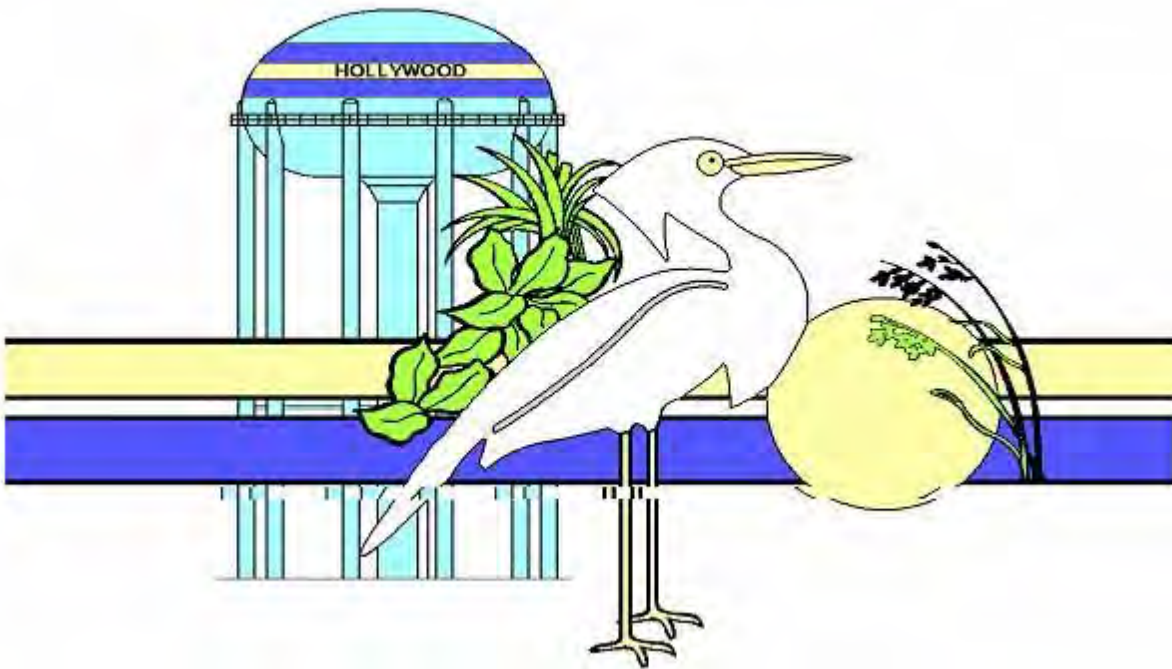


**PROJECT 19-7101**

**CITY OF HOLLYWOOD**  
**CONTRACT DOCUMENTS AND SPECIFICATIONS**  
**FOR**  
**Inflow/Infiltration (I/I) Program – Manhole Repairs**

**October 2019**



Prepared by:

**ENGINEERING AND CONSTRUCTION SERVICES DIVISION**

1621 N 14<sup>th</sup> Avenue  
PO Box 229045  
Hollywood, FL 33022-9045



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

**SECTION 00030**

**NOTICE TO BIDDERS**

**PROJECT NAME:** Inflow/Infiltration (I/I) Program - Manhole Repairs  
**PROJECT NUMBER:** 19-7101

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 10:00 a.m.**, local time, **October 17th, 2019**. On **October 17th, 2019 at 11:00 a.m.** the bids will be opened and read publicly in the Department of Public Utilities, Engineering and Construction Services (ECSD) Conference Room at 1621 N. 14<sup>th</sup> Avenue, Building A, Hollywood, Florida.

**A mandatory pre-bid conference will be held on September 18th, 2019 at 10:00 a.m., at the Southern Regional Waste water Treatment Plant, located at 1621 N. 14<sup>th</sup> Avenue Hollywood, Florida 33021, ECSD Conference Room.**

The Bid Package and Contract documents can be downloaded at: <https://www.demandstar.com/home>. Technical assistance shall be submitted in writing, by **Thursday, October 3, 2019** to the Project Manager, Jose Polanco, [jpolanco@hollywoodfl.org](mailto:jpolanco@hollywoodfl.org).

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](http://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 3<sup>rd</sup> Day of September 2019

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. 14<sup>th</sup> Avenue, Hollywood, Florida, 33022 on **Wednesday, September 18, 2019 at 10:00 AM**. 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 INQUIRIES MUST BE RECEIVED, IN WRITING, BY THE CITY OF HOLLYWOOD NO LATER THAN 5:00 P.M. THURSDAY, OCTOBER 3, 2019. AN ADDENDUM WILL BE ISSUED ONE WEEK BEFORE BID DUE DATE.**

## **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.
- F. Lack of responsibility as shown by past work judged by the Engineer from the standpoint of workmanship and progress.
- G. Non-compliance with the City's Local Minority Business Enterprise and Local Small Business Enterprise Program.
- H. 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.
- I. 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 Building Permits 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 **September 5, 2019** the City of Hollywood, Florida Department of Public Utilities issued the following:

**Bid #19-7101 for Inflow/Infiltration (I/I) Program – Manhole Repairs.**

Project Scope: The project consists of furnish all labor, materials and equipment for performing manhole repairs. The scope includes providing manhole inspection report, replacing manhole frames and covers and performing other miscellaneous manhole repairs, installing cementitious manhole liner, and bypass pumping.

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

TO THE MAYOR AND COMMISSIONERS  
CITY OF HOLLYWOOD, FLORIDA

SUBMITTED October 16, 2019

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 MBE/WBE Program, Exhibit A-D, 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 as per Project Schedule of Section 00800, 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 MBE/WBE Program.

The BIDDER acknowledges receipt of the following addenda:

No. <u>1</u>	Dated <u>9/24/19</u>
No. <u>2</u>	Dated <u>10/10/19</u>
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

\_\_\_\_\_ 10% of Bid Amount \_\_\_\_\_ 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:

EnviroWaste Services Group, Inc  
\_\_\_\_\_  
(Correct Name of Corporation)

By:   
(SEAL) Julio Fojon



President

(Official Title)

18001 Old Cutler Rd, #554 Palmetto Bay, Fl. 33157

(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

EnviroWaste Services Group, Inc

(Name of Corporation)

RESOLVED that Julio Fojon

(Person Authorized to Sign)

President

of EnviroWaste Services Group, 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, FLORIDA

INFLOW/INFILTRATION (I/I) PROGRAM - MANHOLE REPAIRS

PROJECT NO. 19-7101

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

EnviroWaste Services Group, Inc at a meeting of its Board of  
(Name of Corporation)

Directors held on the 21 day of April, 2017.

By: Eduardo Barba

Title: Corporate Secretary

(SEAL)

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

- END OF SECTION -

**SECTION 00301  
PROPOSAL BID FORM**

Project Name: Inflow /Infiltration (I/I) Program - Manhole Repairs

Project No: 19-7101

If the proposal is accepted, the undersigned Bidder agrees to complete all work under this contract within 365 calendar days following the issuance of the Notice to Proceed. Provide a unit price for each line item. All entries on this form must be typed or written in block form in ink.

**BASE BID:**

**CONTRACTOR MUST PROVIDE UNIT PRICE FOR EACH LINE ITEM**

<b>No.</b>	<b>Description</b>	<b>Qty</b>	<b>Units</b>	<b>Unit Price</b>	<b>Total</b>
1	Realign, grout and seal manhole casting (in street)	10	EA	750-	7,500-
2	Realign, grout and seal manhole casting (in rear-yard easement)	10	EA	850-	8,500-
3	Seal visible infiltration through manhole walls, bench and, invert (brick manhole)	10	EA	100-	1,000-
4	Seal visible infiltration through manhole walls, bench and, invert (concrete manhole).	15	EA	100-	1,500-
5	Repair manhole bench and, invert	20	EA	250-	5,000-
6	Replace manhole bench and, invert	50	EA	350-	17,500-
7	Replace standard manhole frame and cover and, install seal.	10	EA	1,000-	10,000-
8	Replace watertight manhole frame and, cover and install seal.	10	EA	1,200-	12,000-
9	Install cementitious manhole liner for precast 4 - feet diameter manhole (in street)	100	V.F.	250-	25,000-
10	Install cementitious manhole liner for precast 4 - feet diameter manhole (in rear-yard easement)	150	V.F.	120-	18,000-
11	Install cementitious manhole liner for brick 4 - feet diameter manhole (in street)	100	V.F.	275-	27,500-
12	Install cementitious manhole liner for brick 4 - feet diameter manhole (in rear-yard easement)	150	V.F.	130-	19,500-
13	Install cementitious manhole liner for precast 5 - feet diameter manhole (in street)	50	V.F.	275-	13,750-
14	Install cementitious manhole liner for brick 5 - feet diameter manhole (in street)	50	V.F.	145-	7,250-
15	Install cementitious manhole liner for precast 6- feet diameter manhole (in street)	50	V.F.	300-	15,000-
16	Install cementitious manhole liner for brick 6 - feet diameter manhole (in street)	50	V.F.	150-	7,500-
17	Manhole Inspection Report	500	EA	25-	12,500-
18	Reinstall tack weld of manhole cover	10	EA	50-	500-
19	Undefined Allowance, cost allowance for work as directed by Engineer and upon authorization by the City of Hollywood Director of Public Utilities due to undefined conditions.	1	L.S.	\$100,000.00	\$100,000.00

**BASE BID TOTAL FOR COMPLETE PROJECT**

100,000.00

**TOTAL BASE BID IN WRITING**

**SUBMITTED BY:**

EnviroWaste Services Group, Inc

**NOTES:**

1. REFER TO SECTION 01025 FOR ADDITIONAL DESCRIPTION OF ITEMS.
2. SUBSTANTIAL COMPLETION SHALL BE AS DEFINED IN THE PROJECT SCHEDULE IN THE SUPPLEMENTARY
3. CLOSEOUT SHALL BE COMPLETED WITH IN 365 DAYS FROM THE " NOTICE TO PROCEED".
4. THE CONTRACT SHALL BE BASED UPON THE SUM OF TOTAL BASE BID
5. WORK ORDERS WILL BE ISSUED AS PROBLEM AREAS ARE IDENTIFIED.

SECTION 00410 - APPROVED BID BOND

(Construction)

STATE OF FLORIDA

KNOW ALL MEN BY THESE PRESENTS:

That we EnviroWaste Services Group, Inc., as Principal, and Aspen American Insurance Company, as Surety, are held and firmly bound unto the City of Hollywood in the sum of Ten Percent of Amount Bid 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 September 24, 2019 for

**CITY OF HOLLYWOOD**  
**INFLOW/INFILTRATION (I/I) PROGRAM – MANHOLE REPAIRS**  
**CITY PROJECT NO. 19-7101**

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.

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 \_\_\_\_\_ 24th \_\_\_\_\_ day of \_\_\_\_\_ September \_\_\_\_\_, 20 19, 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

WHEN THE PRINCIPAL IS A CORPORATION:

Attest:



Secretary

EnviroWaste Services Group, Inc.

Name of Corporation

18001 Old Cutler Road, Suite 554

Business Address

Palmetto Bay, FL 33157

By:



(Affix Corporate Seal)

Julio Fojon

Printed Name

President

Official Title

CERTIFICATE AS TO CORPORATE PRINCIPAL


I, Eduardo Barba, certify that I am the secretary of the Corporation named as Principal in the attached bond; that Julio Fojon who signed the said bond on behalf of the Principal, was then President 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.

 (SEAL)

Secretary

TO BE EXECUTED BY CORPORATE SURETY:

Attest:

  
\_\_\_\_\_  
Secretary  
Sarah Belcastro

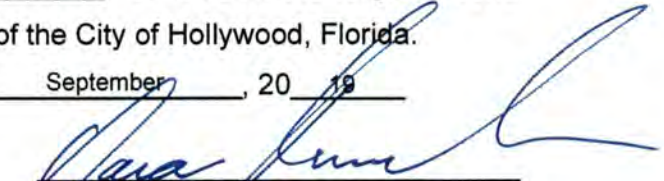
Aspen American Insurance Company  
\_\_\_\_\_  
Corporate Surety  
175 Capital Blvd, Suite 300  
\_\_\_\_\_  
Business Address  
Rocky Hill, CT 06067  
\_\_\_\_\_

BY:   
\_\_\_\_\_  
(Affix Corporate Seal)

Stephen A. Vann  
\_\_\_\_\_  
Attorney-in-Fact  
Lockton Companies, LLC  
\_\_\_\_\_  
Name of Local Agency  
3280 Peachtree Rd, NE Ste. 250  
\_\_\_\_\_  
Business Address  
Atlanta, GA 30305  
\_\_\_\_\_

STATE OF ~~FLORIDA~~ Georgia

Before me, a Notary Public, duly commissioned, qualified and acting, personally appeared, \_\_\_\_\_  
Stephen A. Vann to me well known, who being by me first duly sworn upon oath  
says that he is the attorney-in-fact for the \_\_\_\_\_ Aspen American Insurance Company and  
that he has been authorized by Aspen American Insurance Company 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 24th day of September, 2019

  
\_\_\_\_\_  
Notary Public, State of ~~Florida~~ Georgia  
Oana Dimulescu

My Commission Expires: 06/20/2023

- END OF SECTION -





Aspen American Insurance Company  
175 Capital Boulevard, Rocky Hill, CT 06067

## POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, THAT Aspen American Insurance Company, a corporation duly organized under the laws of the State of Texas, and having its principal offices in Rocky Hill, Connecticut, (hereinafter the "Company") does hereby make, constitute and appoint: Stephen A. Vann, Sarah C. Belcastro of Lockton Companies, its true and lawful Attorney(s)-in-Fact, with full power and authority hereby conferred to sign, execute and acknowledge on behalf of the Company, at any place within the United States, the following instrument(s) by his/her sole signature and act: any and all bonds, recognizances, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking and any and all consents incident thereto, and to bind the Company thereby as fully and to the same extent as if the same were signed by the duly authorized officers of the Company. All acts of said Attorney(s)-in-Fact done pursuant to the authority herein given are hereby ratified and confirmed. This appointment is made under and by authority of the following Resolutions of the Board of Directors of said Company effective on April 7, 2011, which Resolutions are now in full force and effect;

**VOTED:** All Executive Officers of the Company (including the President, any Executive, Senior or Assistant Vice President, any Vice President, any Treasurer, Assistant Treasurer, or Secretary or Assistant Secretary) may appoint Attorneys-in-Fact to act for and on behalf of the Company to sign with the Company's name and seal with the Company's seal, bonds, recognizances, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said Executive Officers at any time may remove any such appointee and revoke the power given him or her.

**VOTED:** The foregoing authority for certain classes of officers of the Company to appoint Attorneys-in-Fact by virtue of a Power of Attorney to sign and seal bonds, recognizances, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, as well as to revoke any such Power of Attorney, is hereby granted specifically to the following individual officers of Aspen Specialty Insurance Management, Inc.:

Michael Toppi, Executive Vice President, Scott Sadowsky, Senior Vice President, Kevin W. Gillen, Senior Vice President, Mathew Raino, Senior Vice President, and Ryan Field, Senior Vice President.

This Power of Attorney may be signed and sealed by facsimile (mechanical or printed) under and by authority of the following Resolution voted by the Boards of Directors of Aspen American Insurance Company, which Resolution is now in full force and effect:

**VOTED:** That the signature of any of the Officers identified by title or specifically named above may be affixed by facsimile to any Power of Attorney for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any and all consents incident thereto, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company. Any such power so executed and certified by such facsimile signature and/or facsimile seal shall be valid and binding upon the Company with respect to any bond or undertaking so executed.

IN WITNESS WHEREOF, Aspen American Insurance Company has caused this instrument to be signed and its corporate seal to be hereto affixed this 7th Day of March, 2019.

STATE OF CONNECTICUT

SS. ROCKY HILL

COUNTY OF HARTFORD

Aspen American Insurance Company

*Kevin W. Gillen*  
Kevin W. Gillen Senior Vice President

On this 7th day of March, 2019 before me personally came Kevin W. Gillen to me known, who being by me duly sworn, did depose and say; that he/she is Senior Vice President, of Aspen American Insurance Company, the Company described in and which executed the above instrument; that he/she knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; and that he/she executed the said instrument on behalf of the Company by authority of his/her office under the above Resolutions thereof.

*Patricia C. Taber*  
Notary Public  
My commission expires: May 31, 2021

**Patricia C. Taber**  
**Notary Public**  
**State of Connecticut**  
**My Commission Expires May 31, 2021**

### CERTIFICATE

I, the undersigned, Kevin W. Gillen of Aspen American Insurance Company, a stock corporation of the State of Texas, do hereby certify that the foregoing Power of Attorney remains in full force and has not been revoked; and furthermore, that the Resolutions of the Boards of Directors, as set forth above, are now and remain in full force and effect.

Given under my hand and seal of said Company, in Rocky Hill, Connecticut, this 24<sup>th</sup> day of SEPTEMBER, 2019

By: *Kevin W. Gillen*

Name: Kevin W. Gillen Senior Vice President



\* For verification of the authenticity of the Power of Attorney you may call (860) 760-7728 or email: Patricia.Taber@aspen-insurance.com

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: EnviroWaste Services Group, Inc  
18001 Old Cutler Rd, #554  
Palmetto Bay, Fl. 33157
2. Contractor's Telephone Number: 305-637-9665  
and e-mail address: info@ewsg.com@ewsg.com
3. Contractor's License (attach copy): CGC1520877  
Primary Classification: General Contractor  
Broward County License Number (attach copy): N/A
4. Number of years as a Contractor in construction work of the type involved in this Contract: 21
5. List the names and titles of all officers of Contractor's firm:  
Julio Fojon, President  
Paul Quentel, CEO  
Melissa Linton, CFO  
Eduardo Barba , Corporate Secretary
6. Name of person who inspected site or proposed work for your firm:  
Name: Mike Garcia  
Date of Inspection: September 18, 2019



7. What is the last project of this nature you have completed?

City of Sunrise

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

No

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

Mike Alvarez, malvarez@balharbourfl.gov

Gio Batista, gbatista@sunrisefl.gov

Jose Polanco, jpolanco@hollywoodfl.org

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 co-ventures).

Name of Project	City	Total Contract Value	Contracted Date of Completion	% Completion to Date
See attached list				

(Continue list on inset sheet, if necessary)

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

See attached list

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

None

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**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.

	<b>Work to be Performed</b>	<b>Subcontractor's Name / Address</b>
1.	None required, 100% self perform	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

NOTE: Attach additional sheets if required.

- END OF SECTION -



## Summary of Qualifications

### EnviroWaste Services Group

EWSG is one of the industry leaders in the maintenance, inspection and repair of storm and sanitary systems throughout the Southeastern United States. EnviroWaste has one of the largest private fleets in the region dedicated to meeting its customers' needs for over 20 years. EWSG's fleet of Vactors, Vac-Cons, industrial cleaners, pump trucks, and TV inspection trucks ensure its customers the technology necessary to meet their maintenance and emergency requirements. EnviroWaste has been contracted by municipalities at the local, state and federal levels in multiple states throughout the years. The years of experience have positioned EWSG to work in conjunction with its customers to establish the most appropriate game plan to achieve their respective goals.

### Sewer Services



EnviroWaste Services Group Inc., specializes in the cleaning of storm-water drainage systems and sanitary sewers. EWSG provides any services related to storm and sanitary sewers for private clients, commercial industries, municipalities, DOT, government agencies, and more!

- \* Pressure Test, Smoke Test, and Pre and Post Video PACP Inspections
- \* Storm and Sanitary Systems Inspection and Cleaning Services
- \* Two in House Certified NASSCO PACP/MACP/LACP Trainers
- \* Full Horizontal Construction Division Specializing in Sidewalks, C&G, Paving
- \* Full Line or Point Repair Sanitary and Storm Sewers
- \* Drainage Installation up to 80" Diameter
- \* Lateral Service Line Inspections, Installations, and Lining
- \* Repair of Lines using Sealing, Grouting, and Sectionals Liners
- \* Full Line CIPP Lining 6"-72"

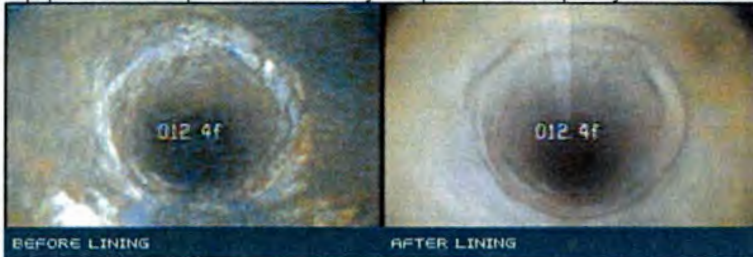
A new drainage system is designed to drain in a matter of minutes. It is recommended that regular maintenance is performed on your drainage system at least once a year to ensure proper water flow. Without appropriate care, leaves, sediment, and trash accumulate, pipes corrode, tree roots perforate the pipes, cracks appear in the system,

**Headquarters: 18001 Old Cutler Road, #554, Miami, FL 33157 \* (877) 637-9665 \* F (877) 637-9659**  
**Offices: Miami, FL \* Orlando, FL \* Tampa, FL**  
**[www.EWSG.com](http://www.EWSG.com) \* email: [info@ewsg.com](mailto:info@ewsg.com)**

# ENVIRO

WASTE SERVICES GROUP

and oil and tire particles from cars build up sludge. These factors cause an obstruction of proper drainage and cause pipe performance to deteriorate, thus rendering your drainage system useless. EnviroWaste has the necessary equipment and experience to identify the problem and quickly and efficiently correct it as well.



Honorably Serving the Entire Southeaster United States!

## CCTV Video Inspection

EnviroWaste's CCTV (closed captioned television) inspection uses custom controlled cameras to locate wreckage within the pipes. Our remote-controlled cameras operate on a four-wheel sled and allow the customer to see the exact condition of their drainage system to identify the problem and its severity. EWSG even offers a new technology that provides cured in place lining services which rehabilitates damaged pipes of any diameter without the costly excavation, while keeping disruptions of service to the very minimum.



Roots in Sewer



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[www.EWSG.com](http://www.EWSG.com) \* email: [info@ewsg.com](mailto:info@ewsg.com)





## Sewer and Drain Cleaning



EnviroWaste Services Group has been providing Florida with sewer and drain cleaning services since 1998. EnviroWaste uses the latest, most advanced storm drain cleaning equipment to serve your maintenance and emergency needs.

EnviroWaste has the Southeastern United State's largest fleet of Jet/Vac trucks are specially designed to restore your system to optimal conditions. Unlike "Septic Tank" trucks, which only suck trash out of the manhole, our superior trucks are specially designed to clean catch basins and lines and come equipped with a jet hose with a high-pressure nozzle to completely clear out the pipe walls and a powerful vacuum to dislodge and remove the debris and blockage to provide maximum water flow. EWSG also provides root cutters to properly remove intrusive roots without using chemicals.

EnviroWaste Services Group Inc., specializes in the cleaning of storm-water drainage systems and sewers. EWSG provides any services related to storm and sanitary sewers for private clients, commercial industries, municipalities, DOT, government agencies, and more!



Before Sewer Cleaning



**Headquarters:** 18001 Old Cutler Road, #554, Miami, FL 33157 \* (877) 637-9665 \* F (877) 637-9659  
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[www.EWSG.com](http://www.EWSG.com) \* email: [info@ewsg.com](mailto:info@ewsg.com)

## Inflow and Infiltration

### I/I Study

Inflow and infiltration occurs when clean ground water or storm water enters a sewer system through improper connections, cracked pipes, and defective joints.

Inflow is the term used to explain when the surface water enters a sewer system through Improper connections of yard, roof, and cellar drains, cracked pipes, holes in manhole covers, catch basins, and cross connections between storm and sanitary sewers.

Infiltration occurs when the ground water enters the wastewater system through deteriorated manholes, cracks, and leaks in the joints.

After a rain or snow storm the inflow and infiltration sources begin filling up the sanitary sewer systems with clear water. These systems eventually become full resulting in the waste water to flow out at a significantly higher water level. If drains and sanitary fixtures are below this overload level water will be able to flow back through the sanitary sewer pipe. As a result, there will be flooding in homes and manholes will burst open, allowing the wastewater onto the streets.

These are the following 3 methods of identifying Inflow and Infiltration:

1. [Smoke Testing](#)
2. [Flow Monitoring](#)
3. [Television Inspection](#)

Flow Monitoring is when special measuring devices are inserted into the sewer lines to monitor the amount of water flowing through the wastewater system.







## Industrial Vacuum Services

In 2019 EWSG acquired Industrial Vacuum Services(IVAC). While adding to EWSG previous experience in industrial vacuum cleaning, EWSG has now also added all of IVAC's experience, equipment, and personnel. EWSG/IVAC now has 6 large industrial vacuum loaders. EWSG specializes in removal of materials, wet or dry, from water and wastewater treatment plants, manufacturing plants, energy plants, construction sites, silos, elevators, quarries, foundries and other industrial sites.

## Sewer Pipeline Repairs/Rehabilitation

A team of highly qualified professionals and technicians are eager to take care of all of your Sewer Pipeline Repair /rehabilitation needs. With hundreds of years of combined experience, our professionals are committed to providing superior services!



We offer 24 Hour Emergency Response, Specializing in Emergency Clean up, Disaster Recovery including Hurricanes and Natural Disasters. **Call 877-637-9665**

## EnviroWaste Services Group

Storm and Sanitary Sewer Maintenance, Inspection, Repair, Rehabilitation and  
Horizontal Construction throughout the Southeast United States

**Headquarters:** 18001 Old Cutler Road, #554, Miami, FL 33157 \* (877) 637-9665 \* F (877) 637-9659  
**Offices:** Miami, FL \* Orlando, FL \* Tampa, FL  
[www.EWSG.com](http://www.EWSG.com) \* email: [info@ewsg.com](mailto:info@ewsg.com)



***State of Florida  
Department of State***

I certify from the records of this office that ENVIROWASTE SERVICES GROUP, INC. is a corporation organized under the laws of the State of Florida, filed on February 13, 1998.

The document number of this corporation is P98000014467.

I further certify that said corporation has paid all fees due this office through December 31, 2017, that its most recent annual report/uniform business report was filed on January 9, 2017, and that its status is active.

I further certify that said corporation has not filed Articles of Dissolution.

*Given under my hand and the  
Great Seal of the State of Florida  
at Tallahassee, the Capital, this  
the Ninth day of January, 2017*



*Ken Diefen*  
**Secretary of State**

Tracking Number: CC8338804770

To authenticate this certificate, visit the following site, enter this number, and then follow the instructions displayed.

<https://services.sunbiz.org/Filings/CertificateOfStatus/CertificateAuthentication>



RICK SCOTT, GOVERNOR

JONATHAN ZACHEM, 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

**BARBA, EDUARDO JOSE**

ENVIROWASTE SERVICES GROUP, INC.

18001 OLD CUTLER RD

554

MIAMI

FL 33157

**LICENSE NUMBER: CGC1520877**

**EXPIRATION DATE: AUGUST 31, 2020**

Always verify licenses online at [MyFloridaLicense.com](http://MyFloridaLicense.com)



Do not alter this document in any form.

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#### **COMPANY INFORMATION**

EnviroWaste Services Group, Inc.  
18001 Old Cutler Road, Suite 554, Miami, FL 33157  
(305) 637-9665, Fax (305) 637-9659, (877) 637-9665  
License: # QB 32296  
CGC 060385

☐ **Owner:** City of Hollywood

**Project Title:** 11-7063, 13-7068, 16-7078 Sanitary Sewer Eval. And Repair

**Budget:** \$ 3,500,000

**Time period:** 2011-current

**Scope:** EWSG has been contracted to cctv, clean and perform full line and point repair sewer replacements. The above lists three separate contracts, we are currently on contract number four. Since 2011 EWSG has been the only company performing work on the City's sewer system. Over 750 excavated point repairs have been done for the City as large as 30" in diameter and 18' in depth.

**Contact:** Jose Polanco Ph: 754-208-9443 [JPOLANCO@hollywoodfl.org](mailto:JPOLANCO@hollywoodfl.org)

☐ **Owner:** FDOT

**Project Title:** E7L52 Desilting and Video Inspection of Storm Sewer System

**Budget:** \$ 6,000,000

**Time period:** January 2017-2019

**Scope:** EWSG has been contracted to cctv and clean the FDOT owned storm water system in Hillsborough, Pasco, Pinellas, Hernando, and Citrus Counties. EWSG also seals and rehabilitates the department's manholes and inlets. In addition to standard cleaning and inspections, EWSG has removed over 10,000 cubic yards of debris from box culverts.

**Contact:** Pedro Lopez Ph: 813-975-6107 [pedro.Lopez@dot.state.fl.us](mailto:pedro.Lopez@dot.state.fl.us)

☐ **Owner:** FDOT

**Project Title:** E5T90 Desilting, Video Inspection, and CIPP of Storm Sewer System

**Budget:** \$ 1,500,000

**Time period:** January 2017-December 2017

**Scope:** EWSG has been contracted to cctv, clean and line the FDOT owned storm water system in Volusia Counties. In addition to standard cleaning and inspections, EWSG has CIPP lined 10,000LF of 18-42" sewer, replaced 80LF of 48" sewer and 300LF of 30" sewer. EWSG also seals and rehabilitates the department's manholes and inlets.

**Contact:** Rick Coe Ph: 386-740-3490 [frederick.Coe@dot.state.fl.us](mailto:frederick.Coe@dot.state.fl.us)

☐ **Project Name:** City of Coral Gables

**Project Title:** IFB 2015.10.07 Routine & Emergency Sewer Repairs and Inspection

**Budget:** \$ 500,000 per year

**Time period:** September 2013-Current

Headquarters: 18001 Old Cutler Road, #554, Miami, FL 33157 \* (877) 637-9665 \* F (877) 637-9659

Offices: Miami, FL \* Orlando, FL \* Tampa, FL  
[www.EWSG.com](http://www.EWSG.com) \* email: [info@ewsg.com](mailto:info@ewsg.com)



**Synopsis:** EWSG has been contracted to provide sewer rehabilitation services for the City of Coral Gables in sewer cleaning/TV'ing, point repairs. EnviroWaste cleans and inspects the City's sanitary sewer system and makes the recommendation for repairs, and performs the repairs. Manhole coatings have been done on 150 manholes. More than 100 excavated point repairs.

**Contact:** Noel Polo 305-460-5022 npolo@coralgables.com

□ **Project Name:** City of Sunrise

**Project Title:** Bid 15-12-01-JC Sewer Rehab, Maintenance, and I&I Reduction

**Budget:** \$ 1,000,000 per year

**Time period:** October 2012-Current

**Synopsis:** EWSG has been contracted to provide sewer rehabilitation services for the City of Sunrises in sewer cleaning/TV'ing, point repairs. EnviroWaste cleans and inspects the City's sanitary sewer system and makes the recommendation for repairs, and performs the repairs. 450 Manholes have been rehabbed, over 150 excavated point repairs.

**Contact:** Gio Batista 954-815-8861 GBatista@sunrisefl.gov

□ **Project Name:** City of North Miami Beach

**Project Title:** ITB 2011-08 Sewer Rehab, Maintenance, and I&I Reduction

**Budget:** \$ 600,000

**Time period:** 2012-Current

**Synopsis:** EWSG has been contracted to provide sewer rehabilitation services for the City of Sunrises in sewer cleaning/TV'ing, point repairs. EnviroWaste cleans and inspects the City's sanitary sewer system and makes the recommendation for repairs, and performs the repairs. We also have installed new water main with fire hydrants.

**Contact:** Pedro Melo 305-770-5135 pedro.melo@citynmb.com

□ **Project Name:** City of Miami Beach, FL

**Project Title:** Horizontal Job Order Contract

**Budget:** \$ 25,000,000

**Time period:** July 2009 – July 2014

**Synopsis:** EWSG has been contracted to provide horizontal general contracting services for the City of Miami Beach including CIPP rehabilitation, manhole rehab, sewer cleaning/TV'ing, point repairs, demolition, drainage, paving, sidewalks, curbs, gutters, excavation, and all other "horizontal" construction services. EnviroWaste cleans and televises all of the outfalls located with the City of Miami Beach. Specifically we have extensively cleaned storm sewer and many outfalls within the city.

**Contact:** Mike Alvarez 786-566-3462 malvarez@balharbourfl.gov

□ **Project Name:** Town of Cutler Bay

**Project Title:** Miscellaneous Construction and Repairs Town Wide

**Budget:** \$ 1,500,000/year

**Headquarters:** 18001 Old Cutler Road, #554, Miami, FL 33157 \* (877) 637-9665 \* F (877) 637-9659

**Offices:** Miami, FL \* Orlando, FL \* Tampa, FL

**www.EWSG.com** \* **email:** info@ewsg.com





**Time period:** July 2008 – Current

**Synopsis:** EWSG has been contracted to provide clean storm sewers, remove and replace sidewalks, asphalt roadways, drainage repairs, along with other miscellaneous tasks. EWSG has installed new or replaced more than 200,000 LF of sidewalks, and paved over 200,000 SY of asphalt roads.

**Contact:** Alfredo Quintero 305-234-4262 [aquintero@cutlerbay-fl.gov](mailto:aquintero@cutlerbay-fl.gov)

☐ **Client Name:** Manatee County

**Project Title:** Wastewater Hauling Emergency Contract

**Budget:** \$ 250,000

**Time period:** September 2014

**Synopsis:** EWSG has been contracted to provide emergency vector and vacuum truck services for all of Manatee County

**Contact:** Bonnie Sietman 941-749-3046 [bonnie.sietman@mymanatee.org](mailto:bonnie.sietman@mymanatee.org)

☐ **Project Name:** City of Miami Beach, FL

**Project Title:** Routine & Emergency Sewer Repairs ITB 113-2013

**Budget:** \$ 2,500,000 per year

**Time period:** September 2013- September 2018

**Synopsis:** EWSG has been contracted to provide sewer rehabilitation services for the City of Miami Beach including CIPP rehabilitation, sewer cleaning/TV'ing, point repairs. EnviroWaste cleans and inspects the City's sanitary sewer system and makes the recommendation for repairs, and performs the repairs. EnviroWaste Services Group has installed 180,000' of mainline CIPP for the City since 2008. Before this contract, EWSG also held two different JOC contracts with the city doing any and all horizontal work, including but not limited to sidewalks, outfalls, seawalls, landscaping, canoe launch ramp, installing new water mains, storm water pump stations. More than 500 sanitary sewer manholes have been lined with SewperCoat.

**Contact:** Mike Alvarez 786-566-3462 [malvarez@balharbourfl.gov](mailto:malvarez@balharbourfl.gov)

☐ **Project Name:** Pasco County, FL

**Project Title:** Wastewater Hauling Emergency Contract

**Budget:** \$ 250,000/year

**Time period:** October 2011 – Current

**Synopsis:** EWSG has been contracted to provide emergency vector and vacuum truck services for all of Pasco County, as many as 13 trucks at the same time

**Contact:** Edward Gribble 727-834-3358 [ebribble@pascocountyfl.net](mailto:ebribble@pascocountyfl.net)

☐ **Project Name:** Hillsborough County, FL

**Project Title:** Wastewater Pumping and Disposal Contract

**Budget:** \$ 2,000,000/year

**Time period:** December 2013 – Current

**Synopsis:** EWSG has been contracted to provide emergency and scheduled vector and vacuum truck services for all of Hillsborough County. EWSG has regularly hauled in excess of 100,000 gallons per hour during emergency situations.

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**Contact:** David Lundberg 813-663-3229 [lundbergd@hillsboroughcounty.org](mailto:lundbergd@hillsboroughcounty.org)

□ **Project Name:** Hillsborough County, FL

**Project Title:** Manhole-Wastewater Lines-Lift Station Cleaning and Inspection

**Budget:** \$ 2,000,000/year

**Time period:** April 2014 – Current

**Synopsis:** EWSG has been contracted to provide all of the sanitary sewer inspection and cleaning for Hillsborough County

**Contact:** Suresh Maharaj 813-554-5011 ext 43836 [maharajs@hillsboroughcounty.org](mailto:maharajs@hillsboroughcounty.org)

□ **Owner:** City of Miami

**Project Title:** Outfall and Drainage Cleaning Contract

**Budget:** \$ 750,000 per year

**Time period:** 2005 – current

**Scope:** EWSG has been contracted to provide cleaning of the City of Miami's storm drainage system. More than 2,000,000 LF of storm sewers have been cleaned since '05

**Contact:** Ely Estevez Ph: 305-416-1295 [eestevez@miamigov.com](mailto:eestevez@miamigov.com)

□ **Owner:** Orange County, FL

**Project Title:** Sanitary Sewer Cleaning and Inspection(Y12-1060, Y15-1140)

**Budget:** \$ 1,100,000 per year

**Time period:** June 2008 – Current, 2 separate contracts

**Scope:** EWSG has been contracted to provide various sewer related contracting services for Orange County, FL, including cleaning and video inspection. EWSG has cleaning and cctv'd over 3,000,000 LF of sanitary sewers.

**Contact:** Dustin Putney 407-836-6822 [dustin.putney@ocfl.net](mailto:dustin.putney@ocfl.net)

□ **Owner:** Orange County, FL

**Project Title:** Orange County Gravity CIPP Lining Y13-1019

**Budget:** \$ 1,000,000

**Time period:** May 2013 – April 2014

**Scope:** EWSG was contracted to provide mainline CIPP lining on sanitary sewers 8-42" in diameter. 30,000 LF of pipe were lined.

**Contact:** Patty Hobbs 407-836-5456 [Patty.Hobbs@ocfl.net](mailto:Patty.Hobbs@ocfl.net)

□ **Owner:** Orange County, FL

**Project Title:** Orange County Sewage Hauling Y14-191A

**Budget:** \$ 250,000

**Time period:** April 2014-current

**Scope:** EWSG has been contracted to provide emergency and scheduled vacuum truck services for all of Orange County. EWSG has been the primary emergency sewage hauling contractor for the County since 2014. EWSG has had multiple 10 plus truck emergency responses all handled in-house.

**Contact:** Brian Vos 321-239-3339 [Brian.Vos@ocfl.net](mailto:Brian.Vos@ocfl.net)

**Headquarters:** 18001 Old Cutler Road, #554, Miami, FL 33157 \* (877) 637-9665 \* F (877) 637-9659

**Offices:** Miami, FL \* Orlando, FL \* Tampa, FL

[www.EWSG.com](http://www.EWSG.com) \* email: [info@ewsg.com](mailto:info@ewsg.com)





□ **Owner:** Orange County, FL

**Project Title:** Stormwater System Inspection, Cleaning, Sealing, Void Detection & Void Filling (Y8-1034, Y8-1110, Y9-1022, Y11-112, Y12-1060, Y13-1083, Y14-1075, Y14-1025, Y17-100)

**Budget:** \$ 3,000,000 per year

**Time period:** June 2008 – Current, 9 separate contracts

**Scope:** EWSG has been contracted to provide various drainage related contracting services for Orange County, FL, including cleaning, video inspection, chemical grouting, internal joint seals, sonar inspection, ground penetrating radar, soil stabilization, injection holes, and injection & sealing of cracks. EWSG has pumped more than 30,000 Cubic Feet of grout for soil stabilization, cleaned and inspected over 2,000,000 Lf of 12-96" storm sewer, and grouted thousands of joints.

**Contact:** Bill Blackham 407-836-6805 William.Blackham@ocfl.net

□ **Owner:** City of Ocala

**Project Title:** Sanitary Sewer System Inspection, Cleaning

**Budget:** \$ 1,250,000

**Time period:** 2008 – 2016

**Scope:** EWSG has been contracted to provide cleaning and inspection of sanitary sewer as well as smoke testing. 750,000 LF of sewer were smoke tested.

**Contact:** Edwards Earnest Ph: 352-629-8521 Fax: 352-629-8242

Eearnest@ocalafl.org

□ **Project Name:** City of Miami Beach, FL

**Project Title:** Smoke Testing

**Budget:** \$ 350,000

**Time period:** July 2010 – July 2012

**Synopsis:** Smoke testing of 700,000+ feet of sanitary sewer along with related report submittal.

**Contact:** Mike Alvarez 786-566-3462 malvarez@balharbourfl.gov

□ **Project name:** S-782 Lateral Sewer Testing – 2005-2007

**Location:** Miami-Dade Water & Sewer Department

**Budget:** \$ 3,300,000 (completed at \$ 2,450,000)

**Time period:** 2 years

**Synopsis:** EWSG was contracted to test approximately 6,000 sanitary sewer service lateral connections in 40 lift stations throughout Miami-Dade County. The lines were tested using the pressure test and/or the smoke test method. This pilot study program, the first of its kind in the U.S., was requested to determine the I&I problems with the lateral connections throughout the County.

**Contact:** Miguel Pichardo 786-258-2573 Miguel.Pichardo@miamidade.gov

□ **Project name:** S-793 Sanitary Sewer Service Laterals CIPP Rehabilitation

**Location:** Miami-Dade Water & Sewer Department

**Headquarters:** 18001 Old Cutler Road, #554, Miami, FL 33157 \* (877) 637-9665 \* F (877) 637-9659

**Offices:** Miami, FL \* Orlando, FL \* Tampa, FL

**www.EWSG.com** \* **email:** info@ewsg.com



**Budget:** \$ 500,000

**Time period:** 2006

**Synopsis:** EWSG was contracted by the Prime Contractor to line 95 sanitary sewer service laterals throughout areas of Miami-Dade County.

**Contact:** Miguel Pichardo 786-258-2573 Miguel.Pichardo@miamidade.gov

□ **Project name:** S-803 Sectional Line Repair – 2006 / 2009

**Location:** Miami-Dade Water & Sewer Department

**Budget:** \$ 2,000,000

**Time period:** Scheduled to complete project within half the allotted time frame.

**Synopsis:** EWSG was contracted to clean, CCTV video, and inspect sewer lines throughout Miami-Dade County to determine where a repair is required. The specific repair method used under this contract is sectional lining. Over 2,000 sectionals were installed.

**Contact:** Miguel Pichardo 786-258-2573 Miguel.Pichardo@miamidade.gov

□ **Project name:** S-847 Sectional Line Repair – 2010-2014

**Location:** Miami-Dade Water & Sewer Department

**Budget:** \$ 2,000,000

**Time period:** Scheduled to complete project within half the allotted time frame.

**Synopsis:** EWSG was contracted to clean, CCTV video, and inspect sewer lines throughout Miami-Dade County to determine where a repair is required. The specific repair method used under this contract is sectional lining. Over 2,000 sectionals were installed.

**Contact:** Miguel Pichardo 786-258-2573 Miguel.Pichardo@miamidade.gov

□ **Project Name:** FDOT – Lake County

**Project Title:** Maintenance contract E5J21

**Budget:** \$ 630,000 (completed on time and under budget)

**Time period:** August 2007 – March 2008

**Synopsis:** EWSG was contracted by the FDOT to repair and maintain the storm water system on any of the Department's rights-of-way in Lake County. The primary work duties included CIPP repair of drainage pipes, joint repairs, sealing of drainage pipes and structures, pressure grouting, desilting of pipes, inlets, and culverts, production of video records and written reports. The installation of liners included sizes ranging from 15" to 36".

□ **Project Name:** Indian Creek Village

**Project Title:** Rehabilitation of Storm Sewer System

**Budget:** \$ 330,000

**Time period:** July 2006 – March 2007

**Synopsis:** EWSG was contracted by the Village to provide various storm sewer services. The scope of services includes CIPP lining, grouting, sectional lining, storm drain cleaning, video inspection, point repairs, repair of inlets and manholes, and site restoration. The installation of liners included sizes ranging from 8" to 36".

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□ **Project Name:** Lighthouse Point

**Project Title:** Rehabilitation of Storm Sewers on 24<sup>th</sup> Street

**Budget:** \$ 85,000

**Time period:**

**Synopsis:** EWSG was subcontracted by a Prime Contractor to provide various storm sewer services. The scope of services includes CIPP lining, storm drain cleaning, and video inspection. The installation of liners included sizes ranging from 15" to 36".

□ **Project name:** Sanitary Sewer Service Laterals CIPP Rehabilitation

**Location:** Kenneth City, FL

**Budget:** \$ 60,000

**Time period:** 2006

**Synopsis:** EWSG was contracted by the Prime Contractor to line 45 sanitary sewer service laterals throughout areas of Kenneth City, FL.

□ **Project name:** Sanitary Sewer Evaluation Study & Repairs

**Location:** Homestead Air Reserve Base, FL

**Budget:** \$ 126,000

**Time period:** 2007

**Synopsis:** The project consisted of evaluating the sanitary sewer system by smoke testing, followed by further evaluation by cleaning and video inspection. This resulted in a variety of repair methods such as CIPP lining, CIPP sectional repairs, installing cleanouts, restoration of manholes, raising chimneys, installation of new sanitary pipes, service reinstatement, open cut point repair, chemical grouting of joints, and site restoration.

□ **Project name:** Sanitary Sewer Evaluation Study & Repairs

**Location:** Miami International Airport, FL

**Budget:** \$ 71,000

**Time period:** 2007-2008

**Synopsis:** The project consisted of evaluating the sanitary sewer system by cleaning and video inspection. This resulted in a variety of repair methods such as CIPP lining, CIPP sectional repairs, installing cleanouts, installation of new sanitary pipes, service reinstatement, open cut point repair, chemical grouting of joints, and site restoration.

□ **Project Name:** City of North Bay Village

**Project Title:** SSES and Sanitary Sewer Repair

**Budget:** \$ 1,500,000

**Time period:** January 2007 - Current

**Synopsis:** EWSG has been contracted to perform a complete sanitary sewer system evaluation of the city along with associated repairs. Part of this project has been the

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# ENVIRO

WASTE SERVICES GROUP

repeated smoke testing of the system throughout the years. Over 600,000 feet of pipe has been smoke tested.

**Contact:** Juan Valiente Ph: 305-865-0506 [jvaliente@nbvillage.com](mailto:jvaliente@nbvillage.com)

□ **Project Name:** City of Orlando

**Project Title:** Bio7-2295-03 Smoke Testing and CIPP Sectional Liner

**Budget:** \$ 650,000

**Time period:** July 2007 – July 2009

**Synopsis:** EWSG has been contracted to provide sectional lining and smoke testing services. Throughout our contract we smoked 750,000 feet.

**Contact:** Ronald Proulx Ph: 407-246-2213

□ **Owner:** Broward County, FL (Water and Wastewater Services)

**Project Title:** Sewer Cleaning / Televising / Grouting / Video Capture

**Budget:** \$ 672,150

**Time period:** August 2008 – October 2009

**Scope:** EWSG has been contracted to provide various drainage related contracting services for Broward County, FL, including cleaning, video inspection, chemical grouting, and bypass pumping.

□ **Project Name:** Town of Cutler Bay, Fl.

**Project Title:** 97 Ave Drainage Improvements

**Budget:** \$ 238,475.00

**Time period:** September 2012- December 2012

**Synopsis:** Milling and installing 1300 sy asphalt, install 14 drains, raise manholes, install 900 lf of 18-24" pipe, install 300 lf of french drain, signing and pavement markings, 200 lf of 5' wide sidewalk.

**Contact:** Alfredo Quintero Jr. 305-234-4262 [aquintero@cutlerbay-fl.gov](mailto:aquintero@cutlerbay-fl.gov)

□ **Project Name:** Town of Cutler Bay, Fl.

**Project Title:** Roadway Resurfacing Phase I & II

**Budget:** \$ 713,000

**Time period:** September 2012- March 2013

**Synopsis:** Milling and resurfacing and striping of 100,000 sy asphalt.

**Contact:** Alfredo Quintero Jr. 305-234-4262 [aquintero@cutlerbay-fl.gov](mailto:aquintero@cutlerbay-fl.gov)

□ **Project Name:** Town of Cutler Bay, Fl.

**Project Title:** Bel Aire SubBasin 8

**Budget:** \$ 225,000

**Time period:** August 2010-December 2010

**Synopsis:** Milling and installing 7133 sy asphalt, install 19 drains, raise manholes, install 262 lf of 18-24" pipe, install 360 lf of french drain, signing and pavement markings.

**Contact:** Alfredo Quintero Jr. 305-234-4262 [aquintero@cutlerbay-fl.gov](mailto:aquintero@cutlerbay-fl.gov)

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□ **Project Name:** Town of Cutler Bay, FL.

**Project Title:** Cutler Ridge Parking Lot

**Budget:** \$ 160,000

**Time period:** August 2010-December 2010

**Synopsis:** Milling and installing asphalt, install 8 drains, install French drain, signing and pavement markings.

**Contact:** Alfredo Quintero Jr. 305-234-4262 [aquintero@cutlerbay-fl.gov](mailto:aquintero@cutlerbay-fl.gov)

□ **Project Name:** Town of Cutler Bay, FL.

**Project Title:** Stop Bar Striping City Wide

**Budget:** \$ 78,000

**Time period:** September 2009-Current

**Synopsis:** Installing 520, 24" Stop Bars with 50' Double Yellow Striping with RPMs at stop signs when required.

**Contact:** Alfredo Quintero Jr. 305-234-4262 [aquintero@cutlerbay-fl.gov](mailto:aquintero@cutlerbay-fl.gov)

□ **Project Name:** City of Miami Beach, FL

**Project Title:** SSES

**Budget:** \$ 3,950,000

**Time period:** 2009-2011

**Synopsis:** EWSG has been contracted to locate and repair defecincies in the City of Miami Beach's waste water and storm water system. Point repairs were performed, manholes were replaced, paving, curb and gutter, asphalt, well points, dewatering.

**Contact:** Mike Alvarez 786-566-3462 [malvarez@balharbourfl.gov](mailto:malvarez@balharbourfl.gov)

□ **Project Name:** City of Miami Beach, FL

**Project Title:** Licoln Road West Street End Improvements and Seawall

**Budget:** \$ 750,000

**Time period:** 2010

**Synopsis:** EWSG has been contracted to renovate the west street end of Lincoln Road in the City of Miami Beach. The work includes the installation of a new outfall, relocation of a fire hydrant, installation of brick pavers, sidewalk, curb and gutter, asphalt, pouring a new seawall cap and sheet piles, landscape as well as all new street and landscape lighting.

**Contact:** Aaron Sinnes 305-898-8100 [aaronsinnes@gmail.com](mailto:aaronsinnes@gmail.com)

□ **Owner:** FDOT District VI – Miami, FL

**Project Title:** Sidewalk Repair

**Budget:** \$ 200,000

**Time period:** August 2008 – August 2011

**Scope:** EWSG has been contracted to provide sidewalk repair for the Florida Department of Transportation.

□ **Owner:** Village of Pinecrest, FL

**Project Title:** Sidewalk Repair

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**Budget:** \$ 100,000

**Time period:** March 2009 – August 2009

**Scope:** EWSG has been contracted to provide sidewalk repair for the Village of Pinecrest.

☐ **Owner:** FDOT

**Project Title:** E7K39 Desilting and Video Inspection of Storm Sewer System

**Budget:** \$ 225,000

**Time period:** November 2014-2017

**Scope:** EWSG has been contracted to cctv and clean the FDOT owned storm water system.

**Contact:** Pedro Lopez Ph: 813-975-6107 [pedro.Lopez@dot.state.fl.us](mailto:pedro.Lopez@dot.state.fl.us)

☐ **Project Name:** FDOT – Broward E4J05

**Project Title:** Maintenance contract

**Budget:** \$ 215,000 per year

**Time period:** 2006-2009

**Contact:** Brenda Morgan 954-931-6177

**Synopsis:** EWSG was contracted by the FDOT to clean and inspect the storm drainage system within the county.

☐ **Project Name:** FDOT – Broward County E4G62

**Project Title:** Maintenance contract

**Budget:** \$300,000 / year

**Time period:** 2003-2005

**Contact:** Brenda Morgan 954-931-6177

**Synopsis:** EWSG was contracted by the FDOT to clean and inspect the storm drainage system within the county.

☐ **Project Name:** FDOT – Miami Dade E6E58

**Project Title:** Maintenance contract

**Budget:** \$ 165,000 per year

**Time period:** 2009-2011

**Contact:** Mary Lou Karner 305-256-6330

**Synopsis:** EWSG was contracted by the FDOT to clean and inspect the deep well injection system within the county.

☐ **Project Name:** FDOT – Miami Dade E6B68

**Project Title:** Maintenance contract

**Budget:** \$ 200,000 per year

**Time period:** 2003-2005

**Contact:** Mary Lou Karner 305-256-6330

**Synopsis:** EWSG was contracted by the FDOT to clean and inspect the storm drainage system within the county.

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□ **Project Name:** FDOT – Miami Dade E6B70

**Project Title:** Maintenance contract

**Budget:** \$ 200,000 per year

**Time period:** 2003-2005

**Contact:** Mary Lou Karner 305-256-6330

**Synopsis:** EWSG was contracted by the FDOT to clean and inspect the storm drainage system within the county.

□ **Project Name:** FDOT – Miami Dade E6D75

**Project Title:** Maintenance contract

**Budget:** \$ 200,000 per year

**Time period:** 2006-2007

**Contact:** Mary Lou Karner 305-256-6330

**Synopsis:** EWSG was contracted by the FDOT to clean and inspect the storm drainage system within the county, large diameter pipes.

□ **Project Name:** FDOT – Lake County E5M28

**Project Title:** Maintenance contract

**Budget:** \$ 225,000 per year

**Time period:** 2009

**Synopsis:** EWSG was contracted by the FDOT to clean, inspect, and repair the storm drainage system within the county.

□ **Project Name:** FDOT – Deland H-5069

**Project Title:** Emergency Clean up contract, Hurricane Frances

**Budget:** \$ 189,000

**Time period:** 2004

**Synopsis:** EWSG was contracted by the FDOT to clean the storm drainage system within the county after Hurricane Frances.

□ **Project Name:** FDOT – Miami Dade H-6069

**Project Title:** Emergency Clean up contract, Hurricane Wilma

**Budget:** \$ 1,000,000

**Time period:** 2005

**Contact:** Mary Lou Karner 305-256-6330

**Synopsis:** EWSG was contracted by the FDOT to clean the storm drainage system within the county after Hurricane Wilma.

□ **Project Name:** FDOT – Miami Dade, Key West H-6065

**Project Title:** Emergency Clean up contract, Hurricane Wilma

**Budget:** \$ 200,000

**Time period:** 2005

**Contact:** Mary Lou Karner 305-256-6330

**Synopsis:** EWSG was contracted by the FDOT to clean the storm drainage system

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within the county after Hurricane Wilma.

□ **Project name:** Citywide Storm Drain Cleaning - 2006

**Location:** City of Miami, FL

**Budget:** \$ 1,900,000 (in-budget)

**Time period:** 3 months (within 25% of time schedule)

**Contact:** Eli Estevez 305-416-1200

**Synopsis:** EWSG was contracted to perform storm drain cleaning services of various pipe diameters throughout the City of Miami. The project was awarded as a combination of annual maintenance service and Hurricane Wilma emergency service.

□ **Project name:** Countywide Storm Drain Cleaning (STDC-4) – 2007

**Location:** Miami-Dade County, FL

**Budget:** \$ 1,700,000

**Time period:** 1 year (completed in 7 months)

**Contact:** Mercedes Barrera 786-256-2625

**Synopsis:** EWSG was contracted to provide maintenance services including the clean out of existing drainage structures and associated culverts throughout Miami-Dade County. The project's scope of work includes hydraulic cleaning and vacuum removal of all foreign material, obstructions, debris, silt, litter, and all other associated work.

□ **Project name:** Countywide Storm Drain Cleaning (STDC-9) – 2007

**Location:** Miami-Dade County, FL

**Budget:** \$ 1,000,000

**Time period:** 1 year (completed in 4 months)

**Contact:** Mercedes Barrera 786-256-2625

**Synopsis:** EWSG was contracted to provide maintenance services including the clean out of existing drainage structures and associated culverts throughout Miami-Dade County. The project's scope of work includes hydraulic cleaning and vacuum removal of all foreign material, obstructions, debris, silt, litter, and all other associated work.

□ **Project name:** Countywide Storm Drain Cleaning (STDC-11) – 2007

**Location:** Miami-Dade County, FL

**Budget:** \$ 1,000,000

**Time period:** 1 year (completed in 4 months)

**Contact:** Mercedes Barrera 786-256-2625

**Synopsis:** EWSG was contracted to provide maintenance services including the clean out of existing drainage structures and associated culverts throughout Miami-Dade County. The project's scope of work includes hydraulic cleaning and vacuum removal of all foreign material, obstructions, debris, silt, litter, and all other associated work.

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□ **Project name:** Countywide Storm Drain Cleaning (STDC-12) – 2007

**Location:** Miami-Dade County, FL

**Budget:** \$ 1,000,000

**Time period:** 1 year (completed in 4 months)

**Contact:** Mercedes Barrera 786-256-2625

**Synopsis:** EWSG was contracted to provide maintenance services including the clean out of existing drainage structures and associated culverts throughout Miami-Dade County. The project's scope of work includes hydraulic cleaning and vacuum removal of all foreign material, obstructions, debris, silt, litter, and all other associated work.

□ **Project name:** Hurricane Katrina drain cleaning - 2005

**Location:** Jefferson Parish, LA

**Budget:** \$ 1,200,000 (in-budget)

**Time period:** 1 month (in-time)

**Synopsis:** EWSG was contracted to perform storm drain cleaning services of various pipe diameters throughout Jefferson Parish, LA, in response to Hurricane Katrina. EWSG mobilized a fleet of jetter/vacuum trucks within 24 hours to assist in clean-up of Parish.

□ **Owner:** Town of Miami Lakes, FL

**Project Title:** General Roadway Construction

**Budget:** \$ 700,000

**Time period:** July 2008 – July 2012

**Scope:** EWSG has been contracted to provide general roadway construction services for the Town of Miami Lakes, FL including drainage, paving, sidewalks, curbs, gutters, etc.

□ **Owner:** FDOT District VI – Miami, FL

**Project Title:** Sidewalk Repair

**Budget:** \$ 200,000

**Time period:** August 2008 – August 2011

**Scope:** EWSG has been contracted to provide sidewalk repair for the Florida Department of Transportation.

□ **Owner:** City of Miami, FL

**Project Title:** Slab Covered Trench Cleaning

**Budget:** \$ 360,000 / year

**Time period:** 2008 – 2012

**Scope:** EWSG has been contracted to clean slab covered trenches for the City of Miami.

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## REFERENCES

Sewer refers to storm and sanitary.

