and install line stops and bypass piping for line stops including thrust blocks, pipe (Class 52 domestic ductile iron, C-900 or C-905 PVC), 316 stainless steel washers, nuts and bolts, and restraining rods for mechanical joint fittings, stainless steel restraining devices for proposed and existing water mains, connections and reconnections, cut-ins or tie-ins to existing water mains (including any required due to phasing) and all necessary coordination, all temporary water main relocations, polyethylene encasement for all domestic ductile iron pipe and fittings, metallic tracer wire, line locator, identification markers, pipe installation, clean fill/backfill material, reinforced concrete slabs and/or excavatable flowable fill to be installed as directed by EOR, bedding, removal and disposal of unsuitable soils, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and re-grading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, bacteriological sampling and testing (including all fees, permit and expediting fees), pressure testing, flushing devices including risers or canons and valves, and all necessary accessories required for a complete installation, other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.** The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation.

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Item No. 14 Remove Existing 8" Water Mains - Payment for all labor, equipment and materials for all work necessary and required for the removal of existing water mains, fittings and associated services/stub outs, regardless of the material. This work shall include but not be limited to: phasing, clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, locating, protection and support of all existing utilities, **temporary utility construction easements**, coordination with all utility facility owners for locating and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities, preparation and submittal of shop drawings, 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, and removing the erosion control devices necessary to comply with NPDES requirements, removal and replacement of impacted exfiltration systems and drainfields, tree and shrub protection, trimming, removal and replacement, Replacement of impacted traffic, signalization, and street lighting lines; signage and mailbox protection removal and replacement, fencing and gate protection and removal and replacement, power pole and guy wire support and relocation, removal and replacement (including coordination and applicable fees),

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irrigation system protection or removal and replacement, remove and replace sanitary sewer laterals of various diameters on various size gravity mains with single and double laterals and provide new SDR 26 PVC piping, cleanouts and fittings, piping trench excavation (including all exploratory equipment and excavations) sheeting, shoring, bracing, dewatering, dewatering permit applications preparation, fees and permitting, cutting and capping, hauling and legal disposal of pipes removed, removal of valve boxes and covers and delivering to the City; clean fill/backfill material, reinforced concrete slabs and/or excavatable flowable fill to be installed as directed by EOR, bedding, removal and disposal of unsuitable soils, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and re-grading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, furnishing and installing caps or plugs and all necessary accessories required for a complete removal, other restorations and other related work not defined in other Bid Package Items. **Any impacts to items on private property including but not limited to fencing, landscaping, trees, etc., shall be restored to equal or better condition by the contractor.** The price bid shall be full compensation for furnishing all materials, labor and equipment required for the complete removal of existing water mains.

- O. **Item No. 15 – Milling and Resurfacing of 1.5” of Asphalt Pavement within FDOT Roadways** - Payment for all labor, equipment and material for all work necessary and required for milling and resurfacing of 1.5” of existing pavement of various thicknesses within FDOT roadways, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto, saw cutting, removal, and disposal of existing pavement of all thicknesses and types to match thickness in kind, any required field work by the Contractor to confirm existing pavement thicknesses prior to bidding (i.e. pavement cores, etc.), and replacement of 1.5” of asphalt pavement to meet all FDOT standards and specifications, latest editions. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items to maintain a level driving surface and to match final grades. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Machine laid asphaltic concrete surface course for permanent paving, will be paid for at the unit price bid times the number of square yards (SY) of asphaltic concrete installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic concrete surface course installation and removal, and disposal of existing concrete and other materials, as required including all restoration efforts.

- P. **Item No. 16 – Milling & Resurfacing of 1” of Asphalt Pavement within City of Hollywood Roadways** - Payment for all labor, equipment and material for all work necessary and required for milling and resurfacing of 1” of existing pavement of various thicknesses, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto, saw cutting, removal, and disposal of existing pavement

of all thicknesses and types, any required field work by the Contractor to confirm existing pavement thicknesses prior to bidding (i.e. pavement cores, etc.), and replacement of 1" of asphalt pavement to meet all City and Broward County standards and specifications, latest editions. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items to maintain a level driving surface and to match final grades. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Machine laid asphaltic concrete surface course for permanent paving, will be paid for at the unit price bid times the number of square yards (SY) of asphaltic concrete installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractor's option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic concrete surface course installation and removal, and disposal of existing concrete and other materials, as required including all restoration efforts.

Q. **Item No. 17 – Temporary Asphalt Restoration** – For temporary asphalt restoration as follows:

- (a) 2-inch thick (min.) SP 9.5 asphaltic concrete structural course within City of Hollywood rights-of-way (with the exception of alleys) in accordance with Standard Detail G-12.1, where shown on the plans. For restoration in alleys refer to pay item 18.
- (b) 3-inch thick (min.) SP 9.5 asphaltic concrete structural course (Traffic B) within FDOT rights-of-way in accordance with FDOT Index 307, where shown on the plans.

Payment shall be at the unit price bid times the number of linear feet (in plan view) installed following the corresponding pavement restoration sections and meeting the compaction requirements provided on the Plans, Specifications and standard details (whichever is more stringent), completed and accepted by the City, Broward County and/or FDOT, with surface at the proper elevations. Greater widths, lengths and thicknesses are at the Contractor's option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete machine-laid asphaltic concrete surface course installation. Asphalt driveway sections shall include 6" thick (min.) compacted limerock base and 1" SP-9.5 asphaltic concrete surface course meeting all other asphalt pavement requirements shown on the plans and specifications. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Asphalt shall be restored over the entire driveway approach regardless of extent of impact.

R. **Item No. 18 – Furnish & Install Temporary Pavement Markings** - For temporary replacement of existing thermoplastic or painted pavement markings and messages, thermoplastic markings, reflective pavement markers, removed or obliterated by the Contractor's operation, or as required for phasing or maintenance of traffic for the work and in accordance with MUTCD, FDOT Standard Specifications for Road and Bridge Construction, and/or Broward County Public Works Department Standards, latest

editions. Markings required for MOT operations shall be billed under the MOT pay item. Any remedial work that requires restoration of temporary pavement markings will be at no additional cost to the City. Payment shall be at the lump sum amount bid for the entire project.

- S. **Item No. 19 - Replacement of Permanent Pavement Markings** - For replacement of existing thermoplastic or painted pavement markings and messages, thermoplastic markings, reflective pavement markers, and other associated permanent pavement markings that are removed or obliterated by the Contractor's operation, or as indicated on the plans, in accordance with MUTCD, FDOT Standard Specifications for Road and Bridge Construction, and/or Broward County Public Works Department Standards, latest editions. Markings required for MOT operations shall be billed under the MOT pay item. Any remedial work that requires restoration of permanent pavement markings will be at no additional cost to the City. Payment shall be at the lump sum amount bid for the entire project.
- T. **Item No. 20 – Removal & Replacement of Concrete Sidewalks** - This pay items consists of the removal, disposal, and replacement of existing concrete sidewalks, pedestrian curb ramps and miscellaneous concrete pavement impacted by the installation of the proposed sewer system improvements, and will be paid for at the unit price bid times the number of square yards (SY) of concrete pavement replaced, completed, ready for service and accepted by the Engineer, Broward County Public Works and/or FDOT. The price bid for this Pay Item shall include, but not be limited to, the following: saw-cutting, removing, hauling, and legally disposing of existing concrete pavement within the envelope of the utility trench typical section (in accordance with the plans or the detail on the plans) and up to the nearest adjacent control joints; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; protecting any existing concrete pavement to remain; furnishing and installing formwork, concrete, water and admixtures, reinforcing steel, and miscellaneous materials; placing, finishing, curing and protecting the finished concrete surface; replacing pedestrian curb ramps and detectable warning surfaces or other ADA requirements; Replacement of impacted traffic, signalization, and street lighting lines. Payment shall not be made for existing concrete pavement outside of the envelope of the utility trench excavation in accordance with the typical trench section provided on the plans. Measurement for payment shall be the number of square yards (SY) lying within the envelope of the utility trench typical section and up to the nearest adjacent control joints. All other replacement due to removal or damage as a result of the Contractor's operation shall be at the Contractor's expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation and all restoration efforts.
- U. **Item No. 21 – Removal and Replacement of Concrete Curb and/or Gutter** - This pay items consists of the removal, disposal, and replacement of existing concrete curbs and/or gutters and other miscellaneous concrete pavement impacted by the installation of the proposed sewer system improvements, and will be paid for at the unit price bid times the number of linear feet (LF) of curbs and/or gutters replaced, completed, ready for service and accepted by the Engineer, Broward County Public Works and/or FDOT. The price bid for this Pay Item shall include, but not be limited to, the following: saw-

cutting, removing, hauling, and legally disposing of existing concrete curbs and/or gutters within the envelope of the utility trench typical section (in accordance with the plans or the detail on the plans) and up to the nearest adjacent control joints; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; protecting any existing concrete pavement to remain; furnishing and installing formwork, concrete, water and admixtures, reinforcing steel, and miscellaneous materials; placing, finishing, curing and protecting the finished concrete surface; replacing pedestrian curb ramps and detectable warning surfaces or other ADA requirements; Replacement of impacted traffic, signalization, and street lighting lines. Payment shall not be made for existing concrete curbs and gutters outside of the envelope of the utility trench excavation in accordance with the typical trench section provided on the plans. Measurement for payment shall be the number of linear feet (LF) lying within the envelope of the utility trench typical section and up to the nearest adjacent control joints. All other replacement due to removal or damage as a result of the Contractor's operation shall be at the Contractor's expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation.

- V. **Item No. 22 – Alley Reconstruction** - Payment for all labor, equipment and material for all work necessary and required for removal and disposal of existing asphalt in alleys or portions of alleys, as shown in the Pavement Restoration Plans and Details. Included in this item is removal and disposal of existing asphalt, furnishing, installing and compacting disturbed base, and constructing 1.5" thick (minimum) machine laid asphaltic (SP 9.5) concrete surface course for permanent paving or matching existing pavement thicknesses in kind. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. This item will be paid for at the unit price bid times the number of square yards (SY) of asphaltic (SP 9.5) concrete overlay installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic (SP 9.5) concrete surface course installation and all re-grading and restoration efforts.
- W. **Item No. 23 – Owner's Contingency (allowance)** - Included in this contingency are works associated with undefined conditions or conflicts developing from undefined conditions. All work authorized for payment will be authorized in writing by the City in advance of commencement for this work. Amount to be paid per undefined conditions or conflict shall be negotiated or agreed to by both parties. The City reserves the right to award any, all, or none of the money associated with this allowance.
- X. **Item No. 24 – Consideration for Indemnification** - In recognition of the Contractor's indemnification obligations, the City will pay to the Contractor the specific consideration of ten dollars (\$10.00). Payment of said specific consideration shall be made at the time of the payment of the first progress estimate and the Contractor shall acknowledge payment of this consideration by letter to the City after receipt of the progress

payment.

- Y. **Item No. 25 – Density Testing (allowance)** - The allowance indicated for this item is to pay for all density testing for all piping installations to meet City, FDOT and Broward County standards. Density testing for multiple mobilizations due to limited testing as ordered by the Contractor will not be paid for by this allowance nor will stand-by time be paid for by this allowance. Any lack of Contractor coordination and scheduling which creates additional trips or downtime by the testing company will not be accepted or paid for by this allowance. The Contractor is to schedule and coordination all testing times to ensure efficiency. 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.
- Z. **Item No. 26 – FPL (allowance)** – This allowance indicated for this item is to pay for all coordination, deactivation, activation, existing utilities verifications, protection and support, exploratory excavations, and all other items required for support, protection, guy wires removals and relocations for power systems and infrastructure within the entire project corridor.
- AA. **Item No. 27 – Permits, Licenses and Fees (allowance)** - The allowance indicated for this item is to pay for all sewer system permits, licenses and other fees as stated herein which are required of the Contractor to submit for and obtain from various agencies having jurisdiction (FDOT, Broward County, City of Hallandale, etc.) for construction of the project. Please refer to the Sewer Plan approval from the Broward County Highway Construction Engineering Division. Please take note of the required security amount of \$ _____ required of the Contractor, which will not be reimbursed by the City. The City will reimburse the ____% permit fee. The allowance shown on the Schedule of Bid Prices is an estimate of fees required. Payment will be based on the actual sewer permits, licenses or fees paid directly to agency, documented by paid receipts, specifically excluding any labor, mark-up, overhead and profit, administration and other costs involved in obtaining sewer permits or licenses or paying fees. This item also includes all notifications, coordination and permitting submittals and fees, flagmen and all necessary construction or inspection fees. Density testing for piping installations are also to be included in this allowance. Density testing for multiple mobilizations due to limited testing as ordered by the Contractor will not be paid for by this allowance nor will stand-by time be paid for by this allowance. Any lack of Contractor coordination and scheduling which creates additional trips or down-time by the testing company will not be accepted or paid for by this allowance. The Contractor is to schedule and coordinate all testing times to ensure efficiency. The Contractor is responsible for submitting and obtaining all necessary regulatory agency sewer permits other than those provided by the Owner and the Contractor is responsible for paying for all associated sewer 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.

- BB. **Item No. 28 – As-Builts and Record Drawings (By Land Surveyor approved by City or EOR)** - Measurement of various items for the As-Builts and Record Drawings will not be made for payment and all items shall be included in the lump sum price. Payment will be for full compensation to furnish as-built documentation and record drawings signed and sealed by a licensed PSM in hardcopy and electronic form and meeting City standards (PDF and AutoCAD) and an asset table at the completion and acceptance of work. In addition, for furnishing monthly as-builts and redlined drawings with pay applications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

Section

Title

DIVISION 1 - GENERAL REQUIREMENTS

01010	Summary and Phasing of Work
01025	Basis of Payment
01030	Special Project Procedures
01041	Project Coordination
01050	Field Engineering
01070	Applicable Standards and Codes
01200	Project Meetings
01300	Submittals
01400	Testing and Inspection
01410	Contractor's Health and Safety Plan
01500	Construction Considerations
01520	Maintenance of Facilities and Sequence of Construction
01530	Protection of Existing Facilities
01550	Site Access and Storage
01560	Special Controls
01570	Traffic Regulations and Maintenance of Traffic
01600	Equipment and Materials
01700	Project Closeout
01720	Project Record Documents and Survey
01740	Permits

DIVISION 2 - SITEWORK

02080	Abandonment, Removal and Disposal of Existing Pipe Removed from Service
02100	Clearing and Grubbing
02140	Dewatering
02160	Temporary Excavation Support Systems
02210	Earth Excavation, Backfill, Fill and Grading
02220	Excavation, Backfill and Compaction
02222	Excavation and Backfill for Utilities and Structures
02223	Screened Gravel
02225	Contaminated Soils and Groundwater
02260	Finish Grading
02332	Limerock Base
02500	Landscaping
02507	Prime and Tack Coats
02510	Asphaltic Concrete Pavement
02526	Concrete Pavement, Curb and Walkway
02580	Pavement Marking

REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

Section

Title

DIVISION 2 – SITEWORK (cont'd.)

02581	Traffic Signs
02582	Raised Retro-Reflective Pavement Markers
02661	Wastewater Force Mains
02665	Horizontal Directional Drill
02930	Sodding

DIVISION 3 - CONCRETE

03051	Leakage Testing of Hydraulic Structures
03111	Concrete Formwork
03210	Concrete Reinforcement
03300	Concrete
03375	Flowable Fill
03420	Precast Reinforced Concrete Structures
03600	Grouting

DIVISIONS 4 – 8 (NOT USED)

DIVISION 9 – FINISHES

09940	Painting
09960	High Performance Coatings

DIVISION 10 (NOT USED)

DIVISION 11 – EQUIPMENT

11305	Flow Meter and Appurtenances
11312	Collection System Bypass

DIVISIONS 12 (NOT USED)

REPLACEMENT OF HALLANDALE BEACH FORCE MAIN AND LARGE USER METER LUM-07

Section

Title

DIVISIONS 13 – SPECIAL CONSTRUCTION

13300 Utility Control Instrumentation System

DIVISIONS 14 (NOT USED)

DIVISION 15 - MECHANICAL

15060 Piping and Fittings
15068 PVC Force Main
15100 Valves, General
15102 Tapping Sleeves and Tapping Valves
15995 Pipeline Testing
15997 Polyethylene Encasement

DIVISION 16 – ELECTRICAL

16050 Electrical Work – General
16110 Electrical Raceway Systems
16120 Electric Wires and Cables
16400 Surge Protection Devices
16450 Grounding
16900 Electrical Controls and Miscellaneous Electrical Equipment
16999 Field Acceptance Tests

APPENDICES

APPENDIX A – Geotechnical Report
APPENDIX B – Permits Obtained by Owner
APPENDIX C – Bentonite Management Plan Example
APPENDIX D – FDEP Contaminated Sites Listing
APPENDIX E – Subsurface Utility Excavation (SUE) Reports
APPENDIX F – Conceptual Layout for Grouting Exst. FM.



DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010

SUMMARY AND PHASING OF WORK

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The work to be performed under this Contract shall consist of furnishing all tools, equipment, materials, supplies, and manufactured articles and for furnishing all transportation and services, including fuel, power, water, and essential communications, and for the performance of all labor, work, or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The work shall be complete, and all work, materials, and services not expressly shown or called for in the Contract documents which may be necessary for the complete and proper construction of the work in good faith shall be performed, furnished, and installed by the Contractor as though originally so specified or shown, at no increase in cost to the City.
- B. Phasing: The Contractor is required to submit a phasing plan for the Owner's review and approval prior to commencement of construction. In addition, the Contractor **will be required to provide multiple crews** to facilitate the work effort and to complete the project in the allotted amount of time. The Contractor is responsible for all crews, sequencing efforts and all phases of the work. Contractor coordination efforts may include, but not be limited to; phasing of the work, work zone coordination, adjusting work limits or work phasing pending the timing of work being completed by others, MOT coordination, MOT phasing, permit submittals and approval timing, restoration coordination, coordination with the Owner, the Engineer and other jurisdictional agencies, coordination with sub-contractors and other workers, public involvement coordination, coordination for notifications, and all other necessary coordination efforts to properly sync the project construction. Additional costs, claims, or change orders to the Owner will not be acceptable due to lack of coordination and proper phasing of the Work on the part of the Contractor.
- C. Prior to construction, the Contractor shall verify existing utilities identified on the Drawings and locate other potential utilities in their working area that may not be shown on the Drawings. The utility verifications consist of excavation to verify tie-in points and to locate potential conflicts that may affect the work as shown on the Drawings. The Contractor shall be responsible for the coordination of this work with the associated utility owners and permitting agencies having jurisdiction over the specific locations to be verified.

1.02 SCOPE

- A. It is the intent of the City to obtain a complete and working installation under this contract and any items of labor, materials or equipment, which may reasonably be assumed as necessary to accomplish this end, should be supplied whether or not

specifically shown on the plans or described herein. Maintenance of the existing utility systems is mandated throughout the construction period.

1.03 WORK BY OTHERS

- A. The Contractor shall cooperate fully with all utility forces of the City, or other public or private agencies engaged in the relocation, altering, or otherwise rearranging any facilities which interfere with the progress of the work, and shall schedule the work so as to minimize interference with said relocation, altering, or rearranging of facilities.
- B. The Contractor's attention is directed to the fact that work will be conducted at the site by other contractors during the performance of the work under this Contract. The Contractor shall conduct its operations so as to cause a minimum of interference with the Work of such other contractors and shall cooperate fully with such contractors to provide continued safe access to their respective portions of the site, as required to perform their respective contracts.
- C. When two or more contracts are being executed at one time on the same or adjacent land in such manner that Work on one contract may interfere with that on another, the City shall determine the sequence and order of the Work. When the territory of one contract is the necessary or convenient means of access for the execution of another contractor, such privilege of access or any other reasonable privilege may be granted by the City to Contractor.

1.04 CONTRACTOR FURNISHED MATERIAL AND EQUIPMENT

- A. All equipment, materials, or devices incorporated in this project shall be new and unused, unless indicated otherwise in the Contract Documents and shall be the products of reliable manufacturers who, unless otherwise specified, have been regularly engaged in the manufacture of such material and equipment for at least five (5) years. Procedures and additional requirements regarding manufacturer's experience and substitutions are included in Section 01300 - Submittals.

1.05 DRAWINGS OF EXISTING FACILITIES

- A. Drawings of the existing facilities may be inspected at the City's Engineering and Construction Services Office. These drawings are for information only and are not a part of the Contract Documents. In making these drawings available for inspection, the City makes no guarantee, either expressed or implied, as to their accuracy or completeness.
- B. The Contractor shall contact representatives for other utilities, facilities in proximity of the work and Sunshine State One Call Inc. (811), to obtain the as-built information from them directly. The utilities shown on Drawings are based upon available records supplied from various sources. The City makes no guarantee, either expressed or implied, as to their accuracy or completeness.

1.06 ITEMS SPECIFIED ON DRAWINGS

- A. Certain items of material and/or equipment, and their installation may be specified on the Drawings and not mentioned in the Specifications. Such items are to be considered as both shown on the Drawings and noted in the Specifications and be provided by the Contractor in accordance with the Specification on the Drawings.

1.07 FIELD LAYOUT OF WORK

- A. See Section 01050 – Field Engineering.
- B. All survey work for construction control purposes shall be made by the Contractor at his expense.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONSTRUCTION COORDINATION

- A. The Contractor is required to coordinate construction activities to maintain the project schedule and complete the work within the Contract Time. Locations of work must be approved by TWA prior to installation.
- B. All work must be coordinated by the Contractor throughout the duration of the project, including but not limited to, phasing of work efforts to ensure that project sequencing and work is properly performed without rework, delays, added costs, or circumstances that could have been avoided if adequate coordination and sequencing/phasing of the project was performed.
- C. The Contractor shall be responsible for coordinating all sub-contractors and trades and in incorporating the work of all subcontractors or trades where necessary and as required.
- D. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction; however, the Contractor shall be solely responsible for this work.

3.02 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from damage in any way. All portions damaged shall be reconstructed by the Contractor at his expense.
- B. Protect all structures in a suitable manner to prevent damage. Should any part of a structure become heaved, cracked or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor at his own expense and to the satisfaction of the ENGINEER. If in the final inspection of the work, any defects, faults or omissions are found, the Contractor shall cause the same to be

repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials, labor and equipment required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein and any damages caused by the performance of the Work, for at least the warranty period described in the Contract.

- C. The Contractor shall completely restore all pavement, sidewalk, curbing, landscaping, swales, culverts, or other areas disturbed by construction activities.

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 Department 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 Department. 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.

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 Department 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 Department. 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, he shall include the cost for that work in the last Bid Item for each construction package so that his proposal for the project does reflect his total price for completing the work in its entirety.
- F. The Contractor shall submit, with each Payment Request, a list of M/WBE Subcontractors that he is or will be utilizing for his contract. For each M/WBE Subcontractor, the following information shall be provided:
 - 1. Total sub-contract dollar amount.
 - 2. Amount paid to date.

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 01300, unless otherwise specified. A representative of the City shall witness all field measurements.

1.03 PAYMENT ITEMS

For purposes of describing items appearing in the Proposal Bid Form, pricing for each item shall include work and components described below:

- A. **Item No. 1 – Mobilization, Bonds, and Insurance** - The lump sum price for this item shall be full compensation for all mobilization/demobilization activities, including but not limited to bonds, insurance, transport of personnel, materials, equipment, and other incidentals to the site, preparation of submittals including schedule, permit packages, and others, temporary facilities and offices, safety equipment and first aid supplies, project signs including procurement, installation, and removal at the end of the project (City approved signs and locations), field surveys, sanitary and other temporary facilities required by the specifications, audio-video documentation of the existing site, any space required for staging, laydown, survey, storage, parking, etc.; preparation and submittal of shop drawings, preparation of a certified Stormwater Pollution Prevention Plan (SWPP) and BMPs 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, and removing the erosion and sedimentation control devices including but not limited to, turbidity barriers, synthetic hay bales, silt fencing, etc., necessary to comply with NPDES requirements, dewatering, groundwater sampling, treatment and disposal, all contamination permitting and compliance, and dewatering permit applications preparation, all fees and all permitting; and all other activities necessary for complete mobilization/demobilization requirement for the contract. **Pay Item No. 1 shall not exceed 3% of the sum of Bid Items Nos. 4 through 20.**

- B. **Item No. 2 – Demobilization** - The lump sum price for this item shall be full compensation for all demobilization activities, including but not limited to transport of personnel, materials, equipment, and other incidentals to the site, preparation of submittals including schedule, permit packages, and others, temporary facilities and offices, safety equipment and first aid supplies, project signs including procurement, installation, and removal at the end of the project (City approved signs and locations), field surveys, sanitary and other temporary facilities required by the specifications, audio-video documentation of the existing site, any space required for staging, laydown, survey, storage, parking, etc.; preparation and submittal of shop drawings; and all other activities necessary for complete demobilization requirement for the contract. **Pay Item No. 2 shall not exceed 2% of the sum of Bid Items Nos. 4 through 20.**
- C. **Item No. 3 – Maintenance of Traffic (MOT)** - Payment for all labor for the design and preparation of signed and sealed (FL Professional Engineer with Advanced MOT Certification) phased and detailed MOT plans, non-standard work hours or evening or weekend hours, all submittals and permitting through various regulatory agencies having jurisdiction over the ROW limits, MOT coordination with other stakeholders or Contractors for adjacent or other work within the work limits, lane closure submittals and approvals, traffic studies, flagman, police, all MOT pavement markings and striping, and installation and removal and/or relocations and maintenance of phased traffic control devices for the duration of the project and to final completion per applicable authority having jurisdiction regarding MOT (vehicular, pedestrian, etc.).
- D. **Items No. 4 - Furnish and Install 16-inch DR-18 PVC Force Main** - Payment for all labor, pipe, equipment and material for all work necessary and required the installation of new force mains and associated stub outs and connections or reconnections as shown on the plans. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thicknesses, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, tree and shrub protection, palm and tree removal and replacement, tree trimming or pruning, signage and mailbox protection, removal and replacement, fencing and gate protection and removal and replacement; Replacement of impacted traffic, signalization, and street lighting lines; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power

line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), removing and replacing fences, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, and bracing (all types required for underwater and/or canal crossings), piping of various materials and types, all domestic ductile iron poly wrapped fittings (shown and not shown), wet tapping, 316 stainless steel washers, nuts and bolts, 316 stainless steel restraining rods for mechanical joint fittings, restraining devices for proposed and existing force mains, painting, priming and coating of piping including special coatings as per the specifications and special piping preparation(s), Protecto 401 interior coating for all DIP force main piping and all bends, line stops and bypass piping for line stops including thrust blocks, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, connections and reconnections to existing force mains, locating grid, wiring and equipment, tracer wires, line locator, identification markers, pipe installation, clean fill/backfill material, reinforced concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, butt fusion welding, MJ adapters, miscellaneous fittings and transitions for various types of piping connections and reconnections, stiffening rings, work during restricted hours and night work as necessary per FDOT requirements or other jurisdictional requirements, full restoration and cleanup, sodding, grading and re-grading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing and gutter removal and restoration, sidewalk removal and restoration, testing (including fees), flushing of piping, swabbing or pigging including entry and exit points, debris removal, water for swabbing/pigging, pigs and associated items for entire pipeline from point of connection to point of connection, pressure testing, exfiltration trench, drainfield and drainage piping removal, repair, and replacement, and all necessary accessories required for a complete installation, 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.

- E. **Item No. 5 – Furnish and Install 20-inch DR-11 HDPE Force Main via Horizontal Directional Drill (HDD)** Payment for pipe installed by means of directional drilling, successfully installed and complete will be at the Contract unit price per linear foot for furnishing and installing the size and type, which price and payment shall be full compensation for all clearing, grubbing, excavation, bedding, grading and regrading, dewatering, sheeting, shoring and bracing, entry and exit pits, all site restoration to equal or better condition, signs and lighting removal and replacement as well as other obstructions removal and replacement, street lighting support and protection, temporary pavement markings (other than for those paid for under MOT), permanent pavement markings and markers, thermoplastic stripping, all testing, temporary jumper connection(s), connections and reconnections to all existing piping including linestops and bypass piping for linestops, including thrust blocks, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and

operations; field verification of existing utilities, coordination with existing utility facility owners, coordination with property owners; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), removing and replacing fences, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, test connections, pigging and pig entry and exit locations, mandrel testing, mud for drilling, water for mud mixing, recycling of mud as applicable, removal and proper disposal of mud to a proper facility, groundwater sampling and testing, appurtenances, site cleanup and disposal of debris. Also included is all pipe, butt fusion welding, sleeves, mechanical joint adapters, stiffening rings (on a case-by-case approved basis only), buoyancy control, exfiltration trench drainfield and drainage piping removal, repair, and replacement; replacement of impacted traffic, signalization, and street lighting lines, signed and sealed submittals, calculations and approvals for the HDD installation, frac mitigation plan and all mitigation measures, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, flushing, swabbing or pigging including entry and exit points, debris removal, water for swabbing/pigging, pigs and associated items for entire pipeline from point of connection to point of connection, pressure testing, and all necessary accessories required for a complete installation, other restorations and other related work not defined in other Bid Package Items.

- F. **Item No. 6 – Furnish and Install 16-inch Plug Valves with Boxes** - Payment for all labor, valves, equipment, and material for all work necessary and required for the installation of new plug valves, as shown in the plans, valve box, valve box extensions, operating nut extensions, test station box and cap, valve wrenches, restraining devices, traffic rated covers, concrete collars. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings, 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, and removing the erosion control devices necessary to comply with NPDES requirements; tree and shrub protection, trimming, removal and replacement, signage and mailbox protection, removal and replacement, Replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for

power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s); protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, groundwater sampling, treatment and disposal, dewatering permit applications preparation and permitting, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, test station box and cap, valve wrenches, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, restraining devices for proposed and existing force mains, polyethylene encasement for all domestic ductile iron fittings and valves, metallic tracer wire, line locater, identification markers, pipe and valve installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, sidewalk removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, 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.

- G. **Item No. 7 – Furnish and Install 4” Air Release Valve Assembly in Manhole** - Payment for all labor, valves, equipment, and materials for all work necessary and required for the installation of new stainless steel combination air release valve with corrosion protection, pipe and valve supports, air release valve manhole, all fittings and valves, aerial connections and supports, grout, manhole adjustments, traffic rated frames, traffic rated covers, also including but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thicknesses, locating, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings; tree and shrub protection, trimming, removal and replacement, signage protection, removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement; removal, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, test station box and cap, valve wrenches, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles,

coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s); protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, groundwater sampling, treatment and disposal, dewatering permit applications preparation and permitting, metallic tracer wire, line locator, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, removal and disposal of unsuitable soils, over-excavation as necessary, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, sodding, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, sidewalk removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, 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.

- H. **Item No. 8 – Place Out of Service (Grout) Existing Force Mains (Various Sizes) –** Payment for placing out of service existing force mains of various sizes shall be made for cutting, capping and abandoning in place all existing force mains within the project limits as shown on the plans and grout filling the piping. This work shall include but not be limited to fittings, restraining of existing piping, grout, pumping equipment and appurtenances for grout, pressure/grout weep holes, dewatering, excavation, compaction, clearing and grubbing, removal and disposal of existing force main pipe contents, and cutting, capping and abandonment of existing piping which is considered incidental to the piping cost pay item removal, disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, coordination with all utility facility owners for locating (including exploratory excavations) and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities; including but not limited to gas mains and all other utilities, preparation and submittal of shop drawings; tree and shrub protection, trimming, removal and replacement, signage and mailbox protection, removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; fencing and gate protection and removal and replacement, protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, groundwater sampling, treatment and disposal, dewatering permit applications preparation and permitting, all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, test station box and cap, valve wrenches, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric

without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), polyethylene encasement for all ductile iron fittings, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, and all debris removal and cleanup, other restorations and other related work not defined in other Bid Package Items.

- I. **Item No. 9 – Furnish and Install 30-inch Double Line Stops w/ Bypass** – Payment for all labor, equipment and material for all work necessary and required for the installation of new double line stops and bypass piping, isolation valves, to permanently or temporarily stop the flow within the indicated main at the locations, recovery of temporary valves and plugs; removal and disposal of wastewater, concrete support blocks/cradles for support, dewatering, tapping sleeve, plug, restraining devices, restraint of existing piping in accordance with the standards and requirements. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, test station box and cap, valve wrenches, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, ductile iron fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, polyethylene encasement for all ductile iron valves, metallic tracer wire, line locater, restraint of existing piping, connections to existing piping, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other restorations and other related work not defined in other Bid Package Items.

- J. **Item No. 10 – Furnish and Install 10-inch Line Stop** – Payment for all labor, equipment and material for all work necessary and required for the installation of new line stop, isolation valves, to permanently or temporarily stop the flow within the indicated main at the locations, recovery of temporary valves and plugs; removal and disposal of wastewater, concrete support blocks/cradles for support, dewatering, tapping sleeve, plug, restraining devices, restraint of existing piping in accordance with the standards and requirements. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box extensions, operating nut extensions, test station box and cap, valve wrenches, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain, hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, ductile iron fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, polyethylene encasement for all ductile iron valves, metallic tracer wire, line locator, restraint of existing piping, connections to existing piping, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, removal of and disposal of pavement of varying thicknesses, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other restorations and other related work not defined in other Bid Package Items.
- K. **Items No. 11 – Furnish and Install 16-inch x 30-inch Reducer** - Payment for furnishing and installing 16-inch x 30-inch reducer will be made at the Contract unit price per each fitting properly furnished and installed, which price and payment shall be full compensation for furnishing, installing, and testing all fittings including but not limited to, 16-inch x 30-inch reducer, polywrap of all DIP fittings where required, and P401 coating for all DI fittings. This work shall include but not be limited to clearing and grubbing, removal and disposal of existing asphalt pavements of varying thickness, protection and support of all existing utilities, tree and shrub protection, signage and mailbox protection and removal and replacement, fencing and gate protection and removal and replacement, replacement of impacted traffic, signalization, and street lighting lines; all bypass piping and pumping equipment including noise attenuation for all pumping equipment, materials and operations, valve, valve box, valve box

extensions, operating nut extensions, test station box and cap, valve wrenches, restraining devices, traffic rated covers, concrete collars, all restrained mechanical joint fittings; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), irrigation system protection or removal and replacement, piping trench excavation (including exploratory excavation), sheeting, shoring, bracing, ductile iron fittings, 316 stainless steel nuts, washers and bolts, 316 stainless steel restraining rods for mechanical joint fittings, metallic tracer wire, line locator, reconnections utility protection, supports and/or relocations in coordination with utility facility Owners, identification markers, pipe installation, clean fill/backfill material, concrete slabs and/or excavatable flowable fill, bedding, compaction, full restoration and cleanup, grading and regrading, driveway removal and restoration of various materials including but not limited to; pavers, stamped concrete, brick and specialty materials, curbing removal and restoration, pressure testing, and all necessary accessories required for a complete installation, exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other related work not defined in other Bid Package Items.

- L. **Item No. 12 – LUM-07 Site Improvements** – This pay item consists of satisfactorily furnishing and installing all items for a fully functional and complete site including but not limited to; demolition and removal of site structures, piping, meters, control panels, fencing and gate, sump pumps, vaults, air release valves, line stops, telemetry, electrical equipment, and all associated infrastructure and any permitting required with the City of Hallandale for the site demolition, and new installations of all site improvements not limited to; structures, piping, meters, control panels, sump pumps, 8-foot high black iron fencing and gate, vaults, air release valves and manholes, telemetry, electrical equipment and all associated infrastructure and any permitting required with the City of Hallandale to provide a completely functional installation. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor, materials and equipment necessary for a complete functional meter infrastructure and site improvements including locating, protection and support of all existing utilities, coordination with all utility facility owners for locating and relocations of existing utilities (by facility owners), temporary utility relocations as needed for City facilities, excavation (including exploratory excavations), sheeting, shoring, bracing, dewatering, groundwater treatment and disposal, clean fill/backfill, compaction, grading and regrading, pipe supports, all testing, all conduit and wiring and electrical panel modifications, electrical meter connections, radio feasibility study report (test) for the telemetry antenna, coating/lining of meter vault, all coordination including coordination with the Owner operations staff, new aluminum hatches, hardware, new plug valves to isolate the meter, meter piping and meter bypass piping (316 stainless steel) and fittings, all couplings, 316 stainless steel bolts, fittings and special connectors, restoration, removal and replacement of existing pavers, sidewalks, curbs and gutters, concrete slabs and pads, asphalt pavement, removal and replacement or removal only, landscaping removal and replacement or removal only, signage and street lighting, replacement of impacted traffic, signalization, and street lighting lines, as well as other

obstructions removal and replacement, flow control and any associated bypass piping and pumping, new 57 stone and filter fabric, removal of existing site groundcover and replacement of clean fill prior to stone and fabric installation, ; hiring of power company to hold and support power poles, removing and resetting guy wires for existing utility poles, coordination with power company and associated utility providers on poles for power line deactivation and relocations as necessary including all associated costs, pipe markers, insulated conducting/tracer wire(s), protection of existing trees, removing and replacing existing trees in kind and size, storage for the replanting of trees as necessary, tree trimming, vegetation removal, replacement of disturbed landscaping in kind and size, and all other items required for a complete, acceptable and operable installation; exfiltration trench, drainfield and drainage piping removal and replacement, other restorations and other related work not defined in other Bid Package Items.

- M. **Item No. 13 – Milling and Resurfacing of 1” of Asphalt Pavement within FDOT Roadways** - Payment for all labor, equipment and material for all work necessary and required for milling and resurfacing of 1” of existing pavement of various thicknesses within FDOT roadways, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto, saw cutting, removal, and disposal of existing pavement of all thicknesses and types, any required field work by the Contractor to confirm existing pavement thicknesses prior to bidding (i.e. pavement cores, etc.), and replacement of 1” of asphalt pavement to meet all FDOT standards and specifications, latest editions. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items to maintain a level driving surface and to match final grades. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Machine laid asphaltic concrete surface course for permanent paving, will be paid for at the unit price bid times the number of square yards (SY) of asphaltic concrete installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic concrete surface course installation and removal, and disposal of existing concrete and other materials, as required including all restoration efforts.
- N. **Item No. 14 – Milling & Resurfacing of 1” of Asphalt Pavement within City of Hollywood Roadways** - Payment for all labor, equipment and material for all work necessary and required for milling and resurfacing of 1” of existing pavement of various thicknesses, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto, saw cutting, removal, and disposal of existing pavement of all thicknesses and types, any required field work by the Contractor to confirm existing pavement thicknesses prior to bidding (i.e. pavement cores, etc.), and replacement of 1” of asphalt pavement to meet all City and Broward County standards and specifications, latest editions. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items to maintain a level driving surface and to match final grades. Also included in this item is removal, disposal, and replacement of existing

underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Machine laid asphaltic concrete surface course for permanent paving, will be paid for at the unit price bid times the number of square yards (SY) of asphaltic concrete installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic concrete surface course installation and removal, and disposal of existing concrete and other materials, as required including all restoration efforts.

O. **Item No. 15 – Temporary Asphalt Restoration** – For temporary asphalt restoration as follows:

- (a) 2-inch thick (min.) SP 9.5 asphaltic concrete structural course within City of Hollywood rights-of-way (with the exception of alleys) in accordance with Standard Detail G-12.1, where shown on the plans. For restoration in alleys refer to pay item 18.
- (b) 3-inch thick (min.) SP 9.5 asphaltic concrete structural course (Traffic B) within FDOT rights-of-way in accordance with FDOT Index 307, where shown on the plans.

Payment shall be at the unit price bid times the number of linear feet (in plan view) installed following the corresponding pavement restoration sections and meeting the compaction requirements provided on the Plans, Specifications and standard details (whichever is more stringent), completed and accepted by the City, Broward County and/or FDOT, with surface at the proper elevations. Greater widths, lengths and thicknesses are at the Contractor's option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete machine-laid asphaltic concrete surface course installation. Asphalt driveway sections shall include 6" thick (min.) compacted limerock base and 1" SP-9.5 asphaltic concrete surface course meeting all other asphalt pavement requirements shown on the plans and specifications. Also included in this item is removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. Asphalt shall be restored over the entire driveway approach regardless of extent of impact.

P. **Item No. 16 – Furnish & Install Temporary Pavement Markings** - For temporary replacement of existing thermoplastic or painted pavement markings and messages, thermoplastic markings, reflective pavement markers, removed or obliterated by the Contractor's operation, or as indicated on the plans, in accordance with MUTCD, FDOT Standard Specifications for Road and Bridge Construction, and/or Broward County Public Works Department Standards, latest editions. Markings required for MOT operations shall be billed under the MOT pay item. Any remedial work that requires restoration of temporary pavement markings will be at no additional cost to the City. Payment shall be at the lump sum amount bid for the entire project.

Q. **Item No. 17 - Replacement of Permanent Pavement Markings** - For replacement of existing thermoplastic or painted pavement markings and messages, thermoplastic markings, reflective pavement markers, and other associated permanent pavement

markings that are removed or obliterated by the Contractor's operation, or as indicated on the plans, in accordance with MUTCD, FDOT Standard Specifications for Road and Bridge Construction, and/or Broward County Public Works Department Standards, latest editions. Markings required for MOT operations shall be billed under the MOT pay item. Any remedial work that requires restoration of permanent pavement markings will be at no additional cost to the City. Payment shall be at the lump sum amount bid for the entire project.

- R. **Item No. 18 – Removal & Replacement of Concrete Sidewalks** - This pay items consists of the removal, disposal, and replacement of existing concrete sidewalks, pedestrian curb ramps and miscellaneous concrete pavement impacted by the installation of the proposed sewer system improvements, and will be paid for at the unit price bid times the number of square yards (SY) of concrete pavement replaced, completed, ready for service and accepted by the Engineer, Broward County Public Works and/or FDOT. The price bid for this Pay Item shall include, but not be limited to, the following: saw-cutting, removing, hauling, and legally disposing of existing concrete pavement within the envelope of the utility trench typical section (in accordance with the plans or the detail on the plans) and up to the nearest adjacent control joints; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; protecting any existing concrete pavement to remain; furnishing and installing formwork, concrete, water and admixtures, reinforcing steel, and miscellaneous materials; placing, finishing, curing and protecting the finished concrete surface; replacing pedestrian curb ramps and detectable warning surfaces or other ADA requirements; Replacement of impacted traffic, signalization, and street lighting lines. Payment shall not be made for existing concrete pavement outside of the envelope of the utility trench excavation in accordance with the typical trench section provided on the plans. Measurement for payment shall be the number of square yards (SY) lying within the envelope of the utility trench typical section and up to the nearest adjacent control joints. All other replacement due to removal or damage as a result of the Contractor's operation shall be at the Contractor's expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation and all restoration efforts.
- S. **Item No. 19 – Removal and Replacement of Concrete Curb and/or Gutter** - This pay items consists of the removal, disposal, and replacement of existing concrete curbs and/or gutters and other miscellaneous concrete pavement impacted by the installation of the proposed sewer system improvements, and will be paid for at the unit price bid times the number of linear feet (LF) of curbs and/or gutters replaced, completed, ready for service and accepted by the Engineer, Broward County Public Works and/or FDOT. The price bid for this Pay Item shall include, but not be limited to, the following: saw-cutting, removing, hauling, and legally disposing of existing concrete curbs and/or gutters within the envelope of the utility trench typical section (in accordance with the plans or the detail on the plans) and up to the nearest adjacent control joints; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain; protecting any existing concrete pavement to remain; furnishing and installing formwork, concrete, water and admixtures, reinforcing steel, and miscellaneous materials; placing, finishing, curing and protecting the finished concrete surface; replacing pedestrian curb ramps and

detectable warning surfaces or other ADA requirements; Replacement of impacted traffic, signalization, and street lighting lines. Payment shall not be made for existing concrete curbs and gutters outside of the envelope of the utility trench excavation in accordance with the typical trench section provided on the plans. Measurement for payment shall be the number of linear feet (LF) lying within the envelope of the utility trench typical section and up to the nearest adjacent control joints. All other replacement due to removal or damage as a result of the Contractor's operation shall be at the Contractor's expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable installation.

- T. **Item No. 20 – Alley Reconstruction** - Payment for all labor, equipment and material for all work necessary and required for removal and disposal of existing asphalt in alleys or portions of alleys, as shown in the Pavement Restoration Plans and Details. Included in this item is removal and disposal of existing asphalt, furnishing, installing and compacting disturbed base, and constructing 1.5" thick (minimum) machine laid asphaltic (SP 9.5) concrete surface course for permanent paving or matching existing pavement thicknesses in kind. Also included in this item is any adjustments of valve boxes, valve covers, manhole frames and rims, removal and replacement of all speed humps, and any other surface items; removal, disposal, and replacement of existing underground geotextile fabric without impacting or damaging portions of geotextile fabric to remain. This item will be paid for at the unit price bid times the number of square yards (SY) of asphaltic (SP 9.5) concrete overlay installed and accepted by the Engineer, as measured along the limits defined in the Pavement Restoration Plans and Details appended hereto. Greater widths are at the Contractors option and expense. The price bid shall be full compensation for furnishing all materials, labor and equipment required for a complete and usable machine-laid asphaltic (SP 9.5) concrete surface course installation and all re-grading and restoration efforts.
- U. **Item No. 21 – Owner's Contingency (allowance)** - Included in this contingency are works associated with undefined conditions or conflicts developing from undefined conditions. All work authorized for payment will be authorized in writing by the City in advance of commencement for this work. Amount to be paid per undefined conditions or conflict shall be negotiated or agreed to by both parties. The City reserves the right to award any, all, or none of the money associated with this allowance.
- V. **Item No. 22 – Consideration for Indemnification** - In recognition of the Contractor's indemnification obligations, the City will pay to the Contractor the specific consideration of ten dollars (\$10.00). Payment of said specific consideration shall be made at the time of the payment of the first progress estimate and the Contractor shall acknowledge payment of this consideration by letter to the City after receipt of the progress payment.
- W. **Item No. 23 – Density Testing (allowance)** - The allowance indicated for this item is to pay for all density testing for all piping installations to meet City, FDOT and Broward County standards. Density testing for multiple mobilizations due to limited testing as ordered by the Contractor will not be paid for by this allowance nor will stand-by time be paid for by this allowance. Any lack of Contractor coordination and scheduling which

creates additional trips or downtime by the testing company will not be accepted or paid for by this allowance. The Contractor is to schedule and coordination all testing times to ensure efficiency. 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.

- X. **Item No. 24 – FPL (allowance)** – This allowance indicated for this item is to pay for all coordination, deactivation, activation, existing utilities verifications, protection and support, exploratory excavations, and all other items required for support, protection, guy wires removals and relocations for power systems and infrastructure within the entire project corridor.
- Y. **Item No. 25 – Permits, Licenses and Fees (allowance)** - The allowance indicated for this item is to pay for all sewer system permits, licenses and other fees as stated herein which are required of the Contractor to submit for and obtain from various agencies having jurisdiction (FDOT, Broward County, City of Hallandale, etc.) for construction of the project. Please refer to the Sewer Plan approval from the Broward County Highway Construction Engineering Division. Please take note of the required security amount of \$ _____ required of the Contractor, which will not be reimbursed by the City. The City will reimburse the ____% permit fee. The allowance shown on the Schedule of Bid Prices is an estimate of fees required. Payment will be based on the actual sewer permits, licenses or fees paid directly to agency, documented by paid receipts, specifically excluding any labor, mark-up, overhead and profit, administration and other costs involved in obtaining sewer permits or licenses or paying fees. This item also includes all notifications, coordination and permitting submittals and fees, flagmen and all necessary construction or inspection fees. Density testing for piping installations are also to be included in this allowance. Density testing for multiple mobilizations due to limited testing as ordered by the Contractor will not be paid for by this allowance nor will stand-by time be paid for by this allowance. Any lack of Contractor coordination and scheduling which creates additional trips or down-time by the testing company will not be accepted or paid for by this allowance. The Contractor is to schedule and coordinate all testing times to ensure efficiency. The Contractor is responsible for submitting and obtaining all necessary regulatory agency sewer permits other than those provided by the Owner and the Contractor is responsible for paying for all associated sewer 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.
- Z. **Item No. 26 – As-Builts and Record Drawings (By Land Surveyor approved by City or EOR)** - Measurement of various items for the As-Builts and Record Drawings will not be made for payment and all items shall be included in the lump sum price. Payment will

be for full compensation to furnish as-built documentation and record drawings signed and sealed by a licensed PSM in hardcopy and electronic form and meeting City standards (PDF and AutoCAD) and an asset table at the completion and acceptance of work. In addition, for furnishing monthly as-builts and redlined drawings with pay applications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01030

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.01 WORK WITHIN RAILROAD RIGHT-OF-WAY (ROW) LIMITS

- A. Contractor shall provide advanced notification(s) to the jurisdictional owners prior to all work efforts. Notifications shall be a minimum of 48 hours in advance of any proposed work efforts and shall be coordinated through the railroad ROW representatives.
- B. The Contractor is responsible for coordination, exhibits and all associated documents for submitting, and securing approvals, for any necessary permits for work within the railroad ROW limits and for paying all associated permit fees.
- C. FDOT standards and specifications, Broward County standards and specifications and the Owner's standards and specifications must be followed at all times. In areas where there are conflicting requirements, the most stringent requirements shall be required to be followed at no additional cost to the Owner.

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. The Contractor is required to submit a phasing plan for the Owner's review and approval prior to commencement of construction. In addition, the Contractor **will be required to provide multiple crews** to facilitate the work effort and to complete the project in the allotted amount of time.
- B. The Contractor may be required to coordinate with other Contractors within adjacent work limits. No additional compensation will be provided for any necessary adjustments or activities that create Contractor or construction downtime.

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. Sound levels measured by the Engineer shall not exceed 50 dBA from 7 P.M. to 7 A.M. or 60 dBA 7 A.M. to 7 P.M. This sound level shall be measured at the exterior of the nearest exterior wall of the nearest residence. Levels at the equipment shall not exceed 85 dBA at any time. 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 Owner 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. Local jurisdictional requirements may vary from the above requirements. It is the Contractor's responsibility to identify and comply with all jurisdictional requirements for noise abatement, construction work hours and notifications.

- C. Work hours as required for the various jurisdictional agency project permits must be followed at all times. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.04 PCCP PIPING AND EXISTING UTILITIES

- A. Pipe Locations. All pipes shall be located substantially as indicated on the Drawings, but the Engineer or Owner reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Soft digs have been performed to field verify the approximate location of the existing piping; however, it is the Contractor's responsibility to field verify and confirm all existing utility locations, including allowing for utility coordination efforts for other utility facilities within the railroad ROW limits and to protect and support all existing utilities at no additional cost to the Owner.
- B. Utility Conflicts. Contractor must identify all locations where there is the possibility of conflicts with existing utilities. Contractor will promptly notify the Owner and Engineer in writing in accordance with these documents. Contractor acknowledges that resolving utility conflicts, can sometimes require permitting. The Owner will grant additional days to the Contractor to cover the length of unanticipated delay in writing. However, under no circumstances will the Contractor be eligible for remobilization costs.

1.05 ADDITIONAL TRAFFIC REQUIREMENTS

- A. Contractor will be responsible for submittal 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 construction proposed within the railroad ROW limits. Contractor shall be the responsible party relating to all aspects of railroad ROW 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 coordination, submittals, permitting, signed and sealed MOT plans to meet all regulatory agencies requirements, inspection services or costs nor any other fees related to providing MOT within the railroad ROW limits.
- 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.

1.06 OPEN EXCAVATIONS AND RESTORATION

- A. Contractor shall be responsible for restoration of all disturbed areas during construction with equal or better quality, quantity, material and size. Items within the project limits that may require restoration due to the Contractor's means and methods and associated work or equipment movement, staging, etc., as well as those limits outside of the work limits, and not shown on the drawings, shall be the responsibility of Contractor to restore if impacted. In addition, timely restoration shall be required by the Contractor. The open trench excavation limits may be required to be limited to minimize risk or safety issues. **The Owner and Engineer, reserve the right to notify the Contractor of any areas that will be required to be backfilled, sheeted, shored or braced including providing restoration in advance of larger scale restoration efforts or other restoration efforts which may need to be performed in advance.**
- B. 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, sheeting, shoring, and bracing to minimize open trench excavation limits adjacent to the railroad ROW limits and to facilitate additional safety measures due to the active railroad.
- C. Installations by open-trench methods shall comply with AREMA Manual for Railway Engineering, Part 4, Culverts, Section 4.14, Assembly and Installation of Pipe Culverts where applicable for railroad crossings.
- D. Sheeting, piles, shoring and bracing and associated signed and sealed design calculations by a licensed Professional Engineer are required to be submitted for work within the railroad ROW limits. All calculations, reviews, and permit approvals are to be provided by the Contractor at no additional cost to the Owner/TWA.

1.07 TEST PITS/HOLES

- A. Test pits and/or holes for the purpose of locating underground pipeline, utilities, 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 FDOT standards and specifications and meeting all AREMA guidelines. Grouting of test holes is typically required if within the railroad right-of-way limits. The costs for such test pits and grouting of the test pits and/or holes shall be borne by the Contractor.

1.08 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, dated June, 1973, including any amendments thereto.

1.09 INCLEMENT WEATHER

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

1.10 COORDINATION OF WORK

- A. The Contractor shall cooperate fully so as to eliminate or minimize the creation of conflicts with all other parties performing work within the active railroad ROW limits. Adjustments from time to time may be required in the Contractor's work location and/or schedule upon notice provided by the railroad representative, FDOT, or the Owner.

1.11 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 Owner or Engineer.
- B. Access to properties along the Project must be maintained at all times throughout the duration of the Project.

1.12 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.

1.13 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, (PL 91-596) and under Section 107 of the Contract Work Hours & Safety Standards Act (PL 91-54).
- B. All equipment furnished and installed under this Contract shall comply to Part 1910, Occupational Safety & Health Standards & Amendments thereto.

C. The Contractor shall comply with the Florida Trench Safety Act (90-96, Florida Law).

1.14 STATE AND FEDERAL PERMITS

A. The Contractor is required to comply with and meet all applicable State and Federal permits. The Owner 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.

1.15 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 Owner and Engineer shall be permitted access to any work area for the inspection of work and materials. The Owner 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 Owner 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.

1.16 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 Owner 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 Owner 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 Owner 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 Owner'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 Owner 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 Owner 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.
 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.
- 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 a legal manner.
- 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 Owner'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.

1.17 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 Owner 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.

1.18 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 Owner 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 Owner, the Owner will not be responsible for the inadvertent removal of material which the Contractor would not have disposed of had he effected the required cleanup.
- C. 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.

1.19 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.

1.20 CONTRACTOR'S USE OF PREMISES

- A. All project construction work will be accomplished on the Owner'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 Owner. 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 Owner.
- 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 Owner. 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. Construct all fill areas so runoff will not flood improved areas.
- F. All connections to existing piping systems shall be made as shown or indicated on the Drawings after consultation, cooperation, and coordination with the Owner. Some 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 Owner when tie-ins with the existing plant utilities are required.

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

1.21 HAZARDOUS LOCATIONS

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

1.22 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.

1.23 DRAINFIELD AND FRENCH DRAIN RESTORATION

- A. Contractor shall restore all existing drainfields and French drains to equal or better condition if impacted during construction efforts. Laterals, services or other impacts to drainfields and French drains must follow FDOT standards and specifications for restoration.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01041

PROJECT COORDINATION

PART 1 - GENERAL

1.01 WORK INCLUDED

Furnish personnel and equipment that will be efficient, appropriate and large enough to secure a quality of work that is acceptable to the Owner/Engineer and a rate of progress that will ensure the completion of the work within the Contract Time. If at any time such personnel appears to the Engineer to be inefficient, inappropriate or insufficient for securing the quality of work aforesaid, he may order the Contractor to increase the efficiency, change the personnel or increase the personnel and equipment, and the Contractor shall conform to such order at no additional cost to the Owner. Failure of the Engineer to give such order shall in no way relieve the Contractor or his obligations to secure the quality of the work and rate of progress. The Contractor is required to submit a phasing plan for the Owner's review and approval prior to commencement of construction. In addition, the Contractor **will be required to provide multiple crews** to facilitate the work effort and to complete the project in the allotted amount of time.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONSTRUCTION COORDINATION

- A. The Contractor is required to coordinate construction activities to maintain the project schedule and complete the work within the Contract Time. Locations of work must be approved by the Owner prior to installation.
- B. All work must be coordinated by the Contractor throughout the duration of the project, including but not limited to, phasing of work efforts to ensure that project sequencing and work is properly performed without rework, delays, added costs, or circumstances that could have been avoided if adequate coordination and sequencing/phasing of the project was performed. Phased work may include multiple partial clearance submittals in order to construct the infrastructure within the proposed project limits. All phasing, coordination, permitting and clearances, etc. will be at no additional cost to the Owner. The Contractor shall plan their work and crews as needed to allow for phased construction and meet the project schedule and deadlines.
- C. The Contractor shall be responsible for coordinating all sub-contractors and trades and in incorporating the work of all subcontractors or trades where necessary and as required.

- D. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction; however, the Contractor shall be solely responsible for this work.

3.02 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from damage in any way. All portions damaged shall be reconstructed by the Contractor at his expense.
- B. Protect all structures in a suitable manner to prevent damage. Should any part of a structure become heaved, cracked or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor at his own expense and to the satisfaction of the Engineer. If in the final inspection of the work, any defects, faults or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials, labor and equipment required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein and any damages caused by the performance of the Work, for at least the warranty period described in the Contract.
- C. The Contractor shall completely restore all pavement, sidewalk, curbing, landscaping, swales, culverts, or other areas disturbed by construction activities.

END OF SECTION

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.
- B. Related Requirements Described Elsewhere:
1. Conditions of the Contract.
 2. Summary of Work: Section 01010.
 3. Project Record Documents and Survey: 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.
 - 3. Building foundation, column locations, and floor levels.
 - 4. Controlling lines and levels required for mechanical and electrical trades.
- C. From time to time, verify layouts by same methods.

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 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 and Survey, for project specific requirements.

1.06 SUBMITTALS

- A. Submit name and address of surveyor and professional engineer 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.

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.
- 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. AWWA - American Water Works Association
35. AWPI - American Wood Preservers Institute
36. AWS - American Welding Society
37. AWWA - American Water Works Association

38. BCEPGMD - Broward County Environmental Protection and Growth Management Department (formerly BCEPD)
39. BCHD - Broward County Health Department
40. BHMA - Builders Hardware Manufacturer's Association
41. CMA - Concrete Masonry Association
42. CRSI - Concrete Reinforcing Steel Institute
43. CSA - Canadian Standards Association
44. DHI - Door and Hardware Institute
45. DIPRA - Ductile Iron Pipe Research Association
46. EIA - Electronic Industries Association
47. ETL - Electrical Test Laboratories
48. FBC - Florida Building Code
49. FDEP - Florida Department of Environmental Protection
50. FDOT - Florida Department of Transportation
51. FS - Federal Specifications
52. ICEA - Insulated Cable Engineers Association
53. IEEE - Institute of Electrical and Electronics Engineers
54. IES - Illuminating Engineering Society
55. IPCEA - Insulated Power Cable Engineers Association
56. ISA - Instrument Systems and Automation
57. ISO - International Organization for Standardization
58. MBMA - Metal Building Manufacturers Association
59. MMA - Monorail Manufacturers Association
60. MTI - Marine Testing Institute
61. NAAMM - National Association of Architectural Metal Manufacturers
62. NACE - National Association of Corrosion Engineers

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

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 will cover such subjects as the following:

1. Insurance certificates
2. Permits, licenses, notifications
3. Affirmative action employment
4. Construction schedules/phasing plans
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 and/or City's RPR
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 and project specific matters

1.02 PROGRESS

- A. A progress meeting shall be held on a once-per-month basis, or as needed to monitor the work progress and obtain necessary construction updates, 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 Engineer will conduct such meetings and as necessary, with the Contractor's input, prepare the meeting agenda and meeting notes. The Contractor is required to provide a knowledgeable and professional Project Manager who will

represent the Contractor in discussions with the City and Engineer and who will maintain a professional demeanor.

- B. In addition, the Engineer 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 monthly 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. If the Contractor is not on track for their overall schedule, a recovery schedule will be required to be provided.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. This section specifies the means of all submittals. All submittals, whether the destination is to the City, Engineer, or other representatives of the City, shall be directed through the Engineer. A summary of the key types of submittals and the number of copies required is as follows:

<u>Copies to Engineer/Owner</u>	<u>Type of Submittal (not inclusive)</u>
1 (digitally)	Construction schedule
4 originals	Schedule of payment items
2 DVDs	Audio visual preconstruction record
1 (digitally)	Shop drawings
4 originals	Certificates of compliance
2 originals	Warranties
1*	Product samples
2 (digitally in CAD) <u>AND</u>	As-builts/Record drawings
2 originals signed and sealed	
2 digitally in CAD	Final Record Drawings

*Unless otherwise required in the specific Section where requested.

1.02 SUBMITTAL PROCEDURES

- A. Transmit each submittal with a form acceptable to the Engineer, clearly identifying the project Contractor, the enclosed material and other pertinent information specified in other parts of this section. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- B. Revise and resubmit submittals as required, identify all changes made since previous submittals. Resubmittals shall be noted as such.
- C. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.03 CONSTRUCTION PROGRESS SCHEDULE

- A. The Contractor is responsible for submitting a phased project schedule, including a phased layout or exhibit showing each phase of the work, the timing for each phase of the work, and the progressive for successive construction events that must be completed

once the initial phase(s) of the work are completed. The schedule should include, but not be limited to, phased MOT plans, phased infrastructure plans, partial clearances for phasing of the work and tie-ins, sequencing, coordination with various jurisdictional agencies having control over the ROW limits, notifications, crews or added resources needed for the phasing, and all other items for a successful and timely construction project to meet the project schedule.

- B. The Contractor shall have the capability of preparing and utilizing the specified construction progress scheduling techniques. A statement of capability shall be submitted in writing to the Engineer with the return of the executed Agreement to the City and will verify that either the Contractor's organization has in-house capability qualified to use the technique or that the Contractor employs a consultant who is so qualified. Capability shall be verified by description of the construction projects to which the Contractor or its consultant has successfully applied the scheduling technique and which were controlled throughout the duration of the project by means of systematic use and updating of the construction progress schedule, the network analysis and associated reports. The submittal shall include the name of the individual on the Contractor's staff who will be responsible for the construction progress schedule and associated reports and for providing the required updating information of same. The Contractor shall submit its proposed progress (baseline) schedule to the Engineer for review and comment within thirty days of the Notice to Award. The Engineer shall have the authority to determine acceptability/correctness of the schedule logic and activity interrelationships. The use of extraneous, nonworking activities and activities which add restraints to the construction schedule shall not be accepted. Baseline schedules that do not meet their contract completion dates shall not be accepted.
- C. The Contractor's progress schedule (baseline and monthly updates) shall be computer generated and resource loaded. Each construction progress schedule, and associated report shall include the following tabulations: a list of activities in numerical order, a list of activity precedence, schedules sequenced by Start Date, Total Float, and End Date. Each schedule and report shall include the following minimum items.
1. Activity Numbers
 2. Estimated Duration
 3. Activity Description
 4. Start Date (Calendar Dated)
 5. End Date (Calendar Dated)
 6. Status (whether critical)

7. Estimated Cost of The Activity
 8. Total Float and Free Float
- D. In addition, each construction progress schedule, network analysis and report shall be prefaced with the following summary data:
1. Contract Name and Number
 2. Contractor's Name
 3. Contract Duration and Float
 4. Contract Schedule
 5. The Effective or Starting Date of The Schedule (the date indicated in the Notice-to-Proceed)
- E. The workday to calendar date correlation shall be based on an 8-hour day and 40-hour week with adequate allowance for holidays and all other special requirements of the Work. A total of six (6) days for adverse weather shall also be allowed for in the progress schedule.
- F. If the Contractor desires to make changes in its method of operating which affect the construction progress schedule and related items, the Contractor shall notify the Engineer in writing stating what changes are proposed and the reason for the change. If the Engineer accepts these changes, in writing, the Contractor shall revise and submit, without additional cost to the City, all of the affected portions of the construction progress schedule, and associated reports. The construction progress schedule and related items shall be adjusted by the Contractor only after prior acceptance, in writing by the Engineer. Adjustments may consist of changing portions of the activity sequence, activity durations, division of activities, or other adjustments as may be required. The addition of extraneous, nonworking activities and activities which add restraints to the construction progress schedule shall not be accepted.
- G. Except where earlier completions are specified, schedule dates which show completion of all Work prior to the contract completion date shall, in no event, be the basis for claim for delay against the City by the Contractor.
- H. Construction progress schedules and related items which contain activities showing negative float or which extend beyond the contract completion date will not be accepted by the Engineer.
- I. Whenever it becomes apparent from the current construction progress schedule and associated reports that delays to the critical path have resulted and the contract

completion date will not be met, or when so directed by the Engineer, the Contractor shall take some or all of the following actions at no additional cost to the City. They shall submit to the Engineer for approval, a written statement of the steps they intend to take to remove or arrest the delay to the critical path in the current construction progress schedule, including a computer-generated schedule revision to reflect proposed actions.

1. Increase construction manpower in such quantities and crafts as will substantially eliminate the backlog of work.
 2. Increase the number of working hours per shift, shifts per day, working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate the backlog of work.
 3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities and comply with the revised schedule.
- J. If when so requested by the Engineer, the Contractor should fail to submit a written statement of the steps they intend to take or should fail to take such steps as reviewed and accepted in writing by the Engineer, the Engineer may direct the Contractor to increase the level of effort in manpower (trades), equipment and work schedule (overtime, weekend and holiday work, etc.) to be employed by the Contractor in order to remove or arrest the delay to the critical path in the current construction progress schedule, and the Contractor shall promptly provide such level of effort at no additional cost to the City.
- K. If the completion of any activity, whether or not critical, falls more than 100 percent behind its previously scheduled and accepted duration, the Contractor shall submit for approval a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.
- L. Shop drawings which are not approved on the first submittal or within the time scheduled, and equipment which does not pass the specified tests and certifications shall be immediately rescheduled.
- M. The contract time will be adjusted only in accordance with the General Requirements and other portions of the Contract Documents as may be applicable. If the Engineer finds that the Contractor is entitled to any extension of the contract completion date, the Engineer's determination as to the total number of days extension shall be based upon the current construction progress schedule and on all data relevant to the extension. Such data shall be included in the next updating of the schedule and related items. Actual delays in activities which, according to the construction progress schedule, do not affect any contract completion date will not be the basis for a change therein.

- N. From time to time it may be necessary for the contract schedule of completion time to be adjusted by the City in accordance with the General Requirements and other portions of the Contract Documents as may be applicable. Under such conditions, the Engineer will direct the Contractor to reschedule the Work or contract completion time to reflect the changed conditions, and the Contractor shall revise the construction progress schedule and related items accordingly, at no additional cost to the City.
- O. Available float time may be used by the City through the City's Engineer.
- P. The City controls the float time and, therefore, without obligation to extend either the overall completion date or any intermediate completion dates, the City may initiate changes that absorb float time only. City initiated changes that affect the critical path on the network diagram shall be the sole grounds for extending the completion dates. Contractor initiated changes that encroach on the float time may be accomplished only with the City's concurrence. Such changes, however, shall give way to City initiated changes competing for the same float time.
- Q. To the extent that the construction project schedule, or associated report or any revision thereof shows anything not jointly agreed upon or fails to show anything jointly agreed upon, it shall not be deemed to have been accepted by the Engineer. Failure to include on a schedule 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 review of the schedule by the Engineer.
- R. Review and acceptance of the construction progress schedule, and related reports, by the Engineer is advisory only and shall not relieve the Contractor of the responsibility for accomplishing the Work within the contract completion date. Omissions and errors in the construction progress schedule, and related reports shall not excuse performance less than that required by the Contract and in no way make the Engineer an insurer of the Contractor's success or liable for time or cost overruns flowing from any shortcomings in the construction progress schedule, and related reports.
- S. The Contractor shall present and discuss the proposed schedule at the preconstruction conference.
- T. The construction progress schedule shall be based upon the precedence diagramming method of scheduling and shall be prepared in the form of a horizontal bar chart showing in detail the proposed sequence of the Work and identifying all construction activities included but not limited to yard piping, all structures and treatment units and all related Work specified herein to be performed under the Contract. The schedule shall be time scaled, identifying the first day of each week, with the estimated date of starting and completion of each stage of the Work in order to complete the project within the contract time. The project critical path shall be clearly identified in color or by other means acceptable to the Engineer.

- U. The progress schedule shall be plotted on 22-inch by 34-inch and 11-inch by 17-inch paper and shall be revised and updated monthly, depicting progress through the last day of the current month and scheduled progress through completion. Ten (one 22-inch by 34-inch and nine 11-inch by 17-inch), schedules, required schedule "sorts" (tabulations) and an electronic copy of the baseline schedule shall be submitted for review and acceptance. Five (one 22-inch by 34-inch and four 11-inch x 17-inch) up-to-date copies of the schedule and five copies of tabulations and an electronic copy shall be submitted along with the application for monthly progress payments for the same period.
- V. The construction progress schedule shall be developed and maintained using Primavera Sure Trak as manufactured by Primavera Systems, Inc., or equal.

1.04 SCHEDULE OF PAYMENT VALUES

- A. The Contractor shall submit a Schedule of Payment Values, in accordance with Section 01025, for all items in the proposal that are to be paid for on a lump sum basis. The schedule shall contain the labor and material values of the component parts of Work for the purpose of making progress payments during the construction period. The Schedule of Payment Values shall directly correlate on an item by item basis (unless otherwise accepted by the Engineer) to each individual activity detailed in the construction progress schedule.
- B. The schedule shall be given in sufficient detail for the proper identification of Work accomplished. Each item shall include its proportional share of all costs including the Contractor's overhead, contingencies and profit. The sum of all scheduled items shall equal the total value of the Contract.
- C. If the Contractor anticipates the need for payment for materials stored on the project site, it shall also submit a separate list covering the cost of materials, delivered and unloaded with taxes paid. This list shall also include the installed value of the item with coded reference to the Work items in the Schedule of Payment Items.
- D. The Contractor shall expand or modify the above schedule and materials listing as required by the Engineer's initial or subsequent reviews.
- E. The Contractor shall update the Schedule of Payment Values monthly for reviewing by the Engineer. The payment applications shall be reviewed by the Engineer in accordance with the updated Schedule of Payment Values.

1.05 SHOP DRAWINGS, PROJECT DATA AND SAMPLES

- A. General: A Shop Drawing Submittal Schedule shall be provided by the Contractor within thirty (30) days of the Notice to Proceed.

- B. The Contractor shall furnish for review four (4) copies of shop drawings, project data, samples and other submittal items required by the Contract Documents. Two (2) copies shall be returned to the Contractor stamped "Furnish as Submitted" or "Furnish as Corrected". Where major corrections are indicated, two (2) copies will be returned stamped "Revise and Resubmit" and a new submittal is required (4 copies).
- C. The review of the Contractor's submissions shall in no way relieve the Contractor of any of his responsibilities under the Contract. An acceptance of a submission shall be interpreted to mean that there are no specific objections to the submitted material, subject to conformance with the Contract Drawings and Specifications.
- D. All submissions shall be dated and properly referenced to the specifications section and Contract Drawing number. The submittal number shall match the following submittal numbering system (or an equivalent system as approved by the Engineer):
- E. Submittal Numbering System
1. Package ID: The package number will reflect the CSI (specification) section number as it appears in the specifications.
 2. Subgroup ID: The submittal number will include the CSI number followed by two additional codes. The first will define the type of submittal as follows:
 - a. 01 - Product Data, Specifications, Cut Sheets, Manufacturers certification or approval letters
 - b. 02 - Shop Drawings
 - c. 03 - Product Samples and Mock-Ups
 - d. 04 - Special requirements as required in the contract documents
 - e. 05 - As-Built Drawings
 - f. 06 - Warranties
 - g. 07 - O&M
 - h. 08 - Spare Parts

The second code will identify individual submittals within that submittal type. The number to the left of the decimal represents the submittal number and the number to the right of the decimal represents the revision number.

Example:

<u>Package</u>	<u>Submittal</u>	<u>Description</u>
03300	03300-01-1.1	Concrete Admixture A, First Submittal
06400	06400-01-1.2	Re-submittal
		← First Submittal
		← Product Data
		← Finish Carpentry

By the following this code system, all submittals may be entered into the Document Tracking System prior to receipt of submittals. When a particular submittal is received, locate the entry in the Document Tracking project file, add the appropriate information and process. The Document Tracking System will provide the next sequence number.

- F. Shop Drawings and Project Data within practical limits shall be submitted as a single complete package for any operating system and shall include all items of equipment and mechanical units involved in the functioning of such system. Where applicable, the submission shall include elementary wiring diagrams showing circuit functioning and necessary interconnection wiring diagrams for construction.
- G. All submissions shall bear the Contractor’s stamp certifying that they have been checked for conformance and accuracy. Submissions without the Contractor’s stamp of approval will not be reviewed by the Engineer and will be returned to the Contractor.
- H. For any submission containing any departure from the Contract Documents and the Contractor shall include proper explanation in his letter of submittal.
- I. Work on fabricated or special items shall not be commenced until the required submission information has been reviewed and accepted.
- J. Standard items shall not be assembled or shipped until the required submission information has been reviewed and accepted.
- K. Prior review actions shall not relieve the Contractor of the responsibility for correcting errors, deviations, and/or omissions discovered at a later date.
- L. Shop Drawings: Shop Drawings include, but are not limited to, layout drawings, installation drawings, construction drawings, certified and interconnecting wiring diagrams, etc. The Contractor shall be responsible for security of all the information, details, dimension, drawings, etc. necessary to prepare submission drawings required and

necessary under this Contract and to fulfill all other requirements of his Contract. The Contractor shall secure such information, details, drawings, etc. from all possible sources including the Contract Drawings, drawings prepared by subcontractors, Engineer, manufacturers, Contractors, etc.

- M. Submission drawings shall accurately and clearly present the following:
1. All working and installation dimensions.
 2. Arrangement and sectional views.
 3. Units of equipment in the proposed position for installation, details of required attachments and connections and dimensioned locations between units and in relation to the structures.
 4. Necessary details and information for making connections between the various trades including but not limited to, power supplies and interconnection wiring between units, accessories, appurtenances, etc.
- N. Product Data: Where manufacturer's publications in the form of catalogs, brochures, illustrations, or other data sheets are submitted in lieu of prepared shop drawings, such submission shall specifically indicate the particular item offered. Identification of such items and relative pertinent information shall be made with indelible ink. Submissions showing only general information will not be accepted.
- O. Product data shall include materials of construction, dimensions, performance characteristics, capacities, wiring diagrams, piping and controls, etc.
- P. Samples: Contractor shall furnish for review all samples as required by the Contract Documents or requested by the Engineer.
- Q. Samples shall be of sufficient size or quantity to clearly illustrate the quality, type, range of color, finish or texture and shall be properly labeled to show the nature of the work where the material represented by the sample will be used.
- R. Samples shall be checked by the Contractor for conformance to the Contract Documents before being submitted to the Engineer and shall bear the Contractor's stamp certifying that they have been so checked. Transportation charges on samples submitted to the Engineer shall be prepaid by the Contractor.
- S. Engineer's review will be for compliance with the Contract Documents, and his comments will be transmitted to the Contractor with reasonable promptness.
- T. Accepted samples will establish the standards by which the completed work will be judged.