- ☐ Miami Dade County W&SD(Sewer) – Miguel Pichardo - 786-258-2573
- ☐ City of Sunrise(Sewer) – Gio Batista (954) 815-8861
- ☐ Town of Cutler Bay(Storm & Construction) – Alfredo Quintero (786) 348-5323
- ☐ Village of Pinecrest (Sewer) – Gary Krackenberg (305) 301-9825
- ☐ City of Doral (Sewer) – Carlos Arroyo (786) 367-5083
- ☐ City of Hollywood(Sewer) – Jose Polanco (954) 921-3930
- ☐ City of Coral Gables(Sewer & Construction) – Noel Polo (305) 460-5022
- ☐ City of North Miami(Sewer) – Wisler Pierre-Louis (305) 895-9838
- ☐ City of Miami(Sewer) – Elyrosa Estevez – (305) 416-1200
- ☐ FDOT (Broward) (Sewer) – Chi Sheu – (954)- 776-4300
- ☐ FDOT (Miami-Dade) (Sewer) – Mary Lou Karner – (305) 256-6330
- ☐ FDOT (Miami Dade) (Sewer) – Houshang Zahedi – (305) 654-7163
- ☐ Miami Dade County Public Works (Sewer) – Mercedes Barrera – (786) 256-2625



<b>Client Name</b>	<b>WO Ref No</b>	<b>Total Contract</b>	<b>Curr Term Ends</b>
City of Miami	IFB 827381	54,610	11/04/21
City of Miami Beach	2013-113-ITB-LR Renewal	As needed	
City of Sunny Isles Beach	C1314-048, YR 17-18	By PO's	11/18/19
FDOT District 6	E6M13-R0	200,000	01/31/20
FDOT Florida's Turnpike Enterprise	E8R40 - Dade, Broward, Palm Beach, Turnpike	323,550	09/11/20
	1st Renewal	323,550	09/11/20
Town of Cutler Bay	ITB 19-08		
Town of Medley	ITB 2016-01	As Needed	
Village of Key Biscayne	RFP 2019-01-03	392,692	
FDOT District 6	E6M25-R0. Fin Proj 423631-7-72-01	400,000	07/09/20
City of Boca Raton*	2017-004	1,566,470	09/30/20
City of Hollywood	16-7081	2,333,410	07/09/20
City of Miami JOC	15-16-033	2,000,000	09/30/22
Broward County	OPN2118843B1	364,875	09/26/20
Broward County*	Y2114050B1	7,450,482	12/04/19
	Bid No. 17-018 Second Renewal		09/30/20
City of Sunrise	15-12-01-JC	By PO's	05/11/20
City of Sunrise	16-59-03-JC	As Needed	06/30/20
Palm Beach County	18-074CC	2,400,000	09/18/20
	18074A-First Renewal	2,800,000	09/18/20
Solid Waste Authority	Bid No. 18-03/AL	89,450	01/13/20
City of Orlando	IFB 18-0255	577,250	06/10/20
FDOT D5 - Orange County	E5U38 - Financial Project 412326-5-72-14	298,092	02/28/19
FDOT D5 - Orange County	E5U66	680,050	11/14/19
Orange County	Y18-1045A	435,000	07/10/20
	Amendment No. 1		07/10/20
Orange County	Y19-110-TA	1,216,851	12/04/20
	Y19-110 Option 1		12/04/20
Orange County	Y17-1024-MV	201,000	05/29/20
Toho Water Authority	IFB-17-122 - Amendment #2	As Needed	11/23/20
Toho Water Authority	IFB-18-006	264,395	09/30/19
Metals & Materials Engineers	ITB No. 15-100485 PASARP Sewer Group 1	As Needed	
Indian River County	2018065	As Needed	07/16/20
City of Clearwater	Project No. 17-0060-UT	1,828,880	

FDOT Dist. 1 - Manatee and Sarasota C	E1R73-R0 - Fin #432728-1-72-62	299,450	08/19/20
FDOT Dist. 1 - Manatee and Sarasota C	E1R73-R1 - Fin #432728-1-72-62	299,450	08/19/20
FDOT Dist. 7 - Hillsborough County	E7L90-R0 - Fin #41602617269	65,000	01/26/19
FDOT Dist. 7 - Tampa	E7L52_R1	2,400,000	01/18/20
FDOT Dist. 7 - Tampa	E7L52_R1	2,200,000	01/18/20
Hillsborough Co Board of CC	Bid No. 6274,1	2,820,000	04/30/20
Hillsborough Co Board of CC	RFQ 5946,1	2,672,727	03/31/20
Manatee County	19-R070549CD	By PO	10/07/22
Pinellas County	189-0036-B(RO)	416,593	01/02/22
Pasco County	IFB-KW-19-219	672,000	TBD
Pasco County	IFB-PM-19-214	816,000	TBD
City of Jacksonville	Contract #10367	500,000	09/30/19
Town of Windermere	RFP #2018-05	By PO	01/10/22
City of St Augustine	PW2019-02	By PO	
City of Orlando	IFB-15-0290	By PO	07/19/19
Orange County	Contract Y18-740	231,739	
Orange County	Contract Y18-173A	1,595,675	07/26/20
Orange County	Contract Y18-1067-EB	632,900	09/03/20
	Option Year No. 1		09/03/20
Orange County	Y17-169-B	2,677,450	06/07/20
Orange County	Y17-1107-A	By PO	09/30/20
Broward County*	Y2114050B1	7,450,482	12/04/19
City of Boca Raton*	2017-004	1,566,470	09/30/20
Gainesville Regional Utilities	2018-105-C	As Needed	08/30/20
	2018-105-C First Amendment	As Needed	08/30/20
Village of Estero	RFB 2018-07	By PO	02/07/20
City of Leesburg	IFB 190251	By PO	04/08/22
JEA	FY-19	100,000	

Category / ID	Category	Year	Plate No.	VIN No.
<b>V100-200: Vactors &amp; Vac-cons</b>				
V116	Vac-con	1998	N2286P	1FDYN80F7WVA40395
V126	Vactor	2004	P0195B	2FZHATAK64AL76085
V127	Vactor	2005	N0265W	2FZHATDC05AN67474
V132	Vactor	2005	N0264W	2FZHATDC45AU85067
V134	Vactor	2006	N1715X	2FZHATDCX6AV69217
V136	Vac-con	2006	N1717X	1HTWHAAT86J253378
V137	Vactor	2006	N17V13X	1HTWGAZT86J293063
V141	Vactor	2006	N1716X	2FZHATDC46AW65909
V142	Vactor	2006	N9073Y	2FZHATDC06AW65910
V143	Vactor	2006	N2484Y	2FZHATDC76AW65421
V145	Vactor	2007	N9068Y	2FZHAZDE87AW65434
V146	Vactor	2007	N6V136R	2FZHAZDE07AW65766
V147	Vactor	2007	N9072Y	2FZHAZDE27AW65767
V149	Vactor	2006	N9071Y	2FZHAZDE56AW65714
V150	Vactor	2007	N9074Y	2FZHATDC87AX52875
V151	Vactor	2007	N9069Y	2FZHATDC67AX52874
V152	Vactor	2007	N9075Y	2FZHATDC07AX52658
V153	Vactor	2007	N4946Z	1HTWGAZT57J564811
V154	Vactor Mini	2009	KQVC73	1HTMMAAL89H145468
V156	Vactor Mini	2009	HQAZ76	1HTMMAALX9H145469
V157	Vac-Con	2002	N6487P	2FZHAZAS62AK52978
V161	Vac-Con	2005	N5827T	2FZHATDC65AU10385
V162	Vac-Con	2007	N2493Y	2FZAATDC07AX53293
V163	Vac-Con	1999	N1198U	2FZNRJBB0XAA81134
V165	Vac-Con	1999	N2488Y	2FZNRJBB7XAA81132
V166	Vactor	2009	NV1273Z	1M2AV04C69M003402
V167	Vactor	2006	N1529Y	2FZHAWDA96AV69273
V168	Vac-Con	2002	N1528Y	2FZHATAK72AJ59075
V169	Vactor	2012	NV1264Z	1FVHG3DV6CDBK4218
V170	Vactor	2007	N1518Y	1HTWYSBT07J399389
V171	Vactor	2007	N1517Y	1HTWYSBT97J399388
V172	Vactor	2007	N1519Y	1HTWYSBT97J399391
V173	Vac-con	2002	P0182B	2FZHATAKX2AJ84116
V174	Vactor	2007	N1501Y	1HTWYSBT67J396643
G175	Guzzler	2005	KMAM15	2FZHAZDE85AN80316
V176	Vac-Con	2002	N1502Y	2FZAATAK72AK14027
V177	Vac-Con	2002	P3793B	2FZHATAK32AJ53211
V178	Vac-Con	2015	NH6744	2NP3LI0X9FM266712
V179	Vac-Con	2017	NH6741	2N93LI0X5HM44912
V180	Vac-Con	2017	NH6742	2NP3LI0X7HM444913
V181	Vac-Con	2018	NH6743	2NP3LIQX3JM474786
V182	Vactor	2011	P5591A	1HTWNAZTXBJ334244
V183	Vac-Con	2012	P5592A	1FVHC3BS4CHBJ4249
V184	Vac-Con	2012	P5593A	1HTWPAZT9CJ601630
V185	Vac-Con	2015	P5594A	1FVHG3CY3FHGC7368
G186	Guzzler	2008	LQSC61	2FZHAZDE18AY47414
G187	Guzzler	2005		1HTWYSBT55J054095
V188	Vactor	2007	P3792B	1HTWGAZT17J399503
V189	Vac-con	2007	P3794B	1HTWHAAT37J422496
G190	Combo	2015		x1684
G191	Supersucker	2017		x7051
G192	Supersucker	1999		x7355
G193	Supersucker	2002		x9123
G194	Supersucker	2006		x1172
<b>C300: Camera Units</b>				
C301	Aries	2003	IVBI27	1FDXE45F23HB85626
C302	Aries	2000	DKMH81	1FDAF56F5YEB20852
C303	Aries	1998	LRVB14	1FDXE47F3WHB98130
C305	Aries	2006	KQUL24	1HTMMAAM76H239572

C306	Aries	2008	IUZV88	1FDXE45P38DA38836
C308	Aries	2008	2072IM	1FDWE45P68DB04081
C309	Aries	2008	GQPY54	1FDAF56R58ED86978
C310	Aries	2008	GQPY55	3FRWF65C68V668017
C311	Aries	2008	7612UC	1FDWE45P28DB52810
C319	Aries	1998	JSJI14	1FDXE47F4WHA70592
C320	Aries	1992	JSJI73	2GDHG31J7N4521889
C321	Cues	2012	KDLF92	1FDXE4FS7CDA05110
C322	Cues	2014	KDKT46	1FDXE4FS0EDB00790
C323	Envirosight	2016	Y14QZG	1FDXE4FS7GDC45828
C324	Envirosight	2016	LFKH92	1FTYE1CM7GKB39260
C325	Envirosight	2015	LFMP16	1FTNE2CM8FKA90240
C326	Envirosight	2016	LFMY09	1FTYR2CM8HKA44427
C327	RST Camera Truck	2007	FLD4604	1FDXE45S87DA05561
C328	RST Camera Truck	2017	JL2831	1FDUF4GT1HED81178
C329	RST Camera Truck	2012	FLD4603	1FDXE4FS8CDA62643
C330	Cues / Video / Seal	2005	Altair	Altair
C331	Cues / Video / Seal / Las	2006	Altair	Altair
C332	Aries	2012	Altair	Altair
C333	Cues / Cutter	2005	Altair	Altair
C334	Cues / Groute / Ranger	2015	Altair	Altair
C335	RST Camera Cube	2018	JAAM	

#### H400: Heavy Equipment

H401		2007	N9070Y	2FZHAZCV77AX37791
H402		1997	N6490P	1FDZS96T0VVA18608
H403		2001	N2486Y	2NPNLD9X21M565786
H404	Dump Truck	2009	P3761B	1XPXDB9X99D771141
H405	BACKHOE	2006	N/A	T0310GX952694
H406	Excavator	2006	N/A	FF01MBQ235957
H407	Excavator		N/A	03025A4AZ04954
H408	Forklift	2000	N/A	GLCO050TGNUE082
H409	Skid Steers	2012		
H410	Skid Steers	2016		
H411	Skid Steers	2016		
H412	Skid Steers	2017		
H413	Mini Excavator	2017		
H414	Excavator	2000		
H415		2008	N/A	
H416	Terrain Loader	2014	N/A	CAT0287DVHMT00261
H417	Midi Excavator	2014	N/A	CAT0308EJFX02203
H418	Midi Excavator	2015	N/A	CAT3055EAEJX00803
H419		2001	NH6740	2FZAASAK11AG97445
H420		2001	NH6745	49H67FBA61HH42387

#### E500: Off-Street Equipment

E501	Trailer	2003	838JJX	N0VIN0200499016
E502	Trailer	2004	GGPM23	4YNBN16294C022097
E503	Trailer	2005	DMGH75	4TOFB253551004307
E504	Trailer	2006	GGQP84	16HCB12116G081147
E505	Trailer	2005	LRYP15	5GLBE20225C000121
E506	Trailer	2001	GGQP85	1U9FS13191A044778
E507	Trailer	2006	GGQP83	16HGB28216G084895
E508	Trailer	2006	CJSE59	4TOFB182361000741
E509	Trailer	2007	8380UF	112HAN3087L073430
E510	Trailer	2010	ADSJ37	5RTBE2029AD018819
E511	Trailer	2000	IVBI28	112H5V326YL054432
E512	Trailer	2015	DNXA81	54GVC16T5F7015001
E513	Arrow Board	2008	GFBUE4	5F11S101381000561
E514	Arrow Board	2008	GFBZ20	511S101581000559
E515	Trailer	2018	IUXX01	7FYBE1211JD004093
E516	Trailer	2018	IVAC06	7FWBE1216J1002673
E517	Arrow Board	2018		5F11S1013J1000615



E518	Arrow Board	2018		5F11S1016J1000592
E519	Arrow Board	2002	JSJI70	5F11S101X21000225
E520		2014	N/A	
E521		2014	N/A	
E522		2008	N/A	JK1AFDD108B501431
E523		2018	N/A	259U52111A51132514
E524	Gator	2018	N/A	
E525		2018	N/A	
E526		2006	GFDD95	2.00604E+11
E527		2011	GFDD96	5892700
E528				B46B10310
E529	RST Camera Trailer	2006	AF95590	5LABE14276MO12813
E530	Trailer	2014	AF95588	54GVC20T8E7013238
E531	Trailer	2009	AF95585	5VGFDD20209L000105
E532	Trailer	2008	AF95586	5W0FB10188L000800
E533	Trailer	2018	AF95589	5WKBE2228J1055578
E534	Trailer	2005	AF95587	46UFU162351098737
E535	Trailer	2011	LFPG30	1TKU01629BM033678
E536	Water Pressure Trailer	2010		x1011
E537	Trailer	2016		x2149
E538	Trailer	2016		x3075
E539	Trailer	2016		x3076
E540	Trailer	2016		x3074
E541	Trailer	2018		x0484

#### P600: Pump Trucks

P601	Pump Truck	1995	N1564V	1HTSDAAN7SH678054
P602	Pump Truck	1999	N1563V	1HTGLAET2XH627327
P604	Pump Truck	1996	N9069U	1M2P267C5TM027456
P605	Pump Truck	1997	N9066U	1M2P267C5VM030540
P606	Pump Truck	1994	N9068U	1M2P264C9RM015792
P607	Pump Truck	1997	N9067U	1M2P267C0VM030221
P608	Pump Truck	1996	N9070U	2WKPDCJH5TK940470
P610	Pump Truck	1998	N7732W	1FUYDTDB1WL943552
P611	Pump Truck	2011	N4271X	1NPSXUEX1BD127491
P612	Pump Truck	2008	HTMH11	1HTWYAH18J573963
P613	Pump Truck	2007	HTMH10	1FUBA5CG77LZ16350
P614	Pump Truck	2007	ERIC77	1FUBA5CG17LY00478
P615	Pump Truck	2009	ERIC80	1HSHWAHN79J122683
P616	Pump Truck	2009	ERIC78	1HSHWAHN39J122678
P617	Pump Truck	2006	IUX32	1NKDLU0X26J129453
P618	Pump Truck	2004	P9606A	2FZHATDC24AM47917
P619	Pump Truck	2006	P9607A	2FZHATDC96AV69225
P620	Pump Truck	2003	P3759B	1M2AG12C03M004491
P621	Pump Truck	2006	P3765B	1XKDDU9X66J133446
P622	Pump Truck	2005	P3760B	3WKDAU8X55F084642
P623	Pump Truck	2006	P9050B	1NPALF0X76N633823
P624	Pump Truck	2007	P9051B	1NPALF0X37N657943
P625	Pump Truck	2004	P9053B	1NPALT0X84D817346
P626	Pump Truck	2004	P9052B	1NPALT0X94D812642
W627	Water Truck	2006		x8859

#### L700: Lining Equipment

L701	Trailer	2002	JSJI13	4XSPB16242G037248
L702	Trailer	2002	JSJI71	1C9EB132121305047
L703	Heat Exchange	1994	JSJI15	HRT446499408010HB
L704	Re-Rounded/Pipe Shifter	1987	JSJI74	1001
L705	Boiler Truck	2000	P7504A	2FZNCMDB0YAB48011
L706	Reefer Truck	2013	LBIG98	3ALACWDT5DDFD6557
L707	Boiler	1996	P2363C	2FUY3MCB4TA796641

#### S800-900: Support

## SECTION 00435

### 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.



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

Shoring and/or sloping

Total \$ \$2,000.00

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

Eduardo Barba  
Witness Printed Name

18001 Old Cutler Rd, #554  
Witness Address

10/15/19  
Date

  
Contractor's Signature

Julio Fojon  
Printed Name

President  
Title

10/15/19  
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

#### **Envirowaste Services Group, 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:

#### **Inflow/Infiltration (I/I) Program - Manhole Repairs Project No. 19-7101**

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 **Three Hundred Nine Thousand Five Hundred Dollars AND 00/100 (\$309,500.00)**.

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

\*\*\*\*\*

CONTRACTOR  
Party of the Second Part

WHEN THE CONTRACTOR IS AN INDIVIDUAL:

Signed, sealed and delivered in the presence of:

_____	_____ (SEAL)
(Witness)	(Signature of Individual)

_____	_____
(Witness)	(Signature of Individual)

\*\*\*\*\*

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

Signed, sealed and delivered in the presence of:

_____	_____
(Witness)	(Name of Firm)
_____	_____ (SEAL)
(Witness)	(Signature of Individual)

\*\*\*\*\*

WHEN THE CONTRACTOR IS A PARTNERSHIP:

_____	_____
(Witness)	(Name of Firm) a Partnership
_____	BY: _____ (SEAL)
(Witness)	(Partner)

\*\*\*\*\*

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 \_\_\_\_\_  
CINTYA RAMOS  
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 installation of:

**Inflow/Infiltration (I/I) Program – Manhole Repairs**

A copy of said Contract, No. 19-7101, 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

19-7101

Gravity Sewer System Condition Assessment and Renewal And Replacement (Inflow/Infiltration I/I) Program (Level 2) – Manhole Repairs

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 \_\_\_\_\_  
Cintya Ramos  
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 installation of the:

**Inflow/Infiltration (I/I) Program - Manhole Repairs, City Project 19-7101.**

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:

By \_\_\_\_\_  
Douglas R. Gonzales  
City Attorney

APPROVED AS TO FINANCE:

By \_\_\_\_\_  
Cintya Ramos  
Financial Services Department Director

- END OF SECTION -

ACORD.		CERTIFICATE OF LIABILITY INSURANCE			DATE (MM/DD/YY)	
PRODUCER		THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.				
		COMPANIES AFFORDING COVERAGE				
		COMPANY A				
INSURED		COMPANY B				
		COMPANY C				
		COMPANY D				
<b>COVERAGE</b> THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN. THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.						
CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
REQUIRED	<b>GENERAL LIABILITY</b> <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input type="checkbox"/> OCCUR				GENERAL AGGREGATE	\$300,000
					PRODUCTS-COMP/OP AGG	\$300,000
					PERSONAL & ADV INJURY	\$300,000
					EACH OCCURRENCE	\$300,000
					FIRE DAMAGE (ANY ONE FIRE)	\$50,000
					MED EXP (ANY ONE PERSON)	
REQUIRED	<b>AUTOMOBILE LIABILITY</b> <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS				COMBINED SINGLE LIMIT	\$100,000
					BODILY INJURY (PER PERSON)	\$
					BODILY INJURY (PER ACCIDENT)	\$
					PROPERTY DAMAGE	\$
	<b>GARAGE LIABILITY</b> <input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT	\$
					OTHER THAN AUTO ONLY:	
					EACH ACCIDENT	\$
					AGGREGATE	\$
	<b>EXCESS LIABILITY</b> <input type="checkbox"/> UMBRELLA FORM <input type="checkbox"/> OTHER THAN UMBRELLA FORM				EACH OCCURRENCE	\$
					AGGREGATE	\$
						\$
REQUIRED	<b>WORKER'S COMPENSATION AND EMPLOYERS' LIABILITY</b> THE PROPRIETOR / PARTNERS / EXECUTIVE OFFICERS ARE: <input type="checkbox"/> INCL <input type="checkbox"/> EXCL				STATUTORY LIMITS	
					EACH ACCIDENT	\$100,000
					DISEASE - POLICY LIMIT	\$500,000
					DISEASE - EACH EMPLOYEE	\$100,000
	OTHER					
DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS						
<b>City of Hollywood is named Additional Insured</b> (Required as shown)						
CERTIFICATE HOLDER			CANCELLATION			
City of Hollywood 2600 Hollywood Blvd. Hollywood, FL. 33020 (Required as shown)			SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.			
			AUTHORIZED REPRESENTATIVE			
ACORD 25-S (1/95)						
ATTENTION: DOLLAR LIMITS ARE SUBJECT TO CHANGE BASED UPON TYPE AND TOTAL COST OF SERVICES PROVIDED.						

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.

**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.

**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.

**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.

**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 01300 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 in order 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 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, in so far 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."

**10.4**                    **Notification and Claim for Change 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.**

**10.5**                    **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 ten (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 sixty (60) 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 ninety (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 ninety (90) days by the CITY or under an order of court or other public authority, or the CITY fails for sixty (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  
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**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 applicable 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:

Project No. 19-7101 Inflow/Infiltration (I/I) Program MANHOLE REPAIRS		
Major Milestones	Completion Time ( Calendar Days)	Liquidated Damages ( Per Day)
Substantial Completion	365	\$1,000.00
Project Closeout	395	\$1,000.00

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

**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 :

- Complete delivery of all ordered equipment and materials

(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.
- Coating touchup completed.
- 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 site work 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: (NOT APPLICABLE)

- 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 required.

#### **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.

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:

<u>Major Milestones</u>	CONSTRUCTION/STARTUP/ACCEPTANCE Completion Time (calendar days)	<u>Liquidated Damages</u> (Per Day)
1. Substantial Completion	365	\$1,000.00
2. Project Closeout	395	\$1,000.00

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 \$1,000.00/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 one (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 Support 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 of 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:**

**ENGINEER:**

**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.

---

<b>ENGINEER</b>	<b>BY</b>	<b>DATE</b>
-----------------	-----------	-------------

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<b>CONTRACTOR</b>	<b>BY</b>	<b>DATE</b>
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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

ADDENDUM

See attachment

- END OF SECTION -



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

1621 N. 14<sup>th</sup> Avenue  
Hollywood, FL 33019  
Phone (954) 921-3930 Fax (954) 921-3258

**ADDENDUM NUMBER 1**

Date: **September 24, 2019**

FOR: **Inflow/Infiltration (I/I) Program – Manhole Repairs**

FILE NUMBER: **19-7101**

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 2019. The bidder shall coordinate all modifications herein with all trades and disciplines related to the work. The Bidder shall acknowledge receipt of this addendum on the Bid Form by addendum number and date. Failure to do so may subject Bidder to disqualification.

**Item 1: Pre-Bid Meeting Minutes & Attendance Record**

See attached pre-bid meeting minutes and attendance record.

**Item 2: In the Technical Specifications**

Section 02755 page 2, section 2.01 Paragraph # 3:

**REPLACE** " Product shall be PERMACAST MS-10,000 with CON-SHIELD as manufactured by AP/M Permaform or SewperCoat as manufactured by Lafarge Calcium Aluminates" with the following:

"Product shall be SewperCoat as manufactured by Lafarge Calcium Aluminates, NO SUBSTITUTION".

**Item 3: Manhole inspection form and work order form**

See attached Manhole inspection form and work order.



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

1621 N. 14<sup>th</sup> Avenue  
Hollywood, FL 33019  
Phone (954) 921-3930 Fax (954) 921-3258

**ADDENDUM NUMBER 1**

**Item 4: Manhole Basin inspection maps**

See attached Manhole Basin maps.

**Item 5: Pre bid meeting questions**

Question 1: Where are the manholes for this project?

*Response:* See attached manhole basin maps. All manholes for this project are on streets and alleys.

Question 2: What is the manhole lining product approved in the City of Hollywood?


*Response:* Product shall be SewperCoat as manufactured by Lafarge Calcium Aluminates, NO SUBSTITUTION.

Question 3: What items are included in item # 19?

*Response:* Any work as directed by Engineer and approved by the City of Hollywood due to undefined conditions.

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.

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



**City of Hollywood  
Department of Public Utilities**






**Pre Bid Meeting Attendance Record**

Project Name: **Inflow/Infiltration (I/I) Program Manhole Repairs**

Project No.: **19-7101**

Engineer:

Date: September 18, 2019

No.	Firm Name & Address (Street Address)	Name of Individual Recipient Telephone No., Fax No., and Email Address of Firm	Signature
1	<del>Daguy Rodriguez</del> 15551 Okeechobee Blvd Loxahatchee FL 33470 <del>Hector Meneses</del> Home Contractors 12302 Sammuss Road Wellington, FL 33411	813 4800596 Daguy@numcc.com Bjdrag@numcc.com <del>Hector Meneses</del> 305-720-6297 hmeneses@forceentopias.net	 
2	Wellington, FL 33411	Mike Prado	
3	Voetex Services 110200 US Hwy 92 E Tampa, FL 33610	813 480 0876 mprado@voetexcompanies.com	
4	Foster Marine Contractors, Inc. 3180 Fairlane Farms Rd. Suite 1 Wellington, FL 33414	Jun Homedia 561-683-0034 bids@foster-marine.net jun@foster-marine.net	
5	Hunterwood Group, Inc 250 W. Blue Heron Blvd. Purviser Beach, FL 33404	Chase Rogers 561-543-7680 C.Rogers@Hunterwoodgroup.com	



**City of Hollywood  
Department of Public Utilities**

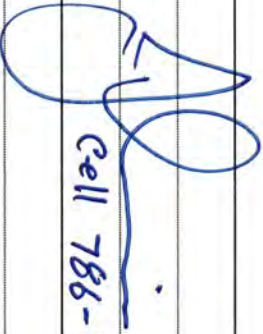

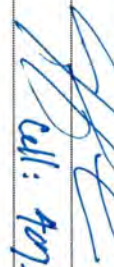

**Pre Bid Meeting Attendance Record**

Project Name: **Inflow/Infiltration (I/I) Program Manhole Repairs**

Project No.: **19-7101**

Engineer:

Date: September 18, 2019

No.	Firm Name & Address (Street Address)	Name of Individual Recipient Telephone No., Fax No., and Email Address of Firm	Signature
6	HETA Express Inc.	Ph. 305-885-1330	
	9390 NW 109 St	Fax 305-885-1327	
	MEDLEY FL 33178	Jorge@HETEXPRESSCORP.COM	
7	Utility Innovations	Eric M. Roberts	
	307 167th Blvd NE	941-725-2123	
	Brookton FL 34412	em@erobertsutilityinnovations.com 941-725-2123	
8	Intracounty Engineers	Templeman/Mike Sweeney	
	1928 NW 18th Street	954-972-9820	
	Pompano Beach, FL 33069	bids@rcenvironmental.com	
9	EnviroWaste Services Group Inc	Zeferino Betancourt	
	18001 Old Cutler Rd Suite 554	305-637-9665 office Cell 7865274831	
	Palmetto Bay, FL 33157	Zefbetancourt@ewsg.com	
10			



**CITY OF HOLLYWOOD**  
**Department of Public Utilities**  
**Engineering & Construction Services Division**

**Inflow / Infiltration – (I/I) Program – Manhole Repairs**

**Project No. 17-7086**  
**Pre-Bid Conference Minutes**

**December 20, 2017 @ 10:00 AM**

**1. Introduction:**

The City of Hollywood is the owner and operator of the sanitary sewer system. Engineering and Construction Services Division (ECSD) will provide the overall contract and construction administration of the project.

**2. Scope of Project:**

The project consists of furnishing all labor, materials and equipment for performing manhole repairs and replacements. Quantities provided in the Proposal Bid forms are approximate only; the amount of work to be done maybe more or less than the provided quantities. Bidders are required to provide the unit prices for each and all line items; failure to provide the line items information shall render the entire bid package non-responsive.

Line items 9 to 14 - Cementitious Manhole Liner

This item of work will be measured and paid at the unit price per vertical foot of manhole wall. Measurement will be made from the bench, at its highest point, to the bottom of of the frame. Payment of the unit price per vertical foot will provide compensation for cleaning the wall; furnishing and supplying of all materials or combination of materials making up the cementitious lining and applying them; furnishing and applying an aromatic urethane sealant to the portion of the cone and the manhole ring; manufacturer's representative's presence or assistance if required; isolation of the manhole by plugging entering lines; testing labor, tools and equipment; and all incidentals necessary to obtain a watertight, sealed manhole wall and bench complete.

Bypass pumping , the contractor shall attempt to perform manhole repair work without bypass pumping. However, if, in the opinion of the owner bypass pumping is necessary, it will be identified as payment item.

Traffic control measures to be included in the price stipulated for all the unit pay items listed under this contract shall include standard traffic cones and up to 10 barricades and 10 advance warning and/or detour signs. No separate payment shall be made for such traffic control measures. The contractor shall advise the owner in advance in the event that additional measures are deemed necessary.



### 3. Bidding Document Description:

- Bidding Contract Document Package – Documents on-line [www.hollywoodfl.org](http://www.hollywoodfl.org)
- Bidding Package (***submit this complete package and two copies***)
  - Proposal
  - Proposal Bid Form
  - Approved Bid Bond (10%)
  - Information Required From Bidders and a List of Subcontractors
  - Trench Safety Form
  - List of subcontractors and/or material suppliers
- Bid Award based upon the sum of the Base Bid
- Construction Cost Estimate: **\$360,000.00**

### 4. General Comments:

- Upon receipt of any work order, the contractor shall evaluate the work site and determine whether any foreseeable item of expense is not covered by a pay item under this contract, the contractor shall notify the owner of this fact prior to initiation of the associated work and shall await authorization to proceed. In the event that no such prior notification is made and no such prior authorization is received, the contractor will not be paid for the expense(s) in question. No after-the fact change orders will be considered or approved.
- Answers to technical questions, minutes for the pre-bid conference, etc. will be addressed in writing via addendum.
- The qualification of the Manhole Rehabilitation Contractor shall be submitted prior to contract award. See Section 02753 of contract documents.
- Bid opening is planned for January. 25, 2018. Bids must be received at the City Clerk's Office (2600 Hollywood Blvd., Room 221 Hollywood, FL 33020) by 10:00 AM and will be opened publicly in the Department of Public Utilities, ECSD Conference Room at 1621 N. 14<sup>th</sup> Ave., Building A, Hollywood, FL at 11:00 AM.

### 5. Key Concerns:

- Coordination with the City (ECSD) and with other contracts
- Maintenance of Traffic : Contractor's responsibility if required
- Project Working Hours : 7:30 AM to 4:00 PM , Monday to Friday. Advance approval is required for work outside standard hours
- Nearby Residents : Notification of the residents is required prior to work on site
- Permitting : Contractor's responsibility if required

**6. Completion Time:**

Substantial Completion: **365 calendar days**

**7. Contractor Questions / Comments:**

- **Question #1:** Basis of Performance and Payment Bonds?
- **Response #1:**  
The Contractor has to furnish necessary bonds equal to one hundred (100) percent of the total Contract base bid.
  
- **Question #2:** Why is Sewpercoat the only manhole liner?
- **Response #2:**  
Sewpercoat has been widely used by the COH for many years and in several manhole rehabilitation projects. Sewpercoat is the preferred coating system as requested by the COH Underground Utilities Division. Underground Utilities Division is the Operation and Maintenance Division; they are the keepers of the sewer collection system and they requested to continue the use of sewpercoat for all manhole rehabilitation work within the COH. ECSD as the engineering branch for the Dept. of Public Utilities agrees with Underground Utilities Division.
  
- **Question #3:** What needs to be done to have other products to be added to the list of acceptable manhole liner?
- **Response #3:**  
For this project, there will be no other products to be added in the list of acceptable manhole liner. For future projects, ECSD staff will discuss with Operation & Maintenance Division the possibilities and technical merits for considering other manhole liner products.
  
- **Question #4:** When will be the Addendum & sign in sheet be available?
- **Response #4:**  
An Addendum will be issued one week before Bid due date.
  
- **Question #5:** What is the thickness of the cementitious liner in the MH?
- **Response #5:**  
The thickness is 1 inch.
  
- **Question #6:** How will you inspect the 1 inch thickness of the cementitious liner in the MH?
- **Response #6:**  
The contractor has to leave a spot where, the inspector can confirm the thickness of the cementitious liner, and then finished.

**8. Site Inspection: N/A**

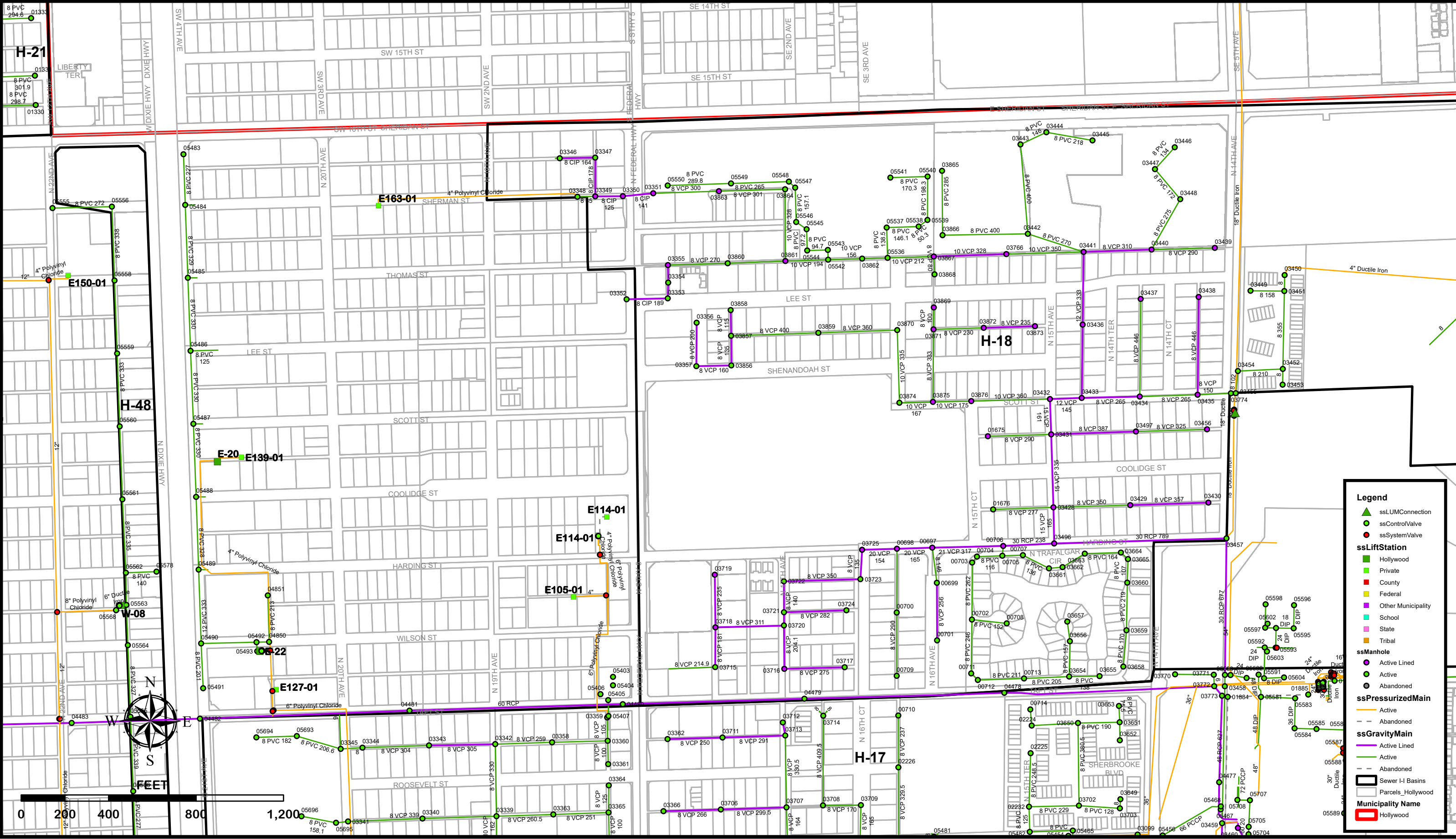
**9. Additional information (See Attached)**

- **Manhole Inspection Form**



# City of Hollywood

## Sanitary Sewer I/I Basin H-18 Location Map







CITY OF HOLLYWOOD, FLORIDA  
DEPARTMENT OF PUBLIC UTILITIES  
ENGINEERING & CONSTRUCTION SERVICES DIVISION  
/I Reduction Program – Manhole Inspection Form

Crew Leader: \_\_\_\_\_ Date: \_\_\_\_ Area: \_\_\_\_\_ MH: \_\_\_\_\_

Weather: Dry / Rain Ground Condition: Dry / Moist / Saturated

Cannot Locate: \_\_\_\_\_ Buried: \_\_\_\_\_ Not a MH: \_\_\_\_\_ Surcharged: \_\_\_\_\_ Subject to Ponding: \_\_\_\_\_

Frame Opening (in.): \_\_\_\_\_ Depth (ft.): \_\_\_\_\_ Wall Dia. (in.): \_\_\_\_\_ Surch. Evid. (ft): \_\_\_\_\_

Address: \_\_\_\_\_

Location Remark: \_\_\_\_\_

MH Surface: Asph Conc. Unpv. Curb Sdwk Drive Fyard Syard Byard Field Woods

Traffic Type: None 1/2 Lne 1/2 Lne Hwy Allev Parking Other Traffic Volume: None Light Med Heavy

Cover Type: Solid Vent Pick Missing Cover Condition: OK Loose Cracked No Gsk N/A

Frame Condition: OK Cracked Brkn Offset Detr Other MH Insert Condition: OK Cracked Missing None

Frame Seal Const.: Conc Rubber Mastic Other None Frame Seal Condition: OK Cracked Leaks N/A

Chimney Const.: Prest Brck Fiber Other None Chimney Condition: OK Cracked Holes Leaks N/A

Cone Const.: Prest Brck Fiber Other None Cone Condition: OK Cracked Holes Leaks N/A

Cone Shape: Conc Ecc Other None Roots Condition: None Light Med Heavy

Wall Construction: Prest Brick Fiber Other None Wall Condition: OK Cracked Holes Leaks N/A

Step Construction: Metal C1 Missing Other None Step Condition: OK Unsafe N/A

Bench Construction: Prest Brck Conc Other None Bench Condition: OK Cracked Holes Leaks N/A

Channel Construction: Clay Brck Conc Other None Channel Condition: OK Cracked Holes Leaks N/A

Channel Deposition: None Sand Rock Debris Other Channel Hydraulics: Good Fair Poor

MH Pipe Conn: OK Cracked Holes Leaks Detr Overall MH Condition: Good Fair Poor

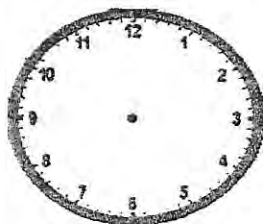
Outgoing Line Length (ft): \_\_\_\_\_

Rehabilitation:	Code	I/I (gpm)	I/I Indications			Area	Code	I/I (gpm)	I/I Indications			Area
(DRY=Dry/No Stains)			Dry	Stain	Flow				Dry	Stain	Flow	
(STAIN=Dry/Stains)			Dry	Stain	Flow				Dry	Stain	Flow	
(FLOW=Active I/I)			Dry	Stain	Flow				Dry	Stain	Flow	

Line	Line Type					Material					Dia.	Dpth	Dir.*	Conn. MH			
1	Out					Clay	PVC	Iron	Liner	Other							
2	In	Overfl.	Lat.	Drop	Other	Clay	PVC	Iron	Liner	Other							
3	In	Overfl.	Lat.	Drop	Other	Clay	PVC	Iron	Liner	Other							
4	In	Overfl.	Lat.	Drop	Other	Clay	PVC	Iron	Liner	Other							
5	In	Overfl.	Lat.	Drop	Other	Clay	PVC	Iron	Liner	Other							
6	In	Overfl.	Lat.	Drop	Other	Clay	PVC	Iron	Liner	Other							

\* Direction (Dir) is O'Clock Position from North

Schematic:



Remarks:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**City Of Hollywood, Florida**

DEPARTMENT OF PUBLIC UTILITIES  
Engineering & Construction Services Division

# WORK TICKET

Contractor:

Contract Number:

ECSD No.:

System Owner:

Release Order Number:

WO #	Lot Number	Issued	Map No.	Basin	Segment	Address		
Cross Street		Location Comments		Gnd Cover		Traffic Type	Traffic Vol.	Exist. Line Material
Length	Est. Depth (ft)	Dn depth(ft)	Dia. (in)	DVD No.	Index	Est. Dist. (ft)	Defect	
Infilt. (gpm)		Recommended Repair				Issuance Remarks		
Fold and Form Liner:		Depth(ft)	Dia. (in)	Length (ft)	Thickness(mm)	# Lats. Reinstated		EasementAccess
Cured in place Liner		Depth(ft)	Dia. (in)	Length (ft)	Thickness(mm)	Easement Access <input type="checkbox"/> ≤ 12" or <input type="checkbox"/> > 12"		# Lats. Reinstated
Sectional Liner		Distance (ft)	Depth(ft)	Dia. (in)	Length (ft)	SVC Reopened (each)		Fuse on Saddle (each)
Test/ Grout		Length (ft)	Dia. (in)	Gallons	Joints tested	Joints sealed		Lateral Grouted
Line Replacement		New material <input type="checkbox"/> DI or <input type="checkbox"/> PVC	Depth(ft)	Dia. (in)	Length (ft)	# Lats. Reinstated		
T - Liner Repair		4" liner up to 25 feet (ea)	6" liner up to 25 feet (ea)	Liner in excess of 25 feet (lf)	Trans. From 6" to 4" line	Coating Removal (ea)		Esmt Access (ea)
Point repair		# of Point Repairs	Depth(ft)	Dia. (in)	Paved? <input type="checkbox"/> Yes or <input type="checkbox"/> No	C/O ( grass) Install and Located (EA)		C/O (road) Install and Located (EA)
Manhole Repairs		Replace Frame and Cover <input type="checkbox"/>		Seal Wall/ Base Junction <input type="checkbox"/>		Install MH Cover Insert <input type="checkbox"/>		
		AGRU MH liner <input type="checkbox"/>		Seal Frame/ Wall Junction <input type="checkbox"/>		Realign and Grout Casting ( Street) <input type="checkbox"/>		
		Seal pipe Entering MH <input type="checkbox"/>		Internal Manhole Joint seal <input type="checkbox"/>		Realign and Grout Casting ( easment) <input type="checkbox"/>		
		Cementitious MH (vf)::	Permacast (vf)	<input type="checkbox"/> Cementitious <input type="checkbox"/> Urethane	Replace MH (vf)	Fiberglass MH 48" <input type="checkbox"/> 60"		
Bypass Pumping		Distance (ft)	Dia. (in)	Duration (hours)	Each	Overlay (Sy)		
Surface Restoration		Asph. Road (sy)	Asph. Drive (sy)	Conc. Road (sy)	Conc. Drive (sy)	Conc. Curb./ Gut (sy)		Sod (sf)
								Fence (ft)
Laterals		Line lenth (ft)	Point repair Depth (ft)	Replace cleanout cover <input type="checkbox"/> Replace Riser and Cover <input type="checkbox"/>		Concrete CO Encasement <input type="checkbox"/> Install CO Riser and Plug <input type="checkbox"/>		
Traffic Control		# of Flagmen		# of Arrow Board	# of Barricades		# of Lane Dividers:	
Root Removal and TV		Root Removal (ft)	Root Removal Dia (in)	Pre TV (lf)	Post TV (ft)	Svc-TV (ea)		Svc TV > 20 (lf)
Pipe Bursting		Length (ft)	Diameter (in)	Depth (ft)	Dia. Incr.: <input type="checkbox"/> Yes New Dia.:	# Lats. Reinstated		# Lats. Bursted
Date Repair Completed: ____/____/____		Pre Tape		Pre Index	Post tape		Post Index	
Repair commets:								
The quantities Above Accurately Reflects This repair								
<div style="display: flex; justify-content: space-between;"> <div>_____</div> <div>_____</div> </div>								
<div style="display: flex; justify-content: space-between;"> <div>Contractor</div> <div>Date</div> </div>								
Project Representative								





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

1621 N. 14<sup>th</sup> Avenue  
Hollywood, FL 33019  
Phone (954) 921-3930 Fax (954) 921-3258

**ADDENDUM NUMBER     2**

Date: **October 10, 2019**

FOR: **Inflow/Infiltration (I/I) Program – Manhole Repairs**

FILE NUMBER:     **19-7101**

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 December 2017. The bidder shall coordinate all modifications herein with all trades and disciplines related to the work. The Bidder shall acknowledge receipt of this addendum on the Bid Form by addendum number and date. Failure to do so may subject Bidder to disqualification.

**Item 1:    Bidder Questions Submitted**

Question 1: Can you send me a copy of the sign in sheet?

*Response:* Refer to addendum No. 1

Question 2: What is the manhole lining product approved in the City of Hollywood?

*Response:* Product shall be SewperCoat as manufactured by Lafarge Calcium Aluminates, NO SUBSTITUTION.

Question 3: Can you send the prior bid tabs for inflow/infiltration (I/I) Program –Manhole Repairs?

*Response:* The prior Bid Tabulation for the most recent inflow/infiltration (I/I) Program – Manhole Repairs, Project No. 7086, is attached.





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

1621 N. 14<sup>th</sup> Avenue  
Hollywood, FL 33019  
Phone (954) 921-3930 Fax (954) 921-3258

**ADDENDUM NUMBER 2**

Question 4: Is the estimate based on previous street access manholes?

*Response:* Yes, the project estimate is based on previous street manholes.

Question 5: We are an LLC. Can we sign all documents as a Corporation?

*Response:* Yes, you have to sign all documents as a Corporation.

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.

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

BID TABULATION

Project Name: Inflow /Infiltration (I/I) Program - Manhole Repairs

Project No: 17-7086

No.	Description	Qty	Units
1	Realign, grout and seal manhole casting (In street)	10	EA
2	Realign, grout and seal manhole casting (In rear-yard easement)	10	EA
3	Seal visible infiltration through manhole walls, bench and, invert (brick manhole)	10	EA
4	Seal visible infiltration through manhole walls, bench and, invert (concrete manhole).	15	EA
5	Repair manhole bench and, invert	20	EA
6	Replace manhole bench and, invert	50	EA
7	Replace standard manhole frame and cover and, install seal.	10	EA
8	Replace watertight manhole frame and, cover and install seal.	10	EA
9	Install cementitious manhole liner for precast 4 - feet diameter manhole (In street)	100	V.F.
10	Install cementitious manhole liner for precast 4 - feet diameter manhole (In rear-yard easement)	150	V.F.
11	Install cementitious manhole liner for brick 4 - feet diameter manhole (In street)	100	V.F.
12	Install cementitious manhole liner for brick 4 - feet diameter manhole (In rear-yard easement)	150	V.F.
13	Install cementitious manhole liner for precast 5 - feet diameter manhole (In street)	50	V.F.
14	Install cementitious manhole liner for brick 5 - feet diameter manhole (In street)	50	V.F.
15	Install cementitious manhole liner for precast 6- feet diameter manhole (In street)	50	V.F.
16	Install cementitious manhole liner for brick 6 - feet diameter manhole (In street)	50	V.F.
17	Manhole Inspection Report	500	EA
18	Reinstall tack weld of manhole cover	10	EA
19	Undefined Allowance, cost allowance for work as directed by Engineer and upon authorization by the City of Hollywood Director of Public Utilities due to undefined conditions.	1	L.S.

TV Diversified, LLC	
Unit Price	Total
750	7,500.00
650	6,500.00
200	2,000.00
125	1,875.00
150	3,000.00
300	15,000.00
1000	10,000.00
1350	13,500.00
180	18,000.00
225	33,750.00
180	18,000.00
225	33,750.00
200	10,000.00
200	10,000.00
215	10,750.00
215	10,750.00
50	25,000.00
200	2,000.00
\$100,000.00	100,000.00

TOTAL 331,375.00

MAXX ENVIRONMENTAL, LLC	
Unit Price	Total
850	8,500.00
900	9,000.00
50	500.00
50	750.00
200	4,000.00
300	15,000.00
1000	10,000.00
1200	12,000.00
170	17,000.00
230	34,500.00
190	19,000.00
240	36,000.00
190	9,500.00
220	11,000.00
230	11,500.00
240	12,000.00
40	20,000.00
150	1,500.00
\$100,000.00	100,000.00

TOTAL 331,750.00

VACVISION ENVIRONMENTAL, LLC	
Unit Price	Total
1000	10,000.00
750	7,500.00
100	1,000.00
100	1,500.00
300	6,000.00
750	37,500.00
1400	14,000.00
1600	16,000.00
145	14,500.00
145	21,750.00
145	14,500.00
145	21,750.00
190	9,500.00
190	9,500.00
230	11,500.00
230	11,500.00
50	25,000.00
200	2,000.00
\$100,000.00	\$100,000.00

TOTAL 335,000.00

National Water Main Cleaning Co.	
Unit Price	Total
750	7,500.00
850	8,500.00
225	2,250.00
225	3,375.00
175	3,500.00
345	17,250.00
825	8,250.00
1195	11,950.00
225	22,500.00
290	43,500.00
120	12,000.00
185	27,750.00
270.5	13,525.00
160	8,000.00
360	18,000.00
220	11,000.00
115	57,500.00
25	250.00
\$100,000.00	100,000.00

TOTAL 376,600.00

Intercounty Engineering, Inc	
Unit Price	Total
1300	13,000.00
1000	10,000.00
350	3,500.00
350	5,250.00
210	4,200.00
420	21,000.00
1250	12,500.00
1600	16,000.00
318	31,800.00
363	54,450.00
382	38,200.00
427	64,050.00
477	23,850.00
573	28,650.00
636	31,800.00
764	38,200.00
60	30,000.00
250	2,500.00
\$100,000.00	100,000.00

TOTAL 528,950.00

AVERAGE	
Unit Price	Total
930	9,300.00
830	8,300.00
185	1,850.00
170	2,550.00
207	4,140.00
423	21,150.00
1095	10,950.00
1389	13,890.00
207.6	20,760.00
250.6	37,590.00
203.4	20,340.00
244.4	36,660.00
265.5	13,275.00
268.6	13,430.00
334.2	16,710.00
333.8	16,690.00
63	31,500.00
165	1,650.00
100000	100,000.00

TOTAL 380,735.00

*DIVISION 1*

## SECTION 01010 – SUMMARY OF WORK

### PART 1 --GENERAL

#### 1.01 GENERAL

- 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 OWNER.
- B. The term "OWNER" as used throughout these contract documents shall mean the actual Owner or a third-party representative who may be designated by the Owner to take responsibility for various functions under this contract.

#### 1.02 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Project consists of furnishing all labor, materials and equipment for performing manhole repairs.
  - 1. Manhole Repairs: Provide manhole inspection reports, replacing manhole frames and covers and performing other miscellaneous manhole repairs, installing cementitious manhole liner, and bypass pumping.
- B. Prior to manhole rehabilitation, the CONTRACTOR shall perform manhole inspections with the OWNER's representative. All manhole inspections must be performed in strict coordination with the OWNER's representative. The CONTRACTOR and OWNER's representative shall inspect each manhole together and the CONTRACTOR must provide the information in the manhole inspection form to be submitted to the OWNER. Both, the CONTRACTOR and the OWNER's representative must sign off within the "Remarks" field in every manhole inspection form.
- C. Prior to manhole rehabilitation, the CONTRACTOR shall coordinate with the OWNER's representative regarding the rehabilitation work to be performed in each manhole. Both, the CONTRACTOR and the OWNER's representative must concur on the extent of the rehabilitation work to be done. After completion of work, the CONTRACTOR must indicate all work performed, sign off, and provide additional comments as necessary in the work tickets. CONTRACTOR shall submit a CD of pre and post photos of manholes and associated work performed in each manhole with the request for payment.

- D. Prior to construction, the CONTRACTOR shall identify existing utilities. The CONTRACTOR will be responsible for the coordination of his work with the associated utility owner and permitting agencies having jurisdiction over the specific locations to be verified.

Repairs shall be continuously generated under individual work orders during the contract period as the results of the ongoing sewer system evaluation survey become available. Work orders of the Project will be issued to the CONTRACTOR in the order in which the OWNER wishes the manholes repaired. The CONTRACTOR shall view the available video inspection tapes to familiarize himself with the pipe condition. The groups shall be worked upon and completed in the order they are issued, and the work of a given group of work orders shall be completed, prior to beginning the work of a subsequent group of work orders, unless otherwise specifically permitted by the OWNER. A work order will consist of a single repair of a sewer element.

- E. Upon receipt of any work order, the CONTRACTOR shall evaluate the work site and determine whether any foreseeable item of expense is not covered by a pay item under this contract. If the CONTRACTOR determines that any foreseeable item of expense is not covered by a pay item under this contract, the CONTRACTOR shall notify the OWNER of this fact prior to initiation of the associated work and shall await authorization to proceed. In the event that no such prior notification is made and no such prior authorization is received, the CONTRACTOR will not be paid for the expense(s) in question. No after-the-fact change orders will be considered or approved.
- F. The Work also includes providing temporary sanitary sewer service of service laterals, bypass pumping or plugging, if needed, and other appurtenant and miscellaneous items and work for a completed project.
- G. Work shall be performed to ensure a minimum of traffic disruption or sewer down time as necessary, and work must be coordinated with affected residents and utility personnel. Whenever the property owners' use of the sanitary sewer must be interrupted by the Work, the CONTRACTOR shall notify the residents well in advance of the interruption. This notification shall be accomplished with door hanger notification cards to be placed at the addresses of affected customers. Property owners shall be informed when service interruption will take place and the approximate duration. This notice shall be provided a minimum of 24 hours in advance of commencement of service interruption, unless otherwise specified. The CONTRACTOR shall make every effort to minimize inconvenience to the public and property owners.
- H. The CONTRACTOR shall perform all work in strict accordance with all applicable OSHA Standards. Particular attention is drawn to those safety requirements involving man entry in confined spaces. Prior to entering manholes and other confined spaces, the atmosphere shall be evaluated by the CONTRACTOR to determine the presence of toxic, flammable or explosive vapors or lack of oxygen in accordance with local, state, or federal safety regulations. CONTRACTOR shall follow all procedures outlined by OSHA's Confined Space Entry requirements.

- I. It is the intent of the OWNER to select and retain contractors to perform wastewater collection system rehabilitation services. The contractors will be selected based upon qualifications, cost, technologies and their ability to perform the required services during the stipulated contract period.
- J. The CONTRACTOR shall warrant to the OWNER that the equipment used on this Contract where covered by patents or license agreements is furnished in accordance with such agreements and that the prices included herein cover all applicable royalties and fees in accordance with such license agreements. The CONTRACTOR shall defend, indemnify and hold the OWNER harmless from and against any and all costs, loss, damage or expense arising out of or in any way connected with any claim of infringement of patent, trademark or violation of license agreement.
- K. As the results of the ongoing sewer system evaluation survey become available, specific collection system rehabilitation work orders will be developed for the technologies and remedial construction services in this proposal. The OWNER reserves the right to select the technology and scope of work for each work order. Contractor unit prices established under this selection process will determine the total cost of each work order.
- L. In the event that an Alternate Bid is awarded, The CONTRACTOR shall be required to prioritize the work describe under the "Sewer main cleaning and TV inspection" line item(s) of the Alternate Bid by performing the preliminary cleaning and TV inspection in conjunction with items related to the Base Bid. The OWNER reserves the right to require the CONTRACTOR to submit the completed "Sewer main Cleaning and TV inspection" reports of the alternate bid ninety (90) days prior to completion of the scope of work of the base bid.

### 1.03 WORK BY OTHERS

- A. The CONTRACTOR's attention is directed to the fact that work may be conducted at the sites 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 sites, as required to perform their respective contracts.
- B. 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 OWNER 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 contract, such privilege of access or any other reasonable privilege may be granted by the OWNER to the CONTRACTOR so desiring, to the extent, amount, in the manner, and at the times permitted. No such decision as to the method or time of conducting the Work or the use of territory shall be made the basis of any claim for delay or damage.

- C. Interference With Work on Utilities: The CONTRACTOR shall cooperate fully with all utility forces of the OWNER or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of 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 other rearranging of facilities.

#### 1.04 FIELD LAYOUT OF WORK

- A. All work under this Contract shall be constructed in accordance with the requirements of each work order or as directed by the OWNER. Information provided concerning existing ground, structures and appurtenances is believed to be reasonably correct but not guaranteed to be absolute and therefore is presented only as an approximation. Any error or apparent discrepancy in the data shown or omissions of data required for accurately accomplishing the work shall be referred immediately to the OWNER for interpretation or correction.
- B. All survey work for construction control purposes shall be made by the CONTRACTOR at his expense. The CONTRACTOR shall establish all base lines for the location of the principal component parts of the work together with bench marks and batter boards adjacent to the work. Based upon the information provided, the CONTRACTOR shall develop and make all detail surveys necessary for construction. The OWNER will furnish information and location of existing bench marks.
- C. The CONTRACTOR shall have the responsibility to carefully preserve the bench marks, reference points and stakes. In case of destruction thereof by the CONTRACTOR or resulting from his negligence, he shall be held liable for any expense and damage resulting there from and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such bench marks, reference points and stakes.
- D. Existing or new control points, property markers, and monuments that will be established or are destroyed during the normal causes of construction shall be re-established by the CONTRACTOR; and all reference ties recorded therefore shall be furnished to the OWNER. All computations necessary to establish the exact position of the work shall be made and preserved by the CONTRACTOR.
- E. The OWNER may check all or any portion of the work, and the CONTRACTOR shall afford all necessary assistance to the OWNER in carrying out such checks. Any necessary corrections to the work shall be performed immediately by the CONTRACTOR.

#### 1.05 CONTRACTOR USE OF PROJECT SITE

- A. The CONTRACTOR's use of the project site shall be limited to its construction operations, including on-site storage of materials, on-site fabrication facilities, and field offices as applicable. Off-site storage of materials, if required, shall be arranged for by the CONTRACTOR and a copy of an agreement for use of other property shall be furnished to the OWNER.

#### 1.06 OWNER USE OF THE PROJECT SITE

- A. The OWNER may utilize all or part of the existing facilities during the entire period of construction for the conduct of the OWNER's normal operations. The CONTRACTOR shall cooperate with the OWNER to minimize interference with the CONTRACTOR's operations and to facilitate the OWNER's operations.

#### 1.07 PARTIAL UTILIZATION OF THE WORK BY OWNER

- A. The CONTRACTOR is hereby advised that the OWNER may accept the responsibility for the maintenance and protection of a specific portion of the project if utilized prior to completion. However, the CONTRACTOR shall retain full responsibility for satisfactory operation of the total project.

#### 1.08 PROJECT MEETINGS

- A. Preconstruction Conference: Prior to the commencement of Work at the site, a preconstruction conference will be held at a mutually agreed time and place which shall be attended by the CONTRACTOR, its superintendent, and its subcontractors as appropriate. Other attendees will be:
  - 1. Representatives of OWNER.
  - 2. Governmental representatives as appropriate.
  - 3. Others as requested by CONTRACTOR or OWNER.
  - 4. Unless previously submitted to the OWNER, the CONTRACTOR shall bring to the conference one copy each of the following:
    - a. Preliminary schedule.
    - b. Preliminary procurement schedule of major equipment and materials and items requiring long lead time.
    - c. Preliminary Shop Drawing / Sample / Substitute or "Or Equal" submittal schedule.
    - d. Schedule of Payment Items (lump sum price breakdown) for progress payment purposes.
    - e. Traffic Maintenance Plan
  - 5. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established.



6. The agenda will include:
  - a. CONTRACTOR's tentative schedules.
  - b. Transmittal, review, and distribution of CONTRACTOR's submittals.
  - c. Processing applications for payment.
  - d. Maintaining record documents.
  - e. Critical work sequencing.
  - f. Field decisions and Change Orders.
  - g. Use of project site, office and storage areas, security, housekeeping, the OWNER's needs.
  - h. Major equipment deliveries and priorities.
  - i. CONTRACTOR's assignments for safety and first aid.
7. The OWNER will preside at the preconstruction conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

B. Progress Meetings: The OWNER will schedule monthly progress meetings. The CONTRACTOR and OWNER, and all subcontractors active on the site shall be represented at each meeting. CONTRACTOR may at its discretion request attendance by representatives of its suppliers, manufacturers, and other subcontractors.

C. The OWNER will preside at the meetings and provide for keeping and distribution of the minutes. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop.

D. The CONTRACTOR shall attend meetings held to coordinate work between other contracts that may be on-going on the project site. The General Superintendent, Job Superintendent, and/or other key representatives of each prime contractor shall attend these conferences.

#### 1.09 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, river 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 any 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 OWNER assumes no responsibility for any conclusions or interpretations made by the CONTRACTOR on the basis of the information made available by the OWNER.

- B. CONTRACTOR shall also take 4" x 6" color photographs and video tapes to document pre-existing above-ground conditions and shall provide the OWNER with a set of photographs, negatives and video tapes. These photographs and tapes may be used for purposes of restoration documentation. Digital photographs supplied on a CD are also acceptable.

#### 1.10 DIFFERING SITE CONDITIONS

- A. The CONTRACTOR shall promptly and before such conditions are disturbed, notify the OWNER 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 OWNER 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's 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.
- B. No claim of the CONTRACTOR under this clause shall be allowed unless the CONTRACTOR has given the notice required in Paragraph A.
- C. No claim by the CONTRACTOR for an equitable adjustment hereunder shall be allowed if asserted after final payment under this contract.

PART 2 -- PRODUCTS -(Not Used)

PART 3 -- EXECUTION-(Not Used)

- END OF SECTION -

## SECTION 01025- BASIS, MEASUREMENT AND PAYMENT

### PART 1 --GENERAL

#### 1.01 SCOPE OF WORK

- A. Payments to the CONTRACTOR shall be made on the basis of the Bid Proposal 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.
- B. The prices stated in the Bid Proposal include all costs and expenses for taxes, labor, equipment, materials, commissions, transportation charges and expenses, patent fees and royalties, 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 details and specified herein. The Basis of Payment for an item at the price shown in the Bid Proposal shall be in accordance with its description of the item in this Section and as related to the work specified. Unit prices will be applied to the actual quantities furnished and installed in conformance with the Contract Documents. The items listed below, refer to and are the same pay items listed in the Bid Proposal. They constitute all of the pay items for the completion of the work. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, services, field offices, layout surveys, job signs, sanitary requirements, testing, safety devices, approval and record drawings, water supplies, power, underground utility locating, maintenance of traffic, site preparation, removal of waste, site cleanup, watchmen, bonds, insurance, mobilization, demobilization, and any other requirements of the General Conditions and Bidding and Contract Requirements. Compensation for all such services, equipment and materials shall be included in the prices stipulated for the unit pay items listed herein.
- C. The CONTRACTOR's attention is called to the fact that the quotations for the various items of work are intended to establish a total price for completing the work in its entirety. Should the CONTRACTOR feel that the cost for any item of work has not been established in the Bid Proposal or this Section, the cost for that Work shall be included in some other applicable Bid Item, so that the Proposal for the project reflects the total price for completing the work in its entirety. It is intended that all work required to complete this Contract will be included in the various items as described herein.
- D. In the event that repairs to laterals, mains, manholes, force mains, utilities, or any other public or private property are required due to damage caused by the CONTRACTOR's operations, the CONTRACTOR shall provide and employ all necessary labor, equipment, and materials, at no additional cost, to complete such repairs in accordance with applicable provisions of these specifications. This shall include but not be limited to materials for repair, if required, including pipe, fittings and specials, pipe bedding, and materials for surface restoration; transportation and handling costs delivered to the work site; any bypass pumping; providing provisional sewers to maintain service; complying with the State of Florida Trench Safety Act, including shoring; removal, transportation and disposal of existing sewer excavation; supporting and protecting existing utilities as required; dewatering;

sheeting and shoring, if necessary; furnishing and installing replacement pipe, fittings and repair couplings; unloading material and placing it in the trench; cutting pipe; furnishing and installing joint materials including lubricant; making all connections within the lines to existing sewers, laterals and structures; placing and compacting bedding and backfill; furnishing and installing additional suitable backfill material, if required; furnishing all materials and equipment required to clean and test the sewer; cleaning and testing the sewer; temporary paving installation and removal; permanent paving replacement; replacement of pavement markings as existed before repair; replacing utilities, catch basins, manholes, trees, grass, shrubs, mail boxes, sprinkler systems, concrete or rock bed driveways, sidewalk and all other similar items, to original locations and to equal or better than original conditions; obtaining and paying for any necessary permits; satisfying all requirements of the permits, and all other appurtenant and miscellaneous items and work including final cleanup.

- E. The OWNER will not provide any space or place to store materials for this project. No payment will be made for stored materials.
- F. The OWNER will not provide for disposal of any solids resulting from sewer line and manhole cleaning. The CONTRACTOR shall obtain permits and make arrangements as required to properly dispose of solids. All solids or semisolids resulting from the cleaning operations shall be removed from the site and disposed of by the CONTRACTOR in a legal and sanitary manner as approved by appropriate authorities, at the CONTRACTOR's cost.
- G. Traffic control measures to be included in the prices stipulated for the unit pay items listed herein shall include standard traffic cones and up to 10 barricades and 10 advance warning and/or detour signs. When the OWNER agrees in advance that further measures are required, such additional measures shall be separately negotiated and addressed on a site-specific basis.
- H. Whenever "Limits of Construction" is referred to, the limit of construction shall be within an area 7.5 feet each side of the centerline of the pipe and no more than five feet beyond the end of the new pipe installed.

#### 1.02 CONTRACT DURATION

- A. As specified in the Bid Form.

#### 1.03 PERFORMANCE AND PAYMENT BONDS

- A. As specified in Section 00610 & Section 00620 respectively.

#### 1.04 MEASUREMENT

- A. 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 OWNER unless otherwise specified. The OWNER will witness all field measurements.
- B. When depth of cuts are indicated in the bid items, they shall be measured vertically from the existing grade at excavation point, paved or unpaved, to the pipe invert.

- C. The quantities stated in the Bid Proposal are approximate only and are intended to serve as a basis for the comparison of bids and to fix the approximate amount of the cost of the Project. The OWNER does not expressly or impliedly agree that the actual amount of the work to be done in the performance of the contract will correspond with the quantities in the Bid Proposal; the amount of work to be done may be more or less than the said quantities and may be increased or decreased by the OWNER as circumstances may require. The increase or decrease of any quantity shall not be regarded as grounds for an increase in the unit price or in the time allowed for the completion of the work, except as provided in the Contract Documents.

#### 1.05 MANHOLE REPAIRS PAYMENT ITEMS

A. Items 1 to 2      Realign, grout and seal manhole casting

1. This item of work will be measured and paid for at the unit price per each manhole, regardless of size of frame and type of surface features which must be restored. Realignment may be horizontal, vertical, or both. Payment of the unit price per each will provide complete compensation for lifting, removing, cleaning and recoating the cast iron frame; removing and replacing the mortar bedding on the top of the manhole wall; reseating the frame in its correct position; patching as required; surface restoration; cleanup; labor, tools and equipment; and all incidentals as necessary to attain a water-tight junction between manhole wall and cast iron frame, including the installation of an aromatic urethane internal manhole sealing system, complete in place.

B. Items 3 to 4- Seal visible infiltration through manhole walls, bench and invert

1. This item of work will be measured and paid for at the unit price per each manhole, regardless of depth or size (or number and flow rate of visible leaks encountered). Payment shall be made per unit price per each for sealing or patching all visible leaks by injecting chemical grout; including dewatering (or other means acceptable to the OWNER) to relieve hydrostatic pressure outside the manhole.

C. Item 5 - Repair manhole bench and invert

1. This item of work will be measured and paid at the unit price of manhole invert repaired. Payment of the unit price will provide compensation for cleaning and patching the manhole bench and flow channels, isolation of the manhole by plugging entering lines, testing labor, tools and equipment and all incidentals and materials needed to restore the manhole bench and invert.

D. Item 6 - Replace manhole bench and invert

1. This item of work will be measured and paid at the unit price per each of manhole invert replaced. Payment of the unit price will provide compensation for cleaning; injecting chemical grout to stop active infiltration, if necessary; furnishing labor,

equipment, and all materials or combination of materials applying them; removal and re-installing flow channel and benches; isolation of the manhole by plugging entering lines; testing labor, tools and equipment; and all incidentals necessary to obtain a watertight, sealed manhole bench and invert.

E. Item 7 Replace standard manhole frame and cover

1. This item of work will be measured and paid for at the unit price per each, regardless of size. Payment of the unit price per each will provide compensation for furnishing and installing the new frame and cover; salvaging and transporting the location designated by the OWNER of all replaced cast iron materials; cutting, removal and replacement of surface materials as necessary; cleanup; labor, tools and equipment; and all incidentals necessary to obtain a new cast iron cover, including the installation of an aromatic urethane internal manhole sealing system, complete in place.

F. Item 8 – Replace watertight manhole frame and cover

1. This item of work will be measured and paid for at the unit price per each, regardless of size. Payment of the unit price per each will provide compensation for furnishing and installing the new frame and cover; salvaging and transporting the location designated by the OWNER of all replaced cast iron materials; cutting, removal and replacement of surface materials as necessary; cleanup; labor, tools and equipment; and all incidentals necessary to obtain a new watertight cast iron cover, including the installation of an aromatic urethane internal manhole sealing system, complete in place.