1.06 OPERATION AND MAINTENANCE INSTRUCTIONS (MANUALS)

- A. Individual Instructions: The Contractor, through manufacturer's representatives or other qualified individuals, shall provide instruction of designated employees of the Owner in the operation and care of all equipment furnished.
- B. Written Instructions: The Contractor shall furnish and deliver to the Engineer, prior to the fifty percent completion point of construction, and no later than thirty (30) days prior to operator training, ten (10) complete sets of instructions, technical bulletins, and any other printed matter such as diagrams, prints or drawings, containing full information required for the proper operation, maintenance, and repair of the equipment. As a minimum, the following shall be included in this submittal:
1. Operating Instructions
 2. Troubleshooting Information
 3. Maintenance Schedule(s)
 4. Lubrication Schedule
 5. Location of Service Centers
 6. Parts Diagram and List
 7. Spare Parts List (spare parts furnished shall be defined)
 8. Special Tools List
 9. Installation Instructions
 10. Assembly & Erection Drawings
 11. Dimensional Drawings
 12. Wiring Diagram(s)
 13. Storage Instructions
- C. These requirements are a prerequisite to the operation and acceptance of equipment. Each set of instructions shall be bound together in appropriate three-ring binders. A detailed Table of Contents shall be provided for each set. Written operation and maintenance instructions shall be required for all equipment items supplied for this project. The amount of detail shall be commensurate with the complexity of the equipment item. Submittal shall be made for all mechanical and electrical equipment included but not limited to pumps, valves, gates, etc.

- D. Information not applicable to the specific piece of equipment installed on this project shall be struck from the submission. Information provided shall include a source of replacement parts and names of service representatives, including address and telephone number.
- E. Extensive pictorial cuts of equipment are required for operator reference in servicing.
- F. When written instructions include shop drawings and other information previously reviewed by the Engineer, only those editions thereof which were accepted by the Engineer, and which accurately depict the equipment installed, shall be incorporated in the instructions.

1.07 RECORD DRAWINGS

- A. Refer to Section 01720 for specific Record Drawing requirements.
- B. The Contractor shall keep and maintain, at the job site, one record set of Drawings. On these, it shall mark all project conditions, locations, configurations, and any other changes or deviations which may vary from the details represented on the original Contract Drawings, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Drawings. As-Built furnished grade information shall be included on the record drawings. Said record drawings shall be supplemented by detailed sketches as necessary or directed to indicate, fully, the Work as actually constructed. These master record drawings of the Contractor's representation of as-built conditions, including all revisions made necessary by addenda and change orders shall be maintained up to date during the progress of Work.
- C. The record drawings shall be received on the 20th working day of every third month after the month in which the final notice to proceed is given as well as on completion of Work. Failure to maintain the record drawings up to date shall be grounds of withholding monthly progress payments until such time as the record drawings are brought up-to-date.
- D. In the case of those drawings which depict the detail requirement for equipment to be assembled and wired in the factory, such as motor control centers and the like, the record drawing shall be updated by indicating those portions which are superseded by change order drawings or final shop drawings, and by including appropriate reference information describing the change orders by number and the shop drawings by manufacturer, drawing, and revision numbers.
- E. Record drawings shall be accessible to the Engineer at all times during the construction period.

- F. Upon substantial completion of the Work and prior to final acceptance, the Contractor shall finalize and deliver a complete set of final record drawings to the Engineer for transmittal to the City, conforming to the construction records of the Contractor. This set of drawings shall consist of corrected drawings showing the reported location of the Work. The information submitted by the Contractor and incorporated in the Final Record Drawings will be assumed to be correct, and the Engineer will not be responsible for the accuracy of such information, and for any errors or omissions which may appear on the Final Record Drawings as a result.
- G. The information submitted by the Contractor in the Final Record Drawings shall be certified by a land surveyor registered in the State of Florida. For clarity, Final Record Drawings needs to be redrawn and clearly labeled as "Record Drawings". Notations indicated in the drawings shall be legible and printed in black ink. No handwritten notes are allowed.
- H. Final payment will not be acted upon until the Engineer certifies the record drawings as required by the agencies having jurisdiction. Said up-to-date record drawings shall be in the form of a set of prints with carefully plotted information.
- I. All final record drawings shall be certified by the Engineer of Record. Such certification shall evidence that Engineer has reviewed the information, finds it in substantial accordance with the design; and where deviations from the design exist, that said deviations are not to the detriment of the system. Engineer's certification shall read as follows:
- "I HEREBY NOTIFY THE OWNER OF THE COMPLETION OF CONSTRUCTION OF ALL THE COMPONENTS OF THE WATER, SEWER AND STORMWATER FACILITIES FOR THE ABOVE REFERENCED PROJECT AND CERTIFY THAT THEY HAVE BEEN CONSTRUCTED IN SUBSTANTIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS PERMITTED BY THE AGENCIES HAVING JURISDICTION."
- J. The Contractor shall submit all electronic media files of the paving, grading, water, sewer and drainage plans, reports, other supporting information, and the final version of as-builts drawings shall be submitted to the Engineer's office. The information provided shall contain an index file with a brief description of the electronic filing contents, and shall be labeled with project name, company name, and point of contact. Documents and spreadsheets shall be submitted in either MS Word, Word Perfect, Excel, Lotus, or other format approved by the Engineer. Drawings shall be submitted in AutoCad, Microstation, or other format approved by the Engineer.
- K. Final Record Drawings shall conform to Section 01720 and shall be submitted to the City, including, but not limited to the following information:
1. Drawings shall be legibly marked to record actual construction.

2. Drawings shall show actual location of all underground and above ground water and wastewater, stormwater piping and related appurtenances. All changes to piping location including horizontal and vertical locations of utilities and appurtenances shall be clearly shown and referenced to permanent surface improvements. Drawings shall also show actual installed pipe material, class, etc. Profile sheets shall be updated to include all field measurements and elevations taken during construction.
3. Drawings shall clearly show all field changes of dimension and detail including changes made by field order or by change order.
4. Drawings shall clearly show all details not on original contract drawings but constructed in the field. All equipment and piping relocation shall be clearly shown.
5. Location of all manholes, hydrants, tees, reducers, crosses, valves, and valve boxes shall be shown. All tees, reducers, crosses, and valves shall be referenced from at least two (2) and preferably three (3) permanent points such as building corners and roadway intersections.
6. Dimensions between all manholes shall be field verified and shown. The rim, inverts and grade elevations of all manholes shall be shown.

1.08 WARRANTIES

- A. Original warranties, called for in the Contract Documents, shall be submitted to the City through the Engineer. When warranties are required, they shall be submitted prior to request for payment.
- B. When advance copies of warranties are requested, they shall be submitted with, and considered as shop drawings.
- C. The Contractor shall warrant to the City that all material and labor used in the construction are covered by his warrantee for a minimum of a one-year period upon approval and acceptance by the City. The Contractor shall replace or repair defects at no cost to the City during the warrantee period. No visible or potential leakage shall be allowed during the warrantee period.

1.09 CERTIFICATES

- A. Copies of certificates of compliance and test reports shall be submitted for requested items to the Engineer prior to request for payment.

1.10 AUDIO-VISUAL PRECONSTRUCTION RECORD

- A. General: Prior to commencing work, the Contractor shall have a continuous color audio-video DVD recording taken of the entire Project, including existing areas that will be disturbed by the Contractor's operations, to serve as a record of preconstruction conditions. No construction shall begin prior to review and acceptance of the tapes covering the respective, affected construction area by the Engineer. The Engineer shall have the authority to reject all or any portion of the video DVD not conforming to the specifications and order that it be redone at no additional charge. The Contractor shall reschedule unacceptable coverage within five days after being notified. The Engineer shall designate those areas, if any, to be omitted from or added to the audio-video coverage. Audio-video recordings shall not be performed more than ninety days prior to construction in any area. All DVDs and written records shall become property of the City.
- B. Services: The Contractor shall engage the services of a professional electrographer. The color audio-video tapes shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business of preconstruction color audio-video tape documentation. The electrographer shall furnish to the Engineer a list of all equipment to be used for the audio-video taping, i.e., manufacturer's name, model number, specifications and other pertinent information. Additional information to be furnished by the electrographer is the names and addresses of two references that the electrographer has performed color audio-video taping for on projects of a similar nature within the last twelve months.
- C. Audio-Video DVDs: Audio-video DVDs shall be new. The DVDs shall be compatible for with a standard player-receiver.
- D. Equipment: All equipment, accessories, materials and labor to perform this service shall be furnished by the Contractor.
 - 1. 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 and clarity and be free from distortion and interruptions.
 - 2. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall not be less than twelve feet. In some instances, audio-video tape coverage may be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking or special conveyance acceptable to the Engineer.

3. The color video camera used in the recording system shall have a horizontal resolution of 300 lines at center, a luminance signal to noise ratio of 45 dB and a minimum illumination requirement of twenty-five foot-candles.
- E. Recorded Information - Audio: Each tape shall begin with the current date, project name and municipality and be followed by the general location; i.e., process structure, or area, 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.
- F. Recorded Information - Video: All video recordings must, by electronic means, display continuously and simultaneously, generated with the actual taping, transparent digital information to include the date and time of recording. The date information shall contain the month, day and year. The time information shall contain the hours, minutes, and seconds. Additional information shall be displayed periodically. Such information shall include, but not be limited to, project name, bid package number, process structure or area, and the viewing side. This transparent information shall appear on the extreme upper left hand third of the screen.
- G. Conditions for Taping: All taping shall be done during times of good visibility. No taping 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 recordings and to produce bright, sharp video recordings of those subjects.
- H. Tape Coverage: Tape 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 road, driveways, sidewalks, curbs, pavement, landscaping, fences, signs and interior and exterior of existing structures affected by the work and the exteriors of structures adjacent to the work, and any other on-site area that will be occupied or impacted by the Contractor or any of his subcontractors or suppliers within the area covered.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01400

TESTING AND INSPECTION

PART 1 - GENERAL

- A. All testing and inspection will be in accordance with the General Conditions or the applicable sections included within each Division.
- 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 City 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 only if such tests, inspections, 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

CONTRACTOR'S HEALTH AND SAFETY PLAN

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. This Section describes Contractor's responsibilities for a written site-specific health and safety plan (SSHP). Contractor shall conduct all construction activities in a safe manner so as not to result in:
 - a. Injuries to employees, Subcontractors or other persons with an interest at or near the Site,
 - b. Employee exposures to health hazards above the occupational limits established by the Occupational Health and Safety Administration (OSHA), the American Conference of Governmental Industrial Hygienists (ACGIH), or the Nuclear Regulatory Commission (NRC),
 - c. Exposure of area residents to air contaminants above the levels established for general public exposure by the Environmental Protection Agency (EPA), NRC, or the State in which the Project is located,
 - d. Significant increases in the levels of contaminants in soil, water, or sediment near the Site, or
 - e. Violations of OSHA, or other Laws or Regulations.

- B. Any disregard of the provisions of the SSHP may, without limitation, be deemed just and sufficient reason for termination of Contractor's services for cause.

1.02 QUALITY ASSURANCE

A. Qualifications:

1. Engage an industrial hygienist certified by the American Board of Industrial Hygiene or a safety professional certified by the Board of Certified Safety Professionals to prepare or supervise the preparation of the SSHP.
2. Submit qualifications along with SSHP.

- B. Regulatory Requirements: Contractor's health and safety practices shall follow the standards and guidelines established in the following:

- C. 29 CFR 1904, OSHA, Record Keeping.

1. 29 CFR 1910, OSHA, General Industry Standards.
2. 29 CFR 1926, OSHA, Construction Industry Standards.
3. 29 CFR 1926.65, OSHA, Hazardous Waste Operations and Emergency Response.
4. 49 CFR 171.8, DOT, Hazardous Materials in Transport.
5. 40 CFR Parts 261.3, 264 and 265, EPA, Resource Conservation and Recovery Act.
6. 29 CFR 1910.146, OSHA, Permit-Required Confined Spaces.
7. 29 CFR 1926.1101, OSHA, Asbestos

1.03 SUBMITTALS (Per Section 01300)

- A. Submit to Engineer the following:
 1. Contractor's SSHP.
 2. Qualifications of industrial hygienist or safety professional.
 3. Health and safety reports.
 4. Accident reports.

PART 2 - PRODUCTS

2.01 GENERAL PROVISIONS

- A. Submit SSHP to Engineer one week prior to the Preconstruction Conference, or 30 days prior to planned mobilization at the Site, whichever is sooner.
- B. The SSHP shall bear a stamp or specific written indication that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of the SSHP.
- C. Engineer will review and either accept or return for revision Contractor's SSHP in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and acceptance will be only to determine if the topics covered by the SSHP conform to the Contract Documents.
- D. Engineer's review and acceptance will not extend to means, methods, techniques, procedures of construction, or to whether the representations made in the SSHP comply with regulatory standards or standards of good practice.
- E. At the time of submittal, Contractor shall give Engineer specific written notice of variations, if any, that the SSHP may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the

submittal; and, in addition, by a specific notation made on each submittal to Engineer for review and acceptance of each such variation.

- F. No Work shall be performed on the Site until the written SSHP has been accepted by the Engineer.
- G. Notwithstanding any other provision of the Contract Documents, extensions to the Contract Times will not be granted if caused by undue delay by Contractor in developing or revising the SSHP.

2.02 WRITTEN HEALTH AND SAFETY PROGRAM

- A. The SSHP, which shall be kept on the Site, shall address the safety and health hazards of each phase of operations on the Site and include the requirements and procedures for employee protection. The SSHP as a minimum, shall address and include the following:
 - 1. The organizational structure of Contractor's organization.
 - 2. A comprehensive work plan.
 - 3. A safety and health risk or hazard analysis for each task and operation found in the work plan.
 - 4. Employee training assignments including copies of 40-hour, 24-hour Supervised Field Activities, 8-hour Supervisors, and 8-hour Refresher Training Certificates for all Contractors' employees assigned to the Project.
 - 5. Personal protective equipment to be used by employees for each of the tasks and operations being conducted. Respirator fit test certificates for all Contractor employees assigned to the Project.
 - 6. Medical Surveillance Requirements: Medical clearance certificates for all Contractors' employees assigned to the Project.
 - 7. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.
 - 8. Site control measures for purposes, including but not limited to:
 - a. Preventing trespassing,
 - b. Preventing unqualified or unprotected workers from entering restricted areas,
 - c. Preventing tracking of contaminants out of the Site,
 - d. Maintaining log of employees on and visitors to the Site,

- e. Delineating hot, cold and support zones,
 - f. Locating personnel and equipment decontamination zones, and
 - g. Communicating routes of escape and gathering points.
- 9. Decontamination procedures.
 - 10. An emergency response plan for safe and effective responses to emergencies, including the necessary PPE and other equipment.
 - 11. Confined space entry procedures (if applicable).
 - 12. A spill containment program.
- B. Organizational Structure:
- 1. The organizational structure part of the SSHP shall refer to or incorporate information on the specific chain of command and specify the overall responsibilities of supervisors and employees, and shall include, at a minimum, the following elements:
 - a. Designation of a general supervisor who has the responsibility and authority to direct all hazardous waste operations.
 - b. A Site safety and health supervisor who has the responsibility and authority to implement and modify the SSHP and verify compliance.
 - c. All other personnel needed for hazardous waste Site operations and emergency response and their general functions and responsibilities.
 - d. The lines of authority, responsibility, and communication.
 - 2. The organizational structure shall be reviewed and updated as necessary to reflect the current status of Site operations.
- C. Work Plan:
- 1. The comprehensive work plan part of the SSHP shall refer to or incorporate information on the following:
 - a. The tasks and objectives of the Site operations and the logistics and resources required to achieve those tasks and objectives.
 - b. The anticipated activities as well as the Contractor's normal operating procedures.
 - c. The personnel and equipment requirements for implementing the work plan.

- D. The SSHP shall include procedures that will be used to ensure safe waste handling during the excavating, handling, loading, and transporting activities.

2.03 ACCIDENT REPORTING AND INVESTIGATION

- A. Document all accidents resulting in bodily injury using OSHA 301 form.
- B. Submit copies of completed OSHA 301 forms to the Engineer weekly.
- C. Based upon the results of an accident investigation, make modifications to the SSHP by changing tasks or procedures to prevent a reoccurrence.
- D. Post a copy of Contractor's OSHA 300A report in a conspicuous place onsite.

2.04 DAILY HEALTH AND SAFETY FIELD REPORTS

- A. Submit to Engineer daily health and safety field reports including, but not limited to, weather conditions, delays encountered in construction, and acknowledgment of deficiencies noted along with corrective actions taken on current and previous deficiencies. In addition, the daily health and safety air monitoring results, documentation of instrument calibration, new hazards encountered, and PPE utilized shall be included.
- B. The daily health and safety field reports shall include a description of problems, real or anticipated, encountered during the course of Work that should be brought to the attention of the Engineer and notification of deviations from planned Work shown in the previously submitted daily health and safety field report(s).

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01500

CONSTRUCTION CONSIDERATIONS

PART 1 - GENERAL

1.01 HYDRAULIC UPLIFT ON STRUCTURES

- A. The Contractor shall be completely responsible for any structures, stormwater conflicting structure, tanks, wet wells, pipelines, manholes, foundations, cellars, or similar structures that may become buoyant during the construction operations due to the ground water, floods or buoyancy of piping caused due to the placement of flowable backfills before the structure is put into operation. 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 structures 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 CUTTING AND PATCHING

- 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 cut or 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 abandoned or otherwise removed and/or relocated 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 structures. Existing utilities coordination is exclusively the responsibility of the Contractor.**
- B. Pipelines: The Contractor shall 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. 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 below. 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.
- B. Where new rectangular openings are to be installed in concrete or concrete masonry walls or floors, the Contractor shall score the edges of each opening (both sides of wall or elevated slab) by saw cutting clean straight lines to a minimum depth of one inch and then chipping out the concrete. Alternately, the opening can be formed by saw cutting completely through the slab or wall. Saw cuts deeper than one inch (or the depth of cover over existing reinforcing steel, whichever is less) shall not be allowed to extend beyond the limits of the opening. Corners shall be made square and true by a combination of core drilling, chipping, or grinding. All necessary precautions shall be taken during removal of concrete to prevent debris from falling and damaging adjacent equipment or piping. Saw cuts allowed to extend beyond the opening shall be repaired by filling with nonshrink grout. The concrete around any exposed reinforcement steel shall be chipped back and exposed reinforcement steel cut a minimum of 1-1/2 inches from the finished face of the new opening. The inside face of the new opening shall be grout to fill any voids and cover the exposed aggregate and shall be trowel-finished to provide a plumb and square opening.
- C. Where new conduit or piping is to be installed through existing concrete walls, the Contractor shall accurately position the core-drill openings. Openings shall be adequately sized to allow alignment of piping or conduit and fittings without deflection and to provide adequate clearance for satisfactory packing in the annular space between the piping or conduit and the core drilling opening as shown on the Drawings.
- D. Where new piping is to be connected to existing piping, the existing piping shall be cut square and the ends properly prepared for the connection shown on the drawings. Any damage to the lining and coating of the existing piping shall be repaired by the Contractor.
- E. Where existing equipment, equipment pads and bases, piping, piping supports, electrical panels and devices, conduits, and associated appurtenances are removed, the Contractor shall rehabilitate the affected area such that little or no evidence of the previous installation remains. Opening in concrete floors, walls, and ceiling from piping, conduit,

and fastener penetrations shall be filled with nonshrink grout and finished to match the adjacent area. Concrete pads and bases for equipment and supports shall be removed by chipping away concrete and cutting any exposed reinforced steel and anchor bolts a minimum of 1-1/2 inches below finished grade. The area of concrete to be rehabilitated shall be scored by saw cutting clean, straight lines to a minimum depth of 1-1/2 inches, and all concrete within the scored lines removed to a minimum depth of 1-1/2 inches. The area within the scored lines shall be patched with nonshrink grout to match the adjacent grade and finish. Abandoned connections to piping and conduits shall be terminated with blind flanges, caps, and plugs suited for the material, type, and service of the pipe or conduit.

- F. Where existing structural steel members are removed or modified, the surface of the remaining existing steel members damaged by construction activities shall be repaired. The affected areas shall be surface prepared and coated in accordance with Section entitled "Painting."
- G. 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 INSTALLATION OF EQUIPMENT

- A. Contractor shall have on hand sufficient personnel, proper equipment, and machinery of ample capacity to facilitate the work.
- B. Contractor shall be responsible for locating, aligning and leveling all equipment and shall employ a licensed surveyor to set all lines and levels of equipment to the accuracy required.
- C. Complete manufacturers installation instructions, including permissible tolerances, shall be furnished in duplicate with each unit of equipment or set of identical units.
- D. All equipment shall be installed in accordance with the shop drawings; inclusive of manufacturers' specifications, drawings and tolerances; under the direct supervision of the required manufacturers Engineer. No instructions shall be issued that are contrary to written specifications without prior written approval by the City's Engineer.
- E. Equipment shall be erected in a neat and workmanlike manner on the foundations' at the locations and elevations shown on the drawings unless otherwise indicated by the Engineer during installation.

1.08 SUPERVISION BY MANUFACTURER'S REPRESENTATIVES

- A. The Contractor shall provide the services of qualified equipment manufacturers technical representatives who shall adequately supervise the installation and testing of all equipment furnished under this Contract and instruct the Contractor's personnel and City's operating personnel in its maintenance and operation.

1.09 EQUIPMENT MANUFACTURER'S CERTIFICATION

- A. As a condition precedent to acceptance of equipment installed and operating, the Contractor will provide the City with written certification, obtained from each company manufacturing equipment for the project that the equipment is installed and does operate in accordance with the specifications and manufacturers recommendations. In addition, the Contractor will be required to provide start up documentation, coordination with the equipment manufacturer, O&M manuals, warranties and a fully functional/complete product.

1.10 SLEEVES AND OPENINGS

- A. The Contractor shall provide all openings, chases, etc., to fit his own work and that of any other subcontractors and contractors. All such openings or chases shown on the Contract Drawings, or reasonably implied thereby, or as confirmed or modified by shop, setting or erecting drawings approved by the Engineer, shall be provided by the Contractor.
- B. Where pipes or conduits are to pass through slabs or walls, or where equipment frames or supports are to be installed as integral part of an opening, the sleeves, opening, forms or frames shall be furnished by the installer of the pipes, conduits or equipment, but shall be placed by the Contractor.
- C. Where hanger inserts, anchor bolts and similar items are to be embedded in concrete as an integral part of a slab or wall, they shall be furnished by the installer of the pipe or other equipment requiring the hanger, etc. but shall be placed by the Contractor.
- D. When requested by the Contractor, the installer of the pipes, conduit, or equipment, including those contractors or subcontractors who require openings or chases in slabs and walls for passage of ducts, mounting or equipment, etc., shall furnish all necessary information, instructions, and materials to effect accurate installation of the required openings, chases, sleeves, frames, inserts, etc. When such items are secured in position, and just prior to construction of the surrounding slab or wall, the subcontractor or contractor for whom the items are installed shall ascertain the proper number, locations, and settings thereof; and the Contractor shall schedule his operations so as to provide a reasonable opportunity and time interval for such inspection.
- E. Any cost resulting from correction of defective, ill-timed, or mislocated work, or for subsequent work which becomes necessary because of omitted openings, chases, sleeves, frames, inserts, etc., shall be borne by the subcontractor or contractor responsible therefor. No contractor or subcontractor shall arbitrarily cut, drill, alter, damage, or otherwise endanger the work of another Contractor. In no case shall beams lintels, or other structural members be cut without the approval of the Engineer. The nature and extent of any corrective or additional work shall be subject to the approval of the Engineer following consultation with the affected parties.

1.11 OBSTRUCTIONS

- A. All water pipes, storm 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.

1.12 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.

1.13 CONSTRUCTION DEWATERING

- 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 Hollywood Noise Ordinance and/or Broward County Noise Ordinance, whichever is more stringent.
- B. Dewatering shall be done in accordance with Section 02140 - Dewatering.

1.14 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. Existing utilities shall be protected in accordance with Section 01530 - Protection of Existing Facilities.

1.15 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.

1.16 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 other facilities.
- 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.

1.17 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.

1.18 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.

1.19 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. Department of Labor, Occupational Safety and Health Administration.
- B. The Contractor shall provide all barricades and flashing warning lights or other traffic and warning devices necessary to warn pedestrians and area traffic. See Section 01570 – Traffic Regulations and Maintenance of Traffic.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

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

- A. **The Construction Schedule shall be submitted by the Contractor and include phasing considerations, layout, sequencing and plans. The phasing plan must be reviewed and approved by the City and the Engineer.**

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 in accordance with Article 14-2, Partial Utilization of the General Conditions.

1.04 CONNECTION OF EXISTING SYSTEMS

All connections to existing systems shall be performed in such a manner that no damage and minimal interruption is caused to the existing installation. Advanced notice and coordination with the City is required for all tie-ins/connections and for any necessary system isolation(s). On completion of its installation, the Contractor shall complete the connection 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 DEPARTMENT OF PUBLIC UTILITIES 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 wastewater treatment plant and existing potable water, sewer and stormwater facilities without the City's authorization, in writing, and supervision. The Contractor shall notify the City's

representative in writing a minimum of three workdays 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 with construction (including mobilization and maintenance of traffic) the Contractor shall distribute copies of the "Notice to Owners" (to be provided by the City) and "Right of Entry and Temporary Construction Easement" (refer to Appendix) to all property owners/tenants within the project area and shall obtain permission from property owners/tenants prior to working within their properties.

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 entitled "Protection of Existing Facilities". Utilities that present potential conflict with the proposed piping shall be field verified by the Contractor with soft digging, GPR, or other methods as necessary.
- 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 interference's and disruptions.
- C. All work by the Contractor that disrupts the normal utilities operations shall be shown on the Construction Schedule specified in Section 01300 and specifically scheduled with the City. Schedule notification shall consist of a written notice defining the work to be accomplished, the normal treatment plant that will be interrupted, the 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, the Contractor shall undertake closing off any pipelines, or opening 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 to City Underground staff.

- 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 the review and acceptance of the Engineer.
- 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. A phasing plan is to be submitted by the Contractor including a phasing schedule, exhibit for the phasing areas and sequencing considerations (permitting, MOT, etc). The Contractor must obtain approval of the phasing plan prior to commencement of construction.
- 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 of the Water and/or Sewer Systems: The tasks included under this phase consist of installation of proposed improvements and sequencing effort for corridors that are congested or needed phased infrastructure and partial clearances as well as other infrastructure considerations for project completion.
- 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. Homeowners 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. Requests for approval to work during other than regular hours must be submitted to the Engineer and City 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 ample time to arrange for personnel to be at the site of the Work, even for work required to occur by contract. Contractor shall pay for the charges for all overtime 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 work. The Contractor shall not violate the Hollywood Code of 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

- A. The Contractor shall coordinate with Sunshine One-Call Notification at 811 a minimum of 48 business hours prior to any excavation for location of existing underground facilities.

3.02 COOPERATION

- A. 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, altering or replacing such equipment pipes, sewers, conduits, manholes, wires, or other structures and appliances which may be required to be installed at or in the work. The Contractor shall cooperate with all the aforesaid parties and shall allow reasonable provisions for the

prosecution 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

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 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 City.
- 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/ALLEYS

- A. General: All paved areas including asphaltic concrete berms cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit. 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.
- B. Temporary Restoration: 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, unless otherwise shown on the drawings.
- 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.

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. Utilities to be Moved: 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 City 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 City a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.
- C. 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 shown, 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.
- D. 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.
- E. Underground Utilities Shown or Indicated: Existing utility lines that are shown 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 by the Contractor at the Contractor's cost.

- F. **Underground Utilities Not Shown or Indicated:** In the event that the Contractor damages any existing utility lines that are 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 under the provisions for changes and extra work contained in the General Conditions.
- G. **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.
- H. **No fill, excavation material, construction generated debris or equipment shall obstruct water valves, gas meters or sewer manholes.** Water, sewer and gas service shall be made accessible to repair or maintenance crews representing the City or a privately-owned utility company.
- I. **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 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

- A. **Trees are to be protected at all times.** If any tree removal, trimming or relocation is required, the Contractor needs to coordinate with the Engineer, accordingly. Trees that are removed are required to be replaced at the Contractor's expense and in kind to the greatest extent possible. 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

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 the main gate for 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 off site sources at no additional cost to the City.
- 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

SECTION 01560

SPECIAL CONTROLS

PART 1 - GENERAL

1.01 CHEMICALS

- A. All chemicals used during project construction or furnished for testing of project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or other classification, will be required to show approval of either EPA or HUD. The handling, use, storage and disposal of such materials, containers or residues shall be in strict conformance with manufacturer and/or Contractor's secured storage. Copies of antidote literature and a supply of antidotes shall be kept at the job site office.

1.02 DUST

- A. During all work for this Contract, the Contractor shall by the application of water and/or calcium chloride or other means, approved by the Engineer, eliminate dust annoyance to adjacent property, business establishments and the plant site in accordance with Article 7.21, Dust Control, of the General Conditions. The Contractor shall take all protective measures, to the satisfaction of the Engineer, necessary to ensure that dust and debris does not enter any of the mechanical or electrical equipment. The Contractor shall be responsible for the cleanup of existing buildings, equipment, controls, etc., which have become soiled due to the lack of proper dust control as determined by the Engineer. The Contractor shall provide daily application of water to all unpaved areas designated by the Engineer in the field and to the satisfaction of the Engineer in the field.

1.03 NOISE

- A. Noise resulting from the Contractor's work shall not violate the Hollywood Code of Ordinance Chapter 100, with specific note to the restrictions of paragraph 100.05 or exceed the noise levels and other requirements stated in the Broward County Chapter 27 Pollution Control, relating to noise abatement in Broward County. The Contractor shall be responsible for curtailing noise resulting from all operations, and upon written notification from the Engineer or the noise control officers, make any repairs, replacements, adjustments, additions and furnish mufflers or other noise attenuation devices when necessary to fulfill requirements.

1.04 EROSION ABATEMENT AND WATER POLLUTION

- A. It is imperative that the Contractor's dewatering operations not contaminate or disturb the environment or properties adjacent to the Work. The Contractor, shall, therefore, schedule and control his operations to confine all runoff water from disturbed surfaces, water from dewatering and/or from excavation below the ground water table operations that becomes contaminated with lime silt, muck and other deleterious matter, fuels, oils, bitumens, calcium chloride, chemicals and other polluting materials.

- B. The Contractor shall construct temporary stilling basin(s) of adequate size and provide all necessary temporary materials, operations and controls including, but not limited to, filters, coagulants, screens and other means necessary to attain the required discharge water quality.
- C. The Contractor shall be responsible for providing, operating and maintaining materials and equipment used for conveying the clear water to the point of discharge. All pollution prevention procedures, materials, equipment and related items shall be operated and maintained until such time as the dewatering operation is discontinued. Upon the removal of the materials, equipment and related items the Contractor shall restore the area to the condition prior to his commencing work.

1.05 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 Owner a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the Owner 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 Hollywood, 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 subject to flooding. Known areas of Hollywood that would be subject to flooding from storm tides include, but are not limited to:

Hollywood Blvd.	North Lake Area	South Lake Area
A1A	Sheridan Street	Dania Beach Blvd.
US Highway 1	46 th Avenue	Hallandale Beach Blvd.

1.06 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.

1.07 PERIODIC CLEAN-UP; BASIC SITE RESTORATION

- A. During construction, the Contractor shall regularly remove from the site all accumulated debris and surplus materials of any kind which result from his operations, or whenever the accumulation in excess of one truck load. Unused equipment and tools shall be stored at the Contractor's yard or base of operations for the project.
- B. When the work involves installation of sewers, drains, water mains, manholes, underground structures, or other disturbance of existing features in or across streets, rights-of-way, easements, or private property, the Contractor shall (as the work progresses) promptly backfill, compact, grade and otherwise restore the disturbed area to a basic condition which will permit resumption of pedestrian or vehicular traffic and any other critical activity or function consistent with the original use of the land. Unsightly mounds of earth, large stones, tree roots, boulders, and debris shall be removed so that the site presents a neat appearance.
- C. The Contractor shall perform the clean-up work on a regular basis and as frequently as ordered by the Engineer. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such work shall also be accomplished, when ordered by the Engineer, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.
- D. Upon failure of the Contractor to perform periodic clean-up and basic restoration of the site to the Engineer's satisfaction, the Engineer may, upon five (5) days prior written notice to the Contractor, employ such labor and equipment as he deems necessary for the purpose, and all costs resulting therefrom shall be charged to the Contractor and deducted from the amounts of money that may be due him.

1.08 SECURITY

- A. The Contractor shall care for and protect against loss or damage of all material to be incorporated in the construction for the duration of the Contract and shall repair or replace damaged or lost materials and damage to structures.
- B. The Contractor shall be responsible for providing and maintaining temporary fencing and gates and the daily securing of temporary fencing and gates used for construction purposes for the duration of the project.

- C. The Contractor shall strictly comply with working hours on the project site. Prior to any work outside of the standard working hours, the Contractor shall request the City's approval via written request (at least 8 hours in advance). The written request shall clearly define the work to be performed, the names of the employees, their employer and their trade and the hours and days during which the work is planned. Other jurisdictions requiring notification or as part of a permit condition must also be coordinated with and notified by the Contractor prior to commencement for all work hours.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

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 Hollywood, Broward County and other local authorities having jurisdiction, to maintain adequate warning signs, lights, barriers, etc., for the protection of vehicular traffic and pedestrian traffic on public roadways and within the project corridor.
- B. 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, railing, etc. shall be erected 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. Traffic Control and Maintenance of traffic during construction shall be included in the Contractor's bid and no additional payment shall be requested to the City for these activities
- C. 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. Department of Transportation, Federal Highway Administration (ANSI D6.1).
- D. The Contractor shall submit a Maintenance of Traffic (MOT) Plan for Engineer and/or City approval at least 60 days prior to construction work. The plan shall be signed and sealed by a registered PE in the state of Florida. All MOT submittals must be done by the Contractor in advance of the work effort such that approvals may be obtained, and the project schedule kept on track.
- E. All MOT provided by the Contractor must take into consideration the required project phasing, maintaining or adjusting MOT as necessary, all permit submittal requirements, permit approvals and permit fees from all jurisdictional agencies having authority over the ROW limits.
- F. Prior to performing any work within or abutting the State rights-of-way, the Contractor shall submit a 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.

- 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 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, 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 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 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 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.
- 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.

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

SECTION 01600

EQUIPMENT AND MATERIALS

PART 1 - GENERAL

1.01 GENERAL

- A. All equipment, materials, instruments or devices incorporated in this project shall be new and unused, unless indicated otherwise in the Contract Documents.
- B. Equipment and materials to be incorporated in the work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the work, and they shall be delivered as nearly as feasible in the order required for executing the work.
- C. The Contractor shall protect all equipment and materials from deterioration and damage. The equipment and materials shall be handled and stored by the manufacturer, fabricator Contractor and Contractor before, during, and after shipment to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, damage or theft of any kind whatsoever. Any equipment exhibiting any of the above, shall be removed and replaced at the Contractor's expense for both labor and materials.

1.02 STORAGE

- A. The Contractor shall store its equipment and materials at their site in accordance with the manufacturer's recommendations and as directed by the Engineer in the field. No storage area will be provided by City. The Contractor shall enforce the instructions of the City and the Engineer regarding the posting of regulatory signs for loadings on structures, fire safety, and smoking areas.

1.03 HANDLING AND MAINTENANCE

- A. The manufacturer's storage instructions shall be carefully followed, and any deviations shall be approved by the manufacturer in writing with a copy to the Engineer. Equipment with moving parts shall be rotated per the manufacturer's recommendations while in storage and during the period between installation and acceptance.
- B. All equipment shall be stored fully lubricated unless otherwise instructed by the manufacturer. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at the time of acceptance.
- C. Equipment with electric motors having space heaters shall have the space heaters energized unless stored in a temperature and humidity-controlled building. Space heaters shall be energized at the time of installation and maintained until acceptance of the equipment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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 in automatic 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. Water distribution system:
 - 1) backfill density tests
 - 2) hydrostatic pressure test
 - 3) bacteriological test
 - 4) "Clearance for Use" Letter by FDEP
 - b. Sewage collection system:
 - 1) gravity main backfill density tests

- 2) manhole backfill density test submittal
 - 3) gravity main low-air pressure test
 - 4) gravity main lamp inspection
 - 5) manhole inspection
 - 6) "Clearance for Use" Letter by FDEP
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. 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.)
- B. Within a reasonable time after receipt of such notice, the Engineer will make an inspection to determine the status of completion.
- C. 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 reinspection fees.
- D. 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 lines into service once FDEP 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 it 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 and Survey.
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.
- 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

SECTION 01720

PROJECT RECORD DOCUMENTS AND SURVEY

PART 1 - GENERAL

1.01 PURPOSE AND DESCRIPTION OF WORK

- A. The purpose of the Project Record Documents is to provide the Owner with factual information regarding all aspects of the Work, both concealed and visible, to enable future location, identification and modification of the Work without lengthy and expensive site measurement, investigation or examination.
- B. Provide professional surveying and mapping work required for the execution of the contract, including verification of existing survey data, construction layout, and production of the As-Built Drawings. This Work shall be performed by a Surveyor that is licensed by the State of Florida as a professional surveyor and mapper pursuant to Chapter 472, F.S.
- C. The location of the constructed improvements as depicted in the contract drawings is required. To verify the As-Built Drawing accuracies and to insure the Work was constructed in conformance with the contract drawings, the following survey documents are required to be certified by the Surveyor.
 - 1. As-Built Asset Attribute Data Table (refer to Table 01720-2),
 - 2. Pipe Deflection Table (refer to Table 01720-3),
 - 3. Boundary Survey and Survey Map Report for any easements that have constructed pipes within and monuments that were replaced.

1.02 DEFINITIONS

Except where specific definitions are used within a specific section, the following terms, phrases, words and their derivation shall have the meaning given herein when consistent with the context in which they are used. Words used in the present tense include the future tense, words in the plural number include the singular number and words in the singular number include the plural number. The word "shall" is mandatory, and the word "may" is permissive.

- A. **As-Built Drawings:** Drawings prepared by the Contractor's Surveyor shall depict the actual location of installed utilities for the completed WORK in a full size hard copy and an electronic AutoCAD file (dwg) format.
- B. **Record Drawings:** Drawings, prepared and certified by the Owner's Consultant Engineer, shall be a compiled representation of the constructed project, a listing of the sources and the basis of information used in the preparation of the "record drawings", the constructed project meets the Engineer's design intent and note the material deviations from the design documents, and the accuracy of the location information is based upon

the Contractor's surveyor data supplied in the tables (As-Built Asset Attribute Data and Pipe Deflection).

- C. **Boundary Survey:** Boundary survey, map and report certified by a Surveyor shall be provided that meets the requirements of Chapter 61G17-6 'Minimum Technical Standards', FAC.
- D. **Surveyor:** Contractor's Surveyor that is licensed by the State of Florida as a professional surveyor and mapper pursuant to Chapter 472, F.S.
- E. **Survey Map Report:** As a minimum the Survey Map Report shall identify any corners that had to be reset, measurements and computations made, and accuracies obtained.

1.03 QUALIFICATIONS OF THE SURVEYOR

- A. The Surveyor, who is proposed by the Contractor to provide services for the Project, is subject to the approval of the Owner. Prior to any services being performed, the Contractor shall submit the name and address of any proposed Surveyor and a written acknowledgement from the Surveyor stating that he has the hardware, software and adequate scope of services in his agreement with the Contractor to fully comply with the requirements of this specification. These submittals shall be provided to the Owner prior to Notice to Proceed. It is recommended that the Surveyor attend the Preconstruction meeting. Any Surveyor, who has not previously performed work for the Owner in the past, shall attend the Preconstruction meeting.

1.04 RELATED REQUIREMENTS

- A. All General Conditions, Supplements to the General Conditions, and any Addenda issued by the Owner are a part of this Section in the same manner as if fully written herein, and shall govern the Work of this Section, except where more stringent articles or requirements are stipulated, then they shall govern this Section.
- B. The Contract Documents are complimentary and what is required by anyone shall be as binding as if required by all.
- C. Other requirements affecting Record Documents may appear in pertinent other sections of these specifications.

1.05 QUALITY ASSURANCE

- A. Delegate the responsibility for maintenance of the Record Documents to one person on the Contractor's staff as approved by the Owner.
- B. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of specifications and each sheet of drawings and other documents where such entry is required to show progress and changes properly.
- C. Make entries within 24-hours after receipt of information has occurred.

- D. Survey documents shall comply with the minimum technical standards of Chapter 61G17-6 of the Florida Administrative Code (FAC) and Table 01720-1 Minimum Survey Accuracies specified in, whichever are more stringent. Asset attribute data shall be signed, sealed and dated by the Surveyor. All coordinates shall be geographically registered in the Florida State Plan Coordinate System using the contract drawings control points for horizontal and vertical controls.

**Table 01720-1
Minimum Survey Accuracies**

Asset/Location	Horizontal Accuracy (feet)	Elevation Accuracy (feet)	Location: horizontal center and vertical top, unless otherwise specified
Bench Marks	N/A	0.01	Point
Horizontal Control	0.01	N/A	Point
Easements and Tracts	*	N/A	Survey Monuments
Civil Site, Topo and Foundation Drawings	0.1	0.01	All
Hydrants	0.01	N/A	Operating Nut
Blow off Valves	0.01	N/A	Valve Enclosure
Air Release Valves	0.01	N/A	Valve Enclosure
Master Meters	0.01	N/A	Register
Meter Box or Curb Stops if box does not exist	0.01	N/A	Top of Meter Box
Clean-out	0.01	N/A	Top of Clean-out
Pump Station	0.01	0.01	Top Center of Wet Well and Pipe Inverts
Manholes	0.01	0.1	Top Center of Cover
Manhole	N/A	0.01	Pipe Inverts
System Valves	0.01	0.1	Operating Nut and Valve Body

Table 01720-1 (cont'd)
Minimum Survey Accuracies

Asset/Location	Horizontal Accuracy (feet)	Elevation Accuracy (feet)	Location: horizontal center and vertical top, unless otherwise specified
Fittings & the end of the pipe	0.01	0.1	Top of Fitting and Ground
Piping at 100' max intervals	0.01	0.1	Top of Pipe and Ground
Restrained Pipe	0.01	N/A	Limits
Connections	0.01	0.1	Pipe Invert
Bore & Jack Casing	0.01	0.1	Top of Casing at Limits of Casing
Existing Utilities**	0.01	0.1	Conflicts

* Shall conform to the requirements of the "Chapter 61G17-6, 'Minimum Technical Standards', FAC", for a boundary survey and shall be certified by the Surveyor.

** Existing utilities including but not limited to water, wastewater, reclaimed water, storm, fiber optic cable, electric, gas and structures within the limits of construction.

1.06 SUBMITTALS

- A. Comply with pertinent provisions for the timely submittal requirements under this article and specification section.
- B. Prior to submitting a monthly payment application, the Contractor's progressive As-Built Drawings and As-Built Asset Attribute Data, and Pipe Deflection Tables shall be acceptable to the Owner.
- C. Progressive As-Built Drawings shall indicate the horizontal and vertical locations of all current constructed improvements with sufficient information and notes to easily determine if the improvements were constructed in conformance with the Contract Documents. The progressive As-Built Asset Attribute Data and Pipe Deflection Tables shall include a Surveyor's certified statement regarding the constructed improvements being within the specified accuracies or if not indicating the variances, as described in Table 01720-1 Minimum Survey Accuracies.
- D. Prior to submitting a request for final payment or the Owner issuing a Certificate of Completion for the Work, the Contractor shall submit the final Record Documents to the Owner for approval. Retainage funds will be withheld at the Owner's discretion based on the quality and accuracy of the final Record Documents.

1.07 RECORD DOCUMENTS AT SITE

- A. Maintain at the site and always available for Owner's use one record copy of:
1. Construction Contract, Drawings, Specifications, General Conditions, Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract Documents.
 2. Change Orders, Verbal Orders, and other modifications to Contract.
 3. Written instructions by the Owner as well as correspondence related to Requests for Information (RFIs).
 4. Accepted Shop Drawings, Samples, product data, substitution and "or-equal" requests.
 5. Field test records, inspection certificates, manufacturer certificates and construction photographs.
 6. Progressive As-Built Drawings
 7. Current Surveyor's tables for the As-Built Assets Attribute Data, pipe deflection data, and gravity main data.
- B. Maintain the documents in an organized, clean, dry, legible condition and completely protected from deterioration and from loss and damage until completion of the Work, transfer of all record data to the final Record Documents and for submittal to the Owner.

PART 2 - PRODUCTS

2.01 AS-BUILT DRAWINGS

- A. Maintain the electronic As-Built Drawings to accurately record progress of Work and change orders throughout the duration of the Contract.
- B. Date all entries. Enter RFI No., Change Order No., etc. when applicable.
- C. Call attention to the entry by highlighting with a "cloud" drawn around the area affected.
- D. In the event of overlapping changes, use different colors for entries of the overlapping changes.
- E. Design call-outs shall have a thin strike line through the design call-out and all As-Built information must be labeled (or abbreviated "AB") and be shown in a bolder text that is completely legible.

- F. Make entries in the pertinent other documents while coordinating with the Engineer and the Owner for validity.
- G. Entries shall consist of graphical representations, plan view and profiles, written comments, dimensions, State Plane Coordinates, details and any other information as required to document field and other changes of the actual Work completed. As a minimum, make entries to also record:
 - 1. Depths of various elements of foundation in relation to finish floor datum and State Plane Coordinates and elevations.
 - 2. As-Built Asset Attribute Data Table shall be completed in the Drawings.
 - 3. When electrical boxes, or underground conduits and plumbing are involved as part of the Work, record true elevations and locations, dimensions between boxes.
 - 4. Actually installed pipe or other Work materials, class, pressure rating, diameter, size, specifications, etc. Similar information for other encountered underground utilities, not installed by Contractor, their owner and actual location if different than shown in the Contract Documents.
 - 5. Details, not on original contract Drawings, as needed to show the actual location of the Work completed in a manner that allows the Owner to find it in the future.
 - 6. The Contractor shall mark all arrangements of conduits, circuits, piping, ducts and similar items shown schematically on the construction documents and show on the As-Built Drawings the actual horizontal and vertical alignments and locations.
 - 7. Major architectural and structural changes including relocation of doors, windows, etc. Architectural schedule changes according to contractor's records and shop drawings.

2.02 RECORD DOCUMENTS

- A. A full size, two (2) hard copy set of the final Record Documents and shall include all of the documents described below under this subsection 2.02.
- B. The following documents shall be signed and sealed by the Surveyor:
 - 1. As-Built Asset Attribute Data Table (see Table 1720-2 for an example).
 - 2. Survey and Survey Map Report for the location of constructed pipes within any easements and right-of-way. As a minimum the Survey Map Report shall identify or describe the locations where the pipe centerline was constructed within three feet of the easement or right-of-way boundary, where the pipe was constructed outside the easement or right-of-way boundary, any corners that had to be reset, measurements and computations made, pump station boundary issues, and accuracies obtained. Survey map report shall be dated after the Work within the right-of-ways or easements have been completed.

3. Pipe Deflection Table (see Table 1720-3 for an example). *An electronic blank table will be supplied by the Owner.*
- C. Digital Set of the final Record Documents including but not limited to:
 1. Scanned digital copies of the final As-Built Drawings.
 2. Electronic Survey documents electronically sealed by the Surveyor.
 3. Final Record Documents information.
 4. Digital As-Built Drawing in the Engineer's current version of AutoCAD file (dwg) format for the Contract Drawings, updated to match the final Record Drawing information.
 - D. New Boundary Survey to re-establish easement corners, right-of-way monuments, or pump station site corners with monuments if destroyed by the Work.
 - E. Scanned Documents: Scan the Survey Documents and other Record Documents reflecting changes from the Bid Documents.
 - F. The scanned As-Built drawing sets shall be complete and include the title sheet, plan/profile sheets, cross-sections, and details. Each individual sheet contained in the printed set of the As-Built Drawings shall be included in the electronic drawings, with each sheet being converted into an individual tif (tagged image file). Then, the tif images shall be embedded into a single pdf (Adobe Acrobat) file representing the complete plan set. Review all Record Documents to ensure a complete record of the project.
 - G. Provide an encompassing digital AutoCAD file that includes all the information of the As-Built Drawings and any other graphical information in the As-Built Drawings. It shall include the overall Work, utility system layout and associated parcel boundaries and easements. Feature point, line and polygon information for new or altered Work and all accompanying geodetic control and survey data shall be included. The surveyor's certified as-built asset attribute data shall be added to the As-Built Drawings and Surveyor shall electronically seal the data.

TABLE 1720-2

Asset Attribute Data Form Examples

General Information Worksheet

	A	B	C
1	Date of submittal	3/3/2009	
2			
3	Collection Date	3/3/2009	
4			
5	Project Number	123456	
6			
7	Project Name	ABC	
8			
9	Contractor Name	Joe Contractor	
10			
11	Company	Your Company	
12			

General Info / Hydrants / Valve / Manhole / Meter / Fitting / Cleanout / Pipes / Structures / Easements

Hydrants Worksheet

	A	B	C	D	E	F	H	I
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation	Service Type		
2	1	H001	535896.7840	1491359.5830	99.78	Water		
3	2	H002	536062.0800	1491360.9250	99.20	Water		
4	3	H002	509643.9000	1481344.6000	99.20	Water		

General Info / Hydrants / Valve / Manhole / Meter / Fitting / Cleanout / Pipes / Structures / Easements

Valves Worksheet

	B	C	D	E	F	G
1	Utilities Asset Number	Easting	Northing	Elevation	Valve Type	Service Type
2	V001	535887.9950	1491394.7730	96.74	Gate	Water
3	V002	535884.7480	1491396.1010	91.27	Gate	Water
4	V003	535883.6870	1491393.4900	92.18	Gate	Water

General Info / Hydrants / Valve / Manhole / Meter / Fitting / Cleanout / Pipes / Structures / Easements

Manhole Worksheet

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation	Invert Elev N	Invert Elev NE	Invert Elev E	Invert Elev SE	Invert Elev S	Invert Elev SW	Invert Elev W	Invert Elev NW	Service Type
2	15	15	535896.3040	1491144.0450	96.31	91.56	88.81			88.71		88.61		Water Reclamation
3	277	277	505962.0207	1474906.7832	92.76						86.85			Water Reclamation
4	278	278	506130.5461	1475093.6556	91.00					85.95		86.17		Water Reclamation
5	279	279	505993.3960	1475243.3448	92.36					88.8				Water Reclamation

General Info / Hydrants / Valve / Manhole / Meter / Fitting / Cleanout / Pipes / Structures / Easements / Lookup / Relation

Meter Worksheet

	A	B	C	D	E	F	G
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation	Meter Type	Service Type
2	7	7	535887.9950	1491394.7730	96.74	Flow	Water

General Info / Hydrants / Valve / Manhole / Meter / Fitting / Cleanout / Pipes / Structures / Easements

Fitting Worksheet

	A	B	C	D	E	F	G
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation	Fitting Type	Service Type
2	20008	F0001	538549.20	1475457.69	78.94	Tee	Water Reclamation
3	20010	F0002	538544.73	1475457.74	78.94	Tee	Water Reclamation
4	20013	F0003	538544.36	1475467.92	79.02	Tee	Water Reclamation

General Info / Hydrants / Valve / Manhole / Meter / Fitting / Cleanout / Pipes / Structures / Easements

Cleanout Worksheet

	A	B	C	D	E	F	H
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation	Service Type	
2	15	15	535898.3040	1491144.0450	96.31	Water Reclamation	
3	277	277	505962.0207	1474906.7832	92.76	Water Reclamation	

General Info / Hydrants / Valve / Manhole / Meter / Fitting / **Cleanout** / Pipes / Structures / Easements

Pipes Worksheet

	A	B	C	D	E	F	G	H	I
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation	W Pipe Type	WW Pipe Type	RW Pipe Type	Service Type
2	20001	P00001	1475448.92	538024.96	81.5	Distribution	Pressurized		Water Reclamation
3	20002	P00002	1475487.58	538055.74	79.74	Distribution	Pressurized		Water Reclamation
4	20004	P00003	1475470.75	538166.01	79.46	Distribution	Pressurized		Water Reclamation

General Info / Hydrants / Valve / Manhole / Meter / Fitting / Cleanout / **Pipes** / Structures / Easements

Structures Worksheet

	A	B	C	D	E	F	G
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation	Structure Type	Service Type
2	20	3980	535886.9150	1491144.3200	96.17	PumpStation	Water Reclamation

General Info / Hydrants / Valve / Manhole / Meter / Fitting / Cleanout / Pipes / **Structures** / Easements

Easements Worksheet

	A	B	C	D	E	F	G
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation		
2	1721	1721	468066.6800	1515018.8300			
3	1722	1722	468066.9400	1514983.8300			
4	1723	1723	468041.9400	1514983.6500			
5	1724	1724	468041.9400	1515018.6400			

Hydrants / Valve / Manhole / Meter / Fitting / Cleanout / Pipes / Structures / **Easements**

Note: Do not fill out Utilities Asset Number (grey) column.

**TABLE 01720-3
PIPE DEFLECTION TABLE EXAMPLE**

Project Contractor: Progress Mtg Date: Contract # Dwg Sheet # Utility Type Pipe Manufacturer Pipe size & material PVC Manufacturer Deflection County Allowable Deflection 75% Allowable Angle of Offset Allowable Radius of Curvature Laying Length of Pipe	FM National Pipe 16" PVC C905 6 inches 4.5 inches 1.5 degrees 764 feet 20 feet	
--	---	--

ID	Size and Type	Northing	Easting	Elev.	Calculations Including Elevation (XYZ)							
					Distance between points AB	Distance between points BC	Distance between points AC	Total Deflection Ø'	Radius of Curve [^]	Average Offset Angle ^{***}	Average Offset ^{****}	
					Length AB ft	Length BC ft	Length AC ft	XYZ (w elevation) degrees	XYZ (w elevation) ft	per laying length degrees	per laying length inches	
14041	16" FM	1505131.50	468948.53	107.68	-	-	-	-	-	-	-	-
7000	16" FM	1505059.60	468932.08	108.15	73.76	38.93	112.66	5.48	1,178.35	0.97	4.07	
2128	16" FM	1505022.11	468921.60	108.55	38.93	39.61	78.54	2.29	1,961.65	0.58	2.45	
2127	16" FM	1504983.85	468911.35	108.29	39.61	38.35	77.96	1.78	2,505.50	0.46	1.92	
2126	16" FM	1504946.67	468901.96	107.81	38.35	39.13	77.42	8.79	505.16	2.27	9.51	
2125	16" FM	1504908.11	468895.31	107.48								

Data that has been inputted
 Values in yellow are over spec

^{*}Uses law of cosines to determine angle ABC and Ø.
 $\text{angle } ABC = \arccos((AB^2 + BC^2 - AC^2) / (2 * AB * BC))$
 $180 - \text{angle } ABC = \text{angle } \phi$
 Calculate the total deflection Ø.
 to the outer point (A or C) is equal in angle to the approach from the next point along the

^{**} Uses law of sines, using the chord length AC and radius R.
 $\text{Since } \sin((\phi/2) * (\pi/180)) = (\text{Chord}/2) / R \text{ and length } AC = \text{Chord}$
 $R = AC / (2 * \sin(\phi * \pi / 360))$
 This calculation assumes an average radius over the bend between three points.

^{***} Adds the lengths of AB + BC / 20ft to get an approximate number of bends over the span.
 This value is divided by the total deflection angle to calculate the average bend angle of
 This assumes that the bend angle consistent across the entire length.

^{****} Uses average offset angle and laying length of pipe.

PART 3 - EXECUTION

3.01 SURVEY FIELD WORK

- A. Locate, reference, and preserve existing horizontal and vertical control points and property corners shown on the Drawings prior to starting any construction Work. If the Surveyor performing the Work discovers any discrepancies that will affect the Project, the Contractor must immediately report these findings to the Owner. All survey work shall meet the requirements as defined in Florida Administrative Code 61G17-6. Reference and preserve all survey points during construction. If survey points are disturbed, it is the responsibility of the Contractor's Surveyor to reset the points at the Contractor's expense. Copies of the Surveyor's field notes and/or electronic files for point replacement shall be provided to the Owner.
1. The Surveyor shall locate all improvements for the project As-Built Asset Attribute Data using State Plane Coordinates as the horizontal datum and the benchmark referenced on the Drawings as the vertical datum. The Owner's Engineer will provide electronic files of the Drawings to be used by the Surveyor in complying with these specifications.
 2. The construction layout shall be established from the reference points shown or listed on the Drawings. The accuracy of any method of staking shall be the responsibility of the Contractor. All construction layout staking shall be done such as to provide for easy verification of the Work by the Owner.
- B. Only a land surveyor licensed in the State of Florida shall be employed for this Work. Monuments for principal control points were set by the Engineer and shall be protected by the Contractor from disturbance. If the monuments are disturbed, any Work that is governed by these monuments shall be held in abeyance until the monuments are reestablished by the Contractor and approved by the Engineer. The accuracy of all the Contractor's stakes, alignments and grades is the responsibility of the Contractor. However, the Engineer has the discretionary right to check the Contractor's stakes, alignments, and grades at any time.
- Use survey control points to layout such work tasks as the following:
1. Clearing, grubbing, work limits, right-of-way lines and easements
 2. Locations for pipelines and all associated structures and appurtenances
- C. The Surveyor shall reference and replace any project control points, boundary corners, benchmarks, section corners, and right-of-way monuments that may be lost or destroyed, at no additional cost to the Owner. Establish replacement points based on the original survey control. Copies of all reference field notes and/or electronic files for point replacement shall be submitted to the Owner.

3.02 CONSTRUCTION PROGRESS MEETINGS

- A. At the preconstruction meeting the *Contractor shall be provided with a blank electronic version of the spreadsheet for the tables: Asset Attribute Data and Pipe Deflection*. The Contractor's surveyor shall use these tables to input the data and shall not alter the table format or formulas.
- B. Contractor shall provide progressive Record Documents both as paper copies and electronic format described below.
1. Construction Contract, As-Built Drawings, Specifications, General Conditions, Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract Documents.
 2. Specifications and Addenda: Record manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed as well as any changes made by Field Order, Change Order or other.
 3. Change orders, verbal orders, and other modifications to Contract.
 4. Written instructions by the Owner as well as correspondence related to Requests for Information (RFIs).
 5. Accepted Shop Drawings, samples, product data, substitution and "or-equal" requests.
 6. Field test records, inspection certificates, manufacturer certificates and construction photographs.
 7. As-Built Asset Attribute Data Table: Surveyor shall obtain field measurements of vertical and horizontal dimensions of constructed improvements. The monthly submittal shall include the Surveyor's certified statement regarding the constructed improvements being within the specified accuracies as described in Table 01720-1 Minimum Survey Accuracies or if not, indicating the variances.
 8. Pipe Deflection Table: Surveyor shall input the type of pipe, pipe manufacturer, PVC manufacturer deflection allowance, allowable angle of offset and radius of curvature, laying length of pipe, and coordinates. Surveyor shall certify the data entered are correct and indicate that the deflection allowance, offset or radius of curvature does not exceed 0.75% of the manufacturer's maximum allowable recommendation for deflection.

3.03 FINAL RECORD DOCUMENTS SUBMITTAL

- A. Submit the Final Record Documents within 20 days after Substantial Completion.
1. Participate in review meetings as required and make required changes and promptly deliver the Final Record Documents to the Engineer and Owner.

3.04 STORAGE AND PRESERVATION

- A. Store Record Documents and samples at a protected location in the project field office apart from documents used for construction.
 - 1. Provide files and racks for storage of documents
 - 2. Provide locked cabinet or secure space for storage of samples.
- B. File documents and samples in accordance with CSI format with section numbers matching those in the Contract Documents.
- C. In the event of loss of recorded data, use means necessary to again secure the data to the Owner's approval.
 - 1. Such means shall include, if necessary in the opinion of the Owner, removal and replacement of concealing materials.
 - 2. In such cases, provide replacements of the concealing materials to the standards originally required by the Contract Documents.

END OF SECTION

SECTION 01740

PERMITS

PART 1 - GENERAL

1.01 General:

A. The Contractor shall obtain and pay for all permits, licenses and fees related to the work. The Contractor shall also initiate all necessary jurisdictional agency reviews and approvals, and secure all required approvals, prior to commencement of the work. Inspection by City personnel is required in addition to, not in lieu of, municipal, FDOT, County, or other agency department inspections. No project will be accepted until it has passed all inspections, including installation or replacement, necessary testing, pavement, and restoration requirements, etc.

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. New or required permit conditions for each jurisdictional agency shall be the responsibility of the Contractor to become aware of, and to follow, at no additional cost to the Owner.

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

Agency	Permit No.
Broward County EPGMD-FDEP (wastewater)	TBD
Broward County HCED	N/A – Plan Review Only
Florida Department of Transportation	TBD
City of Hollywood Building Department	TBD
City of Hallandale Building Department	TBD

Contractor is responsible to obtain any other permits required to complete construction and to obtain all necessary approval for the project construction. In addition, the City of Hollywood Building Department permit must be finalized by the Contractor.

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. Any changes requiring additional costs will be required to be submitted in advance of the Contractor performing the work. Failure to do so may result in the Contractor performing the work at their own cost.

- 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) Notifications, inspections, work during night or weekend hours
 - (b) Dewatering and dewatering discharge and permitting requirements
 - (c) Chemical spill prevention
 - (d) Erosion, sedimentation, turbidity and dust retention
 - (e) Protection of existing facilities (utility, storm, power, railroad, etc.)
 - (f) 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. Providing Operation and Maintenance (O&M) manuals for installed equipment as required by permits
 10. Repair of any permanent traffic controls impacted by Contractor
 11. 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. All jurisdictional as-built requirements for facilities constructed within the agencies right-of-way limits will be the responsibility of the Contractor and at the Contractor's cost. Comments provided by the City, Engineer, and all regulatory agencies will be required to be responded to and as-builts updated at the Contractor's expense such that an actual final as-built survey and representation of all constructed facilities is as accurate as possible. As-builts are to be provided in CAD and

will be required to be signed and sealed by a licensed PSM in the State of Florida. Up to ten (10) hard copy and/or digital signed and sealed sets, including CAD files or PDF files, may also be required of due to the various permitting agencies. All costs will be borne by the Contractor for as-built documentation, files, and plan sets.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION



DIVISION 2

SITework

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 water 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 cementitious 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.

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.
- 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 01300 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 or PCCP Water Mains
- 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.
 3. If manufacturer's representatives are required for portions of piping that is 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 Owner 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 Owner at the location designated by the Owner at no cost to the Owner.

E. Abandonment/Placed out of Service:

1. Types of pipe to be abandoned in place or placed out of service:
 - a. Asbestos Cement (AC) Water Main and various other pipes as shown on the drawings. See Section 01030 Special Project Procedures for asbestos cement (AC) pipe handling.
2. 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.
3. 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

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, parcels owned by the City, and/or right-of-ways to install the pipeline, appurtenances and other project work as shown on the Drawings. The Work shall include the proper 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. In addition, a listing of potentially contaminated sites per the Broward County contaminated site database is included in the Appendix for Contractor review/reference. 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. Section 01560 – Special Controls

- B. Section 02160 – Temporary Excavation Support Systems
- C. Section 02210 – Earth Excavation, Backfill, Fill and Grading
- D. Section 02222 – Excavation and Backfill for Utilities and Structures
- E. Section 02225 – Contaminated Soils and Groundwater

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals:
 - 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 Paragraph 1.04 B.
 - (b) Qualifications of specialist's or firm's field representative, as specified in paragraph 1.04 B, 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 01300, Submittals.
 - (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. Provide in accordance with Section 01400, Testing and Inspection and as specified.
- B. 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.
- C. 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.
- D. 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.

- E. 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 General Requirements.

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.
 - 1. Provide and maintain erosion/sedimentation control devices as indicated or specified and in accordance with the dewatering plan.
 - 2. Provide temporary pipes, hoses, flumes, or channels for the transport of discharge water to the discharge location.
 - 3. Provide cement grout having a water cement ratio of 1 to 1 by volume.

4. Provide for dewatering discharge sampling as required by regulatory agencies. All sampling and permit fees are to be paid by the Contractor.
5. 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's 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 Section 02210, Earth Excavation, Backfill, Fill and Grading, at no additional 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.
- J. Install and maintain erosion/sedimentation control devices at the point of discharge and in accordance with the dewatering plan and regulatory requirements.
- K. Removal:
1. Do not remove dewatering system without written approval from the Engineer, and/or the City.
 2. Backfill and compact sumps or ditches with clean fill in accordance with Section 02210 - Earth Excavation, Backfill, Fill and Grading.
 3. All dewatering wells shall be abandoned upon completion of the work, and completely backfilled with cement grout.

3.02 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

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.
- 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 Owner.
- 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 1.05 E.
- G. Construction operations not to exceed specified noise limits in accordance with the City of Hollywood 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 Owner.

- I. All excavation support systems are to be designed and installed in conformance with the latest OSHA requirements.

1.02 RELATED WORK

- A. Section 02210 – Earth Excavation, Backfill, Fill and Grading
- B. Section 02222 – Excavation and Backfill for Utilities and Structures
- C. Division 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 01300:
 - 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 D.
 - (b) Qualifications of Contractor's temporary excavation support system designer as specified in Paragraph 1.05 G.
 - (c) Qualifications of Contractor's temporary excavation support system installer as specified in Paragraph 1.05 H.
 - (d) Qualifications of Contractor's independent tieback testing laboratory as specified in Paragraph 1.05 I, 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 F, 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 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) 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 01300.
 - (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 excavation support systems.
 - (h) 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, 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. Provide in accordance with Section 01400 and as specified herein.

- B. 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.
- C. Construction operations to conform to noise regulations provided in the Noise Control Plan and this Section.
- D. 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.

- E. 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

- F. 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.

- G. 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.

- H. 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.

- I. 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.
- J. 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.
- K. 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.

1.08 PROJECT/SITE CONDITIONS

- A. Subsurface Conditions: Refer to Sections 01500, 02210, 02222, and the project Geotechnical Report.
- B. Concrete: Section 03300 - Cast in Place & Precast Concrete, Reinforcing and Formwork.

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 Owner's representative present will not be accepted. Repeat testing in the Engineer's presence at no additional cost to the Owner.
- 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 Owner'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 Owner.
- 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 utility owners if existing utilities interfere with the temporary excavation support system. Modify the existing utility with the utility owners' permission or have the utility owner make the modifications at no additional cost to Owner.

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.
- B. 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.
- C. 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.
- D. 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 02210

EARTH EXCAVATION, BACKFILL, FILL AND GRADING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Perform the following earth excavation, backfill, fill and grading as indicated or specified:
 - 1. Make excavations to accommodate piping, conduits, foundations and other structures.
 - 2. Provide materials for backfilling excavations and constructing embankments and fills as indicated and specified.
 - 3. Construct embankments of compacted materials.
 - 4. Grade surfaces to meet finished grades indicated.
 - 5. Immediately notify the Engineer if suspected hazardous materials are encountered and cease operations in that part of work.
 - 6. Immediately stop work and notify the Engineer if historical artifacts or human remains are encountered.
 - 7. Remove boulders within the excavation limits.

1.02 RELATED WORK

- A. Section 01560 – Special Controls
- B. Section 02100 – Clearing and Grubbing
- C. Section 02222 – Excavation and Backfill for Utilities and Structures
- D. Section 02500 – Landscaping
- E. Division 3

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM) Publications:
 - 1. C33: Specification for Concrete Aggregates.
 - 2. C136: Sieve Analysis of Fine and Coarse Aggregates.

3. D421: Practice for Dry Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants.
 4. D422: Test Method for Particle-Size Analysis of Soils.
 5. D1140: Test Method for Amount of Material in Soils Finer than the No. 200 (75 Fm) Sieve.
 6. D1556: Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
 7. D1557: Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft³ (600 kN-m/m³)).
 8. D2167: Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
 9. D2922: Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods. (Shallow Depth).
 10. D3017: Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 11. D4318: Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
 12. D4718: Practice for Correction of Unit Weight and Water Content for Soils Containing Oversized Particles.
 13. D4944: Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Pressure Tester Method.
 14. D4959: Test Method for Field Determination of Water (Moisture) Content of Soil by Direct Heating Method.
 15. D5080: Test Method for Rapid Determination of Percent Compaction.
- B. Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29: Subpart P - Excavations, Trenching and Shoring.

1.04 DEFINITIONS

- A. Percentage of compaction is defined as the ratio of the field dry density, as determined by ASTM D1556 to the maximum dry density determined by ASTM D1557 Procedure C, multiplied by 100.

- B. Proof Roll: Compaction with a minimum of 4 passes of a vibratory steel drum or rubber tire roller. Vibratory plate compactors shall be used in small areas where vibratory steel drum or rubber tire roller cannot be used.
- C. Acceptable Material: Material which does not contain organic silt or organic clay, peat, vegetation, wood or roots, stones or rock fragments over 6-inch [15 cm] in diameter, porous biodegradable matter, loose or soft fill, excavated pavement, construction debris, or refuse. Stones or rock fragments shall not exceed 40 percent by weight of the backfill material.
- D. Unacceptable Materials: Materials that do not comply with the requirements for the acceptable material or which cannot be compacted to the specified or indicated density.

1.05 SUBMITTALS

- A. Submit the following in accordance with Section 01300 - Submittals:
 - 1. Qualifications of the Contractor's Independent Testing Laboratory as specified in Paragraph 1.06 I, four (4) weeks prior to the execution of any earth excavation, backfilling, filling, or compaction process.
 - 2. Submit an excavation, backfilling, and filling plan at least two weeks prior to start of any earth moving activities. 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, but not be limited to the following items:
 - (a) Detailed sequence of work.
 - (b) General description of construction methods.
 - (c) Numbers, types, and sizes of equipment proposed to perform excavation and compaction.
 - (d) Details of dust control measures.
 - (e) Proposed locations of stockpiled excavation and/or backfill materials.
 - (f) Proposed surplus excavated material off-site disposal areas and required permits.
 - (g) Details of erosion and sedimentation control measures which will prevent erosion and sedimentation during the earth moving activities.

3. Laboratory testing results of gradation and moisture-density relationship. Submittal shall include specific location of the source and the date when sample was taken.
4. During Construction, submit written confirmation of fill lift thickness, in-place soil moisture content, and percentage of compaction to the Engineer before placing the next lift or constructing foundations.

1.06 QUALITY ASSURANCE AND CONTROL

- A. Provide in accordance with Section 01400 and as specified.
- B. The Contractor shall be solely responsible for making all excavations in a safe manner. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926 Subpart P) and State requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.
- C. Do not excavate, construct embankments, or fill until all the required submittals have been reviewed by the Engineer.
- D. Formulate excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines and embankments or existing structures and pipelines.
- E. Field Testing and Inspections:
 1. By Contractor's independent testing laboratory, acceptable to the Engineer, at Contractor's expense as specified in Paragraph 1.06 G.
 2. Location of tests mutually acceptable to testing laboratory and the Engineer or as directed by the Engineer.
 3. In the event compacted material does not meet specified in-place density, recompact material and retest this area until specified results are obtained at no additional cost to the Owner.
 4. Contractor's testing laboratory to perform inspection at least once daily to confirm lift thickness and compaction effort for entire fill area.
 5. Owner may retain the services of an independent testing laboratory to conduct confirmatory testing and inspection.
- F. Methods of Field Testing
 1. In-Place Density: ASTM D1556, ASTM D2167, or ASTM D2922.

2. In-Place Moisture Content: ASTM D3017, ASTM D4944, or ASTM D4959.
- G. Material Testing Frequency: The following testing frequencies are minimum required for all structural and non-structural fill, grading and embankment.
1. Field In-Place Density and Moisture Content - Screened gravel and crushed stone shall be compacted as specified and indicated. For other backfill and fill materials, minimum test frequency shall be as follows, and no less than one test per:
 - (a) Trenches under structures, foundation preparation, or roadways subbase: Every 500' lin. ft. [150 m.] per lift.
 - (b) Trenches in areas without structures or roadways: Every 1000 lin. ft. [300 m.] per alternate lift.
 - (c) Paved Roadways: Every 200 lin. ft. [60 m.] per lift
 - (d) Paved Areas: 3,500 sq. ft. [350 sq. m.] per lift.
 - (e) Under each structure: 1,000 sq. ft. [100 sq. m.] per lift.
 - (f) Around each structure: 1,500 sq. ft. [150 sq. m.] per lift.
 - (g) Embankment Fills: 10,000 sq. ft. [1000 sq. m.] per lift.
 2. Moisture Density - One per source, except for screened gravel and crushed stone. Repeat the moisture density test for every 5,000 cubic yard of material use, and whenever visual inspection indicates a change in material gradation as determined by the Engineer.
 3. Gradation Analysis - A minimum of one per source and for each moisture density test and whenever visual inspection indicates a change in material gradation.
 4. Owner's testing laboratory to conduct confirmatory testing at a minimum frequency of 25% of the specified frequencies in paragraph 1.06.H, or as directed by Owner's Engineer.
- H. Construction Tolerances
1. Construct finished surfaces to plus or minus 1 inch [2.5 cm] of the elevations indicated.
 2. Grade cut and fill areas to plus or minus 0.20 foot [6.0 cm] of the grades indicated.

3. Complete embankment edges to plus or minus 6 inches [15 cm] of the slope lines indicated.
 4. Provide the Engineer with adequate survey information to verify compliance with above tolerances.
- I. Cut pavement with a saw or pneumatic tools to prevent damage to remaining pavement without extra compensation. Where pavement is removed in large pieces, dispose of pieces before proceeding with excavation.
 - J. Pipes, drains, and other utilities may exist in certain locations not indicated on drawings. No attempt has been made to show all services. Completeness or accuracy of information given is not guaranteed. Contractor is to conform with all Sunshine One Call (811) requirements.
 - K. Dig test pits considered as incidental to the normal excavation as indicated and specified in this Section, at no additional compensation.
 - L. Carefully support and protect from damage, existing pipes, poles, wires, fences, curbsings, property line markers, and other structures, which the Engineer determines must be preserved in place without being temporarily or permanently relocated. Should such items be damaged, restore without compensation therefore, to at least as good condition as that in which they were found immediately before the work was begun.
 - M. Whenever certain existing structures, as described below, are encountered, and the Engineer so directs, change the location, remove and later restore, or replace such structures, or assist the Owner in doing so.
 - N. In removing existing pipes or other structures, include for payment only those new materials which are necessary to replace those unavoidably damaged as determined by the Engineer.
 - O. The preceding two paragraphs apply to pipes, wires, and other structures which meet the following: (a) are not indicated on the drawings or otherwise provided for, (b) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (c) in the opinion of the Engineer, will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.
 - P. Restore existing property or structures as promptly as practicable.
 - Q. If material unacceptable for foundation (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in accordance with the drawings and/or specifications, remove such material to the required width and depth

as directed by the Engineer and replace it with screened gravel, select borrow, or concrete.

- R. Do not remove excavation materials from the site of the work or dispose of except as directed or permitted by the Engineer.
- S. Haul away and dispose of surplus excavated materials at locations directed by the Engineer at no additional cost to the Owner.
- T. During progress of work, conduct earth moving operations and maintain work site so as to minimize the creation and dispersion of dust. Furnish and spread calcium chloride if the Engineer decides that it is necessary for more effective dust control.
- U. Provide suitable and safe bridges and other crossings where required for accommodation of travel, and to provide access to private property during construction, and remove said structures thereafter.

1.07 SITE CONDITIONS:

- A. Subsurface Conditions: Refer to Front End documents and Geotechnical Report.
- B. 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 GENERAL

- A. Use only acceptable materials from excavations or borrows.
- B. Provide Fine Aggregate conforming to ASTM C33.

2.02 EQUIPMENT

- A. The compaction equipment shall be selected by the Contractor and shall be capable of consistently achieving the specified compaction requirements. The selected compaction equipment shall meet the following minimum requirements:
 - 1. Manually operated vibratory plate compactors weighing no less than 200 pounds [90 kg] with vibration frequency no less than 1600 cycles per minute.
 - 2. Vibratory steel drum or rubber tire roller weighing at least 12,000 pounds [5450 kg].

PART 3 - EXECUTION

3.01 SITE MAINTENANCE

- A. Roadway and Site Leveling: Grade roadway and site as to maintain them in a level unrutted condition and to eliminate puddling of surface and subsurface water.

3.02 EXCAVATION

- A. Execution of any earth excavation shall not commence until the related excavation support systems and backfill and fill materials submittals are reviewed by the Engineer and all Engineer's comments satisfactorily addressed.
- B. Carry out program of excavation, and excavation support systems to eliminate possibility of undermining or disturbing foundations of existing structures or of work previously completed under this contract.
- C. Excavate to widths that give suitable room for building structures or laying and jointing piping.
- D. Do not plow, scrape or dig by machinery near to finished subgrade in a manner that would result in disturbance of subgrade.
- E. Excavate to lines and grades indicated in an orderly and continuous program.
- F. Establish limits of excavation to allow adequate working space for installing forms and for safety of personnel.
- G. Excavate to elevations indicated, or deeper, as directed by the Engineer, to remove unacceptable material.
- H. Exercise care to preserve material below and beyond the lines of excavations.
- I. Place excavated material at the approved stockpile locations and in no case closer than 3 feet [90 cm] from edge of excavations to prevent cave-ins of bank slides.
- J. Regard small, less than one cubic yard, boulders, rock fragments, and concrete encountered during excavation as a normal part of in-place soils and not included for payment as rock.

3.03 SEPARATION OF EXCAVATED MATERIALS FOR REUSE

- A. Remove only existing pavement that is necessary for prosecution of work.
- B. Carefully remove loam and topsoil from excavated areas. Store separately for further use or furnish equivalent loam and topsoil as directed.

- C. Carefully remove acceptable material from excavated areas and store separately for further use as backfill material.

3.04 TRENCH EXCAVATION

- A. When pipe is to be laid in gravel bedding or concrete cradle, excavate trench by machinery to, or just below designated subgrade. If material remaining at bottom of trench is disturbed, recompaction shall be required.
- B. When pipe is to be laid directly on bottom of trench, do not excavate lower part of trenches by machinery to subgrade. Remove remainder of material to be excavated just before placing of pipe by use of hand tools. Form a flat or shaped bottom, true to grade, so pipe will have a uniform and continuous bearing. Support on firm and undisturbed material between joints, except for limited areas where use of pipe slings have disturbed bottom.
- C. Depth and width of trench are to conform with OSHA and Florida Trench Safety Act requirements, whichever are more stringent.

3.05 TRENCH EXCAVATION IN FILL

- A. Place and compact material to top of fill or to a minimum height of 1 ft. [30 cm] above top of pipe, whichever is less, when pipe is to be laid in embankment or other recently filled material. Take particular care to ensure maximum consolidation of material under pipe location. Excavate pipe trench as though in undisturbed material.

3.06 EXCAVATION NEAR EXISTING STRUCTURES

- A. Discontinue digging by machinery when excavation approaches pipes, conduits, or other underground structures. Continue excavation by use of hand tools. Include such manual excavation in work to be done when incidental to normal excavation and under items involving normal excavation.
- B. Excavate test pits when determination of exact location of pipe or other underground structure is necessary for doing work properly.

3.07 REMOVAL OF SUBSURFACE OBSTRUCTIONS

- A. Remove indicated subsurface structures and related obstructions to extent shown.
- B. Promptly notify the Engineer when any unexpected subsurface facilities are encountered during excavation such as utility lines and appurtenances, walls and foundations.

3.08 UNAUTHORIZED EXCAVATION

- A. When the bottom of any excavation for structures is taken out beyond limits indicated or specified, backfill, with screened gravel and crushed stone wrapped with non-woven geotextile fabric or with 1,500 psi (10 Mpa) concrete.

3.09 REUSE AND DISPOSAL OF SURPLUS EXCAVATED MATERIALS

- A. Reuse surplus acceptable excavated materials for backfill; deposit neatly and grade so as to make or widen fills, flatten side slopes, or fill depressions; or legally dispose off-site; all as directed or permitted and without additional compensation.

3.10 SUBGRADE PREPARATION AND PROTECTION

- A. Remove loam and topsoil, loose vegetable matter, stumps and large roots from areas upon which embankments will be built or material will be placed for grading. Shape subgrade as indicated on drawings, and prepare by forking, furrowing, or plowing so that the first layer of new material placed thereon will be well bonded to it.
- B. As directed by the Engineer, over excavate unacceptable materials below the foundation subgrade or two feet below the pipe to be installed. Backfill the over excavation with compacted screened gravel or crushed stone wrapped with nonwoven geotextile fabric. In no case shall the screened gravel be placed directly on the exposed subgrade prior to placing the geotextile fabric.
- C. Proof roll the foundation subgrade prior to backfilling and filling operation or placing foundation concrete.
- D. Proof roll the pipe trench foundation subgrade prior to backfilling and filling operation or placing soil-supported pipeline.
- E. Utilize excavating equipment equipped with a toothless or smooth edged, excavating bucket to expose the pipe trench foundation subgrade to avoid disturbance of the bearing surface. Tamp the exposed subgrade with the excavating bucket prior to backfilling and filling operation or placing soil-supported pipeline.

3.11 CARE AND RESTORATION OF PROPERTY

- A. Enclose uncut tree trunks adjacent to work in wooden boxes of such height as may be necessary for protection from injury from piled material, equipment, operations, or otherwise due to work. Operate excavating machinery and cranes of suitable type with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.

- B. Cut all branches, limbs, and roots smoothly and neatly without splitting or crushing. Neatly trim, cut the injured portions and cover with an application of grafting wax or tree healing paint as directed.
- C. Protect cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations by suitable means or dig up and temporarily replant and maintain. After construction operations have been substantially completed, replant in original positions and care for until growth is reestablished. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish in their beauty or usefulness, replace by items of equal kind and quality existing at the start of the work.
- D. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when their treads or wheels of which are so shaped as to cut or otherwise damage such surfaces.
- E. Restore surfaces damaged by the Contractor's operations to a condition at least equal to that in which they were found immediately before work commenced. Use suitable materials and methods for such restoration.

3.12 BACKFILLING - GENERAL

- A. Do not place, spread, roll or compact fill material during unfavorable weather conditions. If interrupted by heavy rain or other unfavorable conditions, do not resume until ascertaining that the moisture content and density of the previously placed soil are as specified.
- B. Do not use puddling, ponding or flooding as a means of compaction.

3.13 MATERIAL PLACEMENT AND COMPACTION REQUIREMENTS

- A. Select Borrow, and Fine Aggregate
 - 1. Dump and spread in layers not to exceed 8-in. [20 cm] uncompacted thickness.
 - 2. Compact, fill and backfill under structure and bedding for pipes (from below pipe to spring line) as indicated but to not less than 95 percent. Compact to not less than 95 percent in other areas unless otherwise indicated, and not less than 98 percent under roadways.
- B. Screened Gravel and Crushed Stone
 - 1. Dump and spread in layers not to exceed 8-in. [20 cm] uncompacted thickness.
 - 2. Compact using self-propelled vibratory steel drum or rubber tire rollers with a minimum of 4 passes in directions perpendicular to one another in open areas.

In small areas, use manually operated vibratory plate compactors with a minimum of 4 passes.

- C. Bank-run Gravel and Acceptable materials for use as non-structural fill
 - 1. Dump and spread in layers not to exceed 12-in. [30 cm] uncompacted thickness.
 - 2. Compact to not less than 95 percent unless otherwise indicated.
- D. Backfilling and filling operation shall be suspended in areas where tests are being made until tests are completed and the testing laboratory has advised the Engineer that adequate densities are obtained.

3.14 STRUCTURAL FILL AND BACKFILL UNDER STRUCTURES

- A. Provide in accordance with Section 02222.
- B. Compact fill and backfill under structures and pavements with screened gravel, crushed stone, select borrow, or fine aggregate as specified and indicated.

3.15 NON-STRUCTURAL BACKFILL AROUND STRUCTURES

- A. Provide in accordance with Section 02222.
- B. Use acceptable materials for non-structural backfill around structures and compacted as specified and indicated.
- C. Conduct hydraulic testing as soon as practicable after structures are constructed and other necessary work has been done. Start backfilling promptly after completion of tests.
- D. Deposit material evenly around structure to avoid unequal soil pressure.
- E. Do not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking, or other damage.

3.16 BACKFILLING PIPE TRENCHES

- A. Provide in accordance with Section 02222.

3.17 MATERIAL FOR FILLING AND EMBANKMENTS

- A. Use acceptable materials for filling and building embankments unless otherwise indicated.

3.18 PLACING AND COMPACTING EMBANKMENT MATERIAL

- A. Compact fill material as specified and indicated.
- B. Perform fill operation in an orderly and systematic manner using equipment in proper sequence to meet the specified compaction requirements.
- C. Place fill on surfaces which are free of unacceptable materials.
- D. Begin filling in lowest section of work area. Grade surface of fill approximately horizontal but provide with sufficient longitudinal and transverse slope to allow for runoff of surface water from every point.
- E. Conduct filling so that no obstruction to drainage from other sections of fill area is created at any time.
- F. Reduce moisture content of fill material, if necessary, in source area by working it over under warm and dry atmospheric conditions. A large disc harrow with two to three-foot diameter disks may be required for working soil in a drying operation.
- G. Compact uniformly throughout. Keep surfaces of fill reasonably smooth and free from humps and hollows which would prevent proper and uniform compaction. Do not permit hauling equipment to follow a single track on the same layer but direct equipment to spread out to prevent overcompaction in localized areas. Take care in obtaining thorough compaction at edges of fill.
- H. Slightly slope surface of fill to ensure drainage during periods of wet weather. Do not place fill while rain is falling or after a rain-storm until the Engineer considers conditions satisfactory. During such periods and upon suspension of filling operations for any period in excess of 12 hours, roll smooth the surface of fill using a smooth wheel static roller to prevent excessive absorption of rainfall and surface moisture. Prior to resuming compaction operations, remove muddy material off surface to expose firm, compacted material, as determined by the Engineer.
- I. When fill is placed against an earlier fill or against in-situ material under and around structures, including around piping beneath structures or embankments, slope junction between two sections of fill, 1 vertical to 1.5 horizontal. Bench edge of existing fill 24-in. [60 cm] to form a serrated edge of compact stable material against which to place the new fill. Ensure that rolling extends over junction between fills. Follow OSHA standards for variations in soil types and slope requirements.
- J. When fill is placed directly upon another older fill, clean surface thoroughly of debris and remove any loose material. Then proof roll the entire old surface.

- K. After spreading each loose lift to the required thickness and adjusting its moisture content as necessary, roll with sufficient number of passes to obtain the required compaction. One pass is defined as the required number of successive trips which by means of sufficient overlap will insure complete coverage and uniform compaction of an entire lift. Do not make additional passes until previous pass has been completed.
- L. In case material of any fill sinks and weaves under roller or under hauling units and other equipment, required degree of compaction is not being obtained. Reduce the moisture content. If such sinking and weaving produces surface cracks, suspend operations on that part of the embankment until it becomes sufficiently stabilized. Ideal condition in fill is that attained when the entire fill below the surface being rolled is so firm and hard as to show only the slightest weaving and deflection as roller passes. Spread out rolling operations over the maximum practicable area to minimize condition of sinking and weaving.
- M. If because of defective workmanship, compaction obtained over any area is less than that required, remedy condition at no cost to Owner. If additional rolling or other means fail to produce satisfactory results, remove material in that area down to a level of satisfactory density. Perform removal, replacement, and rerolling without additional compensation

3.19 COMPACTION CONTROL OF BACKFILL, FILL, AND EMBANKMENT

- A. Compact to density specified and indicated for various types of material. Control moisture content of material being placed as specified or if not specified, at a level slightly lower than optimum.
- B. The soil testing laboratory shall provide inspection during filling or backfilling operations to ensure compaction of screened gravel or crushed stone and record compaction equipment in use.
- C. Moisture control may be required either at the stockpile area, pits, or on embankment or backfill. Increase moisture content when material is too dry by sprinkling or other means of wetting uniformly. Reduce moisture content when material is too wet by using ditches, pumps, drainage wells, or other devices and by exposing the greatest possible area to sun and air in conjunction with harrowing, plowing, spreading of material or any other effective methods.

3.20 ALLOWANCE FOR SHRINKAGE

- A. Build embankments or backfill to a height above finished grade which will, in the opinion of the Engineer, allow for the shrinkage or consolidation of material. Initially, provide at all points, an excess of at least one percent of total height of backfill measured from stripped surface to top of finished surface.

- B. Supply specified materials and build up low places as directed, without additional cost if embankment or backfilling settles so as to be below the indicated level for proposed finished surface at any time before final acceptance of the work.

3.21 RESTORATION

- A. Provide finished grading in accordance with Section 02260.
- B. Restore all green space areas disturbed by construction operations in accordance with Section 02500, Landscaping, and Section 02930, Sodding.

3.22 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. For Excavation and Backfill for Utilities and Structures refer to Section 02222.
- 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.

1.02 PROTECTION

- A. Excavations
 - 1. Notify ENGINEER 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.
- 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 their toll-free number 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, when ordered by the Engineer, will be paid for under a separate unit bid item if such bid item has been established, otherwise payment will be made in accordance with a negotiated price.
- 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 location shall be one hundred feet (100'), unless the trench is located within a State or County ROW, in which case the requirement defers to the more stringent of those agencies.

3. All trenches shall be fully backfilled at the end of each day or, in lieu thereof, when approved by the ENGINEER, 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 Ordered:

1. Trenches shall be over-excavated beyond the depth shown, when ordered by the 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 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-five percent (95%) of maximum density.
4. Payment for over-excavation shall be paid for either on a negotiated price basis, or as the Engineer may determine in accordance with the General Conditions.

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 (95%) 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 City shall retain the services of an independent materials testing laboratory to perform laboratory and field density tests which, in the opinion of the Engineer, are necessary to establish compliance with the compaction requirements of these specifications. The first round of tests will be paid from the "Cost Allowance for Permits, Licenses and Fees".
- 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 Engineer. Contractor shall give notice to the Engineer 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 Engineer or his 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

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 01300 – Submittals
- B. Section 01560 – Special Controls
- C. Section 02140 – Dewatering
- D. Section 02160 – Temporary Excavation Support Systems
- E. Section 02210 – Earth Excavation, Backfill, Fill and Grading
- F. Section 02220 – Excavation, Backfill and Compaction
- G. Division 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: An independent testing laboratory will be retained by the City 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 01300, Submittals.

- 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. 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. Sheet piling System: Drawings of the sheet piling 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 sheet piling and shoring system. Sheet piling 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, Section 553.60 et. seq.. 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 Florida Statute Section 553.60 et. seq. cited as 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.
- B. All existing utilities including piping, electrical conduits, electric duct banks and telephone cables that are shown on the Contract Drawings to be relocated, shall be relocated prior to initiating earth work. Excavation and backfill for relocation of existing utilities shall conform to the requirements of Section 02222, Excavation and Backfill for Utilities and Structures. 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.

PART 2 - PRODUCTS

2.01 BEDDING MATERIAL

- A. 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 01300, Submittals.

B. 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:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
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:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
5/8 inch	100
1/2 inch	40 - 100
3/8 inch	15 - 45
No. 10	0 - 5

C. 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.

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 Engineer. Existing pipe bedding material may not be used.

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 under Section 02510, Asphaltic Concrete Pavement and 02526, Concrete Pavement, Curb and Walkway.

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

- A. Excavatable flowable fill is called for on the Drawings 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. 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 cementitious 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. See Section 03375 – Flowable Fill for additional requirements.

PART 3 - EXECUTION

3.01 EXCAVATION

- 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.
- 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.

- 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.

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 Support Systems
- B. The term "sheeting" shall represent any type of shoring used to support sides of the excavation. Walls of the excavation shall be kept vertical where open cut is not practical and, if required to protect the safety of workmen, the general public, this or other work or structure, or excavation walls, the excavation shall be properly sheeted and braced

for conditions encountered and in conformance with OSHA requirements. Excavation for the structures shall be sufficient to provide a clearance between their outer surfaces and the face of the excavation, sheeting, or bracing, of not less than two feet, unless otherwise indicated on the Drawings. Materials encountered in the excavation, which have a tendency to slough or flow into the excavation, undermine the bank, weaken the overlying strata, or are otherwise rendered unstable by the excavation operation shall be retained by sheeting, stabilization, grouting or other acceptable methods.

- C. Minimum length of embedment below the deepest part of the excavation shall be 0.3 times the depth of excavation being supported or greater depending on the sheeting. The design of the sheeting arrangement shall be the responsibility of the Contractor.
- D. The Contractor shall furnish, place and maintain sheeting and bracing to support sides of the excavation as necessary to provide safe working conditions in accordance with OSHA requirements, and to protect pipes, structures and other Work from possible damage. Where wood sheeting or certain designs of steel sheeting are used, the sheeting shall be cut off at a level of 2 feet above the top of the installed pipe and that portion below the level shall be left in place. If interlocking steel sheeting is used, it may be removed 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 the removal of sheeting shall be cause for rejection of the affected portion of the work. The City may permit sheeting to be left in place at the request and expense of the Contractor, or the City may order him in writing to leave in place, for the preventing of damage to structures or property. Payment for sheeting ordered to remain in place shall be paid for at a negotiated price.
- E. 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.
 - 1. Removal of groundwater, or dewatering, shall be accomplished in accordance with the requirements of Section 02140, Dewatering.
- B. Disposal: The Contractor shall be responsible to dispose of water from the dewatering operation in accordance with the Contract Documents and shall obtain all necessary permits and conform to all local regulations and codes.

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 9-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.
- 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.
- 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. Sheet piling 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 ALTERNATE METHOD OF CONSTRUCTION

- A. Use of This Method: A combination of conditions in the substrate, water table, or method of disposal may be encountered during the course of the work which makes dewatering impossible. When such conditions are encountered, but only after all reasonable means (pumps, well points, etc.) to dewater the excavation have been employed without success, the Contractor, may request to employ the following

Alternate Method of Construction. The concurrence of the Engineer and City shall be obtained in writing and shall limit the use of the alternate method of construction to such specific portions of the Work as the Engineer and City shall determine acceptable.

- B. 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 the work. No additional payment will be made to the Contractor for excavation, backfill, sheeting or any cost incurred for Work or materials, or any other costs incurred as a result of the use of this alternate method of construction. The prices established in the Proposal shall be for full payment for the various items of work.
- C. Subject to all the requirements stated herein, including written acceptance of the Engineer, construction will be permitted in accordance with the following specifications. All requirements of these Specifications shall apply to this construction unless otherwise specifically modified herein.
- D. Removal of Water: The installation of pipe and appurtenances under water will be permitted and the requirements of Article 3.04 will be waived.
- E. Excavation shall be performed in accordance with Article 3.01 to the specified limits. The excavation shall be completely cleaned of silt and other fines.
- F. Pipe Bedding: Pipe bedding shall be placed from the bottom of the excavation to six inches above the top of the pipe. The bedding material shall be screened gravel or crushed stone as specified in Article 2.01. Limerock screenings, sand or other fine organic material shall not be used.
- G. The bedding material shall be placed to the lower third of the pipe barrel and then be shaped to receive the pipe at the intended elevation. Bedding shall be provided under the branch of all fittings to furnish adequate support and bearing under the fitting. After the pipe section is installed and tested if required, the remaining bedding shall be placed to the top of the pipe.
- H. Select backfill material shall be used to backfill from 6 inches above the top of the pipe to a level one foot above standing ground water. The lift shall then be compacted per Article 3.08. General backfill shall then be placed in 8-inch lifts and compacted per Article 3.08.
- I. If the Alternate Method of Construction is used, all backfill material, including specified pipe bedding material, shall be carefully lifted into the trench and not released to fall freely therein until the bucket or container is at or just above water level. Under no circumstances shall backfill material be dumped or pushed into the trenches containing water. Below water level, the bedding and backfill material shall be carefully rammed into place in uniform layers, of equal depth on each side of the pipe, up to one foot above the water level. Above the water level, backfill material shall be placed and compacted for normal backfill as previously specified.

3.11 RESTORATION

- A. Provide finished grading in accordance with Section 02260, Finish Grading.
- B. 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 02223
SCREENED GRAVEL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide and compact screened gravel as indicated and specified on the Drawings.

1.02 RELATED WORK

- A. Section 02210 - Earth Excavation, Backfill, Fill and Grading

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM) Publications:
 - 1. C33: Specification for Concrete Aggregates
 - 2. D422: Test Method for Particle-Size Analysis of Soils.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Gradation test result from the soil testing laboratory, at least two (2) weeks prior to hauling material, for the Engineer's acceptance.
 - 2. Submit a 20-lb. [9 kg] sample of the material when requested by the Engineer.

1.05 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. Qualifications of the independent soil testing laboratory as specified in Section 02210 - Earth Excavation, Backfill, Fill and Grading.
- C. Maximum particle size and gradation analyses shall be performed in accordance with ASTM D422.
- D. Material testing frequency and requirements as specified in Section 02210 - Earth Excavation, Backfill, Fill and Grading.

PART 2 - PRODUCTS

2.01 MATERIAL

- A. Screened gravel: Gradation and physical property requirements of screened gravel shall conform to ASTM C33, Coarse Aggregate number 67.
- B. Screened gravel for driveway: Gradation and physical property requirements of screened gravel shall conform to ASTM C33, Coarse Aggregate number 57.
 - 1. Contractor shall excavate to 12 inches below grade and install geotextile fabric under 12 inches of screened gravel as indicated.
- C. Screened gravel shall be free from roots, leaves, and other organic materials.
- D. Crushed rock of equivalent size and grading may be used instead of screened gravel.

PART 3 - EXECUTION

3.01 PLACEMENT AND COMPACTION

- A. As specified in Section 02210 - Earth Excavation, Backfill, Fill and Grading and as indicated on the drawings.

3.02 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 02225

CONTAMINATED SOILS AND GROUNDWATER

PART 1 - GENERAL

1.01 THE REQUIREMENT

- 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 Broward County contaminated sites listing as provided in the Appendix and to obtain the most current listing from the Broward County/FDEP website for reference of locations which may potentially have contaminated groundwater and soils.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02222 – Excavation and Backfill for Utilities and Structures
- B. Section 02140 – Dewatering

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 Broward County Environmental Protection and Growth Management Department (BCEPGMD) 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 01300. 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 Broward 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 (EPA Methods 601, 602, 610). 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 RELATED WORK

- A. Division 2

1.03 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 $\frac{3}{4}$ 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 02332

LIMEROCK BASE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment and incidentals required to provide limerock base, in accordance FDOT standards and specifications, and with the grades and typical sections shown on the Drawings and as specified herein. The Contractor is solely responsible for the cost of limerock base to be provided at various locations within the project corridor, and at potentially varying thicknesses per jurisdictional requirements, or for replacement in kind, as applicable.

1.02 RELATED WORK:

- A. Section 02100 – Clearing and Grubbing
- B. Section 02260 – Finish Grading
- C. Section 02510 - Asphaltic Concrete Pavement

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Source: The material used in limerock base courses shall be material classified as either Miami Oolite Formation or Ocala Formation at the Contractor's option; however, only one formation may be used.
- B. Limerock material shall contain not less than 70 percent of carbonates of calcium and magnesium. The maximum percentage of water sensitive clay material shall be 3%.
- C. Graduation: At least 97 percent (by weight) of the material shall pass a 3-1/2-inch sieve and the material shall be grades uniformly down to dust. The fine material shall consist entirely of dust of fracture. All crushing or breaking up which might be necessary in order to meet such size requirements shall be done before the material is placed on the road.
- D. Quality:
 - 1. The limerock material shall be uniform in quality and shall not contain cherty or other extremely hard pieces or lumps, balls or pockets of sand or clay size material in sufficient quantity as to be detrimental to prevent proper bonding,

finishing or strength of limerock base. Limerock material shall be non-plastic, and the liquid amount shall not exceed 35.

2. Compacted limerock material shall have an average LBR value of not less than 100.

PART 3 - EXECUTION

3.01 PREPARATION

- A. For new limerock base construction, or areas where pavement is to be replaced, Contractor shall remove existing subgrade as required to provide the minimum thickness of new limerock base course as indicated on plans.
- B. Compact subgrade to a density of no less than 98% of maximum density as determined by AHSHTO T-180.
- C. No separate bid item is provided in the proposal for evacuating, grading and compacting subgrade. The cost thereof shall be included in the BID schedule items.

3.02 PERFORMANCE

- A. Transporting Limerock: The limerock shall be transported to the point where it is to be used, over rock previously placed if practicable, and dumped on the end of the preceding spread. No hauling over the subgrade or dumping on the subgrade shall be done.
- B. Spreading Limerock:
 1. The limerock shall be spread uniformly, and all segregated areas of fine or coarse rock shall be removed and replaced with well-graded rock.
 2. When the specified compacted thickness of the base is greater than 6-inches, the base shall be constructed in two courses. The thickness of the first course shall be approximately one-half the total thickness of the finished base, or enough additional to bear the weight of the construction equipment without disturbing the subgrade.
- C. Establish grades and cross-sections conforming to plans
 1. Provide a minimum of 12" inches of limerock as required to provide grades, elevations and cross-sections or as indicated on plans.
 2. The Contractor must determine for himself the volume of material required for the site.

D. Compacting and Finishing Base:

1. Work shall comply with the appropriate Section of the FDOT Standard Specifications for Road and Bridge Construction, latest edition.
2. Proposed limerock base shall be compacted to a minimum of ninety-eight percent (98%) of maximum density as determined by ASHTO T-180. Properly compact areas adjacent to curbs, catch basins, manholes and other areas not accessible to rollers with mechanical or hand tamping devices.
3. Correction of Defects:
 - (a) If at any time the subgrade material should become mixed with the base course material, the Contractor shall dig out and remove the mixture, which shall be shaped and compacted as specified above.
 - (b) If cracks or checks appear in the base, either before or after priming, which in the opinion of the Engineer would impair the structural efficiency of the base course or checks by rescarifying, reshaping, adding base material where necessary and recompacting are deemed as being necessary, the Contractor shall rectify at no cost to the Owner.

END OF SECTION

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 Owner.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02510 - Asphaltic Concrete Pavement
- B. Section 02210 - Earth Excavation, Backfill, Fill and Grading
- C. Section 02930 - Sodding

1.03 SUBMITTALS

- A. The Contractor shall submit submittals for review in accordance with the Section 01300 - Submittals.

1.04 DEFINITIONS

- A. The phrase "FDOT Specifications" shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction. 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 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.

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 02507

PRIME AND TACK COATS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The work specified in this section consists of an application of bituminous material on previously prepared base in accordance with these specifications and in conformity with the line, grades, dimensions and notes shown on the Drawings. The Contractor is solely responsible for the cost of prime and tack coats to be provided at various locations within the project corridor, and at potentially varying thicknesses per jurisdictional requirements, or for replacement in kind and to match existing thicknesses, as applicable.
- B. Tack coat will be required prior to overlaying existing pavement.

1.02 RELATED WORK

- A. Section 02510 - Asphaltic Concrete Pavement

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Prime Coat: Unless otherwise indicated, the material used for the prime coat shall be cut back asphalt, Grade RC-70 or RC-250 and shall conform with the requirements specified in AASHTO Designated M 81-75 (1982). Unless otherwise indicated, the use of either RC-70 or RC-250 shall be at the CONTRACTOR'S option.
- B. Tack Coat: The material used for the tack coat shall be emulsified asphalt, Grade RS-2 and shall conform to the requirements specified in AASHTO Designation M 140-82.
- C. All materials are required to meet the standards of the jurisdictional agency having authority over the roadway right-of-way limits.

2.02 EQUIPMENT

- A. The pressure distributor used for placing the tack or prime coat shall be equipped with pneumatic tires having sufficient width of rubber in contact with the road surface to avoid breaking the bond of or forming a rut in the surface.
The distance between the centers of openings of the outside nozzles of the spray bar shall be equal to width of the application required, within an allowable variation of 2-inches. The outside nozzle at each end of the spray bar shall have an area of opening of not less than 25 percent, nor more than 75 percent in excess of other nozzles which shall have uniform openings. When the application covers less than the full width, the

normal opening of the end nozzle at the junction line may remain the same as those of the interior nozzle.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Before applying any bituminous material, all loose material, dust, dirt, and foreign material, which might prevent proper bond with the existing surface, shall be removed. Particular care shall be taken to clean the outer edges of the strip to be treated in order to ensure that the prime or tack coat will adhere.
- B. When the prime or tack coat is applied adjacent to curb and gutter, or another concrete surface (except where they are to be covered with a bituminous wearing coarse) such concrete surfaces shall be protected by heavy paper or other protective material while the primer or tack coat is being applied. Any bituminous material deposited on such concrete surfaces shall be removed immediately.

3.02 WEATHER LIMITATIONS

- A. No bituminous material shall be applied when the air temperature is less than 50 degrees Fahrenheit in the shade, or when the weather conditions or the condition of the existing surface is unsuitable. In no case shall bituminous material be applied while rain is falling or when there is water on the surface to be covered.

3.03 APPLICATION OF PRIME COAT

- A. After the base has been finished the full width of surface shall be swept with a power broom supplemented with hand brooms and mechanical blowers prior to the application of prime coat. Care shall be taken to remove all loose dust, dirt and objectionable matter. If deemed necessary, the base shall be lightly sprinkled with water immediately in advance of the prime coat. The prime coat shall be applied to the full width of the base.
- B. The temperature of the prime material shall be such as to insure uniform distribution. The material shall be applied with a pressure distributor as specified above. The amount to be applied shall be sufficient to coat the surface thoroughly and uniformly without any excess to form pools or to flow off the base. For limerock base, the rate of application shall not be less than 0.10 gallons per square yard; for shell base, the rate of application shall not less than 0.15 gallons per square yard.
- C. If the roadway is to be opened for use following the application of the prime material, a light uniform application of clean sand shall be applied and rolled. The sand shall be nonplastic, shall be free from slit and rock particles and shall not contain any sticks,

vegetation, grass roots, or organic matter. After the sand covering has been applied, the surface may be opened to traffic.

3.04 APPLICATION OF TACK COAT

- A. In general, a tack coat will not be used on primed bases except in areas which have become excessively dirty and cannot be cleaned or where the prime has cured and lost all of its bonding effect.
- B. No tack coat shall be applied until the primed base or leveling course has been cleaned and is free from sand, dust or other objectionable material.
- C. The tack coat shall be applied with a pressure distributor as specified above. It shall be heated to a suitable consistency and applied in a thin uniform layer at the rate of between .02 gallons and .08 gallons per square yard.
- D. The tack coat shall be applied sufficiently in advance of the laying of the wearing surface to permit drying but shall not be applied so far in advance or over such an area as to lose its adhesiveness as a result of being covered with dust or other foreign material. Suitable precautions shall be taken by the Contractor to protect the surface while the tack coat is drying and until the wearing surface is applied.

END OF SECTION

SECTION 02510

ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The work specified in this section consists of the construction of asphaltic concrete surface course composed of a mixture of aggregates, mineral filler and asphalt cement properly laid upon a prepared base or a newly constructed and compacted, primed and tacked roadway base course, in accordance with these specifications and in conformity with the lines, grades, thickness and typical cross section shown on the Drawings. The Contractor shall furnish asphaltic concrete surface course in the locations and to the extent indicated on the Drawings.
- B. The Contractor is solely responsible for the cost of asphaltic concrete pavement to be provided at various locations within the project corridor, and at potentially varying thicknesses per jurisdictional requirements, or for replacement in kind, as applicable.
 - 1. For new asphalt roadway pavement construction or reconstruction, provide asphaltic concrete structural surface course consisting of one of the following:
 - (a) "Superpave Asphalt Concrete" per FDOT Standard Specifications for Road and Bridge Construction.
 - (b) Or as otherwise required by the authority having jurisdiction over the roadway right-of-way and as indicated on the plans and Standard Details.
 - 2. Thickness of the asphalt course shall be two (2") inch thick minimum, or as specified on the Drawings, or by the regulatory agency having jurisdictional authority over the roadway right-of-way limits. In addition, asphaltic pavement may be required to be replaced in kind and to match existing thicknesses if deemed necessary by the agency having jurisdictional authority over the right-of-way. The Contractor should plan on doing any required due diligence (pavement corings) to identify existing pavement thicknesses as necessary.

1.02 QUALITY ASSURANCE

- A. Construction of asphaltic concrete surface courses shall be in accordance with the Standard Specifications for Road and Bridge Construction (current edition), of the Florida Department of Transportation, and supplements thereto, hereinafter referred to as FDOT Specifications, except as amended herein. The FDOT Specifications are hereby made a part of this contract to the extent they are applicable thereto and shall be as binding upon the Contractor as though reproduced herein.

1.03 RELATED SECTIONS

- A. Section 02332 - Limerock Base.
- B. Section 02507 - Prime and Tack Coats.
- C. Section 02582 – Raised Retro-Reflective Pavement Markers.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Bituminous Material: Asphalt cement, Viscosity Gard AC-20 or AC-30, shall conform to the requirements of FDOT Specifications.
- B. Coarse Material: Coarse aggregate, stone or slag shall conform to the requirements of FDOT Specifications.
- C. Fine Aggregate Material: Fine aggregate shall conform to the requirements of FDOT Specifications.
- D. Mineral Filler: Mineral filler shall conform to the requirements of FDOT Specifications.

2.02 GENERAL COMPOSITIONS OF MIXTURE:

- A. The bituminous mixture shall be composed of a combination of aggregate (coarse, fine, or mixture thereof), mineral filler, if required, and bituminous material. The several aggregate fractions shall be sized, uniformly graded and combined in such proportion that the resulting mixture will meet the grading and physical properties of the approved job mix formula.
- B. In all cases, the job mix formula shall be within the design ranges specified in the following table.

Gradation Design Range

<u>Sieve Size</u>	<u>% by Weight Passing</u> <u>Type S-III</u>
¾-inch	
½-inch	100
3/8-inch	88-100
No. 4	60-90
No. 10	40-70
No. 40	20-45
No. 80	10-30
No. 200	2-6

2.03 JOB MIX FORMULA

- A. No work shall be started on the specific project until the Engineer has approved the job mix formula. FDOT approvals will be required for all materials to be used within their ROW limits.
- B. The job mix formula shall conform to the requirements of FDOT Specifications. In addition, the job mix formula shall include test data showing that the material as produced meets the requirements of the following table:

Mix Type	Minimum Marshall Stability (%)	Flow (0.01 in)	Minimum VMA (%)	Air Voids (%)	Min Effective Asphalt Content (%)
SP-9.5	1,500	8 – 14	15	3 – 7	5.5

PART 3 - EXECUTION

3.01 TRANSPORTATION

- A. The mixture shall be transported in tight vehicles previously cleaned of all foreign material and, if necessary, each load shall be covered with a waterproof canvas cover of sufficient dimensions to protect it from weather conditions. The inside surface of the truck bodies may be thinly coated with soapy water, or a mixture of water with not more than five percent of lubricating oil, but no excess of either shall be used. After the truck bodies are coated and before any mixture is placed therein, they shall be raised so that all excess water will drain out. Kerosene, gasoline or similar products shall not be used to prevent adhesion.

3.02 LIMITATION FOR SPREADING

- A. The mixture shall be spread only when the surface is properly prepared and is intact, firm, cured and dry. No mixture shall be spread when the air temperature is less than 40-degree Fahrenheit, nor when the spreading cannot be finished and compacted during the daylight hours. The temperature of the mix at the time of spreading shall not be less than 230-degree Fahrenheit.

3.03 PLACING

- A. The mixture shall be placed in accordance with the requirements of FDOT Specifications. The new asphalt pavement shall be placed in two lifts. The second lift shall match the elevation of the adjacent pavement.

3.04 COMPACTING

- A. The mixture shall be compacted in accordance with the requirements of FDOT Specifications.

3.05 JOINTS

- A. Joints shall conform to the requirements of FDOT Specifications.

3.06 FIELD QUALITY CONTROL

- A. Surface Requirements: Depressions which may develop after initial rolling shall be remedied by loosening or removing the mixture and adding new material to bring the areas to a true surface. No skin patching shall be done. Such portions of the completed pavement which are defective in surface compaction or in composition, or that do not comply with all other requirements of these specifications, shall be taken up and replaced with suitable mixture, properly laid in accordance with these specifications and at the expense of the Contractor.
- B. Thickness Requirements: The thickness of the compacted asphaltic concrete surface course shall be no less than that shown on the Drawings as determined by coring. Thickness testing and correction of defective work shall be as specified in FDOT Specifications.
- C. "As-Built" limerock elevations shall be signed and sealed by a registered land surveyor and submitted to the Project Engineer for approval prior to placement of asphalt. Elevation shall be taken at high and low points, midpoint, intersections and breaks in grade at intervals not to exceed 50 feet. No separate pay item is included in bid form for this work. Include limerock as-built cost in asphalt section.
- D. Protection of Pavement: After the completion of the pavement, no vehicular traffic of any kind shall be permitted on the pavement until it has set sufficiently to prevent rutting or other distortion.

END OF SECTION

SECTION 02526

CONCRETE PAVEMENT, CURB AND WALKWAY

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Concrete pavement, curbs and sidewalk shall be constructed to the lines and grades and dimensions required for a complete installation as shown on the Drawings and specified herein. Existing features are to be replaced in kind and at the same grades and elevations.

1.02 SUBMITTALS

- A. Shop drawings for reinforcing, joint material and mix designs shall be submitted for review in accordance with Section 01300 - Submittals.

PART 2 - PRODUCTS

2.01 CONCRETE

- A. Concrete shall be Class B, conforming to Section 03300 – Cast-in-place Concrete, Reinforcing and Formwork, unless noted or specified otherwise.

2.02 REINFORCING AND WELDED WIRE FABRIC

- A. Joint reinforcing and welded wire fabric shall conform to Section 03300 – Cast-in-place Concrete, Reinforcing and Formwork.

2.03 JOINT SEALER FOR PAVEMENT

- A. Joint sealer shall be a one-or two-part polysulfide base self-leveling sealant for horizontal surfaces that has been developed for foot and vehicular traffic. The sealant shall conform to FDOT standards.

2.04 PREFORMED JOINT FILLER

- A. Preformed joint filler shall be sponge rubber and conform to the requirements of AASHTO Designated M148, Type 1.

PART 3 - EXECUTION

3.01 SUBGRADE CONDITION

- A. The finished subgrade shall be maintained in a smooth, compact condition and any areas which are disturbed prior to placing of the concrete shall be restored at the Contractor's expense. The subgrade shall be moist at the time the concrete is placed. Water shall be uniformly applied ahead of the paving operations as directed by the Engineer. If the Contractor does not maintain the subgrade in the required moist condition, a vapor barrier sheet will be required between the subgrade and the concrete.
- B. The subgrade shall be accurately trimmed to the required elevation with a 1/4-inch tolerance. High areas shall be trimmed to proper elevation. Low areas may be filled with suitable material and compacted to the specified density or filled with concrete integrally with the placing of the pavement.

3.02 SETTING FORMS

- A. The forms shall be accurately set to line and grade and such that they rest firmly, throughout their entire length, upon the compacted subgrade surface. Forms shall be joined neatly and tightly and braces to test the pressure of the concrete and the finishing operations. The alignment and grade of all forms shall be approved before and immediately prior to the placing of concrete.

3.03 MIXING CONCRETE

- A. Concrete shall be mixed in accordance with Section 03300, Cast-in-place Concrete, Reinforcing and Formwork.

3.04 PLACING CONCRETE

- A. The concrete shall be distributed on the subgrade to such depth, that, when it is consolidated and finished, the slab thickness required by the Drawings will be obtained at all points and the surface will at no point be below the grade specified for the finished surface, after application of the allowable tolerance. The concrete shall be deposited on the subgrade in a manner which will require as little rehandling as possible.
- B. Fabric reinforcement shall be placed at mid slab depth, and the fabric shall be maintained at this location during the placing and finishing operations.
- C. Concrete shall be thoroughly consolidated against and along the faces of all forms, by means of hand-operated, spud-type vibrators. Vibrators shall not be permitted to come in contact with the subgrade or a side form. Vibration at any one location shall not continue so long as to produce puddling or the accumulation of excessive grout on the

surface. In no case shall the vibrator be operated longer than 15 seconds in any one location.

3.05 STRIKING-OFF, CONSOLIDATING AND FINISHING CONCRETE

- A. Immediately after the placing, the concrete shall be struck off, consolidated and finished, to produce a finished pavement conforming to the cross section, width and surface. Sequence of operations shall be as follows: strike-off; vibratory consolidation; screeding; floating; removal of laitance; straight-edging; and final surface finish.

3.06 STRAIGHTEDGING AND SURFACE CORRECTIONS

- A. After floating has been completed and the excess water removed, but while the concrete is still in a plastic state, the surface of the concrete shall be tested for trueness with an accurate 10-foot straightedge. The straightedge shall be furnished by the Contractor. The straightedge shall be held in successive positions parallel to the road center line, in contact with the surface, and the whole area tested from one side of the slab to the other as necessary. Any depressions shall be immediately filled with freshly mixed concrete and struck-off; consolidated and refinished. High areas shall be cut down and refinished. Straightedge testing and surface correction shall continue until the entire surface appears to conform to the required grade and cross section.

3.07 FINAL FINISH

- A. As soon as the water sheen has disappeared from the surface of the pavement and just before the concrete becomes nonplastic, a light broom finish shall be given to the surface.

3.08 EDGING

- A. After the final finish has been applied, but before the concrete has become nonplastic, the edges of the pavement along each side of the strip being placed, on each side of construction joints and along any structure extending into the pavement, shall be carefully rounded to a 1/4 inch radius except as otherwise indicated. A well-defined and continuous radius shall be produced and a smoother, dense mortar finish obtained. All concrete shall be completely removed from the top of the joint filler.
- B. All joints shall be checked with a straightedge before the concrete has become nonplastic and, if one side of the joint is higher than the other or the entire joint is higher or lower than the adjacent slabs, corrections shall be made as necessary.

3.09 JOINTS

- A. Construction Joints

1. Construction joints shall be located as shown on the Drawings and/or as directed by the Engineer.
- B. Expansion Joints Around Structures
1. Expansion joints shall be formed by placing pre-molded expansion joint material about all structures and features projecting through, into or against the pavement. Unless otherwise indicated, such joints shall be 1/2 inch in width.
- C. Transverse Expansion Joints
1. Open type transverse expansion joints shall be provided at all sidewalk returns and at 50 feet intervals and wherever indicated on the Drawings. Open type joints shall be formed by staking a 1/4-inch-thick metal bulkhead in place and placing concrete on both sides. After the concrete has set sufficiently to preserve the width and shape of the joint, the bulkhead shall be removed. After the sidewalk has been finished over the joint, the slot shall be opened and edged with a tool having a 1/2-inch radius. Transverse expansion joints shall be cleaned and filled with joint filler strips 1/4-inch-thick conforming to the requirements of AASHTO M-153.
- D. Scored Joints
1. Scored joints shall be either formed or sawed at 5-foot intervals and shall extend to a depth of at least one fourth of the sidewalk slab thickness.

3.10 CURING

- A. After the finishing operations have been completed and as soon as the concrete has hardened sufficiently that marring of the surface will not occur, the entire surface and the edges of the newly placed concrete shall be covered and cured with membrane curing compound.
- B. Curing compound shall be uniformly applied to the surfaces to be cured, in a single coat, continuous film, at the rate of one gallon to not more than 200 square feet, by a mechanical sprayer.
- C. Curing compound shall not be applied during periods of rainfall. Curing compound shall not be applied to the inside faces of joints to be sealed. Should the film become damaged from any cause within the required curing period, the damaged portions shall be repaired immediately with additional compound. Upon removal of side forms, the sides of the slabs exposed shall immediately be coated to provide a curing treatment equal to that provided for the surface.

3.11 CURB AND SIDEWALK CONSTRUCTION

- A. The concrete curbs and sidewalks shall be constructed on a prepared smooth subgrade of uniform density. Large boulders and other obstructions shall be removed to a minimum depth of 6 inches below the finished subgrade elevation and the space shall be backfilled with sand, base course material or other suitable material which shall be thoroughly compacted by rolling or tamping. The Contractor shall furnish a template and shall thoroughly check the subgrade prior to depositing concrete.
- B. Concrete for curbs, and sidewalks shall be formed, mixed, placed and finished in conformance with the requirements of Division 3, except as modified herein. Concrete shall be cured with a clear membrane curing compound which shall be applied at a uniform rate of one gallon per 200 square feet in accordance with the requirements specified herein. Sidewalks shall be given a light broom finish.

3.12 CURBS

- A. Curbs shall be constructed in uniform sections ten feet in length except where shorter sections are necessary for closures or arcs. The sections shall be separated by sheet metal templates set perpendicular to the face and tip of the curve and not less than 2 inches longer than the depth of the curb. The templates shall be held firmly during the placing of the concrete and shall be allowed to remain in place until the concrete has set sufficiently to hold its shape but shall be removed while the forms are still in place.
- B. After the concrete has sufficiently set for a minimum of 12 hours, the Contractor shall remove the forms and backfill the spaces on each side. The earth shall be compacted in satisfactory manner without damage to the concrete Work. Minor defects shall be filled with a mortar composed of one-part Portland cement and two parts fine aggregate.

3.13 PAVEMENT CURB AND SIDEWALK REPAIR

- A. All damage to pavement, curb or sidewalk as a result of work under this Contract shall be repaired in a manner satisfactory to the Engineer and at no additional cost to the Owner. The repair shall include all work as specified herein.
- B. The width of all repairs shall extend at least 12 inches beyond the limit of the damage or as required by jurisdictional agencies. The edge of the pavement curb or sidewalk to be left in place shall be cut to a true edge with a saw or other approved method so as to provide a clean edge to abut the repair. The line of the repair shall be reasonably uniform with no unnecessary irregularities.
- C. All modified, restored, or repaired sidewalks must meet all jurisdictional authority requirements; including but not limited to, thickness, reinforcement, ADA compliance, slopes and safety requirements.

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 routed 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 02581

TRAFFIC SIGNS

PART- 1 GENERAL

1.01 REQUIREMENT

- A. This section consists of all traffic signs within the project limits, whether shown on the Drawings or not, specified herein and as required for a complete installation or removal and replacement.

1.02 SUBMITTALS

- A. The Contractor shall submit shop drawings and other information to the Engineer for review in accordance with Section 01300, Submittals.

1.03 CERTIFICATION

- A. The Contractor shall furnish the manufacturer's certification that all signs furnished conform to these specifications and shall replace or repair at its expense all signs that fail to meet this requirement.

1.04 QUALITY CONTROL

- A. The phrase "FDOT Specifications" shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction. 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.

1.05 TRAFFIC SIGNS

- A. General: Traffic regulating signs shall conform to the colors, dimensions and requirements of the Manual on Uniform Traffic Control Devices (ANSI) and displaying the lettering and symbols indicated on the Drawings.
- B. Sign Panels and Support Members: Sign panels and support members shall conform to Aluminum Association Alloy 6061-T6.
- C. Bolts: Bolts shall conform to Aluminum Association Alloy 2024-T4 with an anodic coating 0.0002-inches thick minimum and chromate sealed.
- D. Nuts: Nuts shall conform to Aluminum Association Alloy 6269-T9.
- E. Reflective Sheeting: Reflective sheeting shall conform to FDOT Type A requirements.

- F. Construction Warning Signs: The Contractor shall install traffic and warning signs during construction in accordance with OSHA, FDOT and Broward County Public Works requirements.
- G. Maintenance of Traffic and Pedestrian safety shall comply with Section 01570, Broward County standards, FDOT Standards and Specifications, or as necessary to meet requirements for the agency having jurisdictional authority over the roadway right-of-way limits.

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 425°F and apply directly to the bonding surface from the melter/applicator by either pumping or pouring. Maintain the application temperature between 375°F and 425°F. 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 WORK INCLUDED

- A. The work under this Section includes providing a complete system for wastewater transmission pressure piping and appurtenant items.

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 8-gauge copper wire. Wire shall terminate at the top of each valve and be capable of extending 12-inches above the ground.
4. All PVC force mains shall be solid green. 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 or above ground piping at pump stations shall be Protecto 401 lined and coated. Flanged DIP shall be epoxy coated from the factory and shall not be coated with bitumastic or asphaltic exterior coatings.
6. Fittings for force mains shall be ductile iron with mechanical joints. Interior coating shall be shop applied Protecto-401. Restrain all fittings per the Contract Documents. Wrap all fittings with polyethylene wrap (ANSI A 21.5/AWWA C105, 8-mil minimum thickness).

- 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 Owner, the methods of manufacture fail to secure uniform results, or where the materials used produce inferior pipe or fittings.

- C. Prevention of Electrolysis: Where shown on Drawings or deemed necessary, electrolytic action through the contact of dissimilar metals shall be prevented 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 Owner.

1.03 SHOP DRAWINGS AND SUBMITTALS

- A. Submittals shall be submitted to the Engineer for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01420 "Drawings and Submittals."
 - 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 Owner 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: Water shall not be allowed in the trenches while the pipes are being laid and/or tested. 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 interfere with the normal drainage of the work area and adjacent properties. 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 Owner so that the entire system will be left clean and unobstructed.

PART 2 - PRODUCTS

2.01 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 in Section 02220 "Earthwork", 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 or in an easement, the Contractor shall install 4-inch diameter schedule 80 PVC utility pipe line markers over the pipe alignment at 400-foot intervals, at all valves, and at all locations where fittings deflect the pipe alignment in the horizontal plane. Marks shall include a detail and be color coded to match the pipe contents and meet FDEP requirements.
 - 4. All mains (PVC and HDPE) shall be installed with a continuous, insulated 8-gauge 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 ground. Directionally drilled pipe shall be installed with two insulated 8-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.
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. Restraining devices are specified in Section 15064 "Polyvinyl Chlorine Pipe and Fittings".

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. As indicated on the Drawings
 - b. As 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 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 or pig for pipes greater than 12-inches.

F. Backfilling: Backfilling shall be in accordance with Section 02220 "Excavating, Backfilling and Compacting" of these specifications.

3.03 CLEANING

A. General: At the conclusion of the Work the Contractor shall thoroughly clean the new pipelines 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. See standard detail in plans.

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
 - 1. General: The Contractor shall perform hydrostatic pressure and leakage tests on all pressure piping. Tests shall be conducted on segments between valves and no more than 2,000 linear feet is to be tested at one time.
 - 2. Standard: AWWA C600, Section 5 (DI pipe) and AWWA C605 Section 7 (PVC pipe) with the exceptions required herein and the exception that the Contractor shall furnish all gauges, meters, pressure pumps and other equipment needed to test the lines.
 - 3. Hydrostatic Pressure Test
 - a. Test Pressure: Test pressure will be 50% above the normal working pressure, but not less than 100-psi, unless otherwise noted on the Drawings.
 - b. 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.
 - c. Air Release: Corporation cocks at least 3/4-inch in diameter, pipe riser and angle globe valves shall be provided at each dead-end to bleed air from the line.

4. Hydrostatic Leakage Test

- a. General: Following the pressure test, the Contractor shall perform the leakage test. The line shall be filled with water and all air removed for the test. The Contractor shall provide a pump to maintain the test pressure for the entire test period.
- b. Test Pressure: Maximum operating pressure as determined by the City but not less than 100-psi unless otherwise noted.
- c. Test duration: 2-hours.
- d. Allowable leakage:
$$L = \frac{SD(P)^{0.5}}{148,000}$$

L = Allowable leakage (gallons per hour)
S = Length of pipe tested (feet)
D = Nominal diameter of pipe (inches)
P = Average test pressure maintained (psig)
- e. Visible Leakage: All leaks evident at the surface shall be repaired and leakage eliminated regardless of the measured total leakage.
- f. Leakage Measurement: The amount of water required to maintain the test pressure is the leakage.

END OF SECTION

SECTION 02665

HORIZONTAL DIRECTIONAL DRILL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. This section shall include but not be limited to all labor, equipment, tools, materials, and incidentals required for the installation of below grade pipeline and/or conduit by the horizontal directional drilling (HDD) method. In addition, design calculations for all HDD installations must be signed and sealed by a Professional Engineer licensed in the State of Florida and submitted for approval by the Contractor as per the requirements listed herein. All pipe and appurtenances of similar type and material shall be furnished by a single manufacturer. Multiple submittals for the same materials will require that a single approvable manufacturer be selected by the Contractor and the Engineer and Owner notified for the final approved submittal to be provided.
- B. The Contractor shall be responsible for all maintenance of traffic (MOT) to maintain vehicular, pedestrian park, and all other access at all times. The project contains various land use areas, all of which must have detailed and specific MOT plans to allow for continuous operations and access at all times. The detailed MOT plans shall be submitted to the Owner/Engineer for approval prior to commencement of the work and address all work areas within the project corridor. The plan shall be in accordance with the Manual of Uniform Traffic Control Devices. The MOT plans are required to be signed and sealed by a professional engineer licensed in the State of Florida and shall meet all Florida Department of Transportation (FDOT), City and County standards and specifications. Comments from all required jurisdictional agencies and the Owner must be addressed prior to the MOT plans being approved and implemented by the Contractor. The Contractor must provide all necessary advanced notifications prior to implementing MOT plans. MOT may be required to be during non-peak hours/dates and times and shall meet all Owner requirements at no additional cost to the Owner.
- C. The Contractor shall coordinate all staging areas with the Owner and jurisdictional authorities, prior to commencement of staging of equipment or materials. Screening or other approved visual barriers, noise attenuation, protection of existing structures and features, maintaining accessways including the use of temporary stabilized access roads or platforms, matting or other necessary improvements to protect wetlands, vehicular and pedestrian protection and MOT, and all other necessary safety precautions to protect and minimize disruptions, and/or other necessary measures as directed by the Owner and others will be required and must be pre-approved by the Owner and jurisdictional authorities prior to installation or implementation. These measures are considered incidental to the Work and due to the surrounding areas of the Work and will be at no additional cost to the Owner.
- D. The Contractor shall use means and methods as necessary to minimize the unintentional release of drilling fluids (aka "frac-out"). A frac-out contingency plan shall be submitted by the Contractor and a minimum of at least one vac truck must be maintained on site at

all times. An example plan is included in the Appendices for reference but more specific information is required to be provided by the Contractor such as number of vac trucks on site, response plan and timeline, emergency contacts, etc. Potential means and methods to minimize frac-outs are at the discretion of the Contractor and may include, but are not limited to; pressure relief or weep holes, bore tracking systems, wire grid installations for tracking, monitoring of drilling fluid pressures and flows, installation of conductor casings at entry and/or exit pit locations, or other means and methods measures as deemed necessary by the Contractor.

- E. Additional or supplemental geotechnical borings shall be the responsibility of the Contractor. Limited geotechnical borings were initially performed by the Owner and are intended to be supplemented with sufficient geotechnical borings being performed by, and paid for by, the Contractor. No claims for unknown soil conditions will be approved, nor will any cost changes be acceptable to the Owner. The Contractor must obtain all necessary soil borings for the locations and depth(s) of their performed installations, at no additional cost to the Owner, and provide all necessary tooling for the various types of soils potentially encountered during the drilling operation.

- F. The Contractor is to field verify all existing utilities prior to commencement of drilling operations. Limited subsurface utility excavations have been performed by the Owner to assist the Contractor in locating existing facilities; however, it is the Contractor's sole responsibility to verify and confirm all existing utility sizes, depths and locations. In addition, all utility coordination and locating of existing facilities is to be performed by the Contractor prior to commencement of any HDD operations to ensure that all existing utility facilities are located, protected and supported as necessary at all times. Any impact to existing utilities shall be repaired and replaced by the Contractor at their expense and at no cost to the Owner.

- G. The Contractor's operations shall be in conformance with the Directional Crossing Contractors Association (DCCA) published guidelines (latest edition) and pipe manufacturer's guidelines and recommendations and use standard engineering practices for all HDD calculations, methods, installations and safety precautions.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. This specification references the following Specifications, which form a part of this specification to the extent specified herein. In any case of conflict, the most restrictive specification shall apply.

1.	Submittals	Section 01330
2.	Quality Assurance/Quality Control	Section 01440
3.	Erosion and Sediment Control	Section 01575
4.	Dewatering	Section 02240
5.	Excavating and Backfilling for Utilities	Section 02320
6.	Bentonite Management Plan	Appendix C

1.03 DEFINITIONS

- A. Horizontal Directional Drilling (HDD): a steer-able system for the underground installation of pipes, conduits and cables using a surface launched rig. A pilot bore is drilled using a rotating drill string and then is enlarged by a back reamer to the size required for the product pipe. The necessary deviation during pilot boring is provided by a slanted face to the drill head, an asymmetric drill head, eccentric fluid jets or a combination of these, usually in conjunction with an aboveground electronic locator or a remote guidance system.
- B. Maxi (Conventional) HDD: typically used for the largest diameter pipelines/conduits and longest length installations. Pipe diameters are typically 18 inches or larger, lengths can exceed 1000 feet and the pullback force is typically in excess of 70,000 pounds. Remote tracking of the drill string is usually provided from sensors near the leading end of the drill string.
- C. Mini HDD: typically used for the smaller diameter pipelines/conduits and for shorter distances. Pipe diameters are typically 6 inches or smaller, lengths less than 600 feet, and pullback forces are up to 20,000 pounds. Tracking of the drill string is typically achieved with a surface held walkover transmitter/receiver.
- D. Midi HDD: typically used for intermediate sizes and lengths of pipelines/conduits. Pipelines are typically between 6 inches and 18 inches diameter, lengths up to 1000 feet and pullback forces from 20,000 to 70,000 pounds. Midi HDD equipment may employ similar capabilities to the Maxi HDD rigs, but have more limitations on capacity. Tracking of the drill string is typically achieved with a surface held walkover transmitter/receiver.

1.04 SUBMITTALS

- A. Submittals shall be submitted to the Engineer and Owner for review and acceptance prior to construction. Submittals for HDD operations are to include, but not be limited to:
 - 1. Detailed work plan including at a minimum: HDD layout showing entry and exit angles, bend radius, existing utilities and separation distances, entry and exit pit locations, pipe layout/stringing, any deviations from the HDD plan and profile in the Contract Documents/plans, means and methods for the HDD submittal and all other pertinent information to perform the HDD. See below for additional requirements.
 - 2. Pipe Material.
 - 3. Couplings / Sleeves.
 - 4. HDPE mechanical joint adapters.
 - 5. Training and experience of directional boring machine operator.
 - 6. Bentonite Management Plan
 - 6. Directional drilling equipment specifications including calibration records.

- B. Prior to beginning Work, the Contractor must submit a detailed work plan to the Owner and Engineer detailing the procedure and schedule to be used to execute the Project. The Work plan should, but not be limited to, the following:
1. A description of all equipment to be used.
 2. Additional or supplemental geotechnical boring locations and depths.
 3. Down-hole tools.
 4. A list of personnel and their qualifications and experience.
 5. List of Subcontractors.
 6. A schedule of work activity.
 7. A safety plan and traffic control plan (if applicable).
 8. An environmental protection plan.
 9. Contingency plans for possible problems/inadvertent fluid release
- C. Equipment/Personnel

1. **Contractor is to submit specifications and signed and sealed calculations showing that all directional drilling equipment to be used is sufficient to handle the pullback forces and to ensure that the equipment will be adequate to complete the work. A variance may be requested by the Contractor for submittal of calculations that are not signed and sealed; however, the Contractor remains at their own risk for any deficiencies or issues with the HDD construction, including all costs with any failed HDD operations or construction issues.** Equipment shall include, but not be limited to, the following:

- a. Drilling rig of sufficient capacity to perform the bore and pullback operations.
- b. Identify location and timing for securing a back-up rig if needed.
- c. A drilling fluid mixing, delivery, and recovery system of sufficient capacity. In addition, a drilling fluid recycling system to remove solids from the drilling fluid so that the fluid can be reused.
- d. Mud motors (if applicable).
- e. Down-hole tools.
- f. A magnetic guidance system to accurately guide boring operations.
- g. Rig safety systems.
- h. Identify location and timing for securing a back-up rig if needed.

- i. Method of logging depth including grid system/wiring, tracking or other methods. The method must be sufficient to obtain accurate information for the depth and length of the bore.
- j. Vacuum trucks of sufficient capacity to handle the drilling fluid volume.
- k. Trained and competent personnel who are experienced must operate the system
- l. **Industry standard calculations to ensure that the HDD rig and equipment is capable of performing the HDD.**

1.05 QUALITY ASSURANCE

A. Technical Guidance

- 1. PPI TR-4: Recommended Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) or Minimum Required Strength (MRS) rating for thermoplastic piping materials or pipe.
- 2. PPI TR-3: Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) or Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.
- 3. PPI TR-2 PVC Range Composition Listing of Qualified Ingredients.

B. Reference Standards (this listing is not all-inclusive of all required standards)

- 1. ASTM D1248 Polyethylene Plastics
- 2. ASTM D1785 Schedule 40, 80 and 120 plastic pipe
- 3. ASTM D3035 Polyethylene Pipe based on Controlled Outside Diameter
- 4. ASTM D3350 Polyethylene Plastics Pipe and Fittings Materials
- 5. ASTM D3261 Butt Heat Fusion Polyethylene Plastic Fittings for Polyethylene Plastic Pipe and Tubing
- 6. ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
- 7. ASTM F2160 Standard Specification for Solid Wall High Density Polyethylene (HDPE) Conduit Based on Controlled Outside Diameter (OD)
- 8. ASTM F1962 Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings
- 9. ASTM D1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- 10. ASTM D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

11. ASTM D2152 Test Method for Degree of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion
12. ASTM D2241 Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR PR)
13. ASTM D2665 Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
14. ASTM D3034 Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
15. ASTM F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe
16. ASTM F679 Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings
17. ASTM F1057 Standard Practice for Estimating the Quality of Extruded Poly (Vinyl Chloride) (PVC) Pipe by the Heat Reversion Technique
18. ASTM F1417 Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
19. ANSI/AWWA C104/A21.4 – Standard for Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water
20. ANSI/AWWA C105/A21.5 – Standard for Polyethylene Encasement for Ductile Iron Pipe Systems
21. ANSI/AWWA C110/A21.10 American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids
22. ANSI/AWWA C111/A21.11 American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
23. ANSI/AWWA C150/A21.50 – Standard for the thickness design of Ductile Iron Pipe
24. ANSI/AWWA C151/A21.51 – Standard for Ductile Iron Pipe, Centrifugally Cast, for Water
25. ANSI/AWWA C153/A21.53 AWWA Standard for Ductile-Iron Compact Fittings for Water Service
26. ANSI/AWWA C600 -- Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
27. AWWA C605 Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
28. AWWA C651 Standard for Disinfecting Water Mains
29. AWWA C900-16 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 60 in. (100mm Through 300mm), for Water Distribution and Transmission

30. AWWA M23 AWWA Manual of Supply Practices PVC Pipe—Design and Installation, Second Edition
31. ASTM C923 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
32. UNI-B-6 Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe
33. UNI-PUB-08 Tapping Guide for PVC Pressure Pipe
34. NSF-14 Plastics Piping System Components and Related Materials
35. NSF-61 Drinking Water System Components--Health Effects

C. Inspection Upon Delivery

1. All pipe, fittings, and appurtenances shall be subject to visual inspection by the Owner's Representative at the point of delivery and again just before being lowered into the trench. All materials found to be defective due to manufacture, or damaged in transit shall be rejected and shall be immediately removed from the job site. Damaged piping may be rejected at the Owner's discretion, whether it meets or exceeds the manufacturer's minimum recommended standards for damages along the surface of the piping. All rejected piping must be replaced by the Contractor at no additional cost to the Owner.
2. The Owner's Representative may perform or cause to be performed all tests as specified in the applicable Standards, to ensure conformance with the standard. In the case of failure of the pipe or appurtenances to comply with such standards, the responsibility for replacement of the defective materials becomes that of the Contractor.
3. The entire product of any manufacturer may be rejected when, in the opinion of the Owner's Representative, the methods of manufacture fail to secure uniform results, or where the materials are such as to produce pipe and/or fittings of inferior quality.
4. All piping must be from a single manufacturer for each individual item submitted. Multiple manufacturers for the same product or item will not be acceptable.

1.06 EXPERIENCE

- A. The Contractor or his qualified subcontractor shall have no less than ten (10) years of experience in the installation and construction of horizontally directionally drilled pipeline of the same piping material(s), with the same nominal piping diameter(s) at a minimum, and of at least the same minimum length as the longest bore length for this specific project. Piping installations must be pressurized piping for water, reclaimed water or force main piping only, and
- B. The Contractor shall provide documentation to the Owner/Engineer of his experience in similar projects and provide the names and contact numbers/addresses of at least five (5) successfully completed HDD examples within the past ten (10) years. Conventional open

trenching experience, bore and jacking experience, or other types of experience not specific to HDD installations will not be acceptable substitutes for horizontal directional drilling experience, and

- C. The documentation for experience shall include but not be limited to the following:
 - 1. Name and description of the projects.
 - 2. Resumes of Project Manager, Superintendent and driller assigned to the specific project. As noted below, all key employees whose resumes were submitted must remain on the project site throughout the duration of the HDD installations. Swapping out of key personnel will not be acceptable. Any key personnel swapped out must be approved by the Owner and Engineer of Record prior to commencement of the HDD operation.
 - 3. Pipe material, type, diameter and length of each HDD installation.
 - 4. Bore diameter and equipment used.
 - 5. Soil conditions encountered.
 - 6. Start and completion dates.
 - 7. Contact names, numbers and addresses, and
- D. Successful installation of the piping is required as well as good references for consideration of performing this project. Bidders must notify their submitted references and all references must be able to be reached to confirm prior project completion. It is the sole responsibility of the Contractor to provide references who are responsive and able to be reached to confirm each project reference. Non-responsive or references that are not able to be reached are grounds for rejection of the submitted bid. In addition, the referenced skilled employees as submitted by the Contractor for the HDD operations are required to be on site throughout the HDD installations, and
- E. The Contractor's operations shall be in conformance with the Directional Crossing Contractors Association (DCCA) published guidelines (latest edition) and pipe manufacturer's guidelines and recommendations.

PART 2 – PRODUCTS

2.01 FUSIBLE POLYVINYLCHLORIDE PIPE (FPVCP)

- A. Fusible polyvinylchloride pipe for potable water shall conform to AWWA C900, AWWA C905, ASTM D2241 or ASTM D1785, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types. Pipe shall be marked verifying suitability for potable water service per NSF-61.
- B. Fusible polyvinylchloride pipe for non-potable water or pressurized wastewater not conforming to AWWA C905 dimensionality shall conform to AWWA C900, ASTM D2241

or ASTM D1785 for standard dimensionality, as applicable. Testing shall be in accordance with the referenced AWWA standards.

- C. Fusible polyvinylchloride pipe for non-potable water or pressurized wastewater conforming to AWWA C905 dimensionality shall conform to AWWA C905.
- D. Fusible polyvinylchloride pipe for non-pressure storm or wastewater conforming to AWWA C905 dimensionality shall conform to AWWA C905.
- E. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
- F. Fusible polyvinylchloride pipe shall be manufactured in a standard 40' nominal length or custom lengths as specified.
- G. Fusible polyvinylchloride pipe shall be blue in color for potable water use. Fusible polyvinylchloride pipe shall be purple in color for reclaim, reuse, or other non-potable use. Fusible polyvinylchloride pipe shall be green in color for wastewater use. Fusible polyvinylchloride pipe shall be white in color for surface or storm water use.
- H. Pipe shall be marked as follows:
 - 1. Nominal pipe size.
 - 2. PVC.
 - 3. Dimension Ratio, Standard Dimension Ratio or Schedule.
 - 4. AWWA pressure class, or standard pressure rating for non-AWWA pipe, as applicable.
 - 5. AWWA standard designation number, or pipe type for non-AWWA pipe, as applicable.
 - 6. Extrusion production-record code.
 - 7. Trademark or trade name.
 - 8. Cell Classification 12454 and/or PVC material code 1120 may also be included.
- I. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.
- J. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The fusion technician shall follow the pipe supplier's guidelines for this procedure. All fusion joints shall be completed as described in this specification.
 - 1. No piping shall be allowed to be pulled until all required fusing of the piping has been completed for that bore, nor shall the initial reaming operations be

performed without close coordination and timing with the fusing operation such that potential hole collapse may not occur. In lieu of having two fusing machines on site, no reaming shall be performed until all piping has been fused for each associated bore, this includes intermediate fusing of piping, as applicable.

2.01 PIPE AND FITTINGS – HDPE

- A. Materials used for the manufacture of polyethylene pipe and fittings shall be PE 3408 High Density Polyethylene (HDPE), meeting the ASTM D3350 cell classification of 345434E or 345434C. The material shall be listed in the name of the pipe and fitting manufacturer in PPI TR-4.
- B. The material shall have a minimum hydrostatic design basis of 1600 psi at 73°F when tested in accordance with PPI TR-3.
- C. Polyethylene pipe and fittings shall be manufactured in accordance with AWWA C906, ASTM F714, ASTM F 2160, ASTM D3035 and ASTM 3350.
- D. Pipeline shall be identified by providing co-extruded longitudinal stripes at three separate locations along the length of the pipe – at 120 degrees, 240 degrees and at 0/360 degrees. Stripes shall be a minimum of 2 inches wide, except on pipe sizes under 6 inch nominal diameter. Background color of the pipe shall pigmented gray color or black and at least a 2% carbon black. Stripes shall be of the same material as the pipe and must comply with FDEP standards for color coding of the fluid that the piping is conveying and shall not be painted or printed on the outside of the pipe wall.
- E. Fittings shall be made from the same material as the pipe and meet the same requirements as that for the pipe. All fittings shall be pressure rated to match or exceed the pressure rating of the pipe to which they are joined.
- F. Fittings shall meet the requirements of ASTM D3261, where applicable. Molded fittings shall have butt fusion compatibility with the pipe to which they are joined.
- G. Pipe and fittings shall be joined by the method of butt fusion, as outlined in ASTM D2657. The pipe manufacturer's fusion procedures shall be followed at all times as well as the recommendations of the Fusion Machine Manufacturer.
- H. Water and wastewater HDPE piping shall be DR-11 HDPE piping at a minimum, or as otherwise shown on the plans.
- I. Pipe used for electrical conduit or fiber optic systems shall be DR-7, minimum. Piping to be installed within the same trench for all open cut work and to be pulled as part of a bundled HDD with all HDD installations.

2.02 PIPE AND FITTINGS – DUCTILE IRON PIPE

- A. The bore path alignment and design for HDD shall be based on the construction plan drawings and specifications, Contractor constructability review, site conditions and other factors specific to the project corridor. Some of these factors are the pipe bell and barrel

diameters, the optimum individual pipe length, pipe weight and buoyancy, profile depth, bore path inside diameter, and allowable deflection capabilities of the joint (see Table 1 below for a general guideline).

Table 1. Design Data for HDD

Size (in)	Pipe OD (in)	Barrel OD (in)	Weight Lined Pipe PC250 (lb/ft)	Buoyancy in Water (lb/ft) net*	Allowable Pulling Force (lb)	Allowable Deflection (Degrees)	Min Curvature

Note: Allowable deflections are based on 50% of manufacturer’s maximum recommendations. Deviations from the recommendations in this table shall require the approval of the EOR

*Buoyancy is based on empty, cement lined pipe immersed in water. The Contractor shall use the above table for reference only and shall be required to follow all manufacturer’s specific recommendations as applicable.

- B. Pipe and Fittings shall meet the requirements of AWWA/ANSI C151/A21.51 and ANSI/AWWAC153/A21.53, respectively. Pipe used for directional drilling shall be Class 250 ductile iron pipe, or as specified by the Engineer, with pipe manufacture designed restrained joints.
- C. Ductile Iron Pipe and Fittings for water or sewer transmission shall be lined with a cement mortar lining and have a protective exterior and interior coating. Protective exterior and interior coating shall conform to ANSI/AWWA C151/A21.51 and shall be a bituminous paint with a 1 mil minimum thickness. Ductile Iron Pipe for sewer application shall be lined with Protecto 401 (P401).
- D. Joints used for directional drilling shall be boltless, flexible, restrained. Pipe and joint seals, when properly assembled and installed, shall be capable of dependably handling the specified internal pressure, as well as vacuum and external pressures that can occur in pipeline operation. Joints shall exhibit such performance attributes in straight alignment or at maximum rated joint deflection. Pipe pulling bell assemblies shall be designed and furnished by the pipe manufacturer. The pulling bell assembly shall have the same performance characteristics as the pipe to which it is connecting. It shall also be fabricated with filling/testing ports, of appropriate size, for testing of the pipe after it is pulled through the bore path. For pipe that is installed using the Assembled Line method, described as follows, the pulling bell may also be used as one of the two (2) bulkheads required for a low pressure air test of the pipe string prior to pull back. After complete installation, the pulling head may also be helpful, with or without further connection of piping, in normal higher pressure hydrostatic testing of the installed piping.
 - 1. The Manufacturer shall have representative proof-of design tests of flexible restrained pipe joints as well as of the pipe pulling bell assemblies that establish the basis for the maximum allowable pulling loads (see Table 1).

2. If the soils in the vicinity of the HDD are determined to be historically corrosive or through direct soil testing it is determined that the pipe requires external corrosion protection the pipe shall be encased with either a single or double polyethylene wrap or as specified by the Engineer. The polyethylene wrap system shall conform to ANSI/AWWA C105/A21.5. Any polyethylene wrap which is damaged during the construction process shall be repaired prior to pulling the pipe through the bore hole.
3. Ramp Method: The ramp method is the pre-assembly of multiple joints of pipe into a long pipe string prior to pulling through the bore hole. With this method the Contractor provides a ramp leading into the bore hole to assure that the joint deflection never exceeds the maximum allowed per the manufacturer. With this method extra care shall be taken to assure that all piping, including any polyethylene wrapped pipe, is not damaged prior to pulling through or as the pull is underway. The means and methods of the installation shall be the Contractor's responsibility for the installation and shall follow approved manufacturers guidelines for the piping installation.
4. Cartridge Assembly: This method is achieved by the assembly of individual joints of pipe within a pit. This method allows for an assemble and pull method, where a joint of pipe is connected then pulled into the bore hole the length of the section of pipe, then the next section etc. This process is repeated until the string of pipe reaches the opposite end of the bore hole. The means and methods of the installation shall be the Contractor's responsibility for the installation and shall follow approved manufacturers guidelines for the piping installation.