G. Items 9 to 14 – Cementitious manhole liner

1. This item of work will be measured and paid at the unit price per vertical foot of manhole wall. Measurement will be made from the bench, at its highest point, to the bottom of the frame. Payment of the unit price per vertical foot will provide compensation for cleaning of the wall; furnishing and supplying of all materials or combination of materials making up the cementitious lining and applying them; furnishing and applying an aromatic urethane sealant to the top portion of the cone and the manhole ring; manufacturer's representative's presence or assistance if required; isolation of the manhole by plugging entering lines; testing labor, tools and equipment; and all incidentals necessary to obtain a watertight, sealed manhole wall and bench complete.
2. Payment for bypass pumping, if required (other than because of damage caused by the CONTRACTOR) will be paid for under a separate item.

H. Items 15 to 17 items in common

1. Reference Part 1.09 of this section.

1.09 ITEMS IN COMMON

A Bypass pumping

1. These items shall provide full compensation for bypass pumping operations required for sewer and manhole repair work. The CONTRACTOR shall attempt to perform the sewer work without bypass pumping. However, if, in the opinion of the OWNER bypass pumping is necessary, it will be identified as a payment item. The pay item is a charge per day for all bypass pumping operations during a specific sewer repair, including services, regardless of the number of pumps required. Bypass Pumping shall be bid on the basis of sewer size which is bypassed.
2. These items shall include, but not be limited to, all necessary and required traffic control; pumps; piping; gasoline/diesel fuel; maintenance; transportation and storage; temporary bypass and service piping; labor; materials and/or any other costs associated with bypass pumping.
3. Plugging or blocking a sewer line shall be included in the appropriate bid item for which the flow must be stopped, and shall be considered incidental work and no additional payment shall be considered.
4. This item is not intended to address bypassing of force main flows where such flows discharge directly into a manhole being repaired or through a force main being repaired.

B. Asphalt roadway replacement

1. The unit price bid for Asphalt Roadway Replacement shall provide full compensation for all work including, but not limited to furnishing all labor, equipment and material required for cutting, removing, protecting and replacing all existing asphalt paving and subgrade removed or damaged under this Contract; limerock base, prime coat, tack coat, asphalt, compaction, traffic markings, and maintenance of traffic. Payment will only be made if asphalt paving is encountered within the "Limits of Construction". All other replacement due to removal or damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.

2. Payment for Asphalt Roadway Replacement will be made once and shall include both temporary and permanent Asphalt Roadway Replacement and will be made per square yard, based on base and asphalt thickness dimensions as required, installed and accepted.

C. Pavement overlay

1. Item for construction pavement repairs (1-inch thick asphaltic concrete wearing surface overlay) will be paid for at the unit price bid times the number of square yards of overlay installed where directed by the OWNER, and the price bid shall provide full compensation for all work including, but not limited to, furnishing all materials, labor and equipment for a complete installation. Pavement overlay will be in addition to the asphalt concrete pavement restoration.

D. Concrete sidewalk replacement

1. The unit price bid for Concrete Sidewalk Replacement shall provide full compensation for all work including, but not limited to, furnishing of all labor, equipment and material required for cutting, removing, protecting and replacing all existing concrete sidewalks removed or damaged under this Contract, concrete, formwork, reinforcing, placing, finishing and curing. Payment will only be made if sidewalks are encountered within the "Limits of Construction" as described herein. All other replacement due to removal or damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.

Payment for concrete sidewalk will be made per square yard installed and accepted.

E. Concrete curb and gutter replacement

1. The unit price bid for Concrete Curb and Gutter Replacement shall provide full compensation for all work including, but not limited to furnishing all labor, equipment and material required for cutting, removing, replacing all existing concrete curbs and gutters removed or damaged under this Contract. Payment will only be made if curbs and gutters are encountered within the "Limits of Construction" as described herein. All other replacement due to removal or damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.
2. Payment for Concrete Curb and Gutter Replacement will be made per linear foot installed and accepted.

F. Asphalt driveway replacement

1. The unit price for Asphalt Driveway Replacement shall provide full compensation for all work including, but not limited to, furnishing of all labor, equipment and material required for cutting, removing, protecting and replacing all existing asphalt driveways removed or damaged under this Contract; limerock base, prime coat, tack coat, asphalt and compaction. Payment will only be made if asphalt driveways are encountered within the "Limits of Construction" as described herein. All other replacement due to



removal or damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.

2. Payment for asphalt driveway replacement will be made per square yard installed and accepted.

G. Concrete driveway replacement

1. The unit price for Concrete Driveway Replacement shall provide full compensation for all work including, but not limited to, furnishing of all labor, equipment and material required for cutting, removing, protecting and replacing all existing concrete driveways removed or damaged under this Contract, concrete, formwork, reinforcing, placing, finishing and curing. Payment will only be made if sidewalks are encountered within the "Limits of Construction" as described herein. All other replacement due to removal or damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.
2. Payment for concrete driveway replacement will be made per square yard installed and accepted.

H. Replace concrete slabs and/or aprons

1. The unit price for Concrete Slab and/or Apron Replacement shall provide full compensation for all work including, but not limited to, furnishing of all labor, equipment and material required for cutting, removing, protecting and replacing all existing concrete removed or damaged under this Contract, concrete formwork, reinforcing, placing, finishing and curing. Payment will only be made if slabs and/or aprons are encountered within the "Limits of Construction" as previously described. All other replacement due to removal or damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.
2. Payment for concrete slab and/or aprons replacement will be made per square yard installed and accepted.

I. Sod replacement

1. Sod replacement will be paid for at the unit price bid and shall provide full compensation for all work including, but not limited to, furnishing all labor, equipment and material required for replacing sod removed or damaged under this Contract. Payment will only be made if sodded areas are encountered within the "Limits of Construction" as described herein. Measurement of payment shall be the number of square feet actually removed and replaced within the Limits of Construction. All other replacement due to removal or damage as a result of the CONTRACTOR's operation shall be at the CONTRACTOR's expense.
2. Payment for Sod Replacement will be made per square foot installed and accepted.

J. Installation in rear-yard easement

1. Payment shall be at the unit price bid, per easement repair performed, provided in the Bid Proposal and shall include full compensation for all additional labor, materials, equipment and incidentals required to perform work away from vehicular traveled ways, if so requested by the OWNER, in association with any other work under this contract. This item will be paid in addition to the price paid under the corresponding work item, and will only be paid when the area where work must necessarily be performed is in the easement area and presents restrictions to vehicular access from roads, alleys, driveways, or other features suitable for access by the installation vehicles. This item shall be full compensation for all additional costs associated with working in an easement area.
2. When the CONTRACTOR judges that this item is applicable, the CONTRACTOR shall obtain the OWNER's concurrence on such judgment in advance of performing the work.

K. Traffic control

1. Traffic control measures to be included in the prices stipulated for all the unit pay items listed under this contract shall include standard traffic cones and up to 10 barricades and 10 advance warning and/or detour signs. No separate payment shall be made for such traffic control measures.
2. The CONTRACTOR shall advise the OWNER in advance in the event that additional traffic control measures are deemed necessary.
3. When the OWNER agrees in advance that further measures are required, such additional measures shall be separately compensated on a site-specific basis using the pay items provided. Payment is based on a unit price per each device or unit price per hour for personnel.

L. Expedited mobilization

1. Payment shall be at the unit price bid, per mobilization performed, provided in the Bid Proposal and shall include full compensation for all additional labor, materials, equipment and incidentals required to complete an expedited mobilization, if so requested by the OWNER, in association with any other work under this contract. Payment shall be per mobilization performed, where CONTRACTOR shall commit to the expedited mobilization within 24 hours of the OWNER's request and mobilize and actively initiate the repair work within 72 hours of the OWNER's request.
2. The CONTRACTOR is not required to accomplish an expedited mobilization, but cannot otherwise earn the associated payment.

M. Manhole Inspection Reports

1. The unit price for manhole inspection reports shall provide full compensation for all work including, but not limited to, furnishing of all labor, equipment and material required to

access each and every manhole including manholes with welded covers, for providing the locations, conditions of different parts of the manhole, sizes of incoming and outgoing pipes, depth, materials, direction of flows, method of construction, manhole pipe connections, roots, channel deposition, schematic diagram of the manhole and pipes, artificial lighting when necessary, and obtaining information of all available items provided in Manhole Inspection Form.

2. The CONTRACTOR is required to provide a complete and acceptable manhole inspection form with all information obtained from the field, two photos of the inside of the manhole preferably showing areas in the manhole that require rehabilitation and one photo of the manhole with its manhole number marked on the pavement. Photos are required in both, hard copy and electronic version; and the photos must clearly identify the respective sanitary sewer basin where the manhole is located and the manhole number.

PART 2-- PRODUCTS (Not Used)

PART 3-- EXECUTION (Not Used)

- END OF SECTION













## SECTION 01090- REFERENCE STANDARDS

### PART 1 --GENERAL

#### 1.01 GENERAL

- A. Titles of Sections and Paragraphs: Captions accompanying specification sections and paragraphs are for convenience of reference only, and do not form a part of the Specifications.
- B. Applicable Publications: Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date of the opening of bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein shall be waived because of any provision of, or omission from, said standards or requirements.

#### 1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Without limiting the generality of other requirements of the specifications, all work specified herein shall conform to or exceed the requirements of all applicable codes and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of these Specifications nor the applicable codes.
- B. References herein to "Building Code" or SFBC shall mean the locally applicable edition of the South Florida Building Code. The latest edition of the code as approved and used by the local agency as of the date of award, as adopted by the agency having jurisdiction, shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.
- C. In case of conflict between codes, reference standards, Drawings and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the OWNER for clarification and directions prior to ordering or providing any materials or labor. The CONTRACTOR shall bid the most stringent requirements.
- D. Applicable Standard Specifications: The CONTRACTOR shall construct the Work specified herein in accordance with the requirements of the Contract Documents and the referenced portions of those referenced codes, standards, and Specifications listed herein.
- E. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.
- F. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

### 1.03 ABBREVIATIONS AND ACRONYMS

- A Wherever in these specifications references are made to the standards, 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. 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.

AAMA	Architectural Aluminum Manufacturer's Association
AASHTO	American Association of the State Highway and Transportation Officials
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AFBMA	Anti-Friction Bearing Manufacturer's Association, Inc.
AGMA	American Gear Manufacturer's Association
AHGDA	American Hot Dip Galvanizers Association
AI	The Asphalt Institute
AIA	American Institute of Architects American
AISC	Institute of Steel Construction American
AISI	Iron and Steel Institute American Institute
AITC	of Timber Construction Air Moving and
AMCA	Conditioning Association
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
API	American Petroleum Institute
APHA	American Public Health Association
APWA	American Public Works Association
ASA	Acoustical Society of America
ASAE	American Society of Agriculture Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASMM	Architectural Sheet Metal Manual
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BCDNRP	Broward County Department of Natural Resources Protection
BCPHU	Broward County Public Health Unit
BCOES	Broward County Office of Environmental Services
BCWRMD	Broward County Water Resources Management Division
BHMA	Builders Hardware Manufacturer's Association
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association

ETL	Electrical Test Laboratories
FDEP	Florida Department of Environmental Protection
FOOT	Florida Department of Transportation
FS	Federal Specifications
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
ISO	International Organization for Standardization
MBMA	Metal Building Manufacturer's Association
MTI	Marine Testing Institute
NAAM	National Association of Architectural Metal Manufacturer's
NACE	National Association of Corrosion Engineers
NASSCO	National Association of Sewer Service Companies
NBS	National Bureau of Standards
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association National
NRCA	Roofing Contractors Association Occupational
OSHA	Safety and Health Administration Portland
PCA	Cement Association
SFBC	South Florida Building Code
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
SFWMD	South Florida Water Management District
UL	Underwriters Laboratories, Inc.

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

##### 1.02 PROGRESS

A. A progress meeting shall be held on a bi-weekly basis for the purpose of coordinating and expediting the work. The CONTRACTOR, as a part of his obligations under the Contract, shall attend in person or by an authorized representative to attend and to act on his behalf. The ENGINEER will conduct such meetings and as necessary, with the CONTRACTOR's input, issue an agenda.

## SECTION 01200

### PROJECT MEETINGS

- 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 ENGINEER will prepare a brief summary report of the decisions or understandings concerning each of the items discussed at the meeting.
- C. At bi-weekly progress meetings, the CONTRACTOR shall submit to the ENGINEER for review a current two (2) week progress schedule. This schedule submission shall include a two week look ahead schedule and reflect status of the work performed during the preceding weeks.

#### **Part 2 - PART 2 -- PRODUCTS (Not Used)**

#### **Part 3 - 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 shall be submitted to the OWNER. A general summary of the types of submittals and the number of copies required is as follows:

Copies to <u>OWNER</u>	Type of Submittal
2	Qualification documentation
3	Construction schedule
2	Schedule of payment items
2	Progress estimates
4	Shop drawings
2	Product samples
2	Certificates of compliance
2	Warranties

- B. Qualification documentation specified throughout these contract documents shall be submitted prior to contract award. The OWNER reserves the right to require the submittal of additional documentation to evaluate the technical suitability of proposed products as well as a bidder's qualifications and ability to satisfactorily perform the work outlined in these contract documents.

#### 1.02 SUBMITTAL PROCEDURES

- A. Transmit each submittal with a form acceptable to the OWNER, clearly identifying the project and the 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 SCHEDULE

- A. The construction schedule shall be prepared for each group of work orders in the form of a horizontal bar chart showing in detail the proposed sequence of the work and identifying construction activities for each major component, structure or facility. 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. Three copies of the schedule shall be submitted within ten calendar days after the date of the Notice to Proceed.
- B. The construction schedule shall be revised to reflect comments by the OWNER and updated monthly, depicting progress to the last day of the month. Three copies shall be submitted with each request for monthly progress payments.
- C. Changes to the schedule shall be accompanied by a letter of explanation with appropriate reference and revision date on the schedule.
- D. The following additional requirements shall apply to the schedule.
  - 1. The CONTRACTOR shall provide notification to the OWNER by e-mail a minimum of 24 hours in advance of any schedule change.
  - 2. Every Tuesday of the week, the CONTRACTOR shall provide a weekly report to the OWNER. The weekly report shall provide the work schedule from Tuesday to Monday of the following weeks for the duration of the project. Contractor shall indicate in the weekly report the work description, location, MH to MH, and date of work.
  - 3. At the completion of each task order, the CONTRACTOR shall notify the OWNER of such fact.

#### 1.04 SCHEDULE OF PAYMENT ITEMS

- A. The CONTRACTOR shall submit a Schedule of Payment Items for review within ten calendar days after the date of the Notice to Proceed. The schedule shall contain the installed value of the component parts of Work for the purpose of making progress payments during the construction period.
- 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. No payment will be made for materials stored on the project site.
- D. The CONTRACTOR shall expand or modify the above schedule as required by the OWNER's initial or subsequent reviews.

## 1.05 PROGRESS ESTIMATES

- A. Progress estimates shall be submitted in accordance with the General Conditions and shall be accompanied by the revised Construction Schedule.

## 1.06 SHOP DRAWINGS

- A. General: The CONTRACTOR shall submit for review shop drawings for concrete reinforcement, structural details, materials fabricated especially for this Contract, and materials for which such Drawings are specified or specifically requested by the OWNER.
- B. Shop drawings shall show the principal dimensions, weight, structural and operating features, type and/or brand of finish or shop coat, grease fittings, etc., depending on the subject of the Drawings.
- C. When so specified, or if considered by the OWNER to be acceptable, the manufacturer's specifications, catalog data, descriptive matter, illustrations, etc., may be submitted for review in place of shop drawings. In such case, the requirements shall be as specified for shop drawings, insofar as applicable.
- D. The CONTRACTOR shall be responsible for the prompt submittal of all shop drawings so that there shall be no delay to the Work due to the absence of such Drawings. The OWNER will review the shop drawings within 14 calendar days of receipt of such Drawings. Reviewed shop drawings will be returned to the CONTRACTOR by regular mail, posted no later than 14 days after receipt.
- E. Time delays caused by rejection of submittals are not cause for extra charges to the OWNER or time extensions.
- F. Requirements: All shop drawings shall be submitted to the OWNER through the CONTRACTOR. The CONTRACTOR is responsible for obtaining shop drawings from his subcontractors and returning reviewed Drawings to them. All shop drawings shall be prepared on standard size, 24-inch by 36-inch sheets, or smaller. All Drawings shall be clearly marked with the name of the project, OWNER, CONTRACTOR, Bid Package number, and structure to which the drawing applies. Drawings shall be suitably numbered and stamped by the CONTRACTOR. Each shipment of Drawings shall be accompanied by a letter of transmittal giving a list of the drawing numbers and the names mentioned above.
- G. 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.



- H. Product data shall include materials of construction, dimensions, performance characteristics and capacities, and other relevant details.
- I. Sample Warranties: When warranties are called for, a sample of the warranty shall be submitted with the shop drawings. The sample warranty shall be the same form that will be used for the actual warranty.
- J. Work Prior to Review: No material or equipment shall be purchased, fabricated especially for this Contract, or delivered to the project site until the required shop drawings have been submitted, processed and marked either "FURNISH AS SUBMITTED" or "FURNISH AS CORRECTED". All materials and Work involved in the construction shall be as represented by said Drawings.
- K. The CONTRACTOR shall not proceed with any portion of the Work for which the design and details are dependent upon the design and details of equipment for which submittal review has not been completed.
- L. CONTRACTOR's Review: Only submittals which have been checked and corrected should be submitted to the CONTRACTOR by his subcontractors and vendors. Prior to submitting shop drawings to the OWNER, the CONTRACTOR shall check thoroughly all such Drawings to satisfy himself that the subject matter thereof conforms to the Drawings and Specifications in all respects. Drawings which are correct shall be marked with the date, checker's name and indications of the CONTRACTOR's approval, and then shall be submitted to the OWNER; other Drawings submitted to the OWNER will be returned to the CONTRACTOR unreviewed.
- M. CONTRACTOR's Responsibility: The review of shop drawings will be general and shall not relieve the CONTRACTOR of the responsibility for details of design, dimensions, etc., necessary for proper fitting and construction of the Work required by the Contract and for achieving the specified performance.
- N. CONTRACTOR's Modifications: For submissions containing departures from the Contract Documents, the CONTRACTOR shall include proper explanation in his letter of transmittal. Should the CONTRACTOR submit for review equipment that requires modifications to the structures, piping, layout, etc. detailed on the Drawings, he shall also submit for review details of the proposed modifications. If such equipment and modifications are accepted, the CONTRACTOR, at no additional cost to the OWNER, shall do all Work necessary to make such modifications.
- O. Substitutions:

Cementitious Manhole Liner: There are no materials to be accepted as substitute to Sewpercoat as manufactured by Kerneos Aluminate Technologies.

Other Materials: Whenever a particular brand or make of material, equipment, or other item is specified, or is indicated on the Drawings, it is for the purpose of establishing a standard of quality, design, and type desired and to supplement the detailed specifications. Any other brand or make which, in the opinion of the OWNER, is equivalent to that specified or indicated may be

offered as a substitute subject to the following provisions:

1. CONTRACTOR shall submit for each proposed substitution sufficient details, complete descriptive literature, and performance data together with samples of the materials, where feasible, to enable the OWNER to determine if the proposed substitution is equal.
  2. CONTRACTOR shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed substitution is equal.
  3. CONTRACTOR shall submit a list of installations where the proposed substitution is equal.
  4. Where the acceptance of a substitution requires revision or redesign of any part of the Work, all such revision and redesign, and all new Drawings and details required therefore, shall be provided by the CONTRACTOR at his own cost and expense, and shall be subject to review of the OWNER.
  5. In all cases the OWNER shall be the sole judge as to whether a proposed substitution is to be accepted. The CONTRACTOR shall abide by the OWNER's decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item, or substitute, as specified. No substitute items shall be used in the Work without written acceptance of the OWNER.
  6. Acceptance of any proposed substitution shall in no way release the CONTRACTOR from any of the provisions of the Contract Documents.
- P. Complete Submittals: Each submittal shall be complete in all aspects incorporating all information and data required to evaluate the products' compliance with the Contract Documents. Partial or incomplete submissions shall be returned to the CONTRACTOR without review.
- Q. Shop Drawing Distribution: The CONTRACTOR shall submit a minimum of 4 copies of all shop drawings to the OWNER for review. Shop drawings will be reviewed, stamped and distributed with the appropriate box checked either "FURNISH AS SUBMITTED", "FURNISH AS CORRECTED" or "REVISE AND RESUBMIT". The distribution of processed shop drawings will be as follows:
1. Drawings Marked "FURNISH AS SUBMITTED" or "FURNISH AS CORRECTED"
    - 1 copy returned to the CONTRACTOR
    - 1 copy remain at the OWNER's office
    - 1 copy remains with the shop drawing reviewer
    - 1 copy for the OWNER's field representative

2. Drawings Marked "REVISE AND RESUBMIT"

- 1 copy returned to the CONTRACTOR
- 1 copy remain at the OWNER's office
- 1 copy remains with the shop drawing reviewer
- 1 copy will be discarded, unless picked up by the CONTRACTOR

- R. If the CONTRACTOR requires additional copies of returned shop drawings, he shall include extra Drawings in his original submittal. The OWNER will process the Drawings and return them to the CONTRACTOR.

1.07 PRODUCT SAMPLES

- A. CONTRACTOR shall furnish for review all product samples as required by the Contract Documents or requested by the OWNER to determine compliance with the specifications.
  - B. 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 complete project identification, the nature of the material, trade name of manufacturer and location of the Work where the material represented by the sample will be used.
  - C. Samples shall be checked by the CONTRACTOR for conformance to the Contract Documents before being submitted to the OWNER and shall bear the CONTRACTOR's stamp certifying that they have been so checked. Transportation charges on samples submitted to the OWNER shall be prepaid by the CONTRACTOR.
  - D. OWNER's review will be for compliance with the Contract Documents, and his comments will be transmitted to the CONTRACTOR with reasonable promptness.
  - E. Acceptable samples will establish the standards by which the completed Work will be judged.
- 

1.08 CERTIFICATES OF COMPLIANCE

- A. Copies of certificates of compliance and test reports shall be submitted for requested items to the OWNER prior to request for payment.

1.09 WARRANTIES

- A. Original warranties, called for in the Contract Documents, shall be submitted to the OWNER. When warranties are required for an item, warranty shall be submitted prior to request for payment of that item.
- B. When warranties are requested, a sample of the warranty to be provided shall be submitted with, and considered part of, the shop drawings.
- C. The CONTRACTOR shall warrant to the OWNER that all material and labor used in

the construction are covered by his warrantee for a minimum of a one year period or as otherwise specified upon approval and acceptance by the OWNER. The CONTRACTOR shall replace or repair defects at no cost to the OWNER during the warrantee period. No visible or potential leakage shall be allowed during the warrantee period.

PART 2 --PRODUCTS - (Not Used)

PART 3 --EXECUTION - (Not Used)

-END OF SECTION-

## SECTION 01400- QUALITY CONTROL

### PART 1 -GENERAL

#### 1.01 QUALITY ASSURANCE

- A. Quality: All materials shall be new and correctly designed, and shall conform to the requirements of Section 01090, "Reference Standards" and Section 01600, "Materials". They shall be standard first-grade quality produced by expert workmen and be intended for the use for which they are offered. Materials which, in the opinion of the OWNER, are inferior or of a lower grade than indicated, specified or required will not be acceptable.
- B. Source Limitations: To the greatest extent possible for each unit of Work, the CONTRACTOR shall provide products, materials, or equipment of a singular generic kind from a single source.
- C. Compatibility of Options: Where more than one choice is available as options for CONTRACTOR's selection of a product, material, or equipment, the CONTRACTOR shall select an option which is compatible with other products and materials already selected. Compatibility is a basic general requirement of product/material selections.

#### 1.02 PRODUCT EVALUATION

- A. The OWNER will employ and pay for the services of an independent testing laboratory for specified testing as specified by the OWNER.
- 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 Documents, existing laws, codes, ordinances, etc. The testing laboratory will have no authority to change the requirements of the Contract Documents, nor perform, accept or approve any of the CONTRACTOR's Work.
- C. The CONTRACTOR shall allow the OWNER ample time and opportunity for evaluation and testing materials to be used in the Work. The CONTRACTOR shall advise the OWNER promptly upon placing orders for materials so that arrangements may be made, if desired, for evaluation before shipment from the place of manufacture. The CONTRACTOR shall at all times furnish the OWNER and his representatives, facilities including labor, and allow proper time for evaluation and testing materials, and workmanship. The CONTRACTOR must anticipate that possible delays may occur in the execution of its work due to the necessity of materials being inspected and accepted for use. The CONTRACTOR shall furnish, at his own expense, all samples of materials required by the OWNER for testing, and shall make his own arrangements for providing water, electric power, or fuel for the various evaluation and tests of structures and materials.
- D. The OWNER will bear the cost of all tests, evaluation, or investigations undertaken by the order of the OWNER for the purpose of determining conformance with the Contract Documents if such tests, evaluation, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by the OWNER as a result of such tests, evaluation, or investigations, the CONTRACTOR shall bear the full cost of any additional tests, evaluations

and investigations, which are ordered by the OWNER to ascertain subsequent conformance with the Contract Documents.

#### 1.03 EVALUATION AT PLACE OF MANUFACTURE

- A. Unless otherwise specified, all products and materials shall be subject to evaluation by the OWNER at the place of manufacture.
- B. The presence of the OWNER at the place of manufacture however, shall not relieve the CONTRACTOR of the responsibility for furnishing products, materials, and equipment, which comply with all requirements of the Contract Documents. Compliance is a duty of the CONTRACTOR, and said duty shall not be avoided by any act or omission on the part of the OWNER.

#### 1.04 SAMPLING AND TESTING

- A. Unless otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered; however, the OWNER reserves the right to use any generally-accepted system of sampling and testing which, in the opinion of the OWNER will insure the OWNER that the quality of the workmanship is in full accord with the Contract Documents.
- B. Any waiver by the OWNER of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial Work, shall not be construed as a waiver of any requirements of the Contract Documents.
- C. Notwithstanding the existence of such waiver, the OWNER reserves the right to make independent investigations and tests and failure of any portion of the Work to meet any of the requirements of the Contract Documents, shall be reasonable cause for the OWNER to require the removal or correction and reconstruction of any such work in accordance with the General Conditions.
- D. In addition to any other evaluation, observation or quality assurance provisions that may be specified, the OWNER shall have the right to independently select, test, and analyze, at the expense of the OWNER, additional test specimens or any or all of the materials to be used. Results of such tests and analyses shall be considered along with the tests or analyses made by the CONTRACTOR to determine compliance with the applicable specifications for the materials so tested or analyzed; provided, however, that where testing or investigation by the OWNER reveals failure to meet the requirements of the Contract Documents, all costs of such independent inspection and investigation, and all costs of removal, correction, and reconstruction or repair of any such Work shall be borne by the Contractor.

#### 1.05 SITE INVESTIGATION AND CONTROL

- A. The CONTRACTOR shall verify all dimensions in the field and shall check field conditions

continuously during construction. The CONTRACTOR shall be solely responsible for any inaccuracies built into the Work due to its failure to comply with this requirement.

- B. The CONTRACTOR shall inspect related and appurtenant Work and shall report in writing to the OWNER any conditions which will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the CONTRACTOR at its sole cost and expense.

#### 1.06 RIGHT OF REJECTION

- A. The OWNER shall have the right, at all times and places, to reject any articles or materials to be furnished hereunder which, in any respect, fail to meet the requirements of the Contract Documents, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the Work at the site. If the OWNER, through an oversight or otherwise, has accepted materials or Work which is defective or which is contrary to the Contract Documents, such materials, no matter in what stage or condition of manufacture, delivery, or erection, may be subsequently rejected by the OWNER.
- B. The CONTRACTOR shall promptly remove rejected articles or materials from the site of the Work after notification of rejection. All costs of removal and replacement of rejected articles or materials as specified herein shall be borne by the CONTRACTOR.

#### 1.07 WATERTIGHTNESS OF STRUCTURES

- A. 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 and/or rainwater will not leak into any repaired collection line, service lateral, or manhole.
- B. The required water tightness shall be achieved by quality construction and proper sealing of all pipes and manholes.
- C. The CONTRACTOR shall provide at its own expense all labor, material, temporary bulkheads, pumps, water, measuring devices, etc., necessary to perform the required tests.

#### 1.08 HYDRAULIC UPLIFT ON STRUCTURES

- A. The CONTRACTOR shall be completely responsible for any pipelines or manholes that may become buoyant during the construction operations due to the groundwater or floods and before the structure is put into operation. Should there be any possibility of buoyancy of a 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.

#### 1.09 CUTTING AND PATCHING

- A. The CONTRACTOR shall perform all cutting and patching of the 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 OWNER and of the other contractors whose work will be affected.



## 1.10 REMOVAL OF EXISTING PIPELINES

- A. General: The scope of work requires the CONTRACTOR to interface with existing piping which will be removed as part of the work. Prior to beginning any work associated with existing facilities to be removed, the CONTRACTOR shall inform the OWNER of his intent so that all arrangements can be made with the OWNER for disconnecting or isolating pipelines (where possible) from service to the extent possible. The CONTRACTOR shall not proceed without written authorization from the OWNER.
- B. Pipelines: The CONTRACTOR shall remove existing pipelines or segments of existing pipelines shown to be replaced as part of the contract work. Piping indicated as being replaced with new piping, shall be excavated and removed using methods which will not disturb adjacent piping or other facilities. After piping has been removed and new piping installed, the CONTRACTOR shall backfill the evacuated area in accordance with requirements set forth in other sections of these specifications.
- C. 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. Any damage to the lining and coating of the existing piping shall be repaired by the CONTRACTOR.
- D. Disposal of Debris: All debris, materials, piping, and miscellaneous waste products from the work 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.

## 1.11 OBSERVATION OF THE WORK

- A. The Work shall be conducted under the general observation of the OWNER and shall be subject to observation by representatives of the OWNER acting on behalf of the OWNER to ensure strict compliance with the requirements of the Contract Documents. Such observation may include mill, plant, shop or field observation, as required. The OWNER shall be permitted access to all parts of the Work, including plants where materials are manufactured or fabricated.
- B. The presence of the OWNER or any observer, however, shall not relieve the CONTRACTOR of the responsibility for the proper execution of the Work in accordance with all requirements of the Contract Documents. Compliance is a duty of the CONTRACTOR, and said duty shall not be avoided by any act or omission on the part of the OWNER or any observer.
- C. All materials and articles furnished by the CONTRACTOR shall be subject to rigid inspection, and no materials or articles shall be used in the Work until they have been inspected and accepted by the OWNER or its representative. No Work shall be backfilled, buried, cast in concrete, hidden or otherwise covered until it has been inspected by the OWNER or its authorized representative. Any Work so covered in the absence of inspection shall be subject to uncovering. Where un-inspected Work cannot be uncovered, such as in concrete cast over reinforcing steel, all such Work shall be subject to demolition, removal,

and reconstruction under proper inspection and no additional payment will be allowed therefore.

#### 1.12 TIME OF OBSERVATION AND TESTS

- A. Samples and test specimens required under these Specifications shall be furnished and prepared for testing in ample time for the completion of the necessary tests and analyses before said articles or materials are to be used. The CONTRACTOR shall furnish and prepare all required test specimens within the scope of the Contract. Except as otherwise provided in the Contract Documents, performance of the required tests will be by the OWNER, and all costs therefore will be borne by the OWNER at no cost to the CONTRACTOR, except that the costs of any test which shows unsatisfactory results shall be borne by the CONTRACTOR. Whenever the CONTRACTOR is ready to backfill, bury, cast in concrete, hide, or otherwise cover any Work under the Contract, the OWNER shall be notified not less than twenty-four hours in advance to request inspection before beginning any such Work of covering. Failure of the CONTRACTOR to notify the OWNER at least twenty-four hours in advance of any such inspections shall be reasonable cause for the OWNER to order a sufficient delay in the CONTRACTOR's schedule to allow time for such inspections and any remedial or corrective Work required, and all costs of such delays, including its effect upon other portions of the Work, shall be borne by the CONTRACTOR.

#### PART 2 --PRODUCTS (Not Used)

#### PART 3 -- EXECUTION (Not Used)

- END OF SECTION -

## SECTION 01510- TEMPORARY UTILITIES

### PART 1 --GENERAL

#### 1.01 THE REQUIREMENT

- A. It shall be the CONTRACTOR's responsibility to provide equipment that is adequate for the performance of the Work under this Contract within the time specified. All equipment shall be kept in satisfactory operating condition, shall be capable of safely and efficiently performing the required Work, and shall be subject to inspection and review by the OWNER's representative at any time within the duration of the Contract. All Work hereunder shall conform to the applicable requirements of the OSHA Standards for Construction.
- B. The CONTRACTOR shall provide for utilities and services for its own operations. The CONTRACTOR shall furnish, install and maintain all temporary utilities during the contract period including removal upon completion of the Work.

#### 1.02 POWER AND LIGHTING

- A. Power: The CONTRACTOR shall provide all necessary power required for its operations under the Contract, and shall provide and maintain all temporary power lines required to perform the Work in a safe and satisfactory manner.
- B. Construction Lighting: All Work conducted at night or under conditions of deficient daylight shall be suitably lighted to insure proper Work and to afford adequate facilities for inspection and safe working conditions. Temporary lighting shall be maintained during nonworking periods if the area is subject to access by the public.
- C. Electrical Connections: All temporary connections for electricity shall be subject to review by the OWNER and the power company representative, and shall be removed in like manner at the CONTRACTOR's expense prior to final acceptance of the Work.
- D. Separation of Circuits: Unless otherwise permitted by the OWNER circuits separate from lighting circuits shall be used for all power purposes.
- E. Construction Wiring: All wiring for temporary electric light and power shall be properly installed and maintained and shall be securely fastened in place. All electrical facilities shall conform to the requirements of Subpart K of the OSHA Safety and Health Standards for Construction.

#### 1.03 WATER SUPPLY

- A. General: The CONTRACTOR shall supply, and pay for all costs for all water used for construction, flushing and testing. The CONTRACTOR shall provide and maintain all meters, piping, fittings, adapters, and valving required.
- B. Potable Water: All drinking water on the site during construction shall be furnished by the CONTRACTOR and shall be bottled water or water furnished in suitable dispensers.

Notices shall be posted conspicuously throughout the site warning the CONTRACTOR's personnel that piped water may be contaminated.

- C. Water Connections: The CONTRACTOR shall not make connection to, or draw water from, any fire hydrant or pipeline without first obtaining permission of the authority having jurisdiction over the use of said fire hydrant or pipeline and from the agency owning the affected water system. For each such connection made, the CONTRACTOR shall first attach to the fire hydrant or pipeline a valve and a meter, if required by the said authority, of a size and type acceptable to said authority and agency.
- D. Removal of Water Connections: Before final acceptance of the Work on the project, all temporary connections and piping installed by the CONTRACTOR shall be entirely removed, and all affected improvements shall be restored to their original condition, or better, to the satisfaction of the OWNER and to the agency owning the affected utility.
- E. Fire Protection: The construction, and all other parts of the Work shall be adequately protected against damage by fire. Hose connections and hose, water casks, chemical equipment, or other sufficient means shall be provided for fighting fires in the temporary structures and other portions of the Work, and responsible persons shall be designated and instructed in the operation of such fire apparatus so as to prevent or minimize the hazard of fire. The CONTRACTOR's fire protection program shall conform to the requirements of Subpart F of the OSHA Standards for Construction.

#### 1.04 SANITATION

- A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.
- B. Such facilities shall be made available when the first employees arrive on the Work, shall be properly secluded from public observation, and shall be constructed and maintained in suitable numbers and at such points and in such manner as may be required.
- C. The CONTRACTOR shall maintain the sanitary facilities in a satisfactory and sanitary condition at all time and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the OWNER, or an adjacent property.
- D. The OWNER shall have the right to inspect any building or other facility erected, maintained, or used by the CONTRACTOR, to determine whether or not the sanitary regulations have been complied with.
- E. Sanitary and Other Organic Wastes: The CONTRACTOR shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR's operations shall be disposed of away from the site in a manner satisfactory to the OWNER and in accordance with all laws and regulations pertaining thereto.

#### 1.05 TEMPORARY VENTILATION

- A. The CONTRACTOR shall provide and maintain adequate ventilation for a safe working environment. In addition, forced air ventilation shall be provided for the curing of installed materials, humidity control and the prevention of hazardous accumulations of dust, gases or vapors.

PART 2 --PRODUCTS- (Not Used)

PART 3 --EXECUTION- (Not Used)

-END OF SECTION-

19-7101

Gravity Sewer System Condition Assessment and Renewal (Inflow / Infiltration I/I) Program (Level 2) Manhole Repairs

01510-4

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 OWNER.
- C. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility.

1.02 RIGHTS-OF-WAY

- A. The CONTRACTOR shall not do any Work that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure, nor shall the CONTRACTOR enter upon any rights-of-way involved until notified that the OWNER has secured authority therefore from the proper party. After authority has been obtained, the CONTRACTOR shall give said party due notice of its intention to begin Work, and shall give said party convenient access and every opportunity for removing, shoring, supporting, or otherwise protecting such pipeline, transmission line, ditch, fence, or structure, and for replacing same. 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 OWNER 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 contract, such privilege of access or any other reasonable privilege may be granted by the OWNER to the CONTRACTOR so desiring, to the extent, amount, in the manner, and at the times permitted. No such decision as to the method or time of conducting the Work or the use of territory shall be made the basis of any claim for delay or damage.

1.03 PROTECTION OF STREET OR ROADWAY MARKERS

- A. The CONTRACTOR shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced for easy and accurate restoration. It shall be the CONTRACTOR's responsibility to notify the proper representatives of the OWNER of the time and location that Work will be done. Such notification shall be sufficiently in advance of construction so that there will be no delay due

to waiting for survey points to be satisfactorily referenced for restoration. All survey markers or points disturbed by the CONTRACTOR without proper authorization by the OWNER, will be accurately restored by the Owner at the CONTRACTOR's expense after all street or roadway resurfacing has been completed.

#### 1.04 RESTORATION OF FACILITIES

- 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 owner. All pavements which are subject to partial removal shall be neatly saw cut in straight lines. Within five working days of the pipe installation, temporary restoration shall be completed. 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 restoration requirements have been called for in the Contract Documents or in the requirements of the agency issuing the permit.
- 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 OWNER.
- 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 of 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 directed by the OWNER.
- E. Temporary Restoration of Sidewalks or Private Driveways: Wherever sidewalks or private driveways have been removed for purposes of construction, the CONTRACTOR shall place suitable temporary sidewalks or driveways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions before proceeding with the final restoration or, if no such period of times is so fixed, the CONTRACTOR shall maintain said temporary sidewalks or driveways until the final restoration thereof has been made.



- F. 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 marking, etc., all complete and finished, acceptable to the OWNER.

#### 1.05 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. The CONTRACTOR shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.
- 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 OWNER to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the CONTRACTOR shall notify the OWNER 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 OWNER and the OWNER of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the CONTRACTOR in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.
- D. OWNER's Right of Access: The right is reserved to the OWNER 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.
- F. Underground Utilities Not Shown or Indicated: In the event that the CONTRACTOR damages any existing utility lines that are not shown or the locations of which are not made known to the CONTRACTOR prior to excavation, a written report thereof shall be made immediately to the OWNER. If directed by the OWNER, repairs shall be made by the CONTRACTOR under the provisions for changes and extra Work contained in the General

Conditions.

- G. All costs of locating, repairing damage not due to failure of the CONTRACTOR to exercise reasonable care, and removing or relocating such utility facilities not shown in the Contract Documents with reasonable accuracy, and for equipment on the project which was actually working on that portion of the Work which was interrupted or idled by removal or relocation of such utility facilities, and which was necessarily idled during such Work will be paid for as extra Work in accordance with the provisions of the General Conditions. Compensation shall not include CONTRACTOR's costs for the coordination of his activities with the utility company affected. CONTRACTOR shall schedule his work in such a manner that he is not delayed by the utilities companies relocating or supporting their facilities. No compensation will be paid the CONTRACTOR for any loss of time or delay.
- H. Approval of Repairs: All repairs to a damaged improvement are subject to inspection and approval by an authorized representative of the improvement owner before being concealed by backfill or other Work.
- I. Maintaining in Service: All oil and gasoline pipelines, power, and telephone or other communication cable ducts, gas and water mains, irrigation 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 OWNER are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The CONTRACTOR shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.
- J. The CONTRACTOR shall be solely and directly responsible to the OWNER and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions or claims of any character brought because of any injuries or damage which may result from the construction operations under this Contract.
- K. Neither the OWNER nor its officers or agents shall be responsible to the CONTRACTOR for damages as a result of the CONTRACTOR's failure to protect utilities encountered in the work.
- L. In the event of interruption to domestic water, sewer, storm drain or other utility services as a result of accidental breakage due to construction operations, promptly notify the proper authority. Cooperate with said authority in restoration of service as promptly as possible and bear all costs of repair. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless prior approval is granted.

#### 1.06 TREES WITHIN STREET RIGHTS-OF-WAY AND PROJECT LIMITS

- A. General: The CONTRACTOR shall exercise all necessary precautions so as not to damage or destroy any trees or shrubs, including those lying within street rights-of-way and project limits, and shall not trim, relocate or remove any trees unless such trees have been approved for trimming or removal by the jurisdictional agency or OWNER. All existing trees and shrubs which are damaged during construction shall be trimmed or replaced by the CONTRACTOR or a certified tree company under permit from the jurisdictional agency or

OWNER and to the satisfaction of said agency and/or the OWNER Tree trimming and replacement shall be accomplished in accordance with the following paragraphs.

- B. Trimming: Symmetry of the tree shall be preserved; no stubs or splits or torn branches left; clean cuts shall be made close to trunk or large branch. Spikes shall not be used for climbing live trees. All cuts over 1-1/2 inches in diameter shall be coated with an asphaltic emulsion material.
- C. Replacement: The CONTRACTOR shall immediately notify the jurisdictional agency and/or the OWNER if any tree is damaged by the CONTRACTOR's operations. If, in the opinion of said agency or the OWNER, the damage is such that replacement is necessary, the CONTRACTOR shall replace the tree at his own expense. The tree shall be of a like size and variety as the tree damaged, or, if of a smaller size, the CONTRACTOR shall pay to the OWNER of said tree compensatory payment acceptable to the tree owner, subject to the approval of the jurisdictional agency or OWNER.

#### 1.07 NOTIFICATION BY THE CONTRACTOR

- A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way the CONTRACTOR shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than three days nor more than seven days prior to excavation, so that a representative of said owners or agencies can be present during such Work if they so desire. The CONTRACTOR shall also notify Sunshine State One-Call of Florida, Inc. at 1-800-432-4770 at least two days, but no more than fourteen days prior to such excavation.
- B. The CONTRACTOR shall prepare a written notice to property owners adjacent to the project work site notifying them of the schedule of work affecting them and anticipated inconveniences they may expect. The notice shall meet the approval of the OWNER and be delivered to property owners at least 72 hours prior to construction adjacent to their property.

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.

#### 1.02 TEMPORARY CROSSINGS

- A. 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 the Work hereunder, and he shall so conduct his operations as not to interfere unnecessarily with the authorized work of utility companies or other agencies in such streets, alleys, ways, or parking areas. No street shall be closed to the public without first obtaining permission of the OWNER 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. Toe boards shall be provided to retain excavated material if required by the OWNER 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.
- B. Traffic Control: For the protection of traffic in public or private streets and ways, 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, Part VI- Traffic Controls for Street and Highway Construction and Maintenance Operations," published by U.S. Department of transportation, Federal Highway Administration (ANSI D6.1).
- 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 Subpart G, Part 1926, of the OSHA Safety and Health Standards for Construction.
- 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.
- F. Temporary Driveway Closure: The CONTRACTOR shall notify the OWNER or occupant (if not owner-occupied) of the closure of the driveways to be closed more than one eight-hour work day, at least three 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: Wherever necessary or required for the convenience of the public or individual residents at street or highway crossings, private driveways, or elsewhere, the CONTRACTOR shall provide suitable temporary bridges or steel plates over unfilled excavations, except in such cases as the CONTRACTOR shall secure the written consent of the individuals and authorities concerned to omit such temporary bridges or steel plates, which written consent shall be delivered to the OWNER 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 STORAGE

- A. The CONTRACTOR shall store his equipment and materials at the CONTRACTOR's base of operations in accordance with the manufacturer's recommendations and as indicated by the OWNER. No storage facility is provided by the OWNER.
- 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 OWNER 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. Upon completion of the Contract, the CONTRACTOR shall remove from the storage areas all of their equipment, temporary fencing, surplus materials, rubbish, etc., and restore the area to its original or better conditions.
- D. The CONTRACTOR's storage shall be limited to on-site storage only. Off-site storage of materials, if required, shall be arranged for by the CONTRACTOR and a copy of an agreement for use of other property shall be furnished to the OWNER.

### PART 2 -- PRODUCTS (Not Used)

### PART 3 --EXECUTION (Not Used)

-END OF SECTION-

## SECTION 01560 -TEMPORARY ENVIRONMENTAL CONTROLS

### PART 1 --GENERAL

#### 1.01 EXPLOSIVES AND BLASTING

- A. The use of explosives on the Work will not be permitted.

#### 1.02 DUST ABATEMENT

- A. The CONTRACTOR shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. The CONTRACTOR shall be responsible for any damage resulting from any dust originating from its operations. The dust abatement measures shall be continued until the CONTRACTOR is relieved of further responsibility by the OWNER. No separate payment will be allowed for dust abatement measures and all costs thereof shall be included in the CONTRACTOR's bid price.

#### 1.03 RUBBISH CONTROL

- A. During the progress of the Work, the CONTRACTOR shall keep the site of the Work and other areas used in a neat and clean condition, and free from any accumulation of rubbish. The CONTRACTOR shall dispose of all rubbish and waste materials of any nature occurring at the Work site, and shall establish regular intervals of collection and disposal of such materials and waste. The CONTRACTOR shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

#### 1.04 SANITATION

- A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for use of employees. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.
- B. Such facilities shall be made available when the first employees arrive on the Work, shall be properly secluded from public observation, and shall be constructed and maintained in suitable numbers and at such points and in such manner as may be required.
- C. The CONTRACTOR shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. He shall rigorously prohibit the committing of nuisances on the site of the Work, on the lands of the OWNER, or an adjacent property.

- D. The OWNER shall have the right to inspect any building or other facility erected, maintained, or used by the CONTRACTOR, to determine whether or not the sanitary regulations have been complied with.
- E. Sanitary and Other Organic Wastes: The CONTRACTOR shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR's operations shall be disposed of away from the site in a manner satisfactory to the OWNER and in accordance with all laws and regulations pertaining thereto.

#### 1.05 CHEMICALS

- A All chemicals used during project construction or furnished for project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, paint, fuel, solvent or reactant of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. The handling, storage, use and disposal of all such chemicals and disposal of residues shall be in strict accordance with all applicable rules and regulations of Federal, State and local jurisdictional agencies and the printed instructions of the manufacturer and all regulatory requirements. Copies of antidote literature shall be kept at the storage site and at the CONTRACTOR's job site office. A supply of antidotes shall be kept at the CONTRACTOR's office.

#### 1.06 NOISE CONTROL

- A Noise resulting from the CONTRACTOR's work shall not exceed the noise levels and other requirements stated in local ordinances. The CONTRACTOR shall be responsible for curtailing noise resulting from his operation. He shall, upon written notification from the OWNER or the noise control officers, make any repairs, replacements, adjustments, additions and furnish mufflers when necessary to fulfill requirements.

#### 1.07 EROSION ABATEMENT AND WATER POLLUTION

- A It is imperative that any CONTRACTOR dewatering operation should not contaminate or disturb the environment of the 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 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 silting 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 its commencing work.

#### 1.08 PRECAUTIONS DURING ADVERSE WEATHER

- A. During adverse weather, and against the possibility thereof, the CONTRACTOR shall take all necessary precautions so that the work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building paper shelters, or other acceptable means. The CONTRACTOR shall be responsible for all changes caused by adverse weather.
- B. The OWNER may suspend construction operations at any time when, in his judgment, the conditions are unsuitable or the proper precautions are not being taken, whatever the weather conditions may be, in any season.

#### 1.09 HURRICANE AND STORM WARNINGS

- A. During such periods of time as are designated by the United States Weather Bureau as being a hurricane alert, watch or warning, the CONTRACTOR shall perform all precautions as necessary to safeguard the work and property, including the removal of all small equipment and materials from the site, lashing all other equipment and materials to each other and to rigid construction, and any other safety measures as indicated below.
- B. The CONTRACTOR shall submit to the OWNER, for review and approval, a Plan of Action describing the procedures to be followed by the CONTRACTOR in the event of a Hurricane Alert, Watch, or Warning.
- C. Upon Notification of a Hurricane Alert:
  - 1. Upon issuance of a Hurricane Alert by the County Manager, all CONTRACTORS performing work within the right-of-way of a designated evacuation route shall immediately secure their work, backfill all excavations within the right-of-way and suitably prepare the roadway surface for full traffic flow. This work shall be completed within 24 hours of the issuance of the alert. Work shall not recommence until the "All Clear" is issued by the County Manager.
  - 2. CONTRACTORS performing at all other locations shall remove all unnecessary debris, materials, and equipment from the job site. The CONTRACTOR shall also keep his crew on standby on weekends and holidays during the Hurricane Alert period.
- D. Upon Notification of a Hurricane Watch:
  - 1. CONTRACTORS shall implement their approved Plan of Action to protect the project and the public.
- E. Upon Notification of a Hurricane Warning
  - 1. CONTRACTORS shall implement their approved Plan of Action to protect the project and the public.



2. For work within the public right-of-ways, the CONTRACTOR will be notified by the OWNER to suspend his construction operations. The CONTRACTOR will backfill all open trenches, remove all construction equipment and materials from the right-of- way and secure operations pending further notice.

#### 1.10 PERIODIC CLEANUP AND BASIC SITE RESTORATION

- A. During construction, the CONTRACTOR shall regularly remove from the site all accumulated debris and surplus materials of any kind which results from its operations. Unused equipment and tools shall be stored at the CONTRACTOR's yard or base of operations for the project.
- B. The CONTRACTOR shall perform the cleanup work on a regular basis and as frequently as ordered by the OWNER. 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 OWNER, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.
- C. Upon failure of the CONTRACTOR to perform periodic clean-up and basic restoration of the site to the OWNER's satisfaction, the OWNER may, upon 5 days prior written notice to the CONTRACTOR, employ such labor and equipment as it deems necessary for the purpose, and all costs resulting therefrom shall be charged to the CONTRACTOR and deducted from amounts of money that it may be due.
- D. The CONTRACTOR's storage shall be limited to on-site storage only. Off-site storage of materials, if required, shall be arranged for by the CONTRACTOR and a copy of an agreement for use of other property shall be furnished to the OWNER.

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 Florida State Department of Transportation, the County, and other local authorities having jurisdiction, to maintain adequate warning signs, lights, barriers, etc., for the protection of traffic on public roadways.
- 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, county and local regulations. He shall conduct his 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 and flagmen shall be provided as may be necessary for the protection of traffic.
- C. Maintenance of Traffic Plans (M.O.T.): When required for specific repairs, the CONTRACTOR shall immediately prepare and submit Maintenance of Traffic (M.O.T.) Plans for approval by authorities having jurisdiction. The traffic maintenance plan must meet the requirements of such authorities. Said M.O.T. Plans shall be in written form with sketches or drawings as necessary and shall comply with the State of Florida Department of Transportation standards for M.O.T. in construction areas. The Plans shall be submitted as soon as possible and not later than two weeks prior to any applicable construction work. A copy of the approval shall be provided to the OWNER.
- D. The CONTRACTOR shall maintain one copy of the approved M.O.T. plan at the construction site for inspection. The OWNER reserves the right to observe the M.O.T. plan in use and to make any changes as field conditions warrant. Any changes shall supersede the plan and be done at the CONTRACTOR's expense.
- E. The CONTRACTOR and his personnel are cautioned against parking vehicles in the business zones for any extended period of time. If necessary, the CONTRACTOR shall obtain offsite parking areas for his personnel.
- F. All dirt spilled from the CONTRACTOR's trucks on existing pavements shall be removed by the CONTRACTOR whenever in the opinion of the OWNER the accumulation is sufficient to cause the formation of mud, dust, interference with traffic or create a traffic hazard.
- G. The CONTRACTOR shall comply with all traffic regulations and perform maintenance of traffic as part of his site operation. No separate payment item shall be made.

PART 2 --PRODUCTS- (Not  
Used) PART 3 -- EXECUTION -  
(Not Used)

- END OF SECTION -

## SECTION 01600 – MATERIALS

### PART 1 --GENERAL

#### 1.01 THE REQUIREMENT

- A. The word "Products", as used herein, is defined to include purchased items for incorporation into the Work, regardless of whether specifically purchased for the project or taken from CONTRACTOR's stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form units of Work. Definitions in this paragraph are not intended to negate the meaning of other terms used in Contract Documents, including "specialties", "systems", "structure", "finishes", "accessories", "furnishings", "special construction", and similar terms, which are self-explanatory and have recognized meanings in the construction industry.
- B. All equipment, materials, instruments or devices incorporated in this project shall be new and unused, unless indicated otherwise in the Contract Documents.

#### 1.02 QUALITY ASSURANCE

- A. All materials and equipment shall conform to Section 01400, "Quality Control".

#### 1.03 PRODUCT DELIVERY-STORAGE-HANDLING

- A. The CONTRACTOR shall deliver, handle, and store products in accordance with supplier's written recommendations and as directed by the OWNER, and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at site and overcrowding of construction spaces. In particular, the CONTRACTOR shall provide delivery/installation coordination to ensure minimum holding or storage times for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.
- 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 supplier 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.
- D. Products shall be transported by methods to avoid product damage and shall be delivered in undamaged condition in supplier's unopened containers or packaging, dry.
- E. The CONTRACTOR shall provide equipment and personnel to handle products and materials by methods to prevent soiling and damage.

- F. The CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

#### 1.04 STORAGE AND PROTECTION

- A. General: Products shall be stored in accordance with supplier's written instructions, with seals and labels intact and legible. Sensitive products shall be stored in weather-tight enclosures and temperature and humidity ranges shall be maintained within tolerances required by supplier's written instructions.
- B. For exterior storage of fabricated products, they shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering; ventilation shall be provided to avoid condensation.
- C. Loose granular materials shall be stored on solid surfaces in a well-drained area and shall be prevented from mixing with foreign matter.
- D. Storage shall be arranged to provide access for maintenance of stored items and for inspection. The CONTRACTOR shall periodically inspect to assure products are undamaged and are maintained under required conditions. The CONTRACTOR shall maintain a log of inspections and shall make said log available to the OWNER on request.
- E. The CONTRACTOR shall verify that storage facilities comply with supplier's product storage requirements and verify that supplier-required environmental conditions are maintained continually.
- F. The CONTRACTOR shall verify that surfaces of products exposed to the elements are not adversely affected and that any weathering of finishes is acceptable under requirements of Contract Documents.
- G. Weather Conditions: 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.
- H. Fire Protection: The CONTRACTOR shall take all necessary precautions to prevent fires at or adjacent to the Work, including its own buildings and trailers. Adequate fire extinguisher and hose line stations shall be provided throughout the work area.

#### 1.05 FASTENERS

- A. All necessary bolts, anchor bolts, nuts, washers, plates and bolt sleeves shall be furnished by the CONTRACTOR in accordance herewith. Bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.
- B. All anchor bolts and other types of anchors embedded, drilled, inserted or driven in concrete,  
including nuts, washers, plates, and bolt sleeves, shall be Type 316 stainless steel

unless otherwise specifically specified as another material.

- C. Unless otherwise specified, stud, tap, and machine bolts shall be of the best quality refined bar iron. Hexagonal nuts of the same quality of metal as the bolts shall be used.

#### 1.06 SALVAGED AND EXCAVATED MATERIALS

- A. In the absence of special provisions in other Sections of the Specifications, salvage materials, equipment or supplies that occur are the property of the OWNER and shall be cleaned and stored as directed by the OWNER.
- B. All materials, including excavated materials needed for backfilling operation, shall be stored on site. Where additional area is needed for stockpiling, off-site storage of any materials shall be arranged for by the CONTRACTOR and a copy of an agreement for use of other property shall be furnished to the OWNER.

PART 2 --PRODUCTS (Not

Used) PART 3 --EXECUTION

(Not Used)

- END OF SECTION

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## SECTION 01700- PROJECT CLOSEOUT

### PART 1 --GENERAL

#### 1.01 FINAL CLEANUP

- A. The CONTRACTOR shall promptly remove from the vicinity of the completed Work, all rubbish, unused materials, concrete forms, construction equipment, temporary structures and facilities, construction signs, tools, scaffolding, materials, supplies and equipment which may have been used in the performance of the work. The CONTRACTOR shall broom clean paved surfaces and rake clean other surfaces of grounds. Final acceptance of the Work by the OWNER will be withheld until the CONTRACTOR has satisfactorily complied with the foregoing requirements for final cleanup of the project site.
- B. The CONTRACTOR shall thoroughly clean all materials, equipment and structures; all marred surfaces shall be touched up to match adjacent surfaces.
- C. The CONTRACTOR shall remove spatter, grease, stains, fingerprints, dirt, dust, labels, tags, packing materials and other foreign items or substances from interior and exterior surfaces, equipment, signs and lettering.
- D. The CONTRACTOR shall remove paint, clean and restore all equipment and material nameplates, labels and other identification markings.
- E. The CONTRACTOR shall maintain cleaning until project, or portion thereof, is accepted by the OWNER.
- F. The CONTRACTOR shall:
  - 1. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
  - 2. Use each type of cleaning material on only those surfaces recommended by the cleaning material manufacturer.
  - 3. Use only materials which will not create hazards to health or property.

#### 1.02 CLOSEOUT TIMETABLE

- A. The CONTRACTOR shall establish dates for 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 OWNER and its authorized representatives sufficient time to schedule attendance at such activities.

### 1.03 FINAL SUBMITTALS

- A. Before the final acceptance of the project, the CONTRACTOR shall submit to the OWNER certain records, certifications, etc., which are specified elsewhere in the Contract Documents. Missing, incomplete or unacceptable items, as determined by the OWNER, shall constitute grounds for withholding final payment to the CONTRACTOR. 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. Written guarantees, where required.
  - 3. Certificates of inspection and acceptance by local governing agencies having jurisdiction.
  - 4. Video recordings and logs of all lines televised.
  - 5. Pre-construction photos (5" x 7").
  - 6. Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

### 1.04 PUNCH LISTS

- A. Final cleaning shall be scheduled upon completion of the project.
- B. The OWNER will make his final inspection whenever the CONTRACTOR has notified the OWNER 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 OWNER 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 OWNER that it is ready for final inspection. This procedure will continue until the entire project is accepted by the OWNER. The "Final Payment" will not be processed until the entire project has been accepted by the OWNER and all of the requirements in previous Article 1.03 "Final Submittals" have been satisfied.

### 1.05 TOUCH-UP AND REPAIR

- A. The CONTRACTOR shall touch-up and repair damage to all existing facilities and surfaces. If in the opinion of the OWNER the touch-up work is not satisfactory, the CONTRACTOR shall repeat the item.

### 1.06 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 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 OWNER or public agency releasing the OWNER from further responsibility in connection with such repair or resurfacing.

PART 2 -- PRODUCTS (Not

Used) PART 3 EXECUTION

(Not Used)

-END OF SECTION-

*DIVISION 2 – SITE WORK*

## SECTION 02070

### SANITARY SEWER MANHOLES

#### **Part 1 - GENERAL**

##### 1.01 SCOPE

- A. The work specified in this Section includes all labor, materials, accessories, equipment and tools required for the construction, installation and testing of precast concrete sanitary sewer manholes, with or without outside drop connections. Manholes shall be located along sanitary sewer mains or at the intersection ("T") of sanitary sewer mains. Work in this section also includes frame/rim leveling and adjustment, manhole coatings, invert flow channels, connections to new and existing manholes, and connections to existing sewer.

##### 1.02 RELATED WORK

- A. Section 01300 – Submittals
- B. Section 01570 - Traffic Regulation and Maintenance of Traffic
- C. Section 02222 - Excavation and Backfill for Utilities
- D. Section 02141 - Temporary Bypass Pumping Systems
- E. Section 02755 - Lining Installation

##### 1.03 REFERENCES

- A. American Society for Testing and Materials/Latest Edition
  - 1. ASTM A-48 - Specification for Gray Iron Casting
  - 2. ASTM C-62 - Specification for Sewer and Manhole Brick
  - 3. ASTM C-139 - Specification for Concrete Masonry Units for Construction
  - 4. ASTM C-443 - Specification for Joints for Circular Concrete, Sewer and Culvert
  - 5. ASTM C-478 - Specification for Pre-Cast Reinforced Concrete Manhole Sections
  - 6. ASTM C-923 - Specification for Resilient Connections Between Reinforced Concrete Manhole Structures and Pipes
  - 7. ASTM C-1244 - Air Testing

##### 1.04 SUBMITTALS

- A. The CONTRACTOR shall submit Shop Drawings and other information for review in accordance with Section 01300 - Submittals, including: dimensions; elevations; dewatering, sheeting and bracing plans; cement type; concrete strength; reinforcement; lifting hooks; joint material; openings; castings; and other applicable information.

## SECTION 02070

### SANITARY SEWER MANHOLES

#### B. Qualification

1. The Qualifications of the Manhole Installation Contractor shall be submitted prior to contract award. These qualifications shall include detailed description of the following:
  - (a) Name, business address and telephone number of the Manhole Installation CONTRACTOR.
  - (b) Names of all supervisory personnel to be directly involved with manhole installation for the project.
  - (c) The CONTRACTOR shall sign and date the information provided and certify that to the extent of his/her knowledge, the information is true and accurate, and that supervisory personnel will be directly involved in this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the OWNER.
  - (d) The CONTRACTOR shall provide his references of previous project lists going back five years including his customers' name, address, and telephone number.
  - (e) Five years of previous related experience shall be required to be qualified in bidding this project.

#### 1.05 UPLIFT

- A. All precast concrete manholes placed below grade shall have adequate safety factors against uplift (excluding weight of soil and associated skin friction) as follows:

<u>Water Elevation</u>	<u>Safety Factor</u>
High water level (H.W.L) -	1.5
100 year flood elevation -	1.2

### **Part 2 - PRODUCTS**

#### 2.01 FRAMES AND COVERS

- A. All workmanship and materials shall be of the highest quality. The manhole ring and cover shall be the product of a manufacturer actively engaged in research, development, and manufacturing of watertight manhole rings and covers.
- B. Castings for frames and covers for manholes shall be composed of best quality, tough, gray iron, free from cold shuts, blow holes, and other

## SECTION 02070

### SANITARY SEWER MANHOLES

imperfections, and shall meet the requirements of ASTM A-48 for Class No. 30B, designed for AASHTO Highway Loading Class H-20.

- C. All bearing surfaces shall be machined to fit true and shall be watertight. No plugging or filling will be allowed.
- D. The combined weight of the frame and cover shall not be less than 395 pounds and cover shall weigh a minimum of 155 pounds.
- E. All sanitary sewer manhole covers shall bear the words "Sanitary Sewer", and contain two non-penetrating pick holes.
- F. Frame and cover shall be set to grade. Lid adapters or adjustment rings shall not be used on new construction.
- G. Frames and covers shall be U.S. Foundry 485-C-ORS or approved equal.

### 2.02 PRECAST MANHOLES

- A. Precast concrete manholes or sections (hereinafter referred to as "precast sections") shall be furnished with waterstops, sleeves and openings as noted on the Drawings. Box out for wall pipes shall conform accurately to the sizes and elevations of the adjoining pipes. Precast sections shall be watertight and conform to the requirements of ASTM C 478 with reinforcement of ASTM A 615, Grade 60 bars and the following modifications there to:
  - 1. The minimum wall thickness shall be 8 inches.
  - 2. Cement to be used in precast manholes and grout shall be ASTM C 150, Type II.
  - 3. The date and name of manufacturer shall be marked inside each precast sections.
  - 4. No more than 2 lift holes may be cast or drilled in each section.
  - 5. Minimum 28-day concrete strength shall be 4,000 psi.
- B. Walls of manholes shall be constructed of reinforced concrete ring sections with a minimum inside diameter of forty-eight (48) inches. Riser sections shall have tongue and groove ends (tongue on top of section). Top sections shall be of eccentric cone or flat slab top design as required by the Drawings. Eccentric cones shall have the same minimum wall thickness and area of circumferential steel reinforcement as the round riser sections. Flat slab tops shall have a minimum thickness of eight (8) inches and shall be reinforced with steel in accordance with the design requirements specified in ASTM C-478.