2.03 BORING EQUIPMENT

- A. Boring equipment shall be matched to the conditions of the project, but in no circumstances, shall the equipment have a pulling force less than twice (2X) the maximum calculated peak-pulling requirement as calculated by proprietary software (such as DrillPath™) for this purpose for the particular job requirements. Signed and Sealed calculations must be submitted and approved by the Engineer.
- B. Boring equipment shall have a mechanical drilling rig with a controlled directional boring head using either a fluid or mechanical cutting head (or combination of both), assisted and cooled by an approved drilling fluid of low pressure and volume.
- C. Contractor shall provide to Owner/Engineer a description of the rig proposed for the project at each location, showing the method of control of the boring head, head type, pulling force of the equipment, age, reamer type(s), manufacturer type and other germane information. Approved boring equipment shall be that manufactured by American Augers, Case Construction, Charles Machine Works (Ditch Witch), Straight Line, Tulsa Rig Iron, Vermeer, or approved equal with approval from the Engineer and Owner.
- D. The location/tracking system employed for determining the location of the drilling head during the pilot bore shall include, but not be limited to: the position of the boring head, the roll angle, the tilt angle, depth below grade, temperature of data transmitter and remaining battery life.
- E. The type of proposed drilling fluid shall be submitted to the Owner/Engineer for approval prior to the commencement of the work. Potable water or reclaimed water will be made available to the Contractor, provided it is within a reasonable distance from the project site. Consumption of this water will be metered and invoiced to the Contractor at the current effective rate.

- F. For all carrier pipelines larger than 6 inches in diameter and prior to commencement of the work, the Contractor shall submit to the Owner/Engineer the results of the proposed drill path profile analysis for approval. The analysis shall include as a minimum, the following:
1. Proposed profile/drill path including separation distances from all existing utilities that have been field verified
 2. Proposed entry and exit angles
 3. Proposed radii of curvature for all directional changes
 4. Pipe deflection and pipe buckling calculations
 5. External pressure and comparison to expected fluid pressure
 6. A graph showing the calculated stresses along the entire path of the proposed profile
 7. Method of buoyancy control (if required/utilized)
 8. Entry and Exit pits, pipe layout and stringing areas
 9. All MOT for associated staging and HDD drilling areas must be signed and sealed, submitted and approved by all jurisdictional agencies having authority over the various ROW limits. City, County and FDOT standards must be provided for all MOT.
- G. For pipelines 4 inches and smaller, the requirements of 2.02 F (above) shall be determined on a case-by-case basis. The Engineer may waive these requirements if the conditions of the project so warrant.
- H. No work or drilling shall commence until the Contractor has submitted the required information and received written approval from the Engineer of the drill path and related procedures.
- I. Any proposed deviations to the HDD drill must be noted and approved by the Engineer and Owner. If the Contractor chooses to construct the HDD deeper than what is shown on the plans, the Owner is not required to, and shall not, pay the Contractor for a longer HDD installation unless documentation is provided, reviewed and approved by the Engineer and Owner justifying a change in the HDD layout and depth of the bore, prior to commencement of construction. Pressure relief/weep holes may be required to be performed by the Contractor to reduce inadvertent mud release rather than constructing the HDD unnecessarily deeper. The Contractor assumes all risks for the HDD installation and for their means and methods to perform the HDD installation.

2.04 LOCATING WIRES

- A. Locating wire shall be an 8 gauge insulated solid copper wire plus an 8 gauge insulated copper clad steel core wire bundle. Color coding shall be consistent with pipeline identification colors. A minimum of two (2) bundled locating wire(s) shall be attached with nylon wire ties at different radial locations around the pipe to ensure continuity in at least wire bundle subsequent to installation. Thus, there will be a minimum total of 4 wires for every HDD installation. Contractor shall be required to provide as many wires as necessary to maintain continuity throughout the length of each directional bore. If rock

is identified in the HDD limits, the wire will be required to be installed in a DR-7 HDPE conduit or casing as part of a bundled HDD installation. Failure of continuous continuity in the locating wire shall result in abandonment and reinstallation of the directional drill, at the discretion of the Owner, and at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 DIRECTIONAL DRILLING

- A. The installation of the pipeline by horizontal directional drilling (HDD) shall be accomplished within the limits indicated on the drawings. The site supervisor for the HDD operation is required to be on site for the entire duration of the HDD operation. Alternate staffing will not be acceptable to be provided to the Owner for the HDD operation.
- B. The Owner shall be notified a minimum of 48-hours in advance to starting the HDD operations. All MOT is to be established prior to commencement of any construction efforts. The HDD operation shall not begin until the Owner has been notified and is present on the job site. The Contractor shall be responsible for the satisfactory completion of a successful HDD installation. The Owner will not pay for any unsuccessful HDD installations or associated costs.
- C. No HDD installations will be allowed to commence on a Friday or on any non-business days due to the potential of an emergency situation occurring. Contractor shall coordinate their timing and HDD installations to ensure that the HDD can be installed in a timely fashion and that restoration and clean up can be performed, prior to non-business or working days. No delay claims will be acceptable for the Contractor's lack of planning or any field issues that cause the HDD installations to have to be rescheduled such that they do not occur on a Friday or other non-standard work days. In addition, the contractor should familiarize themselves with the various holiday/non-work and moratorium periods for which no work is allowed and plan their schedule(s) accordingly.
- D. Before commencement of the drilling operation, all erosion control devices and dewatering shall be in-place and functional in accordance with the contract documents.
- E. All existing utilities shall be field verified prior to commencement of construction by the Contractor such that the work effort is not delayed and there are no utility interruptions. The drawings show existing utilities believed to be near the HDD installation; however, there is no guarantee that these utilities are located as shown or that other utilities are not present. The Contractor must perform all required utility due-diligence including coordination with utility Owners, locating utilities, soft digs, GPR, and all other necessary field verifications prior to commencement of construction to ensure that conflicts with existing utilities do not exist and that no existing utilities are impacted with the construction efforts.
- F. The entire drill path and limits adjacent to the HDD shall be accurately surveyed with entry and exit stakes placed at the appropriate locations for the HDD limits and within the limits specified on the plans.
- G. The Contractor shall comply with all applicable local, state and federal safety regulations and all operations shall be conducted in a safe manner. Additional Owner requirements, permitting and approvals as well as coordination will be the responsibility of the Contractor for all work efforts, and will be at no additional cost to the Owner.
- H. Entry and exit angles of the installed pipeline shall not exceed manufacturer's recommendations for the specific type of piping used nor for the drill rod bending radius

for the HDD operation. Documentation of entry and exit angles shall be provided to the engineer of record and the Owner.

1. The Contractor is to provide HDD equipment that meets the requirements of the HDD bore path and as bid on for the HDD installation. Providing equipment that cannot meet the HDD as designed and as bid by the Contractor will not be acceptable for any change orders or additional compensation. The Contractor is to provide an RFI for any potential issues or concerns that they may have, prior to bidding and submitting on the HDD.
 - I. The Contractor shall take precautions to protect the pipeline from damage and marring during the installation and pull back operation. Such precautions shall include but not be limited to: the use of rollers, pulleys, idlers and trunnions.
 - J. The boring rig shall be sufficiently and adequately anchored for the task. The machine shall have a capacity to adequately complete the drilling and piping installation including all pullback forces. Signed and Sealed calculations must be provided.
 - K. A pilot hole shall be drilled for all installations of 6-inch diameter pipe and larger diameters. The pilot hole shall be conducted with a wire line guidance system. The pilot hole shall follow the designed bore path and shall not exceed the horizontal design plane in either direction by more than two (2) feet, nor more than one (1) foot in either direction, in the vertical plane. The boring shall be conducted using a mechanical boring head, assisted by and cooled by drilling fluid of low pressure and volume. In the event that the pilot hole does deviate from the bore path by more than the above stated requirements, the Contractor shall notify the Engineer immediately and the Engineer may require the Contractor to pull-back and re-drill from the location along the bore path before the deviation.
 - L. The Contractor shall provide MSDS sheets for all drilling slurry compounds and additives.
 - M. The Contractor shall submit, at a minimum, calculations and data indicating the proposed path of the pilot bore, entry and exit angles, stresses on the pipeline during pull back throughout the length of the bore (both pull back and bending stress), external pressure throughout the length of the pull, proposed drilling flow rates, drilling pressures (maximum), radii of curvature for all directional changes, a chart showing the plan and profile of the proposed installation, and charts comparing the installation tension and tensile stress of the pipe to the calculated conditions during pullback. A buoyancy modification plan is required. This plan shall include the means of providing and applying water to the pipe during installation. Adequate review time for the submitted calculations must be provided after submittal and prior to commencement of the work. All calculations must be signed and sealed by a Professional Engineer.
 - N. Installed radius of curvature (in feet) for polyethylene pipe shall be a minimum of 25 times the exterior diameter of the pipeline to be installed (in inches) or as otherwise recommended. Actual radii utilized will be dependent on the specific job conditions. For FPVCP and DIP, the radii shall be greater than the minimum allowable bend radius as provided by the pipe manufacturer. For alternate pipe materials, consultation with the Engineer shall be required for approval.
 - O. Total maximum force applied to the pipeline during pull back shall not exceed the safe allowable pull strength of the pipeline as calculated or provided by the pipe supplier.
 - P. The pulling force of the drilling rig shall be at least twice that required of the maximum stress force calculated for the pull. The Contractor shall provide documentation of the

drilling rig to be used for the work effort and that it meets this requirement. All calculations must be signed and sealed by a Professional Engineer.

- Q. Upon completion of the pull, the Contractor shall provide as-built information of the installed pipeline, including entry and exit locations and elevations (per the WDW Grid coordinate system and NGVD, respectively), and similar location information at 10-foot intervals along the entire length of the profile for profiles under non-submerged surfaces. For profiles under submerged surfaces (such as a lake, stream, canal or river) the frequency of the location interval shall be at a minimum of 20 foot increments. This information shall be provided to the Owner/Engineer within seven calendar days of the completion of each bore path.
- R. Back reaming shall be required for all bores for pipelines exceeding 6 inches in nominal diameter. Back reaming shall be conducted in single or multiple passes of the borehole and shall enlarge the borehole to at least 1.4 times the outer diameter of the pipeline to be installed. The number of back reaming passes shall be proposed by the Contractor and approved by the Engineer prior to commencement of the work. Larger reaming may be required dependent on subsurface conditions encountered.
- S. In the event significant differing soils or strata (from those provided in the geotechnical data and reports) are encountered during the course of the pilot boring, the Contractor shall be responsible for changing the drill head, slurry and other means as may be appropriate for completion of the bore. The Owner shall not be responsible for underground obstacles (such as boulders, tree stumps, loose and unconsolidated soils, hard rock, or other utilities) or structures that may be encountered during the course of the work. During assembly and pull back of the pipe, the pipe must be laid out in such a way as to minimize disruption to and interference with vehicular and pedestrian traffic or other operational conflicts that the Owner/Engineer may identify. Additionally, the pipe must be laid out such that the radius of curvature (in feet) for HDPE pipe of any segment is less than 25 times the outer diameter of the pipe (in inches). For FPVCP and DIP, the pipe should not exceed the minimum allowable bending radius as provided by the pipe supplier.
- T. The Contractor shall be responsible for all maintenance of traffic (MOT) to maintain vehicular, pedestrian park, and all other access at all times. The project contains various land use areas, all of which must have detailed and specific MOT plans to allow for continuous operations and access at all times. The detailed MOT plans shall be submitted to the Owner/Engineer for approval prior to commencement of the work and address all work areas within the project corridor. The plan shall be in accordance with the Manual of Uniform Traffic Control Devices. The MOT plans are required to be signed and sealed by a professional engineer licensed in the State of Florida and shall meet all Florida Department of Transportation (FDOT), City and County standards and specifications. Comments from all required jurisdictional agencies and the Owner must be addressed prior to the MOT plans being approved and implemented by the Contractor. The Contractor must provide all necessary advanced notifications prior to implementing MOT plans. MOT may be required to be during non-peak hours/dates and times and shall meet all Owner requirements at no additional cost to the Owner
- U. The boring profile shall be deep enough to preclude hydraulic fracture or frac-out (loss of drilling fluid to the surface), and the Contractor shall calculations signed and sealed by a Professional Engineer submit calculations to verify that the selected profile provides reasonable assurance to preclude fracture. Contractor is to perform additional geotechnical borings as necessary to ensure that soils within the HDD limits have been adequately identified and analyzed prior to HDD operations. All supplemental geotechnical borings are to be at the Contractor's expense. Should hydraulic fracture occur, the Contractor shall repair all related damages, including cleanup of fluids, and make corrections to preclude future events. A sample frac-out mitigation contingency

plan for HDD is located in the Appendix; however, the Contractor must provide their own site specific and detailed plan. Such corrections may include, but not be limited to: re-profiling the bore or changing the viscosity of the drilling fluid or plugging the fracture or a combination of these. In the event the borehole is abandoned and an alternate route is chosen, the abandoned borehole shall be filled with excavatable flowable fill. There shall be no additional compensation to the Contractor for these efforts, if required or deemed necessary, to complete a successful HDD installation.

- V. Where construction activities are in close proximity to or under water bodies (lakes, creeks, canals, retention basins) or wetlands, special attention shall be given to the proposed profile to insure that hydraulic fracture does not occur under the water feature. Additionally, silt fences, turbidity barriers, mats or platforms to minimize impacts, and similar approved erosion control devices shall be used to protect the water body(s) from the construction activities. Underwater divers will be required to be provided by the Contractor during the entire drilling operation for bores that are subaqueous in nature. This includes pre reaming and pipe pull back operations and all operations up until the time that the final piping is pulled into place complete. The divers must notify the Owner, the Owner's inspector, the Engineer and all other required jurisdictional authorities prior to commencement and immediately if any issues occur with the HDD operation.
- W. The Contractor shall maintain logs of the construction progress at the job site and shall be provided to the engineer of record and the Owner. Such logs shall include a Guided Drilling Log, Mud Log and Driller's Log. The Guided Drilling Log shall record the progress of the pilot bore including location and depth every 10 feet over the course of the bore. The locator/tracker system shall, at a minimum, have the following data: position, roll angle, tilt angle and depth. The Mud Log shall record the quantity and quality of the drilling mud, pressure, flow rate and temperature of the mud. The Driller's Log shall record the progress of the reaming operation. Samples of each log sheet shall be submitted to the Owner/Engineer for approval prior to commencement of the work.
- X. For HDPE, upon completion of the pull back, the Contractor shall "rest" the pipe segment to allow for any contraction and shrinkage for at least 24 hours. No additional work on the pulled pipeline segment shall be allowed during the resting period. There is no rest period required for FPVCP or DIP.

3.02 DRILLING FLUIDS AND THEIR DISPOSAL

- A. The drilling fluids shall provide stabilization of the bore hole during the pilot and reaming operations, transport cuttings to the surface, cool the drill bit and controller, and lubricate the pipe during pull back. The drilling fluids shall be a bentonite slurry, polymer slurry, water or some combination of these. Bentonite is the preferred material for most applications, and use of water or a polymer will require the approval of the Owner/Engineer prior to commencement of the work.
- B. Drilling fluids that are petroleum based or that contain additives that may contaminate the surrounding soils or groundwater will not be allowed.
- C. The Contractor shall adjust the viscosity of the drilling fluid to match the conditions of the project. The Owner shall bear no responsibility for loss of drilling fluid or loss of drilling equipment should an obstacle or unknown condition be encountered during the course of the work.
- D. The Contractor shall be responsible for transporting, containing and storing any water required for the drilling operations, cleanup and other needs.
- E. All drilling fluid excess shall be contained in entry and/or exit pits and pumped/treated/stored as needed so as to preclude spills and escape to the surrounding

environment. Ensure that entry and exit pits are of sufficient size and volume to contain the expected return of drilling fluids and cuttings. All excess fluids shall be properly disposed in an approved method and off site of the work limits.

- F. Upon completion of the pipe installation, restore the pits, drill rig anchors and all impacted work areas to their pre-construction or better condition. Sod all areas disturbed by the drilling operations.

3.03 THERMAL BUTT FUSION FOR HDPE

- A. Fusion Technician shall be qualified by the pipe supplier to install HDPE of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project, and shall be documented by the pipe supplier.
- B. All HDPE-fusion equipment operators shall be qualified to perform pipe joining using the means, methods and equipment employed by the Contractor. Fusion equipment operators shall have current, formal training on all fusion equipment used on the project. Training received more than two years prior to operation of the fusion equipment shall not be considered current. The Contractor shall submit written certification(s) of training provided by the fusion equipment manufacturer.
- C. The pipe shall be warranted for one year per the pipe supplier's standard terms. In addition to the pipe warranty, the fusion services shall be warranted for one year per the fusion service provider's standard terms.
- D. Pipe shall be off-loaded, loaded, installed, handled, stored and stacked per the pipe supplier's guidelines. These guidelines include compliance with the minimum recommended bend radius and maximum safe pull force for the specific pipe being used.
- E. Pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier's guidelines. If pipe is damaged during handling, the Engineer and/or Owner has the ability to reject the piping from being used and at no additional cost to the Owner.
- F. Pipe supplier's procedures shall be followed at all times during fusion operations.
- G. Each fusion joint shall be recorded and logged by an approved electronic monitoring device (data logger) connected to the fusion machine, which utilizes a current version of the pipe supplier's recommended and compatible software.
- H. A data logger shall be used to record and document all butt weld fusion processes. A record shall be made of every fusion weld made. The data logger shall be a rugged, handheld computer as the recording device connected to a data collection device. All data shall be recorded and transmitted to the handheld computer where the joint report will be stored, viewed, printed, or transferred to a desktop computer for archiving. The operator associated with the fusion process shall utilize the data logger report as one means to confirm a complete and proper weld. This data shall be made immediately available to the Owner and Engineer, upon request, and shall be submitted with the project close-out documents. The initial submittal is to be submitted to the Owner and Engineer, within 10 working days after the fusion weld process for review and approval. If a potential defect fusion weld is suspected by the Owner or Engineer or the Contractor, the work shall stop and a mutually acceptable corrective action plan shall be executed. Data logger equipment shall be McElroy Datalogger, Model No. DL6303, DL6304, or Owner approved equal with approval from the Engineer and Owner.

- I. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. This includes requirements for safety, maintenance, and operation with modifications made for HDPE as required for the project.
- J. No piping shall be allowed to be pulled until all required fusing of the piping has been completed for that bore, nor shall the initial reaming operations be performed without close coordination and timing with the fusing operation such that potential hole collapse may not occur. In lieu of having two fusing machines on site, no reaming shall be performed until all piping has been fused for each associated bore, this includes intermediate fusing of piping, as applicable.

3.04 CHECKING AND CLEANING

- A. The pipe shall be checked prior to its insertion and pull back for any flaws in manufacturing and for any potential impacts to the piping during moving and/or pipe layout, etc.
- B. After pull back is complete, but before connections are made to adjoining piping, the pulled section shall again be checked for acceptable roundness by passing a segmented mandrel of no less than 1/2 inch of the smallest pipe section ID, including the interior fusion bead from the thermal butt fusion process. Pipe failing this required roundness check shall be removed and repaired or abandoned and replaced at no additional cost to the Owner. The mandrel size and type must be submitted to, and approved by, the Engineer or Owner prior to use.
- C. The installed and successfully checked pipeline shall be cleaned with stiff brushes followed by a swabbing mandrel sufficient to remove all debris including soils.

3.05 AS BUILTS

- A. As-builts must be submitted for all HDD installations including a detailed bore log as stated herein. As-built variance from the designed bore path shall not exceed plus or minus 1-foot in the vertical plane and plus or minus 2-feet in the horizontal plane. The Contractor shall submit any proposed deviations from the design bore path(s) with submittals, prior to commencement of construction and prior to installing said deviations. FDEP separations must be maintained at all times.
- B. If as-built plans are submitted that indicate that FDEP separation requirements have not been maintained, the Contractor will be required to relocate any facilities that do not meet the separation requirements at their cost. The Contractor is to bring any potential conflicts with existing utilities to the Owner's and Engineer's attention prior to commencement of construction.

END OF SECTION

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 01300, Submittals.

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 subgrade.
- 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



DIVISION 3

CONCRETE

SECTION 03051

LEAKAGE TESTING OF HYDRAULIC STRUCTURES

PART 1 - GENERAL

- A. Description
 - 1. This section describes the method of testing concrete hydraulic structures for leakage.
- B. Related Work Specified Elsewhere
 - 1. Concrete: Section 03300.

PART 2 - MATERIALS

- A. Provide water, piping, and equipment to test concrete structures for leakage.

PART 3 - EXECUTION

- A. General
 - 1. Hydrostatically test reinforced concrete structures which will contain water to determine that they conform to "Leakage Test Procedure" herein and are free of detectable leaks. Do not hydrostatically test walls which are to be restrained or laterally supported by slabs until slab concrete has obtained the specified compressive strength.
 - 2. Prior to testing, clean exposed surfaces by thoroughly hosing and removing surface laitance and loose matter from walls and slabs. Remove wash water and debris from the structures by means other than washing through plant piping.
 - 3. No backfilling, floor finish, concrete or mortar fill, wall insulation, gas proofing or protective coatings, or permanent pipe connections shall be applied to or installed in any new water containment structures until they have been subjected to loading for settlement and tested for leakage. Testing shall not be done until the concrete has reached its 28-day design strength.
- B. Leakage Test Procedure
 - 1. During the test period, the excavation around the structure shall be kept dewatered by the Contractor. The Contractor shall temporarily close all bottom openings and wall openings below maximum water level in the structures; furnish and fill the structures to the design maximum water level with clean water and let it stand for 24-hours before testing. The Contractor shall make his own arrangements for handling the water for testing and its transfer from one

structure to another and its final disposal. After 24-hours the Contractor shall take all necessary elevations and measurements prior to testing of the structures.

2. For the Preloading Test the Contractor shall maintain the liquid level in the structures at the design maximum water level for 72-hours. If the characteristics of settlement of the structure so require, the loading shall continue for a longer period to permit the necessary consolidation of the foundation material, in which case the Contractor shall be entitled to no extra compensation, but a commensurate extension of time for completion of the whole work under this contract shall be allowed.
3. Leakage testing shall not be started until all tank walls, floors and top slabs have been placed and the concrete has attained design strength.
4. Leakage testing shall be carried out in accordance with ACI 350.1 - Tightness Testing of Environmental Engineering Concrete Structures. The test criterion shall be HST-NML (no measurable loss) as defined by ACI 350.1.
5. During the leakage test period, the Engineer shall inspect the structure for leakage. If moist spots become visible, indicating the existence of minor leaks, or if the water level indicates hidden leakage, the Contractor shall furnish all materials and do all work necessary to locate the leaks and make the structure watertight to the complete satisfaction of the Engineer. This includes the repair of cracks, tie holes, etc. No additional compensation shall be allowed for such work.
6. If, in the opinion of the Engineer, during the course of the test weather conditions are such that it becomes difficult to accurately monitor the water level in the tank, the test shall be stopped, and started over again when weather permits.
7. On conclusion of the test, the Contractor shall pump or drain the water from the structure and dispose of it without injury to structures or surfaces.

C. Repair Methods

1. Methods for repairing concrete not passing the leakage test shall be as described in Section 03350.

END OF SECTION

SECTION 03111

CONCRETE FORMWORK

PART 1 - GENERAL

- A. Description
 - 1. This section describes materials and installation of concrete forms.
- B. Related Work Specified Elsewhere
 - 1. Submittals: Section 01300.
 - 2. Divisions 2 and 3
- C. Submittals
 - 1. Submit shop drawings in accordance with the General Conditions and Section 01300.
 - 2. Submit manufacturer's literature for form ties, spreaders, corner formers, form coatings, and bond breakers.

PART 2 - MATERIALS

- A. Form Construction and Design
 - 1. Design formwork in conformance with methodology of ACI 347R for anticipated loads, lateral pressures, depth of concrete placement and rate of concrete placement.
 - 2. Locate bracing and shoring to maintain form stability and comply with finish tolerances specified.
 - 3. Provide temporary openings in wall and column forms to facilitate cleaning, inspection and concrete placement.
 - 4. Provide drop chutes and/or drop pipes to prevent accumulation of hardened concrete on forms and reinforcement above fresh concrete and to prevent concrete segregation.
 - 5. Construct forms with regard for construction and expansion joint locations and architectural lines.
 - 6. Use panels as large as practical to minimize form seam lines.

7. Construct forms to minimize fines leakage during concrete placement at construction joints, bulkheads, base of wall/slab intersections and other areas where fines may migrate from the concrete surface during placement. The level of acceptable fine leakage from the formed surface shall be determined by the Engineer as evidenced by the lack of rock pockets formed during placement of the concrete.
8. Provide form windows or stage forms to allow visual observation at all times of the concrete being placed and vibrated. Provide a formwork design and placement schedule that will limit free fall of concrete in walls 8 inches or less in thickness to 4 feet and for walls thicker than 8 inches, limit this fall to 6 feet. Total vertical lift made in a single pass shall not exceed 2 feet in height.
9. Notify the Owner's Representative prior to concrete placement (48 hours minimum).
10. Steel forms shall be minimum 24 gauge, with tongue-and-groove joints, complete with steel stakes and splice plates.
11. Provide material for forms that is not reactive with concrete. Formwork of aluminum is not acceptable.
12. Expandable metal mesh shall not be used in formwork.

B. Classes of Forms

1. Class I Forms: Use steel forms, ply form, or smooth-surface plywood 3/4-inch minimum thickness for straight surfaces and 1/2-inch minimum thickness for curved surfaces.
2. Class II Forms: Use plywood in good condition, metal, or smooth-planed boards free from large or loose knots with tongue-and-groove or ship-lap joints.
3. Class II forms may be used for exterior concrete surfaces that are 1 foot or more below finished grade. Use Class I forms for all other surfaces.

C. Form Material

1. Use plywood, lumber, and steel of sufficient strength and surface smoothness to produce the specified finish.
2. Lumber used in form construction shall be Southern Yellow Pine, No. 2, S4S, Standard Grade Rules Southern Pine Inspection Bureau. Boards shall be 6 inches or more in width.
3. Plywood used in form construction shall be Grade B-B, Class 1 plyform, mill-oiled, and sanded on both sides in conformance with U.S. Product Standard PS-1.

D. Form Ties

1. Locate form ties on exposed surfaces in a uniform pattern or as indicated in the drawings. Place form ties so they remain embedded in the concrete except for a removable portion at each end and do not leave an open hole through the concrete. Form ties shall have conical or spherical type inserts with a maximum diameter of 1 inch. Construct form ties so that no metal is within 1 inch of the concrete surface when the forms, inserts, and tie ends are removed. Do not use wire ties. Ties shall withstand all pressures and maintain forms within acceptable deflection limits.
2. Flat bar ties for panel forms shall have plastic or rubber inserts having a minimum depth of 1 inch and sufficient dimensions to permit patching of the tie hole.
3. Ties for water-holding structures or dry structures with access, such as basements or pipe galleries, that are below finish grade shall have an integral steel water stop that is tightly and continuously welded to the tie. The water stop shall be at least two times larger in area than the tie cross-sectional area and shall be oriented perpendicular to the tie and symmetrical about the center of the tie. Construct the ties to provide a positive means of preventing rotation or disturbance of the center portion of the tie during removal of the ends.
4. Tapered form ties shall be tapered through-bolts at least 1 inch in diameter at smallest end or through-bolts that utilize a removable tapered sleeve of the same minimum size.

E. Bond Breaker

1. Bond breaker shall be a V.O.C.-compliant nonstaining type that will provide a positive bond prevention, such as Clean Lift 90 W.B. as manufactured by Edoco Burke; Silcoseal 97EC as manufactured by Nox-Crete, Inc.; or equal.
2. Bond breaker shall be certified as meeting the requirements of ANSI/NSF 61 for contact with potable water.

F. Form Release Agent

1. Form releasing agents shall be certified as meeting the requirements of ANSI/NSF 61 for contact with potable water.
2. Form release agent shall effectively prevent absorption of moisture by the form and prevent bond with the concrete. Agent shall be nonstaining, V.O.C.-compliant, leave concrete with a coatable surface, and be nontoxic after 30 days.
3. For steel forms, release agent shall prevent discoloration of the concrete due to rust.

PART 3 - EXECUTION

A. Form Tolerances

1. The following table indicates tolerances or allowable variations from dimensions or positions of structural concrete work:

	Maximum Tolerance (inch)
Sleeves and inserts	+1/4 -1/4
Projected ends of anchors	+1/4 -0.0
Anchor bolt setting	+1/4 -1/4
Finished concrete, all locations	+1/4 -1/4 in 10 feet
	Max ±1-inch in total length

2. The planes or axes from which the above tolerances are to be measured shall be as follows:

Sleeves and inserts:	Centerline of sleeve or insert.
Projected ends of anchors:	Plane perpendicular to the end of the anchor as located in the drawings.
Anchor bolt setting:	Centerline of anchor bolt.
Finish concrete:	The concrete surface as defined in the drawings.

3. Where equipment is to be installed, comply with manufacturer's tolerances if more restrictive than above.
4. Failure of the forms to produce the specified concrete surface and surface tolerance shall be grounds for rejection of the concrete work. Rejected work shall be repaired or replaced at no additional cost to the Owner.

B. Form Surface Preparation

1. Clean form surfaces to be in contact with concrete of foreign material prior to installation. Tape, gasket, plug, and/or caulk joints, gaps, and apertures in forms so that the joint will remain watertight and withstand placing pressures without bulging outward or creating surface irregularities.
2. Coat form surfaces in contact with concrete with a form release agent prior to form installation.
3. Keep form coatings off steel reinforcement, items to be embedded, and the previously placed concrete.
4. Coat face and edges of Class I forms with a two-coat system of one-component polyurethane coating applied by roller at the rate of 500 square feet per gallon.

C. Beveled Edges (Chamfer)

1. Form 3/4-inch beveled edges on exposed concrete edges and corners, beam soffit corners, and where indicated in the drawings. Reentrant corners in concrete members shall not have fillets, unless otherwise shown in the drawings. The top edges of slabs, walkways, beams, and walls may be beveled with an edging trowel in lieu of using chamfer strips.

D. Form Placement

1. Provide means for holding adjacent edges and ends of form panels tight and in accurate alignment to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete. Forms shall be tight and shall prevent the loss of mortar and fines during placing and vibration of concrete.
2. Provide one cleanout and inspection opening (12 inches wide by 18 inches high) every 7 feet at the bottom of each lift of forms.
3. Provide exterior corners in concrete members with bevels as specified.
4. Provide means for removing forms without injury to the surface of finished concrete.
5. Do not embed any form-tying device or part thereof other than metal in the concrete.
6. Locate large end of taper tie on the "wet" side of the wall.
7. Use only form or form-tying methods that do not cause spalling of the concrete upon form stripping or tie removal.
8. Form surfaces of concrete members except where placement of the concrete against the ground is shown in the drawings or as indicated below. The dimensions of concrete members shown in the drawings apply to formed surfaces, except where otherwise indicated. Add 2 inches of concrete where concrete is placed against trimmed undisturbed ground in lieu of forms. Placement of concrete against the ground shall be limited to footings and other nonexposed concrete and only where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing.

E. Form Reuse

1. Reuse only forms that provide a uniform surface texture on exposed concrete surfaces. Apply light sanding or other surface treatment between uses for uniform texture. Plug unused tie rod holes with corks, shave flush, and sand the concrete surface side. Do not patch forms other than filling tie rod holes, except in the case of Class II forms. Do not use metal patching discs on Class I forms.

F. Removal of Forms

1. Forms and shoring for elevated structural slabs or beams shall remain in place until the concrete has reached a compressive strength equal to the specified 28-day compressive strength as determined by test cylinders. Do not remove supports and reshore. The following table indicates the minimum allowable time after the last cast concrete is placed before forms, shoring, or wall bracing may be removed:

Sides of footings and encasements	24 hours
Walls, vertical sides of beams, girders, columns, and similar members not supporting loads	48 hours
Slabs, beams, and girders	10 days (forms only)
Shoring for slabs, beams, and girders	Until concrete strength reaches specified 28-day strength
Wall bracing	Until top or roof slab concrete reaches specified 28-day strength

2. Do not remove forms from concrete that has been placed with outside air temperature below 50°F without first determining if the concrete has properly set without regard for time. Do not apply heavy loading on green concrete. Immediately after forms are removed, the surface of the concrete shall be carefully examined and any irregularities in the surface shall be repaired and finished as specified.

G. Formed Openings

1. Openings shall be of sufficient size to permit final alignment of pipes or other items without deflection or offsets of any kind. Allow space for packing where items pass through the wall to ensure water tightness. Provide openings with continuous keyways and water stops. Provide a slight flare to facilitate grouting and the escape of entrained air during grouting. Provide formed openings with reinforcement as indicated in the typical structural details. Reinforcing shall be at least 2 inches clear from the opening surfaces and encased items.

H. Embedded Items

1. Set anchor bolts and other embedded items accurately before placing concrete and hold securely in position until the concrete is placed and set. Check special castings, channels, or other metal parts that are to be embedded in the concrete prior to and again after placing concrete. Check nailing blocks, plugs, and strips necessary for the attachment of trim, finish, and similar work prior to placing concrete.

I. Pipes and Wall Spools Cast in Concrete

1. Install wall spools, wall flanges, and wall anchors before placing concrete. Do not weld, tie, or otherwise connect the wall spools or anchors to the reinforcing steel.
2. Support pipe and fabricated fittings to be encased in concrete on concrete piers or pedestals. Carry concrete supports to firm foundations so that no settlement will occur during construction.
3. Pipes or spools located below operating water level shall have water stop ring collars and shall be cast in place. Do not block out such piping and grout after the concrete section is cast. Pipes fitted with thrust rings shall be cast in place.

END OF SECTION

SECTION 03210

CONCRETE REINFORCEMENT

PART 1 - GENERAL

A. Description

This section describes materials, testing, and installation of reinforcing steel in concrete.

B. Related Work Specified Elsewhere

1. Concrete Formwork: Section 03111.
2. Concrete: Section 03300.
3. Concrete Finishing and Curing: Section 03350.

C. Submittals

1. Submit shop drawings in accordance with the General Conditions and Section 01300.
2. Submit mill test certificates identifying chemical and physical analyses of each load of reinforcing steel delivered. If mill test reports are unavailable and the quantity of steel for a structure exceeds 5 tons, provide a laboratory test to prove conformance with the specified ASTM standard.
3. Submit reinforcing bending lists and placing drawings for all reinforcing. Placing drawings shall indicate all openings (mechanical, electrical, equipment, and architectural) including additional reinforcing at openings and corner bar arrangements at intersecting beams, walls, and footings indicated in the typical detail and structural drawings. Placing drawings shall be coordinated with the concrete placing schedule. Each bending list and placing drawing submitted shall be complete for each major element of a structure (grade slabs, footings, walls, deck, floor, or roof slabs) including dowels and corner bars. Furnishing such lists shall not be construed that the lists will be reviewed for accuracy. The Contractor shall be wholly and completely responsible for the accuracy of the lists and for furnishing and placing reinforcing steel in accordance with the details shown in the drawings and as specified. Placing drawings shall be prepared by the Contractor and shall not incorporate photocopies of the contract drawings.

PART 2 - MATERIALS

A. Reinforcing Steel

1. Reinforcement shall conform to ASTM A615 or A706, Grade 60.

2. Fabricate reinforcing in accordance with the current edition of the Manual of Standard Practice, published by the Concrete Reinforcing Steel Institute. Bend reinforcing steel cold.
3. Deliver reinforcing steel to the site bundled and with identifying tags.

B. Welded Wire Reinforcement

Welded wire reinforcement shall conform to ASTM A185.

C. Tie Wire

Tie wire shall be 16 gauge minimum, black, soft annealed.

D. Bar Supports

Bar supports in beams and slabs exposed to view after form stripping shall be galvanized and plastic coated. Use concrete supports for reinforcing in concrete placed on grade.

E. Bar Couplers

Reinforcing steel bar splicing couplers shall be a mechanical type as manufactured by Dayton Barsplice Inc., DYWIDAG, or equal. Use couplers which develop 125% of the specified yield strength of the reinforcing bars. Make field demonstrations and sample splicing prior to splicing bars being included into the work.

PART 3 - EXECUTION

A. Placing

1. Place reinforcing steel in accordance with the current edition of Recommended Practice for Placing Reinforcing Bars, published by the Concrete Reinforcing Steel Institute.
2. Place reinforcing in accordance with the following, unless otherwise indicated:
 - a. Reinforcement indicated in the drawings is continuous through the structure to the farthest extent possible. Terminate bars 2 inches clear from faces of concrete.
 - b. Splices may be used to provide continuity due to bar length limitations. Minimum length of bars spliced for this reason is 30 feet. Do not splice reinforcement that is detailed to be continuous in the drawings.
3. Reinforcing steel, before being positioned and just prior to placing concrete, shall be free from loose mill and rust scale and from any coatings that may destroy or reduce the bond. Clean reinforcing steel by sandblasting or wire brushing and remove mortar, oil, paint, or dirt to remove materials that may reduce the bond.
4. Do not straighten or rebend reinforcing steel in the field. Do not use reinforcing with bends not shown in the drawings.

5. Position reinforcing steel in accordance with the drawings and secure by using annealed wire ties or clips at intersections and support by concrete or metal supports, spacers, or metal hangers. Do not place metal clips or supports in contact with the forms. Bend tie wires away from the forms to provide the specified concrete coverage. Bars additional to those shown in the drawings, which may be found necessary or desirable by the Contractor for the purpose of securing reinforcement in position, shall be provided by the Contractor at his own expense.
6. Place reinforcement a minimum of 2 inches clear of any metal pipe or fittings.
7. Secure reinforcing dowels in place prior to placing concrete. Do not press dowels into the concrete after the concrete has been placed.
8. Roll wire mesh used for reinforcement flat before placing concrete. Support and tie wire mesh to prevent movement during concrete placement.
9. Position dowels for masonry walls to occur at reinforced block cells.

B. Splices

Splices shall be as indicated in the drawings. Unless otherwise shown, stagger splices in adjacent horizontal bars 48 bar diameters.

C. Additional Reinforcement Around Openings

Place additional reinforcement around pipe or openings as indicated in the drawings.

D. Welding Reinforcement

Do not weld reinforcing steel unless specifically noted. Welding of reinforcing steel shall be in accordance with AWS D1.4.

E. Placing Welded Wire Fabric

Extend fabric to within 2 inches of the edges of the slab and lap splices at least 1-1/2 courses of the fabric and a minimum of 6 inches. Tie laps and splices securely at ends and at least every 24 inches with 16-gauge black annealed steel wire. Pull fabric into position as the concrete is placed by means of hooks, and work concrete under the steel to ensure that it is placed at the proper distance above the bottom of the slab.

END OF SECTION

SECTION 03300

CONCRETE

PART 1 - GENERAL

A. Description

1. This section describes materials, mixing, testing, and placing of concrete and grout.

B. Related Work Specified Elsewhere: Divisions 2 and 3

C. Submittals

1. Submit shop drawings in accordance with the General Conditions and Section 01300.
2. Prepare concrete and mortar mix designs and laboratory 7-day and 28-day compressive tests or submit test reports of 7- and 28-day compressive tests of the mix where the same mix has been used on two previous projects. Prepare mix designs in accordance with ACI 318, Chapters 4 and 5, except as modified herein. Submit mix design in writing for review by the Owner at least 15 days before placing of any concrete.
3. Provide results of drying shrinkage tests from trial concrete mixes by the Contractor's testing laboratory firm.
4. Provide certificate that cement used complies with ASTM C150 and these specifications.
5. Provide certificates that aggregates comply with ASTM C33 and contain less than 1% asbestos by weight or volume. State weathering region limits of coarse aggregates: severe, moderate, or negligible. State basis of determining that potential reactivity is negligible. Identify certifications and tests to actual materials to be used in the work. Provide additional tests and certifications for each change in material source. Provide an alternate material source of aggregate if tests indicate that aggregates are reactive or possess severe weathering potential. Submit gradation analysis with concrete mix designs.
6. Provide delivery tickets for ready-mix concrete or weighmasters certificate per ASTM C94, including weights of cement and each size aggregate and amount of water added at the plant and record of pours. Record the amount of water added on the job on the delivery ticket. Water added at the plant shall account for moisture in both coarse and fine aggregate.
7. Provide certificate of compliance with these specifications from the manufacturer of the concrete admixtures.

8. Provide epoxy bonding compound manufacturer's specific instructions for use. Provide manufacturer's certifications as to suitability of product to meet job requirements with regard to surface, pot life, set time, vertical or horizontal application, and forming restrictions.
9. Provide non-shrink grout manufacturer's certificate of compliance with these specifications and specific instructions for use.
10. Submit six copies of a report from a testing laboratory verifying that aggregate and gravel material contains less than 1% asbestos by weight or volume and conforms to the specified gradations and characteristics.
11. Plant Qualification: Submit certification from the National Ready Mixed Concrete Association or FDOT indicating compliance with the specified qualification requirements.
12. For potable water, provide certification that all materials used in grout, concrete, or the curing and repair of concrete, meet the requirements of ANSI/NSF 61 for contact with potable water.

D. Plant Qualification

1. Meet requirements of the Check List for Certification of Ready Mixed Concrete Production facilities of the National Ready Mixed Concrete Association and ASTM C94.

E. Standards

1. Unless otherwise indicated, materials, workmanship, and practices shall conform to the following standards:
 - a. FBC (Latest Edition).
 - b. ACI 301, "Structural Concrete for Buildings."
 - c. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - d. ANSI/NSF 61: "Drinking Water System Components-Health Effects."
2. Where provisions of pertinent codes and standards conflict with this specification, the more stringent provisions govern.

F. Shrinkage Tests

1. Perform drying shrinkage tests for the trial batch specified in the paragraph in Part 2 entitled "Trial Batch and Laboratory Tests."
2. Drying shrinkage specimens shall be 4-inch by 4-inch by 11-inch prisms with an effective gauge length of 10 inches. Fabricate, cure, dry, and measure specimens in accordance with ASTM C157 modified as follows:
 - a. Remove specimens from molds at an age of 23 hours \pm 1 hour after trial batching, place immediately in water at 70°F \pm 3°F for at least 30 minutes, measure within 30 minutes thereafter to determine original length, then submerge in saturated lime water at 73°F \pm 3°F. At age seven days, make measurement to determine expansion, expressed as a percentage of original length. This length at age seven days shall be the base length for drying shrinkage calculations (zero days' drying age).
 - b. Then, store specimens immediately in a humidity-controlled room maintained at 73°F \pm 3°F and 50% \pm 4% relative humidity for the remainder of the test. Make and report measurements to determine shrinkage expressed as percentage of base length separately for 7, 14, 21, and 28 days of drying after 7 days of moist curing.
3. Compute the drying shrinkage deformation of each specimen as the difference between the base length (at zero days' drying age) and the length after drying at each test age. Compute the average drying shrinkage deformation of the specimens to the nearest 0.0001 inch at each test age. If the drying shrinkage of any specimen departs from the average of that test age by more than 0.0004 inch, disregard the results obtained from that specimen. Report results of the shrinkage test to the nearest 0.001% of shrinkage. Take compression test specimens in each case from the same concrete used for preparing drying shrinkage specimens. These tests shall be considered a part of the normal compression tests for the project. Allowable shrinkage limitations shall be as specified in Part 2.

PART 2 - MATERIALS

A. Nondomestic Cement and Additives

1. The use of nondomestic cement and additives in concrete may be permitted only after review of a written request to use such materials. The request to use nondomestic materials shall include a chemical analysis that indicates the material meets the project specifications. Certifications that state the nondomestic materials meet the project requirements will not be accepted.
2. Test reports for concrete materials shall be current to within three months of inclusion into the project and shall be identifiable to the materials supplied.

B. Cement

1. Unless nondomestic cement has been approved, use domestic portland cement that conforms to ASTM C150 and C595, Type IPMS or, in lieu of Type IPMS, provide a mixture of 80% Type II portland cement and 20% pozzolan fly ash II/V or 20% Class F fly ash. Use Type III cement for high early strength concrete only for special locations and only when reviewed in advance by the Resident Project Representative. Use Type I cement for tremie concrete. Pozzolan or fly ash content of Type IPMS cement shall not exceed 20% of the total weight.
2. Use only one brand of cement in any individual structure. Use no cement that has become damaged, partially set, lumpy, or caked. Reject the entire contents of the sack or container that contains such cement. Use no salvaged or reclaimed cement.
3. Maximum tricalcium aluminate shall not exceed 8%. The maximum percent alkalis shall not exceed 0.6%.

C. Aggregates

1. Aggregates shall be natural rock, sand, or crushed natural rock and shall comply with ASTM C33, and shall contain less than 1% asbestos by weight or volume. Aggregates shall be free from any substances that will react with the cement alkalis, as determined by Appendix X-1 of ASTM C33.

D. Water and Ice

1. Use water and ice that is clean and free from objectionable quantities of organic matter, alkali, salts, and other impurities that might reduce the strength, durability, or otherwise adversely affect the quality of the concrete. Water shall not contain more than 500 mg/L of chlorides nor more than 500 mg/L of sulfate.

E. Color Additive for Exterior Electrical Duct Encasement

1. For exterior electrical duct concrete encasements, use a color additive for identification purposes: brick red "Colorfull" as manufactured by Owl Manufacturing Company, Arcadia, California; coral red "Chromix C-22" as manufactured by L. M. Scofield Company, Los Angeles, California; or equal. Add the color additive while the concrete is being mixed using the quantity per cubic yard of concrete recommended by the manufacturer for the class of concrete indicated.

F. Concrete Admixtures

1. Class A concrete shall contain an air-entraining admixture conforming to ASTM C260. Admixtures shall be Master Builders MB-AE 90, Sika AER, or equal.
2. Class A concrete shall contain a water-reducing admixture conforming to ASTM C494, Type A or D. It shall be compatible with the air-entraining admixtures. The

amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations. Admixtures shall be Master Builders Pozzolith polymer-type normal setting, Plastocrete 161 or Plastiment, Sika Chemical Corporation, or equal.

3. Do not use any admixture that contains chlorides or other corrosive elements in any concrete. Admixtures shall be nontoxic after 30 days.

G. Fly Ash:

1. Provide fly ash conforming to the following requirements:
 - a. Class F fly ash conforming to ASTM C 618 for chemical and physical properties.
 - b. Supplemental requirements in percent:
 - (1) Maximum carbon content: 3%
 - (2) Maximum sulfur trioxide (SO₃) content: 4%
 - (3) Maximum loss on ignition: 3%
 - (4) Maximum water requirement (as a percent of control): 100%
 - (5) Fineness, maximum retained on No. 325 sieve: 25%

H. Superplasticizer

1. Comply with ASTM C1017, Type 1 or 2.

I. Nonshrink Grout

1. Nonshrink grout shall conform to the Corps of Engineers Specification for Nonshrink Grout, CRD-621-83, and to these specifications. Use a nongas-liberating type, cement base, premixed product requiring only the addition of water for the required consistency. Grout shall be UPCON High Flow, Master Flow 713, or equal. Components shall be inorganic.

J. Ordinary Type Grout (Dry Pack)

1. One-part Portland cement to two parts sand (100% passing a No. 8 sieve). Add sufficient water to form a damp formable consistency.

K. Expansive Grout

1. Premixed, cementitious mixture with a minimum 28-day strength of 3,500 psi. Provide air-entraining admixture as recommended by the manufacturer.

L. Epoxy Grout

1. Mix the two components of epoxy bonding compound in compliance with the manufacturer's instructions.
2. Use sand that is oven dry and meets the following gradation requirements for epoxy grout.

Sieve Size	No. 8	No. 50	No. 100
% Passing	100	30 ±15	5 ±5

M. Epoxy Grout for Machinery Baseplate Installation

1. Epoxy grouts shall meet the following minimum requirements:
 - a. Creep shall be less than 0.005 in./in. when tested per ASTM C1181. The tests shall be at 70°F and 140°F with a load of 400 psi.
 - b. Linear shrinkage shall be less than 0.080% and thermal expansion less than 17×10^{-6} in./in./°F when tested per ASTM C531.
 - c. Compressive strength shall be a minimum of 12,000 psi after seven days when tested per ASTM C579, Method B.
 - d. Bond strength to portland cement concrete shall be greater than 2,000 psi when tested per ASTM C882.
 - e. Epoxy grout shall pass the thermal compatibility test per ASTM C884 when overlaid on portland cement concrete.
 - f. Determine tensile strength and modulus of elasticity per ASTM D638. The tensile strength shall not be less than 1,700 psi and the modulus of elasticity shall not be less than 1.8×10^6 psi.
 - g. Determine gel time and peak exothermic temperature per ASTM D2471. Peak exothermic temperature shall not exceed 110°F when a specimen 6 inches in diameter by 12 inches high is used. Gel time shall be at least 150 minutes.

Class	Type of Work	28-Day Minimum Compressive Strength (in psi)	W/C Ratio (Max)	Cement Content (in lbs per C.Y.)
A	Concrete for all structures and concrete not otherwise specified. Concrete fill at structure foundations, cradle, supports across pipe trenches.	4,000	0.44	564
B	Pavement	3,000	0.54	500
C	Floor grout, miscellaneous unreinforced concrete.	2,000	-	376
D	Precast concrete	5,000	0.40	630

4. Measure slump in accordance with ASTM C143. Slump shall be as follows:
- a. Slab on grade or heavy sections wider (in plan view) than 3 feet: 4 inches maximum.
 - b. Footings, walls, suspended slabs, beams, and columns: 4 inches maximum.
 - c. Pavement: 2 inches maximum.
 - d. Floor grout: 4 inches maximum.

Proportion and produce the concrete to have a maximum slump as shown; slump is prior to addition of superplasticizer. A tolerance of up to 1 inch above the indicated maximum shall be allowed for individual batches provided the average for all batches or the most recent 10 batches tested, whichever is fewer, does not exceed the maximum limit. Concrete of lower than usual slump may be used provided it is properly placed and consolidated.

5. Aggregate size shall be 3/4 inch maximum for slabs and sections 8 inches thick and less. Aggregate size shall be 1 inch maximum for sections greater than 8 inches and less than 17 inches. Aggregate size shall be 1-1/2 inches maximum for all larger slabs and sections. Aggregate size for floor grout shall be maximum 3/8 inch.

6. Combined aggregate grading shall be as shown in the following table:

	Maximum Aggregate Size			
	1-1/2"	1"	3/4"	3/8"
Aggregate Grade per ASTM C33	467	57	67	8

7. Mix design for pumped concrete shall produce a plastic and workable mix. The percentage of sand in the mix shall be based on the void content of the coarse aggregate.

R. Granular Base

1. Use structural backfill material as specified in Section 03123.

S. Trial Batch and Laboratory Tests

1. Before placing any concrete, a testing laboratory designated by the Contractor shall prepare a trial batch of Class A concrete, based on the preliminary concrete mixes submitted. Concrete shall conform to the requirements of this section. Prepare the trial batch using the aggregates, cement, and admixture proposed for the project. The cost of laboratory trial batch tests will be borne by the Contractor. Perform trial batch testing at no additional cost to the Owner.

T. Shrinkage Limitation

1. The maximum concrete shrinkage for specimens cast in the laboratory from the trial batch, as measured at 21-day drying age or at 28-day drying age, shall be 0.036% or 0.042%, respectively. Use a mix design for construction that has first met the trial batch shrinkage requirements. Shrinkage limitations apply only to Class A concrete.
2. If the trial batch specimens do not meet the shrinkage requirements, revise the mix design and/or materials and retest.

U. Workability

1. Concrete shall be of such consistency and composition that it can be worked readily into the forms and around the reinforcement without excessive vibrating and without permitting the materials to segregate or free water to collect on the surface.
2. The proportions shall be adjusted to secure a plastic, cohesive mixture, and one that is within the specified slump range.
3. To avoid unnecessary changes in consistency, obtain the aggregate from a source with uniform quality, moisture content, and grading. Handle materials to

minimize variations in moisture content that would interfere with production of concrete of the established degree of uniformity and slump.

PART 3 - EXECUTION

A. Site-Mixed Concrete

1. Conform to ACI 304 as modified by these specifications.
2. Use a batch-type mixer capable of combining the aggregates, cement, and water within the specified time into a thoroughly mixed and uniform mass and capable of discharging the mixture without segregation.
3. Use equipment that can accurately proportion cement, coarse and fine aggregates, admixtures, and water. Proportion cement and aggregate by weight.
4. Discharge each entire batch before recharging. Do not allow any batch to exceed the manufacturer's rated capacity of the mixer.
5. Mixing time shall be as follows:
 - a. For mixer of a capacity of 1 cubic yard or less, one and one-half minutes after batching is completed.
 - b. For mixers of capacities larger than 1 cubic yard, one and one-half minutes plus one-half minute for each additional 1/2-cubic-yard capacity or fraction thereof in excess of 1 cubic yard.
 - c. The mixer shall revolve at a uniform rate as specified by the manufacturer for the mixing equipment.

B. Ready-Mixed Concrete

1. Provide ready-mixed concrete conforming to ASTM C94 as modified by these specifications.
2. Convey concrete from the truck to the place of final deposit as rapidly as practicable by methods that will prevent segregation or loss of ingredients to maintain the quality of the concrete. Place no concrete more than 90 minutes after mixing has begun for that particular batch. If it is necessary to add water to obtain the specified slump, add water per ASTM C94, but do not exceed the water content of the reviewed design mix.
3. Use dry-batched concrete or jobsite mix only when haul time is excessive. Do not retemper partially hardened concrete.

4. Keep a record showing time and place of each pour of concrete, together with transit-mix delivery slips certifying the contents of the pour.

C. Prior to Placing Concrete

1. Subgrade: Compact the subgrade and/or bedding. Saturate the subgrade approximately eight hours before placement and sprinkle ahead of the placement of concrete in areas where vapor barrier is not used. Remove all standing water, mud, and foreign matter before concrete is deposited.
2. Contractor has the option to provide mud slabs to obtain a dry and stable working platform for placement of slabs.
3. Granular Base: When indicated in the drawings, install a granular base beneath the slab on grade or a structural foundation. Place the granular material on a compacted subgrade and compact the granular base to the same density as the subgrade.
4. Vapor Barrier: Place under structural slabs and buildings and where indicated in the drawings. Lay vapor barrier sheets as described in Section 071119. Stretch and weight edges and laps to maintain their positions until concrete is placed.

D. Placing Concrete

1. Placement shall conform to ACI 304 as modified by these specifications.
2. Coordinate in advance of concrete placement the sequence of placement to assure that construction joints will occur only as designed. Provide Owner's Representative with a copy of the sequence of placement in advance of placement.
3. Alternate sections of concrete walls and slabs may be cast simultaneously. Do not place adjacent sections of walls and slabs until seven days after placement of first placed concrete.
4. Notify the Owner's Representative of readiness, not just intention, to place concrete in any portion of the work. This notification shall be such time in advance of the operation as the Owner's Representative deems necessary to allow observation of the work at the location of the proposed concrete placing. Failure of sufficient advance notification will be cause for delay in placing until observations can be completed. Forms, steel, screeds, anchors, ties, inserts, and other embedded items shall be in place before the Contractor's notification of readiness is given.
5. Schedule sufficient equipment for continuous concrete placing. Provide for backup equipment and procedures to be taken in case of an interruption in placing. Provide backup concrete vibrators at the project site. Test concrete vibrators the day before placing concrete.

6. Do not place concrete until all free water has been removed or has been diverted by pipes or other means and carried out of the forms, clear of the work. Do not deposit concrete underwater, and do not allow free water to rise on any concrete until the concrete has attained its initial set. Do not permit free or storm water to flow over surfaces of concrete so as to injure the quality or surface finish.
7. Where a vapor barrier is installed, do not puncture the vapor barrier by stakes or any other concrete accessory. Repair any holes in the vapor barrier by patching before placing concrete.
8. Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing. Do not deposit concrete in large quantities in one place to be worked along the forms with a vibrator.
9. Use mechanical vibration in placing concrete to eliminate rock pockets and voids, to consolidate each layer with that previously placed, to completely embed reinforcing bars and fixtures, and to bring just enough fine material to exposed surfaces to produce a smooth, dense, and even texture. Vibrators shall be of the high-frequency internal type, and the number in use shall be ample to consolidate the incoming concrete to a proper degree within 15 minutes after it is deposited in the forms. In all cases, at least two vibrators shall be available at the site. Use external vibrators for consolidating concrete when the concrete is otherwise inaccessible for adequate consolidating. Construct forms with sufficient strength to resist displacement or damage when external vibrators are used.
10. Do not place concrete during rainstorms. Protect concrete placed immediately before rainstorms to prevent rainwater from coming in contact with freshly placed or uncured concrete. Keep sufficient protective covering ready at all times for this purpose.
11. Elephant Trunks: Use hoppers and elephant trunks or drop chutes to prevent the free fall of concrete that results in separation of coarse particles.
12. Chutes: Use metal or metal-lined chutes with a slope not exceeding one vertical to two horizontal and not less than one vertical to three horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirement may be used only if they discharge into a hopper before distribution.
13. Deposit concrete continuously and in level layers of such thickness (not exceeding 2 feet in depth) so that no concrete will be deposited on concrete that has hardened sufficiently to cause the formation of seams, planes of weakness, or cold joints.

E. Time Between Pours

1. At least two hours shall elapse after depositing concrete in the columns or walls before depositing in beams, girders, or slabs supported thereon. Place beams, girders, brackets, column capitals, and haunches monolithically as part of the floor or roof system, unless otherwise indicated in the drawings.

F. Maximum Height of Concrete Pours and Free Fall

1. Do not drop concrete freely into place from a height greater than 6 feet in unexposed work and 4 feet in exposed work. Use tremies or pumps where the drop exceeds these limits. See Section 03111 also.

G. Pumping Concrete

1. Conform to the recommendations of ACI 304.2R except as modified herein.
2. Base pump size on rate of concrete placement, length of delivery pipe or hose, aggregate size, mix proportions, vertical lift, and slump of concrete.
3. Minimum inside diameter of pipe or hose shall be based on the maximum aggregate size as follows:
 - a. 3/4-inch-maximum aggregate: 2 inches minimum inside diameter.
 - b. 1-1/2-inch-maximum aggregate: 4 inches minimum inside diameter.
4. Do not use aluminum pipes for delivery of concrete to the forms.
5. Before pumping is started, prime the delivery pipe or hose by pumping mortar through the line using 5 gallons of mortar for each 50 feet of delivery line. Do not deposit mortar in the forms.

H. Hot Weather Requirements

1. During hot weather, give proper attention to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation in accordance with ACI 301, ASTM C94, and the following.
2. When the weather is such that the temperature of the concrete as placed would exceed 90°F, use ice or other means of cooling the concrete during mixing and transportation so that the temperature of the concrete as placed will not exceed 90°F.
3. Take precautions when placing concrete during hot, dry weather to eliminate early setting of concrete. This includes protection of reinforcing from direct sunlight to prevent heating of reinforcing, placing concrete during cooler hours of the day, and the proper and timely application of specified curing methods.

4. There will be no additional reimbursement to the Contractor for costs incurred for placing concrete in hot weather.

I. Cold Weather Requirements

1. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather in accordance with ACI 306 and the following.
2. When the temperature of the surrounding atmosphere is 40°F or is likely to fall below this temperature, use heated mixing water not to exceed 140°F. Do not allow the heated water to come in contact with the cement before the cement is added to the batch.
3. When placed in the forms during cold weather, maintain concrete temperature at not less than 55°F. All materials shall be free from ice, snow, and frozen lumps before entering the mixer.
4. Maintain the air and the forms in contact with the concrete at temperatures above 40°F for the first five days after placing, and above 35°F for the remainder of the curing period. Provide thermometers to indicate the ambient temperature and the temperature 2 inches inside the concrete surface.
5. There will be no additional reimbursement made to the Contractor for costs incurred for placing concrete during cold weather.

J. Bonding to Old Concrete

1. Coat the contact surfaces with epoxy bonding compound. The method of preparation and application of the bonding compound shall conform to the manufacturer's printed instructions and recommendations for specific application for this project.

K. Grouting Machinery Foundations

1. Block out the original concrete or finish off a sufficient distance below the bottom of the machinery base to provide for the thickness of grout shown on the drawings. After the machinery has been set in position and placed at the proper elevation by steel wedges, the space between the bottom of the machinery base and the original pour of concrete shall be filled with a pourable nonshrink grout. Grout and grouting procedure shall be in accordance with API 686, Chapter 4, paragraphs 3.6 and 3.7, and Chapter 5.

L. Backfill Against Walls

1. Do not place backfill against walls until the concrete has obtained a compressive strength equal to the specified 28-day compressive strength. Where backfill is to be placed on both sides of the wall, place the backfill uniformly on both sides.
2. Do not backfill the walls of structures that will be laterally restrained or supported by suspended slabs or slabs on grade until the slab is poured and the concrete has reached the specified compressive strength.

M. Concrete Tests

1. Concrete quality testing will be performed on the concrete by the Contractor per Section 01400, Testing and Inspection and as follows:
 - a. Frequency of Sampling: Cast four concrete test cylinders from each 50 cubic yards, or fraction thereof, of each class of concrete placed in any one day. Sampling and curing of cylinders shall conform to ASTM C31.
 - b. Strength Testing: Test cylinders in accordance with ASTM C39. Test one cylinder at 7 days for information; test two cylinders at 28 days for acceptance; and hold one cylinder for verification. Strength acceptance will be based on the average of the strengths of the two cylinders tested at 28 days. If one cylinder of a 28-day test manifests evidence of improper sampling, molding, or testing, other than low strength, discard it and use the fourth cylinder for the test result.
 - c. Determine concrete slump by ASTM C143 with each strength test sampling and as required to establish consistency.
 - d. Determine air content of the concrete using ASTM C231 to verify the percentage of air in the concrete immediately prior to depositing in forms.
 - e. Concrete acceptance shall be based on the requirements of ACI 318.
2. To facilitate concrete sampling and testing, the Contractor shall:
 - a. Furnish labor to assist the Owner in obtaining and handling samples at the project site.
 - b. Advise the Owner in advance of concrete placing operations to allow for scheduling and completion of quality testing.
 - c. Provide and maintain facilities for safe storage and proper curing of concrete test specimens on the project site, as required by ASTM C31.

END OF SECTION

SECTION 03375

FLOWABLE FILL

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Section specifies the requirements for flowable fill used for trenches, support for pipe structures, culverts, utility cuts and other works where cavities exist and where firm support is needed for pavements and structural elements. Flowable fill may also be used to fill water and sewer lines, and fuel tanks placed out of service, and at other locations as approved.

PART 2 - PRODUCTS (NOT USED)

2.01 MATERIALS

The materials used shall conform with the requirements specified in the FDOT Standard Specifications for Road and Bridge Construction, latest edition. Specific references are as follows:

- A. Portland Cement (Types I, II or II)Section 921
- B. Fly Ash, Slag and other Pozzolanic
Materials for Portland Cement Concrete..... Section 929
- C. Fine Aggregate (Sand)* Section 902
- D. Water..... Section 923

*Any clean sand with 100% passing 3/8" sieve and not more than 10% passing with 200 mesh may be used.

2.02 MIX PROPORTIONS

- A. The Contractor shall be responsible for producing a flowable mixture using these guidelines and by adjusting his mixture design as called for by circumstances or as may be directed by the Engineer of Record.
- B. Excavatable flowable fill material shall be proportioned to produce a 28-day compressive strength of 100 psi.

C. General mix quantities are as follows:

Components	Pounds per Cubic Yard
Cement	50-100*
Fly Ash or Granulated Blast Furnace Slag	0-600
Fine Sand	2,750 (adjust to yield one CY)
Water	500 (Maximum)

*The percentage of cement may be increased above these limits only when early strength is required, and future removal is unlikely.

- D. Weights for fine aggregate and water shall be adjusted according to cementitious content. The mix proportions shall be adjusted for removability, pumpability and flowability. If required, strength test data shall be provided prior to batching.
- E. If required by the Engineer of Record, the flowability can be measured by afflux time determined in accordance with ASTM C 939 and shall be 30 seconds \pm 5 seconds as measured on mortar passing the No. 4 sieve. The equipment required to perform this test shall be provided by the Contractor.

2.03 APPROVED MIXES OF "EXCAVATABLE FLOWABLE FILL"

FDOT - Approved Design Mixes (or latest as approved by FDOT):

Plant	Mix Number
Tarmac	04-FF-65
Rinker Materials Corp.	04-FF-52
Central Concrete Supermix Inc.	06-FF-41
Cemex	06-FF-48

PART 3 - EXECUTION

3.01 Flowable fill shall be produced and delivered using concrete construction equipment. Placing flowable fill shall be done by chute, pumping or other methods approved by the Engineer of Record.

3.02 CONSTRUCTION REQUIREMENTS

The flowable fill shall be placed to the designated fill line without vibration or other means of compaction. Placement shall be avoided during inclement weather, e.g. rain or ambient temperatures below 40 degrees F. The Contractor shall take all necessary precautions to prevent any damages caused by the hydraulic pressure of the fill during placement prior to hardening. Also, necessary means to confine the material within the designated space shall be provided by the Contractor.

3.03 ACCEPTANCE

- A. If required by the Engineer of Record, the flowability can be measured by afflux time determined in accordance with ASTM C 939 and shall be 30 seconds \pm 5 seconds as measured on mortar passing the No. 4 sieve. The equipment required to perform this test shall be provided by the Contractor.
- B. The fill shall be left undisturbed until material obtains sufficient strength. Sufficient strength is 250 psi penetration resistance as measured using a hand-held penetrometer. The penetrometer shall be provided by the Contractor.
- C. All flowable fill areas subject to traffic loads must have a durable riding surface.
- D. An approved type of accelerator may be approved for the placement of "Flowable Fill" in traffic areas when submitted to the City for FDOT approval.

END OF SECTION

SECTION 03420

PRECAST REINFORCED CONCRETE STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide factory-built precast reinforced concrete underground structures as indicated and as specified.

1.02 RELATED WORK:

- A. Section 02210: Earth Excavation, Backfill, Fill and Grading
- B. Section 03210: Concrete Reinforcement
- C. Section 03300: Concrete

1.03 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO: Standard Specifications for Highway Bridges.
- B. American Concrete Institute (ACI):
 - 1. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavy Weight, and Mass Concrete.
 - 2. ACI 301: Standard Specifications for Structural Concrete.
 - 3. ACI 304R: Guide for Measuring, Mixing, Transporting and Placing Concrete
 - 4. ACI 305R: Hot Weather Concreting
 - 5. ACI 306R: Cold Weather Concreting
 - 6. ACI 308: Standard Practice for Curing Concrete
 - 7. ACI 309R: Guide for Consolidation of Concrete
 - 8. ACI 318: Building Code Requirements for Structural Concrete and Commentary
- C. American Society for Testing and Materials (ASTM) Publications:
 - 1. ASTM A48: Specification for Sewer Manhole Frames and Covers

2. ASTM C31: Practice for Making and Curing Concrete Test Specimens in the Field
3. ASTM C33: Specification for Concrete Aggregates
4. ASTM C39: Test Method for Compressive Strength of Cylindrical Concrete Specimens
5. ASTM C143: Test method for Slump of Hydraulic Cement Concrete
6. ASTM C150: Specification for Portland Cement
7. ASTM C172: Practice for Sampling Freshly Mixed Concrete
8. ASTM C192: Practice for Making and Curing Concrete Test Specimens in the Laboratory
9. ASTM C231: Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
10. ASTM C260: Specification for Air-Entraining Admixtures for Concrete
11. ASTM C494: Specification for Chemical Admixtures for Concrete
12. ASTM C858: Specification for Underground Precast Utility Chambers
13. ASTM C1064: Test Method for Temperature of Freshly Mixed Portland Cement Concrete
14. ASTM D75: Practice for Sampling Aggregates

1.04 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300:
 1. Completely detailed shop drawings for all precast concrete structures. Indicate all dimensions, details, reinforcing steel, inserts, connections, openings, joint and opening seals, and lifting devices. Mark each component for identification. Show mark on erection plan and place legibly on unit at time of manufacture.
 2. Properly completed Certificate of Design as specified under Section 01300.
- B. Drawings of modifications or changes in features or details, which are necessitated by, design requirements. Make all such modifications without additional compensation.
- C. Do not fabricate precast concrete structures before shop drawings are accepted by the Engineer.

- D. A certificate of design shall be submitted to the Engineer prior to the production of the precast concrete structures. The certificate of design shall be signed and sealed by a Professional Structural Engineer employed by the structure manufacturer and holding current registration in the state in which the structure is to be installed.

1.05 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. Design Responsibility:
 - 1. Complete the Certificate of Design form in Section 01300 and submit to Engineer prior to manufacture of precast reinforced concrete structures.
 - 2. Submit the following support data along with Certificate of Design:
 - a. Certification signed and sealed by a Florida Professional Engineer employed by the structure manufacturer and holding current registration in the state in which the structure is to be installed stating that all elements and connections are designed to withstand required loads and forces.
 - b. Codes and specifications to which structural design conforms.
 - c. Submit hydrostatic uplift (buoyancy) calculations and reinforced concrete design calculations for review.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01610 and as specified herein.
- B. Coordinate the delivery, storage, handling and installation of the concrete structures.
- C. Store structures on clean blocking, off the ground and protected from rain and ground splatter.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. Oldcastle Precast, Inc.
- B. U.S. Precast Corp.
- C. Or equal.

2.02 MATERIALS:

- A. Concrete shall have a minimum concrete compressive strength of 5000 PSI at 28 days and shall conform to Section 03300.
- B. Steel reinforcement shall conform to ASTM A615, Grade 60.
- C. Portland cement shall be ASTM C150, Type II.
- D. Admixtures causing accelerated setting of cement in concrete shall not be used.
- E. Screened Gravel: As specified in Section 02223.
- F. Butyl rubber-based sealants shall conform to AASHTO M198, Type B but with no bitumen content.
- G. External heat shrink seal per details and specifications.
- H. Non-Shrink Grout:
 - 1. Masterflow 713 Grout by Master Builders, Cleveland, OH.
 - 2. Fire Star Grout by U.S. Grout Corp., Old Greenwich, CT.
 - 3. Upcon by Upcon Co., Cleveland, OH.
 - 4. Or equal.

2.03 PRECAST REINFORCED CONCRETE STRUCTURES:

- A. Design Criteria:
 - 1. Design precast reinforced concrete structure to withstand earth and groundwater loads. Groundwater elevation shall be assumed to be at the top of the structure. Provide design based on the following geotechnical information.

Depth (ft)	Soil Type	Density/Consistency	Frictional Angle (degrees)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Lateral Earth Pressure Coefficients		
						Active, Ka	Passive, Kp	At Rest, Ko
0-12	Sand	Loose to Medium Dense	30	110	48	0.333	3.000	0.500
12-22	Rock	Soft	40	120	58	0.217	4.599	0.357
22-40	Sand	Medium Dense	32	115	53	0.307	3.255	0.470

2. Design precast reinforced concrete structure to withstand an H-20 vehicle loading with an impact factor of 1.3. Design shall account for vehicle positions both above and alongside structure including directly on each manhole cover.
 3. Design precast reinforced concrete structure ceiling to withstand additional concentrated loads from lifting hooks located directly above each valve, meter or other equipment. Each lifting hook shall be capable of supporting the appropriate load, but not less than 2,500 pounds.
 4. Design and install structures to withstand hydrostatic uplift caused by a groundwater elevation at grade level or equal to the top of the structure, whichever produces the most severe condition. Use only the weight of the structure and hold-down slab to resist hydrostatic uplift with a minimum safety factor of 1.5. Do not include side friction of soil on walls.
 5. Walls and floor slab shall be a minimum of 8 inches in thickness. Cast lower wall section and floor slab together in one placement. Precast reinforced concrete structure roof shall be a minimum of 8 inches in thickness or as otherwise shown in the City's standard details.
- B. Provide precast reinforced concrete structure including structure wall, top and base slab thicknesses and required diameters as indicated on the drawings, details and per the City's standards and specifications. Structure shall be a complete watertight enclosure including sumps and entrance tubes as indicated.
- C. Fabricate precast reinforced concrete structure in sections as required for ease of installation and shipment.
- D. Provide pipe sleeves with water stops, rubber pipe boots or other devices at pipe penetrations as indicated.
- E. Manhole Frames and Covers:
1. Castings to be free from scale, lumps, blisters and sandholes.
 2. Machine contact surfaces to prevent rocking.
 3. Thoroughly clean and hammer inspect.
 4. Capable of withstanding AASHTO H-20 loading
- F. Bituminous Waterproofing Material:
1. H.B. Tnemecol 46-46S by Tnemec Company, Inc.
 2. Amercoat 78HB by Ameron International.
 3. Bitumastic 300M by Carboline.

4. Or acceptable equivalent product.
- G. Entrance Hatches:
1. Manufacturers:
 - a. U.S. Foundry
 - b. Bilco Co.
 - c. Halliday
 - d. Babcock-Davis Associates, Inc.
 - e. Or equal.
 2. Provide aluminum hatches of the type and size indicated and as follows:
 - a. Fabricate hatch and frame with ¼ inch extruded aluminum frame and ¼ inch diamond checkered aluminum plate covers.
 - b. Reinforce cover, with aluminum bars and angles welded to underside of covers, to withstand 300-lbs per square foot, unless AASHTO H-20-wheel loading indicated on drawings.
 - c. Provide hatch with hinges, hold-open safety-lock bars and flush lift handles, factory assembled, and shipped complete for installation.
 - d. Provide stainless steel hardware throughout. Hinge covers to frames with heavy duty stainless steel concealed hinges and stainless steel pins. Attach hinges to covers and frames with countersunk/flathead stainless steel machine screws. Covers shall fit flush to frame.
 - e. Provide slam latch, flush mounted grip handle, and removable plug and key wrench.
 - f. Provide ladder-up safety post.
 - g. Provide Type 316 Stainless Steel safety chains.
- H. Provide lifting hooks in the ceiling above pumps, valves and meters. Each hook shall have the capacity to hoist the equipment located below, but not less than 2,500 pounds).
- I. Apply waterproofing to outside of walls, floor, and ceiling.
- J. Provide aluminum access ladders as follows:

1. Fabricate from 1½ inch IPS, Schedule 80 aluminum pipe upright and 1 inch solid round aluminum rod rungs, mortised and welded to uprights. All welds shall be ground smooth. Tops of uprights shall be closed, sealed and ground smooth.
2. Space aluminum rungs 12 inches on centers.
3. Securely fasten ladder to entrance tube and precast reinforced concrete structures with aluminum brackets and ½ inch diameter stainless steel expansion bolts.
4. Ladders shall conform to OSHA Standards 29 CFR Chapter 1926.1053.

PART 3 - EXECUTION

3.01 PROTECTION

- A. Protect aluminum from contact with dissimilar metals, concrete, masonry or mortar.
- B. Before coating application, clean contact surfaces, remove dirt, grease, oil, foreign substances, followed by immersing in, or wipe thoroughly with, an acceptable solvent. Rinse with clean hot water and dry thoroughly.

3.02 FINISHES

- A. Finishes: After fabrication, aluminum ladders and entrance tube hatches to receive an Aluminum Association Standard Anodic finish, Designation C22A31, followed by a shop coat of methacrylate lacquer.
- B. Damaged or worn coating of methacrylate lacquer shall be recoated with a new coating of lacquer of the same type.

3.03 INSTALLATION

- A. Install precast reinforced concrete structure, and related appurtenances in accordance with manufacturer's instructions.
- B. Place precast reinforced concrete structure onto level prepared bedding as indicated in details and specifications. Provide uniform bearing over entire base of structure.
- C. Seal all joints inside and out with specified sealant to ensure joints are waterproof.
- D. Repair or replace damaged waterproofing.
- E. Backfill structure excavation in such a manner so as not to damage the waterproofing.

3.04 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

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 cementitious 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.

1.03 SUBMITTALS

- A. Shop Drawings: Shop drawings shall be submitted in accordance with Section 01300. 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.

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 water 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



DIVISION 4 - 8

NOT USED



DIVISION 9

FINISHES

SECTION 09940

PAINTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide labor, materials, equipment and incidentals required for the surface preparation and application of shop primers and finish coats, as specified herein.

1.02 RELATED WORK

- A. Factory prefinished items as specified.

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Manufacturer's specifications and data on the proposed primers and detailed surface preparation, application procedures and dry mil thicknesses, including list of items and surfaces to receive shop painting.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600 and as specified.
 - 1. Deliver materials to application area in original, unbroken containers, plainly marked with name and analysis of product, manufacturer's name, and shelf life date. Do not store or use contaminated, outdated, prematurely opened, or diluted materials.
 - 2. Store coated items to prevent damage or dirtying of coatings. Avoid need for special cleaning and store coated items out of contact with ground or pavement. Place suitable blocking under coated items during storage.
 - 3. Do not expose surfaces to weather for more than six months before being top coated, or less time if recommended by coating manufacturer.
 - 4. Protect surfaces not to receive paint coatings during surface preparation, cleaning, and painting.
 - 5. Protect coatings from damage during shipment and handling by padding, blocking, use canvas or nylon slings, and use care when handling.

6. At time of delivery of shop painted items to job site, ensure coatings are undamaged and in good condition.

1.05 JOB CONDITIONS

A. Environmental Requirements:

1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.
2. Do not apply coatings when dust is being generated.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Shop coating shall be the following service type, as determined by conditions:

1. Non-Potable Water:

- (a) All ferrous metals not subject to potable water provide one coat with a dry film thickness of 2.5 to 3.0 mils with one of the following or equal:

- (1) #1 Purple Prime made by Tnemec Co.
- (2) Carbozinc 859 by Carboline Co.
- (3) Multiprime EFD Epoxy Fast Day Inhibitive Primer 94-109 made by PPG Protective & Marine Coatings (4.0 – 6.0 DFT).
- (4) Or acceptable equivalent product.

- ##### B. Shop prime with primers guaranteed by the manufacturer to be compatible with their corresponding primers and finish coats for use in the field and which are recommended for use together.

PART 3 - EXECUTION

3.01 APPLICATION

A. Surface Preparation and Priming:

1. Sandblast clean in accordance with SSPC-SP-6, Commercial Grade, immediately prior to priming non-submerged components scheduled for priming, as defined above.

2. Sandblast clean in accordance with SSPC-SP-10, Near White, immediately prior to priming submerged components scheduled for priming, as defined above.
 3. Before priming, provide surfaces dry and free of dust, oil, grease and other foreign material.
 4. Shop prime in accordance with approved manufacturer's printed recommendations.
- B. Non-primed Surfaces: Apply approved coating in accordance with manufacturer's printed recommendation.

3.02 TOUCH-UP

- A. Repair or replace damaged or defective coated areas. Resultant shop painting: Paint items as specified.
- B. Remove damaged or defective coatings by specified blast cleaning to meet surface cleaning requirements, just before recoating. When small areas of coating need touch up, surface preparation may be done with suitable power needle gun to match specified blast cleaning.

3.03 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 09960

HIGH PERFORMANCE COATINGS

PART 1 - GENERAL

1.01 WORK OF THIS SECTION

- A. This section includes general repairs, coating and lining of newly installed pump/lift stations by a monolithic application of high-build, solvent-free UME (Urethane-Modified-Epoxy) hybrid epoxy system to eliminate infiltration/exfiltration, repair concrete voids, and provide corrosion protection as a total lining system. Procedures for surface preparation, cleaning, application and testing are described herein. Different repair methods and procedures are listed in this section. All structures scheduled for coating shall be cleaned, prepared, patched and/or sealed as required prior to the application of the hybrid epoxy system.

1.02 SCOPE OF WORK

- A. The Contactor shall be responsible for furnishing all labor, supervision, materials, and equipment required to complete all lift station coating work, testing, surface repairs and lining in accordance with this Specification.
- B. All Sections of this Specification are mutually complimentary and the overall intent is that the Contractor shall provide for everything in his portion of the work required to make a complete and operable job in every respect unless specifically noted otherwise.
- C. It is the intent of this Specification to ensure that the work, as completed shall meet all applicable codes, ordinances, rules and regulations of every authority having jurisdiction in the area where the construction is located. Failure of the Contractor to point out items that do not meet such requirements does not relieve the Contractor or the Subcontractors of the responsibility of meeting them.
- D. All supplies shall be stored and maintained by the Contractor in accordance with manufacturer's recommendations. Materials shall not be exposed to adverse conditions prior to the work. All materials shall be kept in secured area and away from general public access. The Contractor shall review and maintain all Material Safety Data Sheets (MSDS), product labeling, and technical literature at the project site.

1.03 REFERENCES

- A. The latest codes and standards referenced herein and belonging to the following organizations shall be followed:
 - 1. American Society for Testing and Materials (ASTM)

2. National Association of Corrosion Engineers, NACE International (NACE)
3. The Society for Protective Coatings (SSPC)
4. International Concrete Repair Institute (ICRI)
5. National Association of Sewer Service Companies (NASSCO)
6. EPA Environmental Technology Verification Program (EPA ETV)
7. American Association of State Highway and Transportation Officials (AASHTO)
8. Occupational Safety and Health Administration (OSHA)

1.04 SUBMITTALS

A. Product Data

1. Technical data sheets on each product proposed shall be furnished. The technical data, by validation of ASTM testing results, shall demonstrate conformity with these specifications. If submitting an alternative product, please follow procedures set forth in Section 1.4 (C).
2. Material Safety Data Sheets (MSDS) for each product proposed shall be furnished.

B. Application Data

1. Project specific guidelines and recommendations.
2. Proof of any required federal, state or local permits and/or licenses.
3. Design details for any ancillary systems and equipment to be used on site for surface preparation, application and testing. Confined space entry, flow diversion and/or bypass plans shall be presented by Contractor to Owner as necessary to perform the specified work.
4. Applicator: Company specializing in performing work of this section with minimum one year documented experience and approved by manufacturer.
5. Three (3) recent references of Applicator indicating successful application of coating product(s) of the same or similar material type as specified herein, within municipal wastewater environments.
6. Written warranty:

- (a) Materials and labor shall be warranted by the Contractor per Division 1, "General Requirements", from date of project completion, once correctly applied by an approved applicator and inspected.
- (b) Contractor shall warrant with bond all workmanship of applied material systems per Division 1, "General Requirements", unless otherwise noted, from the date of final acceptance of the project.
- (c) Failure will be deemed to have occurred if the protective system fails to:
 - (1) Prevent the internal damage or corrosion of the underlying structure due to bacteriological, chemical, gaseous (hydrogen sulfide), erosive and abrasive attack, including internal damage or corrosion incurred from vibration and stress cracking. It does not include excessive atypical non-wastewater induced chemical abuse or atypical acts of God which cause structural damage.
 - (2) Seal and protect the substrate and environment from contamination by effluent.
 - (3) Seal and protect from influent.
- (d) Contractor shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship which may develop during said warranty period, and any damage to other work caused by such defects or the repairing of same, at his own expense and without cost to the Owner.

C. Or Equal Submittal

- 1. In order to be considered as an equal product, said product will have to meet the minimum physical and performance properties described herein as measured by the applicable ASTM standards referenced. Testing results must be performed and presented in the form of technical data sheets. Said product manufacturer must provide documentation supporting product's success and history in closed-wastewater-environments for at least ten (10) years.
- 2. Equal products' technical specifications/data and material safety data must be submitted to Owner a minimum of three (3) weeks prior to bid date. Samples of raw material and cured material must be submitted in order to cover at least one (1) square foot of surface.
- 3. Written product pre-approval is required to determine if the prospective product may be bid and utilized on this project. A product will be rejected as

unacceptable should submittal to Owner not be received by the deadline and should the bid package not have enclosed a written approval from the Owner.

PART 2 - COATING/LINING METHODS AND PROCEDURES

2.01 GENERAL

- A. All work shall be in strict accordance with the specifications and in accordance with manufacturer's directions, including application of all products.
- B. Contractor shall conform to all local, state and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.
- C. When freezing temperatures are expected in the area, the Contractor shall take measures to keep applied materials warm and provide the required heat in the structure before repair work is started and the 24-hour period following application.
- D. Any inverts or flow channels shall be covered during construction operations to prevent loose materials from collection in the invert.
- E. Bypassing and/or blocking of the flow shall be done only with Owner's prior approval.
- F. The Owner shall supply water necessary for the project to the Contractor at no cost, from locations indicated by Owner prior to the start of the project. Contractor shall be responsible for transporting the water.
- G. It shall be the contractor's responsibility to provide traffic control and required by the particular location and/or jurisdiction.
- H. Use approved equipment designed, recommended and/or manufactured by the material supplier specifically for the application of all materials.
- I. Examine surface to receive coating. Notify Owners in writing if surfaces are not acceptable for coating.
- J. Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE, and SSPC standards and the UME (Urethane-Modified-Epoxy) hybrid epoxy system manufacturer's recommendations.
- K. Products are to be kept dry, in a climate controlled environment, protected from weather and stored under cover.
- L. Products are to be stored and handled according to their material safety data sheets.

2.02 CLEANING AND PREPARATION

- A. The surfaces to be rehabilitated and lined shall be thoroughly cleaned and made free of all foreign materials including dirt, grit, roots, grease, sludge and all debris or material that may be attached to the wall or bottom of the station.
- B. Surface preparation must achieve clean and sound concrete in accordance with SSPC-SP13/NACE No. 6 "Surface Preparation of Concrete." High pressure water cleaning or jetting, and/or pre-approved abrasive blasting may be necessary in order to achieve acceptable surface preparation free of all foreign material, laitance, oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, and/or other contaminants.
- C. When grease and oil are present within the structure, an approved detergent or degreaser may be used integrally with the high pressure cleaning water.
- D. All materials resulting from the cleaning shall be caught at the base of station and removed prior to applying specified coatings.
- E. All loose or defective brick, grout, ledges, steps and protruding ledges shall be removed to provide an even surface prior to application of coating.

2.03 SEAL ACTIVE LEAKS

- A. Stop active leaks with patching material or infiltration control materials applied according to manufacturer's recommendations.
- B. Materials
 - 1. Hydraulic cement
 - (a) Quick setting, hydraulic cement compound designed for minor patching, and as a leak stopper and water plug, which instantly stops running water and/or seepage through concrete.
 - 2. Chemical grout
 - (a) Chemical grout material used for grouting active leaks shall be hydrophobic polyurethane or prior approved equal. Mixing and handling of all the chemical grout materials shall be in strict accordance with manufacturer's recommendations. Application of materials shall be by injection method only.

C. Execution

1. When leaks are not readily identifiable upon cleaning operation use blower to dry interior for positive identification of leaks and weep areas.
2. Infiltration control material shall be a rapid product specifically formulated for leak control to stop minor water infiltration and making repairs in concrete and brick structures, mixed and applied according to manufacturer's recommendations.
3. Hydraulic cement
 - (a) The work consists of hand applying a dry quick-setting cementitious mix designed to instantly stop running water or seepage in all types of concrete and concrete structures. The certified applicator shall apply material in accordance with manufacturers' recommendations.
 - (b) The area to be repaired must be clean and free of all debris.
 - (c) Proper applications should not require any special mixing of product or special curing requirements after application.
4. Chemical grout
 - (a) While being injected, the chemical sealant must be able to react/perform in the presence of water.
 - (b) The cured material must withstand submergence in water, without degradation.
 - (c) The resultant sealant (grout) formation must be impervious to water penetration.
 - (d) The final sealant must withstand freeze-thaw and wet-dry cycles without causing adverse changes to the sealant.
 - (e) The final sealant formation must not be biodegradable.
 - (f) Chemical grouting material final cure must not exceed one (1) hour.
 - (g) Chemical grouting material must be compatible to other specified top and repair coating material and the final topcoat UME (Urethane-Modified-Epoxy) hybrid epoxy system. Any grouting material used, must be approved by the UME (Urethane-Modified-Epoxy) hybrid epoxy system manufacturer.

- (h) All excess chemical grout must be removed from the surface via mechanical grinding means and top patched with Hydraulic cement.

2.04 CONCRETE CONDITIONING, FILLING AND REPAIR

A. Concrete conditioning, filling and repair shall be performed to minimize the occurrence of outgassing and pin-holing. In addition, filling and repairs will be performed to remedy any deep spalls, voids, gaps, holes, or defects from form release, damage, impact, and other compromises.

B. Materials

1. Conditioners/Primers

- (a) To assist with the occurrence of outgassing. A manufacturer recommended concrete conditioner/primer may be utilized.
- (b) The material must set to cure within a 24 hour window to allow for coating.
- (c) The material must be a penetrating, epoxy-based conditioning coating, and/or a high density cementitious-based material designed to reduce out-gassing and provide a compatible base coat to assist with porous and pinhole resulting substrates.

2. Filling and repair

- (a) The material is epoxy filler and patching material to fill in bug holes, spalled concrete, smooth deteriorated concrete surfaces.
 - (1) Material must be epoxy based.
 - (2) Material must have excellent moisture tolerance, adhere to wet concrete and cure submerged in water.
 - (3) Material must be able to be a stand-alone system in the event that limitations of certain environments prevent the ability to topcoat. Therefore, filler and patching material must be able to withstand wastewater environments with similar chemical resistance expected of an epoxy structural topcoat.
 - (4) Filler and patching material must be compatible to other specified repair coating material and the final topcoat structural epoxy coating.

- (5) Specified material(s) are listed below, or prior approved equal (see Section 1.4 C):

Epoxytec CPP Gel (#C311) by Epoxytec International, Inc.

Tel. - 1 (877) GO EPOXY

Fax - 1 (954) 961-2395

- (b) Concrete conditioning, filling and repair materials shall be in conformity to coating manufacturer recommendations.

C. Execution

1. Conditioners/Primers

- (a) The material thickness for conditioning the concrete in order to reduce the occurrence of outgassing will depend on the material recommended for the specific condition of the surface. Refer to manufacturer's published data for the material selected and recommended.

2. Filling and repair

- (a) Thickness is determined based on filling and patching voids to bridge sharps peaks and irregularities resulting from deteriorated concrete, spalls, cracks, bug holes in order to achieve an acceptable profile for the UME (Urethane-Modified-Epoxy) hybrid epoxy system to be applied. Use putty knife, spatulas and other trowel-applied tools as needed. Refer to manufacturer's published data for application specifics.

2.05 COATING/LINING

A. General

1. It is the intent of this specification to provide for the waterproofing and sealed corrosion protection of wet wells and similar underground structures by the safe, quick and economical application of a coating/lining system incorporating a 100% solids UME hybrid.

B. Materials

1. The UME hybrid epoxy coating system must be a hybrid epoxy exhibiting the following features:
- (a) The hybrid epoxy coating must be a urethane-modified-epoxy (UME).

- (b) The hybrid epoxy coating must be self-priming, requiring no primer.
- (c) The hybrid epoxy coating must adhere to concrete with adhesion testing results in PSI that outperformed the cohesion of concrete (CIGMAT CT-2/3).
- (d) Hybrid epoxy coating must be moisture tolerant to moisture levels of concrete up to 90%.
- (e) The hybrid epoxy coating must be able to react/perform in the presence of water.
- (f) The hybrid epoxy coating must withstand freeze-thaw and wet-dry cycles without causing adverse changes to the cure and performance properties.
- (g) The hybrid epoxy coating must be able to be applied by brush, roller, or spray in order to have options in mobilization requirement and apply in limited access areas.
- (h) The hybrid epoxy coating must hang with vertical and overhead thickness capability of 60 mils in one pass without sag.
- (i) The hybrid epoxy coating must have an indefinite recoat window without preparation for simple repair requirements.
- (j) The hybrid epoxy coating shall be resistant to all forms of chemical or bacteriological attack found in municipal sanitary sewer systems, including severe hydrogen sulfide (up to 600ppm).
- (k) The hybrid epoxy coating must have undergone testing and verified by the University of Houston's CIGMAT program for verification of technology exposed to underground sanitary sewer environments.
- (l) The hybrid epoxy coating must be a modified epoxy (epoxide) coating system exhibiting elongation (ASTM D2370) of 30% (minimum) to 40% (maximum) to ensure properties which withstand movement, vibration, and access induced mechanical impact.

2. Approved material shall exhibit the following physical properties:

- (a) Type hybrid, urethane-modified-epoxy
- (b) Solids by Volume ASTM D2697 100%
- (c) Solvent (VOC) ASTM D3960 none

- (d) Adhesion Strength (concrete, dry) CIGMAT CT-2/3 substrate failure
- (e) Adhesion Strength (brick, wet) CIGMAT CT-2/3 substrate failure
- (f) Adhesion Strength (steel) ASTM D4541 1,500+ psi
- (g) Water Absorption ASTM D1653 < 0.1 g/sq.m.
- (h) Acid Exposure (pH 1, H2SO4) CIGMAT CT-1 passed
- (i) Tensile Strength ASTM D638 5,500+ psi
- (j) Flexural Modulus ASTM D790 55,000+ psi
- (k) Flexural Strength ASTM D790 8,000+ psi
- (l) Compressive Strength ASTM D695 7,000+ psi
- (m) Elongation ASTM D2370 30-40%
- (n) Complete Cure 18 hours (77F)

3. Specified material(s) are listed below, or prior approved equal (see Section 1.4 C):

EpoxytecUroflex (#UME38) by Epoxytec International, Inc.

Tel. - 1 (877) GO EPOXY

Fax – 1 (954) 961-2395

C. Execution

1. Examination

- (a) All structures to be coated shall be readily accessible to the Applicator.
- (b) Appropriate actions shall be taken to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety.
- (c) Any active flows shall be dammed, plugged or bypassed as required to ensure that the liquid flow is maintained below the surfaces to be coated and that concrete to be coated has not reached moisture levels surpassing 90%. All extraneous flows into the structures at or above the area coated shall be plugged and/or diverted until the UME (Urethane-Modified-Epoxy) hybrid epoxy system has set hard to the touch.

- (d) Temperature of the surface to be coated must be maintained between 65F and 110F during application. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Specified surfaces should be shielded to avoid exposure of direct sunlight or other intense heat source. Where varying surface temperatures do exist, coating installation should be scheduled when the temperature is falling versus rising.
- (e) New Portland cement concrete structures shall have endured a minimum of 28 days since installation, prior commencing the conditioning, filling and repair, and coating installation.
- (f) Prior to commencing surface preparation, Contractor shall inspect all surfaces specified to receive the coating and notify Owner, of any noticeable disparity in the site, structure or surfaces which may interfere with the work, use of materials or procedures as specified herein.
- (g) Allow at least 24 hours (77F) for all repair, filling, patching, and conditioning materials to cure prior to coating, unless otherwise stated by the manufacturer.

2. Hybrid epoxy coating

- (a) If spraying, the spray equipment shall be specifically designed to accurately ratio and apply the specified hybrid epoxy coating materials and shall be regularly maintained and in proper working order.
- (b) Top coating or additional coats of the hybrid epoxy coating should occur as soon as the prior coat becomes tacky to tack-free, but no later than the recoat window for the specified material(s). Additional surface preparation procedures will be required if this recoat window is exceeded.
- (c) Follow all published and manufacturer recommended application methods. Properly mix and apply materials to all specified surfaces.
- (d) Material thickness
 - (1) For exterior buried conditions, the application shall cover all specified surfaces to a minimum DFT of 24-30 mils.
 - (2) As an interior liner, the application shall cover all specified surfaces to a minimum DFT of 40 mils.

2.06 QUALITY ASSURANCE AND ACCEPTANCE

- A. Surface preparation inspection must take place prior to proceeding to material applications. Applicator must record pH level, record psi level of water pressure and/or abrasive media type, and ICRI conditions and submit to coating manufacturer's representative or designated inspector.
- B. During application, Applicator shall regularly perform and record epoxy coating thickness readings with a wet film thickness gage, such as those meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, to ensure uniform thickness during application or other similar measuring probe.
- C. Applicator shall perform holiday detection on all surfaces coated with the UME epoxy coating in the presence of the coating manufacturer's representative or designated inspector. After the UME epoxy coating has set hard to the touch, surfaces shall first be dried. An induced holiday shall then be made onto the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied but may be adjusted as necessary to detect the induced holiday (refer to NACE RPO188-99). All detected holidays shall be marked by the coating manufacturer's approved marking methods and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional epoxy coating material can be hand applied to the repair area. All touch-up/repair procedures shall follow the coating manufacturer's recommendations.
- D. A final visual inspection shall be made by the Applicator, coating manufacturer's representative or designated inspector. Any deficiencies in the finished coating shall be marked and repaired by Applicator according to the procedures set forth herein.

END OF SECTION



DIVISION 10

NOT USED



DIVISION 11

EQUIPMENT

SECTION 11305

FLOW METER AND APPURTENANCES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide and test flow meter and appurtenances as indicated and specified.

1.02 REFERENCES

- A. ANSI: American National Standards Institute.
 - 1. ANSI/ASME B16.5 / 16.47 series B Class 150
- B. Hydraulic Institute, Current Edition.
- C. NEMA: National Electrical Manufacturer's Association.

1.03 SYSTEM DESCRIPTION

- A. A wide range of features and user benefits are built into WaterMaster as standard:
 - 1. bi-directional flow
 - 2. self-calibrating transmitter
 - 3. continuous self-checking, with alarms, ensures both sensor and transmitter accuracy
 - 4. true electrode and coil impedance measurement
 - 5. comprehensive simulation mode
 - 6. universal switch-mode power supply (options are available for AC and DC supplies)
 - 7. comprehensive self-diagnostics compliant with NAMUR NE107
 - 8. programmable multiple-alarm capability
 - 9. bus options: HART (4 to 20 mA), PROFIBUS DP (RS485), MODBUS (RS485)
 - 10. configurable pulse / frequency and alarm outputs

11. advanced infrared service port supports remote HMI, HART, cyclic data out and parameter download
12. read-only switch and ultra-secure service password for total security

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01300 - Submittals:

1. Certified shop and erection drawings.
 - a. Electronic files shall conform to the following minimum requirements:
 - (1) Electronic Files: AutoCAD latest version, drawn to scale.
 - (2) Submit electronic files as part of the Shop Drawing submittal.
 - (3) Submit electronic files.
 - (4) Drawings shall include plan views, sectional views, title block, Tag Numbers, serial numbers, Parts List (identifying each component), dimensions, connection sizes and types and all details of all related items. In cases where certain information is proprietary and is omitted, provided a statement indicating that the information is proprietary and is being omitted.
 - b. Drawings shall be in conformance with all other requirements as specified in this specification.
 - c. Drawings of equipment shall be to scale.
2. Data, regarding flow meter characteristics and performance:
 - a. Prior to fabrication and testing, provide manufacturer's guaranteed performance based on actual shop tests of mechanically duplicate flow meters, showing they meet indicated and specified requirements.
 - b. Results of certified performance and witness tests as specified.
3. Shop drawing data for accessory items.
4. Certified setting plans, with tolerances, for anchor bolts.
5. Manufacturer's literature as needed to supplement certified data.
6. Operating and maintenance instructions and parts lists.

7. Listing of reference installations as specified with contact names and telephone numbers.
8. Certified results of hydrostatic testing.
9. List of recommended spare parts other than those specified.
10. Shop and field inspection reports.
11. Recommendations for short and long-term storage.
12. Shop and field testing procedures, equipment to be used and ANSI/HI testing tolerances to be followed.
13. Field testing procedures, equipment to be used and calibration certificates. Submit a minimum of 2 weeks prior to field testing.
14. Special tools.
15. Schematic control and power wiring diagrams.
16. Manufacturer's product data, specifications and color charts for shop painting.
17. Provide a listing of the materials recommended for each service specified and indicated. Provide documentation showing compatibility with process fluid and service specified and indicated.
18. The latest ISO 9001 certification.
19. Material Certification:
 - a. Provide certification from the equipment manufacturer that the materials of construction specified are recommended and suitable for the service conditions specified and indicated. If materials other than those specified are proposed based on incompatibility with the service conditions, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated including an installation list of a minimum of five (5) installations in operation for a minimum of five (5) years. Provide proposed materials at no additional cost to the Owner.
 - b. Where materials are not specified, provide technical data and certification that the proposed materials are recommended and suitable for the service conditions specified and indicated.

- B. A copy of the contract mechanical process, electrical and instrumentation drawings, with addenda that are applicable to the equipment specified in this section, marked to show all changes necessary for the equipment proposed for this specification section. If no changes are required, mark all drawings with “No changes required” or provide a statement that no changes are required.
 - 1. Failure to include all drawings or a statement applicable to the equipment specified in this section will result in submittal return without review until a complete package is submitted.
- C. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked and indexed to indicate specification compliance or marked to indicate requested deviations and clarifications from the specified requirements.
 - 1. If deviations and clarifications from the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
 - 2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in submittal return without review until marked up specifications and justifications are submitted in a complete package.

1.05 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified herein.
- B. Flow meters shall be manufacturer’s standard cataloged product and modified to provide compliance with the drawings, specifications and the service conditions specified and indicated.
- C. Shop tests as specified.
- D. The Contractor shall obtain the flow meter and appurtenances from the flow meter manufacturer, as a complete and integrated package to insure proper coordination and compatibility and operation of the system.
- E. Services of Manufacturer's Representative as stated in Section 01600 and as specified herein.

1.06 DELIVERY, STORAGE AND HANDLING:

- A. Provide in accordance with Section 01600 and as specified herein.
- B. Shipping:
 - 1. Ship equipment, material and spare parts complete except where partial

disassembly is required by transportation regulations or for protection of components.

2. Pack spare parts in containers bearing labels clearly designating contents and pieces of equipment for which intended.
3. The Contractor shall obtain spare parts from the manufacturer at the same time as pertaining equipment. The Contractor shall maintain possession of spare parts until Substantial Completion at which time, spare parts shall be turned over to the Owner.

C. Receiving:

1. Inspect and inventory items upon delivery to site.
2. Store and safeguard equipment, material and spare parts in accordance with manufacturers written recommendations and instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

- A. ABB WaterMaster DN150 Electromagnetic Flow Meter
- B. The naming of a manufacturer in this specification is not an indication that the manufacturer's standard equipment is acceptable in lieu of the specified component features. Naming is only an indication that the manufacturer may have the capability of engineering and supplying the equipment as specified.
- C. The materials and equipment covered by this specification are intended to be standard materials and equipment of proven ability as manufactured by reputable concerns. Equipment shall be installed in accordance with the manufacturer's recommendations and the Contract Documents. The specifications call attention to certain features but do not purport to cover all details entering into the construction of the equipment.

2.02 FLOW METER CONSTRUCTION:

- A. WaterMaster sensors have a rugged, robust construction to ensure a long, maintenance-free life under the arduous conditions experienced in the Water and Waste Industry. The sensors are, as standard, inherently submersible (IP68, NEMA 6P), thus ensuring suitability for installation in chambers and metering pits that are susceptible to flooding. A unique feature of the WaterMaster sensors is that sizes DN40 to DN2400 (1 1/2 to 96 in. NB) are buriable; installation simply involves excavating to the underground pipe, fitting the sensor, cabling back to the transmitter and then backfilling the hole.

2.03 ACCESS COVERS AND FRAMES:

- A. Precast manhole tops shall terminate at such elevations to permit laying brick courses (minimum 3 courses to 4 courses maximum) or providing HDPE adjustment rings (minimum 5-inches to 10-inches maximum) under the manhole frame to make allowance for future street grade adjustments. The manhole top should be flush with final grade elevations to eliminate the potential of infiltration. In addition, the manhole top shall not exceed final grade elevations.
- B. Frames and covers shall be set accurately to conform to the finished grade.

2.04 HARDWARE:

- A. Provide Type 316 stainless steel.

2.05 CONTROL SYSTEM:

- A. Instrumentation and Control:
 - 1. Integrate flow meter into control systems and configuration devices using any Frame application.
 - 2. Connect all devices to a bus structure ('line') as shown in the electrical drawings. Up to 32 stations (master or slaves) can be linked to create one 'segment', although it is recommended not to install more than 16 devices on a single segment. Each end of a segment must be terminated by an active bus terminating resistor. Both bus terminators must always be powered to ensure fault-free operation, therefore it is strongly recommended that they are connected to a back-up power supply. The use of bus amplifiers (repeaters) and segment couplers can be used to extend the network.

2.06 SHOP TESTING:

- A. Transmitter vibration testing
- B. Vibration level: 7 m/s²
- C. Frequency range: 20 to 150 Hz
- D. No. of sweeps in 3 orthogonal planes: 20
- E. Undetectable shift in transmitter span or zero performance

2.07 SHOP PAINTING:

- A. Primer and Finish Paint: Shop apply to all exterior ferrous surfaces, high solids epoxy conforming to the following requirements:
1. Solids by Volume: Minimum 69% (percent +2).
 2. Type: Polyamidoamine epoxy, self priming.
 3. Dry Film Thickness: 4 to 6 mils per coat.
 4. No. of Coats required: Three.
 5. V.O.C Requirement: 2.75 lbs/gallon maximum.
 6. Conform to AWWA D102 Inside systems No. 1 and No. 2.
 7. Certified in accordance with ANSI/NSF Std 61 including thinners.
 8. Color: As specified for piping system of same service or as selected by the Engineer.
- B. Surface preparation, mixing and application and safety requirements shall be in accordance with the paint manufacturer's printed instructions and as specified.
1. SSPC-SP-10: Near-white blast cleaning for immersion service.
 2. SSPC-SP-6: Commercial blast cleaning for non-immersion service.
- C. Ferrous surfaces which are not to be painted shall be given a shop applied coat of grease or rust resistant coating.
- D. Provide additional shop paint coating for touch-up to all surfaces after installation and testing is completed and equipment accepted.

2.08 SPARE PARTS:

- A. Provide in accordance with Section 01600 and as specified herein.
- B. Provide spare parts that are identical to and interchangeable with similar parts installed.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Install all items in accordance with manufacturer's printed instructions, as indicated, specified and approved shop drawings.

3.02 FIELD TESTING:

- A. Adjust secondary functions such as alarm actuations during initial calibration and demonstrated after system is placed in service.
- B. Conduct process calibration on all measuring systems. Document for records and submit to Engineer.

3.03 FIELD TOUCH-UP PAINTING:

- A. After installation and approved testing by the Engineer, apply touch-up paint to all scratched, abraded and damaged shop painted surfaces. Coating type and color shall match shop painting.

3.04 CONTRACT CLOSEOUT:

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 11312

COLLECTION SYSTEM BYPASS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The work covered by this Section consists of providing all temporary bypassing to perform all operations in connection with the flow of wastewater around pipe segment(s) 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 and will be based on phased construction, as necessary. In addition, noise attenuation, maintenance, MOT and permitting for bypass pumping operations will be required at no additional cost to the City.

PART 2- PRODUCTS

2.01 GENERAL

- A. The Contractor shall provide and maintain adequate equipment, piping, bypassing, tankers and other necessary facilities and 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, linestops with bypass piping as needed, backup generators, plugs, 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.

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, accessways, and alleys. This requirement may necessitate temporary trenching or bypass ramps. Ingress and egress to adjacent properties shall be maintained at all times. Ramps, steel plates or other methods shall be deployed by the Contractor to facilitate traffic over the bypass or surface piping. High traffic commercial properties may require alternate methods. The Contractor is required to provide maintenance of traffic (MOT) for all bypass piping operations including, but not limited to, permitting, approvals, fees and phased construction at no additional cost to the City.

3.03 BYPASS PLAN

- A. The Contractor shall submit a comprehensive written plan according to the submittal specifications, 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 for each pump station or line segments around which flows are being bypassed. The plan shall include any proposed tankers, pumps, bypass piping, backup plan and equipment, linestops and bypass piping, ramps, work schedule, phasing, monitoring log for bypass pumping, noise attenuation, monitoring plan of the bypass pumping operation and maintenance of traffic 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.

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 notify City operations 72 hours prior to commencement of bypassing and to allow time for coordination as necessary. 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 workdays (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 appurtenances to accomplish the bypass and for any and all damage that results directly or indirectly from the bypass pumping equipment, piping and/or appurtenances. 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



DIVISION 12

NOT USED



DIVISION 13

SPECIAL CONSTRUCTION

SECTION 13300

UTILITY CONTROL INSTRUMENTATION SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide and test the instrumentation and control system, furnished by a single System Supplier / Integrator (instrumentation subcontractor). Provide fabrication of control panel, RTU panel, antenna tower, and antenna and antenna cable, equipment, installation, programming and other services, and appurtenances required to achieve a complete, integrated, and fully operational system for control and data transmission to the Division Control Center (DCC).
1. The system supplier/ integrator shall fabricate the UL labeled RTU panel including PLC, radio, power supply, AC-UPS, battery, surge suppressors for all analog signals entering the RTU, terminal blocks and other equipment required for a complete operating system to communicate between the control panel and the Division Control Center.
 2. The system supplier/ integrator shall fabricate the UL 698A and UL508A labeled Control Panel (CP) incorporating monitoring panels or relays as provided by manufacturers and other equipment as specified and shown on the drawings.
 3. Provide programming of the PLC as specified and shown on the drawings.
 4. Prepare a radio feasibility study report (OR TEST) to determine the height for mounting the antenna and to determine the proposed location that will allow communication with the DCC.
 5. Provide antenna tower base and tower, erection of tower, antenna and cable for a complete and operating installation.
- B. The system supplier/ integrator (instrumentation subcontractor) for this project is limited to:
1. Curry Controls of Lakeland, Florida, or
 2. CC Control Corp. of West Palm Beach, Florida
- C. Furnish full technical details of all instrumentation offered.
- D. The Supplier of this specification shall be responsible for the coordination of all other equipment furnished in this contract with overall control system requirements.

1.02 RELATED WORK

- A. Division 11: Equipment
- B. Division 16: Refer to applicable sections of electrical for conduit and wiring between panels and field-mounted devices to be furnished and installed.
 - 1. 16900: Electrical Controls and Miscellaneous Electrical Equipment

1.03 REFERENCES

- A. Underwriter's Laboratories, Inc. (U.L.):
 - 1. UL 508A - Standard for Safety Industrial Control Panels
 - 2. UL 698A - Standard for Safety Industrial Control Panels Relating to Hazardous (Classified) Locations
- B. National Electrical Manufacturers Association (NEMA):
 - 1. ICS 1: Industrial Control and Systems General Requirements
 - 2. ICS 2: Industrial Controls and Systems Controllers, Contactors, and Overload Relays Rated 600 Volts.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA-70 National Electrical Code (NEC).
- D. The Instrumentation, Systems, and Automation Society (ISA)
 - 1. ISA-5.2: Binary Logic Diagrams for Process Operations
 - 2. ISA-5.4: Instrument Loop Diagrams

1.04 SYSTEM DESCRIPTION

- A. Equipment, cabinets and other devices furnished hereunder shall be suitable for continuous use in the intended application. The system shall consist of current production products of a single manufacturer wherever possible. Equipment shall be of a design that allows field maintenance and modification.
- B. Terminations:
 - 1. Provide terminations for all inputs and outputs of the PLC in the RTU panel, and for all field wiring between panels and from the CP to field.

2. Provide 4-20mADC signal wiring separated from digital inputs and outputs and power.
 3. Provide continuous conductor from field for all signal wiring.
 4. Provide terminal strips numbered with the signal termination numbers as indicated on the shop drawings. Provide wire numbers on wires at terminal blocks and all connections.
 5. Terminal numbers shall be sequential on the terminal blocks. Provide 10 percent spare terminal blocks for each type of signal.
 6. Partition intrinsically safe wiring separately from all other wiring. Provide a protective cover with labeling to cover the intrinsically safe wires.
- C. Run grounding wires with special care to provide the least possible resistance.
- D. Provide electronic equipment of the manufacturer's latest design and coated to prevent its contamination by dust, moisture, or fungus. Provide field mounted equipment and system components suitable for dusty, humid, corrosive, and hazardous classified conditions specific to the installation location.
- E. Design all instrumentation equipment to operate on 120Vac, +/-10%, at 60Hz, except as specifically noted.
- F. Provide electronic type solid-state instrumentation utilizing linear transmission signals of 4-20mADC, (milliampere direct current), except as specifically noted. Instruments within the same panel or enclosure may be operated by 1-5 Vdc, (volts direct current), provided it is derived from a 4- 20mADC signal.
- G. Provide 4-20mADC outputs capable of driving a 750-ohm load from all transmitters, controllers, and signal processing devices. Inputs to controllers, recorders, indicators, signal processing devices shall be 4-20mADC, or 1 to 5 Vdc derived from a precision 250-ohm resistor in series with the signal loop.
- H. Convert nonstandard signals into compatible standard signals at their source. Zero based signals are not acceptable.
- I. Number wiring in accordance with the numbering system used on the instrument submittal drawings.
- J. Group wiring within the panel according to function, and harness together, or place within ducts and secure to the panel structure.
- K. Equipment installed in designated hazardous areas shall meet Class, Group, and Division as shown on the Contract Electrical Drawings, to comply with the National Electrical Code.

- L. Provide each instrument with mounting hardware, floor-stand, wall bracket, or instrument rack as shown on the drawings or in manufacturers installation instructions and as approved in the submittals or as required.
- M. Design the system and equipment used therein, to resume normal operation without manual intervention, following resumption of power after a power failure.
- N. Provide UL listed or labeled materials and equipment.

1.05 SUBMITTALS

- A. Submit the following in accordance with Section 01300:
 - 1. Submittals shall be bound in Cardinal, Wilson Jones, National, or equal, 8-1/2 x 11 inch three-D-ring binders with hardback; two-inch maximum ring size. If multiple binders are used, correlate data into related consistent groupings. All drawings shall be provided with reinforced punched binder tabs.
 - 2. Instrument Submittals:
 - a. Sales bulletins and other general publications are not acceptable as submittals except where necessary to provide supplemental technical data.
 - b. Submit six sets each of:
 - (1) Component manufacturing data sheets indicating pertinent data and identifying each component by tag number and nomenclature as indicated on drawings and in specifications.
 - (2) System piping schematic and wiring schematic each on single drawing with full description of operation (component identification on schematic as indicated in part a. above).
 - (3) Component drawing showing dimensions, mounting, and external connection details.
 - (4) Provide instrument loop diagrams in accordance with ISA-5.4. Identify range of all analog devices. Identify all termination cabinet and panel terminal numbers. Show all loops in their entirety including control wiring within the Control Panel (CP) and between all field devices including those devices furnished under other Divisions. Clearly identify which selector switch contacts are closed in each selector switch position. Identify normally open or normally closed status for all relay and switch contacts. Assign each wire a unique wire number. Show all power sources, grounding, isolation and lightning protection. Show both analog and discrete signals on a single loop diagram.

Show where the analog signal ground shield shall be cut and taped. Submit loop diagrams on 11 inches by 17-inch sheets. The loop diagrams shall be bound in a 3-ring 11 inch by 17-inch binder. The loop diagrams shall be sequential by facility and loop number. The title shall include the facility and loop number. Submittals which are not properly ordered will not be reviewed.

- (5) Front and interior panel layout and any other panel surface containing instrumentation.
 - (6) List of all spare parts. All manufacturer recommended spare parts shall be supplied in addition to specified spare parts.
 - (7) Loop/equipment protective devices as required, and their proposed application.
 - (8) Shop test plan and results specified in paragraphs 2.08 and 3.02.
- c. Identify any specification section where exceptions are being taken or an "or equal" piece of hardware is being proposed.
 - d. Any changes or modifications to previously submitted materials shall be resubmitted prior to installation.
3. Radio Tower Submittals:
 - a. Submit signed and sealed tower base drawings.
 4. Panel Test Forms:
 - a. Factory test procedure see 3.02.
 - b. Field acceptance test see 3.04.
 5. Operation and Maintenance Manuals:
 - a. Submit operating and maintenance instructions and separate parts lists separately from instrumentation submittal. Incorporate functional description of entire system.
 - b. Submittal shall include the following:
 - (1) Data sheet describing each element in detail, including manufacturer, part number, calibration values, and all information pertaining to the element. Include brief description of each device.

- (2) Manufacturer specification sheets for each element. All specification sheets shall be properly annotated.
 - (3) Complete spare parts list.
 - (4) Submittal shall be in the same form as the Instrumentation Submittal.
 - (5) All information shall be in one submittal.
6. Submit "record copy" of all drawings previously submitted for review within 30 days after completion of system installation as part of operating and maintenance instructions. Show all changes and modifications made during installation. Define special maintenance requirements particular to system along with special calibration and test procedures.
 7. Submit brief description of calibration procedures listing actual calibration and test equipment. Include typical calibration sheet and description of loop check procedures, provide typical loop check sheet.
 8. Provide manufacturer's certified statement of installation approval containing authorization to energize system.
 9. Provide an electronic version of the final O&M manual. All drawings in the manual shall be provided in AutoCAD as well as pdf formats.
 - a. Electronic files shall conform to the following minimum requirements:
 - (1) Electronic Files: AutoCAD R2012 or higher, drawn to scale.
 - b. Submit electronic files on CD or DVD.
- B. A copy of this specification section with addenda and all referenced specification sections with addenda, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations and clarifications from the specified requirements.
1. If deviations and clarifications from the specifications are indicated, therefore requested by the Contractor, provide a detailed written justification for each deviation and clarification.
 2. Failure to include a copy of the marked-up specification sections and or the detailed justifications for any requested deviation or clarification will result in rejection of the entire submittal with no further review and consideration.

1.06 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.

- B. Instrumentation shall be furnished complete by one manufacturer.
- C. Work of system manufacturer's service personnel coordinated by Contractor.
- D. Substitutions on functions specified will not be allowed. To assure interchangeability of parts, maintenance of quality, and ease of interfacing the various subsystems, strict compliance with the specifications shall be maintained.
- E. The Contractor shall have system supplier coordinate with mechanical and electrical systems suppliers to identify any signal isolation, signal boosting devices or auxiliary relays that may be required to complete the system.
- F. Provide auxiliary devices for proper operation, such as transducers, relays, current/current isolators, and signal boosters for interfacing with equipment provided under this and other sections of this specification.
- G. Upon completion of installation, provide competent service personnel for a period of not less than one (1) 8-hour day per station, excluding travel time, for field check-out of the System in the presence of the Owner, for calibration and start-up of equipment. Include one additional service call of one (1), 8-hour working day for use within the first year's operation.
- H. Upon completion of the start-up, provide competent training personnel for a period of not less than one (1) 8-hour working day, excluding travel time, for training of personnel in the use, operation and maintenance of the instrumentation and control system. Training to utilize the submitted operation and maintenance manuals and record copy drawings as reference materials. Training to be for four (4) personnel in each class. Each class to be of four (4) hour duration.
- I. Instrument Calibration: Calibrate electronic and pneumatic test equipment within 6 months prior to use. Accuracies of test equipment shall be traceable to Bureau of Standards.
- J. Instrumentation accuracy shall be in accordance with manufacturer's standard, unless otherwise stated herein.
- K. Calibrate all instrumentation in the presence of the Owner. Provide calibration tag to all calibrated instruments. The calibration tag shall have the name and phone number of the supplier/integrator who performed the calibrations with the date of calibration and the date of the next calibration. The tag shall be signed by the individual that performed the calibration. Linkage or range adjustments sealed by colored lacquer immediately following calibration. Provide calibration records to the Engineer prior to substantial completion.
- L. System energizing not allowed prior to receipt of certified statement from Contractor and supplier approving system and authorizing energizing of system. Exception, system supplier's representative.

- M. Protect materials and equipment against damage in storage and during construction.
- N. Replace damaged materials or equipment as determined by the Engineer at no additional cost to the Owner.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Provide in accordance with Section 01600 and as specified.
- B. Packing and Labeling:
 - 1. Prior to shipment, each component shall be tagged to identify the lift station location, tag number, and system function. Identification shall be prominently displayed on the outside of the package.
 - 2. Firmly attach permanent stainless-steel, or other durable non-corrosive tag to the equipment. Mark tags with the instrument tag number shown in the Instrumentation Data Sheets and/or Instrument Drawings.
- C. Delivery:
 - 1. Following completion of shop assembly, factory test, and approval of all equipment by the Engineer, the panels, cabinets, and consoles and equipment shall be shipped. Provide protection for equipment from handling and the environment.
 - 2. Provide the packed weights conspicuously shown, and instructions for unloading, transporting, storing, and handling at the jobsite.
 - 3. Deliver spare parts at same time as pertaining equipment. Deliver to Owner after completion of work.
- D. Storage:
 - 1. The equipment shall not be stored outdoors. Equipment, including in-line equipment, shall be stored in dry permanent shelters, and shall be protected against mechanical damage. Any damaged equipment shall be replaced by the Contractor at his own expense.
- E. Handling:
 - 1. Install in accordance with manufacturer's printed instructions, locate as shown on the drawings, and as approved by the Engineer.

PART 2 - PRODUCTS

2.01 NEW PRODUCTS

A. Remote Terminal Unit (RTU)

1. Provide a new RTU enclosure similar to the panel shown in the drawings and as specified in 2.06 below and in Section 16900.

B. Ultrasonic Level Transmitter

1. Provide Pulsar Ultra 3 Series - NEMA 4X IP65 enclosure for inside panel mount, 115VAC power supply, 4-20ma DC output, intrinsically safe.
2. Provide transducer dB10 for 1 to 15 Ft measurement range, approved for operation in Class 1, Division 1, Groups C and D area.

C. Level Switch (Float Type)

1. Provide Anchor Scientific Roto-Floats.

D. Control Panel (CP)

1. Provide a control panel as specified below and in Sections 11304 and 16900.

E. Radio Antenna

1. Provide MDS Yagi Antenna.
2. Provide Times Microwave Systems or Andrew heliax antenna cable with lightning and surge protection to connect the antenna to the radio. Surge protection shall be similar to listed and meet requirements of UL 497E. Polyphaser IS-50NX-C2 shall be similar to listed and meet requirements of UL 497E.
3. Provide a connector / splice weatherproofing kit for the connector at the antenna, and where antenna cable leaves the conduit at the base of the antenna tower.
4. Provide grounding of the antenna mast and the coaxial cable to the grounding electrode.
5. Provide antenna tower base section and tower (height as required). Tower shall be Rohn or equal.

2.02 GENERAL

A. Instrumentation

1. Provide 4–20mADC signal wiring separated from digital inputs and outputs.
2. Provide terminal strips numbered with the signal termination number plus additional characters to identify each individual conductor.
 - a. Analog inputs and outputs: Provide the character + appended to the terminal number for the positive signal wire. Provide the character – appended to the terminal number for the negative signal wire. Provide the character S appended to the terminal number for the signal shield.
 - b. Digital inputs: Provide the character C appended to the terminal number for the unpowered (common) conductor. For inputs identified as having a CONTACT TYPE of OPEN, provide the character NC appended to the terminal number for the conductor to be powered. For inputs identified as having a CONTACT TYPE of CLOSED, provide the character NO appended to the terminal number for the conductor to be powered.
 - c. Digital outputs: Digital outputs have 1 to 4 contacts per signal point. Provide the character C appended to the common terminal for single contact outputs. Provide the character C followed by a number 1 thru 4 appended to the common terminal for each contact output of multiple contact outputs. Provide the character P appended to the powered terminal for single contact outputs. Provide the character P followed by a number 1 thru 4 appended to the powered terminal for each contact output of multiple contact outputs.
3. Terminal numbers will be sequential on the terminal blocks.
4. Provide terminals for all spare conductors of cables in conduits which are run to the termination cabinet. Locate terminals for spare shielded wires immediately below the last analog output terminals. Locate terminals for spare nonshielded wires immediately below the last digital output terminals. Provide an additional 10% spare terminal blocks of each type of signal.
5. I/O points are identified by type on the drawings.
 - a. AI – analog input.
 - b. AO – analog output.
 - c. DI – digital input.
 - d. DO – digital output.

6. Provide digital inputs with a contact state as shown on electrical or required for fail-safe operation. The contact state shall be identified as OPEN or CLOSED. A contact state of OPEN indicates that the input to control system is an open contact. A contact state of CLOSED input to control system is a closed contact.

2.03 COMPONENTS

- A. Provide protection to electronic devices from lightning and/or power surges induced in signal and powerlines entering and leaving the panels. The limiting-level shall not interfere with the normal operation of the system and shall be below the electronic devices' surge withstand rating. Enclose all instruments within an appropriate NEMA rated housing properly grounded to the panel in which it is mounted.
- B. Individually connect ground wires for all surge protectors to a common, good earth ground.
- C. Mount surge protectors within RTU and CP. Protectors manufactured by Edco, Joslyn, Telecommunications Industries, or Harger.
- D. Provide lightning and surge protection devices for analog transmitters. Provide devices which will protect the instrument against 10 kilo-ampere surges. The device shall provide two-stage common-mode protection by means of arrestor reactor and varistor in combination and differential mode protection by means of gas arrestor, reactor and zener diode in combination. Devices as manufactured by Edco, Telematic, Harger, or Entrelec.
- E. Where required to maintain intrinsically safe rating, passive devices designed for the purpose, shall be installed according to the equipment, or device manufacturer's printed instructions. Safety barriers shall not require any external voltage supply, and shall include series resistors and fuses, and shunting zener diodes that will limit the transfer of energy to levels classified as "intrinsically safe" by Factory-Mutual.
- F. Provide Factory-Mutual approved barriers, as manufactured by R. Stahl, Inc. or acceptable equivalent products.

2.04 FABRICATION INFORMATION

- A. Mount all panel components to allow easy access for servicing, calibration, adjustments, testing and removal, without the removal of other equipment.
- B. Provide internal panel components mounted directly on removable plates made of the same material and finish as the panel, of a thickness to provide rigid support for mounted components.
- C. Attach identification labels to all internal components. Provide nameplates attached with clear pressure sensitive tape for continuous bond equal to 3M VHB assembly tape.
- D. Unless specified otherwise, pushbuttons shall be of oil-tight, heavy-duty momentary

contact pushbuttons, rated for 10 amperes at 120 volts ac unless specified otherwise. Supply with the quantity of poles required for the application.

- E. Unless specified otherwise, rotary selector switches used for controlling 120 volts ac, shall be oil-tight, heavy-duty, maintained contact type rated for 10 amperes at 120 volts ac. Rotary switches used for low level control signals shall have gold or other precious metal contacts rated for "dry contact" duty.
- F. Provide oil-tight, heavy-duty, LED cluster type pilot lights, with average life of 40,000 hours, minimum, unless otherwise specified.
- G. Provide sealed relays DIN rail mounted with indicating light to indicate its operation. Contacts shall be rated for 10 amperes at 120 volts, ac. Life expectancy shall be 50 million operations, minimum.
- H. Provide electronic timer delay of the plug-in, digital type with output contacts rated for 10 amperes @ 120 volts ac. Life expectancy shall be 20 million operations.
- I. Provide all relays from a single manufacturer.
- J. Power and low-level signal wires shall be routed in separate wireways. Crossings of the two system's wires shall be at right angles. Parallel runs of the two system's wires shall be separated by a minimum of 12 inches.
- K. Provide 18 AWG wire minimum, type XHHW-2 inside the panel, stranded and insulated for 600 volts minimum unless otherwise specified.
- L. Provide terminal blocks of corrosion proof material such as nickel-plated copper. Provide AC and DC control terminals suitable for 12 AWG (4 mm) or larger wire. Provide terminals for DC analog signals suitable for 16 AWG (1.5 mm) wire.
- M. Provide screw-clamp single level terminals with captive screws; secure the wire connector with a clamp in contact with wire connector. Terminals which secure the wire directly from the screw are not acceptable. Provide all terminal blocks from a single manufacturer.
- N. Provide terminal blocks for every input/output wire. Include terminals for signal cable shields.
- O. Wire colors shall be assigned as follows; unless supplier has similar color-coding standard:

AC Power	Black	
AC Neutral or Common	White	
AC Control	Yellow	
DC Control (Digital)	Purple	
DC Control (Analog 4-20mA)	Blue Equipment or Panel Ground	Green
Externally Powered Circuits	Red	

- P. Provide shielded cable pairs for all analog signals internal and external to the panels. Provide minimum conductor size of 16 AWG (1.5 mm) for analog wiring internal to the panel.
- Q. Terminate all wiring at a central terminal array consisting of rigid terminal strips with numbering identical to the wire numbers. The terminal strips shall contain 10% spare terminals. Arrange the terminal blocks vertically and separate the terminal blocks into functional groups:
 - 1. Group one consists of power wiring.
 - 2. Group two consists of DC signals.
 - 3. Group three consists of alarm/status wiring.
- R. Provide internal wiring troughs of the plastic, open-side type with snap-on covers. The open sides shall permit wire movement without disconnecting it.
- S. Wire connectors shall be the hook-fork type, with non-insulated barrel to allow easy inspection of crimp integrity.
- T. Direct interlock of equipment without auxiliary relaying shall not be allowed.
- U. Use only one side of each terminal block row for internal wiring. Use the other side for field wiring. Do not locate terminal blocks within 6 inches (150 mm) of any right angle panel surface.
- V. Wiring troughs shall not be filled to greater than 60% capacity. Provide snap-on covers marked to identify their locations. Any component identification on the covers shall be repeated on the sub-panel to allow component identification with snap-on cover not in place.
- W. Provide a plug-in header with flexible leads for instrument power supplies.
- X. Provide identification for all wiring to panel components powered externally from the panel power circuit breaker inside the panel.
- Y. Identify all relays not provided by others but required for properly providing the control function defined in this section or indicated on the drawings. An example of this requirement is: ON and OFF pilot lights may be controlled by a single pair of wires from a single contact for both conditions; a relay will therefore be required to provide NO and NC contact for both pilot lights. Such relays shall be mounted in their respective control cabinets and shall be clearly marked as being powered outside of the panel's normal circuit breaker.
- Z. Provide all instrument power from the instrument panel or termination panel for the control system. Provide power to the instruments from the same panel that receives the signal. Provide each instrument requiring 120 VAC power or DC power with an individual fused disconnect or circuit breaker. The number of 120 VAC feeds to a panel

shall be shown on the electrical drawings. Provide power to the 24vDC field instruments utilizing a separate power supply and monitor the same utilizing the programmable logic controller (PLC). Instrument power shall not be commingled with panel power for other panel devices. Label all devices with circuit numbers or device tag names. Locate current limiting devices in two separated groups within the panel, one group for AC devices and the other group for DC devices.

- AA. For all signals to be transferred to/from another panel, provide current isolators (analog) or dry relay contacts (discrete) wired out to terminal blocks.

2.05 CONTROL PANEL (PCP) and REMOTE TERMINAL UNIT (RTU):

- A. Provide panels of Type 316 stainless steel for hazardous locations.
- B. Access doors (or access panels), shall have stainless-steel hinges, with latching or fastening means fabricated from Type 316 stainless-steel with adequate internal bracing for structural rigidity and strength.
- C. Surfaces containing instruments shall be fabricated from metal not less than 11-gauge Type 316 stainless steel, reinforced to prevent wracking or distortion.
- D. Provide panels with doors extending the full width for full access to panel- rear mounted components. Panel enclosure shall be NEMA 4X Type 316 stainless steel. Provide formed doors of sheet metal with 180 deg. hinges, gasketed to preserve NEMA rating. Provide inside surface of door or removable panel equipped with a drawing pocket to hold as built and service documentation. Provide door stop kits for outer door and any swing out panel.
- E. Instruments and accessories mounted, wired or piped to terminal strips or bulkhead fittings, and properly identified to assure ease of field connections.
- F. Provide lamicaid nameplates, White with Black engraved legends. Provide nameplates attached with clear pressure sensitive tape for continuous bond equal to 3M VHB assembly tape.
- G. Provide in each panel section 120Vac supply fused disconnect switch, 20A GFCI rated duplex service outlet, and switchable fluorescent lamp and guard with equivalent light output of a 100-watt incandescent lamp.
- H. Remote terminal unit panels shall include the following major components. Other items required for a complete operable UL rated panel shall be provided.
 - 1. NEMA 4X Type 316 stainless steel. Minimum enclosure size shall be 30”H x 24” W x 12”D. RTU panel shall include:
 - 2. Modicon M340 PLC with BMX P34 2020 CPU with minimum eight slot rack, and BMXCPS2010 power supply. The PLC shall be provided with the latest firmware upgrades – minimum version 2.20 is required for proper communication with the radio.

3. I/O cards as required – BMX DDI 1602 – digital input module, BMX DRA 0805 Relay output module, and BMX AMI 0410 analog input module. Removeable cage clamp terminal block BMXFTB2000 for I/O cards.
 4. 900 MHz Radio (MDS SD Series 9710B High Performance Data Transceiver) Model MDSSD9CESNNSNN for Ethernet and Serial communication traffic to be compatible with the existing SCADA system.
 5. Surge Protective Device for power.
 6. Surge protective devices for signal lines.
 7. Circuit breakers
 8. Fuses
 - a. AC-UPS – Sola Model SDU500 with battery.
 - b. Switching Power supply to provide 24VDC for the PLC boards: Manufacturer: Sola, Model: SDN-5-24-100C.
- I. control panel shall include main circuit breaker, additional circuit breakers, and control circuitry as shown on the drawings and specified in Section 11305.

2.06 SPARE PARTS AND TEST EQUIPMENT

A. Spare Parts:

1. Provide spare parts of the type and quantity as specified herein:
 - a. Provide four (4) each of the float switches.
 - b. Provide one (1) each of the following:
 - (1) Modicon M340 PLC with BMX P34 2020 CPU with minimum eight slot rack, and power supply.
 - (2) BMX DDI 1602 – digital input module, BMX
 - (3) DRA 0805 Relay output module
 - (4) BMX AMI 0410 analog input module
 - (5) Removable cage clamp terminal block BMXFTB2000 for I/O cards.
 - (6) AC-UPS – Sola SDU500 with battery.
 - (7) Switching Power supply: Manufacturer: Sola, Model:

(8) SDN-5-24-100C

(9) 900 MHz Radio (MDS SD Series 9710B High Performance Data Transceiver) Model MDSSD9CESNNSNN

c. Three sets of each size fuse.

2. Spare parts equal to at least 25% of the field replaceable system components (minimum of two) shall be supplied.

B. All spare parts shall be carefully packed in cartons, labeled with indelible markings, and suitable for prolonged storage. Complete ordering information including manufacturer's part number, part ordering information including manufacturer, part number, part name, and equipment name and number(s) for which part is to be used shall be supplied with the required part. The spare parts shall be delivered and stored in a location by the Client.

C. Contractor shall provide an itemized price list of the delivered spares for the purchase of additional components. Prices shall be honored for a period of one year from substantial completion of the system.

2.07 SHOP TESTING

A. Provide a shop, factory and field test plan outlining the System Supplier's procedures for testing all field primary devices, final control elements, local control panels, control system, PLCs at the factory prior to shipment. This plan shall demonstrate the system performs as specified and as indicated.

B. Submit the shop test plan with the shop drawings as specified in paragraph 1.05. Submit results of test to Engineer.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION

A. Instrumentation and accessory equipment shall be installed in accordance with the manufacturer's printed instructions and approved shop drawings. The locations of equipment, transmitters, alarms and similar devices are diagrammatic only. Exact locations shall be determined by the system supplier during development and fabrication of systems. Obtain in the field, all information relevant to the placing of the process equipment and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials to complete the work in an approved manner at no additional cost to the Owner.

B. The drawings indicate the intent and not the precise nature of the interconnection between the individual instruments. Provide final equipment interconnections by the system supplier during development and fabrication of systems.

- C. Provide process control system hardware configured to achieve the functional requirements as specified herein and as indicated.
- D. Where specific installation details are not specified or indicated, installation recommendations from the equipment manufacturers or American Petroleum Institute (API) shall be followed as applicable.
- E. The shield on each process instrumentation cable shall be continuous from source to destination and be grounded as directed by the instrument manufacturer or Engineer but in no case shall more than one ground point be employed for each shield.
- F. Once installed, remove lifting rings from cabinets/assemblies. Permanent plugs shall be provided for the holes of the same material and color as the cabinet.
- G. All work shall be executed in full accordance with codes and these contract documents. Should any work be performed contrary to said rulings, ordinances and regulations, the Contractor shall bear full responsibility for such violations at no additional cost to the Owner.
- H. All equipment, raceway, and wiring used in areas designated as hazardous shall be designed for the Class, Group and Division as indicated on the Electrical Drawings for the locations.
- I. Provide local electrical shutoffs and disconnects for all 4-wire field instruments requiring 120 VAC power. Electrical disconnects shall be rated disconnect switches or manual motor starters as specified under Division 16.
- J. Provide all brackets, hangers, and miscellaneous metals for mounting of equipment. Mounting hardware shall be installed in accordance with the manufacturers printed recommendations and not interfere with any other equipment.
- K. The system supplier and/or the equipment manufacturer shall provide qualified manufacturer representative to oversee the installation, the placing and location of system components, their connections to the process equipment panels, cabinets and devices, subject to the Owner's approval. Provide on-site services for a minimum period of one (1) 8-hour day, excluding travel time. The system supplier shall certify that all field wiring for power and signal circuits are correctly installed and terminated in accordance with best industry practice and provide for all system grounding to insure a satisfactory functioning installation. The system supplier shall schedule and coordinate work under this section with that of the electrical work specified under applicable Sections of Division 16.

3.02 FACTORY TESTS

- A. The system supplier shall test all equipment at the factory prior to shipment. Unless otherwise specified in the individual specification sections, all equipment provided by the system supplier shall be tested at the factory as a single fully integrated system.

- B. Each test shall be in the cause and effect format. The person conducting the test shall initiate an input (cause) and upon the system's or subsystem's producing the correct result (effect), the specific test requirement will have been satisfied. The system supplier shall provide a detailed step by step test procedure for review and approval by the Engineer.
- C. All tests shall be conducted in accordance with prior Owner and Engineer approved procedures, forms and checklist. Each specific test to be performed shall be described and a space provided after it for sign off by the appropriate party after its satisfactory completion.
- D. Copies of these sign off test procedures prepared by system supplier, forms, and checklists will constitute the required test documentation.
- E. The system supplier shall provide all special testing materials and equipment, including all interconnecting wires and cables between equipment to be tested, required to conduct the test in accordance with these specifications. Wherever possible, perform tests using actual process variables, equipment, and data. Where it is not practical to test with real process variables, equipment and data, provide an approved means of simulation. Define these simulation techniques in the test procedures. Test the functionality and communication of the PLC with the telemetry radio at the RTU panel.
- F. The system supplier shall coordinate all testing with the Engineer and Owner.
- G. The Engineer and Owner reserve the right to test or retest all specified functions whether or not explicitly stated in the prior approved Test Procedures without additional cost.
- H. The Owner's decision shall be final regarding the acceptability and completeness of all testing.
- I. No equipment shall be shipped until the Owner has received all test results and approved the system is ready for shipment.

3.03 INSTRUMENT INSPECTION AND CALIBRATION

- A. Provide letter from instrument manufacturer certifying instrument has been installed based on the manufacturer's installation instructions. The letter shall include digital pictures of the installed instrument.
- B. Provide manufactures written calibration procedures that will be used for instrument calibration. Calibrate instrument with calibration tools that conform to NIST traceability chain. Calibration instruments shall be twice as accurate as the instrument being calibrated but as a minimum the calibration instrument shall have a measurement uncertainty of 0.02 percent.
- C. Provide calibration of instruments at 10%, 50%, 80%, and 100% of measured span. Provide calibration tag for all calibrated instruments. Provide calibration tag with name, phone number, date, and signature of the person and company performing the

calibration. Provide linkage or range adjustments sealed by colored lacquer following calibration. Provide written calibration records to the engineer prior to substantial completion

3.04 FIELD TESTS

- A. Provide a Functional Acceptance Test (FAT).
 - 1. Provide written notification to the Engineer of the scheduled FAT 2 weeks prior to the intended start date.
 - 2. Provide FAT following installation, calibration, inspection, and preliminary testing.
- B. The Fat shall be conducted in accordance with prior Owner and Engineer accepted procedures, forms and checklist. Each specific test to be performed shall be described and a space shall be described on the documentation forms. A space shall be provided for sign off by the appropriate party after its satisfactory completion.
- C. Signed copies of the test procedures, forms and checklists, prepared by the System Integrator (SI), will constitute the required test documentation.
- D. The SI shall provide all special testing materials and equipment. Wherever possible, perform tests using actual process variables, equipment and data, provide suitable means of simulation. Define these simulation techniques in the test procedures.
- E. Functional Acceptance Test:
 - 1. Prior to the Functional Acceptance Test, the entire installed instrument and control system shall be certified by the SI that it is ready for operation. All preliminary testing, inspection, and calibration shall be complete. The FAT shall prove the installed system operates in accordance with the Specifications. The FAT shall verify the completeness of all system components.
 - 2. The FAT shall be performed on the complete system to demonstrate that it is operating and in compliance with these specifications. Each specified function shall be demonstrated on a paragraph by paragraph and loop by loop basis.
 - 3. Provide loop specific and non-loop specific tests.
 - a. Loop/Component Inspections and Tests: The entire system shall be checked for proper installation, calibrated and adjusted on a loop by loop and component by component basis by the system supplier following field installation, to demonstrate and document the system is in conformance with related submittals and these specifications. The Contractor is required to confirm that the system is properly wired, terminated and tagged from the field wiring nearest to the primary elements or equipment to the DCS and/or PLC I/O.

- b. The system supplier shall maintain the Loop Status Reports and Components Calibration sheets at the jobsite and make them available to the Owner and/or Engineer at all times.
 - c. The Owner reserves the right to witness and sign off all tests conducted by the system supplier. The Owner shall review and initial all Loop Status Sheets and Component Calibration Sheets and spot check their entries periodically and upon completion of the tests. Any deficiencies found shall be corrected. Final versions of these test sheets shall be submitted to the Owner and/or Engineer and be available at all times.
- 4. In the event of rejection of any part or function of a system, the repairs or replacement shall be provided within 10 days and at no additional cost to Owner.
 - 5. Updated versions of the documentation specified to be provided for during the functional acceptance tests shall be made available to the Owner and Engineer at the job sites both before and during the tests. In addition, one copy of all O & M Manuals shall be made available to the Owner and Engineer at the job sites both before and during testing.
 - 6. Test the functionality and communication of the PLC with the telemetry radio at the RTU panel and the existing owner system master Radio and the SCADA computer.

3.05 START-UP TESTING

- A. After completion of the Functional Acceptance Test, the Instrumentation and Control System shall be tested as a component of the Start-up Testing. All furnished hardware and software shall operate for a period of 30 consecutive days, under conditions of full process operation, without a single non field repairable malfunction.
- B. During this test, Owner operations personnel and SI personnel shall be available. For this test, the SI is expected to provide personnel who have an intimate knowledge of the hardware and the SI provided software of the system. The facilities are not staffed. Coordinate staffing requirements during the 30-day test to coincide with normal shift operations as much as possible. Off-shift emergencies shall be fully supported by SI staff. Provide SI staff with cell phones and/or pagers to ensure that support staff is available by phone and/or on-site within four hours of a request by operations staff.
- C. While the start-up testing is proceeding, the Owner shall have full use of the system. Only plant operations personnel shall be allowed to operate equipment associated with live plant processes. Facility operations shall remain the responsibility of the Owner, and the decision of plant operators regarding plant operations shall be final.
- D. During Start-up Testing, the SI shall have available, within 4 hours of notification; personnel who have an intimate knowledge of the hardware and SI furnished systems.
- E. Any malfunction to SI's system during the tests shall be analyzed and corrected by the

SI. The Owner shall determine whether any such malfunctions are sufficiently serious to warrant a repeat of this test.

- F. Any malfunction attributed to the SI during the Start-up Testing which cannot be corrected within 24 hours of occurrence by the SI's personnel, or more than two similar failures of any duration, will be considered as a non-field repairable malfunction.
- G. Upon completion of repairs by the SI, the associated test shall be repeated as specified herein.
- H. In the event of rejection of any part or function, the SI shall perform repairs or replacement within 10 days and at no additional cost to the Owner.
- I. The total availability of the system shall be greater than 99.5 percent during this test period. Availability shall be defined as:

$$\text{AVAILABILITY} = (\text{TOTAL TIME} - \text{DOWN TIME}) / (\text{TOTAL TIME}) * 100\%$$

- J. Upon successful completion of the 30-day startup operation test and subsequent review and acceptance of complete system final documentation, the system shall be considered Substantially Complete, after acceptance by Owner and Engineer.

3.06 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION



DIVISION 14

NOT USED



DIVISION 15

MECHANICAL

SECTION 15060
PIPING AND FITTINGS

PART 1 - GENERAL

1.01 SCOPE

- A. The work included in this section consists of furnishing all material, equipment and labor, and performing all operations necessary for the complete installation of all piping, fittings and accessories within the limits of work, as shown on the drawings and specified herein.
- B. Where references are made to other standards or codes, unless specific date references are indicated the latest edition of said standard or code shall govern.

1.02 WORK NOT INCLUDED UNDER THIS SECTION

- A. Piping installation for various types of piping systems is specified within various other sections herein. Installations specified in this section are supplementary to those sections and in the case of conflict the more stringent condition shall prevail.

1.03 RELATED SECTIONS

- A. Section 01300 - Submittals
- B. Section 15001 – Water Services and Miscellaneous Fittings
- C. Section 15995 - Pipeline Testing and Disinfection
- D. All sections specifying various types of valves.

1.04 PIPING LAYOUT

- A. Field-verify dimensions prior to preparation of layout and shop drawings. Obtain shop drawing approval prior to fabrication of piping. All items not specifically mentioned in the Specifications or noted on the approved Plans, but which are obviously necessary to make a complete working installation shall be included.

1.05 DELIVERY, STORAGE AND HANDLING

- A. During shipping, delivery and installation of pipe and accessories, handle in a manner as to ensure a sound undamaged condition.
- B. Exercise particular care not to injure pipe coatings.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS: DUCTILE IRON

A. GENERAL

1. In accordance with the "Reduction of Lead in Drinking Water Act" (Act) enacted by the USEPA on January 4, 2011, effective January 4, 2014 all piping, fittings, fixtures, valves, and other appurtenances used in potable water supply and distribution systems shall be "lead free" as defined in Section 1417(d) of the Safe Drinking Water Act (SDWA). All requirements of the Act as it relates to the products under this section shall be strictly adhered to.
2. As used herein, "ANSI" denotes the American National Standards Institute, "AWWA" denotes the American Water Works Association, and "ASTM" denotes the American Society for Testing and Materials.
3. All pipe and fittings to be furnished hereunder shall be manufactured in the United States and shall conform to the referenced ANSI and/or AWWA Standard as modified herein, as appearing in the following sections.
4. All markings required on pipe and fittings, shall be clearly legible and located such that they will not be hidden or destroyed when assembled into the intended system.

B. PIPE

1. All pipe shall be ductile iron pipe conforming to ANSI/AWWA Standard C151/A21.51, "Ductile-Iron Pipe, Centrifugally Cast, for Water". All pipe and fittings for water applications shall be in full compliance with ANSI/NSF 61, "Drinking Water System Components-Health Effects". Manufacturers shall maintain their NSF certification for the duration of the Contract and any extensions thereof.
2. Wall Thickness:
 - (a) Buried push-on, mechanical, and restrained joint pipe shall have a wall thickness class in accordance with ANSI A21 .51 equal to or greater than classes indicated below

Buried Pipe Size Class

4" - 12"	52
14" - 54"	52
60" - 64"	Pressure Class 150

3. All flanged, grooved pipe shall have a wall thickness class in accordance ANSI A21.15 (AWWA C115) and be rated at 250 psi working pressure. The nominal

thickness of pipe 6-inch and larger shall not be less than those shown in Table 15.1 of ANSI C115. The nominal thickness of 4-inch pipe shall be ANSI C151 Class 54.

4. For restrained joint pipe, the thickness of the pipe barrel remaining after grooves are cut, if required in the design of restrained end joints, shall not be less than the nominal wall thickness of equal sized non-restrained joint pipe as shown above.
5. Each piece of pipe shall be marked as required in Subsection 4.7 of AWWA C151-02. Letters and numerals on pipe sizes 12-inch and smaller shall be not less than 3/8-inch.
6. The Department of Public Utilities absolutely reserves the right to require the use of higher thickness or pressure class pipe in applications where in the opinion of the Engineer (i.e., the Director of the Department of Public Utilities or his representative) such use is in the best interest of the City. The Engineer's decision in this regard shall be final.
7. A sufficient quantity of non-toxic vegetable soap lubricant shall be supplied with each shipment of pipe. The soap lubricant shall be suitable for use in subaqueous trench conditions.
8. For flanged ductile-iron pipe with integrally cast flanges or threaded flanges, the nominal wall thickness of the pipe barrel shall be as specified in Section D, "Joints and Accessories", under "Flanged Joints", herein below.
9. The single gasket push-on pipe shall be shipped in standard 18-foot or 20-foot lengths, but not both. The restrained single-gasket push-on joint pipe shall be shipped in standard 18 or 20-foot lengths as specified above or fabricated lengths as noted in each order. At least two lengths of each size of single gasket push-on pipe furnished under each order shall be tested with circumferential gauges to insure that the pipe may be cut at any point along its length and have an outside diameter which will be within the manufacturer's standard design dimensions and tolerances for plain pipe. These lengths shall be identified with an easily distinguished, painted marking, longitudinally along the full length of the pipe.

C. FITTINGS

1. Fittings Conforming with ANSI/AWWA C110/A21.10-12 (Water & Sewer Use) - Restrained push-on joint fittings shall be cast ductile iron for use with ductile-iron pipe as specified above. Standard mechanical joint, push-on joint and flanged joint fittings shall also be ductile iron for use with ductile iron pipe as specified above. Cast ductile iron fittings in the 3-inch through 24-inch size range shall be pressure rated at 350 psi, minimum; (except flange-joint fittings shall be rated at 250 psi, minimum); and in the 30-inch through 48-inch size range shall be

pressure rated at 250 psi, minimum. All fittings with mechanical joints, flange joints and push-on joints shall conform to ANSI/AWWA Standard C110/A21.10-98, "Ductile Iron and Gray Iron Fittings, 3-inch Through 48-inch, for Water and Other Liquids". In addition, fittings with mechanical joints and push-on joints shall conform to ANSI/AWWA Standard C111/A21.11-00, "Rubber-Gasket Joints for Ductile Iron Pipe and Fittings".

The weight of fittings shall be as given in ANSI/AWWA C110/A21.11-98 for ductile-iron fittings. The weight of mechanical joint fittings shall be as established in Tables 3 through 12. The weight of flanged joint fittings shall as establish in Tables 13 through 20.

2. Fittings Conforming with ANSI/AWWA C153/A21.53-00 (Water & Sewer Use) - All fittings shall be cast ductile-iron for use with ductile-iron pipe as specified above. Fittings in the 3-inch through 24-inch size range shall be pressure rated at 350 psi minimum; 30-inch through 48-inch size range shall be pressure rated at 250 psi minimum; and in the 54-inch through 64-inch size range shall be pressure rated at 150 psi minimum (except for those fittings such as plugs, caps and sleeves which are normally rated at a higher pressure). No flanged fittings or mixtures of flanged with other end type fittings will be allowed in the range of 3-inch through 48-inch since they are not covered in the AWWA Standard. Flanged fittings conforming with and covered by this standard are allowed in sizes 54, 60 and 64-inch. In conformance with the standard, 54, 60 and 64-inch flanged tees, crosses and reducers with outlets of smaller dimension as listed in ANSI/AWWA C153/A21.53-00 are permitted. All fittings with mechanical joints, flange joints and push-on joints shall conform to ANSI/AWWA Standard C153/A21.53-00, "Ductile-Iron Compact Fittings for Water Service". In addition, fittings with mechanical joints and push-on joints shall conform to ANSI/AWWA Standard C111/A21.11-00, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings" except as otherwise allowed in C153. Mechanical joint glands shall be ductile iron only.