Top sections shall have a top width of such design and dimensions as to properly support the required manhole frame and cover and the lower joint shall be of tongue and groove design.

## SECTION 02070

### SANITARY SEWER MANHOLES

- C. Top sections of cones or flat tops shall have an opening of thirty (30) inches.

#### 2.03 REINFORCED CONCRETE BASES

- A. Pre-cast reinforced concrete bases shall normally be used in lieu of cast-in-place concrete bases.
- B. The base, for either type, shall extend six (6) inches beyond the outside face of the manhole wall and shall be at least eight (8) inches thick.
- C. Bottom section walls shall be monolithically cast with the base section to a minimum height of three feet (3') from the bottom of the base slab.
- D. Pre-poured flow lines in base are generally not accepted and will be approved only after inspection of a completed example.

#### 2.04 MANHOLE LINER

Refer to Section 02755 - Lining Installation

#### 2.05 MANUFACTURER

- A. Manhole structure and liner shall be manufactured by U.S. Precast Corporation, or approved equal.

#### 2.06 PRE-CAST CONCRETE GRADE RINGS

- A. Grade rings shall be pre-cast; reinforced concrete in solid rings a minimum of 8" wide from 1" to 4" thick.
- B. Pre-cast concrete (grade) rings shall be manufactured in accordance with ASTM C-478.
- C. Rings shall have dimensions matching inside diameter of cone or flat top sections and be of adequate outside diameter to support full manhole frame.
- D. Field molding of grade rings is prohibited.

#### 2.07 GRADE RING SEALANTS

- A. Grade rings shall be installed using modified polymer sealant/adhesive between each sealing face, Evergrip 990 Series or equal with approved submittal

## SECTION 02070

### SANITARY SEWER MANHOLES

#### 2.09 MANHOLE CHIMNEY SEALS

- A. The frame chimney joint area of new manholes shall be sealed with flexible rubber chimney sleeve as specified in Section 02755 – Lining Installation.

#### 2.10 GASKETS AND FINISH

- A. Sections shall be joined with a mastic compound set into the annular space cast into the spigot ends of bell and spigot type joints to form a watertight seal. Sealing compound shall be of either bituminous or butyl rubber. Material shall be in strip or rope form, supplied with a two-piece cover to preclude adhesion until use. Approved sealing compounds:

1. Ramnek
2. Lockstop
3. Equal with approved submittals.

- B. Finish for inside and outside of new concrete manhole sections shall be SewperCoat® mortar (or approved equal) applied in accordance with the manufacture's recommendations and as per Section 2071, "Spray Linings and Coatings for Sanitary Sewer".

#### 2.11 PIPE OPENINGS

- A. Adapter couplings are required on all pipe connections to the structure, sized for respective pipe.
- B. Pipe opening shall be fitted with seals cast integrally with manhole section, sized to fit pipe specified, and set at correct elevation and location, or,
- C. Pipe openings shall be pre-cast four inches (4") larger than the pipe with a keyway all around the opening.
- D. Approved pipe seal manufacturers:

1. Dura Tech, Inc. - DUAL SEAL II-III
2. Press Seal Gasket Corporation - PRES SEAL
3. A-Lok Products Corporation - A-Lok MH Pipe Seal
4. Equal with approved submittals

#### 2.12 PIPE-TO-MANHOLE SLEEVE

- A. Sewer pipe shall be connected to new manhole by using a flexible manhole sleeve made from ethylene propylene rubber and conformed to ASTM C-923. The sleeve shall be secured to the pipe by a clamp and grouted.
- B. The sleeve shall be manufactured by Chardon Rubber Company, (440) 285-2161, or approved equal.

## SECTION 02070

### SANITARY SEWER MANHOLES

#### **Part 3 - EXECUTION**

##### 3.01 PREPARATION

- A. Traffic Control. The CONTRACTOR is required to obtain all permits, use appropriate traffic regulating devices, notify all appropriate governmental agencies and conform to all the requirements listed in Section 01570 - Traffic Regulation and Maintenance of Traffic.
- B. Flow Control. Flow control shall be exercised as required to ensure that no flowing sewage comes into contact with sections of the manhole under construction.
  - 1. Plugging and Blocking of Flow. A sewer line plug shall be inserted into the line at a manhole upstream from the section to be inspected. The plug shall be so designed that all or any portion of the sewage flows can be released. During the inspection, testing and replacement portion of the construction, flows shall be shut off or substantially reduced as indicated by the OWNER. The upstream manholes shall be constantly monitored for degree of surcharging. After the testing, inspection or repair is complete, flows shall be restored to normal level.
  - 2. Pumping and Bypassing of Flow. Wherever lines are blocked off and the possibility of backing up the sewage and causing harm to public and private property is foreseen, it shall be the CONTRACTOR's responsibility to bypass flow from manhole to manhole. See Section 02141 – Temporary Bypass Pumping Systems.
  - 3. Bypassing shall be accomplished using sewer plugs with pump connections, by pumping down surcharged manholes, or by other methods acceptable to the OWNER. All bypassed flow must be discharged to a sanitary sewer. Bypassed flow shall not be allowed to enter any storm line, drainage ditch or street gutter.
  - 4. During a bypass operation, the pump shall be manned continuously. The CONTRACTOR shall maintain the pump and bypass equipment and shall be responsible for any damages to public or private property due to the malfunction of same.

##### 3.02 EXCAVATION AND BACKFILL

- A. The CONTRACTOR shall excavate, backfill, and compact in accordance with Section 02222 - Excavation and Backfill for Utilities. Under no circumstances shall the CONTRACTOR be allowed to remove concrete or asphalt without prior cutting. The saw cutting shall be deep enough to produce an even, straight cut. Backfilling shall occur in MAX 12-inch lifts



## SECTION 02070

### SANITARY SEWER MANHOLES

with compaction by an engine driven hand tamp or other mechanical means as acceptable to the OWNER.

#### 3.03 DEWATERING, SHEETING AND BRACING

- A. The CONTRACTOR shall dewater, sheet and/or brace all excavations in accordance with Section 02222 - Excavation and Backfill for Utilities. Well points, pumps, sheeting, bracing and/or sock drain shall be used to provide a safe, dry, open hole for all repairs or replacements specified herein.

#### 3.04 NEW MANHOLE CONSTRUCTION

##### A. General:

- 1. At the locations indicated by the OWNER, the CONTRACTOR shall excavate and locate the existing piping in order to obtain the relative elevations of existing sanitary sewer pipes with respect to ground surface elevation. Excavation shall be non-disruptive and non-destructive soil extraction as provided by Accurate Locating, Inc. or approved equal. After all measurements have been obtained, the excavated hole shall be backfilled and surface shall be restored to its original condition. Excavation and measurements shall be witnessed by the OWNER. Inside measurement shall be used when replacing existing manholes.
- 2. The sewer pipe connections shall be cut to 2 to 3 feet outside the existing manhole exterior wall. Proper dewatering sheeting and bracing of the hole is critical; no manhole shall be allowed to be installed in an unsafe or wet hole.

- B. Bedding Requirements: The CONTRACTOR shall excavate an additional 18 inches below the base of the manhole and fill with "Crushed Stone" as defined in Section 02222 - Excavation and Backfill for Utilities, and shown in the Drawings. The CONTRACTOR shall also use this crushed stone for bedding of all the sewer connections. No excavated fill shall be allowed in the hole until all connections are complete and proper bedding requirements have been met.

##### C. Bases

##### 1. Cast-in-Place

- (a) Base shall be to the design and dimensions indicated on the Drawings.
- (b) Set pre-cast wall section into fresh concrete for integral joint.

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### SANITARY SEWER MANHOLES

- (c) When using wall sections that contain no integral pipe seals, use length of pipe which extends five (5) feet minimum from outside of base dimension. Place approved waterstop on pipe at center point of wall thickness.
- (d) Flow channels shall be formed directly in the concrete of the manhole base and shall be smooth and accurately shaped to a semi-circular bottom conforming to the inside of the adjacent sewer sections. Changes in the direction of the sewer and entering branches shall have a true curve of as large a radius as the size of the manhole will permit. Channels shall be so conformed as to allow the unrestricted entry of television cameras into the sewer line.
- (e) Complete concrete placement around pipe openings, working well into waterstop. Finish flush on outside.
- (f) All slopes (benches) outside flow channels shall be sloped gradual toward invert.

#### 2. Pre-Cast

- (a) Flow channels shall be placed after pipe placement.
- (b) Flow channels, same size as pipe, may be constructed directly with the pre-cast base at time of manufacture. Submit manufacturer's product data to OWNER for approval before placing order.

#### D. Setting Precast Sections

- 1. Precast reinforced concrete sections shall be set so as to be vertical and with sections in true alignment. A flexible, watertight gasket such as "Ram-Nek" or approved equal shall be used between sections. After the sections are assembled, the remaining space in the joint shall be pointed up and filled with a dense cement mortar and finished so as to make a smooth, continuous surface inside and outside the wall sections.
- 2. Sewer pipe connections for manholes shall be resilient, waterproof connections designed in accordance with ASTM C 923 "Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes". Resilient pipe connectors shall be installed following casting in a cored or cast opening of the manhole wall. Resilient connectors shall either be a gasket type connector approved equal to the A-Lok pipe to manhole seal as manufactured by Atlantic Concrete Products, Inc. or a flexible neoprene boot with stainless steel clamps approved

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### SANITARY SEWER MANHOLES

equal to the Kor-N-Seal System as manufactured by the Dukor Corporation. When the pipe is installed in the resilient manhole connector, the pipe shall be capable of a 20 degree minimum deflection in any direction.

3. All holes in sections, used for their handling, shall be thoroughly plugged with mortar. All seams, keyways, and pipe connections shall be thoroughly plugged with brick and mortar inside and out as needed. The mortar shall be hammered into the holes until it is dense and an excess of paste appears on the surface; then finished smooth and flush with the adjoining surfaces.
4. The Invert Elevations that were surveyed by the CONTRACTOR prior to manhole construction shall be used to install the inverts in the new manhole. The inverts shall be resurveyed and submitted to the OWNER for as-built purposes.

#### E. Frames and covers

1. Install pre-cast concrete grade rings, minimum of 4" and total maximum of 12", set in two (2) strips of modified polymer sealant/adhesive compound on each sealing face.
2. Bricks shall not be used for grade adjustment.
3. Set maintenance access structure frame to proper elevation and to cross-section slope where required. Set in two strips of sealing compound and cover with a bed of Portland cement and silica sand. Set frame in cement bedding and bring mortar up over frame. Recheck elevation due to possible sealant compression.
4. Contractor shall be responsible for adjusting the tops of all frames and covers to match the new paving elevation and providing a smooth even transition from pavement to maintenance access structure cover.

- F. Finish: The outside of the precast sections shall be finished in accordance with the following:

<u>Application</u>	<u>Description</u>	<u>DFT</u>
Primary - 1 coat	SewperCoat® PG Wet Spray mortar or approved equal	6-8
Second - 1 coat	SewperCoat® PG Wet Spray mortar or approved equal	8-10

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### SANITARY SEWER MANHOLES

- G. Backfill: The backfill shall be compacted; road subgrade (if in paved area) shall be replaced with acceptable material and compacted as specified in Section 02222 – Excavation and Backfill for Utilities. Prior to backfilling, ensure that all concrete cradles and encasements are dry; all spalls, scars, etc. are repaired; and all coatings have been applied.

#### 3.05 DISPOSAL

- A. All excavated material such as pipe sections, concrete, debris or any other items excavated shall become property of the CONTRACTOR. The CONTRACTOR shall take full responsibility for proper disposal and include the cost in the appropriate bid items.

#### 3.06 SURFACE RESTORATION

- A. All surface restoration shall be in accordance with Section 02222 – Excavation and Backfill for Utilities. Pavement, concrete, sod or any other surface items shall be replaced in equal or better condition than prior to repair.

#### 3.07 TESTING

- A. After construction or replacement work at each manhole has been completed and the materials used have been allowed to cure, it shall be tested for excess infiltration by the CONTRACTOR in the presence of the OWNER. The maximum allowable rate of infiltration is 0.0 gallon per hour per vertical foot of depth of the manhole. THERE SHALL BE NO VISIBLE INFILTRATION. All manholes must meet this requirement before acceptance by the OWNER.

#### 3.08 COVER ADJUSTMENT

- A. Adjustment of existing (old) work requiring raising shall be performed in accordance with Sub-Section 3.04 herein.
- B. Rises in excess of twelve (12) inches shall be made by removing the top section of the manhole and inserting pre-cast sections required to meet the required elevation.
- C. When elevation changes require removal of an existing manhole section(s), the OWNER shall be consulted in advance of the work to determine the best method to accomplish the work. The OWNER will inspect all work.
- D. Methods and materials for lowering manhole frames shall comply with Sub-Sections 3.04 and 3.08.

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### SANITARY SEWER MANHOLES

#### 3.10 CONNECTIONS TO EXISTING MANHOLE

- A. Contractor shall cut an opening (core-bore) in the existing manhole to a size to allow the pipe with a waterstop attached plus one (1) inch clearance on all sides. Cut out existing concrete channel fill, allowing room to form satisfactory new flow channel.
- B. Coupling Adapters (Boots) shall be installed sized for the opening and the pipe diameter.
- C. Place length of pipe to provide joint at five (5) feet minimum from outside of manhole wall or base. Center waterstop in wall, fill opening with waterproof non-shrink grout material and form new flow channel. Second joint shall be five (5) feet ahead/back. Encase to first joint with Type II concrete.

#### 3.11 CONNECTIONS TO EXISTING SEWERS

- A. For proposed sewers of a diameter equal to the existing sewer, a new manhole shall be constructed over the existing sewer to the proper invert elevation.
- B. Existing sewer service shall be maintained during base and flow channel work.
- C. When broken or damaged pipe results from this operation, replace with new pipe to meet current standards. Saw any piping to be removed to preclude cracking or irregular edges caused by breaking out with a hammer or using other methods.
- D. When replacing pipe, use pipe length to have a joint at five (5) feet minimum from manhole wall or base. Cradle and doghouse pipe to first joint with Class A concrete.
- E. For proposed sewers of eight (8) inch diameter or less, a direct connection to an existing sewer may be permitted by using a cutting-in saddle or wye. This method would generally apply to single family dwelling units. For industrial, commercial, or multifamily residences, the OWNER may require that a manhole be constructed on the property to be served and over an existing sewer should one exist. All connections to existing sewers are subject to review by the OWNER on an individual basis.
- F. Proposed sewers of a diameter larger than the existing sewer to which it is to be connected will not be normally permitted without providing additional capacity to the existing sewer.

#### 3.12 DROP MANHOLES

- A. Drop connection shall be made where the invert of any inlet pipe is two (2) feet or more higher than the invert out of the manhole.

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### SANITARY SEWER MANHOLES

- B. Pre-cast manhole sections shall have openings with integrally cast pipe seals to fit design elevations for new installations.
- C. When using "doghouse" sections or connecting to existing manholes refer to Sub-Section 3.09 for construction details of pipe through wall section.
- D. Connection configuration to manhole shall be made in accordance with Standard Details.
- E. Entire configuration of piping shall be encased in Type II concrete to a minimum thickness of six (6) inches.

#### 3.13 PLANNED PIPE OPENINGS

- A. When future pipe connections have been planned for manholes, they shall be plugged to preclude exfiltration and infiltration.
- B. With integral pipe seals, place a pipe stopper/plug of the size required, properly secured, for any thrust caused by testing, etc.

- END OF SECTION -

## SECTION 02141

### TEMPORARY BYPASS PUMPING SYSTEMS

#### PART 1 GENERAL

##### 1.01 SUMMARY:

- A. Section Includes: Furnishing all materials, labor, equipment, power, maintenance, etc. to implement a temporary pumping system for the purpose of diverting the existing raw wastewater flow around the work area at each lift station for the durations specified and disassembly of the bypass pumping system as specified herein.
- B. Be responsible for the design, installation and operation of the temporary pumping system. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.
- C. The Contractor is responsible to maintain flow at each station throughout the contract period of construction. Once the Contractor mobilizes, the City cedes responsibilities of station operations to the Contractor until Substantial Completion is reached.

##### 1.02 SYSTEM DESCRIPTION:

- A. Design Requirements:
  - 1. Provide bypass pumping systems with firm capacity to pump the following peak flow:
    - a. Lift Station E-22: 110 GPM
  - 2. Provide all pumps of adequate size to handle peak flow, and temporary discharge piping to ensure that the total flow of the main can be safely diverted around the pumping station. Bypass pumping system will be required to operate 24 hours per day.
  - 3. Provide control system for the bypass pumping system which will run the pump(s) between preset levels. Additional controls are required to for high-high level and low-low level alarms, and any pump faults.
  - 4. Provide adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.

5. The bypass pumping system shall be capable of bypassing the flow around the work area as necessary for satisfactory performances of work.
  6. Make all arrangements for bypass pumping during the time when the pumping station is shut down for any reason. System must overcome any existing force main pressure on discharge.
- B. It is essential to the operations of the existing wastewater system that there be no interruption in the flow of sewage throughout the duration of the project. To this end, provide, maintain and operate all temporary facilities such as, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the wastewater flow before it reaches the point where it would interfere with the work, carry it past the work and return it to the existing wastewater downstream of the work.
- C. Provide all necessary means to safely convey the raw wastewater past the work area. Do not stop or impede the main flows under any circumstances.
- D. Maintain wastewater flow around the work area in a manner that will not cause surcharging of wastewater, damage to existing pipe line and that will protect public and private property from damage and flooding.
- E. Fluid Character: Provide pumping units to pump raw wastewater.
- F. Furnish pumps which meet rating capacity and head indicated on Process Pump Schedule.
- G. Pumps shall be capable of passing a minimum of a 3-inch non-deformable sphere.

#### 1.03 SUBMITTALS:

- A. ENGINEER approval is required for submittals with an “A” designation; submittals having an “FIO” designation are for information only. Provide all submittals, including the following, in accordance with Section 01300, SUBMITTALS.
- B. Data:
1. Pump Data:
    - a. Pump performance curves. Draw curves for the specified conditions. Include head, brake horsepower, efficiency and required NPSH, all plotted as a function of capacity, from zero to maximum capacity.
    - b. Calculations of static lift, friction losses, and flow velocity.



- c. Submit a specific, detailed description of the proposed pumping system.
- d. Submit operating descriptions, component descriptions, control schematics, electrical connection diagrams and general arrangement drawings, for control equipment.

C. Drawings:

1. Shop Drawings:

- a. Submit shop drawings, including arrangement and erection drawings of the equipment and equipment operating characteristics. Include the following:
  - (1) Submit detailed plans and descriptions outlining all provisions and precautions to be taken regarding the handling of existing wastewater flows. The plan shall include schedules, locations elevations, capacities of equipment, materials and all other incidental items necessary and/or required to insure proper protections of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and all permit conditions
  - (2) The plan shall include but not be limited to details of the following:
    - (a) Staging areas for pumps;
    - (b) Number, size, material, location and method of installation of suction piping;
    - (c) Number, size, material, location of installation of discharge piping;
    - (d) Bypass pump sizes, capacity, number of each size to be on site and motor power of fuel requirements;
    - (e) Standby power generator size, location;
    - (f) Downstream discharge plan;
    - (g) Thrust and restraint block sizes and locations;

- (h) Sections showing suction and discharge pipe depth, embedment, select fill and special backfill;
- (i) Method of noise control for each pump and/or generator;
- (j) Any temporary pipe supports and anchoring required;
- (k) Design plans and computation for access to bypass pumping locations indicated on the drawings;
- (l) Calculations for selection of bypass pumping pipe size;
- (m) Schedule for installation of and maintenance of bypass pumping lines;
- (n) Plan indicated selection location of bypass pumping line locations.

## PART 2 - PRODUCTS

### 2.01 EQUIPMENT:

- A. All pumps used shall be centrifugal self-priming units that do not require the use of foot-valves or Compressor in the priming system. The pumps shall be diesel or electric powered. Pumps shall have sound attenuation enclosure designed for operation at sound levels of 70 decibels and below. The Contractor is fully responsible for coordinating and obtaining temporary electrical service. All pumps used must be constructed to allow dry running for long periods of time to accommodate the cyclical nature of influent flows. The pumps shall not be hydraulic submersible type.
- B. Provide the necessary stop/start control system for each pump. The control system shall remotely contact the contractor with notification of any problem. The contractor is responsible for responding within one (1) hour to the alarm and correcting the problem.
- C. Discharge Piping – in order to prevent the accidental spillage of flows, all discharge systems shall be temporarily constructed of rigid pipe with positive, restrained joints.
- D. Under no circumstances will aluminum “Irrigation” type piping and glued PVC pipe be allowed. Discharge hose will only be allowed in short sections and by specific permission from the ENGINEER. Provide piping materials of steel pipe, ductile iron pipe, or fused, high density polyethylene pipe.

### 2.02 MANUFACTURERS:

- A. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted.

- 1. Thompson Pump & Manufacturing Co., Inc.

## PART 3 - EXECUTION

### 3.01 PRECAUTIONS:

- A. Be responsible for locating any existing utilities in the area selected for installing the bypass pipelines. Locate bypass pipelines to minimize any disturbance to existing utilities and obtain approval of the pipeline locations from the ENGINEER. All costs associated with relocating utilities and obtaining all approvals shall be included in the Contract Price.

### 3.02 INSTALLATION AND REMOVAL:

- A. Make connections to the existing wastewater pipe lines and construct temporary bypass pumping structures only at the access location indicated on the drawings and as may be required to provide adequate suction conduit.
- B. Plugging or blocking of wastewater flows shall incorporate a primary and secondary plugging device. When plugging or blocking is no longer needed for performance and acceptance or work, it is to be removed in a manner that permits the wastewater flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.
- C. The installation of the bypass pipelines is prohibited in all saltmarsh/wetland areas. The pipeline must be located off streets and sidewalks and on shoulder of the roads. When the bypass pipeline crosses local streets and private driveways, place the bypass pipelines in trenches and cover with temporary pavement. Upon completion of the bypass pumping operations, and after the receipt of written permission from the ENGINEER, remove all the piping, restore all property to pre-construction condition and restore all pavement. Be responsible for obtaining any approvals for placement of the temporary pipeline within public ways from the city.

### 3.03 FIELD QUALITY CONTROL AND MAINTENANCE:

- A. Testing: Perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. Test the piping at a test pressure of 50 psi. Provide 24 hours notice to the ENGINEER prior to testing.
- B. Inspection: Inspect bypass pumping system as needed to ensure that the system is working correctly.

C. Maintenance Service: Insure that the temporary pumping system is properly maintained and a responsible operator is on hand at all times when pumps are operating.

D. Extra Materials:

1. Spare parts for pumps and piping shall be kept on site as required.
2. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

END OF SECTION

## SECTION 02222

### EXCAVATION AND BACKFILL FOR UTILITIES

#### **Part 1 - GENERAL**

##### 1.01 THE REQUIREMENT

- A. Excavate, grade and backfill as required for underground piping systems and appurtenances as shown on the Drawings and specified herein.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02900 - Landscaping
- B. Division 3 - Concrete

##### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Codes: All codes, as referenced herein, are specified in Section 01090, "Reference Standards".
- B. Commercial Standards:

ASTM C33	Standard Specification for Concrete Aggregates
ASTM D 422	Method for Particle-Size Analysis of Soils.
ASTM D 698	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in (304.8-mm) Drop.
ASTM D 1556	Test Method for Density of Soil in Place by the Sand-Cone Method.
ASTM D 1557	Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in (457-mm) Drop.
ASTM D 2419	Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

##### 1.04 SUBMITTALS

- A. General: Submit information and samples to the ENGINEER for review as specified herein in accordance with Section 01300, "Submittals".

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### EXCAVATION AND BACKFILL FOR UTILITIES

- B. Dewatering: The CONTRACTOR shall submit to the ENGINEER its proposed methods of handling trench water and the locations at which the water will be disposed of. Methods shall be acceptable to the ENGINEER before starting the excavation.
- 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 Pile System: Drawings of the sheet pile 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 pile and shoring system. Sheet pile 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.
- E. Dewatering Permits: 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 before commencing the work. The CONTRACTOR will not be granted contract time extensions due to dewatering permit processing delays.

#### 1.05 QUALITY CONTROL

- A. An independent testing laboratory (Testing Laboratory) will be selected by the CITY to perform field and laboratory soil testing as described in Section 01400, "Testing and Inspection". The cost of the first round of tests will be paid from the "Cost Allowance for Permits, Licenses and Fees". The costs of subsequent recompaction and retesting resulting from not achieving the required minimum compaction shall be borne by the CONTRACTOR at no additional cost to the CITY.
- B. The CONTRACTOR shall schedule its work so as to permit a reasonable time for testing before placing succeeding lifts and shall keep the Testing Laboratory informed of his progress. A minimum of 48 hours of notice shall be provided to the Testing Laboratory to mobilize its activities.

## SECTION 02222

### EXCAVATION AND BACKFILL FOR UTILITIES

#### 1.06 SUBSURFACE INFORMATION

- A. The CONTRACTOR shall be responsible for anticipating groundwater 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.

#### 1.07 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".

#### 1.08 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.

## SECTION 02222

### EXCAVATION AND BACKFILL FOR UTILITIES

- 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.

#### 1.09 DEWATERING PERMITS

- A. The CONTRACTOR shall be responsible for obtaining all permits required for the dewatering 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:



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### EXCAVATION AND BACKFILL FOR UTILITIES

<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.

### **Part 3 - EXECUTION**

#### 3.01 EXCAVATION

- A. 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.
- B. 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

## SECTION 02222

### EXCAVATION AND BACKFILL FOR UTILITIES

used, of 6 inches to 12 inches as defined on the Drawings. 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.

- C. Ladders or steps shall be provided for and used by workmen to enter and leave trenches.
- D. 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.
- E. 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.

#### 3.02 SHEETING AND BRACING

- A. 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.
- B. If the ENGINEER is of the opinion that at any point sufficient or proper supports, have not be provided, he may order additional supports put in at the CONTRACTOR's expense. The CONTRACTOR shall be responsible for the adequacy of all sheeting used and for all damage resulting from sheeting and bracing failure or from placing, maintaining and removing it.

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### EXCAVATION AND BACKFILL FOR UTILITIES

#### 3.03 REMOVAL OF WATER

- A. General: It is a basic requirement of these Specifications unless otherwise authorized per Article 3.09 that excavations shall be free from water before pipe or structures are installed.
- B. The CONTRACTOR shall provide pumps, and other appurtenant equipment necessary to remove and maintain water at such a level as to permit construction in a dry condition. The CONTRACTOR shall continue dewatering operations until backfilling has progressed to a sufficient depth over the pipe to prevent flotation or movement of the pipe in the trench or so that it is above the water table. If at any point during the dewatering operation it is determined that fine material is being removed from the excavation sidewalls, the dewatering operation shall be stopped. If any of the subgrade or underlying material is disturbed by movement of groundwater, surface water, or any other reason, it shall be replaced at the CONTRACTOR's expense with crushed stone or gravel.
- C. The CONTRACTOR shall use dewatering systems that include automatic starting devices, and standby pumps that will ensure continuous dewatering in the event of an outage of one or more pumps.
- D. Disposal: Water from the trenches and excavation shall be disposed of in such a manner as will not cause injury to public health, to public or private property, to the Work completed or in progress, to the surface of the streets, cause any interference with the use of the same by the public, or cause pollution of any waterway or stream. The CONTRACTOR shall submit his proposed methods of handling trench water and locations at which the water will be disposed of to the ENGINEER for review and shall receive acceptance before starting the excavation. Disposal to any surface water body will require silt screens to prevent any degradation in the water body. The CONTRACTOR shall have responsibility for acquiring all necessary permits for disposal.

#### 3.04 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.

## SECTION 02222

### EXCAVATION AND BACKFILL FOR UTILITIES

#### 3.05 PIPE BEDDING IN DRY TRENCHES

- A. Pipe trenches shall be excavated as described in Article 3.01. 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.

#### 3.06 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 in Article 3.07. 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 in Article 3.07.
- 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.

#### 3.07 COMPACTION AND DENSITIES

- A. Compaction of backfill shall be 98% of the maximum density where the trench is located under structures or paved areas, and 95% of the maximum density elsewhere. Methods of control and testing of backfill construction are:

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### EXCAVATION AND BACKFILL FOR UTILITIES

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. Trench backfill which does not comply with the specified densities, as indicated by such tests, shall be reworked and recompact 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.

#### 3.08 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 of Article 3.05.
- 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. The excavation of material up to a depth of two feet below the outside bottom incidental items of construction and the Work shall be done at no additional cost to the CITY. Where ordered by the ENGINEER, excavation greater than

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### EXCAVATION AND BACKFILL FOR UTILITIES

two feet below the pipe, backfill and additional sheeting, will be compensated by the CITY.

#### 3.09 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 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 shall determine.
- 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 3.03 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.

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### EXCAVATION AND BACKFILL FOR UTILITIES

- 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 3.07. General backfill shall then be placed in 8-inch lifts and compacted per Article 3.07.
- 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.

#### 3.10 RESTORATION OF EXISTING SURFACES

- A. Restore all grassed areas disturbed by the trenching operations by resodding in accordance with Section 02500 – Surface Restoration.

- END OF SECTION -

## SECTION 02500 - SURFACE RESTORATION

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. Items specified in this Section include repairs to landscaped and grassed areas that may be damaged by CONTRACTOR activities.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Asphaltic concrete pavement.
- B. Pavement curb and sidewalks.
- C. Pavement markings and signs.

#### 1.03 SUBMITTALS

- A. The CONTRACTOR shall submit submittals for review in accordance with the Section entitled "Submittals".

#### 1.04 DEFINITIONS

- A. The phrase "DOT Specifications" shall refer to the Florida Department of Transportation Standard Specifications for Road and Bridge Construction. The DOT 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 acceptance 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 SOD

- A. Sod shall be Floratam Sod in irrigated areas and non-irrigated areas.

### 2.02 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.

### 2.03 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.

## PART 3 -- EXECUTION

### 3.01 GRADING AND SODDING

- A. The CONTRACTOR shall regrade the work areas disturbed by his construction activities to the existing grade prior to commencement of construction.
- B. Sod shall be placed on all grassed areas disturbed by construction activities, unless otherwise indicated on the Drawings. Sodding shall be in accordance with Sections 575 - Sodding and 981 – Grassing and Sodding Materials of the DOT Specifications.
- C. Maintenance: Sufficient watering shall be done by the CONTRACTOR to maintain adequate moisture for optimum development of the sodded areas. Sodded areas shall receive no less than 1.5 inches of water per week.
- D. Repairs to Lawn Areas Disturbed by CONTRACTOR's Operations: Lawn areas damaged by CONTRACTOR's operations shall be repaired at once by proper sod bed preparation, fertilization and resodding, in accordance with these specifications. Regardless of the condition of the lawn area (weed content etc.) prior to the CONTRACTOR working in the area, all repairs shall be made with sod.

### 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 burlapped 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 OWNER.
- C. Setting of Plants: 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. The CONTRACTOR, when setting plants in holes, shall make allowances for any anticipated setting of plants.
- 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 an 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 OWNER. 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.

- 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. Minimum required thickness shall be as listed below.

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 Section 334 of FDOT Standard Specifications for Road and Bridge Construction
  - (b) Type S-III asphaltic concrete surface course
  - (c) Or as otherwise required by the roadway jurisdiction and/or as indicated on the plans.

Thickness of the asphalt course shall be one and a half (1.5") inch thick minimum, or as specified on the Drawings.

##### 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.

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ASPHALTIC CONCRETE PAVEMENT

**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, Section 916-1.
- B. Coarse Material: Coarse aggregate, stone or slag shall conform to the requirements of FDOT Specifications, Section 901.
- C. Fine Aggregate Material: Fine aggregate shall conform to the requirements of FDOT Specifications Section 902.
- D. Mineral Filler: Mineral filler shall conform to the requirements of FDOT Specifications, Sections 917-1 and 917-2.

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.

## SECTION 02510

### ASPHALTIC CONCRETE PAVEMENT

- B. The job mix formula shall conform to the requirements of FDOT Specifications, Section 334. 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, Section 330-9. 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 330-10.

## SECTION 02510

### ASPHALTIC CONCRETE PAVEMENT

#### 3.05 JOINTS

- A. Joints shall conform with the requirements of FDOT Specifications, Section 330-11.

#### 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. Surface depressions with standing water exceeding  $\frac{1}{4}$ " in depth will not be allowed by the City, and shall be repaired by the Contractor at no additional cost.
- C. 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, Section 330-14 and 330-15.
- D. "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.
- E. 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, CURBS AND SIDEWALKS

#### **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.

##### 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

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

Joint reinforcing and welded wire fabric shall conform to Section 03300 – Cast-in-place Concrete, Reinforcing and Formwork”

##### 2.03 JOINT SEALER FOR PAVEMENT

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 the requirements of Section 07920 - Sealants and Caulking.

##### 2.04 PREFORMED JOINT FILLER

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



## SECTION 02526

### CONCRETE PAVEMENT, CURBS AND SIDEWALKS

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

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

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 re-handling as possible.
- B. Fabric reinforcement, where required, 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.

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### CONCRETE PAVEMENT, CURBS AND SIDEWALKS

#### 3.05 STRIKING-OFF, CONSOLIDATING AND FINISHING CONCRETE

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

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 re-finished. Straight-edge testing and surface correction shall continue until the entire surface appears to conform to the required grade and cross section.

#### 3.07 FINAL FINISH

As soon as the water sheen has disappeared from the surface of the pavement and just before the concrete becomes non plastic, 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 non plastic, 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 non plastic 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.

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### CONCRETE PAVEMENT, CURBS AND SIDEWALKS

#### 3.09 JOINTS

##### A. Construction Joints

Construction joints shall be located as shown on the Drawings and/or as directed by the ENGINEER.

##### B. Expansion Joints Around Structures

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 ½-inch in width.

##### C. Transverse Expansion Joints

Open type transverse expansion joints shall be provided at all sidewalk returns and at 50 foot intervals and wherever indicated on the Drawings. Open type joints shall be formed by staking a ¼-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 ½-inch radius. Transverse expansion joints shall be cleaned and filled with joint filler strips ¼-inch thick conforming to the requirements of AASHTO M-153.

##### D. Scored Joints

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

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### CONCRETE PAVEMENT, CURBS AND SIDEWALKS

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.

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### CONCRETE PAVEMENT, CURBS AND SIDEWALKS

- B. The width of all repairs shall extend at least 12 inches beyond the limit of the damage. 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.

- END OF SECTION -

## SECTION 02580

### PAVEMENT MARKING AND TRAFFIC SIGNS

#### PART 1 -- GENERAL

##### 1.01 THE REQUIREMENT

- A. This section consists of replacing existing pavement markings, traffic signs, and other traffic controls impacted by the utility construction, as required for a complete installation.
- B. Temporary traffic signs and pavement markings provided for maintenance of Traffic (MOT) during construction will be paid for as part of the lump sum pay item for providing Traffic Control During Construction.

##### 1.02 SUBMITTALS

- A. The CONTRACTOR shall submit shop drawings and other information to the ENGINEER for review in accordance with Section entitled "Submittals".
- B. 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.

##### 1.03 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.

#### PART 2 -- PRODUCTS

##### 2.01 PAVEMENT MARKINGS

- A. Where painted pavement markings are being applied within City roads, the paint shall be Sherwin-Williams or Tnemec traffic paint or approved equal.
- B. Where painted pavement markings are being applied within the right-of-way of Pembroke Road (S.R.824), the paint shall be as specified in Section 710, "Painted Pavement Markings", of the FDOT Specifications.
- C. Wherever thermoplastic pavement markings are being applied, the thermoplastic compound shall be as specified in Section 711, "Thermoplastic Traffic Stripes and Markings", of the FDOT Specifications.

#### PART 3 -- EXECUTION

19-7101

Gravity Sewer System Condition Assessment and Renewal  
And Replacement ( Inflow / Infiltration I/I ) Program ( Level 2 )

### 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.
- E. Thermoplastic pavement markings - Thermoplastic pavement markings, including stripes, pavement messages, stop bars, directional arrows, reflective pavement markers and other miscellaneous items, will be replaced as existed before the repair was made. 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.
- F. Reflective Pavement Markers - 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. 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 02600  
MISCELLANEOUS PIPING

PART 1 -- GENERAL

1.01 SCOPE

- A. This Section consists of furnishing water, sewer, storm water piping complete with fittings, couplings, adapters, valves, and other appurtenances required during construction due to piping relocation or replacement.

1.02 GENERAL INFORMATION AND DESCRIPTION

- A. The pipe and fittings shall be furnished by fully qualified manufacturers experienced in the fabrication, casting and manufacture of the pipe materials specified herein. The pipe and fittings shall be designed, fabricated and installed in accordance with the best practice of the trade and the standards specified herein.
- B. Pipe materials shall be the same as the existing pipe being replaced or relocated.
- C. No material furnished under this specification shall be shipped to the job site until all submittals have been reviewed.

1.03 SUBMITTALS

- A. The CONTRACTOR shall submit Shop Drawings in accordance with the procedures and requirements set forth in Section 01300 - Submittals.
- B. Each submittal shall be complete in all aspects incorporating all information and data listed herein and all additional information required to evaluate the proposed piping material's compliance with the Contract Documents. Partial or incomplete submissions will be returned to the CONTRACTOR without review. Data to be submitted shall include, but is not limited to: catalog data consisting of specifications, illustrations and a parts schedule that identifies the materials to be used.
- C. The CONTRACTOR shall submit to the ENGINEER certified shop tests in accordance with the Section 01300 - Submittals.
- D. The CONTRACTOR shall submit to the ENGINEER certified letters of compliance in accordance with the Section 01300 - Submittals.



## PART 2 -- PRODUCTS

### 2.01 GENERAL

- A. All pipe and fittings shall be marked with the manufacturer's name or trade mark, size, class or pressure rating, and the date of manufacture in accordance with the standards specified herein.

### 2.02 POLYVINYL CHLORIDE (PVC) SEWER AND STORM DRAINAGE PIPE, FITTINGS, AND VALVES

- A. All PVC sewer pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and pressure rating in psi.
- B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.
- C. PIPE AND FITTINGS: All PVC pipe and fittings shall be joined by compression joints unless otherwise shown or specified, and shall conform to the following requirements:
  - 1. Polyvinyl Chloride pipe (PVC) shall conform to the requirements of ASTM D 3034 for pipe size 4 inches to 15 inches and ASTM F 679 for 18 inches to 36 inches, Class SDR 26. Material for PVC pipe and fittings shall conform to the requirements of ASTM D 1784 for Class 12454-B or 12454-C as defined therein.
  - 2. Joints shall be elastomeric gasket joint providing water-tight seal and conform to ASTM F 477.
  - 3. Polyvinyl Chloride (PVC) pipe conforming to AWWA C900 DR18 and AWWA C905 DR25 shall be acceptable to be used for sewer pipe replacement instead of PVC pipe as specified in paragraph 1. The pipe shall be pressured rated at 165 psi and made from Class 12454A or 12454B compounds as defined in ASTM D1784. The fittings shall be PVC and fabricated from segments of AWWA C900 and AWWA C905 PVC pipe. The pressure rating of the fittings shall match the pipe pressure rating.

4. The sizes of replacement sewer shall be as follows:

<u>SDR 26 PVC Pipe (in)</u>	<u>C905 PVC Pipe (in)</u>
15	16
18	18
21	20
24	24

5. Sewer lateral pipe and fittings connected to the collection sewers shall be replaced by the same PVC pipe as used in main line sewer replacement. Transitional couplings shall be used for connection to existing laterals at the property line. Lateral pipe for connecting to the cured-in-place liner pipe shall be PVC pipe conforming to the requirements of ASTM D3034, Class SDR 35, and ASTM D1784, for Class 12454 B or 12454C.

- D. Sewage force main pipe and fittings shall conform to AWWA Standard C900 and Section 2.03 - Polyvinyl Chloride (PVC) Water Pipe, Fittings, and Valves as specified hereinafter.

E. PLUG VALVES:

1. 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. 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 cadmium plated.
2. 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.
3. The exterior valve surfaces shall be shop painted with two coats of asphalt varnish conforming to Federal Specifications TT-V-51C.
4. 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.

5. Plug valve shall be Model 100 Series as manufactured by DeZurik Company, or equal.

F. CLEANOUT: PVC cleanouts shall have screw type access plug. Long radius wye connections and fittings shall be used in order to access cleanout operations.

G. PIPE-TO-PIPE CONNECTIONS:

Pipe-to-pipe connections shall be made by flexible couplings as manufactured by Fernco (1-800-521-1283), or equal.

## 2.03 WATER PIPE, FITTINGS, AND VALVES

### A. POLYVINYL CHLORIDE PIPE

1. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and pressure rating in psi.
2. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.
3. PVC pipe shall conform to ASTM D1785 and shall be made from a 12454B compound which is a Type 1, Grade 1 plastic as defined by ASTM D1784. Rerun or reclaimed materials will not be acceptable.
4. Pipe to be used for potable water applications shall comply with the National Sanitation Foundation Standard No. 14 and shall have markings on the pipe to indicate that it has been tested and is in compliance.
5. Wall Thickness shall be a minimum of Schedule 80, unless otherwise noted in the piping schedule.

### B. JOINTS

1. Pipe joints shall be provided as specified in the pipe schedule.
2. For above ground piping, joints shall be socket welded for nominal pipe sizes less than three inches in diameter. Where threaded connections are required, socket type threaded adapters shall be provided. For above ground piping, three (3) inches in diameter and larger, joints shall be flanged. Socket type flange adapters shall be provided.
3. All PVC pipe less than four inches in diameter intended for buried service shall be socket weld joint.

4. All PVC pipe four (4) inches in diameter and larger, unless otherwise scheduled, intended for buried service shall be push-on type in accordance with AWWA C-900 and shall utilize ductile iron retainers for restraining pipe joints. Retainers shall be cast from 60-42-10 ductile iron and shall have a sufficient number of ductile tie bolts to restrain working and tests pressures as required. The retainer clamp shall be of two piece construction with serrations on the I.D. sufficient to hold the required pressures. The retainers shall be Series 1500 or 6500 as manufactured by EBAA Iron, Inc.
5. Socket type joints shall be made up in accordance with ASTM D2855 with a PVC solvent cement complying with ASTM D2564. The cement shall have a minimum viscosity of 2000 cps.
6. Where flanges are to be used, flanges shall be van stone type with full faced vinyl gaskets.

#### C. FITTINGS

1. Ductile Iron Fitting: Fittings shall be ductile iron mechanical joint (MJ) type, complete with glands, gaskets, bolts and nuts, and shall conform to ANSI/AWWA C110/A21,10. Inside surfaces shall be cement lined according to AWWA C104. Fitting shall be pressure rated at 250 psi, minimum.
2. PVC FITTINGS
  - a. Socket type pipe fittings for Schedule 40 pipe shall conform to ASTM D2466.
  - b. Socket type pipe fittings for Schedule 80 pipe shall conform to ASTM D2467.
  - c. Fittings shall have the same schedule designation, joint type and be made of the same PVC compound as the connecting pipe.

- F. GATE VALVES LESS THAN THREE INCH (3") IPS, BRONZED: 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 hand wheel. Gate valves less than three inches (3") in diameter shall be Nibco-Scott T-133 or T-136 with no substitutions allowed.

#### G. GATE VALVES THREE INCH (3") TO TWELVE INCH (12"):

1. 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.

2. Valves shall be coated with a two-part thermosetting epoxy coating on inside of valve and on valve disc. The coating shall conform with 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.
3. Gate valves four inches (4") through twelve inches (12") in size shall be Mueller A-2360-20 or Clow F6111, or equal.

#### H. BUTTERFLY VALVES:

1. 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.
2. 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 ASTM A-126 Class B with 316 stainless steel disc edge.
3. Valves shall be Mueller 3211-20, Clow F-5370, or equal.

#### I. END CONNECTIONS:

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 center-line.

#### J. TAPPING VALVES, SLEEVES AND CROSSES:

1. Tapping valves shall be resilient wedge type meeting ANSI/AWWA C509 and shall be connected by a machined projection on the outlet flanges of the tapping sleeves and crosses. The outlet ends shall conform in mechanical joint connections, except that the outside of the valves shall be larger than normal size to permit full diameter cuts.

2. Tapping valves shall comply in all other respects to the gate valve requirement of these specifications. All tapping valves must have a cast-in-alignment ring and be capable of accepting a full size cutter. Tapping valves shall be Clow or American Darling only.
3. All tapping sleeves shall have duck-tipped end gaskets, flanged outlet with American one hundred, twenty-five pounds (125 lbs) standard template, mechanical joints in the main line, factory tested for 400 psi and with working pressure of two hundred (200) psi, complete with bolts, glands, gaskets, and nuts. They shall be Mueller H-615, Clow F-5205, or equal.
4. All tapping crosses shall have duck tipped end gaskets, flanged outlet with American one hundred twenty-five (125 lbs) standard template, mechanical joints in the main line, factory tested for four hundred (400) psi and with working pressure of two hundred (200) psi, complete with bolts, glands gaskets and nuts. They shall be Mueller H-715, Clow F-5220, or equal.

#### K. VALVE BOXES AND COVERS

1. 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. 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 shall be Opelicka No. 19, no substitutes.
2. 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.

#### L. SERVICE CONNECTIONS

1. Two-inch PVC pipe for water services shall be schedule 80 and shall be solvent welded except for threaded nipples and bushings and conform to ASTM D 1785 and ASTM D 2467.
2. Curb stops shall be ball valves manufactured by Ford Meter Company or CITY approved equal, except for 1-inch and 2-inch meters instead of curb stops, and shall be installed in meter boxes. Control gate valves shall be Nibco Scott T-133 or T-136. No substitutions.
3. Corporation stops shall be Mueller H-10046 or equal.

- M. TAPPING SADDLES: Double strap tapping saddles shall be constructed of tough malleable iron heavily galvanized bodies with neoprene gaskets cemented to body and iron pipe thread, designed to withstand a working pressure of five hundred (500) psi and accurately fit the pipe for which it is intended. The straps shall be forged steel with curvature accurately designed to fit pipe. All nuts and straps including threads shall be heavily cadmium plated. Tapping saddles shall be Mueller K-10509, Clow F-1280, Smith Blair, or approved equal.
- N. DRESSER COUPLINGS: Dresser couplings shall be regular black couplings with plain gaskets. They shall be Dresser Style 90 with no substitutions allowed. Polyethylene liner shall be used to fully encase the dresser couplings.
- O. MEGATAPE: Megatape and locating metal wire to be buried 18 inches below finished grade over the water main and sewage force mains or service lines on PVC pipe (no exceptions).
- P. LINE STOP FITTING: Valve cut-in on the existing water main shall be performed under pressure using line stop fittings. The body of the fittings shall be carbon steel conforming to ASTM A-36. The flange shall be steel flanges Class D, conforming to AWWA C207 with stainless steel bolts and nuts. The line stop fitting shall be manufactured by International Piping Services Company (1-407-843-2800), or equal.
- Q. FIRE HYDRANTS:
1. All fire hydrants shall be of the dry-barrel type and shall conform in design, material and workmanship to AWWA C502. Hydrants shall have five and one-quarter inch main valve opening and a three way nozzle arrangement. The connection pipe shall be ductile iron pipe conforming to AWWA C151, Class 52.
  2. The depth of bury, measured from the bottom of the connecting pipe to the ground line of the hydrant shall be three feet six inches minimum. Exact depth at each location shall be determined by depth of line to which the hydrant is connected.
  3. Inlet connection shall be six-inch mechanical joint. Typical installation detail is shown in the Contract drawing.
  4. Two - 2-1/2 inch hose nozzles and one - 5-1/4 inch pump nozzle connection threads shall conform to NFPA No. 194 (ANSI B26) Standard for Screw Threads and Gaskets for Fire Hose Couplings.
  5. Hydrants shall be furnished with accessories to include mechanical joint follower rings with set screws and at least one adjustable hydrant wrench with spanner included with every ten hydrants supplied. Barrel extension sections shall not be allowed on new fire hydrants, except by special permission from the ENGINEER.



All fire hydrants shall be Mueller Super Centurion Model A-423 or American Darting Model B84B, with no substitutions allowed.

6. There shall be no shrubbery planted within 6 feet of any fire hydrant.

### PART 3 -- EXECUTION

#### 3.01 GENERAL

- A. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and, in general, conform with manufacturer's recommendations. At the time of laying, the pipe shall be examined carefully for defects, and should any pipe be discovered to be defective after being laid, it shall be removed and replaced with sound pipe by the CONTRACTOR at his expense.
- 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. Pipe and other material shall be distributed along the right-of-way in advance of installation only to the extent approved by the ENGINEER. Such materials shall be so placed as to keep obstruction to traffic minimum.
- C. Upon satisfactory completion of the pipe bedding, a continuous trough for the pipe barrel and recesses for the pipe bells, or couplings, shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support with no pressure being exerted on the pipe joints from the trench bottom.
- D. Pipe shall be installed in accordance with the manufacturer's recommendation. Before being lowered into the trench, the pipes and accessories shall be carefully examined and the interior of the pipes shall be thoroughly cleaned of all foreign matter and other methods acceptable to the ENGINEER. 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. Any pipe which is disturbed or found defective shall be immediately removed and replaced with sound pipe.
- E. Lines shall be laid straight and true to the lines, matching existing grade.
- F. Any work within the pipe and fittings shall be performed with care to prevent damage to the interior wall of the pipe. Damaged interior walls shall be repaired or the pipe section or fitting replaced as required by the ENGINEER. No cables, lifting arms, hooks or other devices shall be inserted into the pipe or fitting. All lifting, pulling or pushing mechanisms shall be applied to the exterior of the pipe or fitting.



- G. After pipe has been laid, reviewed and found satisfactory, sufficient backfill shall be placed along the pipe barrel to hold the pipe securely in place during the conduction of the required tests.

### 3.02 INSTALLATION OF POLYVINYL CHLORIDE (PVC) PIPE

- A. Each length of pipe, immediately prior to being placed in position in the trench, shall be inspected, cleaned and prepared for installation. Gaskets shall be thoroughly checked for brakes, cuts or other damage, and shall be free of oil, grease, dirt or other foreign matter. Pipe joints shall be assembled with care. Lubricant, if required, shall be as recommended by the manufacturer of the pipe, and shall have no deteriorating effects on the gasket and pipe materials. If assembly is underwater, lubricant recommended by the manufacturer for underwater use is required. Good alignment of the pipe if required for assemble. Align the spigot to the bell of the previously laid pipe and insert the spigot into the bell until it uniformly contacts the gasket. Apply steady pressure until the spigot easily slips through the gasket. Do no push or swing the spigot into the bell. Small diameter pipe and fittings may be assembled manually. Mechanical means such as bars and blocks, rackets or jacks shall be used for joining larger pipe and fittings. Power equipment, such as backhoe bucket, shall not be used to assemble pipe and fittings, since excessive force may damage the gasket or bell.
- B. Cutting the pipe in the field shall be done by the CONTRACTOR in a neat and workmanlike manner using manual or power saws. The pipe shall be marked around its entire circumference before cutting to assure a square cut. After cutting, the end shall be beveled using a beveling tool, rasp, or other approved equipment, to the proper taper. Mark the proper insertion depth on the cut and beveled end before installing the cut pipe into the pipeline. Pipe laying shall proceed up-grade from the lowest point of the proposed system, with spigot ends pointing in the direction of flow. All pipe shall be laid straight, true to the lines and matching existing grade, in each section between manholes. The pipe shall be laid so that the identification markings are located on the top of the installed pipelines. At all times when work is not in progress, the exposed ends of all pipes shall be fully protected by an approved stopper to prevent groundwater, dirt, rocks or other substances from entering the pipe.
- C. Each individual length of pipe shall be solidly and evenly bedded and haunched throughout its length on a prepared bed on the floor of the trench and not supported in position on blocks or wedges. Pipe shall only be laid when the two preceding lengths have been thoroughly embedded in place to prevent any movement or disturbance of the finished joint. Any pipe which is disturbed or found to be defective after laying shall be taken up and relaid or replaced.
- D. Mechanical joints shall be made up using annealed high strength cast iron bolts and rubber gaskets as recommended by the manufacturer. All types of mechanical joint pipes shall be laid and jointed in full conformance with the manufacturer's recommendations, which shall be submitted to the ENGINEER for review and approval before work is begun. Only especially skilled workers shall be permitted to make up mechanical joints. Torque

wrenches set as specified in AWWA Standard C111 latest revision shall be used. Spanner-type wrenches may be used with the approval of the ENGINEER.

- E. Push-on joints shall be made in strict, complete compliance with the manufacturer's recommendations. Lubricant, if required, shall be an inert, non-toxic, water soluble compound incapable of harboring, supporting, or culturing bacterial life. Manufacturer's recommendations shall be submitted to the ENGINEER for review and approval before work is begun.
- F. Concrete blocks and restrained joints shall be placed at all bends, lees plugs and other fittings, valves, and pipelines as shown on the Drawings or as directed by the ENGINEER.

### 3.03 VALVE INSTALLATION

- A. All valves stem extensions, valve boxes, and accessories shall be installed in accordance with the manufacturer's written instructions and as shown and specified.
- B. The CONTRACTOR shall not open or close valves unless otherwise approved by the ENGINEER.

### 3.04 VALVE CUT-INS ON WATER MAINS

- A. Water 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.

### 3.05 GRAVITY SEWER INSTALLATION

- A. Gravity sewer installation shall be in accordance with manufacturer's procedures.

### 3.06 HYDRANT INSTALLATION

- A. All fire hydrants shall be installed in strict accordance with the manufacturer's published recommendations, AWWA Standards, and all applicable codes, and the applicable provisions of Section entitled, "Valves, General." All installations shall be to the satisfaction of the local fire and building department.
- B. All hydrant isolating valves with slip joints, friction type, or caulked joint connections shall be harnessed to the main pipe by means of welded steel harness sets, or clamps and steel rods, designed for this purpose. Dry barrel fire hydrants shall be set on a bed of pea gravel not less than 18 inches deep and 3 feet square, for drainage, or as required by local regulations and conditions.
- C. All 6-inch valve additions can be performed with partial-localized system isolation with the approval of the ENGINEER and proper notifications/coordination with the City (i.e. 48 hours minimum prior notice).

- D. Existing concrete thrust blocks shall be removed and replaced in accordance to the requirements of the miscellaneous details in the drawings.
- E. Restrained joints shall be placed at all joints of fire hydrant, pipe connections, and vales.

### 3.07 TESTING WATER MAIN LINES

- A. Water mains shall be tested in accordance with ANSI/AWWA Standard C600.
- B. HYDROSTATIC TESTS:
  - 1. After a new water main has been laid and backfilled, it shall be pumped to a pressure of 150 PSI and all visible leaks stopped by approved methods.

2. A leakage test shall then be conducted at the above-mentioned pressure, and no installation will be acceptable by the OWNER until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{S \bullet D \bullet P^{1/2}}{148,000}$$

in which L equals the allowable leakage in gallons per hour; S is the length of line in feet being tested; D is the nominal diameter of the pipe in inches; and P is the average test pressure during the leakage test in pounds per square inch. 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 to accept the test gauge supplied by the OWNER.

3. The section of main being tested shall be limited to a maximum length of 2,000 feet. 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.
4. 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 to remove the ARV's upon the successful completion of the testing and shall be responsible for all associated site restorations resulting from his/her work.

#### C. DISINFECTION:

1. 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.
2. Mains shall not be put into domestic service until the necessary bacteriological samples have been approved by the applicable regulatory agencies.

### 3.08 TESTING WATER SERVICE LINES

- A. HYDROSTATIC TESTING: Hydrostatic testing of water service lines shall be done in conjunction with the testing of the lateral or main line. No additional leakage allowance will be made for service lines.
- B. DISINFECTION: Disinfection of service lines shall be done in conjunction with the disinfection of the lateral or main line. Sufficient sampling points shall be taken from service line connections to assure uniform results throughout the system being tested.

- END OF SECTION -

SECTION 02730  
SANITARY SEWERAGE

**Part 1 - GENERAL**

1.01 SYSTEM DESCRIPTION

- A. Construct and test a complete wastewater collection system.

1.02 SUBMITTALS

- A. Submit manufacturers' literature and data for all materials.
- B. Submit drawings accurately showing wastewater collection systems and related site improvements in their installed locations prior to the placement of any asphalt or concrete pavement.
- C. Submit complete "as-built" information in the form of Project Record Documents as required by the terms of the Contract.
  - 1. Maintain accurate, clear, legible and complete records forming a true representation of the Work completed and in progress.
  - 2. Provide drawing and specification documentation relative to:
    - (a) Manholes, valves, services, fittings.
    - (b) Vertical and horizontal locations of all fittings, cleanouts, and connection points.
    - (c) Pipe length, size, and material type.
    - (d) Television inspection and other test results.
    - (e) Dimensioned locations and elevations of all other related improvements and system components.
    - (f) Variations between installed construction and delineations contained within the Contractor's Phase III, 100 percent documents.
  - 3. All horizontal and vertical information: Measured and recorded by an independent Registered Surveyor and included in the project Record Documents.
  - 4. Project Record Documents: Signed and sealed by the preparing Professional Land Surveyor registered in the State of Florida and the Contractor's Florida Registered Engineer of Record.

1.03 QUALITY ASSURANCE

- A. Applicable Codes and Jurisdictional Authorities

## SECTION 02730

### SANITARY SEWERAGE

1. Florida Department of Education's State Requirements for Educational Facilities (SREF), Latest Edition.
  2. Occupational Safety and Health Administration (OSHA).
  3. Manual of Uniform Traffic Control Devices (MUTCD).
  4. Florida Department of Health – Broward County.
- B. Survey Data: Base all elevations on North American Vertical Datum of 1988 (NAVD).
- C. Inspections
1. Contractor: notify the municipal or county jurisdictional authorities, Project Consultant, and BCI at least 24 hours prior to arrange the required inspection of the water system.

## **Part 2 - PRODUCTS**

### 2.01 PRODUCTS AND MATERIALS

#### A. Sewer Pipe and Fittings

1. Non-pressure polyvinyl chloride (PVC) pipe conforming to ASTM D3034, SDR 26, with push-on rubber gasket joints.
2. Fittings and accessories: As manufactured or supplied by the pipe manufacturer and conforming to the following additional requirements:
  - (a) Provide PVC sewer piping having a dimension ratio (DR) of 26 and minimum pipe stiffness (PS) of 46 PSI.
  - (b) Joints:
3. Integral bell gasketed joint designed for radial compression of the elastomeric gasket inside the bell on the pipe spigot to ensure a positive seal.
4. Design joint to avoid displacement of the gasket when installed under provisions of the manufacturer's recommendation.
5. Use lubricants to join pipe as recommended by the manufacturer. Solvent cement joints: acceptable. Joint pipe entirely in the trench under strict provisions of the pipe manufacturer's instructions.

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B. Gaskets

1. Provide gaskets molded in a circular form or extruded to the proper section and then spliced into circular form, consisting of a properly vulcanized high-grade elastomeric compound.
2. Basic polymer: Natural rubber, synthetic elastomer or a blend of both.
3. Manufacture gaskets of materials resistant to domestic sewage.
4. Apply an adequate compressive force to gasket to affect a positive seal under all combinations of joint tolerance.
5. Gasket: Shall render the joint flexible and watertight.

(a) Pipe and Fittings

6. Pipe

- (a) Made of PVC plastic having a cell classification of 12454-B or 12454-C or 13364-B (with minimum tensile Modulus of 500,000 PSI) as defined in specification D1784.
- (b) Uniform in color, opacity, density and other physical properties.

7. Fittings: Made of PVC plastic having a cell classification of 12454-B, 12454-C or 13343-C as defined in specification D1782.
8. Compounds with different superior cell classifications are acceptable.
9. Clean reworked material generated by the manufacturer's own production meeting all requirements of specifications are acceptable.
10. Pipe and fittings: homogenous throughout and free from cracks, holes, foreign inclusions or other injurious defects.
11. PVC pipe and fittings showing signs of ultra-violet degradation are not allowed.
12. Pipe Marking: Mark each standard and random length of pipe with the following information:

- (a) Manufacturer's Name or Trademark.
- (b) Nominal Pipe Size.
- (c) The PVC Cell Classification.
- (d) The Legend "Type P#! DR 35 PVC Sewer Pipe".

13. Fittings Marking: Mark fittings with the following information

- (a) Manufacturer's Name or Trademark.
- (b) Nominal Size.
- (c) The Material Designation "PVC" PSM.



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14. Adapters: As required by the field conditions.
15. Service Plugs: Flexible virgin polyvinyl chloride similar to those supplied by Fernco Joint Sealer Company.

#### C. Manholes

1. General Construction:
  - (a) Precast concrete with 4000 PSI concrete and grade 40 steel.
  - (b) Other materials may be used upon prior review by the Engineer.
  - (c) Construct manholes to conform with ASTM C478 and the following:
2. Minimum wall thickness: 8 inches.
3. Minimum inside diameter of base sections: 48 inches.
4. Precast reinforced base: 8-inch thick minimum cast monolithically with the bottom section of manhole walls.
5. Base slab: Extend a minimum of 4 inches from the outside of the manhole.
6. Lifting holes through the structures: Not permitted.
7. Minimum height of base sections: Three feet from the bottom of base slab.
8. Join manhole sections with a mastic compound or a round compression ring of neoprene material set in annular spaces cast into the spigot end of a bell spigot-type joint:
  - (a) Mastic compound of ring: Uniformly compressed between the positioned sections so as to form a watertight joint.
  - (b) Point up and fill the remaining space in the joint with a dense cement mortar and finish so as to make a smooth, continuous surface inside and outside the wall sections after the sections are assembled.
9. Precast Manhole Cones: Terminate at elevations to permit laying up a minimum of 2 and maximum of 4 courses of clay brick under the manhole frame to make allowance for future street grade adjustment.
10. Brick for Manhole Construction:
  - (a) Dense, hard burned, common clay brick conforming to ASTM Specification C62 latest revision, except that brick absorption shall be between 5 and 25 grams of water absorbed in 1 minute by dried brick, set flat face down, in 1/8 inch of water.
  - (b) Thoroughly wet all brick before laying up.

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- (c) Lay up with shove joint in full beds, thoroughly slushed up with mortar at every corner.

#### 11. Invert Channels

- (a) Construction: Smooth and semicircular in shape conforming to inside of adjacent sewer section.
- (b) Make changes in direction of flow as a smooth curve of as large a radius as the size of the manhole will permit.
- (c) Changes in size and grade of channels: make gradually and evenly.
- (d) Form invert channels by 1 of the following methods: Form directly into concrete manhole base, build up with block and mortar, lay half tile in concrete, or lay full section of sewer pipe through manhole and break out top half after the surrounding concrete has hardened.
- (e) Manhole floor outside of channels: Smooth, and sloped toward channels on a slope of 1 inch per foot.

#### 12. Provide stub out for future extensions. Close or plug manhole ends of all stub out.

#### 13. Service laterals: Not permitted through manhole walls.

#### 14. Outside drop connections: Required when the vertical distance between pipe inverts exceeds 2 feet. Drop connections: Cast monolithically with the manhole elements.

#### 15. Steps or ladders: Omit unless specifically required by regulatory agency.

#### 16. Sealant

- (a) Seal entire outside of the manhole with 2 coats, 8 mil each, of Koppers 300-M Bitumastic Paint.
- (b) Seal entire inside of the manhole with SewperCoat (No Substitution) as described in 02755 - Lining Installation
- (c) Interior surfaces: cleaned of all dust, oils, compounds and other foreign matter and etched with 18 percent to 20 percent muriatic acid solution.
- (d) Thoroughly rinse all surfaces with clean, clear water prior to paint application.
- (e) Dilute acid solution prior to removal from the system.

#### 17. Jointing and Plastering

- (a) Mortar: One part Portland Cement and 2 parts of fine sand.
- (b) For block work, lime not exceeding 20 percent of the cement by volume may be added for workability.