3. Since the C153 Standard provides only minimum dimensions, fully detailed drawings of all fittings proposed shall be supplied by the manufacturer with his bid. The tabulated nominal weight of each size and type of fitting shall also be supplied by the manufacturer for all items proposed. This weight shall be that of the bare casting prior to application of any lining or coating. The weight of a fitting supplied under the contract shall not be less than ninety-five (95) percent of the tabulated nominal weight supplied by the manufacturer's catalog literature for that fitting. Further, the weight of fittings supplied shall not be more than five (5) percent above the same tabulated nominal weight.

D. JOINTS AND ACCESSORIES

1. Push-On Type Joints (Single Gasket and Single Gasket with Gasket Restraint) - Push-on joints shall conform to ANSI/AWWA Standard C111/A21.11-12, except that the gaskets for pipe and fittings shall be neoprene where so specified.

The required number of gaskets for each push-on joint pipe plus one extra for every 50 joints or fraction thereof, shall be furnished with each order. The gaskets shall be shipped in suitable protective containers. All single-gasket pipe shall be as manufactured by United States Pipe and Foundry Company (Tyton), by the American Cast Iron Pipe Company (Fastite), by McWane, Inc. (Mix of Tyton and Fastite), Tyler/Union (Tyton) or approved equal.

Push-on joints together with both their regular and gasket-restraint gaskets shall be of the design, dimensions and tolerances of either those provided by American Cast Iron Pipe Company (Fastite/Fast-Grip) or those provided by United States Pipe and Foundry Company (Tyton/Field Lok). No other designs shall be acceptable. If required by the City of Hollywood Department of Public Utilities, the Vendor shall supply complete design drawings with dimensions, tolerances and materials of the joint and gasket being supplied within fourteen (14) calendar days of the date of receipt of the letter, fax or E-mail requiring said submission. If so, required by the Department of Public Utilities, this submission shall be signed, sealed and dated by an Engineer registered to practice in the State where the manufacturer is located.

2. Mechanical Joints - Mechanical joints for fittings shall conform to ANSI/AWWA Standard C111/A21.11-12, except that the gaskets for each fitting under Groups D and D1 shall be neoprene. Bolt holes for mechanical joints shall be equally spaced and shall straddle the vertical centerline. Tee head bolts and hexagonal nuts for all mechanical joints in fittings shall be A-316 stainless steel with dimensions and threading as specified in ANSI/AWWA Standard C111/A21.11-00. Glands shall be of ductile-iron construction for ductile iron fittings and cast gray iron or ductile iron for cast gray-iron fittings. Restraining rods for all mechanical joint fittings shall be A-316 stainless steel.

The proper number of gaskets, glands, bolts and nuts, all conforming to ANSI/AWWA Standard C111/A21.11-00, plus one extra gasket for every 10 joints or fraction thereof, shall be furnished with each order. The gaskets and joint accessories shall be shipped in suitable protective containers. Follower glands held in place with set screws will not be acceptable. Segmented glands will not be acceptable.

3. Mechanical Joint and Push-on Joint “Megalug®”-type Restraining Systems

- a. Use of this type of restraint is restricted to underground mechanical joint or push-on joint applications, and in general may not be used above grade or as a substitute for flanged joints. Any above grade applications will require submission of shop drawings of the piping system where they are utilized and may require design by a Florida registered Professional Engineer.
- b. This type of restraint may be utilized as dictated by design and/or field conditions in any mechanical joint or push-on joint underground piping system of 30-inch nominal diameter and smaller. The prior written permission of the Engineer is required for diameters of 36, 42 and 48-inch. In instances where written permission cannot be immediately obtained, verbal permission will be allowed but is to be confirmed in writing on the first business day following the substitution. If this type of restraint is used without permission or if permission is denied, the Contractor making the substitution shall be solely responsible for all costs, both direct and indirect, of immediately correcting the restraint system to the satisfaction of the Engineer.
- c. It is recognized that flange adapters of this type form a useful tool for adjusting lengths of flanged pipe runs in instances such as runs with a large number of deflections where it is almost impossible to predict all lengths correctly. Therefore, a very restricted number of these joints will be allowed in instances where it can be clearly shown to the satisfaction of the Engineer that they are necessary. This application is restricted to 20-inch nominal diameter and below. Further, this use shall be designed in and shall not be made as a field substitution. In all instances flange adapters shall be rated for a minimum working pressure of 250 psi with a minimum safety factor of 2:1. In no case will these flange adapters be used as a general substitute for standard flanged joints.
- d. The Department of Public Utilities absolutely reserves the right to require other forms of restraint and/or thrust anchoring where, in the opinion of the Engineer, the use of this form of restraint is not in the best interest of the City. In this regard, the Engineer’s decision shall be final.
- e. The “Megalug®” joint-restraint systems manufactured by EBAA Iron, Inc., of Eastland Texas, will be considered the standard of quality for the purpose of evaluating substitute systems. EBAA no substitution.
- f. Each thrust-resistant mechanical joint or push on joint made up with this type of restraint and the pipe and fitting of which it is a part, shall be designed to withstand an axial thrust from an internal pipeline pressure

of at least 150 psi at bulkhead conditions without reduction because of its position in the pipeline nor for support from external thrust blocks.

- g. This type of joint restraint shall not be used above grade except as previously specified nor shall it be used as a carrier pipe within a casing. This type of restraint shall not be used with tape wrapped pipe or with too great a coating thickness on the exterior of the pipe.
 - h. All bolts, nuts and washers for fittings shall be A-316 stainless steel. Restraining rods shall be A-316 stainless steel for mechanical joint fittings.
4. Restrained Push-on Joints (Single Gasket Non-Gasket Restrained) - Restrained joints in pipe and fittings shall be of the single gasket push-on type, and shall conform to all applicable provisions of ANSI/AWWA Standard C111/A21.11-12, except that gaskets for pipe and fittings shall be neoprene, where so specified, and the following requirements:
- a. Thickness of the pipe barrel remaining at grooves cut, if required in the design of restrained end joints, shall not be less than the nominal wall thickness of equal sized non-restrained pipe as specified in Section B above.
 - b. Restrained joints using field welding, set screws, or gaskets with expanding metal inserts will not be acceptable.
 - c. The restraining components, when not cast integrally with the pipe and fittings, shall be ductile iron or a high strength non-corrosive alloy steel.
 - d. Tee head bolts and hexagonal nuts for all restrained joints in pipe and fittings shall be A-316 stainless steel with dimensions and threading as specified in ANSI/AWWA Standard C111/A21.11-12, except that the length of the bolts shall meet the requirements for the restrained joint design. Restraining rods for mechanical joint fittings shall be A-316 stainless steel.
 - e. The proper number of gaskets, bolts, nuts and all necessary joint material, plus one extra gasket for every 10 joints or fraction thereof, shall be furnished with each order. The gaskets and joint accessories shall be shipped in suitable protection containers.
 - f. Each thrust-resistant joint, and the pipe and fitting of which it is a part, shall be designed to withstand the axial thrust from an internal pipeline pressure of at least 150 psi at bulkhead conditions regardless of its position in the pipeline and regardless of it being supported by external thrust blocks.

- g. Restrained push-on joint pipe and fittings shall be capable of being deflected after assembly. During deflection, all components in the restrained system shall be in contact to provide an equal force on all contact areas.
 - h. When restrained spigot ends are ordered for items of Group A, the corresponding bell ends of the pipe to be restrained (also within Group A), shall be furnished with the required matching restraining features at no additional cost other than the price bid per foot of pipe.
5. Flanged Joints - Connecting pieces with one end flanged and the other end either plain-end or mechanical joint, shall conform to ANSI/AWWA Standard C110/A21.10-12. Joint material for both the flanged end and the mechanical joint accessories for connecting pieces with a mechanical joint end shall be furnished as specified.

Flange adapters shall be used only on a restricted basis and shall not be used as a general substitute for regular flanged joints. Further, the Department of Public Utilities absolutely reserves the right to require regular flanged or other types of joints when it is considered in the City's best interest. The decision of the Engineer shall be final in such situation.

Flanges shall be made of ductile iron conforming to ASTM 536. Flange shall be restrained by a number of individual gripping wedges operated by torque-limiting actuating screws. Each flange adapter shall have a permanently cast in identification number allowing tracing of the date, foundry and pour that fabricated the unit together with all test data for the material of the pour. Records for this purpose shall be retained by the foundry for a minimum of two years after the pour date and shall be supplied to the City within no more than two weeks after request. Factor of safety shall be a minimum of 2 to 1.

Other types of flanged fittings and flanged-joint pipe shall conform to the following requirements unless otherwise stated in the order:

- a. Flanged fittings shall conform to ANSI/AWWA Standard C110/A21.10-12, as specified hereinabove.
- b. Flanged ductile-iron pipe with integrally cast flanges shall be manufactured in accordance with ANSI/AWWA Standard C151/A21.51-09, and with provisions contained hereinabove for centrifugally cast ductile iron pipe, and shall be furnished with ANSI Standard Class 125 flanges, plain-faced and drilled, conforming to ANSI Standard B16.1, "Cast Iron Pipe Flanges and Flanged Fittings", latest revision. Hollow back flanges are not acceptable.

- c. Flanged ductile-iron pipe with threaded flanges shall be manufactured in accordance with ANSI/AWWA Standard C115/A21.15-11, "Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges" and shall be rated for a working pressure of 250 psi, minimum. The nominal thickness of flanged ductile-iron pipe 6-inch diameter and larger shall not be less than those shown in Table 1 of ANSI/AWWA Standard C115/A21.15-11. The nominal thickness of 4-inch diameter flanged ductile-iron pipe shall be Class 54 (min.) conforming to Tables 3 and 4 of ANSI/AWWA Standard C151/A21.51-02. The pipe shall be furnished with ANSI Standard Class 125 flanges, plain faced and drilled, conforming to ANSI Standard B16.1, latest revision. Hollow back flanges and grey-iron flanges shall not be acceptable for use as threaded flanges. Threaded flanges shall be individually fitted, and machine tightened on the threaded pipe by the manufacturer and shall not be interchangeable in the field. Pipe lengths shall be as ordered. Removal of flanges, cutting and re-threading the pipe, and re-installing the flanges will not be permitted in any case.

- d. All flanges on ductile-iron pipe and fittings shall be of ductile iron. All joint materials for flanged pipe and fittings shall be supplied with all pipe or fittings ordered. Bolts and nuts shall comply with all requirements of Appendix Section A.1 of ANSI/AWWA Standard C115/A21.15-99, except that all shall be A-316 stainless steel. Unless ring gaskets are specifically called for in the order, gaskets shall be full-faced and 1/8-inch thick. Gaskets shall fully conform to the requirements of ANSI/AWWA Standard C115/A21.15-99, Appendix Section A.2, except that gaskets shall be SBR for water and neoprene for sewer usages.

E. LININGS AND COATINGS

Asphaltic Coating

All ductile iron pipe and fittings shall be outside coated with an asphaltic material applied by means of the airless spray method. The exterior coating shall meet AWWA Specifications for this type of coating, shall be smooth without pinholes, thin, bare or overly thick areas. Smoothness shall be such that when hand rubbed, no "sandpaper" feeling will be experienced and such that the spigot area will readily slide through the gasket without pulling, tearing, rolling or otherwise disturbing the sealing capabilities of the gasket. Spigot ends shall be beveled prior to painting and to an extent that will permit ready insertion of the spigot through the gasket area.

Cement-Mortar Lining

Ductile iron pipe and fittings where so specified shall be cement-lined and seal-coated in accordance with ANSI/AWWA Standard C104/A21.4-13, "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water".

Ceramic Epoxy Lining and Polyethylene Lining

Pipe and fittings where so specified shall be lined with either ceramic epoxy or virgin polyethylene. A Vendor may supply one or the other material but not both in the same order.

All sewer pipe and fittings of 4-inch nominal diameter and above, except for riser pipe for valves, shall be lined with either ceramic epoxy lining or virgin polyethylene. Polyethylene shall be compounded with carbon black to resist exposure to ultraviolet rays during open-air storage, and shall comply with ASTM Standard ASTM D4976-12a, "Polyethylene Plastics Molding and Extrusion Materials". Ceramic epoxy shall contain pigmentation to resist ultraviolet exposure under the same conditions.

Ceramic Epoxy Lining

1. All ductile iron pipe and fittings shall be delivered to the application facility without asphalt, cement lining or other lining on the interior surface or the first 6 inches on the spigot end of the pipe exterior.
2. The only ceramic epoxy material approved by the Department of Public Utilities at this time is Protecto 401™ Ceramic Epoxy, manufactured by Induron Coatings, Inc., of Birmingham, Alabama. Any request for substitution must be accompanied by:
 - (a) A successful history of lining pipe and fittings for sewer service
 - (b) A statement from the manufacturer concerning recoatability and repair to the lining
 - (c) A test report verifying the following properties and a certification of the test results:
 - (1) Permeability rating of 0.00 when tested according to Method A of ASTM E96-66, "Test Method for Water Vapor Transmission of Materials", Procedure A with a test duration of 30 days.
 - (2) The material shall be an amine cured novolac epoxy containing at least 20% by volume of ceramic quartz pigment.
 - (3) An abrasion resistance of no more than 3 mils (.075 mm) loss after one million cycles using European Standard EN 598 (1994), Section 7.8, "Abrasion Resistance".

(4) The following tests must be performed on coupons from factory-lined ductile iron pipe:

- i) ASTM B-117 Salt Spray (scribed panel) - Results to equal no more than 0.0 undercutting after two years.
- ii) ASTM G95 Cathodic Disbondment 1.5 volts @ 77°F - Results to equal no more than 0.5mm undercutting after 30 days.
- iii) Immersion testing rated using ASTM D714-87
 - a. 20% Sulfuric Acid - No effect after two years.
 - b. 140°F 25% Sodium Hydroxide - No effect after two years.
 - c. 160°F Distilled Water - No effect after two years.
 - d. 120°F Tap Water (scribed panel) - 0.0 undercutting after two years with no effect.
- iv) ASTM G-22 90 - Standard practice for determining resistance of synthetic polymeric materials to bacteria. The test should determine the resistance to growth of Acidithiobacillus Bacteria and should be conducted at 30°C for a period of seven days on a minimum of 4 panels. The growth must be limited only to trace amounts of bacteria.

3. Application - Ceramic epoxy lining shall be applied by a competent firm with a successful history of applying linings to the interior of ductile iron pipe and fittings, following the following procedures:

- (a) Surface Preparation - Prior to abrasive blasting, the entire area which will receive the protective compound shall be inspected for oil, grease, etc. Any areas where oil, grease or any substance which can be removed by solvent is present shall be solvent cleaned using the guidelines outlined in SSPC-1 Solvent Cleaning. 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 media. 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 annealing oxide may be left on the surface. Any area where rust reappears before coating must be re-blasted to remove all rust.

- (b) Lining - After the surface preparation and within 8 hours of surface preparation, the interior of pipe and fittings shall receive a minimum forty (40) mils dry film thickness of the protective lining. No lining shall take place when the substrate or ambient temperature is below 40°F. The surface also must be dry and dust free. If flange ends are included in the Project, the linings must not be used on the face of the flange; however, full face gaskets must be used to protect the ends of the pipe. The 40-mil system shall not be applied in the gasket grooves.
- (c) Coating of Gasket and Spigot Ends - Due to the tolerances involved, the gasket area and exterior of the spigot end up to 6 inches back from the end of the spigot must be coated with Protecto Joint Compound of six 6-mil minimum, 10-mil maximum. This coating shall be applied by brush to ensure coverage. Care should be taken that the coating is smooth without excess buildup in the gasket groove or on the spigot end. All material for the gasket groove and spigot end shall be applied after the application of the lining as specified in the preceding paragraph.
- (d) 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 time between coats shall never exceed that time recommended by the lining material manufacturer. No material shall be used for lining which is not indefinitely re-coatable with itself without roughening the surface.
- (e) Touch-Up and Repair - Protecto Joint Compound shall be used for touch-up or repair. Procedures shall be in accordance with manufacturer's recommendations.

4. Sealing Cut Ends and Repairing Field Damaged Areas:

- (a) Remove burrs caused by field cutting of ends or handling damage and smooth out the edge of the lining if rough.
- (b) Remove all traces of oil, grease, asphalt, dust, dirt, etc.
- (c) Areas of loose or damaged lining associated with field cutting the pipe shall be repaired, if approved by the Engineer, as recommended by the pipe manufacturer. The damaged area shall be stripped back by chiseling or scraping about 1 to 2 inches into the well-adhered lining before patching.
- (d) The exposed metal and the 1 to 2-inch lining overlap shall be roughened with a coarse grade of emery cloth (#40 grit), rasp or small chisel. Avoid wire brushing or similar buffing since these tend to make the surface too smooth for good adhesion.

- (e) With the area to be sealed or repaired absolutely, clean and suitably roughened, apply a coat of Protecto Joint Compound by brush in accordance with the manufacturer's recommendations.

5. 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- PC-2 Film Thickness Rating.
- (2) The interior lining of all pipe and fittings shall be tested for pinholes with a nondestructive 2,500-volt test.
- (3) Each pipe joint and fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on the date.

(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, and that the material was applied as required by the specification.

6. Polyethylene Lining

- (a) The polyethylene shall be fused to the pipe and fittings with heat to form a tightly bonded uniform lining 40 mils thick, minimum, extending from the spigot end to the gasket seat in the bell of push-on, restrained push-on and mechanical type joints.
- (b) Prior to preheating the pipe, 75% or more of the high-temperature oxide film shall be removed through proper preparation of pipe interior surface. Fittings shall be sand blasted. Pipe and fittings shall be uniformly preheated to a temperature adequate to provide uniform fusing of the polyethylene powders and proper bonding to the interior of the pipe and fittings.
- (c) The lining at the ends (spigot and bell) shall be hermetically sealed with a coal-tar epoxy. This epoxy shall coat the inside of the bell of both pipe and fitting as well as the last six inches on the inside of the spigot end of the pipe and two to three inches on the outside of the spigot end.

- (d) The lining of all pipe and fittings shall be subjected to and pass a test for pinholes, bare spots, metal particles, insufficient lining thickness and other defects by a method conforming to ASTM Standard G62-87 (1998), "Holiday Detection in Pipeline Coatings", Method B (high voltage). Other test methods may be submitted to the City for approval, but no approval will be granted unless it is clearly shown to the satisfaction of the City that the method is equivalent to the specified tests insofar as detecting defects and insufficient lining thickness.
- (e) The manufacturer shall provide certifications on the "Holiday" test as well as certifications on a uniform (spigot end to gasket seat in bell) minimum 40-mil-thick lining.

F. QUALITY ASSURANCE

1. All piping, fittings and other materials supplied under this contract shall be subject to inspection while still on the delivery truck. It is the sole responsibility of the vendor and supplier to make prior contact with the Department of Public Utilities and provide a minimum of 48-hours prior notice of delivery. When so notified, the City will make arrangements for inspection of the material upon arrival or within a reasonable time thereafter. Material will not be unloaded without inspection taking place either prior to, or if necessary, for examination, during the unloading procedure. The City will not be responsible for any delays or additional costs created by non-compliance with the requirement for prior notification or the requirement for thorough inspection.
2. Materials shall be delivered in complete compliance with the AWWA Standards as modified herein, without damage, and shall match or exceed the quality of any samples supplied. The City absolutely reserves the right to require samples of any material supplied and to perform whatever tests considered by the Engineer, whose decision shall be final, to be in the City's best interest on said samples. Where such tests are of a destructive nature, the sample, if it passes the test will be paid for (at cost as shown by invoice) by the City. Samples failing will be immediately replaced with suitable material at the supplier's/contractor's expense. Samples required prior to order as a condition for purchase or as a materials submittal for approval will be at the supplier's/contractor's expense but, if approved and not used for destructive tests, may be used in the work with permission from the Engineer.
3. Materials found to be defective, not in strict compliance with the quality standards of samples supplied or these specifications shall be immediately returned to the vendor at his expense. If defects are discovered at a later time, the vendor shall be required to remove said items and shall bare all costs for so doing together with any replacement costs. Rejection of items may subject the vendor to liquidated and/or actual damages as specified elsewhere herein.

4. Foundries supplying materials shall maintain their metallurgical records for a minimum period of two years after fabrication and firms not doing so may be found in default.
5. Flaws which provide cause for rejection include but are not limited to:
 - (a) Incorrect metallurgy or metallurgy which cannot be verified to the complete satisfaction of the Engineer
 - (b) Foundry identification/location, size, pressure and material identification information lost, removed, non-existent, or not visible when assembled
 - (c) Not in complete compliance with all applicable AWWA and NSF standards and requirements as modified herein and/or these specifications
 - (d) Not in complete compliance with approved shop drawings
 - (e) Incorrect, rough, chipped, cracked, scratched, flawed or otherwise damaged interior or exterior coatings or linings
 - (f) interior or exterior coatings which are too thin, or too thick to allow proper assembly, or too thick to allow proper grip by restraining gaskets or other restraining elements
 - (g) Pin holes or honey combing of pipe
 - (h) Weld spatter or excess metal in gasket grooves or the whole of the bell area
 - (i) Bell areas which are distorted or otherwise improperly cast
 - (j) Spigots which are out of round, not of proper dimension, or not beveled to an extent that will allow easy assembly of the pipe joint
 - (k) Gaskets which are defective or of the wrong material
 - (l) Lack of joint materials, improper or defective joint materials
 - (m) Bolting of the wrong material or size
 - (n) Electro-galvanizing or other exterior plating when hot-dip galvanizing is required
 - (o) Non-timely or non-submittal of all required certifications, incorrect/incomplete certifications, or certifications lacking the signature, date and seal of a professional engineer when so required

- (p) Flanges which are too thin, not a right angle to the pipe centerline, or otherwise distorted
- (q) All other flaws or defects which, in the opinion of the Engineer whose decision shall be final, adversely affect the assembly and/or function of the piping system as intended.

2.02 PIPE AND FITTINGS: POLY VINYL CHLORIDE (PVC)

A. TYPE PSM SDR-26 PVC SEWER PIPE AND FITTINGS

1. Type PSM SDR-26 PVC Sewer Pipe

- (a) Type PSM SDR-26 PVC Sewer Pipe for sewer mains and laterals shall conform to ASTM Standard D3034, "Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings", except as modified below.
- (b) Pipe shall be made of PVC plastic having a cell classification of 12454-B, 12364-B, 12364-C or 13364-B as defined in ASTM Standard D1784, "Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds".
- (c) The PVC compounds used in the manufacture of the gravity sewer pipe shall be as listed in the Plastic Pipe Institute (PPI) Technical Report TR-4.
- (d) The PVC pipe shall be push-on type, with bells, spigots and elastomeric gaskets, in accordance with ASTM Standard D3034, and in accordance with ASTM Standard D3212, "Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals", except as otherwise modified herein. The gaskets shall be the sole element depended upon to make the joint flexible and watertight. Joints using solvent cement will not be permitted. The pipe bells shall have an annular recess or race to seat and retain the gasket, and the gaskets may be either prepositioned by the manufacturer or shipped separately in suitable protective containers. Pipe spigots shall be beveled. Pipe bells shall be extruded integral with the pipe barrel with a thickness equal to or greater than that of the barrel. Manufacturer's allowable pipe joint gap data shall be provided as part of the shop drawing submittal for piping.
- (e) The gaskets shall be fabricated from a high-grade elastomer compound in accordance with ASTM Standard F477, "Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe", except as otherwise modified herein. The basic polymer for the gaskets shall be synthetic rubber. Natural rubber gaskets or gaskets with both natural and synthetic

rubbers will not be permitted. Gaskets shall be continuous, elastomeric, rubber ring type.

- (f) Nominal laid length of Type PSM SDR-26 PVC sewer pipe shall be 13 feet.
- (g) Type PSM SDR-26 PVC sewer pipe shall be double labeled (180 degrees apart) as follows at intervals of five (5) feet or less:

Manufacturers: Diamond Plastics Corp, JM Eagle, North American Pipe Corp (NAPCO). No substitutions allowed.

Date of manufacture - Manufacturer's name & Code

- Nominal size - Cell classification - "Type PSM

SDR-26 PVC Sewer Pipe" - "Specification D3034"

2. Type PSM SDR-26 PVC Sewer Fittings

- (a) Type PSM SDR-26 PVC Sewer Fittings shall conform to ASTM Standard D3034, "Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings", and to the specifications for Type PSM SDR-26 PVC sewer pipe herein, except as modified below.
- (b) The waterway and bell wall thickness shall be equal to or greater than that specified for pipe, except that for reducing fittings or those with smaller inlets, the wall thickness of each inlet shall be no less than the minimum wall thickness for that size pipe.
- (c) Only molded fittings are accepted. Fabricated fittings are not acceptable.

B. AWWA C900 AND C905 PVC (CI) PIPE AND FITTINGS

1. TYPE C900 and C905 PVC PIPE

- (a) AWWA C900 Pipe for water and sewer mains and laterals shall conform to ANSI/AWWA C900, "(PVC) Pressure Pipe and Fabricated Fittings", for 4-inch through 12-inch PVC pressure pipe and fabricated fittings with cast-iron-pipe-equivalent (CI) outside diameter (OD) dimensions and with wall-thickness-dimension ratios (DRs) 14, 18, and 25, except as otherwise modified herein.
- (b) AWWA C905 pipe for water and sewer mains and laterals shall conform to ANSI/AWWA C905, "Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14-inch Through 48-inch for Water Transmission and Distribution", for 14-inch through 48-inch PVC pressure pipe and fabricated fittings with cast-iron-pipe-equivalent (CI) and steel-pipe-

equivalent (IPS) outside diameter (OD) dimensions and wall thickness dimension ratios (DRs) of 14, 18, 21, 25, 26, 32.5, 41, and 51, except as otherwise modified herein.

- (1) AWWA C900 and C905 pipe shall be made from PVC thermoplastic having physical and chemical properties which meet or exceed a cell classification of 12454-A or 12454-B virgin compounds as defined in ASTM Standard D 1784.
- (2) The AWWA C900 and C905 pipe shall be push-on type, with bells, spigots and elastomeric gaskets in accordance with ASTM Standard D 3139, "Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals ". The gaskets shall conform to ASTM Standard F477 and shall be synthetic rubber. One gasket shall be furnished with each length of elastomeric-gasket bell-end pipe. Pipe spigots shall be beveled. Pipe bells shall be extruded integral with the pipe barrel with a thickness equal to or greater than that of the barrel.
- (3) Nominal laid length of AWWA C900 and C905 PVC (CI) pipe shall be 20 feet.
- (4) The C900 and C905 pipe shall be labeled with the following at intervals of not more than five (5) feet:

Date of manufacture - Manufacturer's Name & Code

- Nominal size - "(CI)" - DR number – Pressure Class – Test Pressure for Hydro Tested or “NOT HYDROSTATIC PROOF TESTED” – AWWA designation number – Manufacturer’s name or trade mark and production run or lot code – Seal (Mark) of the testing agency verifying suitability of material for potable water service (must be NSF).

- (5) Couplings and fabricated fittings shall be marked with:

Nominal Size – “(CI)” – Deflection angle, if applicable – “PVC” – AWWA Pressure Class – AWWA designation number of the applicable standard (C900 or C905) – Manufacturer’s name or trademark - Seal (Mark) of the testing agency verifying suitability of material for potable water service (must be NSF).

2. TYPE C900 and C905 PVC FITTINGS

- (a) Fittings for AWWA C900 and C905, PVC (CI) shall conform to the requirements of ASTM Standard D1784 and the specifications for AWWA C900 and C905, PVC (CI) pipe herein, except as modified below.
- (b) All fittings for C900 pipe shall be manufactured from PVC compound conforming to ASTM Standard D 1784-11. Fittings shall conform to the thickness requirements of DR18. All fittings, except wye branches, shall be Class 235 and shall be manufactured to withstand 755 psi quick burst pressure tested in accordance with ASTM Standard D 1599-99, "Standard Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings", and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM Standard D1598-02, "Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure".
- (c) All fittings for C905 pipe shall be manufactured from PVC compound conforming to ASTM Standard D1784-11. Fittings shall conform to the thickness requirements of DR18 for sizes 14 through 30-inch and DR25 for 36 through 48-inch. All fittings, except wye branches, shall be Class 235 for sizes 14 through 30-inch and Class 165 for 36 through 48-inch. Fittings 14 through 30-inch shall be manufactured to withstand 755 psi quick burst pressure tested in accordance with ASTM Standard D1599-99, "Test Method for Short-Time Hydraulic Failure of Plastic Pipe, Tubing, and Fittings" and withstand 500 psi for a minimum of 1,000 hours tested in accordance with ASTM Standard D1598-02, "Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure". Fittings 36 through 48-inch shall be manufactured to with-stand 535 psi quick burst pressure tested in accordance with ASTM Standard D1599-99, "Test Method for Short-Time Hydraulic Failure of Plastic Pipe, Tubing, and Fittings" and withstand 350 psi for a minimum of 1,000 hours tested in accordance with ASTM Standard D 1598-02, "Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure".

3. JOINT RESTRAINTS FOR C900 AND C905 PVC PRESSURE PIPE

For restraining C900 and C905 PVC pressure pipe and fittings, refer to Section 2.01.D.3, "Mechanical Joint and Push-on Joint "Megalug®"-type Restraining Systems", elsewhere in this specification.

- C. MANHOLE COUPLINGS FOR TYPE PSM SDR-35 PVC SEWER PIPE
1. Manhole couplings for Type PSM SDR-35 PVC sewer pipe shall conform to the requirements specified herein for type PSM SDR-35 PVC sewer fittings and shall be completely coated on the exterior with fine aggregate bonded to the PVC surface.
- D. MANHOLE COUPLINGS FOR AWWA C900 and C905, PVC (CI) PIPE
1. Manhole couplings for AWWA C900 and C905 PVC (CI) pipe shall conform to the requirements specified hereinbefore for AWWA C900 and C905, PVC (CI) fittings, and shall be completely coated on the exterior with fine aggregate bonded into/to the PVC surface.
- E. ADAPTER COUPLINGS
1. Adapter couplings shall have adjustable stainless-steel shear rings. Insert shall be provided with coupling. Clamps shall be all stainless steel.
- F. SMALL DIAMETER PVC PIPE AND FITTINGS (SCHEDULES 40 AND 80)
1. Poly (Vinyl Chloride) (PVC) pipe and fittings specified herein are small diameter PVC with threaded, flanged and solvent cemented joints. All PVC pipe and fittings shall be made from high impact, rigid poly vinyl chloride compounds. Pipe and fittings shall be marked indicating size, type and schedule, ASTM Designation, manufacturer or trademark, and shall bear the NSF (National Sanitation Foundation) seal of approval. Wherever the abbreviation PVC is used in these Specifications in relation to pipe and fittings, it shall mean poly (vinyl chloride) plastic pipe and fittings as specified herein.
 2. PVC pipe shall be Schedule 80 as called for on the Plans or by the Engineer, Type I, Grade I, or Class 12454B with socket ends, and shall comply with ASTM Standard D1785, "Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120".
 3. Schedule 80 socket-type fittings shall comply with ASTM Standard D2467, "Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80" and D2464 "Specification for Threaded Poly Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80, for threaded fittings.
 4. Joining cement for PVC pipe and fittings shall comply with ASTM Standard D2564, "Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings". Cemented joints shall be made in accordance with ASTM Standard D2855, "Recommended Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings".

5. Flanges: One-piece molded hub type flat face flanges, 125-pound standard as specified under fittings hereinbefore.
6. Gaskets: Full faced, 1/8-inch thick, neoprene (for sewer) or SBR (for water).
7. AISI Type 316 stainless steel, ASTM A193, Grade B8M hex bolts and ASTM A194 Grade E8 hex head nuts. Bolts shall be fabricated in accordance with ANSI B 1812 and provided with washers of the same materials as the bolts.

G. CERTIFICATION

1. The Contractor shall provide the City with notarized Certifications, signed by an authorized agent of the manufacturer, that the material was manufactured, sampled, tested, and inspected in accordance with these specifications, and has been found to meet the requirements. A report of said test results shall be furnished.
2. No pipe or fitting will be accepted for use in the project until the Certifications have been sub-mitted to and approved by the City.

H. HANDLING AND STORING PVC PIPE AND FITTINGS

1. Pipe and fittings shall at all times be handled with great care to avoid damage. In loading or unloading operations, the manufacturer's unitized package of pipe and/or fittings shall be lifted with a forklift or other suitable equipment in such a manner as to prevent damage. Pipe may be unloaded by individual lengths. However, each length shall be slid or rolled on skidways in such a manner that the pipe is not dropped, and to avoid any shock. Under no circumstances shall pipe and/or fittings be dropped or allowed to roll or slide against obstructions.
2. Pipe and/or fittings having ultraviolet degradation, warpage, impact damage, abrasion damage, or gouges or cuts will not be accepted. Bell ends showing compression set, damage or deformation will not be acceptable.
3. Gaskets, if not prepositioned in the bell ends, shall be stored and shipped in suitable protective containers. Gaskets shall not be exposed to excessive heat, direct sunlight, oil or grease.
4. Pipe and fittings shall be stored in a manner that will prevent warpage or other damage as previously specified.
5. If the pipe and/or fittings are to be stored for any period in excess of six months in direct sunlight the items shall be covered with an opaque material. The cover shall be placed in such a manner that will permit air circulation above and around the items being covered to prevent excessive heat accumulation.

6. Pipe and fittings shall be manually or mechanically lowered into the trench for installation, and shall not be thrown, dropped or pushed in the trench.

2.03 PIPE AND FITTINGS: COPPER

- A. Pipe: Copper pipe shall be Type K for interior piping and Type K Soft Temper for exterior piping, both conforming to ASTM B88, seamless, round, drawn tubing.
- B. Fittings: Solder joint fittings shall be wrought copper and bronze fittings conforming to ANSI B16.22 or cast brass fittings conforming to ANSI Standard B16.18. Fittings for use with copper tubing shall be one of the following:
 1. Cast Bronze Solder-Joint Fittings: Solder joint fittings of this type shall be cast bronze fittings conforming to ANSI B16.18, "Cast Brass Solder-Joint Fittings", and ASTM Standard B62, "Composition Bronze or Ounce Metal Castings", as manufactured by Chase Brass and Copper Co., Stanley G. Flagg & Co., Inc., or approved equal.
 2. Wrought Copper Solder-Joint Fittings: Solder joint fittings of this type shall be wrought copper fittings in accordance with ASNI B16.22, "Wrought Copper and Bronze Sold-er-Joint Pressure Fittings".
- C. Solder: Solder shall consist of 95 percent tin and 5 percent antimony. Soldering shall be in conformance with Section 3 of the Copper and Brass Research Association Copper Tube Handbook.
- D. Connection of copper pipe or fittings with galvanized pipe or fittings shall be made with dielectric fittings.

2.04 PIPE AND FITTINGS: GALVANIZED STEEL

- A. Steel pipe, except as otherwise specified below, shall be Schedule 40, galvanized, seamless steel pipe, conforming to ASTM Standard A53, "Pipe, Steel Black and Hot-Dipped, Zinc-Coated Welded and Seamless", Type S, Grade A or B. Black steel pipe may be used in fabricating items which are to be hot-dip galvanized after fabrication.
- B. Screwed fittings, except as otherwise specified, shall be 150 psi galvanized malleable iron. Screwed unions shall be galvanized malleable iron with ground brass seats. Pipe threads shall be American Standard B2.1 NPT. Joint compound shall be used on all threaded joints, applied to the male threads only.
- C. Furnish data certified by the manufacturer that the pipe and fittings are of the material specified. No piping will be accepted or used in construction until certificates have been submitted to and approved by the Engineer of Record.

2.05 PIPE AND FITTINGS: VITRIFIED CLAY

- A. Vitrified clay pipe and fittings for gravity sewers shall be extra-strength, non-perforated. Pipe and fittings shall conform to the latest edition of ASTM Standard C700, "Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated", and the following requirements.
- B. A single fracture or crack passing through socket of the pipe bell and exceeding a length of one-half ($\frac{1}{2}$) inch in any direction shall be cause for rejection of the pipe. This requirement supersedes the portion of the ASTM Specifications cited above in conflict herewith.
- C. The Contractor shall furnish certification from the manufacturer that the pipe and fittings used meet the requirements of ASTM Specifications C700.
- D. The manufacturer shall furnish certification that the pipe and fittings supplied meet the requirements of ASTM Standard C700, latest edition. The Contractor shall be prepared to produce said certification when requested by the City.
- E. Only factory bonded joints will be permitted for all vitrified clay pipe. The joints shall have rubber "O" ring type compression seals conforming to "Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings", ASTM C425, latest edition.
- F. City approved pipe joints are Polyester Ring-Type joints as manufactured by Logan Clay Products Company under the trade name of "Logan-O-Ring", Can-Tex Industries under the trade name of "Can-O-Lock," or approved equal.
- G. Where cast iron soil pipe or ductile iron pipe laterals are used with vitrified clay mains, the wye or tee shall be vitrified clay. For the joint between the vitrified clay wye or tee and the lateral pipe use FERNCO "Donut" No. 6-10-601 with E.H.C.I. soil pipe and "Donut" No. 6-08-607 with ductile iron laterals, or approved equals. When using E.H.C.I. soil pipe with ductile iron tees or wyes, use transition gasket by Romac or approved equal.

2.06 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

- A. Smooth wall high density polyethylene pipe shall be a Type III, Class C, Category 5, Grade P34; PE 3408; as defined in ASTM D1248. Minimum classification, as given by ASTM D3350, shall be PE 335434C. Pipe shall meet the standards of ASTM F714, as modified herein, including the "Government/Military Procurement" sections. Minimum hydrostatic design basis shall be 1600 psi. In all cases, hydrostatic design basis and pressure rating shall be as determined using the methods of ASTM F714. Pipe of this type shall be butt-fusion welded at joints. All welding of joints shall be in strict conformity with the recommendations of the pipe manufacturer and by a firm or individual recommended to the Engineer of Record in writing by the manufacturer.
- B. As a part of the shop drawing submittals under Section 01300, "Submittals", the Contractor shall furnish the following signed by a Florida Registered Engineer, all

calculations to determine, the pipe thickness, SDR rating, allowable stresses, in accordance with ASME B31.8 -1992, Table A842.22 and recommended coating, as required by the pipe manufacturer.

2.07 HIGH DENSITY POLYETHYLENE (HDPE) FOR USE IN POTABLE WATER SERVICES 2-INCH NOMINAL DIAMETER AND LESS

A. HDPE PIPE FOR WATER SERVICES:

1. All 2-inch high density polyethylene pipe used for services shall be IPS-OD-controlled with Standard Outside Dimension Ratio (SODR) of 9, pressure rating of 200 psi, nominal outside diameter of 2.375-inches, minimum wall thickness of 0.264-inches, PE 3408, all in conformance with ASTM D3035-95 "Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter".
2. Pipe shall conform with ANSI/AWWA C901-96 "Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) Through 3 In. (76 mm), for Water Service" as modified herein.
3. Pipe shall have a (natural) inner core with a blue colored outer shell.
4. Pipe shall have footage marks at a maximum interval of every two feet.
5. Polyethylene material shall have a minimum cell classification in accordance with ASTM D3350-00 "Polyethylene Plastics Pipe and Fitting Materials" of 345444D for the core, which shall be 100% virgin material, and 345444E for the outer shell. Note that both of these materials are UV stabilized as signified by the "D" for natural colored and "E" for the colored shell.
6. Pipe shall conform with NSF 61 or 14.
7. Manufacturer shall supply certification of compliance with all of the above requirements. Certification shall ship with the pipe on material sold to the City and shall always be submitted with shop drawings and catalogue cuts. When required by the Director of the Department of Public Utilities or his designee, certification shall be signed and sealed by a professional engineer licensed to practice in the state in which the manufacturer is located or in the State of Florida.

B. HDPE TUBING FOR WATER SERVICES:

1. All 1-inch high density polyethylene tubing used for services shall be CTS-OD-controlled with Standard Outside Dimension Ratio (SODR) of 9, pressure rating of 200 psi, nominal outside diameter of 1.125-inches, minimum wall thickness of 0.125-inches, PE 3408, all in conformance with ASTM D2737-99 "Polyethylene (PE) Plastic Tubing".

2. Tubing shall conform with ANSI/AWWA C901 "Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) Through 3 In. (76 mm), for Water Service" as modified herein.
3. Tubing shall have a (natural) inner core with a blue colored outer shell.
4. Tubing shall have footage marks at a maximum interval of every two feet.
5. Polyethylene material shall have a minimum cell classification in accordance with ASTM D3350-00 "Polyethylene Plastics Pipe and Fitting Materials" of 345444D for the core, which shall be 100% virgin material, and 345444E for the outer shell. Note that both of these materials are UV stabilized as signified by the "D" for natural colored and "E" for the colored shell.
6. Tubing shall conform with NSF 61 or 14.
7. Manufacturer shall supply certification of compliance with all of the above requirements. Certification shall ship with the tubing on material sold to the City and shall always be submitted with shop drawings and catalogue cuts. When required by the Director of the Department of Public Utilities or his designee, certification shall be signed and sealed by a professional engineer licensed to practice in the state in which the manufacturer is located or in the State of Florida.

C. MECHANICAL FITTINGS UTILIZED WITH HDPE PIPE AND TUBING WATER SERVICES

1. Mechanical fittings utilized with HDPE pipe and tubing for water services shall conform with ANSI/AWWA C800, "Underground Service Line Valves and Fittings", as modified here-in.
2. Fittings shall utilize AWWA Standard (Mueller) threads on tapped pipe and tapping saddles
3. Fittings shall be designed and manufactured to withstand a sustained working pressure of 150 psi and to restrain the pipe against pull-out under loading beyond that causing tensile yield in the HDPE pipe or tubing connected.
4. The manufacturer shall supply certification of these capabilities and fittings shall not be accepted or installed without said certification. If fittings are being supplied to the City, the certification shall ship with the fittings and payment will not be made without this certification. At the discretion of the Engineer, this certification may be required to be signed and sealed by a professional engineer licensed to practice in the state where the supplying firm is located or in the State of Florida. His decision in this regard shall be final.
5. In all cases, fittings shall be installed in strict accordance with the manufacturer's instructions.

2.08 WALL SLEEVES, PIPES AND CASTINGS

Wall Sleeves: Wall sleeves shall be of cast iron, ductile iron or carbon steel with steel galvanized after fabrication, under wall pipe. Sleeves shall be provided with seals and shall be oversized as required for the installation of seals. Sleeves shall terminate flush with finished surfaces of walls and ceilings and shall extend 2-inches above the finished floor. Escutcheons shall be provided at walls and floor to completely conceal the sleeves smaller than 3-inches. Escutcheons shall be brass or cast iron, nickel plated split-type.

Interior: Wall sleeves shall be installed for all piping passing through interior walls and floors, except where noted on the Drawings. Sleeves shall be of sufficient size to pass the pipe without binding.

- A. Wall Sleeve Seals: Wall sleeve seals shall be modular mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall sleeve. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely water-tight seal between the pipe and wall sleeve. The synthetic rubber shall be suitable for exposure to treated sewage effluent and groundwater. Bolts, nuts and hardware shall be A-316 stainless steel. The seals shall be Link Seal as manufactured by Thunderline Corporation or equal, and the wall sleeve and seal shall be sized as recommended by the seal manufacturer.
- B. All piping passing through exterior walls and base slabs shall be provided with wall pipes. All wall pipes shall be of ductile iron and shall have an intermediate flange or waterstop located in the center of the wall. Each wall pipe shall be of the same grade, thickness and interior coating as the piping to which it is joined. Those portions of the wall pipes that are buried shall have a coal tar outside coating.

2.09 STEEL CASING (JACKING AND BORING)

See Section 15070, "Jacking and Boring"

PART 3 - EXECUTION

3.01 GENERAL:

- A. The Contractor shall provide all barricades and/or flashing warning lights necessary to warn of the construction throughout the Project.
- B. Pipe and fittings shall at all times be handled with great care to avoid damage. In loading and unloading, they shall be lifted with cranes or hoists or slid or rolled on skidways in such manner as to avoid shock. Under no circumstances shall this material be dropped or allowed to roll or slide against obstructions.

- C. All work shall be performed by skilled workmen experienced in similar installations. All pipe and fittings shall be adequately supported by clamps, brackets, straps, concrete supports, rollers or other devices as shown and/or specified. Supports or hangers shall be spaced so that maximum deflection between supports or hangers shall not exceed 0.050 inch for pipe filled with liquid, but shall not be further than 6 feet apart, whichever is closer, unless otherwise shown. All pipe supports shall be secured to structures by approved inserts or expansion shields and bolts.
- D. All pipe shall be thoroughly cleaned internally before being installed. All pipes, except oxygen service, air and gas, shall be flushed with water and swabbed to assure removal of all foreign matter before installation. Air and gas piping shall be tapped with a hammer to loosen scale or other foreign matter that might be within the pipe, then thoroughly blown with a high-pressure air hose. Air shall be from the Contractor's air compressor.
- E. Whenever possible, the pipe will be installed with minimum 48-inches of cover, however, due to the numerous utilities in the area, this burial could change substantially.
- F. At all horizontal or vertical pipe deviation, the Contractor shall install both restrained pipe and thrust blocks. Joints may only be opened to adjust alignment by half of the AWWA or manufacturer's recommended opening (which is smaller).
- G. Pipe Sleeves and Wall Castings: Pipe sleeves and wall castings shall be provided at the locations called for on the Drawings and/or specified herein. These units shall be as detailed and of the material as noted on the Drawings and/or specified herein. 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.
- H. Tie Rods: Unless otherwise indicated on the Drawings, the size and number of tie rods for a joint or installation shall be as recommended by the manufacturer's design chart for a working pressure of 150 psi. Tie rods shall be installed as recommended by the manufacturer.

3.02 EXCAVATION FOR PIPING

- A. The Contractor shall make all excavation necessary for the construction of the pipelines, connections, valves and appurtenances, to the lines and grades shown on the Plans.
- B. The trench shall be excavated at least 6 inches below pipe laying grade as shown on the Plans. All sheeting and shoring shall be installed at the Contractor's expense where it is necessary for pipe installation and property protection or required by the Trench Safety Act. The cost of dewatering any excavation shall be at the Contractor's expense. The disposal of water removed from an excavation shall be in a manner which will not create a hazard or be detrimental to the public health or to public or private property.

- C. The Contractor shall 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. All construction signs required shall be provided by the Contractor.

3.03 INSTALLATION OF PIPE, FITTINGS AND VALVES

A. GENERAL:

1. The design Drawings are in some cases diagrammatic. They may not show every bend, off-set, elbow or other fitting which may be required in the piping for installation in the space allotted. Careful coordination of the work of this Section with that of Division 2 and 16 is necessary to avoid conflicts. Install gravity lines at uniform grade to low point after field verification of low point invert.
2. The centerline of the pipe shall not vary by more than 2 inches from the location shown on the Plans and the top of the pipe shall not vary by more than 2 inches from the established grade, except at points where this tolerance must be changed to clear obstructions, or make connections. Deviation from this location will be permitted only upon written instructions from the Engineer.
3. Sandbags may be used to support the pipe in the ditch, but no pipe shall be laid on blocks, except by the written permission of the Engineer of Record. The trench shall be dewatered to the extent that all poured lead joints in cast iron pipe and fittings may be made perfectly dry. Flanged joints, mechanical joints and push-on joints in cast iron pipe and fittings may be made under water.

B. INSTALLATION OF DUCTILE IRON PIPE:

1. All bends, tees, and plugs, unless otherwise specified, shall be backed with concrete to undisturbed ground. Provision shall be made to prevent concrete from adhering to plugs or bolts.
2. Bolts, nuts and rubber gaskets for use in flanged and mechanical joints shall be stored under cover. Gaskets shall not be exposed to heat, light or any petroleum products, shall be kept clean and shall not be handled with greasy or dirty hands.
3. Before making up flanged joints in cast iron pipe and fittings, the back of each flange under the bolt heads, and the face of each flange shall have all lumps, blisters and excess bituminous coating removed and shall be wire brushed and wiped clean and dry.
4. Before laying the ductile iron pipe, all lumps, blisters and excess coal-tar coating shall be removed from the bell and spigot ends of each pipe and the outside of the spigot and the inside of the bell wire brushed and wiped clean and dry. The entire gasket groove area shall be free of bumps or any foreign matter which

might displace the gasket. The cleaned spigot and gasket shall not be allowed to touch the trench walls or trench bottom at any time. Vegetable soap lubricant shall be applied in accordance with the pipe manufacturer's recommendations, to aid in making the joint. The workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt. Deflections shall be made only after the joint has been assembled.

5. Cutting of ductile iron pipe for inserting valves, fittings, etc., shall be done by the Contractor with a mechanical pipe saw in a neat and workmanlike manner without damage to the pipe, the lining, or the coating.
6. Unless otherwise directed, ductile iron pipe shall be laid with the bell ends facing in the direction of laying; and for lines on an appreciable slope, the bells shall, at the discretion of the Engineer, face upgrade.
7. Push-on and mechanical joints in ductile iron pipe and fittings shall be made in accordance with the manufacturer's standards except as otherwise specified herein. Joints between push-on and mechanical joint pipe and/or fittings shall be made in accordance with AWWA Standard Specification C600, "Installation of Ductile Iron Water Mains and their Appurtenances, except that deflection at joints shall not exceed one-half of the manufacturer's recommended allowable deflection, or one-half of the allowable deflection specified in AWWA C600, whichever is the lesser amount.
8. Flanged joints shall be used only where indicated on the Plans. Before making up flanged joints in the pipeline, the back of each flange under the bolt heads and the face of each flange shall have all lumps, blisters and excess bituminous coating re-moved and shall be wire brushed and wiped clean and dry. Flange faces shall be kept clean and dry when making up the joint, and the workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt. Bolts and nuts shall be tightened by opposites in order to keep flange faces square with each other, and to ensure that bolt stresses are evenly distributed.
9. Bolts and nuts in flanged and mechanical joints shall be tightened in accordance with the recommendations of the pipe manufacturer for a leak-free joint. The workmen shall exercise caution to prevent overstress. Torque wrenches shall be used until, in the opinion of the Engineer, the workmen have become accustomed to the proper amount of pressure to apply on standard wrenches.

C. INSTALLATION OF PVC PIPE:

1. In the installation of glue joint PVC pipe, the pipe shall first be cut square and smooth. Wipe all surfaces to be connected with a cloth moistened with an appropriate solvent and remove any foreign matter from socket of fitting. Using

an ordinary paint brush of width about equal to the nominal pipe size, apply a generous coat of cement to inside and shoulder of socket, flowing on but not brushing out. A similar coat shall then be applied to the end of the pipe for at least the same distance on the pipe as the depth of socket, and to the cut end. Pipe and fittings shall then be pressed firmly together, and the pipe turned a quarter to a half turn to evenly distribute the cement. The cementing and joining operation must not exceed one minute. Allow 24 hours setup time before applying pressure. Sand shall be used as backfill material around pipe installed underground.

2. Thread Sealant: Teflon tape.
3. All rigid PVC pipe shall be cut, made up, and installed in accordance with the pipe manufacturer's recommendations. Plastic pipe shall be laid by snaking the pipe from one side of the trench to the other. Offset shall be as recommended by the manufacturer for the maximum temperature variation between time of solvent welding and during operation.
4. Schedule 80 pipe shall not be threaded. Use Schedule 80 threaded nipple where necessary to connect to threaded valve or fitting.
5. Only strap wrenches shall be used for tightening threaded plastic joints, and care shall be taken not to over tighten these fittings.
6. Provide adequate ventilation when working with pipe joint solvent cement.
7. Testing: All lines shall be hydrostatically tested at the pressures specified elsewhere herein or at the design pressures.
8. Supports and Hangers: In accordance with the manufacturer's recommendations.

D. INSTALLATION OF COPPER PIPE:

1. Tubing above ground shall, whenever possible, be run in full lengths between fittings, valves and connections, and joints shall be kept to a minimum.
2. All connections shall be made without sharp bends or kinks in the tubing.
3. Above ground tubing shall be supported at short intervals to prevent sagging and vibration.
4. All copper pipe shall be reamed to full diameter before joining. The ends of pipe and the inside of fittings shall be cleaned, and flux applied to the entire area of pipe to be soldered.

E. JOINT PIPE:

1. Threaded Pipe: Ream all pipe after cutting and before threading. Use non-hardening pipe compound "Tite-Seal" (or approved equal) on male threads only.
2. Provide nipples of same material and weight as pipe used. Provide extra strong nipples when length of unthreaded part of nipple is less than 1-1/2".
3. Provide reducing fittings rather than bushings where changes in pipe sizes occur.
4. Provide dielectric unions or flanges between copper and steel piping and between brassware and steel. Do not use steel and copper piping in the same system without such isolation.

F. UNIONS:

Provide unions or flanges in all domestic water service lines at each piece of equipment, specialty valves or at other locations required for ready disconnect.

G. PIPE PROTECTION:

1. Paint all uninsulated metal (ductile iron or steel) piping underground with two coats of asphaltic paint.
2. Wrap soil pipe that touches metal or is exposed to masonry with a layer of 6 mil polyethylene.
3. Spirally-wrap all pipelines embedded in concrete with two layers of 30 lb. felt.
4. Coat all exposed threads on galvanized steel pipe after assembly with two coats of zinc chromate.

H. CLEANING AND TESTING:

All of the piping installed under this project shall be tested as follows and as directed by the Engineer:

1. With exceptions as noted below, all ductile iron piping installed under this Contract shall be cleaned and tested according to Section 15995, "Pipeline Testing and Disinfection", and as modified below:
 - (a) Only potable water piping shall be disinfected.
 - (b) No leakage shall be permitted for any flanged-joint, or above ground piping.

2. Unless otherwise specified elsewhere herein, all PVC pressure system bushings and galvanized steel piping shall be tested at 150 psig. No leakage will be permitted.

I. INSTALLATION OF ABOVEGROUND AND EXPOSED PIPING:

1. Aboveground and exposed pipe fittings, valves and accessories shall be installed as shown or indicated on the Drawings.
2. 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 rather than bushings. Pipe connections shall be made in accordance with the details shown and manufacturer's recommendations. Open ends of pipelines 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 and as required to insure adequate support of the piping.
3. Welded connections shall be made in conformity with the requirements of AWWA Standard C 206 and shall be done only by qualified welders. The Engineer may, at his option, require certificates that welders employed on the work are qualified in conformity with the requirements of this standard and/or sample welds to verify the qualifications of the welders. Before testing, field-welded joints shall be coated with the same material used to coat the pipe in accordance with the requirements of AWWA.
4. Flanged joints shall be made up by installing the gasket between the flanges. The threads of the bolts and the faces of the gaskets shall be coated with a suitable lubricant immediately before installation.
5. Joints using Dresser couplings shall be made up as recommended by the manufacturer.
6. Use of perforated band iron (plumber's strap), wire or chain as pipe hangers will not be acceptable. Supports for pipe less than 1-1/2 inches nominal size shall not be more than 8-feet on centers and pipe 2-inches nominal size and larger shall be supported at not more than 10 feet on centers, unless otherwise indicated. Supports for PVC pipe shall be spaced one-half the distance specified above unless otherwise indicated. Any noticeable sagging shall be corrected by the addition of extra supports at the Contractor's expense.

J. INSTALLATION OF HDPE SERVICES:

All HDPE services require the use of a 10-gauge stranded copper blue tracer wire.

3.04 FIELD QUALITY CONTROL

- A. 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.
- B. Pressure and leakage testing shall follow the requirements of Section 15995, "Pipeline Testing and Disinfection".
 - 1. Where infiltration or exfiltration exceeds the allowable limits specified herein, the defective pipe, joints, or other faulty construction shall be located and repaired by the Contractor at no additional cost or time impact to the Contract.
 - 2. The Contractor shall provide all labor, equipment and materials, and shall conduct all testing required under the direction of the Engineer of Record. No separate payment will be made for this work and the cost for this work shall be included in the prices quoted in the Proposal.
 - 3. The Contractor shall locate and repair all leaks until the leakage is reduced to the limits specified. Any observed leaks or obviously defective joints or pipes shall be repaired or replaced as directed by the Engineer of Record, even though the total leakage is below that specified above.

END OF SECTION

SECTION 15068

PVC FORCE MAIN

PART 1- GENERAL

1.01 DESCRIPTION

- A. This section includes materials, installation, and testing of PVC force main conforming to AWWA C900. Size range is 4 through 12 inches.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Painting and Coating: 09900.
- B. Disinfection of Mains: UC-175.
- C. Piping and Fittings: 15060
- D. Cleaning and Testing Mains: UC-170.

1.03 SUBMITTALS

- A. Submit shop drawings in accordance with the General Provisions.
- B. Provide affidavit of compliance with AWWA C900.
- C. Submit fully dimensioned cross-section of the bell and barrel of the pipe. Show the bell maximum outside diameter in the pressurized area and its minimum wall thickness at the same location.
- D. Submit copies of the following manufacturer-required tests conducted on project pipe:
 - 1. Quick-burst strength of pipe and couplings.
 - 2. Flattening resistance of pipe.
 - 3. Record of additional tests after test sample failure.
- E. Submit manufacturer's literature of gray iron and ductile-iron fittings including dimensions, thickness, weight, coating, lining, and a statement of inspection and compliance with the acceptance tests of AWWA C110 or C153. Submit copy of report of pressure tests for qualifying the designs of all sizes and types of AWWA C153 fittings that are being used in the project. The pressure test shall demonstrate that the minimum safety factor described in AWWA C153 is met.
- F. Submit outline drawings and materials description of service connection saddles, corporation stops, and pipe plugs.

- G. Submit test results for the restrained joint system to be used certified by an independent test laboratory demonstrating compliance with these specifications for each size and pressure rating.
- H. Submit restrained joint system installation instructions. Include bolt torque limitations and assembly tolerances.

1.04 MANUFACTURER'S SERVICE

- A. Provide pipe manufacturer's services at the jobsite for the following minimum labor days, travel time excluded: One labor-day to instruct the Contractor's personnel in the preparation and execution of rubber-gasket and solvent-welded joints for the sizes of pipes to be installed in the project.

1.05 MEASUREMENT AND PAYMENT

- A. Payment for the work in this section will be by the linear foot of each size of pipe (including fittings) of each pressure class measured horizontally.

PART 2 - PRODUCTS

2.01 PIPE

- A. Pipe 4-inches through 12 inches shall conform to AWWA C900, rubber-ring gasket bell end or plain end with elastomeric gasket coupling, DR 18 or as shown in the drawings, cast iron equivalent outside diameter, material cell classification 12454 per ASTM D1784, latest revision.

2.02 FITTINGS

- A. Fittings shall conform to AWWA C153, latest revision or AWWA C110, latest revision.

2.03 LINING AND COATING FOR FITTINGS

- A. Line and coat fittings with fusion-bonded epoxy.

2.04 FLANGES

- A. Flanges on outlets of fittings shall be Class 250 per ASME B16.1.
- B. PVC flanges shall be of the one-piece solid socket design and shall be made of the same material as the pipe. Manufacturer's pressure rating shall be at least 250 psi at a temperature of 73°F. Minimum burst pressure shall be 500 psi. Flanges shall match the dimensions of ASME B16.5, Class 250, steel flanges for outside diameter, bolt circle, and bolt holes. Do not use Van Stone flanges.

2.05 OUTLETS AND NOZZLES

- A. For outlets larger than 2 inches, use a Ductile Iron tee with a flanged or MJ outlet.

2.06 RESTRAINED JOINTS

Provide restrained joints where indicated in the drawings. Restrained joints shall be provided by restraining systems that incorporate a wedge restraint on the restraint ring to provide positive restraint.

- A. Restraint devices for bell-and-spigot joints shall consist of a split restraint ring installed on the spigot, connected to a solid backup ring seated behind the bell.
- B. Restraining Glands shall be EBAA Iron Series 2000 and 1600 or approved equal.
- C. The ASTM A536 ductile iron casting of the restrained gland shall be bonded powder coated. The wedge and wedge assembly shall have a bonded liquid polymer coating applied for corrosion protection. The gland shall utilize torque limiting twist off wedge actuation screws.
- D. T-bolts, studs, and connecting hardware shall be high-strength, low alloy material in accordance with AWWA C111.
- E. Design restraining devices to have a 2:1 safety factor based on the design strength of the pipe.

2.07 FLANGED COUPLING ADAPTERS See Section 15065.

2.08 WYE STRAINERS

PVC wye strainers shall be manufactured of the same material as the pipe, with 30- mesh screens and Viton seals. Connecting ends shall be the socket type, solvent welded. Provide one spare screen for each strainer.

PART 3 - EXECUTION

3.01 PRODUCT MARKING

Legibly mark pipe at 5-foot intervals and each coupling to identify the nominal diameter, the outside diameter base, that is, cast-iron or steel pipe (IPS), the material code for pipe and couplings, the dimension ratio number, AWWA C900, and the seal of the testing agency that verified the suitability of the material for potable water service (NSF).

3.02 DELIVERY AND TEMPORARY STORAGE OF PIPE

- A. Ship, store, and place pipe at the installation site, supporting the pipe uniformly. Avoid scratching the pipe surface. Do not stack higher than 4 feet or with weight on bells. Cover to protect from sunlight.

- B. Do not drag PVC pipe over the ground, drop it onto the ground, or drop objects on it.
- C. Store loose pipes on racks with a maximum support spacing of 3 feet. Provide shades for pipe stored outdoors or installed outdoors until the pipe is filled with water. Store fittings indoors in their original cartons.
- D. Store solvent cement indoors or, if outdoors, shade from direct sunlight exposure. Do not use solvent cements that have exceeded the shelf life marked on the storage container.

3.03 HANDLING PIPE

- A. Hoist pipe with mechanical equipment using a cloth belt sling or a continuous fiber rope that avoids scratching the pipe. Do not use a chain. Pipes up to 12 inches in diameter may be lowered by rolling on two ropes controlled by snubbing. Pipes up to 6 inches in diameter may be lifted by hand.

3.04 INSTALLING BURIED PIPING

- A. Bedding material and backfill to 1 foot above the pipe for PVC shall be Type 1 backfill with a max rock size of ¾-inch compacted in 6-inch lifts. The minimum trench width shall be the pipe width plus 24-inches (12-inches on each side).
- B. Before installation, check pipe and fittings for cuts, scratches, gouges, buckling, kinking, or splitting on pipe ends. Remove any pipe section containing defects by cutting out the damaged section of pipe.
- C. Do not install PVC pipe when the temperature is below 40°F or above 90°F.
- D. Do not install pipe that is gouged or scratched forming a clear depression.
- E. Install in accordance with AWWA C605, and as follows.
 - 1. When installing pipe in trenches, do not deviate more than 1 inch from line or 1/4 inch from grade. Measure for grade at the pipe invert.
 - 2. Backfill materials in the pipe zone shall be imported sand per Section 02315. Do not add successive layers unless the previous layer is compacted to 90% relative compaction per ASTM D1557.
 - 3. Compact material placed within 12 inches of the outer surface of the pipe by hand tamping only.
 - 4. Compact trench backfills to the specified relative compaction. Do not float pipe. Do not use high-impact hammer-type equipment except where the pipe manufacturer warrants in writing that such use will not damage the pipe.

3.05 PIPE LAYOUT FOR CURVED ALIGNMENT

- A. Complete curves using straight pipe, and effecting deflection at the joint. Pipe lengths may not be bent for curved alignment.

3.06 ASSEMBLY OF RUBBER-GASKET PIPE JOINT

- A. The spigot and bell or bell coupling shall be dirt free and slide together without displacing the rubber ring. Lay the pipe section with the bell coupling facing the direction of laying.
- B. Insert the rubber ring into the groove in the bell in the trench just before joining the pipes. First clean the groove. Observe the correct direction of the shaped ring. Feel that the ring is completely seated.
- C. Lubricate the spigot over the taper and up to the full insertion mark with the lubricant supplied by the pipe manufacturer. If the lubricated pipe end touches dirt, clean the pipe end and reapply lubricant.
- D. Insert the spigot into the bell and force it slowly into position.
- E. Check that the rubber ring has not left the groove during assembly by passing a feeler gauge around the completed joint.

3.07 FIELD HYDROSTATIC TESTING

- A. Test pressures are shown in Section UC-170. Test in accordance with Section UC-170.

END OF SECTION

SECTION 15100

VALVES, GENERAL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall provide all tools, supplies, materials, equipment, and labor necessary for furnishing, epoxy coating, installing, adjusting, and testing of all valves and appurtenant work, complete and operable, in accordance with the requirements of the Contract Documents. Where buried valves are shown, the Contractor shall furnish and install valve boxes to grade, with covers, extensions, and position indicators.
- B. The provisions of this Section shall apply to all valves and valve operators specified in the various Sections and Division 2 of these Specifications except where otherwise specified in the Contract Documents. Valves and operators in particular locations may require a combination of units, sensors, limit switches, and controls specified in other Sections of these Specifications.

1.02 RELATED WORK

- A. Section 02222 - Excavation and Backfill for Utilities and Structures
- B. Section 02661 – Wastewater Force Mains

1.03 REFERENCE STANDARDS

- A. Codes: All codes, as referenced herein, are specified in Section 01070
- B. Commercial Standards:
- C. ANSI B16.5 Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys
- D. ANSI/ASME B31.1 Power Piping
- E. ASTM A 36 Specification for Structural Steel
- F. ASTM A 48 Specification for Gray Iron Castings
- G. ASTM A 126 Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
- H. ASTM A 536 Specification for Ductile Iron Castings
- I. ASTM B 61 Specification for Steam or Valve Bronze Castings

- J. ASTM B 62 Specification for Composition Bronze or Ounce Metal Castings
- K. ASTM B 148 Specification for Aluminum-Bronze Castings
- L. ASTM B 584 Specification for Copper Alloy Sand Castings for General Applications
- M. ANSI/AWWA C500 Gate Valves for Water and Sewerage Systems
- N. ANSI/AWWA C502 Dry-Barrel Fire Hydrants
- O. ANSI/AWWA C503 Wet-Barrel Fire Hydrants
- P. ANSI/AWWA C504 Rubber-Seated Butterfly Valves
- Q. ANSI/AWWA C507 Ball Valves 6 Inches Through 48 Inches
- R. AWWA C508 Swing-Check Valves for Waterwork Service, 2 Inches Through 24 Inches NPS
- S. ANSI/AWWA C509 Resilient-Seated Gate Valves for Water and Sewage Systems
- T. ANSI/AWWA C511 Reduced-Pressure Principle Backflow-Prevention Assembly
- U. AWWA C550 Protective Interior Coatings for Valves and Hydrants
- V. SSPC-SP-2 Hand Tool Cleaning
- W. SSPC-SP-5 White Metal Blast Cleaning

1.04 SUBMITTALS

- A. Shop Drawings: Shop drawings of all valves and operators including associated wiring diagrams and electrical data, shall be furnished as specified in Section 01300 - Submittals.
- B. Valve Labeling: The Contractor shall submit a schedule of valves to be labeled indicating in each case the valve location and the proposed wording for the label.

1.05 QUALITY ASSURANCE

- A. In accordance with the "Reduction of Lead in Drinking Water Act" (Act) enacted by the USEPA on January 4, 2011, effective January 4, 2014 all piping, fittings, fixtures, valves, and other appurtenances used in potable water supply and distribution systems shall be "lead free" as defined in Section 1417(d) of the Safe Drinking Water Act (SDWA). All requirements of the Act as it relates to the products under this section shall be strictly adhered to.
- B. All valves and related appurtenances shall be manufactured in the United States.

- C. Bolts on valve flanges shall be A-316 stainless steel.
- D. Valve Testing: Unless otherwise specified, each valve body shall be tested under a test pressure equal to twice its design working pressure.
- E. Bronze Parts: Unless otherwise specified, all interior bronze parts of valves shall conform to the requirements of ASTM B 62, or where not subject to dezincification, to ASTM B 584.
- F. Certification: Prior to shipment, the Contractor shall submit for all valves over 12 inches in size, certified, notarized copies of the hydrostatic factory tests, showing compliance with the applicable standards of AWWA, ANSI, ASTM, etc.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The Contractor shall furnish all valves, gates, valve operating units, stem extensions, operators and other accessories as shown or specified. All valves and gates shall be new and of current manufacture. All non-buried valves, 6-inch and larger, shall have operators with position indicators. Where buried, these valves shall be provided with valve boxes, covers and valve extensions. Valves mounted higher than 6-feet above working level shall be provided with chain operators. All valve boxes shall have a minimum design pressure rating of 150 psi unless otherwise specified elsewhere herein. If two (2") or smaller valves are needed, Nibco T-113-LF shall be used.
- B. Ductile iron parts of valves shall meet the requirements of ASTM A126, "Standard Specifications for Gray Iron Castings for Valves, Flanges and Pipe Fittings, Class 'B'." Flanged ends shall be flat-faced and have bolt circle and bolt patterns conforming to ANSI B16.1 Class 125.
- C. All castings shall be clean and sound, without defects of any kind and no plugging, welding or repairing of defects will be permitted. All bolt heads and nuts shall be hexagonal conforming to ANSI B18.2. Gaskets shall be full-face and made of synthetic elastomers in conformance with ANSI B16.21 suitable for the service characteristics, especially chemical compatibility and temperature. Non-ferrous alloys of various types shall be used for parts of valves as specified. Where no definite specification is given, the material shall be the recognized acceptable standard for that particular application. All nuts, bolts and washers shall be A-316 stainless steel.
- D. All buried valves shall be provided with cast-iron valve boxes unless otherwise indicated. The boxes shall conform to City Standards and be installed perpendicularly, centered around and covering the upper portions of the valve operator. The top of each valve box shall be placed flush with finish grade unless otherwise indicated on the Drawings. Valve boxes shall be as specified elsewhere in this Section.

- E. All buried valves and other valves located below a concrete operating deck or level, specified or noted to be key operated, shall have an operator to finish grade or deck level, non-rising stem, a 2-inch square AWWA nut with skirt, and cover or box and cover, as may be required.
- F. Extension Shafts:
1. A one-piece extension shaft with an AWWA 2-inch square operator nut pinned at the top end and coupling shear pin shall be furnished with valves, where applicable, as shown in the Plans or Standard Details. Extension shafts shall be designed and furnished by the valve manufacturer and shall each be complete with coupling, standard AWWA 2-inch square operating nut with skirt, shear pins and centering-identification plate, for connection to the valve operator (or input) shaft as specified herein below. Shafts shall be of solid section. Hollow shafting is not acceptable.
 2. All operator components between the operating nut and the adjustable stops shall be designed to withstand, without damage, an input torque of 300 ft. lbs. The shaft shall be furnished with an AWWA 2-inch square operating nut with skirt, mounted and pinned to the top of the shaft. A coupling shall be provided for the bottom of the shaft to connect the extension to the valve operator (or input) shaft.
 3. The coupling shall be welded to the bottom end of the extension shaft after the exact required length of the shaft has been determined by field measurement during the valve installation and cut to size. The weld shall be wire brushed and painted with Kop-Coat Super Hi-Gard 891 or approved equal. The sized extension shaft with welded coupling shall be installed to the valve operator shaft and pinned with the coupling shear pin. The welding of the coupling to the extension shaft shall be performed by operators who are certified. The welding shall conform to all of the applicable recommendations of the American Welding Society and the American Institute of Steel Construction.
 4. The pin through the coupling and valve operator (or input) shaft shall be of a larger diameter than the pin through the top nut and extension shaft, so that if torque exceeds the designed limits, the pin through the nut will shear first. Pins shall be either force fit or mechanically locked. Mechanical locking shall be by lock washers, lock nuts, force fit or other sturdy and corrosion resistant means. No roll pins will be allowed. Riveted or welded type pins will not be allowed.
 5. The extension shaft shall also be equipped with a combination centering-identification plate. The combination centering-identification plate, with a drilled or punched center hole, will be slipped onto the shaft prior to welding the shaft's bottom coupling as specified above. The center hole in the plate shall be 1/4 inch larger in diameter than the shaft, maximum. The plate shall be 1/8-inch thick AISI

Type 316 stainless steel with an outside diameter of 6-3/4 inches. The top of the plate shall be buffed to remove mill scale, and the following information shall be stamped into the top of the plate in letters and numerals not less than 3/8 inch in height; valve manufacturer; valve type, size and class; direction to open; and number of turns to fully open from a fully closed position. The valves shall open by turning the operating nuts counterclockwise.

- G. Valve Flanges: The flanges of valves shall be in accordance with Section 15060 - Piping and Fittings.
- H. Gate Valve Stems: Gate valve stems shall be of bronze conforming to ASTM B62, containing not more than 5 percent of zinc or more than 2 percent of aluminum. Gate valve stems shall have a minimum tensile strength of 60,000 psi, a minimum yield strength of 40,000 psi, and an elongation of at least 10 percent in 2 inches, as determined by a test coupon poured from the same ladle from which the valve stems to be furnished are poured. Where dezincification is not a problem, bronze conforming to ASTM B 584 may be used.
- I. Protective Coating: Except where otherwise specified, ferrous surfaces, exclusive of stainless-steel surfaces, in the fluid passages of all valves 4-inch and larger shall receive an epoxy coating in accordance with AWWA C550. Flange faces of valves shall not be epoxy coated. The valve manufacturer shall certify in writing that such coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications. Exterior coating shall be asphalt varnish conforming to Federal Specification TT-C-494A.
- J. Nuts and Bolts: All nuts and bolts on valve flanges and supports shall be in accordance with manufacturer's recommendations. Where submerged or buried, all nuts, bolts and washers on valve flanges and valve bodies shall be A-316 stainless steel. Nuts, bolts and washers shall be of different grades of stainless steel to prevent galling.
- K. Valve Labeling: A label shall be provided on all shut-off valves exclusive of hose bibs and chlorine cylinder valves. The label shall be of 1/16-inch brass or stainless steel, minimum 2 inches by 4 inches in size, and shall be permanently attached to the valve or on the wall adjacent to the valve or as indicated by the City.
- L. Valve Operators
 - 1. General
 - a. All butterfly valves, plug valves over 8-inch size and gate valves installed horizontally shall be furnished with geared operators, provided by the manufacturer. All valves of a particular size and pressure rating by a given manufacturer shall be supplied with the same operator. No variation will be permitted during the contract. All valve operators, regardless of type, shall be installed, adjusted, and tested by the valve manufacturer at the

manufacturing plant. Operator orientation shall be verified with the City prior to fabrication. If this requirement is not met, changes to orientation shall be made at no cost the City.

- b. All operators shall turn counterclockwise to open. Operators shall have the open direction clearly and permanently marked. Field adjustment and testing of the operators and valves to ensure proper installation and operation shall be the responsibility of the Contractor.

2. Manual Operators

- a. All manual operators shall be equipped with AWWA square nuts, handwheels or chain drives as appropriate. Some small (6-inch or less) valves may be lever operated if so, specified elsewhere herein. Where buried, the valves shall have extensions with square nuts or floor stands as indicated on the Drawings. Valves mounted higher than 6 feet above floor or operating level shall have chain operators with chain terminating 4 feet above operating level.
- b. Operation of valves and gates shall be designed so that the effort required to operate the handwheel, lever or chain shall not exceed 40 pounds applied at the extremity of the wheel or lever. The handwheels on valves 14 inches and smaller shall not be less than 8 inches in diameter, and on valves larger than 14 inches the handwheel shall not be less than 12 inches in diameter.
- c. Chainwheel operator shall be fabricated of malleable iron with pocketed type chainwheels with chain guards and guides. Chainwheel operators shall be marked with an arrow and the word "open" indicating direction to open. The operators shall have galvanized smooth welded link type chain. Chain that is crimped or has links with exposed ends is not acceptable.

3. Electric Motor Operators

- a. All motorized valves shall be furnished by the Contractor through the valve manufacturers as a complete package. Motor driven valve operators shall be furnished and installed in accordance with the applicable requirements shown on the process and instrumentation diagrams and electrical elementary diagrams. Operators shall comply with AWWA requirements for electrical operators.
- b. Electric operators including the motor, all required gearing, integral continuous duty rated reversing starter, AC line surge suppressors, controls and switches shall be as manufactured by Rotork, Limitorque, EIM; or equal. The motorized operators for modulating service shall be

furnished with an integral position indicator/transmitter/controller. The above unit shall be internally powered, factory calibrated and furnished with adjustable zero, span, gain and deadband controls.

- c. The position indicator/transmitter shall provide a linear, isolated, 4-20 mA, 24 VDC output to remote instrumentation and controls proportional to 0-100 percent travel span. An external DC power source shall not be required.
- d. The position controller shall accept a linear 4-20 mA, 24 VDC input signal proportional to 0-100 percent travel span and shall generate appropriate outputs to the reversing starter to open/close the valve until the desired position has been reached as determined by the position feedback signal to the position controller. Input signal isolation shall be provided.
- e. The controller shall be furnished with circuitry to "lock in the last position" upon loss of control signal. Contractor shall be responsible for proper transmitter/controller calibration in accordance with the manufacturer's recommendations.
- f. Operator capacity shall be adequate to continuously operate the valve under all operating conditions. Unless otherwise indicated, or specified, motor operators shall be furnished complete with motors, limit switch operating mechanisms, travel limit switches, torque switches, transmitters, controllers, starters, lighting and surge suppression, terminal blocks, gear reducers, handwheel, gearing, necessary components, and incidental accessories as follows:
 - 1) All phases of the power supply shall be monitored. The contractor shall open de-energizing the motor upon detection of single phasing.
 - 2) Logic circuits shall be protected against spurious voltage spikes, using opto-isolators in circuits connected to any remote input or output signals.
- g. Enclosure: The starter for 240-volt single phase motor operators and all local devices shall be mounted on a common NEMA 4 and PVC coated cast aluminum enclosure. The enclosure shall be permanently affixed to the valve operator housing.
- h. Valve Stops: Valve stops for the operators shall be positive in action. Closing shall be complete and opening full. Stops shall be field adjustable to the required settings. The torque switches shall prevent any excessive mechanical stress or electrical overloading any direction of travel.

- i. Limit switches and gearing shall be an integral part of the motorized valve operator. The limit switch gearing shall be of the intermittent type, totally enclosed in its own gear case, grease lubricated to prevent direct and foreign matter from entering the gear train and shall be made of bronze or stainless steel. Limit switches shall be of the adjustable type capable of being adjusted to trip at any point between the normal position (full open, or full closed) and 75 percent of the travel to the opposite position.

- j. Local (Motor) Devices: Local devices shall include, but not be limited to the following:
 - 1) Torque Switches: Torque switches, responsive to high torque encountered in either direction of travel. A torque switch which has tripped due to mechanical load shall not reset when the operator motor has come to a halt.

 - 2) Limit Switches: Travel limit switches, for opening and closing direction of travel. Contract operations shall be as indicated on the Drawings. If not shown on the Drawings, the operator shall be furnished with a minimum of two DPDT switches. All switches shall be furnished with 5 ampere contacts. Switches shall be connected such that when the valve is fully open, or fully closed, the "open" or "close" light shall be illuminated. All limit switch contacts shall be wired out to a terminal strip so that the electrician in the field does not have to connect to the switches.

 - 3) Local/remote selector switch with phase motor relay and auxiliary to provide dry contacts for collective indication of placement in the "remote" operating mode, the unit is powered, and that all safety/overload interlocks are satisfied to provide the above signal. For further requirements refer to electrical elementary control schematic.

 - 4) Open/close push-button for local manual operation (modulating service).

 - 5) Position indicator calibrated to 0-100 percent travel span.

 - 6) Terminals for remote indication of full open, full closed and overload (torque).

- k. Operating Unit Gearing: The actuator shall be double reaction unit with the capability of quickly changing the output speed with a gear change. The power gearing shall consist of generated spur or helical gears of heat-treated steel, and worm gearing where required by the type of operator.

Quarter turn or traveling unit operators do not specifically require worm gearing. The worm shall be of hardened alloy steel and the worm gear shall be of alloy bronze. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout for all motor operators. A mechanical dial position indicator to display valve position in percent of valve opening shall be provided. The gearing shall comply with AWWA requirements.

- I. Stem Nuts: The actuator for other than quarter turn valves shall have a stem nut of high tensile bronze or other material compatible with the valve stem and suited to the application. The nut arrangement, where possible, shall be of the two-piece type to simplify field replacement. The stem nut for rising stem valves must be capable of being removed from the top of the actuator without removing the actuator from the valve, disconnecting the electrical wiring, or disassembling any of the gearing within the actuator.
- m. A handwheel shall be provided for manual operation. The handwheel shall not relocate during hand operation nor shall a fused motor prevent manual operation.
- n. When in manual operating position, the volt motor driven unit will remain in this position until motor is energized at which time the valve operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching knob or lever which will disengage the motor and motor gearing mechanically not electrically. Hand operation must be reasonable fast and require no more than 100 lbs. of rim effort at the maximum required torque. It shall not be possible for the unit to be simultaneously in manual and motor operation.
- o. 240 Volt Single Phase Motors: All motors on valves shall be designed for 240 volts 1-phase 60 Hz power. The motor shall be specifically designed for valve actuator service and shall be of high torque, squirrel cage reversible, totally enclosed, non-ventilated construction, with motor leads brought into the limit switch compartment without having external piping or conduit box. Motor insulation shall be NEMA Class B with maximum continuous temperature rating of 120° C (rise + ambient). Motors shall be sized to have a rated running time at the rated running torque of 15 minutes without exceeding the temperature rating of the insulation system. Running load torque shall be not more than 20 percent of the rated seating/unseating torque.

p. Speed-torque curves for the motors and torque calculations for seating, unseating, and running conditions shall be submitted. The maximum valve torque (seating/unseating) shall be less than 50 percent of stall torque or starting torque potential of the motor whichever is greater.

q. Operator Type:

Type A: Remote set-point using a 4-20 mable analog signal

Local Operation

- 1) LOCAL/REMOTE selector
- 2) OPEN/CLOSE pushbuttons
- 3) Position set-point potentiometer/indicator
- 4) LOCAL accepts local position set-point
- 5) OPEN/CLOSE indication
- 6) Fault (torque) indication

Remote operation

- 1) REMOTE - accept a remote 4-20 mA position set-point
- 2) Position transmitter 4-20mA signal to RTU (Remote Transmitter Unit)
- 3) Available Ready of Auto to RTU
- 4) Fault torque status to RTU

r. Valve Closure Time shall be 1 minute

s. Spare Parts:

The Contractor shall furnish loose, one-unit valve operator, complete with all the devices specified herein and with all the features and characteristics similar to the equipment supplied in this Contract. The spare operator shall be delivered to the CITY still in crates.

M. TORQUE LIMITING DEVICE

1. Each valve shall be provided with a torque limiting device designed to protect the actuator and valve parts. The device shall consist of an overtorque protection mechanism enclosed in a hermetically sealed cast iron housing. The mechanism

shall be permanently lubricated, and factory set to trip between 200 and 220 ft. lbs. of applied torque. The housing shall have integrally cast, 2-inch AWWA operating nut and matching socket to operate and to fit over the actuator or extension shaft nuts, respectively. The socket shall be provided with a set screw to fit the device. The direction of rotation shall be permanently shown with word and arrow next to the operating nut. The entire device shall be coated inside and out with a 2-part epoxy. The torque limiting device shall be as manufactured by Annspace Controls Company of St. Louis, Missouri, or approved equal.

N. FLOOR STANDS

1. Floor stands shall be cast iron, non-rising stem type with lockable hand wheel operator, valve position indicator and stainless steel or bronze extension stem. Hand wheel shall be lockable in the full open and full closed positions. The floor stand shall be furnished with an armored padlock and six keys. Lock shall be as manufactured by Master, Schlage or equal. Floor stand shall be standard pattern type as manufactured by Clow Corporation, or equal.

O. END CONNECTIONS:

1. The dimensions of end connections shall conform to AWWA Standard C111-85. The end flanges of flanged valves shall conform in dimensions and drilling to ANSI Standard B16.1 for cast iron flanges and flanged fittings, Class 125, unless specifically provided otherwise. The bolt holes shall straddle the vertical centerline.

2.02 PLUG VALVES

- A. Plug valves shall be of the non-lubricated, eccentric type with resilient faced plugs. Port areas shall be at least 80 percent of full pipe area. Bodies shall be semi steel with raised seats. Seats shall have a welded in overlay of high nickel content on all surfaces contacting the plug face. Valves shall have permanently lubricated, stainless steel bearings in the upper and lower plug stem journals. All valves shall be of the bolted bonnet design.
- B. Valves shall be designed so that they can be repacked without removing the bonnet from the valve and the packing shall be adjustable. All nuts, bolts, springs and washers shall be A-316 stainless steel.
- C. Valves shall be suitable for underground service and designed for working pressure of 150 P.S.I. The valve and actuator shall be capable of satisfactory operation in either direction of flow against pressure drops to and including 100 P.S.I.
- D. The exterior valve surfaces shall be shop painted with two coats of asphalt varnish conforming to Federal Specifications TT-V-51C.

- E. The valves shall be tested in accordance with ANSI/AWWA C504. The CONTRACTOR shall furnish certified copies of reports with every valve stating that the valve has met the requirements of the tests.
- F. Plug valves shall be Model 100 Series as manufactured by DeZurik or Clow Valve. No substitutions.

2.03 GATE VALVES LESS THAN THREE INCH (3") IPS, BRONZED:

- A. Gate valves for use with pipe less than three inches (3") in diameter shall be rated for two hundred (200) psi working pressure, non-shock, block pattern, screwed bonnet, non-rising stem, brass body, and solid wedge. They shall be standard threaded for PVC pipe and have a malleable iron handwheel. Gate valves less than three inches (3") in diameter shall be NIBCO T-113-LF with no substitutions allowed.

2.04 GATE VALVES THREE INCHES AND LARGER:

- A. The valves shall be resilient seated and shall conform in design, material, and workmanship to the standards of AWWA C509. Gate valves shall open counterclockwise and shall be of iron body, non-rising stem, and mechanical cut-in joint ends. All resilient seat valves must be bi-directional.
- B. Valves shall be coated with a two-part thermosetting epoxy coating on inside of valve and on valve disc. The coating shall conform to the requirements of AWWA C-550. After the factory test and inspection, all ferrous parts of the valves except finished or bearing surfaces shall be painted with two (2) coats of asphalt varnish, Federal Specification TT-V-51A or approved equal.
- C. Gate valves three inches and larger in diameter shall be American Flow Control Series 2500, or U.S. Pipe A-USP1 Resilient Wedge Gate Valves. No Substitutions.

2.05 BUTTERFLY VALVES (**Not Permitted without City Approval**)

- A. Valves shall conform to all requirements of AWWA C504 Standard Class 150B. Valves shall have mechanical - joint-type ends conforming to AWWA C111 and cast-iron body conforming to ASTM A126 Class B standards.
- B. Valve bodies shall have two shaft bearing hubs cast integrally with the valve bodies. Valve bearings shall be sleeve type bearings with nylon bearings that are self-lubricating and do not have a harmful effect on water. Valve disc shall be cast iron conforming to ASTM A-126 Class B with 316 stainless steel disc edge.
- C. Valves shall be Mueller 3211-20, Clow F-5370, American Flow Control, or City of Hollywood approved equal.

2.06 TERMINAL BLOW-OFF VALVES:

- A. The terminal blow-off valve assemblies shall be installed in accordance with the details shown in the City of Hollywood Standard Details. The following products shall be used to construct the assemblies:
- B. Angle Valves (for terminal blow-off): 2-inch threaded valves with handwheel, bronze body and composition disc. 2-inch angle valves for terminal blow-off shall be NIBCO T311 or ITT Grinnell Fig. No. 3220
- C. After the tap has been made and the corporation stop has been installed on a pipe conveying potable water, the exposed exterior surfaces of the stop shall be heavily coated with Kop-Coat Super Hi-Gard 891 White 1898 or approved equal. Where taps are made in a pipe conveying sewerage, the Contractor shall heavily coat the inside of the pipe around the stop and the exposed exterior surfaces of the stop with Bitumastic 300M, by Kop-Coat Co., or Protector 401 for sewer applications.
- D. The installation of the terminal blow-off outlet shall include excavation; cutting, threading and installing PVC and galvanized pipe and fittings; tapping the ductile iron plug; concrete thrust block; furnishing and installing angle valve; cutting and placing cast iron riser pipe complete with valve boxes and cover, set in concrete; backfilling and compaction; and all other appurtenant items and work.

2.07 ECCENTRIC PLUG VALVES

- A. Equipment Requirements: Plug valves shall be on the non-lubricated, eccentric type with resilient faced plugs, port areas for valves 20 inches and smaller shall be at least 80% of full pipe area. Port area of valves 24 inches and larger shall be at least 70% of full pipe area. The body shall be of semi-steel (ASTM A-126 C1.B) and shall have bolted bonnet which gives access to the intervals of the valve. Seats shall be welded overlay of high nickel content or a stainless-steel plate locked in the body cavity. If a plate is used, it shall be replaceable through the bonnet access. Bearings shall be permanently lubricated of stainless steel, bronze or teflon lined, fiber glass backed duralon. Bearing areas shall be isolated from the flow with grit seals. Valves shall have packing bonnets where the shaft protrudes from the grit seals. Valves shall have packing bonnets where the shaft protruded from the valve and the packing shall be self-adjusting chevron type which can be replaced without removing the bonnet. All nuts, bolts, springs and washers shall be A-316 stainless steel.
- B. Valves shall be designed for a working pressure of 150 PSI CWP. The valve and actuator shall be capable of satisfactory operation in either direction of flow against pressure drops up to and including 100 PSI (for plug valves over 12 inches in diameter). Valves shall be bubble tight in both directions at 100 psi differential.
- C. Plug valves over 12" in diameter shall have worm gear operators. The operating mechanism shall be for buried service with a 2-inch square operating nut.

- D. Plug valves are to be installed with the seat pointed towards the upstream flow, when specified.
- E. Manufacturers or Equal:
 - 1. Clow Valve Co.;
 - 2. DeZurik Corporation;

2.08 BALL VALVES (4-INCH AND SMALLER)

- A. General Requirements: Unless otherwise specified or shown, general purpose ball valves in size up to 4-inch shall have manual operators with lever or handwheel. Ferrous surface of 4-inch valves, which will be in contact with water shall be epoxy-coated. All ball valves shall be of best commercial quality, heavy duty construction.
- B. Body: All ball valves up to 1-1/2 inch (incl.) in size shall have bronze or forged brass 2- or 3-piece bodies with screwed ends for a pressure rating of not less than 300 psi WOG. Valves 2-inch to 4-inch in size shall have bronze forged brass or steel 2- or 3-piece bodies with flanged ends for a pressure rating of 150 psi.
- C. Balls: The balls shall be solid brass or chrome plated bronze, or stainless steel, with large or full openings.
- D. Stems: The valve seats shall be of Teflon or Buna N or equal, for bi-directional service and easy replacement.
- E. Ball Valve Manufacturers or Equal:
 - 1. Jamesbury Corporation;
 - 2. Jenkins Bros.;
 - 3. Lunkenheimer Flow Control;
 - 4. Wm. Powell Company;
 - 5. Worcester Controls;
 - 6. Valve Primer Corporation.

2.09 CHECK VALVES

N/A

2.10 AIR-VACUUM AND AIR-RELEASE VALVES

- A. Air and Vacuum Valves: Air and vacuum valves shall be capable of venting large quantities of air while pipelines are being filled and allowing air to re-enter while pipelines are being drained. They shall be of the size shown, with flanged or screwed ends to match piping. Bodies shall be of high-strength cast iron. The float, seat, and all moving parts shall be constructed of Type 316 stainless steel. Seat washers and gaskets shall be of a material insuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150 psi water-working pressure, unless otherwise shown.
- B. Air-Release Valves: Air-release valves shall vent accumulating air while system is in service and under pressure and be of the size shown and shall meet the same general requirements as specified for air and vacuum valves except that the vacuum feature will not be required. They shall be designed for a minimum water-working pressure of 150 psi, unless otherwise shown.
- C. Combination Air Valves: Combination air valves shall combine the characteristics of air and vacuum valves and air release valves by exhausting accumulated air in systems under pressure and releasing or re-admitting large quantities of air while a system is being filled or drained, respectively. They shall have the same general requirements as specified for air and vacuum valves.
- D. Air Vacuum and Release Manufacturers or Equal:
 - 1. APCO (Valve and Primer Corporation);
 - 2. Golden-Anderson Valve Division (GA Industries, Inc);
 - 3. Val-Matic (Valve and Manufacturing Corporation).

2.11 BEARINGS:

- A. Valve bearings shall be the sleeve type.
 - 1. 100% nylon or Teflon for valves 20 inches and smaller.
 - 2. Bearings shall be Teflon with fiberglass backing for valves 24 inches and larger.
 - 3. Bearings shall be self-lubricating and bearing load shall not exceed 1/5 of the compressive strength of the bearing or shaft material.
- B. Valve Discs:
 - 1. Discs shall operate through a 90-degree angle from fully closed to fully open.

2. Valve discs shall be cast iron alloy ASTM A436 Type 1, ASTM A48 or ASTM A126 for valves 20 inches and smaller and ASTM A48 cast iron or ASTM A536 ductile iron for valves 24 inches and larger.
 3. Valve discs shall have a Type 316 stainless steel seating edge and shall not have any hollow chambers.
- C. Shafts and Seals
1. Valve shafts shall be Type 316 stainless steel meeting the minimum requirements of AWWA C504.
 2. Valve shafts shall be one piece for valves 20 inches and smaller and two pieces for valves 24 inches and larger.
 3. Shaft seals shall be self-compensating, split V type and shall be adjustable and replaceable without removing the operator and/or the shaft, except for buried applications.
 4. Shaft seals shall be Buna-N unless otherwise specified.
- D. Valves for buried service shall be totally enclosed, fully gasketed, grease packed and designed to operate indefinitely when submerged under a minimum 20 feet of water.
- E. Manufacturers: Valmatic – American BFV, Pratt – Groundhog, or Dezurik – BAW.

2.12 CORPORATION STOPS (Ball Valve Type)

- A. Unless otherwise shown, corporation stops shall be made of brass alloy for key operation, with screwed ends with corporation thread or iron pipe thread, as required. AWWA taper thread for inlet thread and compression type fittings for outlet.
- B. Corporation Stops shall be as manufactured by or the Ford Meter Box Company or approved equal.

2.13 TAPPING VALVES AND TAPPING SLEEVES:

- A. Tapping Sleeves - See Section 15102 – Tapping Sleeves and Tapping Valve.
- B. Tapping Valves – Refer to Gate Valves in Section 2.04.C above.

2.14 VALVE BOXES AND COVERS

- A. Valve boxes and covers for all size valves shall be of cast iron construction and adjustable screw-on type. The lid shall have cast in the metal the word “WATER” for the water lines, or “SEWER” for sewage force mains. All valve boxes shall be six-inch (6") nominal diameter and shall be suitable for depths of the particular valve. The stem of the buried valve shall be within twenty-four inches (24") of the finished grade unless otherwise approved by

the ENGINEER. Valve boxes for 3" through 20" valves shall be Tyler Union model 6860 Cast Iron screw-type valve box with 5- $\frac{1}{4}$ " locking lid or approved equal.

- B. Cast iron valve box shall not rest directly upon the body of the valve or upon the pipe. The box shall be placed in proper alignment and to such an elevation that its top will be at the final grade. Backfilling around both units shall be placed and compacted to the satisfaction of the ENGINEER.

PART 3 - EXECUTION

3.01 VALVE INSTALLATION

- A. General: All work shall be performed by skilled workmen experienced in similar installations. All valves shall be adequately supported by clamps, brackets, straps, concrete supports or other devices as shown or specified. All supports shall be secured to structures by approved inserts or expansion shields and bolts.
- B. All valves shall be thoroughly cleaned internally before being installed. Installation of valves shall be done in accordance with this section.
- C. All valves, gates, operating units, stem extensions, valve boxes, and accessories shall be installed in accordance with the manufacturer's written instructions and as shown and specified. All gates shall be adequately braced to prevent warpage and bending under the intended use. Valves shall be firmly supported to avoid undue stresses on the pipe. Install valves so that they are easily accessible for operation, visual inspection and preventive maintenance.
- D. Location of valves and chain operators: Install valves so as to be accessible for operation and free from interferences when operated. Position so that leakage will not contact any electrical equipment that may be located below.
- E. The installation of all underground valves shall include a valve box and riser in accordance with the Details shown on the Plans or in the Standard Details for the various sizes and types of valves to be installed. Riser pipes and valve boxes shall be carefully centered and set flush with the finished grade if in paving, or with the top of the ground if out of paved areas. All valve boxes shall be held in position with concrete as shown on the Plans or in the Standard Details.
- F. Upon completion of the Project, but prior to final acceptance, the Contractor in the presence of the Engineer, shall fully open each valve installed by him, except at connections to existing City mains. For valves 16-inch and larger, the Contractor, shall count the number of turns required to operate each valve from a completely closed to a fully opened position, and shall paint the number on the bottom of the valve box lid or manhole cover. Valves at connections to existing City mains shall only be operated by City forces.

- G. Valve Accessories: Where combinations of valves, sensors, switches, and controls are specified, it shall be the responsibility of the Contractor to properly assemble and install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.
- H. Flange Ends:
1. Flanged valve boltholes shall straddle vertical centerline of pipe.
 2. Clean flanged faces insert gasket and bolts and tighten nuts progressively and uniformly.
- I. Screwed Ends:
1. Clean threads by wire brushing or swabbing.
 2. Apply joint compound.
- J. Valve Orientation:
1. Install operating stem vertical when valve is installed in horizontal runs of pipe having centerline elevations 4 feet 6 inches or less above finished floor, unless otherwise shown.
 2. Install operating stem horizontal in horizontal runs of pipe having centerline elevations between 4 feet 6 inches and 6 feet 9 inches above finish floor, unless otherwise shown.
 3. Orient butterfly valve shaft so that unbalanced flows or eddies are equally divided to each half of the disc, i.e., shaft is in the plane of rotation of the eddy.
 4. If no plug valve seat position is shown, locate as follows:
 - (a) Horizontal Flow: The flow shall produce an “unseating” pressure, and the plug shall open into the top half of valve.
 - (b) Vertical Flow: Install seat in the highest portion of the valve.
- K. Install a line size ball valve and union upstream of each solenoid valve, in line flow switch, or other in line electrical device, excluding magnetic flowmeters, for isolation during maintenance.
- L. Locate valve to provide accessibility for control and maintenance. Install access doors in finished walls and plaster ceilings for valve access.

- M. Extension Stem for Operator: Where the depth of the valve is such that its centerline is more than 3 feet below grade, furnish an operating extension stem with 2 inch operating nut to bring the operating nut to a point 6 inches below the surface of the ground and/or box cover.
- N. Torque Tube: Where operator for quarter-turn valve is located on floor stand, furnish extension stem torque tube of a type properly sized for maximum torque capacity of the valve.

3.02 VALVE CUT-INS

- A. The system shall be maintained under pressure during entire construction. All valve additions shall be performed while the system is in service. No line shall be shut down during construction by Contractor or others unless approved by the OWNER. Linestops with bypass piping may be required for all valve cut-ins if flow cannot otherwise be isolated.
- B. Valve Accessories: Where combinations of valves, sensors, switches, and controls are specified, it shall be the responsibility of the Contractor to properly assemble and install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.

3.03 TESTS AND INSPECTION

- A. Valve may be either tested while testing pipelines, or as a separate step.
- B. Test that valves open and close smoothly with operating pressure on one side and atmospheric pressure on the other, in both directions for two-way valve and applications.
- C. Inspect air and vacuum valves as pipe is being filled to verify venting and seating is fully functional.
- D. Count and record number of turns to open and close valve; account for any discrepancies with manufacturer's data.
- E. Set, verify, and record set pressures for all relief and regulating valves.
- F. Test hydrostatic relief valve seating; record leakage. Adjust and retest to maximum leakage of 0.1 gpm per foot of seat periphery.

END OF SECTION

SECTION 15102

TAPPING SLEEVES AND TAPPING VALVES

PART 1- GENERAL

1.01 SCOPE

- A. The Contractor shall furnish and install tapping sleeves and tapping valves, as shown on the Plans and/or as specified herein. All items not specifically mentioned in these specifications or noted on the Drawings, but which can be reasonably inferred as necessary to make a complete working installation, shall be included.
- B. Tapping sleeves, where shown on the Plans, shall fit the existing pipe to be tapped and the Contractor shall determine the outside diameter and type of pipe before ordering the sleeve. Contractor must field verify dimensions, locations, distances and elevations before ordering tapping sleeves. The Contractor shall adjust his work to conform to said field conditions.
- C. Only tapping sleeves shall be used for tapping existing mains to connect new mains. Tapping saddles will not be permitted.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15060 - Piping and Fittings

1.03 MANUFACTURE

- A. All valves shall be the products of domestic manufacturing firms which have been regularly engaged in the production of valves for at least 5 years. All valves specified herein shall be tested at the factory in accordance with the AWWA Standard Leakage and Hydrostatic Test as modified herein and a certified test report shall be furnished for each valve.

1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for all tapping sleeves and valves.
- B. For all AWWA valves, submit an affidavit stating the valves and all materials used in their construction conform to the applicable requirements of AWWA C500 as modified herein, that all specified tests have been performed and all test requirements have been met.

PART 2 - PRODUCTS

2.01 TAPPING SLEEVES

- A. Tapping sleeves shall be of cast iron construction except as specified below, shall be full-bodied and shall be designed to withstand a working pressure of at least 150 psi.
- B. The tapping sleeves, including outlet flanges shall be as dimensioned and thicknesses shall be as required by AWWA/ANSI C110/A21.10. The tapping sleeves shall be mechanical joint ended, on the run, and shall have a connecting flange outlet, with centering groove (for all valves size 12-inch and below and for valves above 12-inch if available from the manufacturer), for connecting to the tapping valve. For tapping sleeves with outlets 12 inches and smaller, the connecting flange joint between the tapping sleeve and the tapping valve shall be in compliance with all applicable provisions of MSS Standard Practice SP60, latest revision, as developed and approved by the Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street N.E. Vienna, VA. 22180. For tapping sleeves with outlets larger than 12 inches, the connecting flange must provide a matching fit with tapping valves by other manufacturers.
- C. Each mechanical joint on the tapping sleeve shall be furnished complete with tee-head bolts and nuts complying with ANSI/AWWA C111/A21.11, "Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings" (latest edition). Tee-head bolts and hex nuts shall be of high strength cast iron. Bolts and nuts to join the two halves of the sleeve together shall be A-316 stainless steel, hex, or tee-head bolts and nuts.
- D. Each tapping sleeve shall be furnished complete with all necessary split end gaskets, longitudinal gaskets and two-piece (split) steel glands (follower glands held in place by set screws not acceptable). Gasket shall be shipped separately in suitable protective containers. Material for split end gaskets shall conform to ANSI/AWWA Standard C111/A21.11. Material for longitudinal gaskets shall be rubber conforming to ANSI/AWWA Standard C111/A21.11.
- E. The sleeves shall be suitable for use with ductile iron pipe conforming to ANSI/AWWA Standard C151/A21.51, "Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids", with wall thickness and outside diameter as specified in Table 51.4 and 51.5. The sleeves shall also be suitable for use with other cast iron pipe with differing outside diameters and other types of pipe where required.
- F. The City will permit the use of the PowerSeal Pipeline Products Corp. 3490MJ Mechanical Joint tapping sleeve as an approved equal to ductile iron flange-outlet tapping sleeves. This unit has a mechanical joint branch outlet tapping connection which mates with a standard resilient-seated gate valve rather than the tapping flange x mechanical joint ends required by the standard design of tapping sleeves. These units shall be manufactured of Type 304 (18-8) Stainless Steel per ASTM A240, with MJ outlets fabricated of Type 304 (18-8) Stainless Steel per ANSI 21.11. Bolts and nuts shall be made

of A-316 Stainless Steel and meet ASTM requirements. A-316 stainless steel hex nuts shall be furnished with fusion bonded coating to prevent seizing and galling. Gaskets shall be SBR for potable water use, or Neoprene, EPDM, or Nitrile for sanitary sewer use.

PART 3 - EXECUTION

3.01 GENERAL

- A. Where shown on the approved plans, the Contractor shall install the tapping sleeves and valves of the indicated size, without taking existing main out of service. Under no circumstances shall be Contractor be permitted to tap these existing mains. The Contractor shall pressure test the tapping sleeve and valve after installation on the main, but prior to tapping operations. The test shall be conducted in the presence of the City's Inspector. No leakage will be permitted at any joint in either the tapping sleeve or tapping valve. Taps shall be made by tapping specialists with credentials acceptable to the City.
- B. Tapping valves 16-inch and smaller require the installation of a cast iron or C900 PVC riser pipe, complete with ductile iron valve box and cover, centered over the operator and set in concrete. Tapping valves 16-inch and larger shall be installed in a horizontal position with the operator in the vertical position with valve box over the operator and set in concrete.
- C. Where a tapping valve with by-pass gate valve will be installed, the Contractor shall install a valve box over the main valve and a valve box over the by-pass valve. Valve boxes and covers for all size valves shall be of cast iron construction and adjustable screw-on type. The lid shall have cast in the metal the word "WATER" for the water lines, or "SEWER" for sewage force mains. All valve boxes shall be six-inch (6") nominal diameter and shall be suitable for depths of the particular valve. The stem of the buried valve shall be within twenty-four inches (24") of the finished grade unless otherwise approved by the ENGINEER. Valve boxes for 3" through 20" valves shall be Tyler Union model 6860 Cast Iron screw-type valve box with 5- $\frac{1}{4}$ " locking lid, or approved equal.
- D. The tapping sleeve and valve shall be installed complete, and the work shall include all necessary excavation, including interlocking sheeting and shoring, backfilling and compaction, surface repairs, and sheeting and shoring outside of the main trench line, dewatering, testing the sleeve and valve, supporting tapping by City forces, constructing the concrete thrust anchor and all other appurtenant items and work. Installation of tapping sleeve shall be in accordance with City of Hollywood Public Utilities Department Standard Details, Specifications Policies and Procedures.
- E. Prior to ordering the tapping sleeve, the Contractor shall excavate and field-verify the type and outside diameter of the main.

3.02 TAPS

- A. The Contractor shall comply with all applicable provisions of Subsections 3.01 above, including installation and pressure testing of tapping sleeve and tapping valve in the presence of the City's Inspector.
- B. Since cutting equipment used for this type of installation is of a special design, the Contractor shall make provisions for furnishing a tapping specialist to perform actual tapping operation. The qualifications of the tapping specialist shall be forwarded to the City prior to any tapping work. The Contractor shall also furnish all incidental equipment necessary to operate the tapping machine.
- C. The tapping valve shall be installed in the horizontal position with the operator in the vertical position, and shall include a valve box cover. Tapping valves shall be left in the closed position.
- D. When the invert of the tapping valve is under water, interlocking sheeting and tremie concrete shall be used, unless otherwise approved by the City. Seal the perimeter of all pipes passing through the sheeting below the water table. Only minimum seepage will be permitted. The cofferdam must be designed and sealed by a State of Florida, P.E. No work will be permitted within the cofferdam until it is demonstrated to the City to be dry. Approval to remove the initial water in the cofferdam must be obtained from the City and other governmental agencies having jurisdiction over the work.
- E. All tapping operations shall be conducted under the direct supervision of City of Hollywood Utility Inspector or Engineer. All operations shall have prior approval of the City.

3.03 RECORD DRAWINGS

- A. Record Drawing shall be prepared in accordance with Section 01300
- B. The location and elevation for each valve, tapping flange outlet, fitting, service line and other appurtenances along the pipeline shall be recorded by the Contractor's Florida Registered Land Surveyor.

END OF SECTION

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 01300 Submittals and Section 01700 Project Closeout.

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 Department 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. 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. 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.
- I. The Contractor shall be responsible for coordination with Broward County Department of Health, who shall collect and test samples from main. The Contractor shall provide assistance to the Dept. of Health for the collection of samples. The samples shall be taken from each main or section of main to be placed in service where designated by the Dept. of Health. The samples must be approved by the Department of Health before the main is placed in service.
- J. The Contractor shall be responsible for any rechlorination and retesting that may be required until the Department of Health'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 to Chapter 17-22 of 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
 - 1. Submit reports under provisions of Sections entitled "Submittals", "Project Closeout", and "Project Record Documents and Survey".
 - 2. 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/FDEP permit.
 - 3. As per Chapter 33.94 of Recommended Standards for Wastewater Facilities (2004 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 15997

POLYETHYLENE ENCASEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. All cast/ductile iron pipe, fittings, valves and risers shall be encased with polyethylene film in order to prevent contact between the pipe and the surrounding soil for the purpose of corrosion protection, following all requirements of this section. Cost for all PE encasement shall be included in the linear footage piping cost.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 01300 - Submittals
- B. Section 15060 – Piping and Fittings

1.03 REFERENCED SPECIFICATIONS, CODES AND STANDARDS

- A. AWWA C105-10
- B. ANSI A21.5
- C. ASTM D149
- D. ASTM D882
- E. ASTM D1248
- F. ASTM D1709-B
- G. ASTM D1922
- H. ASTM D4976
- I. NT4112-05

1.04 SUBMITALLS – Per Section 01300

- 1. Manufacturer's product data for polyethylene tubing
- 2. Manufacturer's product data for polyvinyl tape

PART 2 - PRODUCTS

2.01 MATERIALS

A. Polyethylene Tube:

1. Only virgin polyethylene material shall be approved. The material shall be 8 mil minimum, Group 2, Linear Low Density, flat tube polyethylene film meeting or exceeding the requirements of AWWA C105-10, ANSI A21.5-88, ASTM D4976 and NT4112-05, and having the following properties:

Color Blue for water piping , Green for wastewater piping

Tensile Strength 3600 psi, minimum - ASTM D882

Elongation 800%, minimum - ASTM D882

Dielectric Strength 800 V/mil, minimum - ASTM D149

Impact Resistance 600 g, minimum - ASTM D1709-B

Propagation Tear Resistance 2550 gf, minimum - ASTM D1922

2. The film shall be marked showing trademark, year of manufacture, type of resin, specification conformance, applicable pipe sizes and the words "warning: corrosion protection-repair any damage."
3. Tube size will be as listed below or as otherwise approved:

Nominal pipe diameter (in.)	Polyethylene flat tube width (in.)
4	16
5	20
8	24
12	30
16	37
20	45
24	54
30	67
36	81
42	95
48	108
54	121

B. Polyvinyl Tape:

1. The polyethylene encasement shall be secured to the cast/ductile iron using 6-inch, 10-mil "all weather" tape with polyvinyl film backing. On the tape shall be

marked the UPC code and mil thickness designation. Pipe-wrap tape shall be moisture resistant, anti-corrosive, conform and adhere to both metal and plastic.

PART 3 - EXECUTION

3.01 POLYETHYLENE ENCASEMENT

- A. The polyethylene sleeve (polywrap) shall be installed in accordance with ANSI/AWWA C105/A21.5, "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids". The polywrap shall be placed on the cast/ductile iron pipe so that no dirt or bedding material comes in contact with the pipe. All lumps of clay, mud, cinders, etc., on the pipe surface should be removed before the pipe is covered with polyethylene. If the polyethylene is damaged, it must be repaired before the trench is backfilled.
 - 1. Small holes or tears can be repaired with a piece of tape placed over the hole. Large holes or tears should be repaired by taping another piece of polyethylene over the hole.
 - 2. Overlaps, ends, and repairs can be held in place with tape or plastic tie straps until the trench is backfilled.
- B. General installation recommendations:
 - 1. When lifting polywrapped pipe with a backhoe, use a fabric-type "sling" or padded cable to protect the polyethylene.
 - 2. When installing polywrap below the water table or in areas subject to tidal action, seal as thoroughly as possible both ends of each polyethylene tube with adhesive tape or plastic tie straps at the joint overlap. Also, place tape or plastic tie straps around the pipe at two (2) foot intervals.
 - 3. Special care shall be taken to prevent damage to wrapping when placing backfill.
 - 4. Quality of installation is more important than the actual sequence followed.
- C. Per AWWA C105-05, there are 3 installation methods:
 - 1. Method "A" - The polyethylene tube should be cut to lengths that provide a one foot overlap beyond each end of a pipe section. Slip the tubing over the pipe with the printed side up, and bunch it back to clear both ends. A shallow bell hole should be made to facilitate installation of the polyethylene. Lower pipe into position and make up the joint. Pull tubing over the joint from the preceding pipe length and tape it securely to the new pipe length. Overlap the polyethylene from the new pipe length back over the same joint and tape in place on the preceding pipe barrel. Pull the polyethylene along the length of the new pipe, folding excess tubing over the top of the pipe barrel and securing it every 3 to 4 feet.

Keep the excess polyethylene for the overlap of the next joint bunched back from the joint in preparation for making the next joint. Repeat this process for each polyethylene taped into place.

2. Method "B" - Cut the polyethylene tube 1 ft. shorter than the length of pipe sections. Slip the tube around the pipe so as to allow 6 in. of bare pipe at each end. Before making a joint, slip a 3 ft. Length of polyethylene tube over the preceding pipe section. Overlap by at least 1 ft. and secure, after joint is made.
3. Method "C" - Wrap odd shaped fitting with sheet or split length of polyethylene tube by passing the sheet under the fitting and bringing it up around the body. Make seams by bringing it folding over twice, and tapping down. Tape the sheet securely in place at valve stems and other penetrations.
4. Pipe-shape fittings (bends, reducers, etc.) shall be treated according to Methods "A" and "B". Odd shaped fittings (valves, tees, etc.) shall be treated according to Method "C".

END OF SECTION



DIVISION 16

ELECTRICAL

SECTION 16050

ELECTRICAL WORK - GENERAL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide complete and operational power systems, grounding systems and other specified systems, including the installation and wiring of miscellaneous equipment and devices. Perform all work and testing as indicated and specified.
 - 1. Provide conduit, wiring and connections for power, control, instrumentation and alarms for equipment specified and indicated in the drawings and specifications.
 - 2. Raceways supports and equipment anchoring shall be provided as specified in the Division 16 sections which form a part of the Contract Documents.
 - 3. Electrically powered equipment and devices identified in other divisions and sections of the specifications and drawings.
 - 4. Provide electrical system studies including a short circuit and protective device coordination study and an arc-flash study for the electrical system constructed under this contract.
 - 5. Earth and rock excavation, backfill, concrete masonry, concrete reinforcement, and construction joints required for Electrical work shall be provided under other Divisions of Work specified under this contract.

1.02 RELATED WORK

- A. Division 1: General Requirements
- B. Division 2: Site Work
- C. Division 3: Concrete
- D. Division 11: Equipment
- E. Division 13: Instrumentation and Control Systems

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01300 - Submittals:

1. Shop Drawings and Data: Include manufacturer's drawings, bills of material, panel and equipment layouts, catalog data, schematics diagrams, interconnection diagrams, wiring diagrams and other documentary or descriptive information as required for each assembly submitted in one package insofar as possible.
 - a. Bills of material: Include a numbered list of all components, with manufacturer's name, catalog number, rating, and other identification. Place item number or similar identification on all other drawings where item appears.
 - b. For informational purposes only, submit equipment installation instructions in separate submittals from other shop drawings.
 - c. Shop drawings and data are required for the following list:
 - (1) Circuit Breakers
 - (2) Conduit and Fittings
 - (3) Wire and Cable
 - (4) Wiring Devices
 - (5) Generator Receptacles
 - (6) Explosion proof pull / terminal Box
 - (7) Explosion proof EYS seals
 - (8) Handholes, and Associated Equipment and Devices
 - (9) Grounding Equipment and Devices
 - (10) Control Stations
 - (11) Outdoor Lighting Fixture
 - (12) Lighting Pole
 - (13) Enclosures
 - (14) Control Panels

(15) Field Acceptance Test Reports

(16) Record Drawings

- d. Mark shop drawings and data submitted to indicate items applicable to this specific contract.
- e. Include one-line diagrams, schematic diagrams, wiring diagrams, control sequence diagrams, relay diagrams, and metering. Submit only completed drawings showing all local and remote devices associated with each item. Submit one complete package of shop drawings. Partial submittals will be returned without action.

Install permanent nameplates on all devices or pieces of equipment such as starters, relays, contactors, pushbuttons, indicating lights, switches, RTU enclosure, control panel, and pull/terminal boxes. Ensure position of nameplates is readable after equipment installation.

- f. Obtain available fault current rating from FP&L. Provide a nameplate or label with date of calculation and fault current rating and place nameplate on the service switch.
- g. Submit arc flash calculation for the lift station based on FP&L information and provide plastic coated label on control panel with the results of the study.

1.04 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. Install electrical work in conformance with latest rules and requirements of National Fire Protection Association Standard No. 70 (National Electrical Code), the City of Hollywood, Fl., and the Florida Power and Light Corporation (FP&L).

1.05 INTERFERENCE AND ERRONEOUS LOCATIONS

- A. Locations of electrical equipment, devices, outlets, and similar items, as indicated, are approximate only. Exact locations shall be determined during construction.
- B. Verify in field, all data and final locations of work installed under other sections of specifications, required for placing of electrical work.
- C. In case of interference with other work or erroneous locations with respect to equipment or structures, furnish all labor and materials to complete the work.

1.06 APPROVAL AND MARKING EQUIPMENT

- A. Ensure that devices and materials are listed and/or labeled by Underwriters' Laboratories, Inc., wherever standards have been established by that agency. Where Underwriters' Laboratories listing is not available for equipment, submit certified test reports of a Nationally Recognized Testing Laboratory (NRTL), approved by the local inspecting authority, indicating that equipment is in conformance with local code requirements or any other applicable requirements. Tests and inspections for approval of equipment shall be performed at no additional cost to Owner.
- B. Clearly mark equipment, devices and material with name or trademark of manufacturer and rating in volts and amperes and other pertinent information on a nameplate.

1.07 ELECTRIC SERVICE

- A. Electrical power system for the meter station shall be 120/240V single phase, 3-wire.

1.08 EQUIPMENT SPECIFIED ELSEWHERE

- A. Certain items of control equipment and other equipment are indicated on electrical drawings for connection, but are specified in other sections pertaining to plumbing, mechanical process, instrumentation, etc. Such items are not furnished as part of electrical work but must be provided by the contractor.

1.09 ALTERATIONS

- A. All modifications or alteration to existing electrical facilities required shall be made to successfully install and integrate the new electrical equipment as shown. All modifications to existing handholes, equipment, panels or cabinets shall be made in a professional manner with all coatings repaired to match existing.
- B. Provide temporary wiring as needed for equipment intended to operate during alterations.
- C. Where existing equipment including wiring is in the way of new Work and is required to be relocated, disconnect electrical circuits, relocate equipment as directed, and reestablish circuits.

1.10 INCOMING SERVICE

- A. Contact the following organization for coordinating the incoming power requirements:

Florida Power & Light Gulfstream Service Center 4000 Davie Rd Ext Hollywood, FL
33024
Maggie Loundy Office: (954) 442-6363

- B. The organization identified above will furnish:
1. Pole and pole-mounted transformers.
 2. Connection of all secondary cables to utility-furnished equipment
 3. Cable up pole
 4. The handhole at base of service pole
 5. Meter.
- C. Provide the following in accordance with the contract documents:
1. Meter Enclosure including bypass device with 100% bypass capacity.
 2. Service entrance rated manual disconnect switch.
 3. New secondary ductline
 4. Secondary cables of sufficient length for termination at the new pole or transformer handhole.
- D. Charges and fees by power company for providing the permanent electrical service is a contingency item paid by Owner and is included in the contract as an allowance. All other charges and fees including but not limited to temporary service and power used will be at no additional cost to the Owner. These other charges shall include provision for temporary service during construction and ~~costs~~ associated with by-pass pumping.
1. Perform all work in accordance with power company's requirements and in manner approved by power company.
 2. Notify power company, in writing, within two weeks after the contract award date concerning incoming service requirements.
 3. Confirm the FPL project manager has been made aware of this project.
- E. The final, complete installation shall comply with all state and local statutory requirements having jurisdiction. The Contractor shall arrange for all necessary permits, pay all fees and arrange for all required inspections by local authorities. All work shall comply with the requirements of the National Electrical Code, all state codes and the codes and ordinances of the city or town in which the work is to be done.

PART 2 - PRODUCTS

2.01 METERING EQUIPMENT

- A. Power Company: Secondary metering equipment furnished by power company as follows:
 - 1. Meter
- B. Electrical Contractor: Secondary metering equipment installed by Electrical contractor as follows:
 - 1. Meter (furnished by Power Company).
 - 2. Meter Enclosure (furnished by Electrical Contractor from FP&L Approved metering equipment enclosure list.)

PART 3 - EXECUTION

3.01 METERING EQUIPMENT

- A. Install metering equipment as follows:
 - 1. Ensure that metering equipment installation shall be in accordance with requirements of power company by submitting drawings, sketches, catalog information and other appropriate material for power company approval.
- B. All equipment, materials, controls, motor starters, branch and feeder breakers, panelboards, transformers, wiring, raceways, etc. furnished and installed to temporarily bypass the lift stations shall be removed when the permanent installation is fully operational.

3.02 PROTECTION OF ELECTRICAL EQUIPMENT

- A. Protect electrical equipment from the weather, especially from water dripping or splashing upon it, at all times during shipment, storage, and construction.
- B. Do not store equipment outdoors.
- C. Where equipment is installed or stored in moist areas, or unheated buildings, provide acceptable means to prevent moisture damage.
- D. Provide uniformly distributed source of heat in electrical equipment to prevent condensation and damage to electrical insulation systems.

3.03 DEFECTIVE OR DAMAGED EQUIPMENT

- A. Damaged equipment shall not be used. Equipment damaged in shipment, storage,

installation or through other means shall be replaced without additional cost to the Owner.

- B. All equipment showing signs of water damage shall be rejected regardless of dielectric test results.
- C. All electrical equipment is considered "in storage" regardless of location until first energized. Manufacturer's recommendations for storage precautions, conditions and care shall be followed.
- D. Do not install equipment or material that was subjected to possible water damage.

3.04 EQUIPMENT ENCLOSURE

- A. The equipment enclosure classification is NEMA 4X, Type 316 stainless steel. Provide all equipment, devices and material meeting the requirements of this schedule unless otherwise noted or specified.

3.05 DRAWINGS AND SPECIFICATIONS

- A. Drawings and specifications are typical of work to be done and of the arrangement desired. Provide accessories and appurtenances which the Engineer deems functionally necessary for a complete installation, whether or not explicitly indicated or described.
 - 1. A set of red-lined "as-built" 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 location and routing of conduits, pull boxes, circuit numbers, and other information as required.
 - 2. A minimum of 30 days prior to application for Final Payment submit two sets of drawings that are marked to show the as-installed equipment, devices, duct line locations and wiring. These sets are to be provided to the Owner. The markings on the drawings are to be neat, clean and legible.

3.06 ANCHORING OF EQUIPMENT

- A. Anchoring of equipment is the Contractors sole responsibility and shall meet or exceed building code requirements for wind loads.

3.07 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 16110

ELECTRICAL RACEWAY SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide complete raceway systems, with matching accessories, fittings, boxes, and other hardware, as indicated and specified.
- B. All raceway runs are indicated diagrammatically to outline general routing of raceway. Unless specifically identified for installation in concrete walls or slabs, raceways shall be run exposed with raceway supporting systems. Avoid interfering with pipes, ducts, structural members, or other equipment. Any installation deviations from the contract requirements shall be corrected at no cost to Owner.
- C. All raceway systems shall be installed in accordance with the criteria described in this section. Any proposed deviations from these requirements shall be submitted to the Engineer in writing for review and disposition.
 - 1. Use Type 316 stainless steel support systems for exterior application and in NEMA 4, 4X, or 7 areas.
- D. Aluminum conduit is not acceptable.

1.02 RELATED WORK

- A. Section 16050: Electrical Work - General

1.03 REFERENCES

- A. National Fire Protection Association (NFPA):
 - 1. 70: National Electrical Code (NEC)
- B. Underwriter's Laboratories, Inc. (UL):
 - 1. U.L.-1: Electrical Flexible Metal Conduit
 - 2. U.L.-6: Rigid Metal Electrical Conduit
 - 3. U.L.-360: Electrical Liquid-Tight Flexible Steel
 - 4. U.L.-651: Schedule 40 and 80 PVC Conduit

5. U.L.-886: Electrical Outlet Boxes and Fittings for Use in Hazardous Locations, Class 1, Groups A, B, C, and D and Class 11, Groups E, F, and G
 6. U.L.-1242: Intermediate Metal Conduit
- C. National Electrical Manufacturers Association (NEMA):
1. RN-1: Polyvinylchloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
 2. TC-2: Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
 3. TC-3: Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing
- 1.04 SUBMITTALS:
- A. Submit the following in accordance with Section 01300:
1. Submit shop drawings and manufacturers' product data in accordance with the requirements of Section 16050.
- 1.05 QUALITY ASSURANCE:
- A. Provide in accordance with Section 01400 and as specified.
- B. Items provided under this section shall be listed and labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).
1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.
 2. Terms "listed" and "labeled" shall be as defined in NFPA 70, National Electrical Code, Article 100.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Rigid Metal Conduit, intermediate metal conduit and polyvinylchloride-coated rigid steel conduit.
1. Thomas & Betts
 2. Robroy Industries.
- B. Polyvinylchloride (PVC) Conduit:
1. Triangle/PWC, Inc.

2. Robroy Industries.
 3. Carlon Electrical Sciences, Inc.
- C. Liquid-Tight Flexible Conduit:
1. American Flexible Conduit Company.
 2. Anamet, Inc.
 3. Electri-Flex Company.
 4. International Metal Hose Company.
- D. Boxes and Fittings:
1. Crouse-Hinds Electrical Construction Materials.
 2. Appleton Electric Company.
- E. Fiberglass-Reinforced Polyester Boxes:
1. Crouse-Hinds Electrical Construction Materials.
 2. Hoffman Engineering Company.
- F. Support Systems:
1. Thomas & Betts (Superstrut).
 2. Unistrut Corp.

2.02 MATERIALS AND COMPONENTS

- A. Rigid Metal Conduit:
1. Provide galvanized rigid metal conduit, each with a coupling on one end and thread protector on another end.
 2. Hot dip galvanizes rigid steel conduit over entire length, along interior and exterior surfaces, including threads. Conduit shall conform to U.L.-6.
- B. Polyvinylchloride (PVC) Conduit:
1. Provide PVC conduit, Schedule 80 conforming to NEMA Standard TC-2 and UL-651.

C. Polyvinylchloride-Coated Rigid Steel Conduit:

1. Provide polyvinylchloride-coated (PVC-Coated), rigid steel conduit conforming to NEMA Standard RN-1 consisting of hot-dipped galvanized rigid steel conduit, as specified hereinbefore, with a polyvinylchloride jacket bonded to the outside of all conduit surfaces with a nominal thickness of 40 mils meeting the requirements of NEMA RN-1, 3.1. The adhesive strength of the bonding to equal or exceed tensile strength of the coating. Provide couplings and fittings for this conduit conforming to the requirements of NEMA RN-1, 3.5.
2. A two-part urethane coating shall be applied to the interior of all conduit and fittings at a two-mil thickness. The interior coating shall be flexible to allow field bending without cracking or flaking.

D. Boxes:

1. Provide outlet boxes and fittings for hazardous locations conforming to U.L.-886 for class, group, and division indicated. Provide aboveground connector type pull / terminal boxes, watertight, raintight, dust tight with aluminum cover and base, and backpanel for terminal connections of conductors and ground wires.
2. Provide boxes and covers for polyvinylchloride-coated steel conduit made of galvanized cast iron, with a polyvinylchloride factory-applied coating over the galvanizing. Provide coating thickness of 40- mil minimum. Boxes shall have hubs with extruded sleeves extending beyond the hub in the same manner as specified for conduit couplings. Provide cover screws of stainless steel.
3. Provide stainless steel covers or device plates suitable for the area classification. Use cover screws of stainless steel or high brass for iron boxes.

E. Fittings:

1. Provide explosion proof EYS sealing fittings. Use sealing compound and fiber approved for use with the fitting for installation in hazardous locations.
2. Provide stainless steel fittings.
3. Provide suitable expansion fittings where conduits cross expansion joints. Equip these fittings with grounding straps, clamps, and copper bonding jumpers.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Perform all work in accordance with the National Electric Code.
- B. Use no conduit less than 3/4-in. [20 mm] in diameter, unless otherwise indicated.

- C. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's printed instructions.
- D. Installation of service raceways and conductors shall be in accordance with the requirements of FP&L and NEC.

3.02 INSTALLATION OF FITTINGS

- A. Install expansion fittings wherever conduits cross structural expansion joints. Keep the fittings in line with conduit and install with regard to temperature so that full working range of expansion is available.
- B. Do not install fittings to replace elbows and pull boxes, unless space or other problems make use of fittings necessary. Use oversize fittings whenever large cable is installed, in order to maintain proper bending radius.
- C. Equip ends of all conduits with conduit fittings. Fit conduits terminating at power distribution equipment, or in box above or below, with grounding type bushings, or solidly ground by locknuts or other acceptable fittings. Connect each grounding bushing to ground bus by a bare or green-covered copper wire. Do not use ground wire smaller than 12 AWG. Install ground wire larger than 12 AWG when required by NEC. Where conduits terminate in unprotected areas or where bonding is required over expansion joint, flexible conduit or equivalent; use ground wires No. 6 AWG. copper or larger.
- D. Terminate conduits entering gasketed sheet-metal boxes or gasketed sheet-metal equipment enclosures with gasketed hubs.
- E. Terminate conduits entering non-gasketed sheet-metal boxes or enclosures with double locknuts and insulated bushings, or with acceptable equivalent.
- F. Join raceways with fittings listed for the purpose. Make joints tight. Use raceway fittings compatible with raceway and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, except as otherwise indicated.
 - 1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
 - 2. Use insulating bushings to protect conductors.
 - 3. Tighten set screws of threadless fittings with suitable tool.

3.03 INSTALLATION OF RACEWAYS

- A. All aboveground conduit shall be PVC coated rigid galvanized steel. All underground conduit shall be schedule 80 PVC. Conduit shall be placed on a 2" layer of sand with a sand cover meeting the minimum cover requirements as specified in NEC Table 300.5. Conduit between the pull / terminal boxes and the wet well and valve chamber shall be

encased in 2" of concrete, with minimum cover to top of conduit of 24", in accordance with NEC Article 501.10(A)(1) Exception. The elbow and vertical riser conduit shall be PVC coated rigid galvanized steel. The EYS seal fitting shall be installed in the conduit between the pull / terminal boxes and the control panel.

- B. Provide cast-in-place inserts in concrete to support all runs, unless otherwise permitted. Use stainless steel sleeve type concrete anchors for installing boxes, and conduit supports. Provide Type 316 stainless steel nut, bolts, and washers, for use with concrete anchors.
- C. When specified on the Contract Drawings, install conduits in slabs as close to middle of concrete slabs as practicable without disturbing reinforcement.

Do not use conduit with outside diameter exceeding one-third of slab thickness. Do not place conduits closer than three diameters on centers, except at cabinet locations where slab thickness is increased as permitted by Engineer.

- D. Do not use dissimilar metals in conjunction with each other. Use an insulation between adjoining surfaces to eliminate direct contact and any resultant electrolysis. Maintain electrical continuity of system. Use bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other acceptable materials as insulation.
- E. Install fittings to match raceway being used.
- F. Provide separate raceways for all low voltage instrumentation raceways (50 volts and below) from control and power raceways.
- G. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely, and install the locknuts with dished part against the box; use two locknuts, one inside and one outside the box.
- H. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.
- I. Install pull wires in all empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-lb. tensile strength. Leave not less than 12 inches [300 mm] of slack at each end of the pull wire.
- J. Complete raceway installation before beginning conductor installation.
- K. Use temporary closures to prevent foreign matter from entering raceway.
- L. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

3.04 BENDS

- A. Make all bends carefully to prevent distortion of circular cross section. Field bend conduit shall have an inside radius of not less than nine times cable diameter.
- B. Where bends of less than nine times cable diameter are necessary, use standard factory elbows. Size conduit to permit cable-bending radius within the factory elbow of at least eight times cable diameter.
- C. Allow no conduit greater than 50 feet [15.2 meters] in length to have more than two 90-degree bends or equivalent thereof between pulling points. For conduits less than 50 feet [15.2 meters] in length, allow only three 90-degree bends between pulling points.

3.05 CUTTING, THREADING AND CONNECTING

- A. Make all field cuts in conduits squarely, file cut ends, ream to remove rough edges and thread in accordance with N.E.C. No running thread permitted. Make all connections mechanically strong and tight, and with acceptable connectors. Where conduit surface coating is damaged or removed in the cutting, threading or reaming process, restore the surface to its original condition.

3.06 CONDUIT CLEANING

- A. Clean all conduit carefully before and after installation, ream ends free of burrs, and free inside surfaces from all imperfections likely to injure cable.
- B. After installation of each completely new conduit run, snake the run with band to which is attached a tube cleaner with cylindrical mandrel of a diameter not less than 85 percent of nominal diameter of conduit. Remove and replace all conduit through which mandrel will not pass.
- C. Use a sponge with steel brush to clean steel conduit and use a sponge with nylon brush to clean PVC conduits.
- D. After cleaning, protect ends of all conduit with standard caps to prevent entrance of water, concrete, debris, or other foreign substance.

3.07 CONDUIT DRAINAGE

- A. Where practicable, pitch conduit to drain to outlet boxes, or install so as to avoid trapping moisture. Where dips are unavoidable in exposed conduits, install fitting with drain hole at low point.

3.08 INSTALLATION OF BOXES

- A. All boxes shall be type 316 stainless steel except as noted.

- B. Support boxes in same manner as required for conduit. Size boxes to provide bending radius for wire or cable of at least eight times diameter or in accordance with NEC, whichever is larger.
- C. Center all outlets in panels, or spaces and adjust to structural finish. Where specific locations are not indicated, locate outlets with respect to equipment served.
- D. Assemble cast-metal boxes with threaded conduit hubs in such manner that conduit connections and gasketed covers are watertight. Close all unused threaded openings with pipe plugs and compound.
- E. Provide cast boxes with covers and device plates suitable for the area classification. Install screws of stainless steel or high brass for iron boxes. Field apply 2-part epoxy coating over exterior of iron pull boxes to minimize future corrosion.

3.09 HAZARDOUS AREAS

- A. Install all conduits, fittings, equipment and devices within areas to comply with requirements of NEC for Hazardous Locations, Class, Division, and Group as indicated on the drawings.
- B. In such hazardous locations, seal conduits terminating at boxes enclosing circuit-opening equipment at entrance to enclosure with compound-filled, commercial, sealing fittings to prevent passage of explosive or combustible gases through conduits. Conduits shall be sealed between the pull / terminal boxes and the control panel.
- C. Seal all conduits leading from or entering such hazardous locations at points of exit or entrance with two-part epoxy sealant. Conduit from wet well to aboveground Class 1 Division 1 explosion proof pull / terminal box shall not have a seal. Seals shall be installed between the aboveground box and the control panel. Conduit into and out of pull / terminal box shall be filled with duct seal.
- D. Install conduit connections with at least five threads tightly engaged and made up with suitable thread compound.
- E. Where drain/seal fittings are required, they shall be of malleable iron construction with an internal drainage path which provides a visual means to ensure that the compound chamber is properly filled. The installation shall enable the drain/breather fitting and filler plug to be installed right after the compound is poured.

3.10 PROTECTION

- A. Provide protection and install in accordance with manufacturer printed instructions. The conduit and raceway equipment manufacturers, to ensure that coatings, finishes, and enclosures are without damage or deterioration at completion of project.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touch-up coating recommended by the manufacturer.

3.11 FINAL SYSTEM ACCEPTANCE

- A. Upon completion of installation of system, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions and at no additional cost to the Owner.
- B. Label all raceways and boxes in accordance with the requirements of Section 16050.

3.12 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 16120

ELECTRIC WIRES AND CABLES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide wires and cables for complete electrical systems as indicated and specified.

1.02 RELATED WORK

- A. Section 16050: Electrical Work - General

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM): B3: Soft or Annealed Copper Wire.
B8: Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
B33: Tinned Soft or Annealed Copper Wire for Electrical Purposes.
- B. National Fire Protection Association (NFPA): NFPA-70: National Electrical Code (NEC).
- C. Underwriters Laboratories, Inc. (UL):
U.L. 44: Thermoset-Insulated Wires and Cables
U.L. 83: Thermoplastic-Insulated Wires and Cables
U.L. 854: Service Entrance Cables
- D. Insulated Cables Engineers Association, Inc. (ICEA)/National Electrical Mfg's Association (NEMA):
 - 1. ICEA S-61-4021/WC 5: Thermoplastic Insulated Wire & Cable.
 - 2. ICEA S-66-524/NEMA WC7; Cross-Linked-Thermosetting-Polyethylene Insulated Wire and Cable
 - 3. ICEA S-68-516/WC 8: Ethylene-Propylene-Rubber-Insulated Wire & Cable.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300 - Submittals: Submit shop drawings and manufacturer's product data in accordance with the requirements of Section 16050.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. 600V Cable:
 - Okonite. Southwire.
 - American Insulated Wire.
 - Or acceptable equivalent product.
- B. Control and Metering Wire: Belden Wire and Cable. Alpha Wire.

2.02 MATERIALS AND COMPONENTS:

- A. Furnish copper conductors. Material and stranding of conductors to conform to ASTM B3, ASTM B33, and to ASTM B8, for the appropriate class.
- B. All wire shall be brought to the job in unbroken packages and shall bear the date of manufacturing not older than 12 months.
- C. Wires and Cables for Maximum 600-Volt Power Circuits: For #8 and smaller provide type XHHW-2. Where used in lighting or receptacle branch circuits provide No. 12 and No. 10. Provide wire with Class C stranding. Provide No. 6 AWG and larger as XHHW-2 with Class B stranding. Provide wires and cable conforming to UL 83.
- D. Shielded Cable for Instrumentation Wiring: 7 –strand copper conductors, size No. 16 AWG. Insulate conductors individually with color coded polyethylene or polyvinylchloride. Twist pairs with varying lay (if more than one pair) and cover with cable tape and copper or aluminum coated Mylar shielding tape and tinned copper drain wire. Jacket: polyvinylchloride. Cables: rated 600 volts and 90 degrees C and listed for installation in wet location.

PART 3 - EXECUTION

3.01 GENERAL

- A. Perform work in accordance with the National Electrical Code.

B. Provide power cable identification as follows:

System Voltage	Neutral	Phase A	Phase B	Phase C
240/120V	White- Gray Stripe	Black- Blue Stripe	Red- Blue Stripe	None

NOTE: Colored insulation, tapes or sleeves may be used to provide color coding. Insulated ground conductors must have green covering.

- C. Use green to identify insulated ground conductors.
- D. Permanently identify each grounded and ungrounded conductor for each nominal voltage system at each Control Panel.

3.02 INSTALLATION OF WIRING

- A. Unless otherwise indicated, use no conductor smaller than No. 12 AWG for power, No. 14 AWG for control, and No. 16 AWG for shielded applications.
- B. Number and sizes of wires and conduits indicated are a guide only and are not necessarily correct for the actual equipment installed. Install as many wires and conduits as necessary for complete electrical system and provide adequately for the equipment actually installed.
- C. Install conductors continuous from outlet to outlet and make no splices except within outlet or junction boxes.
- D. Install cable in underground raceway system without splices. There shall be no splices between connection points unless otherwise indicated.
- E. Draw all conductors contained within a single conduit at the same time.
- F. Apply wire pulling compound to conductors being drawn through conduits. Use pulling compound Minerallac No. 100, Y-er-Eas, Yellow 77, High Performance Polywater Cable Lubricant.
- G. Use no cable bend with radius of less than eight times its diameter.
- H. Wires and cables installed without prior submittal review are subject to removal at no additional expense.

3.03 CONDUCTOR IDENTIFICATION

- A. Label each wire at both termination points. Carry individual conductor or circuit identification throughout, with circuit numbers or other identification clearly stamped

on terminal boards and printed on directory cards in distribution cabinets and panelboards.

- B. Identify each wire in junction boxes, cabinets, and terminal boxes where total number of controls, indicating, and metering wires is three or more and no terminal board is provided, including all power wire. Where no termination is made use a plastic-coated, self-adhesive, wire marker and where termination is made use a, plastic, pre-printed sleeve wire marker.
- C. In cases similar to above where terminal boards are provided for the control, indicating, and metering wires, identify all wires including motor leads and other power wires too large for connection to terminal boards, by sleeve wire markers as specified above.
- D. In manholes and handholes, identify each power wire by laminated plastic tag located so it is easily seen. Control wires to be bundled and marked as listed in conduit and wire schedule.

3.04 CONNECTORS, TERMINAL LUGS AND BOARDS

- A. For wiring of circuits consisting of No. 10 or No. 12 AWG, such as for lighting branch circuits, use self-insulated pressure type connectors for all splices or joints.
- B. Terminate all wires connected to terminal boards, terminal blocks, or to other similar terminals by means of ring and tongue, nylon self-insulated, tin-plated copper pressure terminals.
- C. Terminal boards shall be 600 volts and rated for 125% of the ampacity of the connected circuit. They shall have screw terminals, with white marking strips for wire identification. Terminate only one wire on a terminal, including ground wires, unless rated for more.
- D. Wire connections for which terminals are not supplied, for example, at solenoids or motor terminal junction boxes:

10AWG and smaller: Use self-insulated pressure-type connectors.

8AWG and larger: Use insulated, mechanical type with set screw or follower bearing directly on the wire. Split bolt connectors are not acceptable.
- E. Clearly and permanently mark terminal strips with ink or indelible pencil. Mark each wire consistently throughout entire system, using notation of wires given on manufacturer's wiring diagrams wherever possible.

3.05 TESTING

- A. Perform tests of all cables prior to energizing in accordance with Section 16999.
- B. Submit results of all cable tests on forms indicating cable size, voltage, from, the and date with name of tester and witness.

3.06 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 16400

SURGE PROTECTION DEVICES (SPDs)

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide Surge Protection Devices (SPD) integral to the electrical distribution system equipment indicated on the Contract Drawings. The distribution system includes 120/240V 1 phase service entrance rated manual safety switch and a control panel with 120V circuit breakers.
- B. The components shall provide protection for electrical and electronic devices against the damaging effects of surges, transients and electrical line noise.

1.02 RELATED WORK

- A. Division 1: General Requirements
- B. Division 16: Electrical

1.03 REFERENCES

- A. Underwriters Laboratory (UL):
 - 1. ANSI/UL 1449 Fourth Edition – Standard for Safety – Surge Protective Devices.
 - 2. UL 1283 – Standard for Safety – Electromagnetic Interference Filters.
- B. National Electric Code and all applicable state and local codes.
- C. American National Standard Institute (ANSI)/Institute of Electrical and Electronic Engineers (IEEE):
 - 1. ANSI/IEEE C62.41 - IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits
 - 2. ANSI/IEEE C62.45 - IEEE Recommended Practice on Surge Testing for Equipment Connected to Low Voltage (1000 V and less) AC Power Circuits.
 - 3. National Electrical Manufacturers Association (NEMA):
 - 4. NEMA 250 - Enclosures for Electrical Equipment (1000 volts maximum)
 - 5. NEMA LS 1 - Low Voltage Surge Protection Devices

1.04 SUBMITTALS:

- A. Submit the following in accordance with Section 01300 and as specified herein.
 - 1. Shop drawings, manufacturer's product data, and component ratings in accordance with this section and the requirements of Section 16050.
 - 2. Provide verification that the SPD complies with the required ANSI/UL 1449 4th edition listing by UL.
 - 3. SPD type, model number, system voltage, phases, modes of protection, Maximum Continuous Operating Voltage (MCOV), Voltage Protection Rating (VPR), Short Circuit Current Rating (SCCR), and Nominal Discharge Current (In).
 - 4. Outline drawings and internal wiring diagrams, including ratings of overcurrent circuit protection included with or provided for the unit.
 - 5. Where separate Surge Protection Devices are required by the Contract Drawings, provide manufacturer's standard installation requirements.
 - 6. Factory test data.
 - 7. Operating and Maintenance Instruction Manuals:
 - a. Furnish:
 - (1) Operating instruction manuals outlining step-by-step procedures for system startup and operation and in accordance with Section 01300.
 - (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) Simplified connection wiring diagrams for each circuit.

1.05 QUALITY ASSURANCE:

- A. SPD units and all components shall be designed manufactured and tested in accordance with the latest applicable UL Standard (ANSI/UL 1449 4th Edition).

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Surge Protection Devices.
 - 1. Surge Suppression Inc.
 - 2. Eaton-Cutler Hammer
 - 3. Square D (Schneider Electric)

2.02 GENERAL

- A. Electrical Requirements
 - 1. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.
 - 2. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.
 - 3. Short Circuit Current Rating (SCCR) – The minimum SCCR of the SPD types 1 and 2 shall be 100 KA.
 - 4. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards.
 - 5. Protection Modes – The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

Configuration	Protection Modes			
	L-N	L-G	L-L	N-G
Wye	●	●	●	●
Delta	N/A	●	●	N/A
Single Split Phase	●	●	●	●
High Leg Delta	●	●	●	●

- 6. Nominal Discharge Current (I_n) – All SPDs applied to the distribution system shall have a 20kA I_n rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an I_n less than 20kA shall be rejected.

7. Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 4th Edition VPR for the device shall not exceed the following:

MODES	208Y/120	480Y/277
L-N; L-G;	700V	1200V
L-L	1000V	2000V
N-G	600V	1200V

8. ANSI/IEEE C High Let-Through Voltage – The let through voltage based on an ANSI/IEEE C62.41 Category C3 shall not exceed the following:

Mode	208Y/120	480Y/277
L-N	550V	900V
N-G	470V	920V

B. SPD Design:

1. Maintenance Free Design – The SPD shall be maintenance free and shall not require any intervention throughout its life. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.
2. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules shall not be accepted.
3. Electrical Noise Filter – Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.
4. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.

5. Monitoring Diagnostics – Each SPD shall provide the following integral monitoring options:
 - a. Protection Status Indicators - Each unit shall have a green / red solid-state indicator light that reports the status of the protection on each phase.
 - (1) For wye configured units, the indicator lights must report the status of all protection elements and circuitry in the L-N and L-G modes. Wye configured units shall also contain an additional green / red solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode. SPDs that indicate only the status of the L- N and L-G modes shall not be accepted.
 - (2) For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes.
 - (3) The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators must indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights must continue to indicate the status of the protection on all other phases and protection modes. Diagnostics packages that simply indicate whether power is present on a particular phase shall not be accepted.
 - b. Remote Status Monitor – The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition.
6. Overcurrent Protection
 - a. The unit shall contain thermally protected MOVs. These thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect the MOV(s) from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.
7. Fully Integrated Component Design – All of the SPD’s components and diagnostics shall be contained within one discrete assembly. SPDs or individual SPD modules that must be ganged together in order to achieve higher surge current ratings or other functionality shall not be accepted.

8. Safety Requirements

- a. SPDs designed to interface with the electrical assembly via conductors shall require no user contact with the inside of the unit. Such units shall have any required conductors be factory installed.

2.03 SYSTEM APPLICATION

- A. The SPD applications covered under this section include distribution and branch panel locations, and Pump control panel. All SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C, B, and A environments.
- B. SPD Type – SPD installed within pump control panel shall be Type 1. All SPDs installed in panelboards shall be Type 2.

2.04 SHOP TESTING

- A. Provide a factory performance test for each unit. The tests shall be in accordance with the latest version of NEMA and UL Standards:

PART 3 - EXECUTION

3.01 INSPECTION

- A. Visually inspect delivered unit(s) and accessories for conformance with the Contract Drawings and specifications.

3.02 INSTALLATION

- A. Install unit in compliance with the manufacturer's printed instructions. All electrical installation Work shall be in accordance with UL Listing Requirements and National, State, and Local Electrical Codes.

3.03 CHECKOUT AND TESTING

- A. Provide checkout, field, and functional testing in accordance with Sections 16050 and 16999.

END OF SECTION

SECTION 16450

GROUNDING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide a single, complete, integrated grounding system, including conductors, raceways, and connections, indicated and specified, and in accordance with the National Electrical Code Article 250 and the National Electrical Safety Code.
- B. Include grounding of electric equipment enclosures etc., transformers, ground grid systems with ground rod, rebar, and water pipe connections; fence, and antenna structural steel.
- C. Include grounding conductors completely inter-connecting water supply pipe, ground rods, ground grid, other distribution equipment, and other ground able equipment.

1.02 RELATED WORK

- A. Section 16050: Electrical Work - General

1.03 REFERENCES

- A. American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE):
 - 1. ANSI-C2-/IEEE: National Electrical Safety Code.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA-70: National Electric Code.
- C. ASTM International (ASTM):
 - 1. B3: Standard Specification for Soft or Annealed Copper Wire.
 - 2. B8: Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - 3. B33: Standard Specification for Tinned Soft or Annealed Copper Wire for Electrical Purposes.

- D. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. Standard 81: Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potential of a Ground System.
- E. Underwriters Laboratories (UL):
 - 1. 467: Standard for Grounding and Bonding Equipment.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300 - Submittals:
 - 1. Submit shop drawings and manufacturers' product data in accordance with requirements of Section 16050.
 - 2. Submit information on:
 - a. Ground rods
 - b. Exothermic welding
 - c. Connecting hardware

PART 2 - PRODUCTS

2.01 MANUFACTURER'S COMPLIANCE

- A. Manufacturer's acceptance contingent upon products' compliance with the specifications.

2.02 MANUFACTURERS

- A. Ground Rods:
 - 1. ERICO Products Inc.
- B. Exothermic Welding:
 - 1. ERICO Products, Inc.
 - 2. American Brass Mfg. Co.
 - 3. Orgo-Thermit, Inc.
 - 4. Or an acceptable equivalent product.

- C. Connecting Hardware:
 - 1. American Brass Mfg. Co.
 - 2. Thomas and Betts
 - 3. Anderson Electric Corp.
 - 4. Or an acceptable equivalent product.

2.03 MATERIALS AND COMPONENTS

- A. Conductors:
 - 1. Provide copper grounding conductors bare or insulated, sized as indicated or as required by the NEC. Minimum bare conductor size shall be No. 2 AWG. Provide protection of conductors if physical damage would result from direct exposure.
 - 2. Provide bare conductors where conductors are buried in the earth or where they are embedded in the concrete.
- B. Ground Rods:
 - 1. Ground rods shall conform to the requirements of NFPA 70 and UL Standard 467.
 - 2. Ground rods shall be copper-clad steel rods not less than 3/4 inch (19 mm) in diameter and not less than 10 feet (3 m) long per section.
 - 3. Ground rods shall be clean and smooth with the following characteristics:
 - a. Cone-shaped point on the first section.
 - b. Die-stamped near the top with the name or trademark of the manufacturer and the length of the rod in millimeters or feet.
- C. Connections:
 - 1. Provide silicon bronze ground clamps for use on copper or brass pipes which are U.L. listed.
 - 2. Provide ground clamps, for use on iron pipes, of galvanized or malleable iron, or of standard noncorrosive material.