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- (c) Joints: completely filled and free from surplus mortar.
  - (d) Exterior and interior surfaces of block manholes: plaster with 3/4 inch of cement mortar.
18. Seal all openings and joints watertight with non-shrink grout.
19. Castings for manhole frames and covers:
- (a) Made of clean even grain, tough gray cast iron conforming to ASTM Designation A48 for Class 30, gray iron.
  - (b) Smooth, true to pattern, and free from projects, sand holes, warp and other defects.
  - (c) Machine horizontal surfaces of the frame cover seat and the under surface of the cover which rests upon the cover seat.
  - (d) Rocking any cover after it has been seated in any position in its associated frame: Not permitted.
  - (e) Machining: required only on those frames and covers intended for vehicular traffic.
  - (f) Coat castings with coal tar pitch varnish to make a smooth coating, tough and tenacious when cold, not tacky and not brittle.
  - (g) Cast the words "Sanitary Sewer" on the grates.
  - (h) Set manhole frames and covers so that the top cover is flushed with the finished grade.
  - (i) Ensure the manhole frame and corner type is suitable for the future addition of cast iron rings for upward adjustment of top elevation.
  - (j) Seating surfaces between frames and covers: machined to fit true.
  - (k) Plugging or filling: Not allowed.
  - (l) Pick type-lifting holes: cast into lids, but not through the lid.
  - (m) Provide a sealed locking type lid when manholes lies below the Broward County 10 year flood elevation or when an unusual condition exists.

### **Part 3 - EXECUTION**

#### 3.01 PREPARATION

##### A. Existing Utilities

1. Provide temporary support, adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the Work.

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2. Permanently support, relocate, remove, or reconstruct existing utility structures (such as conduits, ducts, pipe branch connections to main sewers, main drains or other structures) where the grade or alignment of the pipe is obstructed. Deviations from the required line or grade: Not permitted.
  3. Contact the Florida Sunshine One Call (811) "No-Cuts" Center and verify existing utility field locations at least 48 hours prior to beginning any excavation.
  4. Verify the size, location, elevation, and material of all existing utilities within the area of construction.
- B. Unloading Materials: Exercise care in unloading and handling pipe, valves, fittings, and all other material.
- C. Excavation
1. Excavate pipe trenches to required depths.
  2. In general, water distribution lines have a minimum of 36 inches cover.
  3. If rock is encountered, excavate to a minimum of 6 inches below bottom of pipe, and backfill trench.
  4. Width of trench: Sufficient to allow workmen to perform all operations incidental to constructing the pipeline and in conference with all jurisdictional requirements including OSHA
  5. Provide hand dug bell holes to permit proper joint making.
  6. Pipe bearing on rock: Not Permitted.

### 3.02 INSTALLATION

- A. Install sewer pipe under provisions of ASTM D2321 and the Uni-Bell Plastic Pipe Association's "Recommended Practice for the Installation of PVC Sewer Pipe".
- B. Lay pipe commencing at the lowest point, with spigot ends pointing in the direction of flow:
1. Lay all pipes with ends abutting and true to line and grade.
  2. Carefully center pipe and form a uniform invert.
  3. Lay pipe under provisions of manufacturer's requirements.
- C. Lay pipe accurately to the line and grade required for system performance:
1. Clean and dry all surfaces of the portions of the pipe to be jointed or of the factory-made jointing material.

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2. Use lubricant, primers, adhesives, etc. as recommended by the pipe or joint manufacturer's specifications.
  3. Place, fit, join and adjust jointing materials or factory-fabricated joints in such a manner as to obtain a watertight line.
  4. Place sufficient backfill material along each side of the pipe to prevent movement of pipe off line and grade as soon as possible after the joint is made.
- D. Plug exposed ends of pipes to prevent earth, water or other substances from entering the pipe when construction is not in progress.
- E. Neoprene boot with stainless steel accessories: Grout Harco or similar manhole couplings in place with non-shrink grout at each pipe connection into a manhole wall.
- F. Cleanouts: Install at all services exceeding 75 feet in length with cleanouts at the property line, or 5 feet from a building.
- G. All Sewer Service Piping: Six inches in diameter with minimum slope of 0.4 percent and 36 inches of cover, minimum. Flush and lamp entire system.
- H. Test entire system for infiltration and exfiltration: Limit to not more than 0.1 gallons per foot in 24 hours.
- I. Concrete Encasement of Sewer Pipe:
1. Excavate trenches with mechanical equipment.
  2. Provide temporary supports consisting of timber, wedges or masonry prior to formation of the encasement to support the pipe in place.
  3. Provide temporary supports of minimum dimensions and support the pipe at not more than 2 places, 1 at the bottom of the barrel of the pipe adjacent to the shoulder of the socket, and the other near the spigot end.
  4. After completion of jointing of the pipe has been completed, uniformly pour concrete beneath and on both sides of the pipe. Provide uniform encasement of at least 4 inches thick at all points.

#### 3.03 FIELD QUALITY CONTROL

- A. Protect pipe during handling against impact shocks and free falls. Keep pipe clean at all times. Do not use pipe that does not conform to the specifications.
- B. Notify the utility company and authorities having jurisdiction at least 48 hours prior to beginning construction in order to arrange inspection of the sanitary sewer.
- C. Sewer Test

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1. On completion of each block or section of sewer, clean, test, and lamp the block or section of sewer:
  - (a) Each section of the sewer: Show a full circle of light between manholes on examination from either end.
  - (b) Each manhole, or other appurtenance to the system: Provide appropriate size and form, be watertight, neatly and substantially constructed, with the top set permanently to exact position and grade.
  - (c) Repairs of deficiencies revealed by inspection: Repair broken or cracked pipe, remove all deposits, with sewers left true to line and grade, entirely clean and ready for use.
  - (d) Sewer Lamping: Witnessed by the regulatory agencies having jurisdiction.
2. Infiltration/Exfiltration
  - (a) The allowable limits of infiltration or exfiltration for the entire system: Do not exceed a rate of 100 gallons per inch of inside pipe diameter per mile of pipe per 24 hours.
  - (b) House service lines: No additional allowance.
  - (c) The allowable limits of infiltration or exfiltration of manholes: Do not exceed a rate of 4 gallons per manhole per 24 hours.
  - (d) Any part or all of the system may be tested for infiltration or exfiltration as directed by the Project Consultant or other jurisdictional authorities.
  - (e) Prior to testing for infiltration: Pump out system and maintain normal infiltration conditions at the time of testing.
  - (f) Determine the amounts of infiltration or exfiltration by pumping into or out of calibrated drums, or by other methods approved by the Project Consultant or other jurisdictional authorities.
3. Exfiltration Test
  - (a) Conducted by filling the portion of the system being tested, with water, to a level equal to the lowest part of the manhole frame.
  - (b) An air test may be substituted for the water exfiltration test, by the Project Consultant or other jurisdictional authorities.
4. Conduct and run tests continuously for 2 hours on portions of the system not exceeding 3 manhole sections or 1000 linear feet whichever is greater.

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5. Where infiltration or exfiltration exceeds the allowable limits: locate and repair defective pipe, joints, or other faulty construction. Remove and reconstruct as much of the work as is necessary in order to conform to the specified allowable limits.

#### D. TV. Inspection

1. Conduct television inspection of all lines after all other testing has been successfully completed.
2. Repair the manhole-to-manhole section where defects are found and conduct television inspection after repairs.

#### E. Temporary Drainage During Construction

1. Construct and maintain temporary drainage facilities, which may be required to provide drainage relief for the new construction without causing abnormal or adverse flooding impacts to the existing or new facilities.
2. Temporary facilities may include swales, pipe, etc. as necessary.

#### F. Restoration of Surfaces and Structures

1. Restore and replace paving, curbing, sidewalks, fences, sod, survey points, or other disturbed surfaces or structures to a condition equal to that before the work was begun.
2. Restoration of surfaces and structures outside the Owner's property line: Comply with requirements of the applicable governing agencies.

#### G. Cleaning Up

1. Remove surplus pipeline material, tools, temporary structures, etc.
2. Dispose of all dirt, rubbish, and excess earth off site.

- END OF SECTION -

## SECTION 02750 - WASTEWATER FLOW CONTROL

### PART 1 -- GENERAL

#### 1.01 SCOPE OF WORK

- A. The work specified in this Section includes all labor, materials, accessories, equipment and tools for performing all operations required to bypass pump sewage around a manhole or sewer section in which work is to be performed. The CONTRACTOR shall be prepared to bypass pump sewage as a part of his operations.
- B. The work specified in this Section also includes all labor, materials, accessories, equipment and tools for performing all operations required to bypass pump sewage around a section of force main or gravity sewer in which work is to be performed, or around a manhole into which a force main or gravity sewer discharges if work is to be performed at the manhole. The CONTRACTOR shall be prepared to bypass pump sewage as a part of his operations.
- C. The CONTRACTOR shall provide all pumps, piping, and other equipment to accomplish this task; perform all construction; obtain all permits; pay all costs; and perform complete restoration of all existing facilities to equal or better condition to the satisfaction of the CITY.

#### 1.02 GENERAL

- A. When sewer line flows at the upstream manhole of the line being repaired or replaced are above the maximum allowable requirements for television survey, or do not allow the proper sewer or manhole repair / replacement, the flows shall be reduced to the levels indicated by one of the following methods: manual operation of pumping stations by CITY forces, by the CONTRACTOR plugging / blocking of the flows, or by the CONTRACTOR pumping / bypassing of the flows as acceptable to the CITY.
- B. In some applications, the wastewater flow may be plugged and contained within the capacity of the collection system. This shall only be done when it has been determined the system can accommodate the surcharging without any adverse impact.
- C. For the initial television survey, before and after any repair / replacement with the exception of joint testing and sealing, the sewer line shall be blocked completely. No flow, except infiltration/inflow, will be allowed through the respective sewer line being televised on the television survey.
- D. For all other television surveys, including warranty surveys and joint testing and sealing operations, the depth of flow within the sewer shall not exceed that shown below for the respective pipe sizes as measured in the manhole.

##### 1        Maximum Depth of Flow – Warranty Television Survey

6" - 10" Pipe .....	20% of pipe diameter
12" - 24" Pipe.....	25% of pipe diameter



Above 24" Pipe.....30% of pipe diameter

2 Maximum Depth of Flow – Joint Testing/Sealing

6" - 12" Pipe.....25% of pipe diameter

15" - 24" Pipe .....30% of pipe diameter

Above 24" Pipe.....35% of pipe diameter

- E. When sewer line flows at the upstream manhole of the line being repaired or replaced, in the opinion of the CITY, are too excessive to plug while the rehabilitation is being performed, the CONTRACTOR shall submit a written plan and pump/bypass the flow as acceptable to the CITY.
- F. When flows of sewage through a force main being repaired, or discharging by gravity or force main to a manhole being repaired or replaced, are in the opinion of the CITY too excessive to plug or stop while the rehabilitation is being performed, the CONTRACTOR shall submit a written plan and pump/bypass the flow as acceptable to the CITY.

1.03 SUBMITTALS

- A. The CONTRACTOR shall submit complete, detailed plans for this aspect of the work to the CITY for review.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 PLUGGING AND BLOCKING

- A. A sewer line plug shall be inserted into the line at a manhole upstream from the section being surveyed, repaired or replaced. The plug shall be so designed that all or any portion of the operation flows can be released. During the survey portion of the operation, flows shall be shut off or reduced to within the maximum flow limits specified. During repairs or replacement, the flows shall be shut off or pumped / bypassed, as acceptable to the CITY. After the work tasks have been completed, flows shall be restored to normal.

3.02 PUMPING AND BYPASSING

- A. When pumping/bypassing is required, as determined by the CITY, the CONTRACTOR will supply the necessary pumps, conduits and other equipment to divert the flow of sewage around the manhole section in which work is to be performed. The bypass system shall be of sufficient capacity to handle existing flows plus additional flow that may occur during periods of rain storms. The CONTRACTOR will be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and bypassing system. A "setup" consists of the necessary pumps, conduits and other equipment to divert the flow of sewage around a manhole section, from the start to finish of work performed in the manhole section.
- B. Pumps and equipment shall be continuously monitored by a maintenance person capable of starting, stopping, refueling and maintaining these pumps during the rehabilitation. If

pumping is required on a 24-hour basis, engines shall be equipped in a manner to keep noise to a minimum.

- C. In the case of bypassing force main/gravity sewer flows, whether such flows normally discharge into a manhole being repaired/replaced or pass through a force main/gravity sewer being repaired/replaced, bypass shall be accomplished by one of two methods.
1. In the absence of surface conditions that prevent temporary bypass piping, the force main/gravity sewer shall be accessed by excavation and temporary piping shall be installed to bypass the repair/replacement in a manner acceptable to the CITY. In general, for manhole repairs/replacement, the CONTRACTOR shall excavate to the force main outside the manhole, cut the force main, attach bypass piping, and bypass flow to the next downstream manhole. For force main repairs, the CONTRACTOR shall excavate to the force main on each side of the repair, cut the force main on each side of the repair, attach bypass piping on each side of the repair, and bypass flow around the repair. Upon the conclusion of bypass activities and repair work, the CONTRACTOR shall install closure pieces to permanently rejoin and restore the force main to full function.
  2. Where surface conditions prevent the use of temporary bypass piping, and where the CITY cannot accomplish the bypass operations in-house, the CITY shall shut down the associated lift station and the CONTRACTOR shall pump from the wet well into tanker trucks for transport to a designated location. The number of tanker trucks deemed necessary for this operation shall be agreed to in advance by the CITY.

### 3.03 FLOW CONTROL PRECAUTIONS

- A. Surcharging Sewers. Where the raw sewage flow is blocked or plugged, sufficient precautions must be taken to protect the public health. No septic conditions shall be allowed due to CONTRACTOR's operations. The sewer lines shall also be protected from damage. The following occurrences shall not be allowed:
1. No sewage shall be allowed to back up into any homes or buildings.
  2. No sewage shall overflow any manholes, cleanouts or any other access to the sewers.
  3. Users upstream of the repair area shall be able to use all their water and sewer utilities without interruption.
- B. If any of the above unallowable conditions occur or are expected to occur, the CONTRACTOR shall bypass pump to alleviate one or all of the conditions. Additionally, the CONTRACTOR is required to observe the conditions upstream of the plug and be prepared to immediately start bypass pumping, if needed. It is CONTRACTOR's responsibility to pay for all damage claims.
- C. Pumps. Any sump pumps, bypass pumps, trash pumps or any other type pump which pulls sewage/water or any type of material out of the manhole or sewer shall discharge this material into another manhole, or appropriate vehicle or container acceptable to the CITY.

Under no circumstances shall this material be discharged, stored or deposited on the ground, swale, road or open environment.

- D. Traffic Control. The CONTRACTOR shall take appropriate steps to ensure that all pumps, piping and hoses that carry raw sewage are protected from traffic. Traffic control shall be performed in accordance with Section 01570 - Traffic Regulation and Maintenance of Traffic.
- E. Sewage Spills. In the event, during any form of "Sewage Flow Control", that raw sewage is spilled, discharged, leaked or otherwise deposited in the open environment, due to the CONTRACTOR's work, the CONTRACTOR is responsible for any clean up of solids and disinfection of the area affected. This work will be performed at the CONTRACTOR's expense with no additional cost to the CITY. The CONTRACTOR is also responsible for notifying the sewer system maintenance personnel and complying with any and all regulatory requirements in regards to the size spill with no additional cost to the CITY.

- END OF SECTION -

## SECTION 02751 - PREPARATORY CLEANING AND ROOT REMOVAL

### PART 1 -- GENERAL

#### 1.01 SCOPE

- A. This Section covers the preparatory cleaning of sewer lines and manholes as needed prior to the internal survey of the sewer lines by closed-circuit television. It also covers the preparatory cleaning and root removal of sewer lines and the cleaning of manholes prior to rehabilitation. The CONTRACTOR shall furnish all necessary material, labor, equipment and services required for cleaning the specific sewer lines.

#### 1.02 GENERAL

- A. Sewer Line Cleaning. The intent of sewer line cleaning is to remove foreign materials from the lines and restore the sewer to a minimum of 95% of the original carrying capacity or as required for proper seating of internal pipe joint sealing packers or performance of other specified work. It is recognized that there are some conditions such as broken pipe and major blockages that prevent cleaning from being accomplished or where additional damage would result if cleaning were attempted or continued. Should such conditions be encountered, the CONTRACTOR will not be required to clean those specific sewer sections. If, in the course of normal cleaning operations, damage does result from preexisting and unforeseen conditions such as broken pipe, the CONTRACTOR will not be held responsible.
- B. Manhole Cleaning General. All concrete and masonry surfaces must be cleaned prior to repair. Grease, laitance, loose bricks, mortar, unsound concrete, and other materials must be completely removed. Water blasting (minimum 1,200 psi) utilizing proper nozzles shall be the primary method of cleaning; however, other methods such as wet or dry sandblasting, acid wash, concrete cleaners, degreasers or mechanical means may be required to properly clean the surface. Surfaces on which these methods are used shall be thoroughly rinsed, scrubbed, and neutralized to remove cleaning agents and their reactant products.

#### 1.03 HYDRAULIC CLEANING EQUIPMENT

- A. Hydraulically Propelled Equipment. The equipment used shall be of a movable dam type and be constructed in such a way that a portion of the dam may be collapsed at any time during the cleaning operation to protect against flooding of the sewer. The movable dam shall be equal in diameter to the pipe being cleaned and shall provide a flexible scraper around the outer periphery to insure removal of grease. If sewer cleaning balls or other equipment which cannot be collapsed is used, special precautions to prevent flooding of the sewers and public or private property shall be taken.
- B. High-Velocity Jet (Hydrocleaning) Equipment. All high-velocity sewer cleaning equipment shall be constructed for ease and safety of operation. The equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring

action from 15 to 45 degrees in all size lines designated to be cleaned. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tank, auxiliary engines, pumps, and hydraulically driven hose reel.

- C. Mechanically Powered Equipment: Bucket machines shall be in pairs with sufficient power to perform the work in an efficient manner. Machines shall be belt operated or have an overload device. Machines with direct drive that could cause damage to the pipe will not be allowed. A power rodding machine shall be either a sectional or continuous rod type capable of holding a minimum of 750 feet of rod. The rod shall be specifically heat-treated steel. To insure safe operation, the machine shall be fully enclosed and have an automatic safety clutch or relief valve.

## PART 2 -- PRODUCTS (Not Used)

## PART 3 -- EXECUTION

### 3.01 GENERAL

- A. The designated sewer sections shall be cleaned using hydraulically propelled, high-velocity jet, or mechanically powered equipment. The equipment shall dislodge, transport and remove all sludge, mud, sand, gravel, rocks, bricks, grease, roots, sticks, and all other debris from the interior of the sewer pipe and manholes. The equipment and methods selected shall be based on the conditions of lines and manholes at the time the work commences and shall be satisfactory to the OWNER. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. If, again, successful cleaning cannot be performed or the equipment fails to traverse the entire manhole section, the cleaning effort shall be stopped and sufficient inspection performed so that the OWNER can be notified of the reason for inability to continue.

### 3.02 CLEANING PRECAUTIONS

- A. During all cleaning and preparation operations all necessary precautions shall be taken to protect the sewer from damage. During these operations, precautions shall also be taken to insure that no damage is caused to public or private property adjacent to or served by the sewer or its branches.
- B. Satisfactory precautions shall be taken in the use of cleaning equipment. When hydraulically propelled cleaning tools (which depend upon water pressure to provide their cleaning force) or tools which retard the flow in the sewer line are used, precautions shall be taken to insure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. When possible, the flow of sewage in the sewer shall be utilized to provide the necessary pressure for hydraulic cleaning devices. When additional water from fire hydrants is necessary to avoid delay in normal work procedures, the water shall be conserved and not used unnecessarily. The CONTRACTOR shall employ operational hydrant meters to be obtained from the OWNER, and shall obtain

water only from the OWNER's hydrants. No fire hydrant shall be obstructed in case of a fire in the area served by the hydrant.

### 3.03 MATERIAL REMOVAL

- A. All sludge, dirt, sand, rocks, grease, roots, and other solid or semisolid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing material from manhole section to manhole section, which could cause line stoppages, accumulations of sand in wet wells, or damage pumping equipment, shall not be permitted.
- B. Under no circumstances shall sludge or other debris removed during these operations be dumped or spilled into the streets, ditches, storm drains or other sanitary sewers. The CONTRACTOR shall remove from the site and properly dispose of all solids or semi-solids recovered during the cleaning operation. The CONTRACTOR shall obtain permits and make arrangements as required to properly dispose of solids.
- C. The CONTRACTOR is advised that he shall not dispose of this material by legal or illegal dumping on private or public property, by sale to others, or any means other than those given above.
- D. The CONTRACTOR shall keep his haul route and work area(s) neat and clean and reasonably free of odor, and shall bear all responsibility for the cleanup of any spill which occurs during the transport of cleaning/surface preparation by-products and the cleanup of any such material which is authorized by or pursuant to this Contract and in accord with applicable law and regulations. The CONTRACTOR shall immediately cleanup any such spill, or waste. If the CONTRACTOR fails to cleanup such spill, or waste immediately, the OWNER shall have the right to cleanup or arrange for its cleanup and may charge to the CONTRACTOR all costs, including administrative costs and overhead, incurred by the OWNER in connection with such cleanup. The OWNER may also charge to the CONTRACTOR any costs incurred or penalties imposed on the OWNER as a result of any spill, dump or discard. Under no circumstances is this material to be discharged into the waterways or any place other than where authorized to do so by the appropriate authority. The term "CONTRACTOR" as used in this section shall include the CONTRACTOR's subcontractors and other Contractors.
- E. The general requirements for vehicles hauling such waste materials are as follows: Transport vehicles must be of type(s) approved for this application by the political jurisdictions involved. General requirements are that the vehicles have watertight bodies, that they be properly equipped and fitted with seals and covers to prohibit material spillage or drainage, and that they be cleaned as often as is necessary to prevent deposit of material on roadways. Vehicles must be loaded within legal weight limits and operated safely within all traffic and speed regulations.
- F. The routes used by the CONTRACTOR for the conveyance of this material on a regular basis shall be subject to approval by the governing authority having jurisdiction over such routes.

### 3.04 DISPOSAL OF MATERIALS

- A. All solids or semisolids resulting from the cleaning operations shall be removed from the site and disposed of by the CONTRACTOR in a legal and sanitary manner as approved by appropriate authorities, at the CONTRACTOR's cost. Copies of records of all disposal shall be furnished to the OWNER, indicating disposal site, date, amount and a brief description of material disposed. All materials shall be removed from the site no less often than at the end of each workday. Under no circumstances will the CONTRACTOR be allowed to accumulate debris, etc., on the site of work beyond the stated time, except in totally enclosed containers and as acceptable to the OWNER.

### 3.05 ROOT REMOVAL

- A. Roots shall be removed in the designated sections and manholes where root intrusion is indicated on the work order. Special attention should be exercised during the cleaning operation to assure almost complete removal of roots from the joints. Any roots which could prevent the traveling of the packer or could prevent the proper application of chemical sealants, or could prevent the proper seating and application of cured-in-place, fold-and-formed or sectional cured-in-place liners, shall be removed. Procedures may include the use of mechanical equipment such as rodding machines, bucket machines and winches using root cutters and porcupines, and equipment such as high-velocity jet cleaners.

### 3.06 ACCEPTANCE OF CLEANING OPERATION

- A. Acceptance of sewer line cleaning shall be made upon the successful completion of the television survey and shall be to the satisfaction of the OWNER. Liner installation shall not be initiated until the OWNER has reviewed the post-cleaning television survey tapes and has accepted the cleaning. If television survey shows the cleaning to be unsatisfactory, the CONTRACTOR shall be required to reclean and reinspect the sewer line until the cleaning is shown to be satisfactory. In areas where television survey is not performed, the OWNER may require the CONTRACTOR to pull a double squeegee (with each squeegee the same diameter as the sewer) through each manhole section as evidence of adequate cleaning. If internal sealing is to follow the television survey, particular attention should be given to the adequacy of the cleaning to insure that proper seating of the sealing packer can be achieved.
- B. In the event that special cleaning involving the mechanical removal of roots, grease, and/or tuberculation has been authorized, acceptance of sewer line cleaning shall be made upon the successful completion of the post-cleaning television survey and shall be to the satisfaction of the OWNER. Liner installation shall not be initiated until the OWNER has reviewed the post-cleaning television survey tapes and has accepted the cleaning.

- C. In addition, on all those lines which have sags or dips, to an extent that the television camera lens becomes submerged for three (3) or more feet during the television inspection, the CONTRACTOR shall pull double squeegee and/or sponges through the line in order to remove the water from those dips or sags, or draft the water by means of high-velocity jet cleaners. Water removal shall be performed until the television camera lens will no longer be submerged. This requirement may be waived by the OWNER if the water in which the camera lens is submerged, is clear enough to allow the identification of pipe defects, cracks, holes and location of service taps.

- END OF SECTION -



## SECTION 02754 - MANHOLE REHABILITATION

### PART 1 -- GENERAL

#### 1.01 SCOPE

- A. Work orders will include the various manhole repairs specified in this Section. Manhole rehabilitation shall be accomplished by the application of materials that will improve the overall structural condition of the manhole. The intent of this portion of the work is to provide for aspects of sewer manhole rehabilitation and sealing using various procedures either singularly or in combination, including type of repair, methods of repair, materials and equipment as required for each manhole scheduled for rehabilitation.
1. Manhole Preparation: These work items include cleaning the manhole, sealing walls and patching the interior surfaces.
  2. Manhole Repairs - Critical Leak Areas: These work items include repairing leaks in the wall to base areas, pipe penetrations and manhole joints.
  3. Manhole Liners: These work items include installation of cementitious liners, cementitious/epoxy liners, and high density polyethylene (HDPE) liners.
  4. Frame and Cover Repairs: These work items include the repair of frame and cover leaks, realigning and grouting frame, and frame and cover replacement.

#### 1.02 SUBMITTALS

- A. The CONTRACTOR shall submit shop drawings and other information as specified in accordance with Section 01300, "Submittals".
- B. Qualification
1. The Qualification of the Manhole Rehabilitation Contractor shall be submitted prior to contract award. These qualifications shall include detailed description of the following:
    - a. Name, business address and telephone number of the Manhole Rehabilitation CONTRACTOR.
    - b. Name(s) of all supervisory personnel to be directly involved with Manhole Rehabilitation for this project.
    - c. The CONTRACTOR shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel will be directly involved with and used on this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the OWNER.

- d. Specialty technicians shall be certified by the equipment manufacturer and/or its authorized representative. Certifications shall be submitted to the OWNER.
- e. The CONTRACTOR shall provide his references of previous project lists going back five years including his customers' name, address, and telephone number.
- f. The CONTRACTOR shall have a State of Florida Underground Utility Contractor's License and must have been in business in the State of Florida for the last (5) five years in providing manhole rehabilitation contracting services utilizing the product being proposed for this bid.

C. Construction Procedures

- 1. The CONTRACTOR shall submit written descriptions of the construction method(s) and equipment to be used and locations required for equipment and material access.

PART 2 -- PRODUCTS

2.01 MANHOLE FRAMES AND COVERS

- A. All manhole frame and cover material and installation requirements shall be as indicated in the Drawings.
- B. Replacement of manhole frames and covers shall be pursuant to requirements outlined in Section 02754.

2.02 RUBBER SEALS

- A. The manhole frame-chimney joint area of manholes and the precast manhole barrel joints shall be sealed with internal flexible rubber seals, as manufactured by Cretex Specialty Products or approved equal, meeting the following requirements.
- B. Internal rubber seals used for sealing the joints between the manhole frame and chimney or corbel/cone section, shall consist of the following components:
  - 1. Rubber Sleeve and Extension: The flexible rubber sleeve extensions and wedge strips shall be extruded from a high grade rubber compound conforming to the applicable requirements of ASTM C 923, with a hardness (durometer) of 48 $\pm$ 5.
    - a. The sleeve shall be double pleated with a minimum unexpanded vertical height of 8 inches, a minimum thickness of 3/16 inches and shall be capable of a vertical expansion when installed of not less than 2 inches. The top and bottom section of the sleeve shall contain an integrally formed expansion band recess and multiple sealing fins.
    - b. The extension, if required, shall have a minimum thickness of 3/16 inches. The top section of the extension shall be shaped to fit into the bottom band recess of the sleeve under the bottom chimney seal band. The bottom

section of the extension shall contain an integrally formed expansion band recess and multiple sealing fins matching that of the rubber sleeve.

- c. Any splice used to fabricate the sleeve and extension shall be hot vulcanized and have a strength such that the sleeve shall withstand a 180 degree bend with no visible separation.
  - d. The continuous wedge strip used to adapt the rubber sleeve to sloping surfaces shall have the slope differential needed to provide a vertical band recess surface, be shaped to fit into the band recess and have an integral band restraint. The length of the wedge strip shall be such that, when its ends are butted together, it will cover the entire inside circumference of that band recess needing slope adjustment.
2. Expansion Bands: The expansion bands used to compress the sleeve against the manhole shall be 16 gauge stainless steel conforming to ASTM A 240, Type 316, with a minimum width of 1 3/4 inches. The expansion mechanism shall have the capacity to develop the pressures necessary to make a watertight seal and shall have a minimum adjustment range of 2 diameter inches. Studs and nuts used for this mechanism shall be stainless steel conforming to ASTM F 593 and 594, Type 316.

## 2.03 PREPATORY INFILTRATION CONTROL PRODUCTS

### A. Infiltration Control/Plugging Material

1. The infiltration control material shall be a rapid-setting, high-early-strength, hand-applied, cementitious material for stopping infiltrating water and making repairs in concrete, brick or other masonry constructed manholes. The material shall be nonshrinking, nonmetallic, and noncorrosive. It shall be formulated at the factory, and supplied in factory sealed and labeled pre-measured containers. The material shall have the following minimum requirements:

a. Compressive Strength	ASTM C 109	600 psi at 1 hour 2,400 psi at 24 hours
b. Expansion	ASTM C 327	0.10 percent
c. Sulfate Resistance	ASTM C 267	No weight loss after 15 cycles; 2,000 ppm
d. Freeze/Thaw Resistance	ASTM C 666	Method A: 100 cycles no visible damage
e. Pull-Out Strength	ASTM C 234	14,000 pounds
f. Set Time	ASTM C 191-92	45-60 seconds

2. Product shall be Premacast-Plug as manufactured by AP/M Permaform, P.O. Box 555, Johnston, IA 50131 (Tel. 800-662-6465); Strong-Seal Strong-Plug as manufactured by the Strong Company, Inc., 4505 Emmet Saunders Road, Pine Bluff, Arkansas 71601 (Tel. 800-982-8009); Preco-Plug as manufactured by Fosroc Incorporated, 150 Carley Court, Georgetown, Kentucky 40324 (Tel. 800-645-3954); or approved equal.

B. Chemical Grouting Material

1. Chemical Grouts may be used for stopping very active infiltration and shall be mixed per manufacturer's recommendations and as specified in Section 02763-Chemical Grouting. The chemical grout shall be an extremely low viscosity acrylamide resin with gel times from 5 seconds to several hours. Product shall be AV-100 Chemical Grout as manufactured by Avanti International, 822 Bay Star Boulevard, Webster, Texas 77598 (Tel. 800-877-2570) or approved equal.

C. Patching Material

1. Patching material shall be a rapid-setting, high-early-strength, corrosion resistant, hand-mixed and hand-applied cementitious material for filling voids and repairing inverts in concrete, brick, or other masonry constructed manholes. It shall be formulated at the factory, and supplied in factory sealed and labeled pre-measured containers. The material shall have the following minimum requirements:

a. Compressive Strength	ASTM C 109	2,400 psi at 24 hours
b. Bond Strength	ASTM C 321	145 psi at 28 days
c. Applied Density	--	105 plus or minus 5 pounds per cubic foot
d. Shrinkage	ASTM C 596	0 percent at 90 percent relative humidity
e. Set Time	ASTM C 191-92	3-5 minutes
2. Product shall be Permacast-Patch as manufactured by AP/M Permaform, Strong-Seal QSR as manufactured by The Strong Company, Inc., Preco-Patch as manufactured by Fosroc Incorporated, or approved equal.

2.04 CEMENTITIOUS LINER MATERIALS

A. Liner Material:

1. The liner material shall be ultra high strength, high build, corrosion resistant, mortar based on Portland cement and Microsilica fortified with a bacteria inhibitor of pure fused calcium aluminate cementitious liner. The liner shall be used to form the structural/structurally enhanced monolithic liner at a minimum thickness of one (1.0) inch covering all interior manhole surfaces, including the bench, and shall have the following minimum requirements at 28 days:

Compressive Strength	ASTM C 109	>8,000 psi
Tensile Strength	ASTM C 496	>600 psi
Flexural Strength	ASTM C 293	>800 psi
Shrinkage	ASTM C 596	0% @ 95%R.H.
Bond	ASTM C 882	>1,000 psi
Applied Density		125 pcf $\pm$ 5 lbs.

2. Product shall be PERMACAST MS- 10,000 with CON-SHIELD as manufactured by AP/M Permaform or SewperCoat as manufactured by Lafarge Calcium Aluminates.

B. Water: Water shall be clean and potable.

C. Other Materials: No other material shall be used with the above mixes unless approved by the manufacturer and acceptable to the Engineer.

## 2.05 HIGH DENSITY POLYETHYLENE (HDPE) LINER MATERIAL

- A. The CONTRACTOR shall furnish and install all labor, materials, equipment, and incidentals required to rehabilitate existing sewer manholes with a minimum 2 mm (0.079 inches) High Density Polyethylene (HDPE) liner insert.
- B. The HDPE liner rehabilitation system shall be designed to protect the interior surface of the structure from acid corrosion, abrasion, and impact, and to eliminate groundwater infiltration and restore structural integrity to the existing structure.
- C. Installation of the liner insert on manholes shall be performed without requiring the removal of any component part of the existing structure or excavation of the site, except for the removal of the existing bench and invert and any loose or corroded material separated from the structure during the pressure cleaning process.
- D. Liner attachment to existing structure shall be made using a mechanical bond between the liner anchors and poured new concrete.
- E. The CONTRACTOR shall submit shop drawings, manufacturer's installation instructions, the thermo-welding specifications of the liner manufacturer, and a copy of the liner thermo-welders' certification issued by the manufacturer.
- F. The HDPE liner shall be free of pores, pinholes, voids and foreign bodies. All anchoring studs shall be manufactured during the extrusion process in one piece with the sheet. No welding to attach the studs to the sheet or mechanical finishing work is permitted. Additionally, all welding rod, profile strips, cap strips and polyester backed transition wrap shall be manufactured from the same resins by the same manufacturer.

G. The HDPE liner material shall conform to:

Property	Test Method	Value
Density	ASTM D 792	0.945 g/cm <sup>3</sup>
Melt Flow Index	ASTM D 1238	190/5g / 10min.
Heat Reversion	ASTM D 1637	<2 %
Yield Stress	ASTM D 638	≥ 2,320 psi
Elongation of Yield	ASTM D 638	≥ 12 %
Elongation at Break	ASTM D 638	≥ 200 %
Fire Classification	UL-94	V2
Pull-out Resistance	SKZ Test Directives	3 t/ft <sup>2</sup>
Max. Working Temp.		140 Degrees F

- H. Studded HDPE liner sheets used for manhole rehabilitation shall have a minimum design thickness of 2 mm (.079 inches) and have a minimum of 39 wedge shaped anchoring studs per square foot of liner. Minimum stud height shall be no less than 13 mm (0.51 inches) with a minimum length of 14 mm (0.55 inches).
- I. Transitions from dissimilar materials, such as PVC pipe to HDPE liner, shall be accomplished using a polyester backed HDPE transition wrap.
- J. Liner insert shall be constructed with a minimum overall inside dimension six inches less than the original inside dimension of the structure to be rehabilitated. The resulting void will be poured with concrete. The concrete used to anchor the liner shall be Type II Portland cement producing an average 4,000 psi compressive strength in 28 days. Concrete shall be poured or pumped in place and vibrated to eliminate voids. The forming system used to support the liner during the concrete pour shall be capable of bracing the liner against compression that would result from the pouring and vibrating of concrete into the void between the liner 's embeds and the existing wall.
- K. The CONTRACTOR shall utilize an internal steel forming system for placing a new and structurally independent three (3) inch concrete wall, within the existing manhole structure.

## 2.06 AROMATIC URETHANE SEALANT

- A. The flexible sealant shall be a two component, aliphatic, chemically curing, urethane sealant. The sealant shall be designed for flexibility from ground movement and extended water immersion when applied to the inside wall of the adjustment ring area. Manhole seal shall be designed to prevent leakage of water into the manhole through the frame joint area and the area above the manhole cone, including all extensions to the chimney area. Extension shall include, but is not limited to, lifting rings, brick and/or block material that may have been used to achieve grade. The material shall not corrode in municipal sewer environments. It shall have the following properties:

Movement Capability	ASTM C719	50%
Tensile Strength	ASTM D412	1100 psi
Adhesive Strength	ASTM D903	175 lb. l/in
Tear Resistance	ASTM D1004	165 lb. l/in
Ultimate Elongation	ASTM D412	750%
Hardness (Shore A)	ASTM C661	50
Low Temperature (Flexibility @ -4°F)	ASTM D1790	Pass
Heat Aging	ASTM C920	2%
Shelf Life @70°F in sealed containers		9 months
Recovery	ASTM C920	98%
Bond Durability	Test Blocked at 25% for 48 hours	
Water Immersion	Samples on masonry block will withstand water immersion while elongated 50%	

- B. The sealant shall be Ring Seal™ as manufactured by The Rain Stopper, P.O. Box 19369 Shreveport, LA 71149, (Tel. 800-843-4950), or Flex-Seal Utility Sealant as manufactured by Sealing Systems, Inc., 23230 West Thomess Boulevard, Loretto, Minnesota, 55357, (Tel. 800-478-2054), or an approved equal.
- C. A primer coat of 2-3 mils thickness shall be applied to the prepared surface. The primer shall have the following properties:

Tensile Strength	ASTM D 412	3,000 psi
Elongation	ASTM D 412	400%
Adhesive Strength	ASTM D 903	350 lb. l/in
Tear Resistance	ASTM D 1004	220 lb. l/in
Hardness	ASTM D 2240	85

- D. The flexible sealant shall be applied on primed surfaces at a thickness of 100 mils or as specified by the engineer. The overlap of the bottom portion of casting and the top of the lowest adjustment ring should be 3-inches or greater.

## 2.07 CEMENTITIOUS AND EPOXY COATING SYSTEMS

### A. Cementitious Coating

- The material applied onto the surface of the manhole shall be a microsilica and fiber enhanced cement mortar repair product formulated for the application within a sanitary sewer environment. The fiber-reinforced spray-applied cementitious mortar must exhibit suitable corrosion resistance, restore structural integrity, seal rough deteriorated surfaces and resist external hydrostatic water pressure. The mortar shall be capable of being applied over wet surfaces without degrading the final product. The product shall be formulated at the factory, and supplied in factory sealed and labeled pre-measured containers. The material shall conform to the following minimum physical characteristics:

- |                           |            |  |
|---------------------------|------------|--|
| a. Compressive Strength   | ASTM C 109 | 9,000 psi at 28 days                               |
| b. Tensile Strength       | ASTM C 496 | 700 psi at 28 days                                 |
| c. Flexural Strength      | ASTM C 78  | 1,000 psi at 28 days                               |
| d. Shrinkage              | ASTM C 596 | 0 percent at 28 days, 90 percent relative humidity |
| e. Shear Bond             | ASTM C 882 | > 1,000 psi  |
| f. Freeze/Thaw Resistance | ASTM C 666 | Method A = 100 cycles, no visible damage           |
2. Product shall be MS-10,000 Mortar as manufactured by AP/M Permaform, Strong-Seal MS-2A as manufactured by The Strong Company, Inc., Renderoc SP 15 as manufactured by Fosroc Incorporated, or approved equal.

#### B. Epoxy Coating

- The topcoat material shall be a 100% solids epoxy coating specifically made to provide protection against future deterioration and corrosion. Material shall be non-toxic, non-explosive and highly resistant to acids, bases and hydrocarbons.
- The product shall conform to the following minimum physical characteristics:

<u>Property</u>	<u>Standard</u>	<u>Minimum Value</u>
Compressive Strength	ASTM D695	9,000 psi
Flexural Strength	ASTM D790	6,000 psi
Tensile Strength	ASTM D2370	4,000 psi
Adhesion Strength	ACI503R Appendix A	145 psi

- Product shall be Mainstay DS-5 Ultra High Build Epoxy Coating as manufactured by Madewell Products Corporation, Roswell, Georgia; or COR+GARD as manufactured by AP/M Permafirm, Johnson, IA; or approved equal.

#### C. Other Materials

- No other materials shall be used with the above mixes unless approved by the manufacturers and acceptable to the OWNER.

### PART 3 -- EXECUTION

#### 3.01 GENERAL

- The CONTRACTOR shall perform all work in strict accordance with all applicable OSHA Standards. Particular attention is drawn to those safety requirements involving man entry in confined spaces.



- B. Flow Control: Flow control, as specified in Section 02750, "Wastewater Flow Control" shall be exercised as required to ensure that no flowing sewage comes into contact with sections of the manhole under repair.
- C. Prior to beginning work, the OWNER will visually review the manhole and confirm the repair procedure indicated on the Work Order.

### 3.02 PREPARATION

#### A. General:

1. All manholes listed in Work Orders for repairs shall be cleaned as indicated in Section 02751, "Preparatory Cleaning and Root Removal".
2. The casting and adjusting area of the manhole shall be sandblasted to remove any loose material and rust.
3. Prior to cleaning the manhole, a 2-inch mesh screen shall be installed at the manhole outlet to catch debris. The CONTRACTOR shall clean all accumulations of debris, such as dirt and grease, loose mortar, bricks and concrete, and dispose of properly.
4. The manhole surface shall be clean, structurally sound and free from oil, grease, loose mortar, paints, protective coatings, efflorescence, laitance and airing compounds. The condition of the manhole may require the use of an environmentally safe degreasing compound; if so, the surface shall be thoroughly rinsed to eliminate any residue.
5. Any existing manhole steps shall be removed when installing manhole liners.
6. When a cementitious liner or cementitious/epoxy liner is called for in the Work Order, manhole interior shall be high-pressure (4,000 psi) water cleaned and sand blasted to remove all deteriorated concrete and other loose material. As a minimum, four (4) inches of the manhole cover frame area shall also be cleaned by sand blasting. After the cleaning process, the concrete structure shall be washed with a 5-10 percent solution of muriatic acid. The structure shall be cleaned again with high pressure water to remove acid residual and any loose material. The CONTRACTOR shall make provisions during sand blasting operations to contain all sand. No sand shall be allowed into the sanitary sewer lines.

#### B. Sealing of Manholes Walls:

1. After the completion of the cleaning operation, manhole wall leaks shall be sealed by the following methods:
  - a. Plugging using the infiltration control material specified in Article 2.03, and/or
  - b. Patching using the material specified in Article 2.03, and/or

c. Chemical Grout Sealing (using material specified in Article 2.03)

- i. Equipment: The basic equipment shall consist of chemical pumps, chemical containers, injection packers, hoses, valves, and all necessary equipment and tools required to seal manholes. The chemical injection pumps shall be equipped with pressure meters that will provide for monitoring pressure during the injection of the chemical sealants. When necessary, liquid bypass lines equipped with pressure-regulating bypass valves will be incorporated into the pumping system.
- ii. Sealing Procedures (Precast Manholes): At each point of leakage within the manhole structure, a hole shall be carefully drilled from within the manhole and shall extend through the entire manhole wall. In cases where there are multiple leaks around the circumference of the manhole, fewer holes may be drilled, providing all leakage is stopped from these holes. Grout ports or sealant injection devices shall be placed in these previously drilled holes in such a way as to provide a watertight seal between the holes and the injection device. A hose, or hoses, shall be attached to the injection device from an injection pump. Chemical sealing materials as specified shall then be pumped through the hose until material refusal is recorded on the pressure gage mounted on the pumping unit or a predetermined quantity of sealant has been injected. Care shall be taken during the pumping operation to insure that excessive pressures do not develop and cause damage to the manhole structure. Upon completion of the injection, the ports shall be removed and the remaining holes filled with mortar and troweled flush with the surface of the manhole walls or other surfaces. The mortar used shall be a nonshrink patching mortar.
- iii. Sealing Procedures (Brick and Block Manholes): When chemical grouting is used to seal random or isolated leaks or leaking sections of a brick or block manhole, it shall be done in accordance with "ii Sealing Procedures", above.

2. All materials shall be mixed and applied in accordance with the manufacturer's written instruction. Leaks may be temporarily channeled through "bleed" pipes which are removed and plugged during the final repairs. The manhole sealing repair shall be acceptable to the OWNER before additional work proceeds.

- C. Patching: Loose material shall be removed from the area to be patched or repointed exposing a sound subbase. Holes or voids around steps, joints or pipes, spalled areas and cavities caused by missing or broken brick shall be patched and missing mortar repointed using a nonshrink patching mortar specified in Article 2.03. Cracks not subject to movement and greater than 1/16 inch in width shall be routed out to a minimum width and depth of 2 inch and patched with nonshrink patching mortar.

### 3.03 MANHOLE LINERS

- A. Cementitious Liner (Spray or Spin Applied): On those manholes identified by the OWNER, the CONTRACTOR shall install the ultra high strength, high build, corrosion resistant, mortar based on Portland cement and Micro silica fortified with a bacteria inhibitor or pure fused calcium aluminate cementitious liner to the wall and bench surfaces of brick or concrete, using the following procedure:

1. Preparatory Repair:

- a. After all preparation has been completed, remove all loose material and wash the wall again.
- b. Leakage around pipe entering manhole shall be sealed.
- c. Any service line repairs shall be made at this time using a quick-setting patching mix, and shall be used per manufacturer's recommendations.

2. Mixing: If ambient temperatures are in excess of 95°F, precautions shall be taken to keep the mix temperature at time of application below 90°F. Mix water temperature shall not exceed 80°F. Chill with ice, if necessary.

- a. Should the reconstruction process require application thickness greater than 1-inch, a base coat shall be used to build the substrate to within 1-inch of the finished dimension. For each bag of product, use the amount of water required per manufacturer's recommendation following mixing procedures as noted on product bag and using the approved equipment for mixing and application.
- b. The base coat material is to be applied in multiple passes. Each application thickness shall not exceed 2 inch. The base coat is to be built out to within 1-inch of required finished dimension.
- c. The final coat shall be as a whole a minimum thickness of 1-inch throughout. For each bag of product, use the amount of water or water settings required per manufacturer's recommendations following mixing procedures noted on product bag and using the approved equipment for mixing and application.
- d. Prepared mix shall be discharged into a hopper and mixing shall continue to occur in such a manner as to allow spraying continuously without interruption until each application is complete.

3. Application:

- a. The surface, prior to spraying base coat applications, shall be clean and free of all foreign material and shall be damp without noticeable free water droplets or running water, but totally saturated, just prior to application of each coat. Materials shall be spray applied from the bottom of the wall to the top, to within 1-inch of the original substrate dimension using as many passes

as necessary but each application shall not exceed 0.5 inch. The surface is to be rough troweled after each pass. The light troweling is performed to assure that material penetrates the voids and sets the bond.

- b. A final application is applied after the base coat applications have begun to take an initial set (disappearance of surface sheen). The final application shall be a minimum thickness of 1-inch. Again, application shall be from the bottom up. The surface is then troweled to a smooth finish being careful not to over finish or over trowel so as to bring additional water to the surface and weaken it. A brush finish is then applied to the troweled finish or top coat surface. Manufacturer ' s recommendations shall be followed whenever more than 24 hours have elapsed between applications.
  - c. Bench and Invert Application: The wooden covers shall be removed at this time and the bench sprayed with materials mixed per specifications and spray applied in such a manner that a gradual slope is produced from the walls to invert with the thickness at the edge of the invert to be no less than 2-inch. The wall / bench intersection shall be rounded to a uniform radius the full circumference of the intersection. Through the use of flow-through plugs, the CONTRACTOR shall isolate the channel invert, clean and inspect the invert. If the invert has active infiltration, signs of infiltration, cracks or deterioration, the invert shall be sprayed with the materials specified.
4. Curing: Caution should be taken to minimize exposure of applied product to sunlight and air movement. If application of additional coat is to be longer than 15 minutes, the manhole shall be covered. At no time should the finished product be exposed to sunlight or air movement for longer than 15 minutes before placing the manhole cover. If ambient humidity level is below 70 percent, it shall be necessary to keep finished product damp for the first seventy-two hours.
- a. Curing Time: The final application shall have a minimum of eight hours cure time before subjected to active flow.
  - b. Traffic: Traffic shall not be allowed over manholes for twenty-four hours after reconstruction is complete.
5. Frame-Joint Area Sealing System: A minimum of seven (7) days after the cementitious liner has been installed, the CONTRACTOR shall install the aromatic urethane internal manhole sealing system through the frame joint area. As a minimum, four (4) vertical inches shall be applied on the frame, and six (6) vertical inches on the cone area. Any material left on the frame from the application of the cementitious liner shall be wire-brushed prior to sealant application. Ring Seal™ or approved equal may require the proper mixing of agents, as recommended by the manufacturer ' s instructions. Ensure casting and structure are clean and dry prior to applying Adhesive Primer. Brush the adhesive primer onto the casting and structure surfaces where the mastic is intended to adhere. After allowing for proper drying of adhesive primer to occur, sealant may be applied by brush as evenly as possible over the chimney area, that includes the frame joint area and the area of the manhole

cone, including all extension to the chimney area. Cost for this item shall be included in the bid item for cementitious manhole liner.

6. Testing: Six 2-inch cubes shall be cast each day or from every 50 bags of product used. The test specimen shall be properly labeled and sent to laboratory for compression strength testing as described in ASTM C 109.
  7. Warranty: The manufacturer shall warrant that the products are produced in conformity with its standard specifications or formulations within recognized tolerances, free of adulteration or contamination, and that the product will perform in accordance with representations in the manufacturer's literature and technical data sheets when properly applied in strict conformance with the printed instructions on container and prescribed in technical data instructions and when applied to a properly prepared surface.
- B. HDPE Liner: On those manholes identified in the Work Order, the CONTRACTOR shall install an HDPE liner to the wall and bench surfaces.
1. It is the intent of this portion of the specification to provide for reconstruction of the manhole by the utilization of a pre-fabricated thermo-welded liner. The liner shall continuously cover the exposed surfaces of the manhole and provide structural enhancement and corrosion resistance.
  2. The finished liner shall be formulated from materials specified in Article 2.05.
  3. The existing manhole shall be prepared for the application of the HDPE liner system using methods of cleaning and stoppage of flowing water as specified. Prior to applying the liner, the entire manhole wall surface shall be cleaned to remove corroded and loose material and check for through wall leaks and repair if needed.
  4. In manholes with a concrete base, drill hole up to ½-inch diameter to confirm the existence of the base. Once the base is confirmed, remove the benches and channel and extend the liner to the floor. Flow channel and benches shall be reconstructed after liner installation. If a concrete base does not exist, install liner in the manhole to abut into the existing bench. Once the liner is cured, overlay the bottom 6-inches of the liner from the bench and above with a 3-inch wide concrete ring, within the periphery of the manhole. The concrete mortar shall be fortified with a bacteria inhibitor. An alternate to the concrete ring is to provide and place a flexible and corrosion resistant sealant to seal between the bench and the liner. In addition a moisture tolerant epoxy mortar (Sauzerizen 201T or approved equal), shall be trowelled on top of the bench and sealant up to the liner with ¼-inch thickness. The alternate application shall be pre-approved by the OWNER.
  5. The existing bench and invert shall be removed so that the liner can be extended to, and cover, the bottom of the manhole. Flow channel and benches shall be reconstructed after liner installation.
  6. The HDPE liner shall continue from the cone section to include the chimney up to the existing manhole frame. The chimney section shall be applied by means of an

appropriate two-part epoxy compound in conjunction with a 3 millimeter HDPE/polyester back liner, compatible with the HDPE material used for the manhole walls. The HDPE/polyester material shall be adhered to the cone/chimney section using the two-part epoxy compound and stainless steel anchors. All seams and anchors shall be thermal welded and subject to the same holiday testing as the manhole walls.

7. The following steps shall be followed for the installation of manhole liners:
  - a. Insert prefabricated HDPE liner into structure. Locate pipes and make cutouts for pipes in liner.
  - b. Extend existing pipes by means of HDPE "Top Hat" pipe extensions with short pipe sections wrapped with polyester backed HDPE transition wrap. Use mandrel to hold new pipe extensions in place and in alignment with existing pipes. Thermo-welded pipe extensions back to liner.
  - c. Install sectional support form, or steel forming method, inside of liner insert.
  - d. Pour or pump high flow 4,000 psi concrete mix in void (3 inches wide) between stud side of liner and existing manhole. Vibrate thoroughly to consolidate concrete. Allow curing for a minimum of six hours from time of concrete placement .
  - e. Remove forming system, inspect liner, spark test all thermo-welds.
  - f. Rebuild concrete bench and invert channel, or fillet, in place.

#### C. Cementitious / Epoxy Liners

1. Those manholes identified by the OWNER shall be coated with an extremely low shrinkage cementitious repair product to waterproof and enhance the structural integrity of the manhole and then 100 percent solids epoxy for corrosion protection after the manhole has been properly prepared.
2. The material used shall be designed, manufactured, and intended for sewer manhole rehabilitation and the specific application in which they are used.
3. The selected product or system must bear the manufacturer ' s certification that it will fulfill the requirements described herein when applied in accordance with his recommendations. The CONTRACTOR shall supply a list of locations and references for other projects in which the product was used within the previous three years.
4. The materials shall be delivered to the job site in original unopened packages and clearly labeled with the manufacturer ' s identification and printed instructions. All material shall be stored and handled in accordance with recommendations of the manufacturer.

5. Preparatory Repair

- a. After preparation has been completed, remove all loose material and wash wall again.
- b. Any bench, invert or service line repairs shall be made at this time using the quick setting patching material and shall be used per manufacturer's recommendations.
- c. Invert repair shall be performed on all inverts with visible damage or infiltration. After blocking flow through the manhole and thoroughly cleaning the invert, the quick setting patch material shall be applied to the invert at a minimum thickness of 1 inch, extending out into the bench sufficiently to tie into the monolithic liner to be spray applied. The finished invert shall be smooth and free of ridges. The flow may be re-established in the manhole within thirty minutes after placement of the material.
- d. Active leaks shall be stopped using quick setting, specially formulated mixes according to manufacturer's recommendations. Some leaks may require weep holes to localize the infiltration during the application. After application, the weep holes shall be plugged with the quick setting mix prior to application of the final coat. When severe infiltration exists, drilling may be required to pressure grout using grouting procedures. Manufacturer's recommendations shall be followed when pressure grouting is required.

6. Cementitious Liner Application

- a. Cementitious liner application shall be as indicated in Section 3.03 A, "Cementitious Liner (spray or spin applied)".

7. Epoxy Topcoat Application

- a. Spraying
  - i. Epoxy corrosion barrier topcoat is applied to all surfaces prepared with the restoration mortar, in accordance with the manufacturer's instructions.
  - ii. Epoxy should be applied as soon as possible after finishing or restoration mortar in accordance with manufacturer's instructions. Do not allow surface contamination to the finished restoration mortar before application of topcoat.
  - iii. Spray apply a minimum thickness of 100 mils.
  - iv. Epoxy coating shall be applied to the entire wall surface and manhole bench.
- b. Curing

- i. Shelter system from direct impingement of water until one to three hours after application of topcoat, depending on substrate temperatures, after which cure sufficiently to be undamaged by water, impingement or immersion at ordinary velocities. Epoxy must be in a tack-free condition before being immersed.

8. Product Testing

- a. Four (4) 2-inch cubes shall be cast each day or from every pallet of product used and shall be properly packaged, labeled and returned to the manufacturer for testing in accordance with the manufacturer's directions for compression strength per ASTM C109 procedure.

3.04 FRAME AND COVER REPAIRS (REPLACEMENT)

A. Work Orders will identify one of the following repairs:

1. Realign, Grout, and Seal Manhole Casting (Frame): In most cases, when the cast iron frame and cover are in reusable condition and are not themselves sources of inflow, the leakage through the joint under the frame can be handled by removing and replacing the old mortar joint. When acceptable to the OWNER, this shall be accomplished by excavating as necessary, lifting off the frame, thoroughly cleaning its bottom bearing surface, coating it with asphalt paint similar to the original coating, removing the old mortar from the top of the wall and replacing it with a 2-inch (nominal) layer of new mortar consisting of one part of Portland cement to three parts of clean, washed sand, mixed with an adequate amount of water and carefully resealing the frame in its correct position. Realignment may be horizontal or vertical. Where vertical realignment is required, grade rings as described in Section 02754 may be required in order to raise the manhole frame and cover to the existing grade elevation. A minimum of seven (7) days after the manhole casting has been realigned and grouted, the CONTRACTOR shall install an aromatic urethane internal manhole sealing system through the frame-joint area.
2. Replace Manhole Ring and Cover and Install Seal: Where identified by the OWNER, cast iron rings and covers shall be replaced by the CONTRACTOR. The CONTRACTOR shall remove and replace the entire assembly with a new frame and cover. The frame shall be set on the manhole wall as described in Paragraph 1 entitled "Realign, Grout, and Seal Manhole Casting (Frame)" above. A minimum of seven (7) days after the manhole casting has been realigned and grouted, the CONTRACTOR shall install an aromatic urethane internal manhole sealing system through the frame-joint area.

3.05 RUBBER CHIMNEY SEAL

- A. Where so indicated by the OWNER, a flexible rubber chimney sleeve shall be installed in manhole frame and chimney joint area with stainless steel expansion band to compress the sleeve and seal the chimney area between casting ring and manhole wall, or HDPE manhole liner.



### 3.06 INVERT REPLACEMENT

- A. The CONTRACTOR shall remove existing channel and benches to the base of the manhole. Rebuild channel by reshaping channel invert and building new slope of shelves or benches. Work shall include aligning inflow and outflow ports in such a manner to prevent the deposition of solids at the transition point. All inverts shall follow the grades of the pipe entering the manholes. Changes in direction of the sewer and entering branch or branches shall have a true curve of as large a radius as the size of the manhole will permit, but will be shaped to allow easy entrance of maintenance equipment including buckets, TV camera, etc.

### 3.07 TESTING

- A. After the specified rehabilitation work has been completed, the manholes shall be visually reviewed and tested in accordance with manufacturer's testing procedures by the CONTRACTOR in the presence of the OWNER and found to be acceptable.

- 1. Visual Review: All rehabilitated manholes shall be visually reviewed for water tightness against leakage of water into the manhole. All visible leaks and defects observed during the review shall be repaired to the OWNER's satisfaction. There shall be no visible infiltration.

- 2. Exfiltration Testing:

- a. Incoming and outgoing sewer and service lines shall be plugged, the plugs restrained and the manhole filled with water to the top of the manhole frame. A soaking period of up to one hour will be allowed if bypassing of the sewage is not required or has been provided for. At the end of this optional soaking period, the manhole shall be refilled with water and the test begun. The time shall then be recorded and after a period of not less than one hour has passed, the manhole again refilled, the amount required being carefully measured. The maximum allowable rate of exfiltration is 0.1 gallon per hour per vertical foot of depth of the manhole.
- b. Exfiltration testing shall be done on 10 percent of the manholes, or on one (1) manhole, if less than ten (10) are being repaired, as chosen by the OWNER, where each of the following type of repairs (sealing) has been performed:
  - i. Cementitious liner (spray applied).
  - ii. Cementitious liner with epoxy coating
  - iii. HDPE liner.
- c. Manholes that fail the exfiltration test shall be reworked and retested by the Contractor at no additional compensation and additional manholes will be retested at the Contractor's expense. Any manholes that are visually leaking, are unacceptable, or fail the test shall be reworked and retested.

- 3. Testing and Verification of Liners:

- a. The owner's inspector shall verify the thickness of Cementitious liners and, epoxy coatings with a wet gauge. Any area found to be less than the minimum prescribed thickness shall immediately receive the additional material needed. The resultant lined manhole wall shall be leak-free, smooth and free of honeycomb or areas of segregated aggregate. The HDPE plastic liner shall be securely embedded into the concrete to produce a continuous protective barrier. Epoxy coatings and the surface and welds of HDPE liners shall be tested at 10,000 volts with a holiday detector for pinholes and holidays. Any defects shall be promptly repaired and re-tested. Inspection and testing shall be preformed by the Certified Applicator in the presence of the OWNER.

- END OF SECTION -

## SECTION 02754

### SANITARY SEWER MANHOLES

#### **Part 1 - GENERAL**

##### 1.01 SCOPE

- A. The work specified in this Section includes all labor, materials, accessories, equipment and tools required for the construction, installation and testing of precast concrete sanitary sewer manholes, with or without outside drop connections. Manholes shall be located along sanitary sewer mains or at the intersection ("T") of sanitary sewer mains. Work in this section also includes frame/rim leveling and adjustment, manhole coatings, invert flow channels, connections to new and existing manholes, and connections to existing sewer.

##### 1.02 RELATED WORK

- A. Section 01300 – Submittals
- B. Section 01570 - Traffic Regulation and Maintenance of Traffic
- C. Section 02222 - Excavation and Backfill for Utilities
- D. Section 02141 - Temporary Bypass Pumping Systems
- E. Section 02755 - Lining Installation

##### 1.03 REFERENCES

- A. American Society for Testing and Materials/Latest Edition
  - 1. ASTM A-48 - Specification for Gray Iron Casting
  - 2. ASTM C-62 - Specification for Sewer and Manhole Brick
  - 3. ASTM C-139 - Specification for Concrete Masonry Units for Construction
  - 4. ASTM C-443 - Specification for Joints for Circular Concrete, Sewer and Culvert
  - 5. ASTM C-478 - Specification for Pre-Cast Reinforced Concrete Manhole Sections
  - 6. ASTM C-923 - Specification for Resilient Connections Between Reinforced Concrete Manhole Structures and Pipes
  - 7. ASTM C-1244 - Air Testing

## SECTION 02754

### SANITARY SEWER MANHOLES

#### 1.04 SUBMITTALS

A. The CONTRACTOR shall submit Shop Drawings and other information for review in accordance with Section 01300 - Submittals, including: dimensions; elevations; dewatering, sheeting and bracing plans; cement type; concrete strength; reinforcement; lifting hooks; joint material; openings; castings; and other applicable information.

#### B. Qualification

1. The Qualifications of the Manhole Installation Contractor shall be submitted prior to contract award. These qualifications shall include detailed description of the following:
  - (a) Name, business address and telephone number of the Manhole Installation CONTRACTOR.
  - (b) Names of all supervisory personnel to be directly involved with manhole installation for the project.
  - (c) The CONTRACTOR shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel will be directly involved with and used on this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the OWNER.
  - (d) The CONTRACTOR shall provide his references of previous project lists going back five years including his customers' name, address, and telephone number.
  - (e) Five years of previous related experience shall be required to be qualified in bidding this project.

#### 1.05 UPLIFT

A. All precast concrete manholes placed below grade shall have adequate safety factors against uplift (excluding weight of soil and associated skin friction) as follows:

<u>Water Elevation</u>	<u>Safety Factor</u>
High water level (H.W.L) -	1.5
100 year flood elevation -	1.2

## SECTION 02754

### SANITARY SEWER MANHOLES

#### **Part 2 - PRODUCTS**

##### 2.01 FRAMES AND COVERS

- A. All workmanship and materials shall be of the highest quality. The manhole ring and cover shall be the product of a manufacturer actively engaged in research, development, and manufacturing of watertight manhole rings and covers.
- B. Castings for frames and covers for manholes shall be composed of best quality, tough, gray iron, free from cold shuts, blow holes, and other imperfections, and shall meet the requirements of ASTM A-48 for Class No. 30B, designed for AASHTO Highway Loading Class H-20.
- C. All bearing surfaces shall be machined to fit true and shall be watertight. No plugging or filling will be allowed.
- D. The combined weight of the frame and cover shall not be less than 395 pounds and cover shall weigh a minimum of 155 pounds.
- E. All manhole covers shall bear the City of Hollywood Logo and contain two non-penetrating pick holes.
- F. Frame and cover shall be set to grade. Lid adapters or adjustment rings shall not be used on new construction.
- G. Frames and covers shall be U.S. Foundry 485 or approved equal.

##### 2.02 PRECAST MANHOLES

- A. Precast concrete manholes or sections (hereinafter referred to as "precast sections") shall be furnished with waterstops, sleeves and openings as noted on the Drawings. Box out for wall pipes shall conform accurately to the sizes and elevations of the adjoining pipes. Precast sections shall be watertight and conform to the requirements of ASTM C 478 with reinforcement of ASTM A 615, Grade 60 bars and the following modifications there to:
  - 1. The minimum wall thickness shall be 8 inches.
  - 2. Cement to be used in precast manholes and grout shall be ASTM C 150, Type II.
  - 3. The date and name of manufacturer shall be marked inside each precast sections.
  - 4. No more than 2 lift holes may be cast or drilled in each section.
  - 5. Minimum 28-day concrete strength shall be 4,000 psi.
- B. Walls of manholes shall be constructed of reinforced concrete ring sections with a minimum inside diameter of forty-eight (48) inches. Riser sections shall have tongue and groove ends (tongue on top of section). Top sections shall

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### SANITARY SEWER MANHOLES

be of eccentric cone or flat slab top design as required by the Drawings. Eccentric cones shall have the same minimum wall thickness and area of circumferential steel reinforcement as the round riser sections. Flat slab tops shall have a minimum thickness of eight (8) inches and shall be reinforced with steel in accordance with the design requirements specified in ASTM C-478.

Top sections shall have a top width of such design and dimensions as to properly support the required manhole frame and cover and the lower joint shall be of tongue and groove design.

- C. Top sections of cones or flat tops shall have an opening of thirty (30) inches.

#### 2.03 REINFORCED CONCRETE BASES

- A. Pre-cast reinforced concrete bases shall normally be used in lieu of cast-in-place concrete bases.
- B. The base, for either type, shall extend six (6) inches beyond the outside face of the manhole wall and shall be at least eight (8) inches thick.
- C. Bottom section walls shall be monolithically cast with the base section to a minimum height of three feet (3') from the bottom of the base slab.
- D. Pre-poured flow lines in base are generally not accepted and will be approved only after inspection of a completed example.

#### 2.04 MANHOLE LINER

Refer to Section 02755 - Lining Installation

#### 2.05 MANUFACTURER

- A. Manhole structure and liner shall be manufactured by U.S. Precast Corporation, or approved equal.

#### 2.06 PRE-CAST CONCRETE GRADE RINGS

- A. Grade rings shall be pre-cast; reinforced concrete in solid rings a minimum of 8" wide from 1" to 4" thick.
- B. Pre-cast concrete (grade) rings shall be manufactured in accordance with ASTM C-478.
- C. Rings shall have dimensions matching inside diameter of cone or flat top sections and be of adequate outside diameter to support full manhole frame.
- D. Field molding of grade rings is prohibited.

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### SANITARY SEWER MANHOLES

#### 2.07 GRADE RING SEALANTS

- A. Grade rings shall be installed using modified polymer sealant/adhesive between each sealing face, Evergrip 990 Series or equal with approved submittal

#### 2.08 MANHOLE CHIMNEY SEALS

- A. The frame chimney joint area of new manholes shall be sealed with flexible rubber chimney sleeve as specified in Section 02755 – Lining Installation.

#### 2.09 GASKETS AND FINISH

- A. Sections shall be joined with a mastic compound set into the annular space cast into the spigot ends of bell and spigot type joints to form a watertight seal. Sealing compound shall be of either bituminous or butyl rubber. Material shall be in strip or rope form, supplied with a two-piece cover to preclude adhesion until use. Approved sealing compounds:
  - 1. Ramnek
  - 2. Lockstop
  - 3. Equal with approved submittals.
- B. Finish for outside of new concrete manhole sections shall be Kop-Coat 300M Coal Tar Epoxy or approved equal.

#### 2.10 PIPE OPENINGS

- A. Adapter couplings are required on all pipe connections to the structure, sized for respective pipe.
- B. Pipe opening shall be fitted with seals cast integrally with manhole section, sized to fit pipe specified, and set at correct elevation and location, or,
- C. Pipe openings shall be pre-cast four inches (4") larger than the pipe with a keyway all around the opening.
- D. Approved pipe seal manufacturers:
  - 1. Dura Tech, Inc. - DUAL SEAL II-III
  - 2. Press Seal Gasket Corporation - PRES SEAL
  - 3. A-Lok Products Corporation - A-Lok MH Pipe Seal
  - 4. Equal with approved submittals

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### SANITARY SEWER MANHOLES

#### 2.11 PIPE-TO-MANHOLE SLEEVE

- A. Sewer pipe shall be connected to new manhole by using a flexible manhole sleeve made from ethylene propylene rubber and conformed to ASTM C-923. The sleeve shall be secured to the pipe by a clamp and grouted.
- B. The sleeve shall be manufactured by Chardon Rubber Company, (440) 285-2161, or approved equal.

### **Part 3 - EXECUTION**

#### 3.01 PREPARATION

- A. Traffic Control. The CONTRACTOR is required to obtain all permits, use appropriate traffic regulating devices, notify all appropriate governmental agencies and conform to all the requirements listed in Section 01570 - Traffic Regulation and Maintenance of Traffic.
- B. Flow Control. Flow control shall be exercised as required to ensure that no flowing sewage comes into contact with sections of the manhole under construction.
  - 1. Plugging and Blocking of Flow. A sewer line plug shall be inserted into the line at a manhole upstream from the section to be inspected. The plug shall be so designed that all or any portion of the sewage flows can be released. During the inspection, testing and replacement portion of the construction, flows shall be shut off or substantially reduced as indicated by the OWNER. The upstream manholes shall be constantly monitored for degree of surcharging. After the testing, inspection or repair is complete, flows shall be restored to normal level.
  - 2. Pumping and Bypassing of Flow. Wherever lines are blocked off and the possibility of backing up the sewage and causing harm to public and private property is foreseen, it shall be the CONTRACTOR's responsibility to bypass flow from manhole to manhole. See Section 02141 – Temporary Bypass Pumping Systems.
  - 3. Bypassing shall be accomplished using sewer plugs with pump connections, by pumping down surcharged manholes, or by other methods acceptable to the OWNER. All bypassed flow must be discharged to a sanitary sewer. Bypassed flow shall not be allowed to enter any storm line, drainage ditch or street gutter.



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### SANITARY SEWER MANHOLES

4. During a bypass operation, the pump shall be manned continuously. The CONTRACTOR shall maintain the pump and bypass equipment and shall be responsible for any damages to public or private property due to the malfunction of same.

#### 3.02 EXCAVATION AND BACKFILL

- A. The CONTRACTOR shall excavate, backfill, and compact in accordance with Section 02222 - Excavation and Backfill for Utilities. Under no circumstances shall the CONTRACTOR be allowed to remove concrete or asphalt without prior cutting. The saw cutting shall be deep enough to produce an even, straight cut. Backfilling shall occur in MAX 12-inch lifts with compaction by an engine driven hand tamp or other mechanical means as acceptable to the OWNER.

#### 3.03 DEWATERING, SHEETING AND BRACING

- A. The CONTRACTOR shall dewater, sheet and/or brace all excavations in accordance with Section 02222 - Excavation and Backfill for Utilities. Well points, pumps, sheeting, bracing and/or sock drain shall be used to provide a safe, dry, open hole for all repairs or replacements specified herein.

#### 3.04 NEW MANHOLE CONSTRUCTION

##### A. General:

1. At the locations indicated by the OWNER, the CONTRACTOR shall excavate and locate the existing piping in order to obtain the relative elevations of existing sanitary sewer pipes with respect to ground surface elevation. Excavation shall be non-disruptive and non-destructive soil extraction as provided by Accurate Locating, Inc. or approved equal. After all measurements have been obtained, the excavated hole shall be backfilled and surface shall be restored to its original condition. Excavation and measurements shall be witnessed by the OWNER. Inside measurement shall be used when replacing existing manholes.
2. The sewer pipe connections shall be cut to 2 to 3 feet outside the existing manhole exterior wall. Proper dewatering sheeting and bracing of the hole is critical; no manhole shall be allowed to be installed in an unsafe or wet hole.

- B. Bedding Requirements: The CONTRACTOR shall excavate an additional 18 inches below the base of the manhole and fill with "Crushed Stone" as defined

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in Section 02222 - Excavation and Backfill for Utilities, and shown in the Drawings. The CONTRACTOR shall also use this crushed stone for bedding of all the sewer connections. No excavated fill shall be allowed in the hole until all connections are complete and proper bedding requirements have been met.

#### C. Bases

##### 1. Cast-in-Place

- (a) Base shall be to the design and dimensions indicated on the Drawings.
- (b) Set pre-cast wall section into fresh concrete for integral joint.
- (c) When using wall sections that contain no integral pipe seals, use length of pipe which extends five (5) feet minimum from outside of base dimension. Place approved waterstop on pipe at center point of wall thickness.
- (d) Flow channels shall be formed directly in the concrete of the manhole base and shall be smooth and accurately shaped to a semi-circular bottom conforming to the inside of the adjacent sewer sections. Changes in the direction of the sewer and entering branches shall have a true curve of as large a radius as the size of the manhole will permit. Channels shall be so conformed as to allow the unrestricted entry of television cameras into the sewer line.
- (e) Complete concrete placement around pipe openings, working well into waterstop. Finish flush on outside.
- (f) All slopes (benches) outside flow channels shall be sloped gradual toward invert.

##### 2. Pre-Cast

- (a) Flow channels shall be placed after pipe placement.
- (b) Flow channels, same size as pipe, may be constructed directly with the pre-cast base at time of manufacture. Submit manufacturer's product data to OWNER for approval before placing order.

#### D. Setting Precast Sections

- 1. Precast reinforced concrete sections shall be set so as to be vertical and with sections in true alignment. A flexible, watertight gasket such as "Ram-Nek" or approved equal shall be used between sections.

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After the sections are assembled, the remaining space in the joint shall be pointed up and filled with a dense cement mortar and finished so as to make a smooth, continuous surface inside and outside the wall sections.

2. Sewer pipe connections for manholes shall be resilient, waterproof connections designed in accordance with ASTM C 923 "Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes". Resilient pipe connectors shall be installed following casting in a cored or cast opening of the manhole wall. Resilient connectors shall either be a gasket type connector approved equal to the A-Lok pipe to manhole seal as manufactured by Atlantic Concrete Products, Inc. or a flexible neoprene boot with stainless steel clamps approved equal to the Kor-N-Seal System as manufactured by the Dukor Corporation. When the pipe is installed in the resilient manhole connector, the pipe shall be capable of a 20 degree minimum deflection in any direction.
3. All holes in sections, used for their handling, shall be thoroughly plugged with mortar. All seams, keyways, and pipe connections shall be thoroughly plugged with brick and mortar inside and out as needed. The mortar shall be hammered into the holes until it is dense and an excess of paste appears on the surface; then finished smooth and flush with the adjoining surfaces.
4. The Invert Elevations that were surveyed by the CONTRACTOR prior to manhole construction shall be used to install the inverts in the new manhole. The inverts shall be resurveyed and submitted to the OWNER for as-built purposes.

#### E. Frames and covers

1. Install pre-cast concrete grade rings, minimum of 4" and total maximum of 12", set in two (2) strips of modified polymer sealant/adhesive compound on each sealing face.
2. Bricks shall not be used for grade adjustment.
3. Set maintenance access structure frame to proper elevation and to cross-section slope where required. Set in two strips of sealing compound and cover with a bed of Portland cement and silica sand. Set frame in cement bedding and bring mortar up over frame. Recheck elevation due to possible sealant compression.
4. Contractor shall be responsible to see that all such items as mentioned under this Section are adjusted to the new paving elevation to provide a smooth even transition from pavement to maintenance access structure cover.

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### SANITARY SEWER MANHOLES

- F. Finish: The outside of the precast sections shall be finished in accordance with the following:

<u>Application</u>	<u>Description</u>
Primary - 1 coat	SewperCoat as specified in Section 02755

- G. Backfill: The backfill shall be compacted; road subgrade (if in paved area) shall be replaced with acceptable material and compacted as specified in Section 02222 – Excavation and Backfill for Utilities. Prior to backfilling, ensure that all concrete cradles and encasements are dry; all spalls, scars, etc. are repaired; and all coatings have been applied.

#### 3.05 DISPOSAL

- A. All excavated material such as pipe sections, concrete, debris or any other items excavated shall become property of the CONTRACTOR. The CONTRACTOR shall take full responsibility for proper disposal and include the cost in the appropriate bid items.

#### 3.06 SURFACE RESTORATION

- A. All surface restoration shall be in accordance with Section 02222 – Excavation and Backfill for Utilities. Pavement, concrete, sod or any other surface items shall be replaced in equal or better condition than prior to repair.

#### 3.07 TESTING

- A. After construction or replacement work at each manhole has been completed and the materials used have been allowed to cure, it shall be tested for excess infiltration by the CONTRACTOR in the presence of the OWNER. The maximum allowable rate of infiltration is 0.0 gallon per hour per vertical foot of depth of the manhole. THERE SHALL BE NO VISIBLE INFILTRATION. All manholes must meet this requirement before acceptance by the OWNER.

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### SANITARY SEWER MANHOLES

#### 3.08 COVER ADJUSTMENT

- A. Adjustment of existing (old) work requiring raising shall be performed in accordance with Sub-Section 3.04 herein.
- B. Rises in excess of twelve (12) inches shall be made by removing the top section of the manhole and inserting pre-cast sections required to meet the required elevation.
- C. When elevation changes require removal of an existing manhole section(s), the OWNER shall be consulted in advance of the work to determine the best method to accomplish the work. The OWNER will inspect all work.
- D. Methods and materials for lowering manhole frames shall comply with Sub-Sections 3.04 and 3.08.

#### 3.09 CONNECTIONS TO EXISTING MANHOLE

- A. Contractor shall cut an opening (core-bore) in the existing manhole to a size to allow the pipe with a waterstop attached plus one (1) inch clearance on all sides. Cut out existing concrete channel fill, allowing room to form satisfactory new flow channel.
- B. Coupling Adapters (Boots) shall be installed sized for the opening and the pipe diameter.
- C. Place length of pipe to provide joint at five (5) feet minimum from outside of manhole wall or base. Center waterstop in wall, fill opening with waterproof non-shrink grout material and form new flow channel. Second joint shall be five (5) feet ahead/back. Encase to first joint with Type II concrete.

#### 3.10 CONNECTIONS TO EXISTING SEWERS

- A. For proposed sewers of a diameter equal to the existing sewer, a new manhole shall be constructed over the existing sewer to the proper invert elevation.
- B. Existing sewer service shall be maintained during base and flow channel work.
- C. When broken or damaged pipe results from this operation, replace with new pipe to meet current standards. Saw any piping to be removed to preclude cracking or irregular edges caused by breaking out with a hammer or using other methods.
- D. When replacing pipe, use pipe length to have a joint at five (5) feet minimum from manhole wall or base. Cradle and doghouse pipe to first joint with Class A concrete.
- E. For proposed sewers of eight (8) inch diameter or less, a direct connection to an existing sewer may be permitted by using a cutting-in saddle or wye. This method would generally apply to single family dwelling units. For industrial,

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### SANITARY SEWER MANHOLES

commercial, or multifamily residences, the OWNER may require that a manhole be constructed on the property to be served and over an existing sewer should one exist. All connections to existing sewers are subject to review by the OWNER on an individual basis.

- F. Proposed sewers of a diameter larger than the existing sewer to which it is to be connected will not be normally permitted without providing additional capacity to the existing sewer.

#### 3.11 DROP MANHOLES

- A. Drop connection shall be made where the invert of any inlet pipe is two (2) feet or more higher than the invert out of the manhole.
- B. Pre-cast manhole sections shall have openings with integrally cast pipe seals to fit design elevations for new installations.
- C. When using "doghouse" sections or connecting to existing manholes refer to Sub-Section 3.09 for construction details of pipe through wall section.
- D. Connection configuration to manhole shall be made in accordance with Standard Details.
- E. Entire configuration of piping shall be encased in Type II concrete to a minimum thickness of six (6) inches.

#### 3.12 PLANNED PIPE OPENINGS

- A. When future pipe connections have been planned for manholes, they shall be plugged to preclude exfiltration and infiltration.
- B. With integral pipe seals, place a pipe stopper/plug of the size required, properly secured, for any thrust caused by testing, etc.

- END OF SECTION -

## SECTION 02755

### LINING INSTALLATION (SEWPERCOAT)

#### **Part 1 - GENERAL**

1.01 General: This specification defines the method and material for the new manhole coating and rehabilitation of sanitary sewer structures (manholes, wet wells, lift/pump stations, large diameter concrete pipe, etc.) utilizing a spray applied calcium aluminate cementitious structural rehabilitation system. The purpose of this project is to obtain a dense and durable concrete lining that is resistant to biosulfuric acid attack and meets the strength requirements described elsewhere in this specification. The work covered in this specification consists of furnishing all labor, equipment, materials, and supervision necessary to accomplish the rehabilitation as specified. When complete the rehabilitated structure shall:

- A. Provide for a uniformly smooth surface of specified thickness.
- B. Minimize, if not eliminate sources of inflow/infiltration (I/I).
- C. Provide a service life that is supported by documented test analysis.

#### 1.02 Contractors Sequence of Operation

- A. The Contractor's sequence of operation relative to structural rehabilitation shall include, but not be limited to the following:
- B. Eliminate all sources of groundwater infiltration and voids in walls.
- C. Rehabilitate all interior surfaces including walls, ceilings and floors in accordance with specification and nature of the sub-surfaces.
- D. Provision to "cure" the installed lining material.
- E. Provision to "test" lining and structural rehabilitation materials.

#### 1.03 Submittals

- A. The Contractor shall furnish detailed and complete data pertaining to the surfaces of the structure to be rehabilitated, the rehabilitation product, surface preparation and installation to the engineer for approval. The submission of this data shall be made in a timely manner to prevent project delay. At the request of the Engineer, the Contractor shall test for adverse chemical conditions that may hinder overall product performance.
- B. Prior to initiating the work, the Contractor shall submit specific technical data with complete physical properties of the structure to be rehabilitated and the proposed product for the rehabilitation of the structure, as well as a specific plan for sub-surface preparation.
- C. A certificate of "Compliance with Specifications" shall be furnished for all materials supplied.
- D. A work plan shall be submitted

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- E. A safety plan. It is the contractor's responsibility to comply with OSHA standards and all regulations pertaining to the work including confined space entry.

#### **Part 2 - PRODUCTS**

##### 2.01 Materials

- A. Lining material furnished under this specification shall be a prepackaged mortar mix, including all cement, aggregates, and any required additives. It is the intent of this specification that the Contractor only be required to add the proper amount of potable water so as to produce concrete suitable for spray application. Do not add portland cement, other aggregates, or any admixtures whatsoever to lining material. Typical package weights shall not be less than 50 lbs and shall be identical for all material furnished on this project.
- B. The chemical composition of the cement portion as well as the aggregates of the mortar mix shall be as follows:

Al <sub>2</sub> O <sub>3</sub>	CaO	FeO + Fe <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>
39-44%	35-39%	9-14%	5-7%

- C. The design properties of the mortar mix shall be as follows:

Compressive Strength (ASTM C109)	> 5,500 psi	24 hours
Flexural Strength (ASTM C293)	> 1,200 psi	24 hours
Splitting Tensile Strength (ASTM	> 800 psi	24 hours
Slant Shear test (ASTM C882)	> 1,200 psi	24 hours
Shrinkage at 28 days (ASTM C596)	< 0.08% cured @ 90% relative	
Freeze/Thaw after 300 Cycles	No visible damage after 300 cycles	

The mortar mix shall be either "SewperCoat PG" or "SewperCoat 2000HS Regular", both as manufactured by Kerneos Inc. – Chesapeake, Virginia or approved equal.

- 2.02 Mortar mix must have at least seven (10) years of successful performance in similar applications and be supplied by an ISO 9001 certified manufacturer. Manufacturer's ISO 9001 certificate shall be submitted to engineer and owner.

- A. In addition, the mortar mix shall be designed to withstand long-term exposure to a bacterially corrosive hydrogen sulfide environment that may be expected



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to produce a pH of 1 on normal Portland cement based concrete or typical brick and mortar surfaces.

- 2.03 Water used in mixing shall be fresh, clean, potable water, free from injurious amounts of oil, acid, alkali, vegetable, sewage and/or organic matter. Water shall be considered as weighing 8.32 pounds per gallon.
- A. Mortar mix shall be stored with adequate provisions for the prevention of absorption of moisture. It shall be stored in a manner that will permit easy access for inspection and identification of each shipment.

### **Part 3 - EXECUTION**

#### 3.01 Sampling and Testing

- A. A recognized independent testing laboratory shall test mortar materials used on the project. The Manufacturer, instead of an independent laboratory, may test project sample specimens, provided the Owner, Engineer, and Manufacturer are in agreement of this testing method prior to project commencement. Specific materials recommended by the Engineer shall then be tested.
- B. The cost of sampling and testing of the mortar mix during placement and the surface to which it is applied shall be born by the Contractor. Other testing required showing conformance with these specifications shall be the responsibility of the Contractor. Certified test reports and certificates, when so directed, shall be submitted in duplicate to the Engineer and to such other agencies or persons the Engineer may designate.
- C. Any materials failing to meet the requirements of these specifications shall not be incorporated into the work plan.

#### 3.02 Qualification of Work Crew

- A. The lining material Manufacturer shall maintain a listing of competent contractors that have demonstrated requisite skill and training to be qualified applicators of their materials.
- B. Prior to project commencement, the Contractor must satisfy the Engineer that all Contractor's work crew personnel have performed satisfactory work in similar capacities elsewhere for a sufficient period of time to be fully qualified to properly perform the work in accordance with the requirements of the related specifications.
- C. Foreman shall have at least 4 years experience with similar work and project conditions.

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D. Nozzlemen shall be qualified by having had similar work experience.

3.03 Work Crew responsibilities prior to application of lining material shall include the following:

- A. Surface preparation as discussed in section 4.1.
- B. Ensure the operating air pressure is uniform and provides adequate nozzle velocity for proper compaction.
- C. Continuously regulate the water content so that the applied materials consistently achieve proper compaction with a low percentage of rebound and no visible "sag".
- D. Ensure that the installation equipment nozzle is held at the proper distance away from and as nearly perpendicular to the prepared sub-surface as the working conditions will permit to secure maximum material compaction with minimum rebound and no visible "sag".
- E. Follow a sequence routine that will fill corners with adequately compacted material applied at a maximum practicable layer thickness.
- F. Determine necessary operating procedures for placement in confined spaces, extended distances or around unusual obstructions where placement velocities and mix consistency may need to be adjusted.
- G. Direct the crew as to when to start and stop the flow of materials during installation and to immediately stop all work when material is not arriving uniformly at the nozzle.
- H. Ensure that slough pockets are removed and prepared for installation of replacement material.
- I. Bring the installed materials to established finished elevations in a neat and timely manner and within established tolerances.
- J. Applicator's job foreman shall operate the mixing/placing equipment and direct the work of mixing crew personnel. Applicator's work crew shall also maintain proper line pressures throughout the mixing/placing equipment to ensure the necessary consistent nozzle velocity. Applicator's work crew shall further see that all material fed to the nozzle is uniformly fed through this equipment.

### 3.04 EQUIPMENT

- A. Equipment shall be of spray type and approved by the material manufacturer. Alternate equipment may be utilized provided it meets the performance requirements of the specification. All equipment must be kept in operating condition and good repair

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#### **Part 4 - CONSTRUCTION METHODS**

##### 4.01 SURFACE PREPARATION

- A. Ensure all sub-surfaces are clean and free of laitance, loose material, residue and all existing coating and lining materials. See Section 4.4 for Inflow and Infiltration Prevention. For detailed explanation of the required surface preparation see ACI RAP-3 "Spall Repair by Low Pressure Spraying" page 2. ACI 546R "Concrete Repair Guide", chapter 2 also provides a good reference for important considerations for repairing concrete surfaces using mortar.
- B. Sub-surfaces shall be thoroughly saturated with water prior to the application of the lining materials. In no instance shall shotcrete be applied in an area where running water exists. It is the intent of this specification that the existing surface be saturated and free of any running water just prior to installation – or SSD, "saturated surface dry condition." To achieve this condition it may be necessary to presoak the sub-surface for a at least 24 hours.

##### 4.02 OPERATIONS

- A. The Contractor shall provide all equipment necessary to individually gauge, control, and monitor the actual amounts of all component materials necessary to complete the lining installation. The type of equipment and methods used to gauge, control, and monitor component materials shall be subject to approval by the Engineer and Manufacturer.
- B. All lining materials shall be thoroughly mixed by mechanical means to ensure all agglomerated particles are reduced to original size or removed prior to placement into the application equipment (i.e. the hopper). Each batch of material should be entirely discharged before recharging with fresh material. Mixing equipment shall be cleaned at regular intervals to remove all adherent materials.
- C. The addition of water to the mix shall be in strict accordance with the Manufacturer's recommendations.
- D. Re-mixing or tempering shall not be permitted. Rebound materials shall not be reused.

##### 4.03 PROTECTION OF ADJACENT SURFACES

- A. During progress of the work, adjacent areas or grounds which may be permanently discolored, stained or otherwise damaged by dust and rebound material, shall be adequately protected and, if contacted, shall be cleaned by early scraping, brushing or washing as the surroundings permit.

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#### 4.04 INFLOW and INFILTRATION PREVENTION

- A. If inflow or infiltration is observed within the structure after surface preparation is complete, a rapid setting crystalline enhanced hydraulic cement product specifically formulated for infiltration control shall be used to stop minor infiltration flows in accordance with the manufacturer's recommendations. The material shall meet the following strength requirements:

Compressive Strength (ASTM C597B)	600 psi	(24 hours)
	1,000 psi	(7 days)
Bond Strength (ASTM C321)	30 psi	(1 hour)
	80 psi	(1 day)

- B. The material shall be Preco Plug, Octocrete, Burke Plug or Engineer approved equal. Where infiltration flows are more severe, pressure grouting may be required. The material for pressure grouting shall be Avanti A-220, DeNeef or Engineer approved equal installed in accordance with the manufacturer's written instructions.
- C. All materials, labor, equipment, and incidentals required to correct inflow and infiltration conditions will be considered incidental to rehabilitation.

#### 4.05 APPLICATION OF MATERIALS

- A. Lining material shall not be applied to a frozen surface or to a surface that may freeze within 24 hours of application. Frozen conditions shall be defined as ambient temperatures of 32 degrees Fahrenheit or below.
- B. Sequence of application may be from bottom to top or vice versa if rebound is properly removed.
- C. Application shall be from an angle as nearly perpendicular to the surface as practicable, with the nozzle held at least 1 foot from the working sub-surface (except in confined control). If the flow of material at the nozzle is not uniform and slugs, sand spots, or wet sloughs result, the nozzleman shall direct the nozzle away from the work until the faulty conditions are corrected. Such defects shall be replaced as the work progresses.
- D. Application shall be suspended if:
1. Air velocity separates the cement from the aggregate at the nozzle.
  2. Ambient temperature approaches freezing and the newly placed SewperCoat cannot be protected and insulated.

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- E. The time interval between successive layers of material application must be sufficient to allow “tackiness” to develop but not final set. If final set does occur, this surface shall be prepared in accordance with Sections 4.1.1 of this document.
- F. Construction joints within a manhole shall be avoided. In the event a construction joint is necessary and approved by the Engineer, it shall be sloped off to a thin, clean, regular edge, at a 45-degree angle. Prior to placement of the adjoining materials, the sloped portion and adjacent applied material shall be thoroughly cleaned as necessary, then moistened and scoured with an air jet.
- G. Nozzleman shall bring the material to an even plane and to well-formed corners.
- H. After the body coat has been placed, the surface shall be trued with a thin-edge screed to remove high areas and expose low areas. Low areas shall be properly filled with additional material to insure a true, flat surface in accordance with Section 4.5.5 of this document.
- I. For manhole applications, the minimum thickness of SewperCoat shall be a ½-inch cover over all surfaces. For other larger structures (lift stations, wet wells, treatment plant structures, etc.), the minimum thickness of SewperCoat shall be a 1-inch cover over all surfaces.

#### 4.06 CURING

- A. If the material has been applied and furnished in accordance to the specifications, and it has been determined that the environment is not moist enough for natural curing, the contractor will be required to apply a curing compound to all coated surfaces. Curing compound shall meet the requirements of ASTM C309 and have the approval of the lining material Manufacturer and the Engineer prior to use.
- B. Moist curing may also be used in lieu of curing compound. If moist curing is selected, it should be implemented just after the notice of uniform heat generation of the installed lining. Moist curing can consist of the use of soaker hoses, water sprinklers, or vapor/misting machines. Regardless of delivery method, moist curing should continue for a minimum of 18 hours.

- END OF SECTION -

## SECTION 02763 - CHEMICAL GROUTING

### PART 1 -- GENERAL

#### 1.01 SCOPE

- A. The work specified in this Section includes all labor, materials, accessories, equipment and tools necessary for chemical grouting, sealing, and air testing sanitary sewer pipe joints, pursuant to ASTM F2304-03.

#### 1.02 GENERAL

##### A. Chemical Root Treatment

1. When so directed by the OWNER, the CONTRACTOR shall perform chemical root treatment in accordance with Section 02762 - Chemical Root Treatment.
2. The CONTRACTOR shall schedule his work to perform chemical root treatment a minimum of 8 weeks prior to performing the work specified under this Section.
3. When so directed by the OWNER, prior to performing chemical grouting, the CONTRACTOR shall remove roots and clean the sewer in accordance with Section 02751 - Preparatory Cleaning and Root Removal.

##### B. Leak Testing

1. Sewer line joint testing shall be accomplished by applying air pressure to each sewer joint, and monitoring the pressure in the void over a one-minute period. The intent of joint testing is to identify defective joints prior to the joint sealing process and check the effectiveness of the seal.
2. Testing cannot be performed and shall not be required on cracked, structurally unsound, or broken pipe, severely corroded or out-of-round pipe, or on visibly leaking joints.

##### C. Leak Sealing

1. Sources, or possible sources, of infiltration within the sewer system, are to be sealed to eliminate infiltration.
2. The application of the sealing grout within the pipe shall be by means of remote-controlled equipment designed to be positioned at the specific joint or crack to be sealed and to apply the grout under sufficient pressure for the grout to pass through the opening and fill voids outside the pipe as well as the opening in the pipe wall. Control of the device and review of the results shall be by operating the closed-circuit television camera and van-mounted monitor conforming to the requirements of Section 02752 - Television Survey. The method of sealing used shall not damage the pipe or change pipe alignment, and the original cross sectional area shall not be permanently reduced or changed.

### 1.03 QUALIFICATIONS

- A. The Qualifications of the Grouting CONTRACTOR shall be submitted prior to contract award. These Qualifications shall include detailed descriptions of the following:
  - 1. Name, business address and telephone number of the CONTRACTOR.
  - 2. Name(s) of all supervisory personnel to be directly involved with Grouting for this project.
  - 3. The CONTRACTOR shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel will be directly involved with and used on this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the OWNER.
  - 4. Specialty technicians shall be certified by the equipment manufacturer and/or its authorized representative. Certifications shall be submitted to the OWNER.
  - 5. The CONTRACTOR shall provide his references of previous project lists going back five years including his customers' names, addresses, and telephone numbers.
  - 6. To be qualified, the CONTRACTOR shall have a minimum of five years previous experience in grouting.

## PART 2 -- PRODUCTS

### 2.01 CHEMICAL JOINT SEALING MATERIALS

- A. Chemical joint sealing materials used on this project shall be AV-118 Duriflex, or AV-100 plus activators, initiators and inhibitors recommended by the manufacturer, Avanti International, Houston, Texas or an approved equal.
- B. In those lines which had root removal performed, a chemical root inhibitor shall be added to the grout prior to sealing the joints. CONTRACTOR shall submit the chemical to be used for OWNER's approval prior to utilization.

## PART 3 -- EXECUTION

### 3.01 LEAK TESTING EQUIPMENT

- A. The basic equipment used shall consist of a television camera, joint testing device such as a packer, and test monitoring equipment. In combination, the equipment shall be constructed in such a way as to provide means for introducing a test medium under pressure, into the Void area created by the expanding ends of the joint testing device. The testing equipment shall also have the means for regulating the flow rate of the test medium into the Void area in conjunction with the means for continuously measuring the actual static pressure of the test medium at and within the Void area only. The packer device shall be constructed in such a manner as to allow some flow to pass through its center annulus.
- B. Void pressure data shall be transmitted electrically and without the use of the test medium or hoses. All test monitoring shall be above ground and in a location to allow for simultaneous continued observation of the television monitor and test monitoring equipment by the CONTRACTOR. The OWNER shall witness the testing operation.
- C. Sewer line joint testing shall be accomplished before and after the grouting operation by applying a positive pressure to each sewer joint and monitoring the pressure in the Void. The intent of joint testing is to identify defective joints prior to the joint sealing process and determine the effectiveness of the seal repaired.

### 3.02 CONTROL TEST PROCEDURES

- A. Prior to and during the joint testing phases of the work, the CONTRACTOR shall perform Control, Intermediate, and Final testing in accordance with the latest edition of ASTM F2304.

### 3.03 JOINT TESTING PROCEDURE

- A. Sewer line joints shall be individually tested at a test pressure equal to  $\frac{1}{2}$  psi per vertical foot of pipe depth, but in no case exceeding a pressure of 10 psi and in accordance with the following procedures:
  - 1. The packer or testing device shall be positioned within the line in such a manner as to straddle the joint to be tested.
  - 2. The packer ends or testing device ends shall be expanded so as to isolate the joint from the remainder of the line and create a Void area between the packer or testing device and the pipe joint. The ends of the testing device shall be expanded against the pipe with sufficient inflation pressure to contain the test medium within the Void without leakage past the expanded end.
  - 3. The test medium shall be introduced into the Void area until a pressure or flow rate equal or greater than the required test pressure is observed with the Void pressure monitoring equipment.
    - a. Air Test – After the void pressure is observed to be equal to or greater than the required test pressure, the airflow shall be stopped and the air



test supply line vented. The operator will observe this void pressure for a period of 15 s, if the pressure is maintained, with a pressure drop of less than 1 psi (7 kPa), then the joint will be considered as having passed the test. If the pressure shows additional decay during the recommended time period, it will be considered as having failed and shall be sealed as described in Section 12. Upon completion of the sealing, the joint will be retested at the established test criteria (post-test).

- b. Water Test – A liquid (water) shall be introduced into the void area until a pressure equal to or greater than the required test pressure is observed with the void pressure monitoring equipment. If the required test pressure cannot be developed (due to joint leakage), the joint will have failed the test and shall be sealed as specified. The flow rate of the test liquid shall then be regulated to a rate at which the void pressure is observed to be the required test pressure for a period of 30 seconds. A reading of the test liquid flow meter shall then be taken. If the flow rate exceeds ¼ gallon per minute (due to joint leakage), the joint will have failed the test and shall be sealed as specified.

- 4. The test medium shall be air or liquid.

### 3.04 TEST RECORDS

- A. During the joint testing procedure, complete records shall be kept, to include the following data:
  - 1. Identification of the manhole section tested.
  - 2. Type of pipe.
  - 3. Diameter of pipe.
  - 4. Length of pipe sections between joints.
  - 5. Depth of pipe to surface.
  - 6. Test pressure used and duration of test.
  - 7. Statement indicating the pass/fail test results for each joint tested, Location (stationing) of each joint tested and location of any joints not tested with an explanation for not testing.
- B. In the case of a "passing" joint, a single pressure reading may be recorded. In the case of a "failing" joint requiring grout, three pressures shall be recorded: the initial "failing" pressure; the zero pressure after grout has been injected and the packer deflated; and the final pressure after the grout has been injected and the packer reinflated.

### 3.05 JOINT SEALING EQUIPMENT

- A. The basic equipment shall consist of a closed circuit television system, necessary chemical sealant containers, pumps, regulators, valves, hoses, etc., and joint sealing packers for the various sizes of sewer pipe. The packer shall be a cylindrical case of a size less than pipe size, with the cables at either end used to pull it through the line. The packer device shall be constructed in such a manner as to allow a restricted amount of sewage to flow at all times. Generally, the equipment shall be capable of performing the specified operations in lines where flows do not exceed the maximum line flows as specified in Section 02750 - Wastewater Flow Control. When the packer is inflated, two widely spaced annular bladders shall be formed, each having an elongated shape and producing an annular void around the center portion of the packer.
- B. Before starting the work, a performance test demonstration verifying the accuracy and repeatability of the void pressure meter and fluid pumping equipment should be performed. If these test demonstrations fail to show that the readings are accurate,  $\pm 0.5$  psi (3 kPa) for void pressure repeatability, and  $\pm 0.1$  (0.4 L) of chemical pumped into a measured container, the CONTRACTOR shall be required to make the required repair or adjustments to the equipment and gages and retest until the results are satisfactory to the OWNER's representative. The test demonstration may be required at each work shift during the sealing operation.
- C. 3.06 JOINT SEALING PROCEDURE
  - A. In the preparation and application of the sealing grout, the recommendations of the manufacturer of the grout materials shall be followed. Before joint sealing, chemical grout gel times should be measured and recorded. Gel times should also be measured and recorded whenever a new batch is made and at the end of the shift. These gel times measurements are a very effective and meaningful quality assurance procedure.
  - B. Joint sealing shall be accomplished by forcing chemical sealing materials into or through infiltration points by a system of pumps, hoses, and sealing packers. Jetting or driving pipes from the surface that could damage or cause undermining of the pipe lines, will not be allowed. Excavating the pipe, which would disrupt traffic, undermine adjacent utilities and structures, will not be allowed. The packer shall be positioned over the area of infiltration by means of a metering device and the closed circuit television in the line. It is important that the procedure used by the CONTRACTOR for positioning the packer be accurate to avoid over-pulling the packer and thus not effectively sealing the point of infiltration. The packer sleeves shall then be expanded using precisely controlled pressures. The pneumatically expanded sleeve or elements shall seal against the inside periphery of the pipe to form a void area at the point of infiltration, now completely isolated from the remainder of the pipe line. Into this isolated area, sealant materials shall be pumped through the hose system at controlled pressures, which are in excess of groundwater pressures. The pumping, metering, and packer device shall be integrated so that the proportions and quantities of materials can be regulated in accordance with the type and size of the leak being sealed.
  - C. The grout must be injected beyond the joint interface into the soil surrounding the pipe joint.
  - D. A color additive (dye) should be added to the grout so that a visual residual layer of grout rings the joint providing confirmation the packer was located over the joint and the void was filled during the sealing operation.

- E. No joint shall be considered sealed unless, while under continual pressure, an attempt is made to pump grout to “refusal” (up to ½ gallon per inch diameter pipe size). This is to insure that sufficient chemical has been dispersed into the soil surrounding the joint and that a temporary seal has not been made by applying a minimum amount of chemical grout to the void and the joint area inside the pipe. When chemical grout cannot be pumped to “refusal” within a volume less than or equal to ½-gal per inch diameter pipe size due to latent physical conditions, no additional work shall be undertaken until authorization to proceed has been given by the OWNER/OWNER’s representative.
- F. Upon completing the sealing of each individual joint, the packer shall be deflated; moved at least one packer length in either direction, and then repositioned over the joint; with the void pressure meter reading zero pressure, then reinflated and tested as specified in subsection 3.03 - Joint Testing Procedure. Should the void pressure meter not read zero, the CONTRACTOR shall clean his equipment of residual grout material or make the necessary equipment repairs to provide for an accurate void pressure reading. Joints that fail to meet the specified test criteria shall be resealed and retested until the test criteria can be met in order to receive payment.
- G. All testing shall be performed by the CONTRACTOR in the presence of the OWNER. It shall be the responsibility of the CONTRACTOR to completely seal every leak authorized for sealing to the extent determined by the OWNER. If, in the OWNER’s opinion, it is not necessary to continue with a particular leak, the crew shall move to the next joint or leak. The CONTRACTOR shall remove any small excess sealing grout inside the sewer line. CONTRACTOR shall operate his equipment with care and shall be responsible for any damage to the sewer system or other facilities caused by his operations, and shall repair such damage at his expense and without delay as instructed by the OWNER.

### 3.07 JOINT SEALING RECORDS

- A. Included in the records for joint sealing shall be:
  - 1. The test pressure before and after sealing and the duration of the test.
  - 2. The volume of grout material used to seal each joint.
  - 3. The volume of grout placed per section.
  - 4. The gel set time used.
  - 5. The barrel test results.
  - 6. The grouting material used including additives and their respective quantities.

### 3.08 LATERAL SEALING PROCEDURE

- A. The following shall apply to the sealing of all reinstated laterals after the main has been lined.

1. The total batch shall be no more than 50 gallons. That means reducing the water in each tank by 5 gallons. This will increase the strength of the “gel” by increasing the solids to 12 percent.
2. The “gel” time shall be 10 seconds longer than the time required by the pumps to fill the inside packer void and at no time shall the “gel” time be less than 20 seconds.

### 3.09 TELEVISION SURVEY

- A. Television survey, including Preconstruction Survey, Post Construction Survey, and Warranty Survey, as indicated in Section 02752 - Television Survey, is required for all grouted lines.

3.10 WARRANTY: All chemical grouting work described herein shall be guaranteed against faulty workmanship and/or materials for a period of 3 years after the completion of the work.

- END OF SECTION -

*DIVISION 3 -CONCRETE*

## SECTION 03305 - CONCRETE AND GROUT

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, all in accordance with the requirements of the Contract Documents
- B. The following types of concrete shall be covered in this Section:
  - 1. Structural Concrete: Concrete to be used in all cases except where noted otherwise in the Contract Documents.
  - 2. Sitework Concrete: Concrete to be used for curbs, gutters, catch basins, sidewalks, fence and guard post embedment, underground duct bank encasement and all other concrete appurtenant to electrical facilities unless otherwise shown or noted on the Drawings.
- C. The following types of grout are covered in this Section:
  - 1. Non-Shrink Grout: This type of grout shall be used wherever grout or cementitious grout is called for in the Contract Documents, unless another type is specifically referenced.
  - 2. Epoxy Grout: This type of grout shall be used whenever epoxy grout is called for.

#### 1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Codes: Without limiting the generality of other requirements of these specifications, all work specified herein shall conform to or exceed the requirements of the South Florida Building Code and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.
- B. Commercial Standards:

ACI 301	Specifications for Structural Concrete for Buildings.
ACI 315	Manual of Standard Practice for Detailing Reinforced Concrete Structures.
ACI 318	Building Code Requirements of Reinforced Concrete.
ACI 347	Recommended Practice for Concrete Formwork.
ASTM A 185	Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.

ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
ASTM C 31	Test Methods for Making and Curing Concrete Test Specimens in the Field.
ASTM C 33	Specification for Concrete Aggregates.
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C 94	Specification for Ready-Mixed Concrete.
ASTM C 143	Test Method for Slump of Portland Cement Concrete.
ASTM C 150	Specification for Portland Cement.
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete.
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
ASTM C 494	Specification for Chemical Admixtures for Concrete.
ASTM C 579	Test Methods for Compressive Strength of Chemical Resistant Mortars and Monolithic Surfacing.
ASTM C 827	Test Method for Early Volume Change of Cementitious Mixtures.
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
CRD C 621	
CRSI	Manual of Standard Practice.

### 1.03 SUBMITTALS

- A. General: The CONTRACTOR shall submit shop drawings and other information to the OWNER for review in accordance with Section 01300 - Submittals.
- B. Mix Designs: The CONTRACTOR shall submit shop drawings for review for proposed concrete mix designs which shall show the proportions and gradations of all materials proposed for each class and type of concrete specified herein. The mix design shall be checked by an independent testing laboratory acceptable to the OWNER. All costs related to such checking shall be borne by the CONTRACTOR.

- C. Grout: The CONTRACTOR shall submit shop drawings for all types of grout for use in this Project.
- D. Accessories: The CONTRACTOR shall submit shop drawings for all types of concrete accessories to be used for this project including, but not limited to, form ties, water stops, joint materials and curing agents.
- E. Delivery Tickets: Where ready-mix concrete is used, the CONTRACTOR shall submit delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the State certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.
- F. Reinforcing Steel: The CONTRACTOR shall submit shop drawings of shop bending diagrams, placing lists, and Drawings of all reinforcing steel prior to fabrication.

#### 1.04 QUALITY ASSURANCE

- A. Tests on component materials and for compressive strength of concrete will be performed as specified herein. Test for determining slump will be in accordance with the requirements of ASTM C 143.
- B. The cost of all laboratory tests on cement, aggregates, and concrete, will be borne by the OWNER. However, the CONTRACTOR shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications.
- C. Concrete for testing shall be supplied by the CONTRACTOR at no cost to the OWNER, and the CONTRACTOR shall provide assistance to the OWNER in obtaining samples. The CONTRACTOR shall dispose of and clean up all excess material.
- D. Field Compression Tests: Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the OWNER to ensure continued compliance with these specifications. At least one set of test specimens shall be made for each 50 yards of concrete placed. Each set of test specimens shall be a minimum of 4 cylinders.
- E. Compression test specimens for concrete shall be made in accordance with ASTM C31. Specimens shall be 6-inch diameter by 12-inch high cylinders.
- F. Compression tests shall be performed in accordance with ASTM C 39. One test cylinder will be tested at 7 days and 2 at 28 days. The remaining cylinder will be held to verify test results, if needed.
- G. Evaluation and Acceptance of Concrete: Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 318, Chapter 5,



"Concrete Quality", and as specified herein. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected. All concrete which fails to meet the ACI requirements and these Specifications, is subject to removal and replacement at the cost of the CONTRACTOR.

- H. Construction Tolerances: The CONTRACTOR shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the Specifications, permissible deviations will be in accordance with ACI 347.

## PART 2 -- PRODUCTS

### 2.01 FORMWORK

- A. Form Materials: Except as otherwise expressly accepted by the OWNER, all lumber for use as forms, shoring, or bracing shall be new material. Materials for concrete forms shall conform to the following requirements:
1. Form materials shall be metal, wood, plywood, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade shown.
  2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS 1 for Concrete Forms, Class 1, and shall be edge sealed. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Exterior Grade.
- B. Unless otherwise shown, exterior corners in concrete members shall be provided with 3/4-inch chamfers or tooled to a 1/2-inch radius. Re-entrant corners in concrete members shall not have fillets unless otherwise shown.
- C. Form Ties: Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1 1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming. Form Ties shall be Burke Penta-Tie System by The Burke Company, or equal.

### 2.02 CONCRETE MATERIALS

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.

- B. All materials furnished for the work shall comply with the requirements of ACI 301, as applicable.
- C. Storage of materials shall conform to the requirements of ACI 301.
- D. Materials for concrete shall conform to the following requirements:
  - 1. Cement shall be standard brand Portland cement conforming to ASTM C 150 Type II.
  - 2. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities.
  - 3. Aggregates shall be obtained from pits acceptable to the OWNER, shall be non-reactive, and shall conform to the SFBC and ASTM C 33. Maximum size of coarse aggregate shall be as specified herein.
  - 4. Ready-mix concrete shall conform to the requirements of ASTM C 94.
  - 5. Air-entraining Admixture meeting the requirements of ASTM C 260 shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 5 percent. The OWNER reserves the right, at any time, to sample and test the air-entraining agent received on the job by the CONTRACTOR. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.
  - 6. Water reducing and retarding admixtures shall be added to control the set, effect water reduction. The addition of the admixture shall be separate from the air entraining admixture and as recommended by the manufacturer. The admixture shall be completely compatible with and be manufactured by the same manufacturer as the air entraining admixture. The addition of the admixture shall be completed within one minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Water reducing and set retarding admixtures shall be in conformance with ASTM C 494, Type D.

## 2.03 CURING MATERIALS

- A. Materials for curing concrete conform to ASTM C 309 and shall be Burke Spartan, Cote Cure-Seal Hardener (with red fugitive dye) as manufactured by the Burke Company, MB 429 as manufactured by Master Builders, or equal. The curing compound shall contain a fugitive dye so that areas of application will be readily distinguishable.
- B. Polyethylene sheet for use as a concrete curing blanket shall be white and have a nominal thickness of 6 mils.

## 2.04 JOINT MATERIALS

- A. Materials for joints in concrete above grade nonhydraulic structures shall conform to the following requirements:
1. Preformed joint filler shall be a non-extruding, resilient, bituminous type conforming to the requirements of ASTM D 1751.
  2. Elastomeric joint sealer shall be a single component, pour grade, polyurethane sealant meeting FS TT-S-230A, Type 1. Materials shall attain Shore A Hardness of 40-45.
  3. Mastic joint sealer shall be a material that does not contain evaporating solvents; that will tenaciously adhere to concrete surfaces; that will remain permanently resilient and pliable; that will not be affected by continuous presence of water and will not in any way contaminate potable water; and that will effectively seal the joints against moisture inflation even when the joints are subject to movement due to expansion and contraction. The sealer shall be composed of special asphalts or similar materials blended with lubricating and plasticizing agents to form a tough, durable master substance containing no volatile oils or lubricants and shall be capable of meeting the test requirements set forth hereinafter, if testing is required by the OWNER.

## 2.05 REINFORCING STEEL

- A. General: All reinforcing steel for all reinforced concrete construction shall conform to the following requirements:
1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement with supplementary requirement S-1, and shall be manufactured in the United States.
  2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A185. All welded wire fabric reinforcement shall be galvanized.
- B. Accessories: Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. Slab bolsters shall have gray plastic-coated legs.
- C. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Where the concrete blocks are used on concrete surfaces exposed to view, the color and texture of the concrete blocks shall match that required for the finished surface. Wire ties shall be embedded in concrete block bar supports.

## 2.06 CONCRETE DESIGN REQUIREMENTS

- A. General: Concrete shall be composed of cement, admixtures, aggregates and water. These materials shall be of the quantities specified. In general, the mix shall be designed to

produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the OWNER. All changes shall be subject to review by the OWNER.

- B. The CONTRACTOR is cautioned that the limiting parameters specified below are not design mixes. Additional cement or water reducing agent may be required to achieve workability demanded by the CONTRACTOR's construction methods. The CONTRACTOR is responsible for any costs associated with furnishing concrete with the required workability.
- C. Water-Cement Ratio and Compressive Strength: The minimum compressive strength and cement content shall be not less than specified as follows:

<u>Type of work</u>	<u>Min. 28-Day Compressive Strength (psi)</u>	<u>Max. Size Aggregate (in.)</u>	<u>Min. Cement per cu yd (sacks)</u>	<u>Max. W/C Ratio (by wt.)</u>
<u>Structural Concrete:</u>				
All reinforced concrete unless noted otherwise below.	4,000 (Class A)	1	6	0.45
<u>Sitework Concrete:</u>				
Concrete fill, pavement, curbs and sidewalks.	3,000 (Class B)	1	5.5	0.5

Note: One sack of cement equals 94 lbs.

- D. Consistency: The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. The slumps shall be as follows:

<u>Application</u>	<u>Slump</u>	<u>Variation</u>
Footings and Slabs	3"	± 1/2" to -1"
Mortar or grout for construction joints	8"	± 1 1/2"
All Other Applications	3"	± 1"

## 2.07 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall conform to meeting the requirements as to materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.

- B. Ready-mixed concrete shall be delivered to the site of the work, and discharge shall be completed within one and one half hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first. In hot weather, or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 60 minutes.

## 2.08 NONSHRINK GROUT

- A. Non-shrink grout shall be a prepackaged, inorganic, non-gas liberating, nonmetallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout specified herein shall be that recommended by the manufacturer for the particular application.
- B. Non-shrink grouts shall have a minimum 28 day compressive strength of 5,000 psi and shall meet the requirements of CRD C 621.

## 2.09 EPOXY GROUT

- A. Epoxy grout shall be a pourable, non-shrink, 100 percent solids system. The epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all pre-measured and pre-packaged. The resin component shall not contain any non-reactive diluents. Resins contained butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.
- B. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application.
- C. The mixed epoxy grout system shall have a minimum working life of 45 minutes at 75 degrees F.
- D. The epoxy grout shall develop a compressive strength of 5000 psi in 24 hours and 10,000 psi in seven days when tested in accordance with ASTM C 579, Method B. There shall be no shrinkage (0.0 percent) and a maximum 4.0 percent expansion when tested in accordance with ASTM C 827.

## 2.10 BONDING COMPOUND

- A. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur 32 Hi-Mod Epoxy Adhesive, as manufactured by Sika Corporation; Concrese Liquid (LPL), as manufactured by Master Builders; BurkEpoxy MV as manufactured by The Burk Company; or approved equal shall be used.

## PART 3 -- EXECUTION

### 3.01 GENERAL FORMWORK REQUIREMENTS

- A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The CONTRACTOR shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed and replaced at the CONTRACTOR's expense. All design, construction, maintenance, preparation, and removal of forms shall be in accordance with the SFBC, ACI 347 and the requirements specified herein.
- B. All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete.

### 3.02 FORMWORK CONSTRUCTION

- A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is called for by the OWNER.
- B. Construction Joints: Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the OWNER. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete.
- C. Form Ties: Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spilling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1 inch back from the formed face or faces of the concrete.

### 3.03 REUSE OF FORMS

- A. Forms may be reused only if in good condition and only if acceptable to the OWNER. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view.

### 3.04 REMOVAL OF FORMS

- A. Careful procedures for the removal of forms shall be strictly followed, and this work shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. Members which must support their own weight shall not have their forms

removed until they have attained at least 75 percent of the 28-day strength of the concrete as specified herein. Forms for all vertical walls and columns shall remain in place at least 2 days after the concrete has been placed. Forms for all parts of the Work not specifically mentioned herein shall remain in place for periods of time as determined by the OWNER.

### 3.05 FABRICATION OF REINFORCING STEEL

- A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.
- B. Bending or Straightening: Reinforcement shall not be straightened or rebent in a manner which will injure the material. Bars with kinks or bends not shown shall not be used. All bars shall be bent cold, unless otherwise permitted by the OWNER. No bars partially embedded in concrete shall be field-bent except as shown or specifically permitted by the OWNER.

### 3.06 PLACING REINFORCING STEEL

- A. Reinforcing steel shall be accurately positioned as shown on the Drawings, and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcing steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the CONTRACTOR shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.
- B. The portions of all accessories in contact with the formwork shall be made of concrete, plastic, or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.
- C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- D. Bars additional to those shown which may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR at its own expense.
- E. Reinforcement placing tolerances shall be within the limits specified in ACI 318, unless otherwise directed by the OWNER.
- F. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters having gray, plastic-coated standard type legs as specified herein. Slab bolsters shall be spaced not less than 30 inches on centers, shall extend continuously across the entire width of the reinforcing mat, and shall support the reinforcing mat in the plane shown.



- G. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3 feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

### 3.07 SPLICING

- A. Reinforcement bar splices shall only be used at locations shown. When it is necessary to splice reinforcement at points other than where shown, the character of the splice shall be as acceptable to the OWNER.
- B. Lap length for reinforcement bars shall be in a Class C Splice in accordance with ACI 318, unless otherwise shown. Laps of welded wire fabric shall be in accordance with the ACI 318.

### 3.08 CLEANING AND PROTECTION OF REINFORCING STEEL

- A. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.
- B. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is a delay in depositing concrete, reinforcing shall be reinspected and, if necessary, recleaned.

### 3.09 PREPARATION OF SURFACES FOR CONCRETING

- A. General: No concrete shall be placed until the reinforcement steel and formwork have been erected in a manner acceptable to the OWNER. The CONTRACTOR shall notify the OWNER not less than two working days prior to concrete placement, allowing for inspection and any corrective measures which are required. Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, as determined by the OWNER, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting, followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.
- C. Existing concrete surfaces upon or against which concrete is to be placed shall be given a roughened surface for good bond. Joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by

hydroblasting. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

- D. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent work, provided that construction joints shall be made only where acceptable to the OWNER.
- E. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the OWNER at least 4 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
- F. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown on the Drawings or by shop drawings and shall be acceptable to the OWNER before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.
- G. Casting Against Old Concrete: Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydro-blasting (exposing aggregate) prior to the application of an epoxy bonding agent. Application shall be according to the bonding agent manufacturer's instructions and recommendations.
- H. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited under water nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the OWNER.
- I. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.
- J. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2 inches clearance between said items, and any part of the concrete reinforcement will not be permitted.
- K. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

### 3.10 MIXING, HANDLING, TRANSPORTING, AND PLACING

- A. General: Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section.
- B. Mixing: Mixing of concrete shall conform to the requirements of Chapter 7 of ACI 301.
- C. Retempering: Retempering of concrete or mortar which has partially hardened will not be permitted.
- D. Non-Conforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the CONTRACTOR.
- E. Unauthorized Placement: No concrete shall be placed except in the presence of duly authorized representative of the OWNER. The CONTRACTOR shall notify the OWNER in writing at least 24 hours in advance of placement of any concrete.
- F. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screened in an up-slope direction.
- G. Placement in Wall Forms: Concrete shall not be dropped through reinforcement steel or into any deep form, whether reinforcement is present or not, causing separation of the coarse aggregate from the mortar on account of repeatedly hitting rods or the sides of the form as it falls, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4 feet below the ends of ducts, chutes, or buggies. Concrete shall be uniformly distributed during the process of depositing, and in no case after depositing shall any portion be displaced in the forms more than 6 feet in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet; and care shall be taken to avoid inclined layers or inclined construction joints where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in forms shall not exceed 5 feet of vertical rise per hour.
- H. The surface of the concrete -shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4 inch thick shall be tacked to the forms on these surfaces. The concrete shall be carded about 1/2 inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and all laitance shall be removed.

- I. Conveyor Belts and Chutes: All end of chutes, hopper gates and all other points of concrete discharge throughout the CONTRACTOR's conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the OWNER. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be provided in the interior of all forms so that the concrete, at the places of deposit, is visible from the deck or runway.
- J. Temperature of Concrete: The temperature of concrete, when it is being placed, shall not be more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in whether during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessarily to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The CONTRACTOR shall be entitled to no additional compensation on account of the foregoing requirements.

### 3.11 PUMPING OF CONCRETE

- A. If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- B. The minimum diameter of the hose (conduits) shall be 4 inches.
- C. Minimum compressive strength, cement content, and maximum size of aggregates shall be as specified herein. Gradation of coarse aggregates shall conform to ASTM C 33 and shall be as close to the middle range as possible. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand shall not be over 3.00.

### 3.12 TAMPING AND VIBRATING

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8,000 or 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
- B. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely

fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified with 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

### 3.13 FINISHING CONCRETE SURFACES

- A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions shown on the Drawings are defined as tolerances and are specified herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.
- B. Formed Surfaces: No treatment is required after form removal except for curing, repair of defective concrete, and treatment of surface defects. Where architectural finish is required, it shall be as specified or as shown on the Drawings.
- C. Unformed Surfaces: After proper and adequate vibration and tamping, all unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. The classes of finish specified for unformed concrete surfaces are designated as follows:
  - 1. Finish U1: Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8 inch. No further special finish is required.
  - 2. Finish U2: After sufficient stiffening of the screened concrete, surfaces shall be float finished with wood or metal floats or with a finished machine using flat blades. Excessive floating of surfaces while the concrete surface to absorb excess moisture will not be permitted. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Surface irregularities shall not exceed 1/4 inch. Joints and edges shall be tooled where shown on the Drawings or as determined by the OWNER.
  - 3. Finish U3: After the floated surface (as specified for Finish U2) has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples and trowel marks. The finish shall be smooth and free of all irregularities.
  - 4. Finish U4: Steel trowel finish (as specified for Finish U3) without local depressions or high points. In addition, the surface shall be given a light hairbroom finish with brooming perpendicular to drainage unless otherwise shown. The resulting surface shall be rough enough to provide a nonskid finish.

- D. Uniformed surfaces shall be finished according to the following schedule:

UNFORMED SURFACE FINISH SCHEDULE

<u>Area</u>	<u>Finish</u>
Grade slabs and foundations to be covered with concrete or fill material	U1
Floors to be covered with topping grout	U2
Slabs to be covered with built-up roofing	U2
Slabs	U4

3.14 CURING AND DAMPPROOFING

- A. All concrete shall be cured for not less than 14 days after placing, in accordance with the methods specified herein for the different parts of the work, and described in detail in the following paragraphs.

FINISH SCHEDULE

<u>Surface to be Cured or Dampproofed</u>	<u>Method</u>
Unstripped forms	1
Construction joints between footings and walls, and between floor slab and columns	2
Encasement concrete and thrust blocks	3
All concrete surfaces not specifically provided for elsewhere in this Paragraph	4

- B. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removed. If steel forms are used, the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 14 days of placing the concrete, curing shall be continued in accordance with Method 4.
- C. Method 2: The surface shall be covered With burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.
- D. Method 3: The surface shall be covered with moist earth not less than 4 hours, nor more than 24 hours, after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.

- E. Method 4: The surface shall be sprayed with a liquid curing compound. It shall be applied in accordance with the manufacturers printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film which will seal thoroughly.
- F. Care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.
- G. Wherever curing compound may have been applied by mistake to faces against which concrete subsequently is to be placed and to which it is to adhere, said compound shall be entirely removed by hydroblasting just prior to the placing of new concrete.
- H. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on uniformed surfaces, and within 2 hours after removal of forms from contact with formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2-hour period; provided, however, that any such repairs which cannot be made within the said 2-hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound, following which repairs shall be made as provided herein.

### 3.15 PROTECTION

- A. The CONTRACTOR shall protect all concrete against injury until final acceptance by the OWNER. Fresh concrete shall be protected from damage due to rain. The CONTRACTOR shall provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

### 3.16 TREATMENT OF SURFACE DEFECTS

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the OWNER. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the CONTRACTOR at its own expense.
- B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2 inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32 inch depth of the surface film from all hard portions, by means of an efficient sandblast. After cutting and

sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces under repair will remain moist, but not so wet as to overcome the suction upon which a good bond depends. The material used for repair proposed shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white Portland cement as is required to make the color of the patch match the color of the surrounding concrete.

- C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed, but shall be repaired in an approved manner with dry-packed cement grout.
- D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of this Section, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

### 3.17 CARE AND REPAIR OF CONCRETE

- A. The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the OWNER. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at anytime prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with the acceptable concrete at the CONTRACTOR's expense.

### 3.18 GROUT INSTALLATION

- A. All surface preparation, curing, and protection of cement grout shall be as specified herein. The finish of the grout surface shall match that of the adjacent concrete.
- B. The CONTRACTOR through the manufacturer of nonshrink grout and epoxy grout shall provide on-site technical assistance upon request, at no additional cost to the OWNER.
- C. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- D. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

- END OF SECTION -



*DIVISION 9 - PAINTING*

## 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 01610 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 topcoated, 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:

## SECTION 09940 - PAINTING

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 Dry 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.

## SECTION 09940 - PAINTING

### 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 -

*DIVISION 15 - MECHANICAL*

## SECTION 15000 - PIPING, GENERAL

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install all piping systems shown and specified, in accordance with the requirements of the Contract Documents. Each system shall be complete with all necessary fittings, supports, anchors, expansion joints, flexible connectors, valves, accessories, lining and coating, testing, excavation, backfill and encasement, to provide a functional installation.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Excavation and backfill for utilities.
- B. Pipeline testing and disinfection.

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

##### A. Commercial Standards:

ANSI/ASME B1.20.1	Pipe Threads, General Purpose (inch).
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 125.
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys.
ANSI/AWWA L115/A21.15	Flanged Ductile Iron Pipe with Threaded Flanges. Steel Pipe Flanges for Water Works Service, Sizes 4 in. through 144 in.
ANSI/AWS D1.1	Structural Welding Code.
ASTM A 307	Specification for Carbon Steel Externally Threaded Standard Fasteners.
ASTM D 2000	Classification System for Rubber Products in Automotive Applications.

#### 1.04 SUBMITTALS

- A. The CONTRACTOR shall submit complete shop drawings and certificates, test reports, affidavits of compliance, of all piping systems, in accordance with the requirements in Section 01300, "Submittals", and as specified in the individual piping sections.

- B. Each shop drawing submittal shall be complete in all aspects, incorporating all information and data listed herein and all additional information required to evaluate the proposed piping material's compliance with the Contract Documents. Partial or incomplete submissions will be returned to the CONTRACTOR without review.
- C. Data to be submitted shall include, but not be limited to:
  - 1. Catalog Data consisting of specifications, service, pipe size, working pressure, wall thickness, lining, coating, illustrations and a parts schedule that identifies the materials to be used for the various piping components and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.
  - 2. Weight of all component parts.
  - 3. Design calculations where specified.
- D. Certifications: Prior to installation, the CONTRACTOR shall furnish an Affidavit of Compliance certified by the pipe manufacturer that the pipe, fittings and specials furnished under this Contract comply with all applicable provisions of AWWA and these specifications. No pipe or fittings will be accepted for use in the Work on this project until the affidavits have been submitted and accepted in accordance with Section 01300, "Submittals".
- E. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

#### 1.05 QUALITY ASSURANCE

- A. General: All pipe shall be subject to review at the place of manufacture. During the manufacture of the pipe, the OWNER shall be given access to all areas where manufacturing is in progress, and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.
- B. Tests: Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards.
- C. Welding Requirements: All welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or spiral welds for pipe cylinders, spigot and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections.