3. Furnish ground clamps, for use on pipes, with rigid metal base providing good contact by proper seating on the pipe. Do not use strap type clamps.
4. Provide copper-clad steel ground rods; Make cable to ground rod connection without passing over end of ground rod.

PART 3 - EXECUTION

3.01 EXOTHERMIC WELDING

- A. Welding shall be by the exothermic process.
- B. Within the welding procedure, include the proper mold and powder charge and conform to the manufacturer's recommendations.
- C. Welding processes shall be the exothermic fusion type that will make a connection without corroding or loosening.
- D. The welding process shall join all strands and not cause the parts to be damaged or weakened.
- E. Completed connection or joint shall be equal or larger in size than the conductors joined and have the same current-carrying capacity as the largest conductor.
- F. Paint buried ground connection with a bitumastic paint.

3.02 INSTALLATION OF GROUNDING CONDUCTORS

- A. Install grounding conductors so that they will not be exposed to physical damage. Install connections firm and tight. Arrange conductors and connectors so no strain on connections. Grounding conductors for support structures, antenna, and pressure transmitter shall be installed in PVC conduit passing through the concrete base or slab for each of these pieces of equipment. Conduit shall pass through and extend 6 inches from the side of the concrete to allow for future maintenance and replacement as required.
- B. Bury equipment grounding conductors 30 inches deep. Bring loops or taps up for connection to equipment or other items to be grounded.
- C. Where raceways are used to contain and protect grounding conductors, install in accordance with Sections 16110.
- D. Where bare grounding conductors are contained within metallic raceways, bond ends of raceways to conductors.
- E. Install loop type, low impedance, grounding system interconnecting all components so at least two grounding connections are provided for each major item of electrical

equipment. Ensure that severing of any single grounding conductor in this system does not remove grounding protection on any major item.

- F. Buried and concealed ground connections shall use exothermic welding.
- G. Make accessible connections to structural members by exothermic welding process or by bolted connector. Connections to equipment or ground bus by bolted connectors.

3.03 INSTALLATION OF GROUND RODS

- A. Install ground rods near equipment as indicated on schematic. Install the top of the rod 12-in. below the ground surface.
- B. Make connection to overall grounding system as indicated.
- C. Ensure that final resistance of interconnected ground system is 5 ohms, or less. Measure ground resistance in normally dry conditions, and not less than 48 hours after rainfall.

3.04 EQUIPMENT GROUNDING

- A. Ground each piece of electrical equipment by means of a grounding conductor installed in raceway feeding that piece of equipment. Grounding conductors installed in conduit with insulated conductors to be furnished with green, 600-volt insulation. Ground conductors are in addition to and not to be considered as the neutral wire of the system.
- B. Connect power transformer cases and neutrals to grounding system. Connect neutral ground connection at transformer terminal. Provide two separate, independent, diagonally opposite, connections for power transformers so removal of one connection will not impair continuity of other.
- C. Connect a grounding conductor between panelboard and grounding system. Where a grounding bar is furnished with panelboard, connect grounding conductor to bar.
- D. Where conduits are not effectively grounded by firm contact with a grounded enclosure, apply grounding bushings on at least one end of conduit run.
- E. Ground metal fences when used to enclose electrical equipment or when overhead electrical lines cross fence. Unless otherwise indicated, provide grounding by buried outside peripheral ground loop; connections to each corner fence post and nearby ground rod; flexible connections to each gate; and at least two connections to grounding system from approximately opposite positions on fence.

3.05 SIGNAL GROUNDING

- A. Ground signal surge protection and shields of twisted, shielded cable using a signal bonding conductor. The signal bonding conductor shall be a continuous path from the

instrument surge protection or shield to the grounding electrode conductor. The signal bonding conductor shall be isolated from the equipment grounding conductor for its entire path.

- B. Where convenient several signal bonding conductors may be combined, providing that all the following conditions are met:
 - 1. The combined signal bonding conductor shall have the equivalent cross section of the conductors that it was combined from or three times the cross section of the largest conductor that it was combined from, whichever is less.
 - 2. The combined signal bonding conductor shall be isolated from the equipment grounding conductor.
 - 3. Where two signal bonding conductors are combined use a three-port insulated splice.
 - 4. Where three or more signal bonding conductors are combined, use a copper bus mounted on 600V insulators. Attach each conductor to the bus using an insulated ring tongue lug and screw terminal.

3.06 TESTS AND CHECKOUTS

- A. Testing shall not be performed within 48 hours of rainfall. Dry season resistance of each electrode(s) shall not exceed 5 ohms. If such resistance cannot be obtained with the system as installed, additional grounding rods shall be provided as required.
- B. Furnish copies of test reports on ground system.

3.07 CONTRACT CLOSEOUT:

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 16900

ELECTRICAL CONTROLS AND MISCELLANEOUS ELECTRICAL EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide and connect the electrical control equipment and miscellaneous electrical equipment, including such instruments and devices indicated and specified. Device enclosures for electrical equipment as indicated and specified.
- B. Control panel enclosures and devices specified herein are provided under those specification sections which invoke this section for control panel requirements or as indicated on electrical drawings. The control panel (CP) shall be provided by the system supplier / integrator (instrumentation subcontractor), per Section 13300 Utility Control Instrumentation System.

1.02 RELATED WORK

- A. Section 13300: Utility Control Instrumentation System
- B. Section 16050: Electrical Work – General

1.03 REFERENCES

- A. Underwriter's Laboratories, Inc. (U.L.):
 - 1. UL-467: UL Standard for Safety, Grounding and Bonding Equipment.
 - 2. UL-489: UL Standard for Safety, Molded-Case Circuit Breakers, Molded-case Switches and Circuit Breaker Enclosures.
 - 3. UL 508A - Standard for Safety Industrial Control Panels
 - 4. UL 698A - Standard for Safety Industrial Control Panels Relating to Hazardous (Classified) Locations
- B. National Electrical Manufacturers Association (NEMA):
 - 1. 250: Enclosures for Electrical Equipment (1000 volts maximum).
 - 2. ICS 1: Industrial Control and Systems General Requirements

3. ICS 2: Industrial Controls and Systems Controllers, Contactors, and Overload Relays Rated 600 Volts.
 4. ICS 4: Application Guideline for Terminal Blocks.
- C. American Society for Testing and Materials (ASTM) Publications:
1. D 178: Specification for Rubber Insulating Matting.
- D. National Fire Protection Association (NFPA):
1. NFPA-70 National Electrical Code (NEC).

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300 - Submittals:
1. Submit shop drawings and manufacturer's product data, brochures including wiring diagrams in accordance with Section 16050.
 2. Wiring diagrams to show control interface points provided with other equipment.
 3. Shop drawings to include:
 - a. Outline drawings with elevations.
 - b. Equipment arrangement drawings.
 - c. Anchor bolt location drawings.
 - d. Electrical schematics and wiring diagrams.
 - e. Electrical fuse/circuit breaker characteristic.
 - f. Equipment performance curves and data.
 - g. Bill of installation/assembly materials.
 - h. Equipment weights.
 - i. Completed manufacturer's data sheets.

1.05 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.

PART 2 - PRODUCTS

2.01 ELECTRICAL DISTRIBUTION MANUFACTURERS

- A. Siemens.
- B. General Electric Company.
- C. Cutler-Hammer.
- D. Square D Company.
- E. Appleton Electric Company.
- F. Crouse-Hinds Company.
- G. O-Z/Gedney.

2.02 STAINLESS STEEL/GALVANIZED STEEL CHANNEL MANUFACTURERS

- A. Unistrut Corp.
- B. Power-Strut.

2.03 UTILITY SERVICE DISCONNECT SWITCH

- A. The switch shall be mounted in a NEMA 4X enclosure. Enclosure shall be fabricated from Type 316 stainless steel.
- B. Heavy duty safety switches to be UL listed, File E 2875 and 154828, and meet or exceed NEMA Standard KS1.

2.04 CONDUIT AND WIRING

- A. Provide conduit and wiring necessary to make connections between instrument panels, consoles, cabinets and external equipment and devices.

2.05 CIRCUIT BREAKERS

- A. Provide manually operated circuit breakers, ambient-compensated, providing thermal magnetic inverse time-limit overload and instantaneous short circuit protection. Provide overload protection on all poles; trip settings as indicated.
- B. Provide circuit breakers housed in NEMA type enclosure indicated, having external operating handles with provisions for padlocking.

2.06 CONTROL PANELS AND ELECTRICAL ENCLOSURES

- A. Control Panel shall be fabricated and installed by the system supplier / integrator (instrumentation subcontractor) as mentioned in sections 13300 and 11304. Ensure that dimensions, NEMA rating, construction and mounting of equipment is as indicated.
- B. Provide pad lockable enclosures with back panels constructed of at least 14 gage steel and dead front swing out panel kit with blank outer door. Provide door stop kits for swing out panel and outer door to secure in the open position. Panel enclosure shall be NEMA 4x Type 316 stainless steel. Provide door and body stiffeners in panels over 36 inches in length. NEMA 7 panels to be provided with hand operated quick disconnects of stainless-steel material.
- C. Provide UL listed and NEMA rated circuit breakers, Square D starters and thermal mechanical overload relays with auxiliary normally open contact, pushbuttons, indicator lights and switches of heavy duty, oil tight types. Provide intrinsically safe relays for field wiring and relays of industrial types, with 120-volt, 60-Hertz operating coils, and contacts rated for intended service.
- D. Provide nameplates for each panel and each device on panel. Nameplates of laminated plastic material, at least 3/32 in. thick, and with white letters on a black background.
- E. Secure nameplates with clear pressure sensitive tape for continuous bond equal to 3M VHB assembly tape.
- F. Terminal Blocks:
 - 1. Provide terminal blocks rated for 600 volts with screw type terminals.
 - 2. Terminal blocks to be one piece with full barriers.
 - 3. Provide General Electric EB-25 terminal blocks or equal.
- G. Provide print pocket on inside of enclosure and include as-built drawings for Owner's use.
- H. Intrinsically safe circuits are required to have a barrier separation from other circuits, either with full height barriers or a separate box within the enclosure. Provide a specific area for installation of conduits containing intrinsically safe circuits.
- I. Provide enclosures as manufactured by Hoffman, Inc, or Schaefer.
- J. Enclosures 24 inches high or larger shall be provided with fluorescent light fixtures, light switch and 20-amp GFCI protected receptacle. Light fixtures shall be UL listed for wet locations and provide light output equivalent to a 100-watt incandescent lamp.

- K. Where equipment and devices are to be installed in hazardous locations, provide equipment and components suitable for the environment.
- L. All indicating lamps to be LED cluster type.

2.07 CONTACTORS AND RELAYS:

- A. Provide mechanically held, heavy duty type contactors (relays) for lighting control, rated 30 amps, 600 volts, with number of poles as indicated.
- B. Provide contactor in the required NEMA enclosure suitable for wall mounting. Provide circuit breaker or fuse protection on each ungrounded pole. Provide contactor similar to Automatic Switch Company, 1035 series, 1255-166.
- C. Provide industrial grade relays, NEMA rated, Square D Class 8501 or equal.

2.08 NAMEPLATES

- A. Provide nameplates for equipment (including pushbutton and selector switch stations) listed in this section and other controls furnished under this contract, to designate the equipment controlled and their function.
- B. Nameplates shall be laminated black bakelite with one-quarter inch (1/4-in.) high, white, recessed letters. Securely attach to the equipment with clear pressure sensitive tape for continuous bond equal to 3M VHB assembly tape.
- C. Provide all junction boxes, pull boxes, disconnect switches and control panels with a nameplate to designate the system wiring contained within.
- D. Install nameplates in a location near or on the equipment or devices.

2.09 CHANNEL

- A. Provide Type 316 stainless steel channel with corresponding stainless-steel accessories.

PART 3 - EXECUTION

3.01 WIRING OF MISCELLANEOUS DEVICES

- A. Make electrical connections required for recording and indicating instruments, and miscellaneous devices. Provide electrical supplies to metering, instrumentation, control, and alarm systems.
- B. Connect HAND-OFF-AUTO switches, safety switches, tumbler switches, and other accessory devices as indicated or necessary for control of motors and other electrical equipment or devices.

- C. Install conduit and wiring and make electrical connections between all instrument panels, consoles, cabinets, and external equipment and devices. Panels, cabinets, etc., are indicated.

3.02 WIRING OF EQUIPMENT FURNISHED UNDER OTHER SECTIONS

- A. As specified in Section 16050, install conduit, wiring, and connections for equipment and devices furnished under other Sections of specifications, and as indicated.
- B. Refer to mechanical specifications and drawings for locations of pressure-operated control switches, float switches, metering instruments, control panels, alarm actuating contacts, indicating lamps, limit switches, and other devices requiring wiring or interconnections with equipment supplied under Electrical Sections of these specifications.

3.03 CHANNELS

- A. Install Type 316 stainless steel for mounting of electrical equipment in outdoor areas and below grade, outside building and structure walls.

3.04 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION

SECTION 16999

FIELD ACCEPTANCE TESTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. After electrical installation is complete, perform tests to demonstrate that entire system is in proper working order and in accordance with drawings and specifications. Do not perform tests less than those outlined hereafter, unless requested in writing and approved by Engineer. Tests are in addition to, and no substitution for, tests of individual items at manufacturer's plant. Perform insulation and ground resistance tests before operating tests. Determine proper rotation of motors before permanent connections are made.
- B. Pay all costs for tests including expenses incident to retests occasioned by defects and failures of equipment to meet specifications.
 - 1. Replace wiring and equipment found defective, or failing to meet specified requirements, at no additional cost, unless written acceptance for repair is given by Engineer.
 - 2. Furnish three copies of all test results to Engineer.
 - 3. Unless otherwise specified, Owner will supply electric current for tests.

1.02 REFERENCES

- A. NEMA: National Electrical Manufacturers Association, 2101 L Street, Northwest, Washington D.C.
- B. IEEE: Institute of Electrical and Electronic Engineers, 345 East 47th Street, New York, NY.

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01300 - Submittals:
 - 1. Submit data sheets for the insulation resistance testing of conductors and motors prior to performing operating testing.
 - a. List all cables and motors to be tested.
 - b. Provide space on data sheets to enter the results of testing, instruments used with serial numbers, and name of personnel performing testing. This data to be filled out during testing in the presence of the Engineer.

2. Submit data sheets for ground system testing in accordance with paragraph 3.05 of this specification section.

PART 2 - PRODUCTS

2.01 TESTING EQUIPMENT

A. Calibration:

1. Furnish applicable electrical instruments including voltmeters, ammeters, wattmeters, tachometers and all other equipment required to perform tests specified. Furnish certified copies of calibration curves of these instruments which have been calibrated for specific tests. Provide these instruments as directed by the Engineer during performance of operating tests.
2. Make openings in circuits for testing instruments and place and connect all instruments, equipment, and devices, for the tests. Upon completion of tests, remove instruments and instrument connections and restore all circuits to permanent condition.
3. Other sections of specifications require services of one or more manufacturer's representatives, to ensure that equipment supplied has been installed properly and adjusted to proper working order. Advise representative of applicable tests in this Section, so that work will be coordinated, and tests combined where feasible.

2.02 TESTING

A. Coordination:

1. Coordinate activities, and cooperate with others on project, to ensure that systems are energized when required, loads applied, and other requirements of Section are carried out on timely, coordinated basis.
2. Conduct tests in presence of Engineer. Notify Engineer seven calendar days or more in advance when any test is to be performed, and do not start tests without Engineer's permission.

B. Preparation:

1. Make up no -voltage connections at service entrance, transformers, motors, and generator permanently until correct phase rotation of all equipment is determined. Install and insulate these connections temporarily, if necessary, while determining proper rotation.

2. Make permanent connections after proper rotation has been established and subsequent to completion of insulation resistance and dielectric tests.
3. Verify conductors, buses and motor leads are properly labeled or tagged to ensure correct phase and rotation connection of the power system.

PART 3 - EXECUTION

3.01 INSTALLATION VERIFICATION

- A. Open all electrical equipment enclosures for inspection by the Engineers.
- B. Remedy all installations which do not conform to NEC criteria or show evidence of poor workmanship.

3.02 INSULATION RESISTANCE TESTS OF CIRCUITS, 600 VOLTS AND BELOW

- A. Do not subject conductors rated 600 volts and below to high potential dielectric tests. Test each complete feeder and branch circuit of 600 volts or below with everything but power supply and power-consuming equipment, connected thereto, and have an insulation resistance between conductors and between each conductor and ground of not less than 1,000,000 ohms, unless otherwise accepted by Engineer.
- B. Cables which fail any part of their field test shall be replaced with new cable and retested.
- C. Determine insulation resistance values with panelboards, fuseholders, switches, receptacles, and overcurrent devices in place.
- D. Use megohmmeter having output of at least 500 volts to determine insulation resistance value for 600 volt rated conductors
- E. List each circuit and measured resistance as test data on data sheets as described in paragraph 1.03.
- F. Maintain written record of all insulation resistance values. Identify conductor, or equipment, date that value was taken and resistance value. Arrange information in suitable neat tabular form and submit to Engineer in triplicate.

3.03 GROUND RESISTANCE

- A. Test each ground rod in accordance with IEEE Std. 142 and submit tabulation of results to Engineer. Include identification of electrode, date of reading and ground resistance value in results.

- B. Test entire grounding system for continuity of connections and for resistance. Ensure that ground resistance of conduits, equipment cases, and supporting frames does not vary appreciably from that of system as whole and does not exceed 5 Ohms.

3.04 OPERATING TESTS

- A. Provide electrical test instruments as directed by the Engineer and specified in paragraph 2.01 A.1, to measure circuit voltage, current and harmonics.
- B. Operate switches, circuit breakers and control devices to verify correct operation.
- C. Associated equipment includes instruments, meters, relays, circuit breakers, switches, and other devices in substations, switchgear, motor control centers, panelboards, control and instrumentation panels, related to motor being tested.
- D. Where tests of any of above-referenced equipment are included in other Sections of specifications, coordinate testing, as directed by Engineer, to avoid duplication and conflict between tests.
- E. Perform above tests in addition to, and not in substitution for required manufacturer's factory tests of individual items.

3.05 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700.

END OF SECTION



APPENDIX A

GEO TECHNICAL REPORTS

September 25, 2020

Mr. Kenneth L. Caban, P.E.
Vice President
Tetra Tech
450 N. Park Road
Hollywood, Florida 33021

Re: Report of Subsurface Exploration & Geotechnical Engineering Study
Hollywood-Hallandale Force Main
S. 15th Avenue to S. 18th Court, & Fletcher Street
Hollywood, Florida
NV5 Project No. 17035

Dear Mr. Caban:

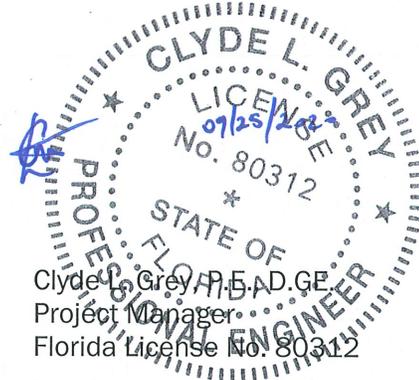
NV5, Inc. submits this report in fulfillment of the scope of services described in our Proposal No. 20-0669 Rev3 dated September 8, 2020. The work was authorized by a word order issued by Tetra-Tech. This report describes our understanding of the project, present our evaluations, and provides our professional opinions and recommendations for foundation design and construction for the project.

This report should be read in its entirety.

Sincerely,
NV5, Inc.

CLYDE GREY
(For)

Alfredo Budik, P.E.
Senior Engineer
Florida License No. 43884



Clyde L. Grey, P.E., A.D. GE
Project Manager
Florida License No. 80312

Distribution: 2 Copies to Addressee via U.S. Mail
 1 Copy to Addressee via Email
 1 Copy to NV5 File

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1.0 SITE AND PROJECT INFORMATION

Based on information we received, we understand the project consists of a force main (FM) starting at Pembroke Road going north on South 18th Court, then turning east on Fletcher Street and finally north on South 15th Avenue. A site vicinity map is presented on Drawing 1. Total length of the project is about 4,800 lineal feet. The force main will be installed using open cut method and the horizontal drilling method. The open cut pipe will be 4 to 6 feet below grade, except at the intersection with Federal Highway, which will be HDD about 20 to 25 feet below the existing grade.

We were provided with undated exhibits for the proposed force main alignment and cross sections prepared by Tetra Tech. Based on the exhibits the grade varies from about Elevation +2 to +8 feet with respect to the 1988 North American Vertical Datum (NAVD).

2.0 PURPOSE AND SCOPE OF WORK

The purpose of our services on this project is to explore the subsurface conditions in order to provide geotechnical parameters for the subsurface conditions encountered. Specifically, this report provides:

- ◆ Drawings showing borings locations, a graphic summary of the generalized subsurface conditions, and borings logs with detailed descriptions of the materials encountered.
- ◆ Discussion of generalized subsurface conditions at the force main alignment including groundwater levels.
- ◆ Geotechnical parameters for the proposed force main.

3.0 FIELD EXPLORATION

NV5 performed a field exploration program comprising six (6) engineering borings as described below. The test locations are shown on Drawing 1. The test locations were marked and identified in the field by NV5. It should be noted that the test locations shown are approximate. If accurate as-built test locations are required, they should be surveyed. The test data reported herein reflect our interpretation of conditions at the specific test locations only, and at the time the tests were performed.

The borings were drilled with a truck-mounted drill rig utilizing the rotary wash method. Samples of the subsurface materials were recovered at roughly 2-foot intervals within the upper eight (8) to 10 feet of the borings, and at approximately 5-foot intervals thereafter, where applicable, using a Standard Penetration Test split-spoon sampler (SPT) in substantial accordance with ASTM D-1586, "Standard Test Method for Standard Penetration Test and Split-Barrel Sampling of Soils." This test procedure drives a 1.4-inch-inner-diameter split-tube sampler into the subsurface using a 140-pound hammer falling 30 inches. The total number of blows required to drive the sampler the second and third six-inch increments is the SPT N-value, in blows per foot, and is an indication of material strength. Upon completion of the borings, the boreholes were backfilled to the ground surface with soil cuttings and the upper few feet closed with cement grout.

A geotechnical engineer classified the soil/rock samples recovered from the borings. The collected samples were later re-examined to confirm field classifications. Visual soil classifications were made in accordance with ASTM D2487 and ASTM D2488. The results of the classification and consequent generalized stratification are shown in Drawing 2, the boring summary sheet, and in the records of test boring in Appendix A (sheets A-1 through A-8). Strata contacts indicated on these drawings are approximate.



We note that the top of boring elevations have been estimated. For accurate elevations, the boring locations should be surveyed.

4.0 LOCAL GEOLOGY AND GEOLOGIC HAZARDS

4.1 LOCAL GEOLOGY

Broward County is located on the southern flank of a stable carbonate platform on which thick deposits of limestones, dolomites and evaporites have accumulated. The upper two hundred feet of the subsurface profile is composed predominantly of limestone and quartz sand. These sediments were deposited during several glacial and interglacial stages when the ocean was at elevations higher than present.

In many portions of Broward County, surface sand deposits of the Pamlico Formation are encountered. The Pamlico sands overlie the Miami Limestone. In western Broward County, portions of the Everglades Region interfinger with the Pamlico sand. The Everglades soil consists of peat and calcareous silt (marl).

The Miami Limestone is a soft to moderately hard, white, porous to very porous, sometimes sandy, oolitic calcareous cemented grainstone. The formation outcrops in portions of Broward County. The Miami Limestone has a maximum thickness of about 35 feet along the Atlantic Coastal Ridge and thins sharply near the coastline and more gradually in a westerly direction. The Miami Limestone was formed about 130,000 years ago at a time when the sea level was twenty-five feet higher than it is today. This environment facilitated formation of concentrically layered sand sized carbonate grains called oolites. These grains formed by repeated precipitation of calcium carbonate around the nucleus of a sand or shell grain.

The Miami Limestone can be separated into two facies: the barrier bar oolitic facies and the tidal shoal limestone facies. The barrier bar facies is characterized by lenses of oolitic limestone separated by intermittent, 1-inch thick or less, uncemented sand layers (cross-bedded limestone). Zones of higher porosity are characteristic and parallel the bedding planes of the cross-bedded limestone. The tidal shoal limestone facies is characterized by a distinct lack of bedding planes. In addition, burrowing organisms have churned previously deposited sediments, which have resulted in high porosity channels in the rock. These ancient channels give the rock an appearance of a hardened sponge in some areas.

The Fort Thompson Formation underlies the Miami Limestone, and includes sand, sandstone, and limestone. The upper zones of the Fort Thompson Formation consist of sand having a thickness ranging from five (5) to 35 feet. The remainder of the formation consists of coralline limestone, quartz sandstone, sandy limestone and freshwater limestone. The type of soils within the formation and the degree of cementation vary with lateral extent and depth.

The Fort Thompson Formation is underlain by the Tamiami Formation. The Tamiami Formation consists of sands, silts, clays, and sometime fossiliferous limestone. The upper portions of the Tamiami Formation are permeable and make up the lower reaches of the Biscayne Aquifer. This formation ranges in thickness from zero (0) to 300 feet in South Florida.

4.2 GEOLOGIC HAZARDS

The South Florida area is relatively free of geologic hazards. The region is not considered seismically active. Consequently, hazards such as ground shaking, liquefaction, lateral spreading, and ground rupture that are normally associated with earthquakes and other seismic activity are generally not a factor for the design of structure foundations in South Florida. Based on the 2018 International Building Code, a Site Class D classification is considered appropriate for this site.

Karst topography that is associated with the formation of sinkholes and other underground discontinuities in carbonate rock formations in the central and northern portions of Florida is generally not found in South Florida. Any discontinuities in the limestone due to solutioning of the rock are typically limited in vertical and lateral extent and are usually not considered a factor in the design of foundations in the local practice.

5.0 SUBSURFACE CONDITIONS

The subsurface conditions encountered in the borings are generally consistent with the geology described above. The subsurface conditions are presented graphically in the attached boring summary sheet (Drawing 2) and in more detail on the records of test boring sheets. It should be noted that the ground surface elevations shown for the borings have been estimated. If accurate elevations are required, the test locations should be surveyed.

Layer 1 – Sand:

This layer comprises light brown and light gray sand that typically extends to about six (6) feet below grade, except in Boring B-3 where it extended to 18 feet below the existing grade. Top soil with thickness of about two (2) inches to one foot was encountered at the top of the borings. It should be noted that in Boring B-6 a thin lense of peat was recovered between 3.5 and 4 feet below grade. SPT N-values for Layer 1 range from less than one (1) to 13 blows per foot (bpf). The average SPT-N value is about four (4) bpf.

Layer 2 – Limestone with sand:

This layer consist of light gray and light brown limestone with sand an extends to the maximum termination depth of the borings at 30 feet below existing grade. The thickness of the limestone range from one (1) to 10 feet in the borings. SPT N-values recorded in this layer range from one (1) to 13 bpf with an average value of about five (5) bpf.

Groundwater

Groundwater was encountered in the borings at depths of about 1.8 to 7.5 feet below the existing ground surface. It should be noted that groundwater readings during drilling might not represent stabilized groundwater levels. Stabilized water levels would be best obtained by installing groundwater monitoring devices and taking readings over an extended period. NV5 can provide these services if they are of interest to the project development team.

The depths above correspond approximately to elevations of about +0.2 to +1 foot NAVD based on our assumed site grades between +2 to +8 feet NAVD. On average, groundwater levels in the general vicinity of the project are expected to vary between elevations -1.5 to +2.5 feet NAVD, the variations being primarily as a result of seasonal rainfall. However, it should be noted that groundwater levels outside of the ranges stated herein could be encountered during construction. Storm and hurricane events and construction activities can also result in variations in the groundwater levels outside of the levels described above.

Notwithstanding, we conclude that groundwater will generally be encountered within 10 feet of the existing ground surface.

6.0 RECOMMENDATIONS

Our recommended geotechnical parameters for the design of the new bulkhead are presented in the Table 1 below.

TABLE 1 - SUMMARY OF ESTIMATED PERTINENT ENGINEERING PARAMETERS

Soil Description	Depth Below Existing Grade (ft)	Total Unit Weight (pcf)	SPT N-Values	Angle of Internal Friction (deg)	Cohesion (psf)	Unfactored Coefficient of Active Earth Pressure K_a	Unfactored Coefficient of Passive Earth Pressure K_p
Sand	0 - 6	105	<1 - 13	28	-	0.36	2.76
	0 - 18 (for B-3)						
Limestone	1 - 10	120	1 - 13	38	-	0.24	4.20

6.1 EXCAVATION AND DEWATERING

- Shallow excavations into the near-surface materials will likely stand vertical for very short periods only. The sides of those excavations will unravel over time as they are exposed to weather and construction traffic. In general, the Layer II limestone is expected to stand vertically unsupported if excavated. However, localized weaker sandy zones within this layer could become loose if unsupported. Temporary shoring, sliding trench boxes, or other support could be required to prevent instability of excavation and to protect workers from injury. All excavations should comply with Occupational Safety and Health Administration (OSHA) design and safety requirements. Shoring designs should be signed and sealed by a Florida-licensed professional engineer, and should be provided for the Owner's review.
- Average groundwater elevation is expected to be approximately between Elevation -1.5 and +2.5 feet NAVD for this site. As stated above, groundwater levels outside of this range could be encountered during construction. Dewatering is expected to be required for deeper utilities and appurtenances such as sewers, storm drains, catch basins, and manholes. We judge that localized dewatering can be accomplished using pumps and sumps. Dewatering of larger excavations and larger volumes could require the installation of well points or other dewatering systems.

It should be noted there are two components to the dewatering process. The first is extracting the water from the subsurface and the requirement of the project to maintain a dry excavation to allow construction to proceed. The other component is the ability to discharge the volume of water extracted. The contractor must ensure this capability exists for the site such that all dewatering and consequent effluent discharge will meet the requirements of the local jurisdictional agencies including Broward County, Florida Department of Environmental Protection (FDEP), Florida Department of Transportation, and South Florida Water Management District (SFWMD) as appropriate. This study did not include specific testing or analysis to determine if dewatering is feasible or if adequate discharge is available. Ultimately,

dewatering of the site to facilitate construction is the contractor's responsibility.

During dewatering the adjacent properties must be monitored for adverse impacts from dewatering drawdown. The dewatering subcontractor should submit a proposed design for dewatering operations to the owner for review and approval prior to commencing work.

6.2 OTHER RECOMMENDATIONS

1. NV5 should participate in the evaluation of field problems as they arise and recommend solutions. We should also be involved with site work activities so we can address needed changes to the recommendations if site conditions different from those described herein are encountered. NV5 should observe and test the force main installation to satisfy the requirements of the Florida Building Code and municipal agencies. If Ownership retains another geotechnical engineer to observe installation, that engineer will be required to accept full responsibility for the structure performance.
2. NV5 should participate in the design development phases of this project to verify that our recommendations have been properly implemented. We should be provided an opportunity to review final design plans.

7.0 REPORT LIMITATIONS

This report has been prepared pursuant to our Proposal No. 20-0669 Rev3 to Tetra Tech (*client*) dated September 8, 2020 and in general accordance with the standard of care ordinarily practiced by members of Consultant's profession performing similar services on similar projects in similar localities; no other warranty is expressed or implied. The report should be read in its entirety. NV5 is not responsible for misinterpretations arising from reading sections of the report only.

This report has been prepared for the exclusive use of the Owner and other members of the design/construction team for the specific site(s) and project(s) discussed in this report. The report should not be used for any other site(s) or project(s) without express written permission from NV5.

The evaluation and recommendations submitted in this report are based in part upon the data collected from the field exploration. These data were collected at specific locations and describe subsurface conditions encountered at those specific locations at the time(s) the field explorations were made. Further, the plan area of the field test locations is relatively small as compared to the total site area. Consequently, subsurface conditions could be different at site locations other than those tested. The nature or extent of variations throughout the subsurface may not become evident until the time of construction. If variations later become evident, it may be necessary for NV5 to revisit the recommendations provided in this report.

In the event changes are made in the nature, design, or location(s) of the proposed project construction, the conclusions and recommendations contained in this report cannot not be relied upon unless the changes are reviewed by NV5, and the conclusions and recommendations herein are either verified or modified as needed in writing by NV5. Therefore, NV5 must be informed of any such changes if those changes are not addressed in this report.

The scope of services performed by NV5 did not include any environmental assessment or investigation for the presence or absence of wetlands, sinkholes, chemically hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around the site.



NV5 should be retained to provide consultation to the ownership and design team during the design development phase of the project, to review final construction specifications and review design drawings in order to ascertain that its recommendations have been properly interpreted and implemented. Furthermore, NV5 should be retained to provide inspections during geotechnical construction. If NV5 is not afforded the opportunity to participate in the installation phase as recommended in this report, client agrees that NV5 has no responsibility for the interpretation of the recommendations made in this report or for structure performance.

8.0 CLOSURE

We appreciate the opportunity to provide specialized engineering services on this project and look forward to an opportunity to participate in construction related aspects of the development. If you have questions about information contained in this report contact the writer at 305.901-2151.

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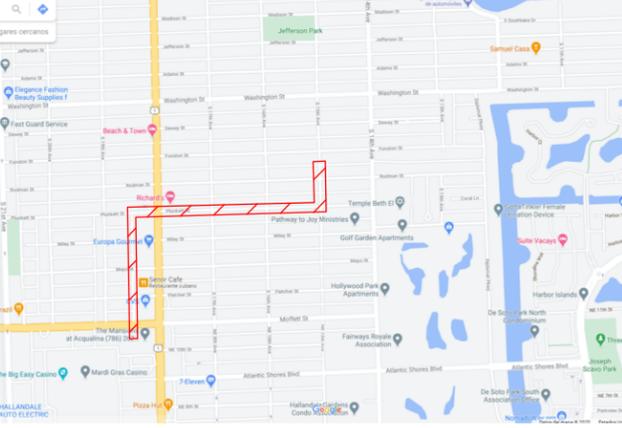
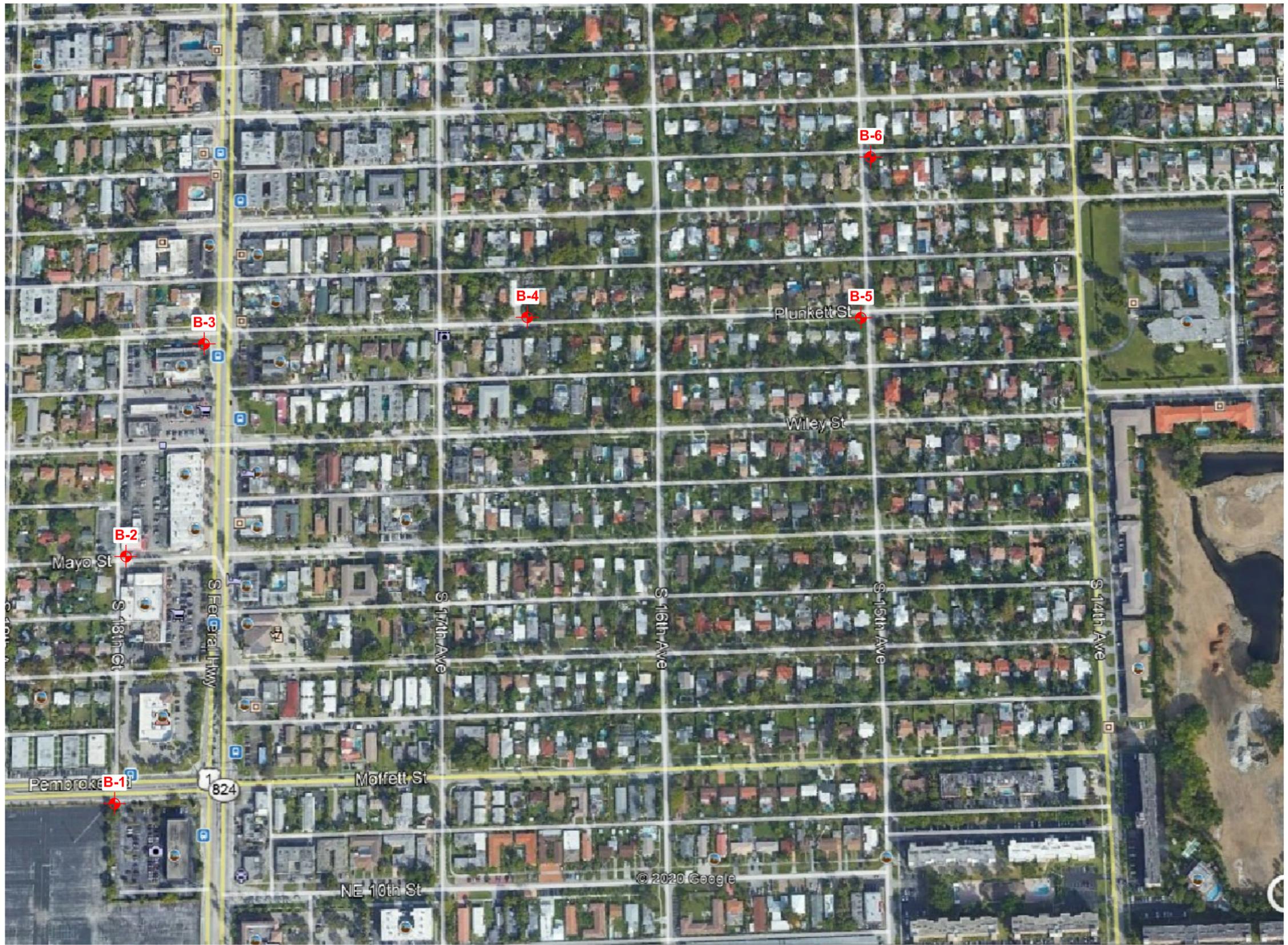
8.0 CLOSURE

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DRAWINGS

NIV5

CONSTRUCTION QUALITY ASSURANCE - INFRASTRUCTURE - ENERGY - PROGRAM MANAGEMENT - ENVIRONMENTAL



Site Vicinity Map



Approximate Scale in Feet

LEGEND:

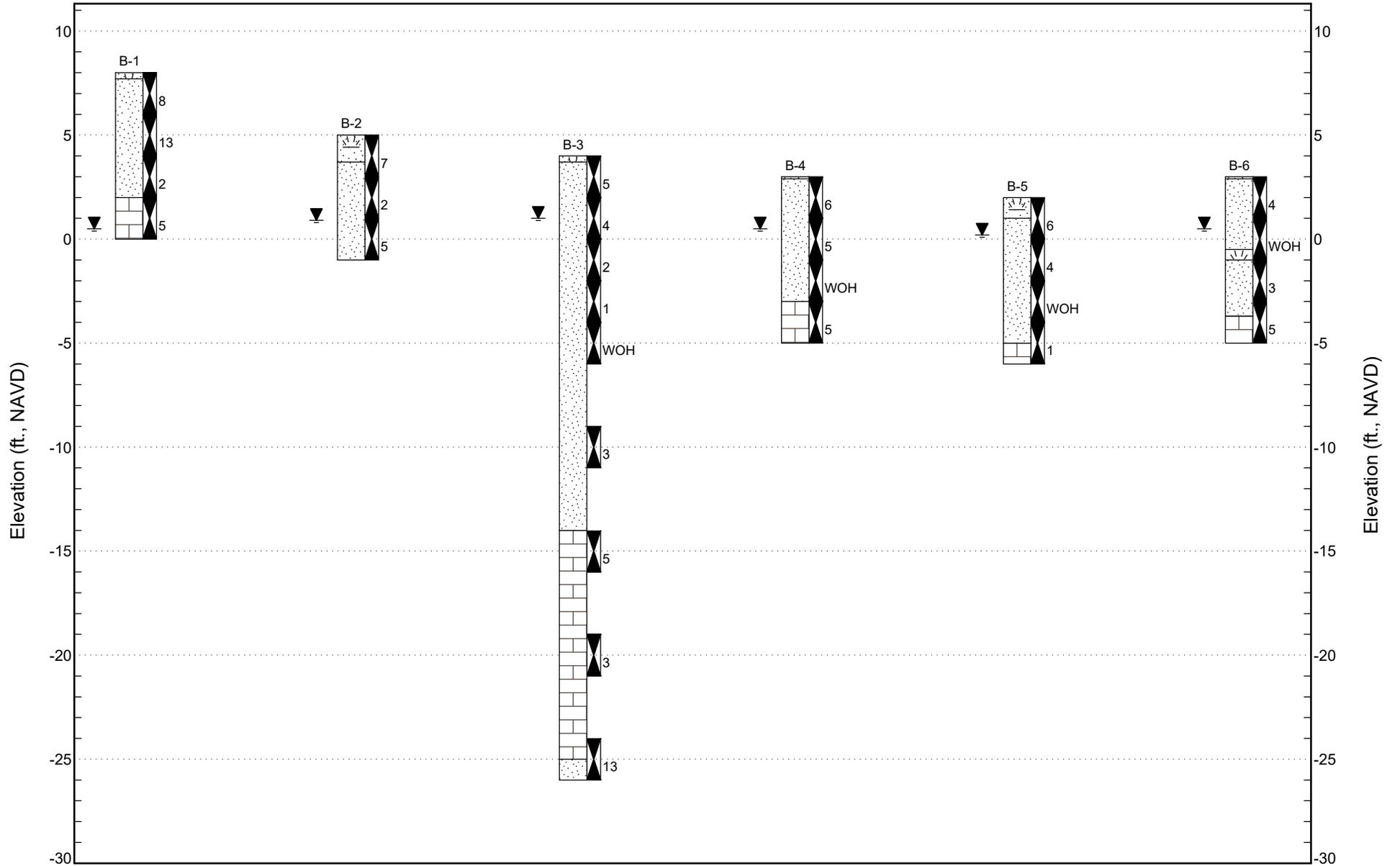
- B-1 - Number and Approximate Location of Test Boring.

NOTES:

1. Test locations shown are approximate.
2. Test location symbols are not to scale.
3. Base for this drawing was taken from aerial view from Google Earth, 2020.



DRAWING TITLE:	Site Vicinity Map & Test Location Plan	DWN BY:	NVF
PROJECT NAME:	Hollywood-Hallandale Force Main	CKD BY:	AB
PROJECT LOCATION:	S. 15th Avenue to S. 18th Court and Fletcher Street, Hollywood, Florida	PROJECT NO:	17035
		DATE:	09/23/2020
		DWG NO:	1
		APD BY:	—



BORING SUMMARY SHEET

PROJECT NAME: Hollywood-Hallandale Force Main

PROJECT LOCATION: S. 15th Avenue to S. 18th Court and Fletcher Street, Hollywood, Florida

PROJECT NUMBER: 17035

DATE: NVF

DRAWN BY: NVF

CHECKED BY: AB

DRAWING NO: 2

LEGEND



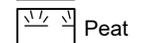
Topsoil



Sand



Limestone



Peat



Standard Penetration Test



Water Level

Note: Boring top elevations have been estimated



APPENDIX A
BORING LOG DATA

NIV5

CONSTRUCTION QUALITY ASSURANCE - INFRASTRUCTURE - ENERGY - PROGRAM MANAGEMENT - ENVIRONMENTAL

PROJECT NAME Hollywood-Hallandale Force Main
PROJECT NUMBER 17035 **PROJECT LOCATION** S. 15th Avenue to S. 18th Court and Fletcher Street, Hollywood, Florida
DATE STARTED 9/19/20 **COMPLETED** 9/19/20 **GROUND ELEVATION** 8 ft NAVD est. **HOLE SIZE** 3 inches
DRILLING CONTRACTOR NV5 **GROUND WATER LEVELS:** 7.5 ft / Elev 0.5 ft
DRILLING METHOD Continuous Sampling
LOGGED BY D. Correa/ Y. Parada **CHECKED BY** N.Vieira
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAVD)
0						
	SPT	2-4-4-4 (8)	SM		0.3 4" of Topsoil	7.7
	SPT	6-7-6-5 (13)	SP		SAND, loose, fine, light gray, with a trace of limestone fragments	5
5	SPT	2-1-1-1 (2)			6.0 SAND, medium dense, fine, light gray	
	SPT	1-2-3-2 (5)	LS		6.0 SAND, very loose, fine, light gray, with a trace of shells	2.0
					8.0 ▼ LIMESTONE, very soft, light brown	0 0.0

Boring terminated at 8.0 feet.



BORING NUMBER B-2

PROJECT NAME Hollywood-Hallandale Force Main
PROJECT NUMBER 17035 **PROJECT LOCATION** S. 15th Avenue to S. 18th Court and Fletcher Street, Hollywood, Florida
DATE STARTED 9/18/20 **COMPLETED** 9/18/20 **GROUND ELEVATION** 5 ft NAVD est. **HOLE SIZE** 3 inches
DRILLING CONTRACTOR NV5 **GROUND WATER LEVELS:** 4.1 ft / Elev 0.9 ft
DRILLING METHOD Continuous Sampling
LOGGED BY D. Correa/ Y. Parada **CHECKED BY** N.Vieira
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAVD)
0						5
	SPT	10-4-3-3 (7)	SM		16" of Topsoil	3.7
	SPT	2-1-1-1 (2)	SP		SAND, loose, fine, brown to light gray	
	SPT	2-3-2-4 (5)				SAND, very loose, fine, brown to light gray
5	SPT	2-3-2-4 (5)			SAND, loose, fine, brown to light gray	-1.0
Boring terminated at 6.0 feet.						

PROJECT NAME Hollywood-Hallandale Force Main
PROJECT NUMBER 17035 **PROJECT LOCATION** S. 15th Avenue to S. 18th Court and Fletcher Street, Hollywood, Florida
DATE STARTED 9/18/20 **COMPLETED** 9/18/20 **GROUND ELEVATION** 4 ft NAVD est. **HOLE SIZE** 3 inches
DRILLING CONTRACTOR NV5 **GROUND WATER LEVELS:** 3.0 ft / Elev 1.0 ft
DRILLING METHOD Rotary drill with mud, wash & casing
LOGGED BY D. Correa/ Y. Parada **CHECKED BY** N.Vieira
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAVD)
0						3.7
0.3			SM		4" of Topsoil	
1.0	SPT	2-1-4-3 (5)	SP		SAND, loose, fine, light gray	
2.0	SPT	3-2-2-2 (4)			▼ SAND, very loose, fine, light gray to dark brown	0
3.0	SPT	1-1-1-WOH (2)			SAND, very loose, fine, dark brown	
4.0	SPT	WOH-WOH-1-WOH (1)			SAND, very loose, fine, gray	
5.0	SPT	WOH-WOH-1-WOH (1)			SAND, very loose, fine, brown	-5
10.0						
15.0	SPT	2-1-2-1 (3)			SAND, very loose, fine, brown	-10
18.0						-14.0
20.0	SPT	2-3-2-1 (5)	LS		SANDY LIMESTONE, very soft, light brown	-15
25.0	SPT	1-1-2-1 (3)			SANDY LIMESTONE, very soft, light brown	-20
29.0						
29.0	SPT	3-5-8-4 (13)	SP		SANDY LIMESTONE, very soft, light brown	-25.0
30.0					SAND, medium dense, fine light gray	-26.0

Boring terminated at 30.0 feet.



BORING NUMBER B-4

PROJECT NAME Hollywood-Hallandale Force Main
PROJECT NUMBER 17035 **PROJECT LOCATION** S. 15th Avenue to S. 18th Court and Fletcher Street, Hollywood, Florida
DATE STARTED 9/18/20 **COMPLETED** 9/18/20 **GROUND ELEVATION** 3 ft NAVD est. **HOLE SIZE** 3 inches
DRILLING CONTRACTOR NV5 **GROUND WATER LEVELS:** 2.5 ft / Elev 0.5 ft
DRILLING METHOD Continuous Sampling
LOGGED BY D. Correa/ Y. Parada **CHECKED BY** N.Vieira
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAVD)
0						
	SPT	9-4-2-3 (6)	SM		0.1 2" of Topsoil	2.9
	SPT	3-3-2-1 (5)	SP		SAND, loose, fine, brown to light gray, with a trace of limestone fragments SAND, loose, fine, light gray	0
5	SPT	WOH-WOH-WOH-WOH (WOH)			6.0 SAND, very loose, fine, light gray to gray	-3.0
	SPT	1-2-3-4 (5)	LS		8.0 LIMESTONE, very soft, light gray	-5 -5.0

Boring terminated at 8.0 feet.



BORING NUMBER B-5

PROJECT NAME Hollywood-Hallandale Force Main
PROJECT NUMBER 17035 **PROJECT LOCATION** S. 15th Avenue to S. 18th Court and Fletcher Street, Hollywood, Florida
DATE STARTED 9/18/20 **COMPLETED** 9/18/20 **GROUND ELEVATION** 2 ft NAVD est. **HOLE SIZE** 3 inches
DRILLING CONTRACTOR NV5 **GROUND WATER LEVELS:** 1.8 ft / Elev 0.2 ft
DRILLING METHOD Continuous Sampling
LOGGED BY D. Correa/ Y. Parada **CHECKED BY** N.Vieira
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAVD)
0						
	SPT	2-2-4-4 (6)	SM		12" of Topsoil	1.0
					▼ SAND, loose, fine, light gray	0
	SPT	4-3-1-1 (4)	SP		SAND, very loose, fine, light gray	
5	SPT	1-WOH-WOH-WOH (WOH)			SAND, very loose, fine, light gray	
	SPT	WOH-WOH-1-1 (1)	LS		SAND, very loose, fine, dark brown	-5 -5.0
					LIMESTONE, very soft, light brown	-6.0

Boring terminated at 8.0 feet.

PROJECT NAME Hollywood-Hallandale Force Main
PROJECT NUMBER 17035 **PROJECT LOCATION** S. 15th Avenue to S. 18th Court and Fletcher Street, Hollywood, Florida
DATE STARTED 9/18/20 **COMPLETED** 9/18/20 **GROUND ELEVATION** 3 ft NAVD est. **HOLE SIZE** 3 inches
DRILLING CONTRACTOR NV5 **GROUND WATER LEVELS:** 2.5 ft / Elev 0.5 ft
DRILLING METHOD Continuous Sampling
LOGGED BY D. Correa/ Y. Parada **CHECKED BY** N.Vieira
NOTES _____

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (ft., NAVD)
0						
	SPT	1-2-2-2 (4)	SM		0.1 2" of Topsoil	2.9
			SP		SAND, very loose, fine, brown to dark gray	
	SPT	1-WOH-WOH-1 (WOH)	PT		3.5 SAND, very loose, fine, dark brow, with organics	0
					4.0 PEAT, very soft, dark brown	-0.5
5	SPT	1-1-2-1 (3)	SP		SAND, very loose, fine, dark brow, with organics	-1.0
	SPT	2-2-3-2 (5)	LS		6.7 SAND, loose, fine, dark gray	-3.7
					8.0 LIMESTONE, very soft, light gray	-5 -5.0

Boring terminated at 8.0 feet.

KEY TO SYMBOLS

Symbol Description

Strata symbols

	Limestone Fragments		Concrete		Silty Sand
	Sand with silt		Asphalt		
	Limestone		Sandstone		
	Sand		Low Plasticity Clay		
	Topsoil		Sand with some clay		

Misc. Symbols

	Groundwater level measured at boring completion. The date checked is indicated.
	Boring continues
	End of Boring

Soil Samplers

	Standard penetration test. 140 lb. hammer dropped 30"		Hand Auger
	Rock Core		

Notes:

1. Exploratory borings were drilled on 09/18/20 and 09/18/20 using a 3-inch-diameter rotary drill with mud, wash and casing.
2. Groundwater was encountered at 1.8 and 7.5 feet below grade upon boring completion.
3. These logs are subject to the limitations, conclusions, and recommendations in this report.
4. Results of tests conducted on samples recovered are reported on the logs.

NOTES RELATED TO RECORDS OF TEST BORING AND GENERALIZED SUBSURFACE PROFILE

1. Groundwater level was encountered and recorded (if shown) following the completion of the soil test boring on the date indicated. Fluctuations in groundwater levels are common; consult report text for a discussion.
2. The boring location was identified in the field by offsetting from existing reference marks and using a cloth tape and survey wheel.
3. The borehole was backfilled to site grade following boring completion, and patched with asphalt cold patch mix when pavement was encountered.
4. The Record of Test Boring represents our interpretation of field conditions based on engineering examination of the soil samples.
5. The Record of Test Boring is subject to the limitations, conclusions and recommendations presented in the report text.
6. "Field Test Data" shown on the Record of Test Boring indicated as 11/6 refers to the Standard Penetration Test (SPT) and means 11 hammer blows drove the sampler 6 inches. SPT uses a 140-pound hammer falling 30 inches.
7. The N-value from the SPT is the sum of the hammer blows required to drive the sampler the second and third 6-inch increments.
8. The soil/rock strata interfaces shown on the Record of Test Boring are approximate and may vary from those shown. The soil/rock conditions shown on the Record of Test Boring refer to conditions at the specific location tested; soil/rock conditions may vary between test locations.
9. Relative density for sands/gravels and consistency for silts/clays and limestone are described as follows:

SPT Blows/ Foot	Sands/Gravels Relative Density	SPT Blows/Foot	Silt/Clay Relative Consistency	SPT Blows/ Foot	Limestone Relative Consistency
0-4	Very loose	0-2	Very Soft	0-20	Very Soft
5-10	Loose	3-4	Soft	21-30	Soft
11-30	Medium Dense	5-8	Medium Stiff	31-45	Medium Hard
31-50	Dense	9-15	Stiff	46-60	Moderately Hard
Over 50	Very Dense	16-30	Very Stiff	61-50/2"	Hard
		Over 30	Hard	Over 50/2"	Very Hard

10. Grain size descriptions are as follows:

<u>NAME</u>	<u>SIZE LIMITS</u>
Boulder	12 inches or more
Cobbles	3 to 12 inches
Coarse Gravel	3/4 to 3 inches
Fine Gravel	No. 4 sieve to 3/4 inch
Coarse Sand	No. 10 to No. 4 sieve
Medium Sand	No. 40 to No. 10 sieve
Fine Sand	No. 200 to No. 40 sieve
Fines	Smaller than No. 200 sieve

11. Definitions related to adjectives used in soil/rock descriptions:

<u>PROPORTION</u>	<u>ADJECTIVE</u>	<u>APPROXIMATE ROOT DIAMETER</u>	<u>ADJECTIVE</u>
About 5%	with a trace	Less than 1/32"	Fine roots
About 5% to 12%	with	1/32" to 1/4"	Small roots
About ≥ 12%	silty, sandy, etc.	1/4" top 1"	Medium roots
		Greater than 1"	Large roots



APPENDIX B

PERMITS OBTAINED **BY OWNER**

TO BE PROVIDED AS PART OF ADDENDUM



APPENDIX C

BENTONITE MANAGEMENT PLAN EXAMPLE

Plan for Minimization of Environmental Impact from HDD Drilling Fluids

Introduction

CONTRACTOR proposes to utilize the horizontal directional drilling (HDD) method to install one crossing for the project. HDD is a widely used trenchless installation method which accomplishes the installation of pipelines and buried utilities with minimum environmental impact. However, HDD is not totally without impact. The primary environmental impact associated with HDD revolves around the use of drilling fluids.

The purpose of this document is to present CITY OF HOLLYWOOD's plan for minimizing environmental impacts associated with inadvertent drilling fluid returns.

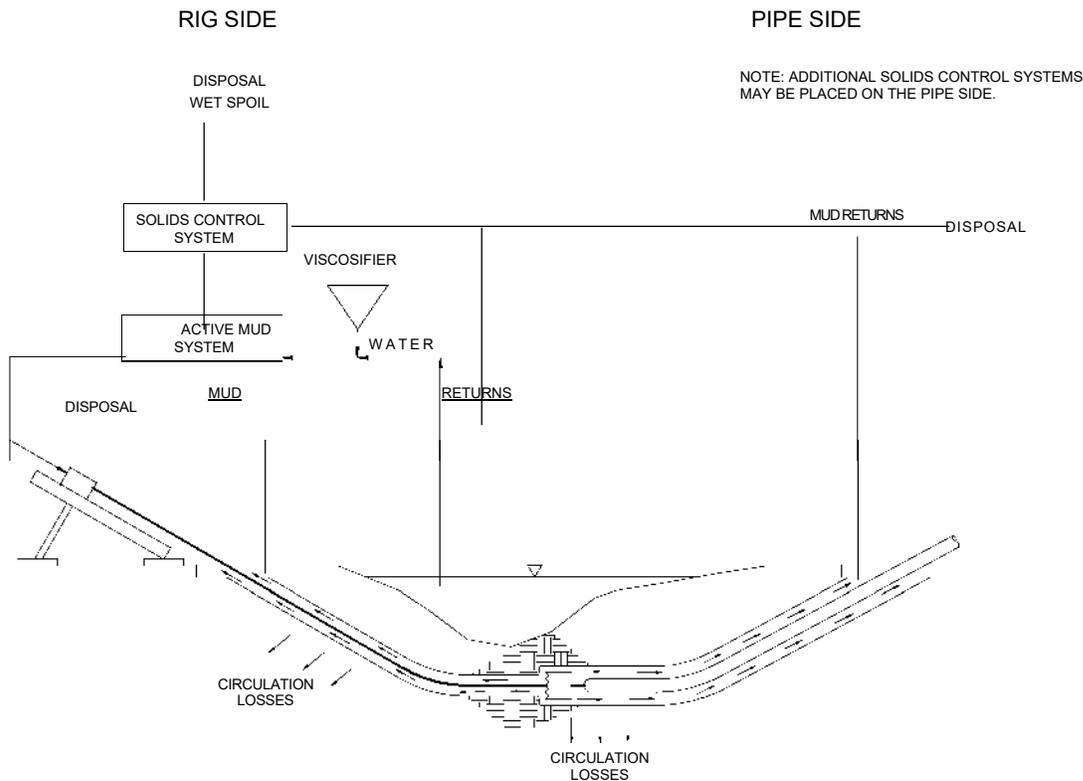
Background

The principal functions of drilling fluid in HDD pipeline installation are listed below:

- **Transportation of Spoil.** Drilled spoil, consisting of excavated soil or rock cuttings, is suspended in the fluid and carried to the surface by the fluid stream flowing in the annulus between the hole and the pipe.
- **Cooling and Cleaning of Cutters.** Drilled spoil build-up on bit or reamer cutters is removed by high velocity fluid streams directed at the cutters. Cutters are also cooled by the fluid.
- **Reduction of Friction.** Friction between the pipe and the hole wall is reduced by the lubricating properties of the drilling fluid.
- **Hole Stabilization.** The drilled or reamed hole is stabilized by the drilling fluid. This is critical in HDD pipeline installation as holes are often in soft soil formations and are uncased. Stabilization is accomplished by the drilling fluid building up a wall cake and exerting a positive pressure on the hole wall. Ideally, the wall cake will seal pores and produce a bridging mechanism to hold soil particles in place.
- **Transmission of Hydraulic Power.** Power required to turn a bit and mechanically drill a hole is transmitted to a downhole motor by the drilling fluid.
- **Hydraulic Excavation.** Soil is excavated by erosion from high velocity fluid streams directed from jet nozzles on bits or reaming tools.
- **Soil Modification.** Mixing of the drilling fluid with the soil along the drilled path facilitates installation of a pipeline by reducing the shear strength of the soil to a near fluid condition. The resulting soil mixture can then be displaced as a pipeline is pulled into it.

The major component of drilling fluid used in HDD pipeline installation is a potable fresh water source found at the project location. In order for water to perform the HDD functions required, it is generally necessary to modify its properties by adding a viscosifier. The viscosifier used almost exclusively in drilling fluids is naturally occurring clay in the form of bentonite, which typically comes from Wyoming and South Dakota and is principally sodium montmorillonite. It is not a hazardous material as defined by the U.S. Environmental Protection Agency characteristics of ignitability, corrosivity, reactivity, or commercial chemicals. It is also used to seal earth structures such as ponds or dams and as a suspending component in livestock feeds.

The properties of bentonite used in drilling fluids are often enhanced by the addition of polymers. This enhancement typically involves increasing the yield; that is, reducing the amount of dry bentonite required to produce a given amount of drilling fluid. For use in drilling fluids, Wyoming bentonite yields in excess of 85 barrels (42 gal/bbl) per ton of material. Addition of polymers to produce high yield bentonite can increase the yield to 200 barrels per ton of material. Typical HDD drilling fluids use high yield bentonite and are composed of less than 4% viscosifier by volume, with the remaining components being water and drilled spoil.



A typical HDD drilling fluid flow circuit is illustrated schematically above. All stages of HDD involve circulating drilling fluid from equipment on the surface, through a drill pipe, and back to the surface through a drilled annulus. Drilling fluid returns collected at the entry and exit points are stored in a steel tank and processed through a solids control system which removes spoil from the drilling fluid allowing the fluid to be reused. The basic method used by the solids control

system is mechanical separation using shakers, desanders, and desilters. The excess spoil and drilling fluid are transported to, and disposed of, at an approved disposal site.

Drilling fluid will flow in the path of least resistance. In the drilled annulus, the path of least resistance may be an existing fracture or fissure in the soil. When this happens, circulation can be lost or reduced. This is a common occurrence in pipeline installation by HDD and does not prevent completion. However, the environment may be impacted if the fluid inadvertently returns to the surface at a location on a waterway's banks or within a waterway.

Minimization of Environmental Impact

Silt fence, hay bales and other BMP tools will be installed at the entry and exit holes for each HDD in order to protect wetlands and other sensitive areas from drilling mud runoff. In addition, BMP'S will be kept at the drilling site to protect against any inadvertent surface returns along the drill path.

The most effective way to minimize environmental impact associated with HDD drilling fluids is to maintain fluid circulation to the extent practical. Maintenance of fluid circulation will be the responsibility of the horizontal drilling contractor with oversight by the Company Inspector. An excerpt from construction specifications defining this responsibility is presented below.

CONTRACTOR shall employ his best efforts to maintain full annular circulation of drilling fluids. Drilling fluid returns at locations other than the entry and exit points shall be minimized. In the event that annular circulation is lost, CONTRACTOR shall temporarily cease drilling, install the appropriate BMP'S to contain the drilling fluids and then take steps to restore circulation.

It should be recognized, however, that restoration of circulation may not be practical or possible and that environmental impact will be minimized by completing crossing construction as soon as possible. Therefore, absent a threat to public health and safety, and after the proper BMP'S are employed to contain the drilling fluid, drilling operations will continue in the event of lost circulation if this is deemed to reduce the duration of construction operations.

If inadvertent surface returns occur on a waterway's banks, it will be the responsibility of the horizontal drilling contractor to stop circulation and install BMP'S to contain the drilling fluid prior to resuming with the drilling operation. After construction, the contractor will restore the disturbed area after contacting the appropriate regulatory agencies. An excerpt defining this responsibility is presented below.

If inadvertent surface returns of drilling fluids occur, drilling will temporarily cease and the fluids shall be immediately contained with hand placed barriers (i.e. synthetic hay bales, sand bags, silt fences, etc.) and collected using pumps as practical. If the amount of the surface return is not great enough to allow practical collection, the affected area shall be diluted with fresh water and the fluid will be allowed to dry and dissipate naturally. If the amount of the surface return exceeds that which can be contained with hand placed barriers, small collection sumps (less than 5 cubic yards) may be used. If the amount of the surface return exceeds that which can be contained and collected using small sumps,

drilling operations shall be suspended until surface return volumes can be brought under control.

If inadvertent surface returns occur within a waterway, drilling will temporarily cease and the contractor will install booms, floating turbidity curtains, and/or other BMP's as necessary before resuming the drilling. The returns will be monitored and documented. Any inadvertent surface return(s) that occurs within a waterway will be reported to the appropriate regulatory agencies.

Monitoring

Monitoring with respect to drilling fluids and other construction quality issues will be the responsibility of the Contractor. Each employee responsible for performing the HDD will be knowledgeable in HDD technology and will be on site during drilling operations. The Contractor's performance and any visible signs of inadvertent drilling fluid returns will be documented. The Contractor is to review the detailed project specifications for all requirements for all HDD operations.



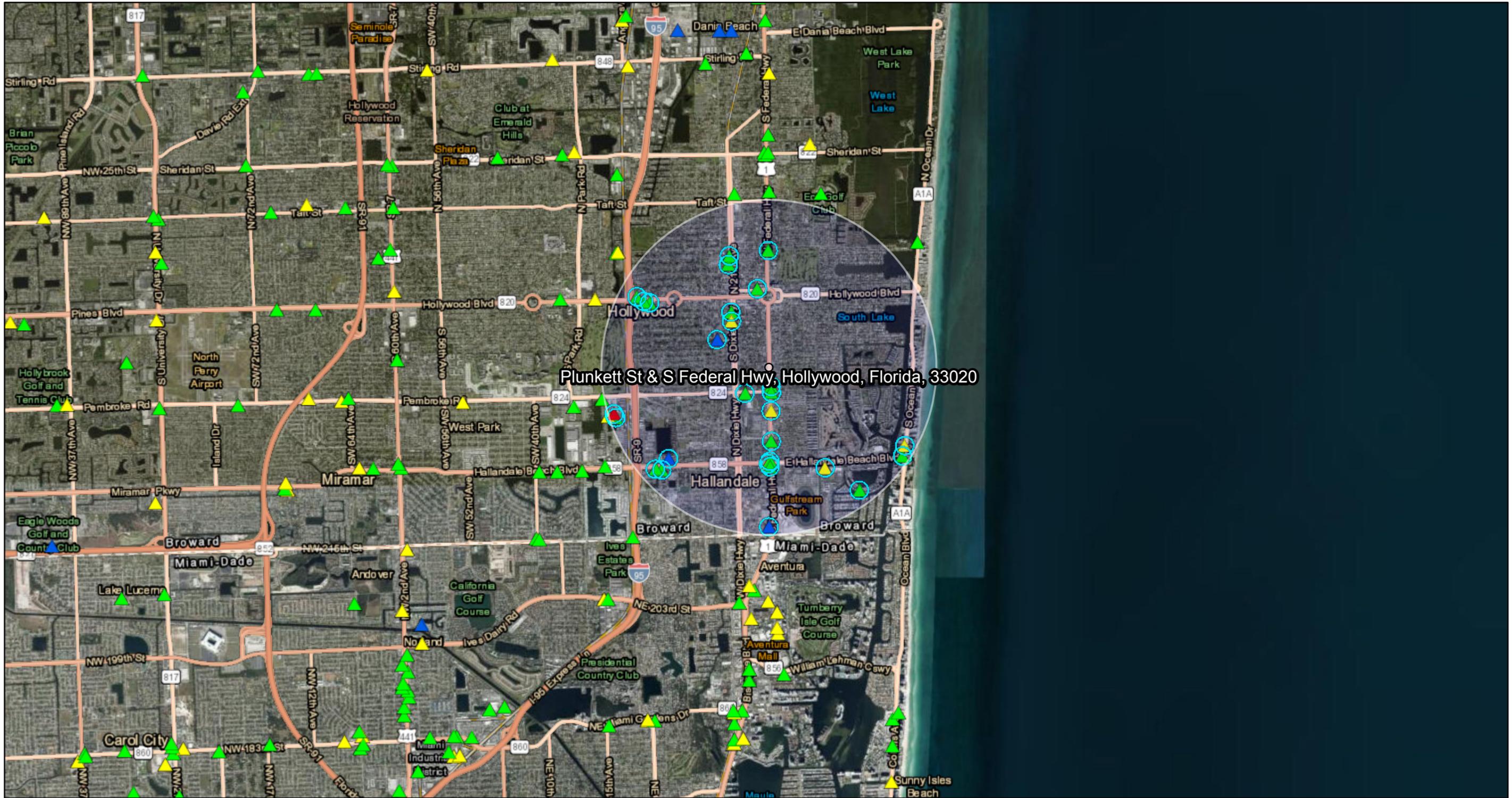
APPENDIX D

FDEP

CONTAMINATED

SITES LISTING

Contamination Locator Map (CLM) Embedded Map

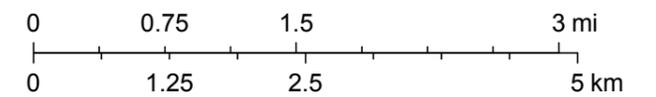


July 30, 2020

DEP Cleanup Sites - Contamination Locator Map

- ▲ BROWNFIELD SITES
- ▲ PETROLEUM
- ▲ SUPERFUND
- ▲ OTHER WASTE CLEANUP

1:72,224



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, HERE, Garmin, (c) OpenStreetMap contributors, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, FDEP

Search Results

DEP Cleanup Sites: 28 found.

7-ELEVEN FOOD STORE #30002-33

4112 S OCEAN DR
HOLLYWOOD, FL 33019

Facility Id: 8501729

PENDING Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

7-ELEVEN STORE #34842

26 S FEDERAL HWY
HALLANDALE BEACH, FL 33009

Facility Id: 8502180

ACTIVE Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

AHMED CHEVRON #0202671

1625 S FEDERAL HWY
HOLLYWOOD, FL 33020

Facility Id: 8502228

PENDING Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

BELLO PROPERTY

230 S DIXIE HWY
HOLLYWOOD, FL 33020

Facility Id: 9103671

PENDING Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

DAVO AUTO CENTER

2828 HOLLYWOOD BLVD
HOLLYWOOD, FL 33020

Facility Id: 8502583

ACTIVE Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

Gem Cleaners Dry Cleaners - Former

1450 E Hallandale Beach Blvd
Hallandale Beach, FL 33009

Facility Id: ERIC_4246

ONHOLD Other Cleanup

[Watch This Site](#)

[Documents](#)

Gulfstream Point Green Reuse Site

918 South Federal Highway
HALLANDALE BEACH, FL 33009

Facility Id: BF061905001

ACTIVE Brownfield Cleanup

[Watch This Site](#)

[Documents](#)

HALLANDALE BEACH U-GAS
999 W HALLANDALE BEACH BLVD
HALLANDALE, FL 33009
Facility Id: 8502072
ACTIVE Petroleum Cleanup
[Watch This Site](#)
[Documents](#)

HB 1000-18 LLC
1021 W HALLANDALE BEACH BLVD
HALLANDALE, FL 33009
Facility Id: 8501728
ACTIVE Petroleum Cleanup
[Watch This Site](#)
[Documents](#)

HWY SHELL
815 N FEDERAL HWY
HOLLYWOOD, FL 33020
Facility Id: 8502231
PENDING Petroleum Cleanup
[Watch This Site](#)
[Documents](#)

Harbour Cove Associates
100 Northwest 9th Terrace
HALLANDALE BEACH, FL 33009
Facility Id: BF060401001
ACTIVE Brownfield Cleanup
[Watch This Site](#)
[Documents](#)

House of Lorraine Valet Services Inc
500 E Hallandale Beach Blvd
Hallandale Beach, FL 33009
Facility Id: ERIC_4075
OPEN Other Cleanup
[Watch This Site](#)
[Documents](#)

ICON OFFICE BUILDING LLC
1847 TYLER ST
HOLLYWOOD, FL 33020
Facility Id: 9813634
ACTIVE Petroleum Cleanup
[Watch This Site](#)
[Documents](#)

MARATHON-HALLENDALE #588
200 E PEMBROKE RD
HALLANDALE BEACH, FL 33009
Facility Id: 8502749
ACTIVE Petroleum Cleanup
[Watch This Site](#)
[Documents](#)

MASTER CRAFT AUTOMOTIVE
800 N DIXIE HWY
HOLLYWOOD, FL 33020

Facility Id: 9806980

ACTIVE Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

MOBIL-HOLLYWOOD BLVD

2911 HOLLYWOOD BLVD

HOLLYWOOD, FL 33020

Facility Id: 8502126

PENDING Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

No Spot Cleaners Inc

716 N Federal Hwy

Hallandale Beach, FL 33009

Facility Id: ERIC_4066

OPEN Other Cleanup

[Watch This Site](#)

[Documents](#)

OCEAN VIEW TOWERS CONDOMINIUM

401 GOLDEN ISLES DR

HALLANDALE, FL 33009

Facility Id: 8838001

ACTIVE Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

Oceania Executive Dry Cleaners

3810 S Ocean Dr

Hollywood, FL 33019

Facility Id: ERIC_4062

ONHOLD Other Cleanup

[Watch This Site](#)

[Documents](#)

PETROLEUM PRODUCTS CORP

3130 SW 19TH ST

PEMBROKE PARK, FL 33009

Facility Id: 8732818

ACTIVE Petroleum Cleanup

[Watch This Site](#)

[Documents](#)

Petroleum Products Corp

3130 SW 19th St

Hallandale Beach, FL 33009

Facility Id: ERIC_3796

OPEN Superfund Cleanup

[Watch This Site](#)

[Documents](#)

Pinnacle at Peacefield Brownfield Site

2110, 2210, and 2118 Adams Street

HOLLYWOOD, FL 33020

Facility Id: BF061902001

ACTIVE Brownfield Cleanup

[Watch This Site](#)
[Documents](#)

SHELL-FIRST COAST ENERGY #3829

2800 HOLLYWOOD BLVD

HOLLYWOOD, FL 33020

Facility Id: 8502526

ACTIVE Petroleum Cleanup[Watch This Site](#)[Documents](#)

SUNSHINE #372

15 N FEDERAL HWY

HALLANDALE, FL 33009

Facility Id: 8502064

PENDING Petroleum Cleanup[Watch This Site](#)[Documents](#)

SUNSHINE AUTO REPAIR INC

1010 N FEDERAL HWY

HALLANDALE, FL 33009

Facility Id: 8841523

PENDING Petroleum Cleanup[Watch This Site](#)[Documents](#)

TRANS COPACABANA CORP

612 N DIXIE HWY

HOLLYWOOD, FL 33020

Facility Id: 8838036

ACTIVE Petroleum Cleanup[Watch This Site](#)[Documents](#)

TROPICAL AUTO WAXING

225-229 N FEDERAL HWY

HALLANDALE BEACH, FL 33009

Facility Id: 8842282

ACTIVE Petroleum Cleanup[Watch This Site](#)[Documents](#)

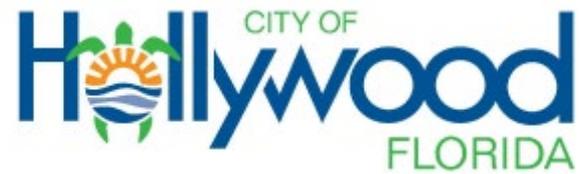
Wynona Cleaners

500 E Dixie Hwy

Hollywood, FL 33351

Facility Id: ERIC_4184

ONHOLD Other Cleanup[Watch This Site](#)[Documents](#)



APPENDIX E

SUBSURFACE UTILITY EXCAVATION (SUE) REPORTS

TO BE PROVIDED AS PART OF ADDENDUM



APPENDIX F

CONCEPTUAL

LAYOUT FOR

GROUTING EXST. FM

Appendix F

Conceptual Layout for Grouting Exst. FM

Funston St.

Rodman St.

Plunkett St.

S 15TH AVE

S 19TH AVE

S 16th Ave

S 15th Ave

S 14th Ave

NE 12th Ave

Approx. transition to and Alignment of Exst. 8" FM

Place out of Service (Grout fill) Exst. FM. (Approx. 1,700 LF of 10" FM and 3,200 LF of 8" FM - Refer to plans for surveyed areas)

Approx. Alignment of Exst. 10" FM

Google Earth

© 2020 Google

NE 10th St
1000 ft