#### 1.06 MANUFACTURER'S SERVICE REPRESENTATIVE

- A. Where the assistance of a manufacturer's service representative is advisable, in order to obtain correct pipe joints, supports, or special connections, the CONTRACTOR shall furnish such assistance at no additional cost to the Owner.

## 1.07 SHIPPING, HANDLING AND STORAGE

- A. Special care in handling shall be exercised during delivery, distribution and storage of pipe to avoid damage and setting up stresses. Damaged pipe will be rejected and shall be replaced at the CONTRACTOR's expense. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.
- B. No pipe shall be dropped from cars or trucks to the ground. All pipe shall be carefully lowered to the ground by mechanical means. In shipping, pipe and fittings shall be blocked in such manner as to prevent damage to castings or lining. Any broken or chipped lining shall be carefully patched. Where it is impossible to repair broken or damaged lining in pipe because of its size, the pipe shall be rejected as unfit for use.
- C. All mechanical joint pipe shall be laid with 1/8-inch space between the spigot and shoulder of pocket.

## 1.08 CLEANUP

- A. After completion of the work, all remaining pipe cuttings, joining and wrapping materials, and other scattered debris, shall be removed from the site. The entire piping system shall be handed over in a clean and functional condition.

## PART 2 -- PRODUCTS

### 2.01 GENERAL

- A. All pipes, fittings, and appurtenances shall be installed in accordance with the requirements of the applicable Sections of Division 2 and furnished as specified herein.
- B. Pressure Rating: All piping systems shall be designed for the maximum expected pressure as defined in Section 15995, "Pipeline Testing and Disinfection", or as shown in the individual piping sections of the Specifications.

### 2.02 PIPE FLANGES

- A. Flanges: Where the design pressure is 125 psi or less, flanges shall conform to either ANSI/AWWA C115/A21.15 Class D or ANSI B16.1 125-lb class. Where the design pressure is greater than 150 psi, up to a maximum of 250 psi, flanges shall conform to either ANSI/AWWA C115/21.15 or ANSI B16.1 250-lb class. Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe, unless otherwise shown. Attachment of the flanges to the pipe shall conform to the applicable requirements of ANSI/AWWA 115/21.15. Flanges for miscellaneous small pipes shall be in accordance with the standards specified for these pipes.



- B. Flange Coating: All machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.
- C. Flange Bolts: If studs are required, they shall be in accordance with ASTM A 307, Grade B, with heavy hex nuts. Machine bolts shall normally be used on all flanged connections and shall be in accordance with ASTM A 307, Grade A, with hex nuts. If studs are required, they shall extend through the nuts a minimum of 1/4-inch. All bolts and nuts shall conform to Section 05500, "Miscellaneous Metalwork".
- D. Flange Gaskets: Gaskets for flanged joints shall be of materials as specified in piping sections. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange. Ring gaskets shall not be permitted.

## 2.03 SLEEVE-TYPE COUPLINGS

- A. Construction: Sleeve-type couplings shall be provided where shown, and shall be of similar material as the pipe, without pipe stop, and shall be of sizes to fit the pipe and fittings shown. The middle ring shall be not less than 1/4 inch in thickness and shall be either 5 or 7 inches long for standard steel couplings, and 16 inches long for long-sleeve couplings. The followers shall be single-piece contoured mill section welded and cold-expanded as required for the middle rings. They shall be of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket.
- B. Pipe Preparation: The ends of the pipe, where specified or shown, shall be prepared for sleeve-type couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with outside diameter not more than 1/64 inch smaller than the nominal outside diameter of the pipe. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subjected to an air test for porosity.
- C. Gaskets: Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. The rubber in the gasket shall meet the following specifications:
  - 1. Color - Jet Black.
  - 2. Surface - Nonblooming.
  - 3. Durometer Hardness -  $74 \pm 5$ .
  - 4. Tensile Strength - 1000 psi Minimum.
  - 5. Elongation - 175 percent Minimum.

- D. The gaskets shall be immune to attack by the material which is being transported. All gaskets shall meet the requirements of ASTM D 2000, AA709Z, meeting Suffix B13 Grade 3, except as noted above.
- E. Insulating Couplings: Where insulating couplings are required, both ends of the coupling shall have a wedge-shaped gasket which assembles over a rubber sleeve of an insulating compound in order to obtain insulation of all coupling metal parts from the pipe.
- F. Restrained Joints: Where harnesses are required for sleeve-type couplings, they shall be in accordance with the requirements of the appropriate reference standard, or as shown.
- G. Supplier, or equal:
  - 1. Rockwell (Smith-Blair), Style 411
  - 2. Dresser, Style 38
  - 3. Ford Meter Box Co., Inc., Style FC1 or FC3

## 2.04 PIPE THREADS

- A. All pipe threads shall be in accordance with ANSI/ASME B1.20.

## PART 3 -- EXECUTION

### 3.01 GENERAL

- A. The CONTRACTOR shall furnish all labor, tools, materials, and equipment necessary for installation and jointing of the pipe. All piping shall be installed in accordance with the Drawings in a neat workmanlike manner and shall be set for accurate line and elevation. All piping shall be thoroughly cleaned before installation, and care shall be taken to keep the piping clean throughout the installation.
- B. Piping shall be attached to valves, etc., in accordance with the respective manufacturers' recommendations.

### 3.02 LAYING PIPE

- A. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and shall, in general, agree with manufacturer's recommendations. At the time of laying, the pipe shall be examined carefully for defects, and should any pipe be discovered to be defective after being laid, it shall be removed and replaced with sound pipe by the CONTRACTOR at his expense.
- B. The CONTRACTOR shall perform all earthwork including excavation, backfill, bedding, compaction, sheeting, shoring and bracing, dewatering and grading in accordance with Division 2 "Sitework."

- C. Upon satisfactory excavation of the pipe trench and completion of the pipe bedding, a continuous trough for the pipe barrel and recesses for the pipe bells, or couplings, shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure shall be exerted on the pipe joints from the trench bottom.
- D. Pipe shall be installed in accordance with the manufacturer's recommendation. Before being lowered into the trench, the pipes and accessories shall be carefully examined and the interior of the pipes shall be thoroughly cleaned of all foreign matter. At the close of each work day and 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.
- E. Lines shall be laid straight and depth of cover shall be maintained uniform with respect to finish grade, whether grading is completed or proposed at time of pipe installation. Where a grade or slope is shown on the Drawings, the CONTRACTOR shall use laser based surveying instruments to maintain alignment and grade. At least one elevation shot shall be taken on each length of pipe and recorded. No abrupt changes in direction or grade will be allowed.
- F. After pipe has been laid, reviewed, and found satisfactory, sufficient backfill shall be placed along the pipe barrel to hold the pipe securely in place during the conduction of the hydrostatic test. No backfill shall be placed over the joints until the hydrostatic test is satisfactorily completed, leaving it exposed to view for the detection of visible leaks. Upon satisfactory completion of the hydrostatic test, backfilling of the trench shall be completed.
- G. All underground piping shall be properly restrained at all fittings where the pipeline changes direction, changes size, or ends, using restrained joint pipe.

### 3.03 FLANGED JOINTS

- A. Flanged joints shall be made up with full face gaskets as specified in the piping paragraphs. Flange faces shall have a uniform bearing on the gaskets. Flanges shall be drawn together uniformly until the joint is tight. No washers shall be permitted for the bolt and nut assemblies. The length of the bolts shall be uniform and in accordance with the standards specified herein. The bolt's maximum projection beyond the end of the nut shall be 0.25 inch nor shall the bolt fall short of the end of the nut.

### 3.04 THREADED JOINTS

- A. All threads shall be clean, machine cut and all pipe shall be reamed before erection. Taps and dies shall be cleaned, sharpened and in good condition. All threaded joints shall be made tight with teflon tape.
- B. After having been set up, a joint shall not be backed off unless the joint is broken, the threads cleaned and new tape is applied.

### 3.05 THRUST RESTRAINT

- A. Restrained joints shall be located at valves, changes in direction of piping, and major branch connections.
- B. On all piping, where sleeve type couplings and flanged adapters are located near fittings or valves, tie rods shall span across the coupling as specified herein to restrain movements of the pipe along its axial direction. Such restraints can be deleted if both ends of the pipe are anchored in a concrete structure with no fitting or valve occurring within the span length, in the suction piping to a pump where the coupling is between the pump and valve, or when the water pressure measured at the crown of the pipe is less than five feet.
- C. All sleeve type couplings shall be harnessed except where noted specifically on the Drawings. The harnessing shall be as shown on the Drawings or as specified herein.
- D. All buried tie rods and associated hardware shall be 316 stainless steel.
- E. In general, all valves and fittings shall be restrained in an acceptable manner such that the unbalanced force developed at them shall be supported independent of the piping system.

### 3.06 TESTING

- A. Field testing of pipelines shall conform to the requirements of Section 15995 - Pipeline Testing and Disinfection.

- END OF SECTION -

## SECTION 15006 - DUCTILE IRON PIPE

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install ductile iron pipe and all appurtenant Work, complete in place, all in accordance with the requirements of the Contract Documents. All pipe and fittings shall be push-on or restrained joint pipe.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Piping, General.
- B. Pipeline Testing and Disinfection

#### 1.03 REFERENCED SPECIFICATIONS, CODES AND STANDARDS

##### A. Commercial Standards:

ANSI/AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings 3-inch through 48-inches For Water and Other Liquids
ANSI/AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
ANSI/AWWA C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or other Liquids
ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and Appurtenances
SSPC - PA2	Measurement of Dry Paint Thickness with Magnetic Gages

#### 1.04 SUBMITTALS

- A. Shop Drawings: The CONTRACTOR shall submit Shop Drawings of pipe and fittings in accordance with the requirements in Sections 15000, "Piping, General", and 01300, "Submittals".

### PART 2 -- PRODUCTS

#### 2.01 GENERAL

- A. All ductile iron pipe shall conform to the requirements of ANSI/AWWA Standard C151/A21.51. The wall thickness and outside diameter of the pipe shall conform to Table 50.15. Special thickness classes of Ductile Iron Pipe Thickness shall be as follows:

<b>Size</b>	<b>Special Thickness Class</b>
4-inch - 12-inch	52 (Minimum)

- B. Each pipe shall be cast with the year of manufacture, the class and the letters "DI" for ductile iron.

## 2.02 FITTINGS

- A. Fittings for use with the ductile iron pipe specified herein shall be ductile iron. Cast ductile-iron fittings shall be pressure rated at 250 psi, minimum. All fittings with mechanical joints, flange joints and push-on joints shall conform to AWWA/ANSI Standard C110/A21.10-93 Class 350. In addition, fittings with mechanical joints and push-on joints shall conform to ANSI/AWWA Standard C111/A21.11, except that neoprene gaskets shall be used for the joint.

## 2.03 JOINTS

- A. All pressurized ductile iron pipe and fittings for use below grade shall have push-on or restrained joints as indicated on the Drawings.
- B. All ductile iron pipe and fittings shall have rubber gaskets in conformance with ANSI/AWWA Standard C111/A21.11.

## 2.04 THRUST RESTRAINED JOINTS

- A. Restrained Push-On Joint: Joints for ductile iron pipe and fittings shall be TR-FLEX as manufactured by U.S. Pipe and Foundry, Flex-Ring by the American Ductile Iron Pipe Co., or equal. The restraining components, when not cast integrally with the pipe and fittings, shall be ductile iron or a high strength non-corrosive alloy steel. Tee head bolts and hexagonal nuts for all restrained joints in pipe and fittings shall be of high strength cast iron with composition, dimensions and threading as specified in ANSI/AWWA Standard C111/A21.11, except that the length of the bolts shall meet the requirements for the restrained joint design.
- B. The gasket and joint accessories shall be shipped in suitable protective containers. Each restrained 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 without reduction because of its position in the pipeline nor from support by external thrust blocks. Restrained joint pipe and fittings shall be capable of being deflected after assembly.

## 2.05 PIPE LINING

- A. General: All ductile iron pipe and fittings shall be smooth cement-lined followed by a bituminous seal coat in accordance with AWWA C104/ANSI A21.4. Special attention shall be given to the lining of fittings. Linings shall be applied to bare metal. All lining shall

extend to the faces of flanges, to the end of spigots, or to the shoulder of hubs, as the case may be.

## 2.06 EXTERIOR COATING

- A. An asphaltic coating shall be applied to the exterior of all ductile iron pipe and fittings intended for buried service and shall conform to ANSI A21.51.

## 2.07 PVC PIPE SLEEVE

- A. PVC pipe sleeve shall be provided for all ductile iron pipe crossings under sewer and storm drain pipes. The PVC pressure pipe shall conform to the requirements of AWWA C905. The PVC sleeve shall extend 10 feet on either side of the sewer and/or storm drain pipe that the ductile iron pipeline crosses under. The ductile iron pipe shall be installed with casing spacers inside the PVC pipe sleeve and provided with a bulkhead at either end of the sleeve.
- B. The annular space between the ductile iron water main pipe and the PVC sleeve shall be filled with clean sand, having 100 percent passing a standard No. 30 sieve.

## PART 3 -- EXECUTION

### 3.01 INSTALLATION

- A. Unless otherwise directed, ductile iron pipe shall be laid with the bell ends in the direction of laying.
- B. Thrust restrained and mechanical joints shall be made in accordance with the manufacturer's standards except as otherwise specified herein. Joints between mechanical joint pipe and/or fittings shall be made in accordance with ANSI/AWWA Standard C600, 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 ANSI/AWWA C600, whichever is the lesser amount.
- C. Before laying thrust restrained and mechanical joint pipe and fittings, all lumps, blisters and excess bituminous coating shall be removed from the bell and spigot ends. The outside of each spigot and the inside of each bell shall be 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 only be made after the joint has been assembled.
- D. Prior to making up flanged joints in ductile 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. 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 insure that bolt stresses are evenly distributed.

- E. Bolts and nuts in thrust restrained, mechanical and flanged joints shall be tightened in accordance with the recommendations of the pipe manufacturer for a leak-free joint. The mechanics shall exercise caution to prevent overstress. Torque wrenches shall be used until, in the opinion of the OWNER, the mechanics have become accustomed to the proper amount of pressure to apply on standard wrenches.
- F. Cutting of the ductile iron pipe for inserting valves, fittings, etc., shall be done by the CONTRACTOR in a neat and workmanlike manner without damage to the pipe, the lining, or the coating. After cutting the pipe, the plain end shall be beveled with a heavy file or grinder to remove all sharp edges.
- G. Areas of loose or damaged lining associated with field cutting shall be repaired or replaced as recommended by the pipe manufacturer and required by the OWNER. Repair methods shall be as recommended by the manufacturer and shall be submitted to the OWNER for review.
- H. Any work within the pipe shall be performed with care to prevent damage to the lining. No cable, lifting arms or other devices shall be inserted into the pipe. All lifting, pulling or pushing mechanisms shall be applied to the exterior of the pipe barrel.
- I. Homing the pipe shall be accomplished by the use of a hydraulic or mechanical pulling device, unless otherwise accepted by the OWNER. No pipe shall be driven or struck in order to seat it home.
- J. Cleaning methods shall be acceptable to the OWNER, and must be sufficient to remove silt, rocks, or other debris which may have entered the pipeline during its installation and shall also follow the requirements of Section 15995, "Pipeline Testing and Disinfection".
- K. All tapping for service connection shall be provided with service saddles as specified in Section 15115, "Miscellaneous Valves".
- L. The CONTRACTOR shall furnish the necessary sand, equipment, and hoses for filling the annular space in the PVC sleeve with sand. Sand shall be conveyed by air through a hose and deposited by air pressure in its final position. The sand shall be free of lumps to flow unimpeded and to completely fill all voids. In general, sand backfill will be considered complete when no more sand can be forced into the annular space between the bulkheads. The CONTRACTOR shall protect the interior surface of the PVC sleeve from damage.

- END OF SECTION -



## SECTION 15007 – AWWA C900/C905 PVC PIPE

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install 4-inch to 48-inch polyvinyl chloride (PVC) pressure pipeline, complete in place, all in accordance with the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15000 - Piping, General  
B. Section 15995 - Pipeline Testing and Disinfection

#### 1.03 REFERENCED SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ANSI/AWWA C104/A21	Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water
ANSI/AWWA C1 10/A21	Ductile Iron and Gray Iron Fittings 3-inch through 48-inch for Water and other Liquids
ANSI/AWWA C11 1/A21 .1	Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and Appurtenances
ANSI/AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe 4-inch through 12-inch for Water
ANSI/AWWA C905	Polyvinyl Chloride (PVC) Pressure Pipe 14-inch through 48-inch for Water
ASTM D 2584	Test Method for Ignition Loss of Cured Reinforced Resins
PPI Technical Report	Policies and Procedures for Developing
TR 3/4	Recommended Hydrostatic Design Stresses for Thermoplastic
AWWA Manual M23	PVC Pipe – Design and Installation

## 1.04 SUBMITTALS

- A. Shop Drawings: The CONTRACTOR shall submit Shop Drawings of pipe and fittings and appurtenances in accordance with the requirements in the Section entitled "Submittals".
- B. Certifications
  - 1. The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards.
  - 2. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR

## 1.05 QUALITY ASSURANCE

- A. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of this Section of the Specifications, as specified in the referenced standards, as applicable.
- B. In addition to those tests specifically required, the ENGINEER may request additional samples of any material for testing by the CITY. The additional samples shall be furnished at no additional cost to the CITY.

## PART 2 -- PRODUCTS

### 2.01 GENERAL

- A. PVC pressure pipe (4-inch through 12-inch) shall conform to the applicable requirements of ANSI/AWWA C900 and subject to additional requirements specified herein.
- B. PVC pressure pipe (14-inch through 48-inch) shall conform to the applicable requirements of ANSI/AWWA C905 and subject to additional requirements specified herein.

### 2.02 PIPE

- A. The pipe shall be of the diameter and pressure class specified or shown, shall be furnished complete with rubber gaskets, and all specials and fittings shall be provided as required in the Contract Documents. The dimensions and pressure classes for Dimension Ratios for large PVC pressure pipe with Cast-Iron Pipe Equivalent O.D.'s shall conform to the requirements of AWWA.
- B. Unless otherwise provided in alternate qualification procedures of PPI-TR3, compounds which have a Hydrostatic Design Basis (HDB) of 4000 psi at 73.4 degrees F for water shall not contain additives and fillers that exceed the recommended values in Table 1, Part Y of PPI-TR3 (e.g., allowable content range for calcium carbonate is 0.0-5.0 parts per hundred of resin). If requested by the ENGINEER, the additive and filter content shall be determined using the prolysis method as specified in ASTM D 2584.

- C. Joints: All joints for the buried PVC pipe shall be either an integral bell manufactured on the pipe or a separate coupling both employing a rubber ring joint. The bell and coupling shall be the same thickness as of the pipe barrel, or greater thickness. The sealing ring groove in the coupling shall be of the same design as the groove in cast iron fittings and valves available from local water works supply distributors. Where required, restrained joint retainer glands shall be used and shall be cast from 60-42-10 ductile iron and shall have a sufficient number of ductile tie bolts to restrain working and test pressures as required. The retainer clamp shall be of two piece construction with serrations on the I.D. sufficient to hold the required pressures with a safety factor of 2:1. The retainers shall be Series 1500 or 6500 as manufactured by EBAA, Iron, Inc.
- D. Joint Deflection: Deflection at the joint shall not exceed 1.5 degrees or one half the maximum deflection recommended by the manufacturer. No deflection of the joint shall be allowed for joints which are overbelled or not belled to the stop mark.
- E. Color: Pipe color shall be appropriate for service. All force mains shall be green, reclaimed water shall be purple, potable water shall be blue.

## 2.03 FITTINGS

- A. Fittings in the pipe shall be ductile iron and shall conform to the requirements of AWWA C1 10, Class 250. PVC pipe fittings shall be restrained joint.
- B. All fittings shall be lined and coated in accordance with the requirements of Section entitled "Ductile Iron Pipe" and "Piping, General".
- C. Each fitting shall be clearly labeled to identify its size and pressure class.
- D. Mechanical joint restraint shall be incorporated in the design of the follower gland or follower gland and gasket. The restraining system shall meet the requirements of ASTM 1674 for testing joint restraint products. The restraint mechanism shall consist of a plurality of gripping surfaces to maximize restraint capability. Glands shall be manufactured of ductile iron conforming to ASTM A536-80. The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell conforming to ANSI/AWWA A21.11/C111 and ANSI/AWWA A21.53/C153 of latest revision. For the restrained gland type, twist-off nuts, sized same as tee-head bolts, shall be used to insure proper actuating of restraining devices. The restraining glands shall have a pressure rating equal to that of the PVC pipe on which it is used and shall be Megalug Series 2000 PV as manufactured by EBAA, Iron Inc., or approved equal. Alternatively, for sizes through 12-inch, the restraint system shall be internal to the gasket which is actuated by the gland. The restraining system shall have a pressure rating equal to that of the PVC pipe on which it is used and shall be MJ FIELD LOK Gasket Series PV as manufactured by U.S. Pipe or approved equal.

## PART 3 – EXECUTION

### 3.01 GENERAL

- A. All laying, jointing, testing for defects and for leakage shall be performed in the presence of the ENGINEER, and shall be subject to acceptance by the ENGINEER. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the work.
- B. Installation shall conform to the requirements of AWWA M23, instructions furnished by the pipe manufacturer, and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the aforementioned requirements are in conflict, the more stringent provision shall apply.

### 3.02 HANDLING AND STORAGE

#### A. Handling

- 1. Pipe, fittings and accessories shall be carefully inspected before and after installation and those found defective shall be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, pipe, fittings, and accessories shall be cleaned, and shall be maintained in a clean condition. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe, fittings or any other material be dropped or dumped into trenches.

#### B. Storage

- 1. Pipe should be stored, if possible at the job site in unit packages provided by the manufacturer. Caution should be exercised to avoid compression damage or deformation to bell ends of pipe. Pipe should be stored in such a way as to prevent sagging or bending and protected from exposure to direct sunlight by covering with an opaque material while permitting adequate air circulation above and around the pipe. Gaskets should be stored in a cool, dark place out of the direct rays of the sun, in the original packaging.

### 3.03 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of Section entitled "Excavation and Backfill for Utilities" and as specified herein.

### 3.04 INSTALLATION

- A. Bell and spigot pipe shall be laid with the bell end pointing in the direction of laying. Pipe shall be graded in straight lines, taking care to avoid the formation of any dips or low points. Pipe shall not be laid when the conditions of trench or weather are unsuitable. At the end of each days work, open ends of pipe shall be closed temporarily with wood blocks or bulkheads.
- B. Pipe shall be supported at its proper elevation and grade, care being taken to secure firm and uniform support. Wood support blocking will not be permitted. The full length of each section of pipe and fittings shall rest solidly on the pipe bed, with recessed excavation to

accommodate bells, joints and couplings. Anchors and supports shall be provided where necessary and where indicated on the Drawings for fastening work into place. Fittings shall be independently supported.

- C. Short lengths of pipe shall be used in and out of each rigid joint or rigid structure. Piping that does not allow sufficient space for proper installation of jointing material shall be replaced by one of proper dimensions. Blocking or wedging between bells and spigots will not be permitted.
- D. Joints shall be installed according to manufacturer's recommendations. Trenches shall be kept free of water until joints have been properly made. The maximum combined deflection at any coupling shall be in accordance with the manufacturer's recommendations.
- E. Pipe shall be cut by means of saws, power driven abrasive wheels or pipe cutters, which will produce a square cut. No wedge-type roller cutters will be permitted. After cutting, the end of the pipe shall be beveled using a beveling tool, portable type sander or abrasive disc.

### 3.05 FIELD TESTING AND DISINFECTION

- A. Field testing and disinfection of water mains shall conform to the requirements of Section entitled "Pipeline Testing and Disinfection".

- END OF SECTION -

## SECTION 15008 - PVC NON-PRESSURE PIPE

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install all 6- to 15-inch underground PVC non-pressure pipe for gravity sewer replacement and all appurtenant work, complete in place, all in accordance with the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Excavation and Backfill for Utilities.
- B. Piping, General
- C. Piping Schedule
- D. Pipeline Testing and Disinfection

#### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ASTM D 1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
ASTM D 2321	Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

#### 1.04 SUBMITTALS

- A. Samples: The CONTRACTOR shall submit to the CITY for review, samples of all the materials proposed for use on the Work. The samples shall be clearly marked to show the manufacturer's name and product identification and shall be submitted along with the manufacturer's technical data and application instructions. All sample submittals shall conform to the requirements for "Samples" in Section 01300, "Submittals".
- B. Shop Drawings: The CONTRACTOR shall submit shop drawings and laying diagrams of all Pipe, joints, bends, special fittings, and piping appurtenances in accordance with Section 01300, "Submittals".
- C. Certificates: The CONTRACTOR shall provide manufacturer's certificates for all materials indicating conformance to the Contract Documents.

## 1.05 QUALITY ASSURANCE

- A. Testing: All materials testing will be based upon applicable ASTM Test Methods and AWWA Standards referenced herein for the materials specified.
- B. Certificates: Manufacturer's notarized certificates of compliance shall be furnished by the CONTRACTOR.
- C. The pipe shall be subjected to the specified hydrostatic strength tests, flexure tests, and crushing tests. The crushing tests shall be made on samples taken from the center of full-length sections of pipe.

## 1.06 CLEANUP

- A. In addition to the requirements of Section 01700, "Project Closeout", the CONTRACTOR, upon completion of backfilling and grading over trenches shall remove all excess materials and equipment from the site.

## PART 2 – PRODUCTS

### 2.01 GENERAL

- A. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and pressure rating in psi.
- B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

### 2.02 PIPE

- A. All PVC pipe shall be joined by compression joints unless otherwise shown or specified in the Piping Schedule, and shall conform to the following requirements:
  - 1. Polyvinylchloride pipe (PVC) shall conform to the requirements of ASTM D 3034, Class SDR 35. Material for PVC pipe shall conform to the requirements of ASTM D 1784 for Class 12454-B or 12454-C as defined therein.
  - 2. Flexible rubber rings for compression type joints for PVC pipe and fittings shall conform to the requirements of ASTM D 1869.

### 2.03 FITTINGS

- A. All fittings for PVC pipe shall conform to the requirements of ASTM D 2241. The ring groove and gasket ring shall be compatible with PVC pipe ends. The flanged fittings shall be compatible with cast-iron or ductile iron pipe fittings.
- B. The strength class of the fittings shall be not less than the strength class of any adjoining pipe.

## 2.04 BEDDING MATERIAL

- A. Unless otherwise specified or shown, all material used for pipe bedding shall conform to the requirements for "Embedment materials" as specified in ASTM D 2321.

## PART 3 – EXECUTION

### 3.01 GENERAL

- A. All laying, jointing, testing for defects and for leakage shall be performed in the presence of the CITY, and shall be subject to his approval before acceptance. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the Work.
- B. Installation shall conform to the requirements of ASTM D 2321 and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the requirements of ASTM D 2321 are in conflict, the more stringent provision shall apply.

### 3.02 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of the Section entitled "Excavation and Backfill for Utilities", and as specified herein.
- B. Unless otherwise specified or shown, the maximum width of trenches shall be as specified in said ASTM D 2321.

### 3.03 LAYING PIPE

- A. The pipe shall be installed in accordance with the requirements of ASTM D 2321 and as specified herein and shown and the sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for joining, the bedding for the pipe shall be checked for firmness and uniformity of surface.
- B. Proper implements, tools, and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the CONTRACTOR for safe and efficient execution of the Work. All pipe, fittings, valves, and accessories shall be carefully lowered into the trench by means of backhoe, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.
- C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe or will produce ragged, uneven edges.
- D. The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap,



wood, or other similar temporary plugs will not be permitted.

- E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the Work shall be furnished by the CONTRACTOR.
- F. Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers, or main drains, the obstruction shall be permanently supported, relocated, removed, or reconstructed by the CONTRACTOR in cooperation with owners of such utility structures.

### 3.04 HANDLING

- A. Handling of the PVC pipe shall be done with care to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.
- B. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.

### 3.05 FIELD JOINTING

- A. Each pipe compression type joint shall be joined with a lock-in rubber ring and a ring groove that is designed to resist displacement during pipe insertion.
- B. The ring and the ring seat inside the bell shall be wiped clean before the gasket is inserted. At this time a thin film of lubricant shall be applied to the exposed surface of the ring and to the outside of the clean pipe end. Lubricant other than that furnished with the pipe shall not be used. The end of the pipe shall be then forced into the ring to complete the joint.
- C. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.
- D. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe which has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the OWNER, the trench conditions or weather are unsuitable for such Work.

### 3.06 INSTALLATION OF BENDS, TEES, AND REDUCERS

- A. Cast-iron and PVC fittings shall be installed Utilizing standard installation procedures. Fittings shall be lowered into trench by means of rope, cable, chain, or other acceptable means without damage to the fittings. Cable, rope, or other devices used for lowering fitting into trench, shall be attached around exterior of fitting for handling. Under no circumstances shall the cable, rope or other device be attached through the fitting's interior for handling. Fittings shall be carefully connected to pipe or other facility, and joint shall be checked to insure a sound and proper joint.

### 3.07 PIPE-TO-PIPE CONNECTIONS

- A. Pipe-to-pipe connections shall be made by using flexible banded, sheer reinforced couplings or adapter couplings, each with compression joints, in compliance with ASTM C 425.

### 3.08 PIPE-TO-PIPE MANHOLE CONNECTIONS

- A. When a sound pipe stub-out exists at a manhole to which connection is to be made, a pipe-to-pipe connection shall be made as described above. If a stub-out is not present or is faulty, an opening shall be cut in the manhole wall and the connection made. The connection shall consist of a pipe stub-out with elastomeric waterstop grouted into the opening with non-shrink grout. A flexible band coupling, as shown on the details for new manholes, shall join the pipe stub-out to the replacement pipe. The invert or floor inside the manhole shall be cut and reshaped as necessary.

### 3.09 GRAVITY SEWER SERVICE LATERALS

- A. Lateral sewers shall be installed in accordance with all the applicable requirement for pipe installation. Branch fittings shall be installed in the main line sewer as it is constructed, in the locations and configuration of the original laterals or as designated by the CITY.
- B. The existing laterals shall be hand excavated to a joint, saw cut, clean and square and the appropriate adapter installed to connect the replacement laterals. Care shall be taken to maintain the slopes of the existing laterals. The laterals shall be removed and replaced from the main line to a point along the existing lateral as determined by the CITY to be in acceptable condition.
- C. The CONTRACTOR shall not excavate trenches for laterals on both sides of the street at the same time unless written permission has been secured in advance to close the street.

### 3.10 TESTING

- A. Field testing of gravity sewer pipe shall conform to the requirements of Section 15995, "Pipeline Testing and Disinfection".

- END OF SECTION -

## SECTION 15009 - PVC PRESSURE PIPE

### PART 1 – GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install polyvinyl chloride (PVC) pressure pipeline, complete in place, all in accordance with the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Piping, General
- B. Piping Schedule
- C. Pipeline Testing

#### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

##### A. Commercial Standards:

ASTM D 1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 1785	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
ASTM D 2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

#### 1.04 SUBMITTALS

##### A. Shop Drawings

1. The CONTRACTOR shall submit shop drawings of pipe, fittings, and appurtenances in accordance with the requirements in Section entitled, "Submittals."

## B Certifications

1. The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards.
2. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

## 1.05 QUALITY ASSURANCE

### A. Tests

1. Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of this Section of the Specifications, as specified in the referenced standards, as applicable.
- B. In addition to those tests specifically required, the ENGINEER may request additional samples of any material for testing by the CITY. The additional samples shall be furnished at no additional cost to the CITY.

## PART 2 -- PRODUCTS

### 2.01 GENERAL

- A. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and pressure rating in psi.
- B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

### 2.02 PIPE

- A. PVC pipe shall conform to ASTM D1785 and shall be made from a 12454B compound which is a Type 1, Grade 1 plastic as defined by ASTM D1784. Rerun or reclaimed materials will not be acceptable.
- B. Wall Thickness shall be a minimum of Schedule 80, unless otherwise noted in the piping schedule.
- C. PVC pipe exposed to sunlight shall contain U.V. protectant.

### 2.03 JOINTS

- A. Pipe joints shall be provided as specified in the pipe schedule.
- B. All PVC pipe four (4) inches in diameter and larger, unless otherwise scheduled, intended for buried service shall be push-on type in accordance with AWWA C-900 and shall utilize ductile iron retainers for restraining pipe joints. Retainers shall be cast from 60-42-10 ductile iron and shall have a sufficient number of ductile tie bolts to restrain working and

tests pressures as required. The retainer clamp shall be of two piece construction with serrations on the I.D. sufficient to hold the required pressures. The retainers shall be Series 1500 or 6500 as manufactured by EBAA Iron, Inc.

- C. Socket type joints shall be made up in accordance with ASTM D2855 with a PVC solvent cement complying with ASTM D2564. The cement shall have a minimum viscosity of 2000 cps.
- D. Where flanges are to be used, flanges shall be van stone type with full faced vinyl gaskets.

## 2.04 FITTINGS

- A. Socket type pipe fittings for Schedule 40 pipe shall conform to ASTM D2466.
- B. Socket type pipe fittings for Schedule 80 pipe shall conform to ASTM D2467.
- C. Fittings shall have the same schedule designation, joint type and be made of the same PVC compound as the connecting pipe.

## PART 3 – EXECUTION

### 3.01 GENERAL

- A. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the Work.
- B. Installation shall conform to the requirements of ASTM D 2321 and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the requirements of ASTM D 2321 are in conflict, the more stringent provision shall apply.

### 3.02 BEDDING MATERIAL

- A. Unless otherwise specified or shown, all material used for pipe bedding shall conform to the requirements for "Embedment Materials" as specified in ASTM D 2321.

### 3.03 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of the Section entitled "Excavation and Backfill for Utilities," and as specified herein.
- B. Unless otherwise specified or shown, the maximum width of trenches shall be as specified in ASTM D 2321.
- C. The minimum depth of cover over the top of the pipe shall be 36-inches unless otherwise shown on the Drawings.

### 3.04 LAYING PIPE

- A. The pipe shall be installed in accordance with the requirements of ASTM D 2321 and as specified herein and shown and the sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for joining, the bedding for the pipe shall be checked for firmness and uniformity of surface.
- B. Proper implements, tools, and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the CONTRACTOR for safe and efficient execution of the Work. All pipe, fittings, valves, and accessories shall be carefully lowered into the trench by means of backhoe, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.
- C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe or produce ragged, uneven edges.
- D. The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.
- E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the Work shall be furnished by the CONTRACTOR at its own expense under the direction of the ENGINEER.

### 3.05 HANDLING

- A. Handling of the PVC pipe shall be done with care to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.
- B. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.

### 3.06 FIELD JOINTING

- A. All pipe joints shall be made in accordance with the manufacturers written instructions.
- B. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.
- C. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe which has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the ENGINEER, the trench conditions or weather are unsuitable for such Work.

### 3.07 PROTECTIVE COATINGS

- A. Protective coating shall be as indicated in Section 15390 – Piping Schedule.

### 3.08 FIELD TESTING

- A. Field testing and disinfection of water mains shall conform to the requirements of the Section entitled "Pipeline Testing and Disinfection."

- END OF SECTION -

## SECTION 15008

### PVC NON-PRESSURE PIPE

#### **Part 1 - GENERAL**

##### 1.01 THE REQUIREMENT

This specification includes 4" through 15" unplasticized polyvinyl chloride (PVC) plastic non-pressure gravity sewer pipe with integral bell and spigot push-on gasket joints for the conveyance of domestic sanitary sewage.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02222 - Excavation and Backfill for Utilities
- B. Section 02730 – Gravity Sanitary Sewers
- C. Section 15000 - Piping General
- D. Section 15007 – AWWA C900/C905 PVC Pipe
- E. Section 15009 – PVC Pressure Pipe
- F. Section 15995 - Pipeline Testing and Disinfection

##### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

###### A. Commercial Standards:

ASTM D 1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR-Series).
ASTM D 2321	Recommended Practice for Underground Installation of flexible Thermoplastic Sewer Pipe.
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

##### 1.04 SUBMITTALS

- A. Samples: The CONTRACTOR shall submit to the CITY for review, samples of all the materials proposed for use on the Work. The samples shall be clearly marked to show the manufacturer's name and product identification and shall be submitted along with the manufacturer's technical data and application instructions. All sample submittals shall conform to the requirements for "Samples" in Section 01300, "Submittals".



## SECTION 15008

### PVC NON-PRESSURE PIPE

- B. Shop Drawings: The CONTRACTOR shall submit shop drawings and laying diagrams of all Pipe, joints, bends, special fittings, and piping appurtenances in accordance with Section 01300, "Submittals".
- C. Certificates: The CONTRACTOR shall provide manufacturer's certificates for all materials indicating conformance to the Contract Documents.

#### 1.05 QUALITY ASSURANCE

- A. Testing: All materials testing will be based upon applicable ASTM Test Methods and AWWA Standards referenced herein for the materials specified.
- B. Certificates: Manufacturer's notarized certificates of compliance shall be furnished by the CONTRACTOR.
- C. The pipe shall be subjected to the specified hydrostatic strength tests, flexure tests, and crushing tests. The crushing tests shall be made on samples taken from the center of full-length sections of pipe.

#### 1.06 CLEANUP

- A. In addition to the requirements of Section 01700, "Project Closeout", the CONTRACTOR, upon completion of backfilling and grading over trenches shall remove all excess materials and equipment from the site.

### **Part 2 - PRODUCTS**

#### 2.01 GENERAL

- A. All pipe and fittings shall meet the requirements of ASTM D3034 for 6" through 15" SDR 26 sewer pipe.
- B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.
- C. PVC pipe and fittings shall be homogenous throughout and free from cracks, holes, foreign inclusions or other injurious defects.
- D. PVC pipe and fittings showing signs of ultra-violet degradation will not be accepted.

#### 2.02 PIPE

- A. All pipe shall have a dimension ratio (DR) of 26 and minimum pipe stiffness (PS) of 115 psi. It shall be made from quality PVC resin, compounded to

## SECTION 15008

### PVC NON-PRESSURE PIPE

provide physical and mechanical properties that equal or exceed cell class 12454 or 12364 as defined in ASTM D1784 (minimum tensile Modulus of 500,000 PSI).

- B. Pipe shall be fabricated in 20-foot lengths and shall be suitable for use as a gravity sewer conduit.
- C. The bell shall consist of an integral wall section with a solid cross section elastomeric gasket which meets the requirements of ASTM F477.
- D. All PVC pipe shall be uniform in color, opacity, density and other physical properties.
- E. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, the PVC cell classification and pressure rating in psi.

#### 2.03 Joints

- A. Joints shall be integral bell push-on gasket joints designed for radial compression of the elastomeric gasket inside the bell on the pipe spigot to ensure a positive seal.
- B. Design joint to avoid displacement of the gasket when installed under provisions of the manufacturer's recommendation.
- C. The joint design shall meet the requirements of ASTM D3212 under both pressure and 22 in. Hg vacuum.
- D. Use lubricants to join pipe as recommended by the manufacturer.

#### 2.04 Gaskets

- A. Provide solid cross section elastomeric gaskets which meets the requirements of ASTM F477, molded in a circular form or extruded to the proper section and then spliced into circular form, consisting of a properly vulcanized high-grade elastomeric compound.
- B. Gaskets shall be factory assembled and securely locked in place to prevent displacement during assembly. Provisions must be made for expansion and contraction at each joint with an elastomeric gasket.
- C. The basic polymer shall be natural rubber, synthetic elastomer or a blend of both.
- D. Gaskets shall be manufactured of materials resistant to domestic sewage.
- E. Apply an adequate compressive force to gasket to affect a positive seal under all combinations of joint tolerance.

## SECTION 15008

### PVC NON-PRESSURE PIPE

#### 2.06 FITTINGS

- A. All fittings for PVC pipe shall conform to the requirements of ASTM D 2241. The ring groove and gasket ring shall be compatible with PVC pipe ends. The flanged fittings shall be compatible with cast-iron or ductile iron pipe fittings.
- B. The strength class of the fittings shall be not less than the strength class of any adjoining pipe.
  - 1. Fittings Marking: Mark fittings with the following information
    - (a) Manufacturer's Name or Trademark.
    - (b) Nominal Size.
    - (c) The Material Designation "PVC" PSM.
- C. Service Plugs shall be flexible virgin polyvinyl chloride as manufactured by Fernco Joint Sealer Company, or approved equal.
- D. Adapters: As required by the field conditions.

#### 2.07 BEDDING MATERIAL

- A. Unless otherwise specified or shown, all material used for pipe bedding shall conform to the requirements of Section 02222, "Excavation and Backfill for Utilities".

### **Part 3 - EXECUTION**

#### 3.01 GENERAL

- A. All laying, jointing, testing for defects and for leakage shall be performed in the presence of the CITY, and shall be subject to the CITY'S approval before acceptance. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the Work.
- B. Installation shall conform to the requirements of ASTM D 2321 and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the requirements of ASTM D 2321 are in conflict, the more stringent provision shall apply.

#### 3.02 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of Section 02222 - Excavation and Backfill for Utilities, and as specified herein.

## SECTION 15008

### PVC NON-PRESSURE PIPE

- B. Unless otherwise specified or shown, the maximum width of trenches shall be as specified in said ASTM D 2321.

#### 3.03 LAYING PIPE

- A. The pipe shall be installed in accordance with the requirements of ASTM D 2321 and as specified herein. Sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for joining, the bedding for the pipe shall be checked for firmness and uniformity of surface.
- B. Proper implements, tools, and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the CONTRACTOR for safe and efficient execution of the Work. All pipe, fittings, valves, and accessories shall be carefully lowered into the trench by means of backhoe, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.
- C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe or will produce ragged, uneven edges.
- D. The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.
- E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the Work shall be furnished by the CONTRACTOR.
- F. Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers, or main drains, the obstruction shall be permanently supported, relocated, removed, or reconstructed by the CONTRACTOR in cooperation with owners of such utility structures.

## SECTION 15008

### PVC NON-PRESSURE PIPE

#### 3.05 HANDLING

- A. Handling of the PVC pipe shall be done with care to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.
- B. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.

#### 3.06 FIELD JOINTING

- A. Each pipe compression type joint shall be joined with a lock-in rubber ring and a ring groove that is designed to resist displacement during pipe insertion.
- B. The ring and the ring seat inside the bell shall be wiped clean before the gasket is inserted. At this time a thin film of lubricant shall be applied to the exposed surface of the ring and to the outside of the clean pipe end. Lubricant other than that furnished with the pipe shall not be used. The end of the pipe shall be then forced into the ring to complete the joint.
- C. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.
- D. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe which has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the OWNER, the trench conditions or weather are unsuitable for such Work.

#### 3.07 INSTALLATION OF BENDS, TEES, AND REDUCERS

- A. PVC fittings shall be installed utilizing standard installation procedures. Fittings shall be lowered into trench by means of rope, cable, chain, or other acceptable means without damage to the fittings. Cable, rope, or other devices used for lowering fitting into trench shall be attached around exterior of fitting for handling. Under no circumstances shall the cable, rope or other device be attached through the fitting's interior for handling. Fittings shall be carefully connected to pipe or other facility, and joint shall be checked to insure a sound and proper joint.

## SECTION 15008

### PVC NON-PRESSURE PIPE

#### 3.09 PIPE-TO-PIPE CONNECTIONS

- A. Pipe-to-pipe connections shall be made by using flexible banded, sheer reinforced couplings or adapter couplings, each with compression joints, in compliance with ASTM C 425.

#### 3.10 PIPE-TO-PIPE MANHOLE CONNECTIONS

- A. When a sound pipe stub-out exists at a manhole to which connection is to be made, a pipe-to-pipe connection shall be made as described above. If a stub-out is not present or is faulty, an opening shall be cut in the manhole wall and the connection made. The connection shall consist of a pipe stub-out with elastomeric waterstop grouted into the opening with non-shrink grout. A flexible band coupling, as shown on the details for new manholes, shall join the pipe stub-out to the replacement pipe. The invert or floor inside the manhole shall be cut and reshaped as necessary.

#### 3.11 GRAVITY SEWER SERVICE LATERALS

- A. Lateral sewers shall be installed in accordance with all the applicable requirements for pipe installation. Branch fittings shall be installed in the main line sewer as it is constructed, in the locations and configuration of the original laterals or as designated by the CITY.
- B. The existing laterals shall be hand excavated to a joint, saw cut, clean and square and the appropriate adapter installed to connect the replacement laterals. Care shall be taken to maintain the slopes of the existing laterals. The laterals shall be removed and replaced from the main line to a point along the existing lateral as determined by the CITY to be in acceptable condition.
- C. The CONTRACTOR shall not excavate trenches for laterals on both sides of the street at the same time unless written permission has been secured in advance to close the street.

#### 3.12 TESTING

- A. Field testing of gravity sewer pipe shall conform to the requirements of Section 15995 - Pipeline Testing and Disinfection.

- END OF SECTION -

SECTION 15009  
PVC PRESSURE PIPE

**Part 1 - GENERAL**

1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install polyvinyl chloride (PVC) pressure pipeline, complete in place, all in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15000 - Piping General
- B. Section 15390 - Piping Schedule
- C. Section 15995 - Pipeline Testing and Disinfection

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ASTM D 1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 1785	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
ASTM D 2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

1.04 SUBMITTALS

A. Shop Drawings

- 1. The CONTRACTOR shall submit shop drawings of pipe, fittings, and appurtenances in accordance with the requirements in Section 01300 entitled, "Submittals."

SECTION 15009  
PVC PRESSURE PIPE

B. Certifications

1. The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards.
2. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

1.05 QUALITY ASSURANCE

A. Tests

1. Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of this Section of the Specifications, as specified in the referenced standards, as applicable.
- B. In addition to those tests specifically required, the ENGINEER may request additional samples of any material for testing by the CITY. The additional samples shall be furnished at no additional cost to the CITY.

**Part 2 - PRODUCTS**

2.01 GENERAL

- A. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and pressure rating in psi.
- B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

2.02 PIPE

- A. PVC pipe shall conform to ASTM D1785 and shall be made from a 12454B compound which is a Type 1, Grade 1 plastic as defined by ASTM D1784. Rerun or reclaimed materials will not be acceptable.
- B. Wall Thickness shall be a minimum of Schedule 80, unless otherwise noted in the piping schedule.
- C. PVC pipe exposed to sunlight shall contain U.V. protectant.



SECTION 15009  
PVC PRESSURE PIPE

2.03 JOINTS

- A. Pipe joints shall be provided as specified in the Section 15390 "Piping Schedule".
- B. All PVC pipe four (4) inches in diameter and larger, unless otherwise scheduled, intended for buried service shall be push-on type in accordance with AWWA C-900 and shall utilize ductile iron retainers for restraining pipe joints. Retainers shall be cast from 60-42-10 ductile iron and shall have a sufficient number of ductile tie bolts to restrain working and tests pressures as required. The retainer clamp shall be of two piece construction with serrations on the I.D. sufficient to hold the required pressures. The retainers shall be Series 1500 or 6500 as manufactured by EBAA Iron, Inc.
- C. Socket type joints shall be made up in accordance with ASTM D2855 with a PVC solvent cement complying with ASTM D2564. The cement shall have a minimum viscosity of 2000 cps.
- D. Where flanges are to be used, flanges shall be van stone type with full faced vinyl gaskets.

2.04 FITTINGS

- A. Socket type pipe fittings for Schedule 40 pipe shall conform to ASTM D2466.
- B. Socket type pipe fittings for Schedule 80 pipe shall conform to ASTM D2467.
- C. Fittings shall have the same schedule designation, joint type and be made of the same PVC compound as the connecting pipe.

**Part 3 - EXECUTION**

3.01 GENERAL

- A. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the Work.
- B. Installation shall conform to the requirements of ASTM D 2321 and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the requirements of ASTM D 2321 are in conflict, the more stringent provision shall apply.

3.02 BEDDING MATERIAL

- A. Unless otherwise specified or shown, all material used for pipe bedding shall conform to the requirements for "Embedment Materials" as specified in ASTM D 2321.

SECTION 15009  
PVC PRESSURE PIPE

3.03 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of Section 02222 - Excavation and Backfill for Utilities, and as specified herein.
- B. Unless otherwise specified or shown, the maximum width of trenches shall be as specified in ASTM D 2321.
- C. The minimum depth of cover over the top of the pipe shall be 36-inches unless otherwise shown on the Drawings.

3.04 LAYING PIPE

- A. The pipe shall be installed in accordance with the requirements of ASTM D 2321 and as specified herein and shown and the sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for joining, the bedding for the pipe shall be checked for firmness and uniformity of surface.
- B. Proper implements, tools, and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the CONTRACTOR for safe and efficient execution of the Work. All pipe, fittings, valves, and accessories shall be carefully lowered into the trench by means of backhoe, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.
- C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe or produce ragged, uneven edges.
- D. The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.

## SECTION 15009

### PVC PRESSURE PIPE

- E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the Work shall be furnished by the CONTRACTOR at its own expense under the direction of the ENGINEER.

#### 3.05 HANDLING

- A. Handling of the PVC pipe shall be done with care to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.
- B. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.

#### 3.06 FIELD JOINTING

- A. All pipe joints shall be made in accordance with the manufacturers written instructions.
- B. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.
- C. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe which has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the ENGINEER, the trench conditions or weather are unsuitable for such work.

#### 3.07 PROTECTIVE COATINGS

- A. Protective coating shall be as indicated in Section 15390 – Piping Schedule.

#### 3.08 FIELD TESTING

- A. Field testing and disinfection of water mains shall conform to the requirements of Section 15995 - Pipeline Testing and Disinfection.

- END OF SECTION -

## SECTION 15019 - MISCELLANEOUS PIPING

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install all exposed and buried mill piping as shown and specified, complete, including polyethylene tubing, copper tubing, solvent-welded PVC pipe, fittings, gaskets, bolts, insulating connections, and such other specialties as required for a complete and operable piping system in accordance with the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Excavation and Backfill for Utilities
- B. Piping, General.
- C. Pipeline Testing and Disinfection

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

##### A. Commercial Standards:

ANSI/ASME B1.20 1	Pipe Threads, General Purpose (inch)
ASTM B 62	Specification for Composition Bronze or Ounce Metal Castings
ASTM B 584	Specification for Copper Alloy Sand Castings for General Applications
ASTM D 2000	Classification System for Rubber Products in Automotive Applications
ASTM D-1248	Polyethylene Plastics Molding and Extrusion Materials
AWWA C 901	Polyethylene (PE) Pressure Pipe and tubing, ½" through 3" for Water Service

#### 1.04 SUBMITTALS

- A. For the materials and equipment items supplied under the provisions of this Section, the Contractor shall submit copies of the manufacturer's product specifications and performance details according to the requirements of Section entitled "Submittals."

#### 1.05 QUALITY ASSURANCE

- A. Tests: Except where otherwise specified, all material used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards.

- B. Certificates: Manufacturer's notarized certificates of compliance shall be furnished by the Contractor.
- C. The pipe shall be subjected to the specified hydrostatic strength tests, flexure tests, and crushing tests. The crushing tests shall be made on samples taken from the center of full-length sections of pipe.

#### 1.06 CLEANUP

- A. In addition to the requirements of Section entitled "Project Closeout", the Contractor, upon completion of backfilling and grading over trenches shall remove all excess materials and equipment from the site.

### PART 2 -- PRODUCTS

#### 2.01 COPPER TUBING

- A. Copper tubing shall conform to the requirements of ASTM B 88 and shall be Type K, soft temper for buried tubing and hard-drawn for above-ground application. Fittings shall be soldered or sweated on and shall be of wrought copper to ANSI B16.22. Soldered joints shall contain 95-percent tin and 5-percent antimony. No solders or fluxes containing more than 0.2 percent of lead shall be used.

#### 2.02 PVC (POLYVINYL CHLORIDE) PRESSURE PIPE, SOLVENT-WELDED

- A. PVC pipe shall be made from all new rigid unplasticized polyvinyl chloride and shall be Normal Impact Class 12454-B, Schedule 80 to conform to ASTM D 1785, unless otherwise shown. Schedule 40 PVC pipe shall be used for piping sleeves under pavement, as shown on the drawings. Elbows and tees shall be of the same material as the pipe. Unless otherwise shown, joint design shall be for solvent-welded construction.

#### 2.03 COMPRESSIONS COUPLINGS

- A. Compression couplings shall be provided for connections of the new service connection piping at the corporation stop, angle key meter valve branch assembly, pipe joints, and the service meter. The compression couplings shall be of similar material to the meter or pipe and shall be of the sizes to fit the pipe and fittings. The compression coupling shall have stainless steel clamp or set screws, pack joint nut with beveled gasket and a gap for adjustability. Compression couplings shall be Pack Joint Couplings as manufactured by Ford Meter Box Company or equal. Meter couplings shall be model C38-23-2.5 as manufactured by Ford Meter Box Company, or equal.

#### 2.04 PIPE THREADS

- A. All pipe threads shall be in accordance with ANSI/ASME B1.20.

## 2.05 POLYETHYLENE TUBING

- A. The polyethylene compound from which the tubing is made shall be an ethylene hexene copolymer and shall comply with the applicable requirements as specified in ASTM D3350 providing a cell classification of 355434C and simultaneously be as specified in ASTM D1248 for Type 111 Category 5, Grade P34, Class C,. PE3408 very high molecular weight, high density polyethylene plastic material.
- B. Polyethylene tubing shall have a working pressure at 200 PSI at 73.4 degrees F.
- C. All tubing furnished under these specifications shall conform to the following standards:
  - 1. AWWA C-901, ASTM D2239, ASTM D2737, ASTM D3350, ASTM D1248, ASTM F1248, ASTM D1693, ASTM D2837, and ASTM D3140.
- D. Tubing dimensions and tolerances shall conform to the following requirements:
  - 1. Polyethylene tubing surfaces shall be mirror smooth, and shall be free from bumps and irregularities. Materials must be completely homogenous and uniform in appearance.
- E. Tubing dimensions and tolerances shall correspond with the values listed in AWWA C901 with a dimension ratio (DR) of 9.
- F. Tubing shall be fully labeled at intervals of not more than 5 feet with brand name and manufacturer, the nominal size, PE 3408, the word "Tubing" and DR9, PC200, AWWA C901, and the seal, or mark, of the testing agency.

## 2.06 HIGH DENSITY POLYETHYLENE PIPE

- A. General: High density polyethylene pipe shall be used for sewer replacement by pipe bursting.
- B. The materials of the replacement pipe shall be PE 3408 High Density Polyethylene (HDPE) pipe and conform to requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) based on outside diameter, ASTM D1248, ASTM D3350 - Cell Classification PE 345434C. Sizes of the insertions to be used shall be such to increase to or renew as indicated on the Drawings. All pipe shall be made of virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults. The minimum wall thickness of the polyethylene pipe shall have SDR 17 for gravity sewer installation and SDR 11 for force main installation, or as directed otherwise by the ENGINEER.
- C. The replacement pipe shall be 1100 Series Driscopipe, SDR17 with 100 psi pressure rating for gravity sewer, and 1000 Series Driscopipe, SDR 11 with 160 psi pressure rating for force main, as manufactured by Philips 66, or equal.

- D. The inside diameter of the replacement pipe for gravity sewer shall be color coded and equivalent to the soft white Driscopipe Opticore pipe, or equal.

## PART 3 -- EXECUTION

### 3.01 INSTALLATION

- A. Couplings: Pipe couplings shall be installed in strict accordance with the manufacturer's printed recommendations, using the correct style coupling and gasket for any given application.
- B. Plastic Pipe: PVC pipe joints shall be solvent-welded in accordance with the manufacturer's instructions. Expansion joints or pipe bends shall be provided to absorb pipe expansion over a temperature range of 100 degrees F, unless otherwise shown. Care shall be taken to provide sufficient supports, anchors, and guides, to avoid stress on the piping. The Contractor shall obtain the services of the pipe supplier, to instruct the pipe fitters in the correct way of making solvent welded joints. Only clean, fresh solvent shall be used at any time.

- END OF SECTION -

## SECTION 15390 – PIPING SCHEDULE

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. Reference Section 15000, Piping.

#### 1.02 PIPING SYSTEM SCHEDULES

- A. Piping requirements for this Section are defined on the Drawings, and in the Piping System Schedule. In the absence of a specified test pressure, pipe shall be tested at a pressure 50 percent greater than the normal operating pressure as determined by the ENGINEER or 10 psig, whichever is greater unless the Schedule indicates that no test is required.
- B. Non-critical gravity lines such as drains, floor drains, roof drains, etc., do not typically require a pressure test.

#### PIPING SCHEDULE ABBREVIATIONS

- A. Material
  - 316 SS - 316 Stainless Steel (nonwelded joints) or 316L Stainless Steel – low carbon (welded joints)
  - BSP - Black Steel Pipe
  - CMP - Corrugated Metal Pipe
  - CSP - Carbon Steel Pipe
  - CU - Copper
  - DI - Ductile Iron
  - FRP - Fiberglass Reinforced Plastic Pipe
  - GSP - Galvanized Steel Pipe
  - HDPE - High Density Polyethylene
  - PVC - Polyvinylchloride
- B. Wall Thickness, Class or Schedule
  - CL - Class
  - DR - Diameter Ratio
  - Sch - Schedule
  - SDR - Standard Diameter Ratio
- C. Joint Type
  - BFW - Butt Fusion Weld
  - CJ - Compression Joint
  - Flg - Flanged
  - PO - Push on Joint
  - RJ - Restrained Joint
  - SW - Solvent Welded
  - Thd - Threaded
  - Wld - Welded



D. Fitting Type

316 SS	-	316 Stainless Steel (nonwelded joints) or 316L Stainless Steel – low carbon (welded joints)
BSP	-	Black Steel Pipe
CSP	-	Carbon Steel Pipe
CU	-	Copper
DI	-	Ductile Iron
GSP	-	Galvanized Steel Pipe
PVC	-	Polyvinylchloride
Stl	-	Carbon Steel
Mol	-	Molded HDPE

E. Interior Surface Protection

AC	-	Asphalt Coated
ACCL	-	Asphalt Coated Cement Lined
EL	-	Epoxy Lined
PL	-	Polyethylene Lined
GAL	-	Galvanized

F. Exterior Surface Protective Coating

AC	-	Asphalt Coated
P	-	Painted
GAL	-	Galvanized
PE		Polyethylene Encased

### 1.03 PIPING SCHEDULE

Service	Nominal Pipe Diameter (Inches)	Material	Thickness Class or Schedule	Working Pressure (PSIG)	Type of Joints	Type of Fittings	Protective Coating		Remarks
							Interior	Exterior	
AIR RELEASE VENT AIR / VACUUM VENT	All	GSP	Sch 40	100	Thd	GSP	Gal	Gal/P	
EFFLUENT BYPASS PIPE Above Ground	36 / 48	DI	CL 51	20	Flg	DI	EL	P	--

- 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 entitled "Submittals" and Section 01700 entitled "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 City as a condition precedent to the approval and acceptance of the system.
- D. All water mains shall be flushed to remove all sand, debris, rock and other foreign matter. Dispose of the flushing water without causing a nuisance or property damage.

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### PIPELINE TESTING AND DISINFECTION

#### **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.
- 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

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### PIPELINE TESTING AND DISINFECTION

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

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### PIPELINE TESTING AND DISINFECTION

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.

#### 3.05 BACTERIOLOGICAL ANALYSES

- A. Sample points for the purpose of collecting water samples for bacteriological analysis shall be provided by the contractor as indicated on the plans and as directed by the Health Department at no additional cost to the Contract.

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### PIPELINE TESTING AND DISINFECTION

Sampling points may be temporary and consist of a corporation tap, 1-inch copper tubing and 1-inch gate valve specifically provided for sample collection. Temporary sampling points may not be removed until the sample results are approved by the Health Department. Sampling points may be permanent, such as a terminal blow-off, fire hydrant, etc.

- B. The Contractor shall be responsible for retaining the services of a testing laboratory certified by State of Florida, and approved by the BCHD in the collection, storage and analysis of water samples from public water systems in accordance with Chapter 62-550.550 (FAC), "Certified Laboratories and Analytical Methods for Public Water Systems".
- C. Bacteriological samples shall be collected from all sampling points shown on the plans, or as directed by the Health Department, and tested against the drinking water standards from Chapter 62-550.310 (FAC), "Primary Drinking Water Standards: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels". Samples shall be tested using methods from AWWA M12, "Simplified Procedures for Water Examination".
- D. Samples shall be collected and tested on each of two successive days. The disinfection process shall be repeated if any individual test results reflect presence of harmful bacteria in the water.
- E. The Contractor shall be responsible for any re-chlorination and re-testing that may be required until the BCHD'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.
- F. No public water mains shall be placed into service until the results of the drinking water analyses are approved by the BCHD, and until they issue a letter releasing the main for service.
- G. Submittals
  - 1. Submit name of testing laboratory and evidence of certification with the State and County Health Departments.
  - 2. Submit three copies of reports.
- H. Project Record Documents
  - 1. Submit reports under provisions of Sections entitled "Submittals" and "Project Closeout".
  - 2. Bacteriological report; accurately record:



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### PIPELINE TESTING AND DISINFECTION

- (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 -

*DIVISION 3 -CONCRETE*

## SECTION 03305 - CONCRETE AND GROUT

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, all in accordance with the requirements of the Contract Documents
- B. The following types of concrete shall be covered in this Section:
  - 1. Structural Concrete: Concrete to be used in all cases except where noted otherwise in the Contract Documents.
  - 2. Sitework Concrete: Concrete to be used for curbs, gutters, catch basins, sidewalks, fence and guard post embedment, underground duct bank encasement and all other concrete appurtenant to electrical facilities unless otherwise shown or noted on the Drawings.
- C. The following types of grout are covered in this Section:
  - 1. Non-Shrink Grout: This type of grout shall be used wherever grout or cementitious grout is called for in the Contract Documents, unless another type is specifically referenced.
  - 2. Epoxy Grout: This type of grout shall be used whenever epoxy grout is called for.

#### 1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Codes: Without limiting the generality of other requirements of these specifications, all work specified herein shall conform to or exceed the requirements of the South Florida Building Code and the applicable requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of this Section.
- B. Commercial Standards:

ACI 301	Specifications for Structural Concrete for Buildings.
ACI 315	Manual of Standard Practice for Detailing Reinforced Concrete Structures.
ACI 318	Building Code Requirements of Reinforced Concrete.
ACI 347	Recommended Practice for Concrete Formwork.
ASTM A 185	Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.

ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
ASTM C 31	Test Methods for Making and Curing Concrete Test Specimens in the Field.
ASTM C 33	Specification for Concrete Aggregates.
ASTM C 39	Test Method for Compressive Strength of Cylindrical Concrete Specimens.
ASTM C 94	Specification for Ready-Mixed Concrete.
ASTM C 143	Test Method for Slump of Portland Cement Concrete.
ASTM C 150	Specification for Portland Cement.
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete.
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
ASTM C 494	Specification for Chemical Admixtures for Concrete.
ASTM C 579	Test Methods for Compressive Strength of Chemical Resistant Mortars and Monolithic Surfacing.
ASTM C 827	Test Method for Early Volume Change of Cementitious Mixtures.
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
CRD C 621	
CRSI	Manual of Standard Practice.

### 1.03 SUBMITTALS

- A. General: The CONTRACTOR shall submit shop drawings and other information to the OWNER for review in accordance with Section 01300 - Submittals.
- B. Mix Designs: The CONTRACTOR shall submit shop drawings for review for proposed concrete mix designs which shall show the proportions and gradations of all materials proposed for each class and type of concrete specified herein. The mix design shall be checked by an independent testing laboratory acceptable to the OWNER. All costs related to such checking shall be borne by the CONTRACTOR.

- C. Grout: The CONTRACTOR shall submit shop drawings for all types of grout for use in this Project.
- D. Accessories: The CONTRACTOR shall submit shop drawings for all types of concrete accessories to be used for this project including, but not limited to, form ties, water stops, joint materials and curing agents.
- E. Delivery Tickets: Where ready-mix concrete is used, the CONTRACTOR shall submit delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the State certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.
- F. Reinforcing Steel: The CONTRACTOR shall submit shop drawings of shop bending diagrams, placing lists, and Drawings of all reinforcing steel prior to fabrication.

#### 1.04 QUALITY ASSURANCE

- A. Tests on component materials and for compressive strength of concrete will be performed as specified herein. Test for determining slump will be in accordance with the requirements of ASTM C 143.
- B. The cost of all laboratory tests on cement, aggregates, and concrete, will be borne by the OWNER. However, the CONTRACTOR shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications.
- C. Concrete for testing shall be supplied by the CONTRACTOR at no cost to the OWNER, and the CONTRACTOR shall provide assistance to the OWNER in obtaining samples. The CONTRACTOR shall dispose of and clean up all excess material.
- D. Field Compression Tests: Compression test specimens shall be taken during construction from the first placement of each class of concrete specified herein and at intervals thereafter as selected by the OWNER to ensure continued compliance with these specifications. At least one set of test specimens shall be made for each 50 yards of concrete placed. Each set of test specimens shall be a minimum of 4 cylinders.
- E. Compression test specimens for concrete shall be made in accordance with ASTM C31. Specimens shall be 6-inch diameter by 12-inch high cylinders.
- F. Compression tests shall be performed in accordance with ASTM C 39. One test cylinder will be tested at 7 days and 2 at 28 days. The remaining cylinder will be held to verify test results, if needed.
- G. Evaluation and Acceptance of Concrete: Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 318, Chapter 5,

"Concrete Quality", and as specified herein. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for all subsequent batches of the type of concrete affected. All concrete which fails to meet the ACI requirements and these Specifications, is subject to removal and replacement at the cost of the CONTRACTOR.

- H. Construction Tolerances: The CONTRACTOR shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the Specifications, permissible deviations will be in accordance with ACI 347.

## PART 2 -- PRODUCTS

### 2.01 FORMWORK

- A. Form Materials: Except as otherwise expressly accepted by the OWNER, all lumber for use as forms, shoring, or bracing shall be new material. Materials for concrete forms shall conform to the following requirements:
1. Form materials shall be metal, wood, plywood, or other acceptable material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade shown.
  2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS 1 for Concrete Forms, Class 1, and shall be edge sealed. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Exterior Grade.
- B. Unless otherwise shown, exterior corners in concrete members shall be provided with 3/4-inch chamfers or tooled to a 1/2-inch radius. Re-entrant corners in concrete members shall not have fillets unless otherwise shown.
- C. Form Ties: Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to ensure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1 1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming. Form Ties shall be Burke Penta-Tie System by The Burke Company, or equal.

### 2.02 CONCRETE MATERIALS

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.

- B. All materials furnished for the work shall comply with the requirements of ACI 301, as applicable.
- C. Storage of materials shall conform to the requirements of ACI 301.
- D. Materials for concrete shall conform to the following requirements:
  - 1. Cement shall be standard brand Portland cement conforming to ASTM C 150 Type II.
  - 2. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities.
  - 3. Aggregates shall be obtained from pits acceptable to the OWNER, shall be non-reactive, and shall conform to the SFBC and ASTM C 33. Maximum size of coarse aggregate shall be as specified herein.
  - 4. Ready-mix concrete shall conform to the requirements of ASTM C 94.
  - 5. Air-entraining Admixture meeting the requirements of ASTM C 260 shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 5 percent. The OWNER reserves the right, at any time, to sample and test the air-entraining agent received on the job by the CONTRACTOR. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.
  - 6. Water reducing and retarding admixtures shall be added to control the set, effect water reduction. The addition of the admixture shall be separate from the air entraining admixture and as recommended by the manufacturer. The admixture shall be completely compatible with and be manufactured by the same manufacturer as the air entraining admixture. The addition of the admixture shall be completed within one minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Water reducing and set retarding admixtures shall be in conformance with ASTM C 494, Type D.

## 2.03 CURING MATERIALS

- A. Materials for curing concrete conform to ASTM C 309 and shall be Burke Spartan, Cote Cure-Seal Hardener (with red fugitive dye) as manufactured by the Burke Company, MB 429 as manufactured by Master Builders, or equal. The curing compound shall contain a fugitive dye so that areas of application will be readily distinguishable.
- B. Polyethylene sheet for use as a concrete curing blanket shall be white and have a nominal thickness of 6 mils.

## 2.04 JOINT MATERIALS

- A. Materials for joints in concrete above grade nonhydraulic structures shall conform to the following requirements:
1. Preformed joint filler shall be a non-extruding, resilient, bituminous type conforming to the requirements of ASTM D 1751.
  2. Elastomeric joint sealer shall be a single component, pour grade, polyurethane sealant meeting FS TT-S-230A, Type 1. Materials shall attain Shore A Hardness of 40-45.
  3. Mastic joint sealer shall be a material that does not contain evaporating solvents; that will tenaciously adhere to concrete surfaces; that will remain permanently resilient and pliable; that will not be affected by continuous presence of water and will not in any way contaminate potable water; and that will effectively seal the joints against moisture inflation even when the joints are subject to movement due to expansion and contraction. The sealer shall be composed of special asphalts or similar materials blended with lubricating and plasticizing agents to form a tough, durable master substance containing no volatile oils or lubricants and shall be capable of meeting the test requirements set forth hereinafter, if testing is required by the OWNER.

## 2.05 REINFORCING STEEL

- A. General: All reinforcing steel for all reinforced concrete construction shall conform to the following requirements:
1. Bar reinforcement shall conform to the requirements of ASTM A 615 for Grade 60 Billet Steel Reinforcement with supplementary requirement S-1, and shall be manufactured in the United States.
  2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A185. All welded wire fabric reinforcement shall be galvanized.
- B. Accessories: Accessories shall include all necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. Slab bolsters shall have gray plastic-coated legs.
- C. Concrete blocks (dobies), used to support and position reinforcement steel, shall have the same or higher compressive strength as specified for the concrete in which it is located. Where the concrete blocks are used on concrete surfaces exposed to view, the color and texture of the concrete blocks shall match that required for the finished surface. Wire ties shall be embedded in concrete block bar supports.

## 2.06 CONCRETE DESIGN REQUIREMENTS

- A. General: Concrete shall be composed of cement, admixtures, aggregates and water. These materials shall be of the quantities specified. In general, the mix shall be designed to



produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the OWNER. All changes shall be subject to review by the OWNER.

- B. The CONTRACTOR is cautioned that the limiting parameters specified below are not design mixes. Additional cement or water reducing agent may be required to achieve workability demanded by the CONTRACTOR's construction methods. The CONTRACTOR is responsible for any costs associated with furnishing concrete with the required workability.
- C. Water-Cement Ratio and Compressive Strength: The minimum compressive strength and cement content shall be not less than specified as follows:

<u>Type of work</u>	<u>Min. 28-Day Compressive Strength (psi)</u>	<u>Max. Size Aggregate (in.)</u>	<u>Min. Cement per cu yd (sacks)</u>	<u>Max. W/C Ratio (by wt.)</u>
<u>Structural Concrete:</u>				
All reinforced concrete unless noted otherwise below.	4,000 (Class A)	1	6	0.45
<u>Sitework Concrete:</u>				
Concrete fill, pavement, curbs and sidewalks.	3,000 (Class B)	1	5.5	0.5

Note: One sack of cement equals 94 lbs.

- D. Consistency: The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. The slumps shall be as follows:

<u>Application</u>	<u>Slump</u>	<u>Variation</u>
Footings and Slabs	3"	± 1/2" to -1"
Mortar or grout for construction joints	8"	± 1 1/2"
All Other Applications	3"	± 1"

## 2.07 READY-MIXED CONCRETE

- A. Ready-mixed concrete shall conform to meeting the requirements as to materials, batching, mixing, transporting, and placing as specified herein and in accordance with ASTM C 94.

- B. Ready-mixed concrete shall be delivered to the site of the work, and discharge shall be completed within one and one half hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever is first. In hot weather, or under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 60 minutes.

## 2.08 NONSHRINK GROUT

- A. Non-shrink grout shall be a prepackaged, inorganic, non-gas liberating, nonmetallic, cement-based grout requiring only the addition of water. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout specified herein shall be that recommended by the manufacturer for the particular application.
- B. Non-shrink grouts shall have a minimum 28 day compressive strength of 5,000 psi and shall meet the requirements of CRD C 621.

## 2.09 EPOXY GROUT

- A. Epoxy grout shall be a pourable, non-shrink, 100 percent solids system. The epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all pre-measured and pre-packaged. The resin component shall not contain any non-reactive diluents. Resins contained butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the manufacturer. Manufacturer's instructions shall be printed on each container in which the materials are packaged.
- B. The chemical formulation of the epoxy grout shall be that recommended by the manufacturer for the particular application.
- C. The mixed epoxy grout system shall have a minimum working life of 45 minutes at 75 degrees F.
- D. The epoxy grout shall develop a compressive strength of 5000 psi in 24 hours and 10,000 psi in seven days when tested in accordance with ASTM C 579, Method B. There shall be no shrinkage (0.0 percent) and a maximum 4.0 percent expansion when tested in accordance with ASTM C 827.

## 2.10 BONDING COMPOUND

- A. For bonding freshly-mixed, plastic concrete to hardened concrete, Sikadur 32 Hi-Mod Epoxy Adhesive, as manufactured by Sika Corporation; Concrese Liquid (LPL), as manufactured by Master Builders; BurkEpoxy MV as manufactured by The Burk Company; or approved equal shall be used.

## PART 3 -- EXECUTION

### 3.01 GENERAL FORMWORK REQUIREMENTS

- A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The CONTRACTOR shall assume full responsibility for the adequate design of all forms, and any forms which are unsafe or inadequate in any respect shall promptly be removed and replaced at the CONTRACTOR's expense. All design, construction, maintenance, preparation, and removal of forms shall be in accordance with the SFBC, ACI 347 and the requirements specified herein.
- B. All forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete.

### 3.02 FORMWORK CONSTRUCTION

- A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is called for by the OWNER.
- B. Construction Joints: Concrete construction joints will not be permitted at locations other than those shown or specified, except as may be acceptable to the OWNER. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete.
- C. Form Ties: Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spilling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1 inch back from the formed face or faces of the concrete.

### 3.03 REUSE OF FORMS

- A. Forms may be reused only if in good condition and only if acceptable to the OWNER. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on all exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view.

### 3.04 REMOVAL OF FORMS

- A. Careful procedures for the removal of forms shall be strictly followed, and this work shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. Members which must support their own weight shall not have their forms

removed until they have attained at least 75 percent of the 28-day strength of the concrete as specified herein. Forms for all vertical walls and columns shall remain in place at least 2 days after the concrete has been placed. Forms for all parts of the Work not specifically mentioned herein shall remain in place for periods of time as determined by the OWNER.

### 3.05 FABRICATION OF REINFORCING STEEL

- A. Reinforcing steel shall be accurately formed to the dimensions and shapes shown on the Drawings, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 318, except as modified by the Drawings.
- B. Bending or Straightening: Reinforcement shall not be straightened or rebent in a manner which will injure the material. Bars with kinks or bends not shown shall not be used. All bars shall be bent cold, unless otherwise permitted by the OWNER. No bars partially embedded in concrete shall be field-bent except as shown or specifically permitted by the OWNER.

### 3.06 PLACING REINFORCING STEEL

- A. Reinforcing steel shall be accurately positioned as shown on the Drawings, and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. All reinforcing steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers which are strong and rigid enough to prevent any displacement of the reinforcing steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used, in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. All concrete blocks used to support reinforcing steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the CONTRACTOR shall furnish concrete, metal, plastic, or other acceptable bar chairs and spacers.
- B. The portions of all accessories in contact with the formwork shall be made of concrete, plastic, or steel coated with a 1/8 inch minimum thickness of plastic which extends at least 1/2 inch from the concrete surface. Plastic shall be gray in color.
- C. Tie wires shall be bent away from the forms in order to provide the specified concrete coverage.
- D. Bars additional to those shown which may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR at its own expense.
- E. Reinforcement placing tolerances shall be within the limits specified in ACI 318, unless otherwise directed by the OWNER.
- F. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters having gray, plastic-coated standard type legs as specified herein. Slab bolsters shall be spaced not less than 30 inches on centers, shall extend continuously across the entire width of the reinforcing mat, and shall support the reinforcing mat in the plane shown.

- G. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than 3 feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

### 3.07 SPLICING

- A. Reinforcement bar splices shall only be used at locations shown. When it is necessary to splice reinforcement at points other than where shown, the character of the splice shall be as acceptable to the OWNER.
- B. Lap length for reinforcement bars shall be in a Class C Splice in accordance with ACI 318, unless otherwise shown. Laps of welded wire fabric shall be in accordance with the ACI 318.

### 3.08 CLEANING AND PROTECTION OF REINFORCING STEEL

- A. Reinforcing steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.
- B. The surfaces of all reinforcing steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is a delay in depositing concrete, reinforcing shall be reinspected and, if necessary, recleaned.

### 3.09 PREPARATION OF SURFACES FOR CONCRETING

- A. General: No concrete shall be placed until the reinforcement steel and formwork have been erected in a manner acceptable to the OWNER. The CONTRACTOR shall notify the OWNER not less than two working days prior to concrete placement, allowing for inspection and any corrective measures which are required. Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, as determined by the OWNER, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by sandblasting, followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.
- C. Existing concrete surfaces upon or against which concrete is to be placed shall be given a roughened surface for good bond. Joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be accomplished by

hydroblasting. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

- D. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent work, provided that construction joints shall be made only where acceptable to the OWNER.
- E. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the OWNER at least 4 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
- F. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown on the Drawings or by shop drawings and shall be acceptable to the OWNER before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.
- G. Casting Against Old Concrete: Where concrete is to be cast against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydro-blasting (exposing aggregate) prior to the application of an epoxy bonding agent. Application shall be according to the bonding agent manufacturer's instructions and recommendations.
- H. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited under water nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the OWNER.
- I. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.
- J. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2 inches clearance between said items, and any part of the concrete reinforcement will not be permitted.
- K. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

### 3.10 MIXING, HANDLING, TRANSPORTING, AND PLACING

- A. General: Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section.
- B. Mixing: Mixing of concrete shall conform to the requirements of Chapter 7 of ACI 301.
- C. Retempering: Retempering of concrete or mortar which has partially hardened will not be permitted.
- D. Non-Conforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the Work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the CONTRACTOR.
- E. Unauthorized Placement: No concrete shall be placed except in the presence of duly authorized representative of the OWNER. The CONTRACTOR shall notify the OWNER in writing at least 24 hours in advance of placement of any concrete.
- F. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screened in an up-slope direction.
- G. Placement in Wall Forms: Concrete shall not be dropped through reinforcement steel or into any deep form, whether reinforcement is present or not, causing separation of the coarse aggregate from the mortar on account of repeatedly hitting rods or the sides of the form as it falls, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4 feet below the ends of ducts, chutes, or buggies. Concrete shall be uniformly distributed during the process of depositing, and in no case after depositing shall any portion be displaced in the forms more than 6 feet in horizontal direction. Concrete in forms shall be deposited in uniform horizontal layers not deeper than 2 feet; and care shall be taken to avoid inclined layers or inclined construction joints where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in forms shall not exceed 5 feet of vertical rise per hour.
- H. The surface of the concrete -shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4 inch thick shall be tacked to the forms on these surfaces. The concrete shall be carded about 1/2 inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and all laitance shall be removed.



- I. Conveyor Belts and Chutes: All end of chutes, hopper gates and all other points of concrete discharge throughout the CONTRACTOR's conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the OWNER. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be provided in the interior of all forms so that the concrete, at the places of deposit, is visible from the deck or runway.
- J. Temperature of Concrete: The temperature of concrete, when it is being placed, shall not be more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in whether during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessarily to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The CONTRACTOR shall be entitled to no additional compensation on account of the foregoing requirements.

### 3.11 PUMPING OF CONCRETE

- A. If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- B. The minimum diameter of the hose (conduits) shall be 4 inches.
- C. Minimum compressive strength, cement content, and maximum size of aggregates shall be as specified herein. Gradation of coarse aggregates shall conform to ASTM C 33 and shall be as close to the middle range as possible. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand shall not be over 3.00.

### 3.12 TAMPING AND VIBRATING

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8,000 or 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
- B. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely

fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified with 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

### 3.13 FINISHING CONCRETE SURFACES

- A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions shown on the Drawings are defined as tolerances and are specified herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.
- B. Formed Surfaces: No treatment is required after form removal except for curing, repair of defective concrete, and treatment of surface defects. Where architectural finish is required, it shall be as specified or as shown on the Drawings.
- C. Unformed Surfaces: After proper and adequate vibration and tamping, all unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. The classes of finish specified for unformed concrete surfaces are designated as follows:
  - 1. Finish U1: Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8 inch. No further special finish is required.
  - 2. Finish U2: After sufficient stiffening of the screened concrete, surfaces shall be float finished with wood or metal floats or with a finished machine using flat blades. Excessive floating of surfaces while the concrete surface to absorb excess moisture will not be permitted. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Surface irregularities shall not exceed 1/4 inch. Joints and edges shall be tooled where shown on the Drawings or as determined by the OWNER.
  - 3. Finish U3: After the floated surface (as specified for Finish U2) has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples and trowel marks. The finish shall be smooth and free of all irregularities.
  - 4. Finish U4: Steel trowel finish (as specified for Finish U3) without local depressions or high points. In addition, the surface shall be given a light hairbroom finish with brooming perpendicular to drainage unless otherwise shown. The resulting surface shall be rough enough to provide a nonskid finish.

- D. Uniformed surfaces shall be finished according to the following schedule:

UNFORMED SURFACE FINISH SCHEDULE

<u>Area</u>	<u>Finish</u>
Grade slabs and foundations to be covered with concrete or fill material	U1
Floors to be covered with topping grout	U2
Slabs to be covered with built-up roofing	U2
Slabs	U4

3.14 CURING AND DAMPPROOFING

- A. All concrete shall be cured for not less than 14 days after placing, in accordance with the methods specified herein for the different parts of the work, and described in detail in the following paragraphs.

FINISH SCHEDULE

<u>Surface to be Cured or Dampproofed</u>	<u>Method</u>
Unstripped forms	1
Construction joints between footings and walls, and between floor slab and columns	2
Encasement concrete and thrust blocks	3
All concrete surfaces not specifically provided for elsewhere in this Paragraph	4

- B. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removed. If steel forms are used, the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 14 days of placing the concrete, curing shall be continued in accordance with Method 4.
- C. Method 2: The surface shall be covered With burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.
- D. Method 3: The surface shall be covered with moist earth not less than 4 hours, nor more than 24 hours, after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.

- E. Method 4: The surface shall be sprayed with a liquid curing compound. It shall be applied in accordance with the manufacturers printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film which will seal thoroughly.
- F. Care shall be exercised to avoid damage to the seal during the curing period. Should the seal be damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.
- G. Wherever curing compound may have been applied by mistake to faces against which concrete subsequently is to be placed and to which it is to adhere, said compound shall be entirely removed by hydroblasting just prior to the placing of new concrete.
- H. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on uniformed surfaces, and within 2 hours after removal of forms from contact with formed surfaces. Repairs required to be made to formed surfaces shall be made within the said 2-hour period; provided, however, that any such repairs which cannot be made within the said 2-hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound, following which repairs shall be made as provided herein.

### 3.15 PROTECTION

- A. The CONTRACTOR shall protect all concrete against injury until final acceptance by the OWNER. Fresh concrete shall be protected from damage due to rain. The CONTRACTOR shall provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

### 3.16 TREATMENT OF SURFACE DEFECTS

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the OWNER. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. All repairs and replacements herein specified shall be promptly executed by the CONTRACTOR at its own expense.
- B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2 inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32 inch depth of the surface film from all hard portions, by means of an efficient sandblast. After cutting and

sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces under repair will remain moist, but not so wet as to overcome the suction upon which a good bond depends. The material used for repair proposed shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white Portland cement as is required to make the color of the patch match the color of the surrounding concrete.

- C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed, but shall be repaired in an approved manner with dry-packed cement grout.
- D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of this Section, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

### 3.17 CARE AND REPAIR OF CONCRETE

- A. The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the OWNER. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at anytime prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with the acceptable concrete at the CONTRACTOR's expense.

### 3.18 GROUT INSTALLATION

- A. All surface preparation, curing, and protection of cement grout shall be as specified herein. The finish of the grout surface shall match that of the adjacent concrete.
- B. The CONTRACTOR through the manufacturer of nonshrink grout and epoxy grout shall provide on-site technical assistance upon request, at no additional cost to the OWNER.
- C. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- D. Grout shall be placed in such a manner, for the consistency necessary for each application, so as to assure that the space to be grouted is completely filled.

- END OF SECTION -

*DIVISION 9 - PAINTING*

## 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 01610 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 topcoated, 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:

## SECTION 09940 - PAINTING

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 Dry 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.



## SECTION 09940 - PAINTING

### 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 -

*DIVISION 15 - MECHANICAL*

## SECTION 15000 - PIPING, GENERAL

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install all piping systems shown and specified, in accordance with the requirements of the Contract Documents. Each system shall be complete with all necessary fittings, supports, anchors, expansion joints, flexible connectors, valves, accessories, lining and coating, testing, excavation, backfill and encasement, to provide a functional installation.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Excavation and backfill for utilities.
- B. Pipeline testing and disinfection.

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

##### A. Commercial Standards:

ANSI/ASME B1.20.1	Pipe Threads, General Purpose (inch).
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 125.
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys.
ANSI/AWWA L115/A21.15	Flanged Ductile Iron Pipe with Threaded Flanges. Steel Pipe Flanges for Water Works Service, Sizes 4 in. through 144 in.
ANSI/AWS D1.1	Structural Welding Code.
ASTM A 307	Specification for Carbon Steel Externally Threaded Standard Fasteners.
ASTM D 2000	Classification System for Rubber Products in Automotive Applications.

#### 1.04 SUBMITTALS

- A. The CONTRACTOR shall submit complete shop drawings and certificates, test reports, affidavits of compliance, of all piping systems, in accordance with the requirements in Section 01300, "Submittals", and as specified in the individual piping sections.

- B. Each shop drawing submittal shall be complete in all aspects, incorporating all information and data listed herein and all additional information required to evaluate the proposed piping material's compliance with the Contract Documents. Partial or incomplete submissions will be returned to the CONTRACTOR without review.
- C. Data to be submitted shall include, but not be limited to:
  - 1. Catalog Data consisting of specifications, service, pipe size, working pressure, wall thickness, lining, coating, illustrations and a parts schedule that identifies the materials to be used for the various piping components and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.
  - 2. Weight of all component parts.
  - 3. Design calculations where specified.
- D. Certifications: Prior to installation, the CONTRACTOR shall furnish an Affidavit of Compliance certified by the pipe manufacturer that the pipe, fittings and specials furnished under this Contract comply with all applicable provisions of AWWA and these specifications. No pipe or fittings will be accepted for use in the Work on this project until the affidavits have been submitted and accepted in accordance with Section 01300, "Submittals".
- E. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

#### 1.05 QUALITY ASSURANCE

- A. General: All pipe shall be subject to review at the place of manufacture. During the manufacture of the pipe, the OWNER shall be given access to all areas where manufacturing is in progress, and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.
- B. Tests: Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards.
- C. Welding Requirements: All welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or spiral welds for pipe cylinders, spigot and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections.

#### 1.06 MANUFACTURER'S SERVICE REPRESENTATIVE

- A. Where the assistance of a manufacturer's service representative is advisable, in order to obtain correct pipe joints, supports, or special connections, the CONTRACTOR shall furnish such assistance at no additional cost to the Owner.

## 1.07 SHIPPING, HANDLING AND STORAGE

- A. Special care in handling shall be exercised during delivery, distribution and storage of pipe to avoid damage and setting up stresses. Damaged pipe will be rejected and shall be replaced at the CONTRACTOR's expense. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.
- B. No pipe shall be dropped from cars or trucks to the ground. All pipe shall be carefully lowered to the ground by mechanical means. In shipping, pipe and fittings shall be blocked in such manner as to prevent damage to castings or lining. Any broken or chipped lining shall be carefully patched. Where it is impossible to repair broken or damaged lining in pipe because of its size, the pipe shall be rejected as unfit for use.
- C. All mechanical joint pipe shall be laid with 1/8-inch space between the spigot and shoulder of pocket.

## 1.08 CLEANUP

- A. After completion of the work, all remaining pipe cuttings, joining and wrapping materials, and other scattered debris, shall be removed from the site. The entire piping system shall be handed over in a clean and functional condition.

## PART 2 -- PRODUCTS

### 2.01 GENERAL

- A. All pipes, fittings, and appurtenances shall be installed in accordance with the requirements of the applicable Sections of Division 2 and furnished as specified herein.
- B. Pressure Rating: All piping systems shall be designed for the maximum expected pressure as defined in Section 15995, "Pipeline Testing and Disinfection", or as shown in the individual piping sections of the Specifications.

### 2.02 PIPE FLANGES

- A. Flanges: Where the design pressure is 125 psi or less, flanges shall conform to either ANSI/AWWA C115/A21.15 Class D or ANSI B16.1 125-lb class. Where the design pressure is greater than 150 psi, up to a maximum of 250 psi, flanges shall conform to either ANSI/AWWA C115/21.15 or ANSI B16.1 250-lb class. Flanges shall have flat faces and shall be attached with bolt holes straddling the vertical axis of the pipe, unless otherwise shown. Attachment of the flanges to the pipe shall conform to the applicable requirements of ANSI/AWWA 115/21.15. Flanges for miscellaneous small pipes shall be in accordance with the standards specified for these pipes.

- B. Flange Coating: All machined faces of metal blind flanges and pipe flanges shall be coated with a temporary rust-inhibitive coating to protect the metal until the installation is completed.
- C. Flange Bolts: If studs are required, they shall be in accordance with ASTM A 307, Grade B, with heavy hex nuts. Machine bolts shall normally be used on all flanged connections and shall be in accordance with ASTM A 307, Grade A, with hex nuts. If studs are required, they shall extend through the nuts a minimum of 1/4-inch. All bolts and nuts shall conform to Section 05500, "Miscellaneous Metalwork".
- D. Flange Gaskets: Gaskets for flanged joints shall be of materials as specified in piping sections. Blind flanges shall have gaskets covering the entire inside face of the blind flange and shall be cemented to the blind flange. Ring gaskets shall not be permitted.

## 2.03 SLEEVE-TYPE COUPLINGS

- A. Construction: Sleeve-type couplings shall be provided where shown, and shall be of similar material as the pipe, without pipe stop, and shall be of sizes to fit the pipe and fittings shown. The middle ring shall be not less than 1/4 inch in thickness and shall be either 5 or 7 inches long for standard steel couplings, and 16 inches long for long-sleeve couplings. The followers shall be single-piece contoured mill section welded and cold-expanded as required for the middle rings. They shall be of sufficient strength to accommodate the number of bolts necessary to obtain adequate gasket pressures without excessive rolling. The shape of the follower shall be of such design as to provide positive confinement of the gasket.
- B. Pipe Preparation: The ends of the pipe, where specified or shown, shall be prepared for sleeve-type couplings. Plain ends for use with couplings shall be smooth and round for a distance of 12 inches from the ends of the pipe, with outside diameter not more than 1/64 inch smaller than the nominal outside diameter of the pipe. The middle ring shall be tested by cold-expanding a minimum of one percent beyond the yield point, to proof-test the weld to the strength of the parent metal. The weld of the middle ring shall be subjected to an air test for porosity.
- C. Gaskets: Gaskets for sleeve-type couplings shall be rubber-compound material that will not deteriorate from age or exposure to air under normal storage or use conditions. The rubber in the gasket shall meet the following specifications:
  - 1. Color - Jet Black.
  - 2. Surface - Nonblooming.
  - 3. Durometer Hardness -  $74 \pm 5$ .
  - 4. Tensile Strength - 1000 psi Minimum.
  - 5. Elongation - 175 percent Minimum.

- D. The gaskets shall be immune to attack by the material which is being transported. All gaskets shall meet the requirements of ASTM D 2000, AA709Z, meeting Suffix B13 Grade 3, except as noted above.
- E. Insulating Couplings: Where insulating couplings are required, both ends of the coupling shall have a wedge-shaped gasket which assembles over a rubber sleeve of an insulating compound in order to obtain insulation of all coupling metal parts from the pipe.
- F. Restrained Joints: Where harnesses are required for sleeve-type couplings, they shall be in accordance with the requirements of the appropriate reference standard, or as shown.
- G. Supplier, or equal:
  - 1. Rockwell (Smith-Blair), Style 411
  - 2. Dresser, Style 38
  - 3. Ford Meter Box Co., Inc., Style FC1 or FC3

## 2.04 PIPE THREADS

- A. All pipe threads shall be in accordance with ANSI/ASME B1.20.

## PART 3 -- EXECUTION

### 3.01 GENERAL

- A. The CONTRACTOR shall furnish all labor, tools, materials, and equipment necessary for installation and jointing of the pipe. All piping shall be installed in accordance with the Drawings in a neat workmanlike manner and shall be set for accurate line and elevation. All piping shall be thoroughly cleaned before installation, and care shall be taken to keep the piping clean throughout the installation.
- B. Piping shall be attached to valves, etc., in accordance with the respective manufacturers' recommendations.

### 3.02 LAYING PIPE

- A. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and shall, in general, agree with manufacturer's recommendations. At the time of laying, the pipe shall be examined carefully for defects, and should any pipe be discovered to be defective after being laid, it shall be removed and replaced with sound pipe by the CONTRACTOR at his expense.
- B. The CONTRACTOR shall perform all earthwork including excavation, backfill, bedding, compaction, sheeting, shoring and bracing, dewatering and grading in accordance with Division 2 "Sitework."

- C. Upon satisfactory excavation of the pipe trench and completion of the pipe bedding, a continuous trough for the pipe barrel and recesses for the pipe bells, or couplings, shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure shall be exerted on the pipe joints from the trench bottom.
- D. Pipe shall be installed in accordance with the manufacturer's recommendation. Before being lowered into the trench, the pipes and accessories shall be carefully examined and the interior of the pipes shall be thoroughly cleaned of all foreign matter. At the close of each work day and 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.
- E. Lines shall be laid straight and depth of cover shall be maintained uniform with respect to finish grade, whether grading is completed or proposed at time of pipe installation. Where a grade or slope is shown on the Drawings, the CONTRACTOR shall use laser based surveying instruments to maintain alignment and grade. At least one elevation shot shall be taken on each length of pipe and recorded. No abrupt changes in direction or grade will be allowed.
- F. After pipe has been laid, reviewed, and found satisfactory, sufficient backfill shall be placed along the pipe barrel to hold the pipe securely in place during the conduction of the hydrostatic test. No backfill shall be placed over the joints until the hydrostatic test is satisfactorily completed, leaving it exposed to view for the detection of visible leaks. Upon satisfactory completion of the hydrostatic test, backfilling of the trench shall be completed.
- G. All underground piping shall be properly restrained at all fittings where the pipeline changes direction, changes size, or ends, using restrained joint pipe.

### 3.03 FLANGED JOINTS

- A. Flanged joints shall be made up with full face gaskets as specified in the piping paragraphs. Flange faces shall have a uniform bearing on the gaskets. Flanges shall be drawn together uniformly until the joint is tight. No washers shall be permitted for the bolt and nut assemblies. The length of the bolts shall be uniform and in accordance with the standards specified herein. The bolt's maximum projection beyond the end of the nut shall be 0.25 inch nor shall the bolt fall short of the end of the nut.

### 3.04 THREADED JOINTS

- A. All threads shall be clean, machine cut and all pipe shall be reamed before erection. Taps and dies shall be cleaned, sharpened and in good condition. All threaded joints shall be made tight with teflon tape.
- B. After having been set up, a joint shall not be backed off unless the joint is broken, the threads cleaned and new tape is applied.



### 3.05 THRUST RESTRAINT

- A. Restrained joints shall be located at valves, changes in direction of piping, and major branch connections.
- B. On all piping, where sleeve type couplings and flanged adapters are located near fittings or valves, tie rods shall span across the coupling as specified herein to restrain movements of the pipe along its axial direction. Such restraints can be deleted if both ends of the pipe are anchored in a concrete structure with no fitting or valve occurring within the span length, in the suction piping to a pump where the coupling is between the pump and valve, or when the water pressure measured at the crown of the pipe is less than five feet.
- C. All sleeve type couplings shall be harnessed except where noted specifically on the Drawings. The harnessing shall be as shown on the Drawings or as specified herein.
- D. All buried tie rods and associated hardware shall be 316 stainless steel.
- E. In general, all valves and fittings shall be restrained in an acceptable manner such that the unbalanced force developed at them shall be supported independent of the piping system.

### 3.06 TESTING

- A. Field testing of pipelines shall conform to the requirements of Section 15995 - Pipeline Testing and Disinfection.

- END OF SECTION -

## SECTION 15006 - DUCTILE IRON PIPE

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install ductile iron pipe and all appurtenant Work, complete in place, all in accordance with the requirements of the Contract Documents. All pipe and fittings shall be push-on or restrained joint pipe.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Piping, General.
- B. Pipeline Testing and Disinfection

#### 1.03 REFERENCED SPECIFICATIONS, CODES AND STANDARDS

##### A. Commercial Standards:

ANSI/AWWA C110/A21.10	Ductile-Iron and Gray-Iron Fittings 3-inch through 48-inches For Water and Other Liquids
ANSI/AWWA C111/A21.11	Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
ANSI/AWWA C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or other Liquids
ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and Appurtenances
SSPC - PA2	Measurement of Dry Paint Thickness with Magnetic Gages

#### 1.04 SUBMITTALS

- A. Shop Drawings: The CONTRACTOR shall submit Shop Drawings of pipe and fittings in accordance with the requirements in Sections 15000, "Piping, General", and 01300, "Submittals".

### PART 2 -- PRODUCTS

#### 2.01 GENERAL

- A. All ductile iron pipe shall conform to the requirements of ANSI/AWWA Standard C151/A21.51. The wall thickness and outside diameter of the pipe shall conform to Table 50.15. Special thickness classes of Ductile Iron Pipe Thickness shall be as follows:

<b>Size</b>	<b>Special Thickness Class</b>
4-inch - 12-inch	52 (Minimum)

- B. Each pipe shall be cast with the year of manufacture, the class and the letters "DI" for ductile iron.

## 2.02 FITTINGS

- A. Fittings for use with the ductile iron pipe specified herein shall be ductile iron. Cast ductile-iron fittings shall be pressure rated at 250 psi, minimum. All fittings with mechanical joints, flange joints and push-on joints shall conform to AWWA/ANSI Standard C110/A21.10-93 Class 350. In addition, fittings with mechanical joints and push-on joints shall conform to ANSI/AWWA Standard C111/A21.11, except that neoprene gaskets shall be used for the joint.

## 2.03 JOINTS

- A. All pressurized ductile iron pipe and fittings for use below grade shall have push-on or restrained joints as indicated on the Drawings.
- B. All ductile iron pipe and fittings shall have rubber gaskets in conformance with ANSI/AWWA Standard C111/A21.11.

## 2.04 THRUST RESTRAINED JOINTS

- A. Restrained Push-On Joint: Joints for ductile iron pipe and fittings shall be TR-FLEX as manufactured by U.S. Pipe and Foundry, Flex-Ring by the American Ductile Iron Pipe Co., or equal. The restraining components, when not cast integrally with the pipe and fittings, shall be ductile iron or a high strength non-corrosive alloy steel. Tee head bolts and hexagonal nuts for all restrained joints in pipe and fittings shall be of high strength cast iron with composition, dimensions and threading as specified in ANSI/AWWA Standard C111/A21.11, except that the length of the bolts shall meet the requirements for the restrained joint design.
- B. The gasket and joint accessories shall be shipped in suitable protective containers. Each restrained 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 without reduction because of its position in the pipeline nor from support by external thrust blocks. Restrained joint pipe and fittings shall be capable of being deflected after assembly.

## 2.05 PIPE LINING

- A. General: All ductile iron pipe and fittings shall be smooth cement-lined followed by a bituminous seal coat in accordance with AWWA C104/ANSI A21.4. Special attention shall be given to the lining of fittings. Linings shall be applied to bare metal. All lining shall

extend to the faces of flanges, to the end of spigots, or to the shoulder of hubs, as the case may be.

## 2.06 EXTERIOR COATING

- A. An asphaltic coating shall be applied to the exterior of all ductile iron pipe and fittings intended for buried service and shall conform to ANSI A21.51.

## 2.07 PVC PIPE SLEEVE

- A. PVC pipe sleeve shall be provided for all ductile iron pipe crossings under sewer and storm drain pipes. The PVC pressure pipe shall conform to the requirements of AWWA C905. The PVC sleeve shall extend 10 feet on either side of the sewer and/or storm drain pipe that the ductile iron pipeline crosses under. The ductile iron pipe shall be installed with casing spacers inside the PVC pipe sleeve and provided with a bulkhead at either end of the sleeve.
- B. The annular space between the ductile iron water main pipe and the PVC sleeve shall be filled with clean sand, having 100 percent passing a standard No. 30 sieve.

## PART 3 -- EXECUTION

### 3.01 INSTALLATION

- A. Unless otherwise directed, ductile iron pipe shall be laid with the bell ends in the direction of laying.
- B. Thrust restrained and mechanical joints shall be made in accordance with the manufacturer's standards except as otherwise specified herein. Joints between mechanical joint pipe and/or fittings shall be made in accordance with ANSI/AWWA Standard C600, 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 ANSI/AWWA C600, whichever is the lesser amount.
- C. Before laying thrust restrained and mechanical joint pipe and fittings, all lumps, blisters and excess bituminous coating shall be removed from the bell and spigot ends. The outside of each spigot and the inside of each bell shall be 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 only be made after the joint has been assembled.
- D. Prior to making up flanged joints in ductile 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. 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 insure that bolt stresses are evenly distributed.

- E. Bolts and nuts in thrust restrained, mechanical and flanged joints shall be tightened in accordance with the recommendations of the pipe manufacturer for a leak-free joint. The mechanics shall exercise caution to prevent overstress. Torque wrenches shall be used until, in the opinion of the OWNER, the mechanics have become accustomed to the proper amount of pressure to apply on standard wrenches.
- F. Cutting of the ductile iron pipe for inserting valves, fittings, etc., shall be done by the CONTRACTOR in a neat and workmanlike manner without damage to the pipe, the lining, or the coating. After cutting the pipe, the plain end shall be beveled with a heavy file or grinder to remove all sharp edges.
- G. Areas of loose or damaged lining associated with field cutting shall be repaired or replaced as recommended by the pipe manufacturer and required by the OWNER. Repair methods shall be as recommended by the manufacturer and shall be submitted to the OWNER for review.
- H. Any work within the pipe shall be performed with care to prevent damage to the lining. No cable, lifting arms or other devices shall be inserted into the pipe. All lifting, pulling or pushing mechanisms shall be applied to the exterior of the pipe barrel.
- I. Homing the pipe shall be accomplished by the use of a hydraulic or mechanical pulling device, unless otherwise accepted by the OWNER. No pipe shall be driven or struck in order to seat it home.
- J. Cleaning methods shall be acceptable to the OWNER, and must be sufficient to remove silt, rocks, or other debris which may have entered the pipeline during its installation and shall also follow the requirements of Section 15995, "Pipeline Testing and Disinfection".
- K. All tapping for service connection shall be provided with service saddles as specified in Section 15115, "Miscellaneous Valves".
- L. The CONTRACTOR shall furnish the necessary sand, equipment, and hoses for filling the annular space in the PVC sleeve with sand. Sand shall be conveyed by air through a hose and deposited by air pressure in its final position. The sand shall be free of lumps to flow unimpeded and to completely fill all voids. In general, sand backfill will be considered complete when no more sand can be forced into the annular space between the bulkheads. The CONTRACTOR shall protect the interior surface of the PVC sleeve from damage.

- END OF SECTION -

## SECTION 15007 – AWWA C900/C905 PVC PIPE

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install 4-inch to 48-inch polyvinyl chloride (PVC) pressure pipeline, complete in place, all in accordance with the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15000 - Piping, General  
B. Section 15995 - Pipeline Testing and Disinfection

#### 1.03 REFERENCED SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ANSI/AWWA C104/A21	Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water
ANSI/AWWA C1 10/A21	Ductile Iron and Gray Iron Fittings 3-inch through 48-inch for Water and other Liquids
ANSI/AWWA C11 1/A21 .1	Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and Appurtenances
ANSI/AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe 4-inch through 12-inch for Water
ANSI/AWWA C905	Polyvinyl Chloride (PVC) Pressure Pipe 14-inch through 48-inch for Water
ASTM D 2584	Test Method for Ignition Loss of Cured Reinforced Resins
PPI Technical Report	Policies and Procedures for Developing
TR 3/4	Recommended Hydrostatic Design Stresses for Thermoplastic
AWWA Manual M23	PVC Pipe – Design and Installation

## 1.04 SUBMITTALS

- A. Shop Drawings: The CONTRACTOR shall submit Shop Drawings of pipe and fittings and appurtenances in accordance with the requirements in the Section entitled "Submittals".
- B. Certifications
  - 1. The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards.
  - 2. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR

## 1.05 QUALITY ASSURANCE

- A. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of this Section of the Specifications, as specified in the referenced standards, as applicable.
- B. In addition to those tests specifically required, the ENGINEER may request additional samples of any material for testing by the CITY. The additional samples shall be furnished at no additional cost to the CITY.

## PART 2 -- PRODUCTS

### 2.01 GENERAL

- A. PVC pressure pipe (4-inch through 12-inch) shall conform to the applicable requirements of ANSI/AWWA C900 and subject to additional requirements specified herein.
- B. PVC pressure pipe (14-inch through 48-inch) shall conform to the applicable requirements of ANSI/AWWA C905 and subject to additional requirements specified herein.

### 2.02 PIPE

- A. The pipe shall be of the diameter and pressure class specified or shown, shall be furnished complete with rubber gaskets, and all specials and fittings shall be provided as required in the Contract Documents. The dimensions and pressure classes for Dimension Ratios for large PVC pressure pipe with Cast-Iron Pipe Equivalent O.D.'s shall conform to the requirements of AWWA.
- B. Unless otherwise provided in alternate qualification procedures of PPI-TR3, compounds which have a Hydrostatic Design Basis (HDB) of 4000 psi at 73.4 degrees F for water shall not contain additives and fillers that exceed the recommended values in Table 1, Part Y of PPI-TR3 (e.g., allowable content range for calcium carbonate is 0.0-5.0 parts per hundred of resin). If requested by the ENGINEER, the additive and filter content shall be determined using the prolysis method as specified in ASTM D 2584.

- C. Joints: All joints for the buried PVC pipe shall be either an integral bell manufactured on the pipe or a separate coupling both employing a rubber ring joint. The bell and coupling shall be the same thickness as of the pipe barrel, or greater thickness. The sealing ring groove in the coupling shall be of the same design as the groove in cast iron fittings and valves available from local water works supply distributors. Where required, restrained joint retainer glands shall be used and shall be cast from 60-42-10 ductile iron and shall have a sufficient number of ductile tie bolts to restrain working and test pressures as required. The retainer clamp shall be of two piece construction with serrations on the I.D. sufficient to hold the required pressures with a safety factor of 2:1. The retainers shall be Series 1500 or 6500 as manufactured by EBAA, Iron, Inc.
- D. Joint Deflection: Deflection at the joint shall not exceed 1.5 degrees or one half the maximum deflection recommended by the manufacturer. No deflection of the joint shall be allowed for joints which are overbelled or not belled to the stop mark.
- E. Color: Pipe color shall be appropriate for service. All force mains shall be green, reclaimed water shall be purple, potable water shall be blue.

## 2.03 FITTINGS

- A. Fittings in the pipe shall be ductile iron and shall conform to the requirements of AWWA C1 10, Class 250. PVC pipe fittings shall be restrained joint.
- B. All fittings shall be lined and coated in accordance with the requirements of Section entitled "Ductile Iron Pipe" and "Piping, General".
- C. Each fitting shall be clearly labeled to identify its size and pressure class.
- D. Mechanical joint restraint shall be incorporated in the design of the follower gland or follower gland and gasket. The restraining system shall meet the requirements of ASTM 1674 for testing joint restraint products. The restraint mechanism shall consist of a plurality of gripping surfaces to maximize restraint capability. Glands shall be manufactured of ductile iron conforming to ASTM A536-80. The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell conforming to ANSI/AWWA A21.11/C111 and ANSI/AWWA A21.53/C153 of latest revision. For the restrained gland type, twist-off nuts, sized same as tee-head bolts, shall be used to insure proper actuating of restraining devices. The restraining glands shall have a pressure rating equal to that of the PVC pipe on which it is used and shall be Megalug Series 2000 PV as manufactured by EBAA, Iron Inc., or approved equal. Alternatively, for sizes through 12-inch, the restraint system shall be internal to the gasket which is actuated by the gland. The restraining system shall have a pressure rating equal to that of the PVC pipe on which it is used and shall be MJ FIELD LOK Gasket Series PV as manufactured by U.S. Pipe or approved equal.



## PART 3 – EXECUTION

### 3.01 GENERAL

- A. All laying, jointing, testing for defects and for leakage shall be performed in the presence of the ENGINEER, and shall be subject to acceptance by the ENGINEER. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the work.
- B. Installation shall conform to the requirements of AWWA M23, instructions furnished by the pipe manufacturer, and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the aforementioned requirements are in conflict, the more stringent provision shall apply.

### 3.02 HANDLING AND STORAGE

#### A. Handling

- 1. Pipe, fittings and accessories shall be carefully inspected before and after installation and those found defective shall be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, pipe, fittings, and accessories shall be cleaned, and shall be maintained in a clean condition. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe, fittings or any other material be dropped or dumped into trenches.

#### B. Storage

- 1. Pipe should be stored, if possible at the job site in unit packages provided by the manufacturer. Caution should be exercised to avoid compression damage or deformation to bell ends of pipe. Pipe should be stored in such a way as to prevent sagging or bending and protected from exposure to direct sunlight by covering with an opaque material while permitting adequate air circulation above and around the pipe. Gaskets should be stored in a cool, dark place out of the direct rays of the sun, in the original packaging.

### 3.03 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of Section entitled "Excavation and Backfill for Utilities" and as specified herein.

### 3.04 INSTALLATION

- A. Bell and spigot pipe shall be laid with the bell end pointing in the direction of laying. Pipe shall be graded in straight lines, taking care to avoid the formation of any dips or low points. Pipe shall not be laid when the conditions of trench or weather are unsuitable. At the end of each days work, open ends of pipe shall be closed temporarily with wood blocks or bulkheads.
- B. Pipe shall be supported at its proper elevation and grade, care being taken to secure firm and uniform support. Wood support blocking will not be permitted. The full length of each section of pipe and fittings shall rest solidly on the pipe bed, with recessed excavation to

accommodate bells, joints and couplings. Anchors and supports shall be provided where necessary and where indicated on the Drawings for fastening work into place. Fittings shall be independently supported.

- C. Short lengths of pipe shall be used in and out of each rigid joint or rigid structure. Piping that does not allow sufficient space for proper installation of jointing material shall be replaced by one of proper dimensions. Blocking or wedging between bells and spigots will not be permitted.
- D. Joints shall be installed according to manufacturer's recommendations. Trenches shall be kept free of water until joints have been properly made. The maximum combined deflection at any coupling shall be in accordance with the manufacturer's recommendations.
- E. Pipe shall be cut by means of saws, power driven abrasive wheels or pipe cutters, which will produce a square cut. No wedge-type roller cutters will be permitted. After cutting, the end of the pipe shall be beveled using a beveling tool, portable type sander or abrasive disc.

### 3.05 FIELD TESTING AND DISINFECTION

- A. Field testing and disinfection of water mains shall conform to the requirements of Section entitled "Pipeline Testing and Disinfection".

- END OF SECTION -

## SECTION 15008 - PVC NON-PRESSURE PIPE

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install all 6- to 15-inch underground PVC non-pressure pipe for gravity sewer replacement and all appurtenant work, complete in place, all in accordance with the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Excavation and Backfill for Utilities.
- B. Piping, General
- C. Piping Schedule
- D. Pipeline Testing and Disinfection

#### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ASTM D 1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
ASTM D 2321	Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

#### 1.04 SUBMITTALS

- A. Samples: The CONTRACTOR shall submit to the CITY for review, samples of all the materials proposed for use on the Work. The samples shall be clearly marked to show the manufacturer's name and product identification and shall be submitted along with the manufacturer's technical data and application instructions. All sample submittals shall conform to the requirements for "Samples" in Section 01300, "Submittals".
- B. Shop Drawings: The CONTRACTOR shall submit shop drawings and laying diagrams of all Pipe, joints, bends, special fittings, and piping appurtenances in accordance with Section 01300, "Submittals".
- C. Certificates: The CONTRACTOR shall provide manufacturer's certificates for all materials indicating conformance to the Contract Documents.

## 1.05 QUALITY ASSURANCE

- A. Testing: All materials testing will be based upon applicable ASTM Test Methods and AWWA Standards referenced herein for the materials specified.
- B. Certificates: Manufacturer's notarized certificates of compliance shall be furnished by the CONTRACTOR.
- C. The pipe shall be subjected to the specified hydrostatic strength tests, flexure tests, and crushing tests. The crushing tests shall be made on samples taken from the center of full-length sections of pipe.

## 1.06 CLEANUP

- A. In addition to the requirements of Section 01700, "Project Closeout", the CONTRACTOR, upon completion of backfilling and grading over trenches shall remove all excess materials and equipment from the site.

## PART 2 – PRODUCTS

### 2.01 GENERAL

- A. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and pressure rating in psi.
- B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

### 2.02 PIPE

- A. All PVC pipe shall be joined by compression joints unless otherwise shown or specified in the Piping Schedule, and shall conform to the following requirements:
  - 1. Polyvinylchloride pipe (PVC) shall conform to the requirements of ASTM D 3034, Class SDR 35. Material for PVC pipe shall conform to the requirements of ASTM D 1784 for Class 12454-B or 12454-C as defined therein.
  - 2. Flexible rubber rings for compression type joints for PVC pipe and fittings shall conform to the requirements of ASTM D 1869.

### 2.03 FITTINGS

- A. All fittings for PVC pipe shall conform to the requirements of ASTM D 2241. The ring groove and gasket ring shall be compatible with PVC pipe ends. The flanged fittings shall be compatible with cast-iron or ductile iron pipe fittings.
- B. The strength class of the fittings shall be not less than the strength class of any adjoining pipe.

## 2.04 BEDDING MATERIAL

- A. Unless otherwise specified or shown, all material used for pipe bedding shall conform to the requirements for "Embedment materials" as specified in ASTM D 2321.

## PART 3 – EXECUTION

### 3.01 GENERAL

- A. All laying, jointing, testing for defects and for leakage shall be performed in the presence of the CITY, and shall be subject to his approval before acceptance. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the Work.
- B. Installation shall conform to the requirements of ASTM D 2321 and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the requirements of ASTM D 2321 are in conflict, the more stringent provision shall apply.

### 3.02 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of the Section entitled "Excavation and Backfill for Utilities", and as specified herein.
- B. Unless otherwise specified or shown, the maximum width of trenches shall be as specified in said ASTM D 2321.

### 3.03 LAYING PIPE

- A. The pipe shall be installed in accordance with the requirements of ASTM D 2321 and as specified herein and shown and the sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for joining, the bedding for the pipe shall be checked for firmness and uniformity of surface.
- B. Proper implements, tools, and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the CONTRACTOR for safe and efficient execution of the Work. All pipe, fittings, valves, and accessories shall be carefully lowered into the trench by means of backhoe, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.
- C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe or will produce ragged, uneven edges.
- D. The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap,

wood, or other similar temporary plugs will not be permitted.

- E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the Work shall be furnished by the CONTRACTOR.
- F. Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers, or main drains, the obstruction shall be permanently supported, relocated, removed, or reconstructed by the CONTRACTOR in cooperation with owners of such utility structures.

### 3.04 HANDLING

- A. Handling of the PVC pipe shall be done with care to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.
- B. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.

### 3.05 FIELD JOINTING

- A. Each pipe compression type joint shall be joined with a lock-in rubber ring and a ring groove that is designed to resist displacement during pipe insertion.
- B. The ring and the ring seat inside the bell shall be wiped clean before the gasket is inserted. At this time a thin film of lubricant shall be applied to the exposed surface of the ring and to the outside of the clean pipe end. Lubricant other than that furnished with the pipe shall not be used. The end of the pipe shall be then forced into the ring to complete the joint.
- C. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.
- D. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe which has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the OWNER, the trench conditions or weather are unsuitable for such Work.

### 3.06 INSTALLATION OF BENDS, TEES, AND REDUCERS

- A. Cast-iron and PVC fittings shall be installed Utilizing standard installation procedures. Fittings shall be lowered into trench by means of rope, cable, chain, or other acceptable means without damage to the fittings. Cable, rope, or other devices used for lowering fitting into trench, shall be attached around exterior of fitting for handling. Under no circumstances shall the cable, rope or other device be attached through the fitting's interior for handling. Fittings shall be carefully connected to pipe or other facility, and joint shall be checked to insure a sound and proper joint.

### 3.07 PIPE-TO-PIPE CONNECTIONS

- A. Pipe-to-pipe connections shall be made by using flexible banded, sheer reinforced couplings or adapter couplings, each with compression joints, in compliance with ASTM C 425.

### 3.08 PIPE-TO-PIPE MANHOLE CONNECTIONS

- A. When a sound pipe stub-out exists at a manhole to which connection is to be made, a pipe-to-pipe connection shall be made as described above. If a stub-out is not present or is faulty, an opening shall be cut in the manhole wall and the connection made. The connection shall consist of a pipe stub-out with elastomeric waterstop grouted into the opening with non-shrink grout. A flexible band coupling, as shown on the details for new manholes, shall join the pipe stub-out to the replacement pipe. The invert or floor inside the manhole shall be cut and reshaped as necessary.

### 3.09 GRAVITY SEWER SERVICE LATERALS

- A. Lateral sewers shall be installed in accordance with all the applicable requirement for pipe installation. Branch fittings shall be installed in the main line sewer as it is constructed, in the locations and configuration of the original laterals or as designated by the CITY.
- B. The existing laterals shall be hand excavated to a joint, saw cut, clean and square and the appropriate adapter installed to connect the replacement laterals. Care shall be taken to maintain the slopes of the existing laterals. The laterals shall be removed and replaced from the main line to a point along the existing lateral as determined by the CITY to be in acceptable condition.
- C. The CONTRACTOR shall not excavate trenches for laterals on both sides of the street at the same time unless written permission has been secured in advance to close the street.

### 3.10 TESTING

- A. Field testing of gravity sewer pipe shall conform to the requirements of Section 15995, "Pipeline Testing and Disinfection".

- END OF SECTION -

## SECTION 15009 - PVC PRESSURE PIPE

### PART 1 – GENERAL

#### 1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install polyvinyl chloride (PVC) pressure pipeline, complete in place, all in accordance with the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Piping, General
- B. Piping Schedule
- C. Pipeline Testing

#### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

##### A. Commercial Standards:

ASTM D 1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 1785	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
ASTM D 2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

#### 1.04 SUBMITTALS

##### A. Shop Drawings

1. The CONTRACTOR shall submit shop drawings of pipe, fittings, and appurtenances in accordance with the requirements in Section entitled, "Submittals."



## B Certifications

1. The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards.
2. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

## 1.05 QUALITY ASSURANCE

### A. Tests

1. Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of this Section of the Specifications, as specified in the referenced standards, as applicable.
- B. In addition to those tests specifically required, the ENGINEER may request additional samples of any material for testing by the CITY. The additional samples shall be furnished at no additional cost to the CITY.

## PART 2 -- PRODUCTS

### 2.01 GENERAL

- A. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and pressure rating in psi.
- B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

### 2.02 PIPE

- A. PVC pipe shall conform to ASTM D1785 and shall be made from a 12454B compound which is a Type 1, Grade 1 plastic as defined by ASTM D1784. Rerun or reclaimed materials will not be acceptable.
- B. Wall Thickness shall be a minimum of Schedule 80, unless otherwise noted in the piping schedule.
- C. PVC pipe exposed to sunlight shall contain U.V. protectant.

### 2.03 JOINTS

- A. Pipe joints shall be provided as specified in the pipe schedule.
- B. All PVC pipe four (4) inches in diameter and larger, unless otherwise scheduled, intended for buried service shall be push-on type in accordance with AWWA C-900 and shall utilize ductile iron retainers for restraining pipe joints. Retainers shall be cast from 60-42-10 ductile iron and shall have a sufficient number of ductile tie bolts to restrain working and

tests pressures as required. The retainer clamp shall be of two piece construction with serrations on the I.D. sufficient to hold the required pressures. The retainers shall be Series 1500 or 6500 as manufactured by EBAA Iron, Inc.

- C. Socket type joints shall be made up in accordance with ASTM D2855 with a PVC solvent cement complying with ASTM D2564. The cement shall have a minimum viscosity of 2000 cps.
- D. Where flanges are to be used, flanges shall be van stone type with full faced vinyl gaskets.

## 2.04 FITTINGS

- A. Socket type pipe fittings for Schedule 40 pipe shall conform to ASTM D2466.
- B. Socket type pipe fittings for Schedule 80 pipe shall conform to ASTM D2467.
- C. Fittings shall have the same schedule designation, joint type and be made of the same PVC compound as the connecting pipe.

## PART 3 – EXECUTION

### 3.01 GENERAL

- A. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the Work.
- B. Installation shall conform to the requirements of ASTM D 2321 and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the requirements of ASTM D 2321 are in conflict, the more stringent provision shall apply.

### 3.02 BEDDING MATERIAL

- A. Unless otherwise specified or shown, all material used for pipe bedding shall conform to the requirements for "Embedment Materials" as specified in ASTM D 2321.

### 3.03 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of the Section entitled "Excavation and Backfill for Utilities," and as specified herein.
- B. Unless otherwise specified or shown, the maximum width of trenches shall be as specified in ASTM D 2321.
- C. The minimum depth of cover over the top of the pipe shall be 36-inches unless otherwise shown on the Drawings.

### 3.04 LAYING PIPE

- A. The pipe shall be installed in accordance with the requirements of ASTM D 2321 and as specified herein and shown and the sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for joining, the bedding for the pipe shall be checked for firmness and uniformity of surface.
- B. Proper implements, tools, and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the CONTRACTOR for safe and efficient execution of the Work. All pipe, fittings, valves, and accessories shall be carefully lowered into the trench by means of backhoe, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.
- C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe or produce ragged, uneven edges.
- D. The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.
- E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the Work shall be furnished by the CONTRACTOR at its own expense under the direction of the ENGINEER.

### 3.05 HANDLING

- A. Handling of the PVC pipe shall be done with care to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.
- B. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.

### 3.06 FIELD JOINTING

- A. All pipe joints shall be made in accordance with the manufacturers written instructions.
- B. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.
- C. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe which has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the ENGINEER, the trench conditions or weather are unsuitable for such Work.

### 3.07 PROTECTIVE COATINGS

- A. Protective coating shall be as indicated in Section 15390 – Piping Schedule.

### 3.08 FIELD TESTING

- A. Field testing and disinfection of water mains shall conform to the requirements of the Section entitled "Pipeline Testing and Disinfection."

- END OF SECTION -

## SECTION 15008

### PVC NON-PRESSURE PIPE

#### **Part 1 - GENERAL**

##### 1.01 THE REQUIREMENT

This specification includes 4" through 15" unplasticized polyvinyl chloride (PVC) plastic non-pressure gravity sewer pipe with integral bell and spigot push-on gasket joints for the conveyance of domestic sanitary sewage.

##### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02222 - Excavation and Backfill for Utilities
- B. Section 02730 – Gravity Sanitary Sewers
- C. Section 15000 - Piping General
- D. Section 15007 – AWWA C900/C905 PVC Pipe
- E. Section 15009 – PVC Pressure Pipe
- F. Section 15995 - Pipeline Testing and Disinfection

##### 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

###### A. Commercial Standards:

ASTM D 1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR-Series).
ASTM D 2321	Recommended Practice for Underground Installation of flexible Thermoplastic Sewer Pipe.
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

##### 1.04 SUBMITTALS

- A. Samples: The CONTRACTOR shall submit to the CITY for review, samples of all the materials proposed for use on the Work. The samples shall be clearly marked to show the manufacturer's name and product identification and shall be submitted along with the manufacturer's technical data and application instructions. All sample submittals shall conform to the requirements for "Samples" in Section 01300, "Submittals".

## SECTION 15008

### PVC NON-PRESSURE PIPE

- B. Shop Drawings: The CONTRACTOR shall submit shop drawings and laying diagrams of all Pipe, joints, bends, special fittings, and piping appurtenances in accordance with Section 01300, "Submittals".
- C. Certificates: The CONTRACTOR shall provide manufacturer's certificates for all materials indicating conformance to the Contract Documents.

#### 1.05 QUALITY ASSURANCE

- A. Testing: All materials testing will be based upon applicable ASTM Test Methods and AWWA Standards referenced herein for the materials specified.
- B. Certificates: Manufacturer's notarized certificates of compliance shall be furnished by the CONTRACTOR.
- C. The pipe shall be subjected to the specified hydrostatic strength tests, flexure tests, and crushing tests. The crushing tests shall be made on samples taken from the center of full-length sections of pipe.

#### 1.06 CLEANUP

- A. In addition to the requirements of Section 01700, "Project Closeout", the CONTRACTOR, upon completion of backfilling and grading over trenches shall remove all excess materials and equipment from the site.

### **Part 2 - PRODUCTS**

#### 2.01 GENERAL

- A. All pipe and fittings shall meet the requirements of ASTM D3034 for 6" through 15" SDR 26 sewer pipe.
- B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.
- C. PVC pipe and fittings shall be homogenous throughout and free from cracks, holes, foreign inclusions or other injurious defects.
- D. PVC pipe and fittings showing signs of ultra-violet degradation will not be accepted.

#### 2.02 PIPE

- A. All pipe shall have a dimension ratio (DR) of 26 and minimum pipe stiffness (PS) of 115 psi. It shall be made from quality PVC resin, compounded to

## SECTION 15008

### PVC NON-PRESSURE PIPE

provide physical and mechanical properties that equal or exceed cell class 12454 or 12364 as defined in ASTM D1784 (minimum tensile Modulus of 500,000 PSI).

- B. Pipe shall be fabricated in 20-foot lengths and shall be suitable for use as a gravity sewer conduit.
- C. The bell shall consist of an integral wall section with a solid cross section elastomeric gasket which meets the requirements of ASTM F477.
- D. All PVC pipe shall be uniform in color, opacity, density and other physical properties.
- E. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, the PVC cell classification and pressure rating in psi.

#### 2.03 Joints

- A. Joints shall be integral bell push-on gasket joints designed for radial compression of the elastomeric gasket inside the bell on the pipe spigot to ensure a positive seal.
- B. Design joint to avoid displacement of the gasket when installed under provisions of the manufacturer's recommendation.
- C. The joint design shall meet the requirements of ASTM D3212 under both pressure and 22 in. Hg vacuum.
- D. Use lubricants to join pipe as recommended by the manufacturer.

#### 2.04 Gaskets

- A. Provide solid cross section elastomeric gaskets which meets the requirements of ASTM F477, molded in a circular form or extruded to the proper section and then spliced into circular form, consisting of a properly vulcanized high-grade elastomeric compound.
- B. Gaskets shall be factory assembled and securely locked in place to prevent displacement during assembly. Provisions must be made for expansion and contraction at each joint with an elastomeric gasket.
- C. The basic polymer shall be natural rubber, synthetic elastomer or a blend of both.
- D. Gaskets shall be manufactured of materials resistant to domestic sewage.
- E. Apply an adequate compressive force to gasket to affect a positive seal under all combinations of joint tolerance.

## SECTION 15008

### PVC NON-PRESSURE PIPE

#### 2.06 FITTINGS

- A. All fittings for PVC pipe shall conform to the requirements of ASTM D 2241. The ring groove and gasket ring shall be compatible with PVC pipe ends. The flanged fittings shall be compatible with cast-iron or ductile iron pipe fittings.
- B. The strength class of the fittings shall be not less than the strength class of any adjoining pipe.
  - 1. Fittings Marking: Mark fittings with the following information
    - (a) Manufacturer's Name or Trademark.
    - (b) Nominal Size.
    - (c) The Material Designation "PVC" PSM.
- C. Service Plugs shall be flexible virgin polyvinyl chloride as manufactured by Fernco Joint Sealer Company, or approved equal.
- D. Adapters: As required by the field conditions.

#### 2.07 BEDDING MATERIAL

- A. Unless otherwise specified or shown, all material used for pipe bedding shall conform to the requirements of Section 02222, "Excavation and Backfill for Utilities".

### **Part 3 - EXECUTION**

#### 3.01 GENERAL

- A. All laying, jointing, testing for defects and for leakage shall be performed in the presence of the CITY, and shall be subject to the CITY'S approval before acceptance. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the Work.
- B. Installation shall conform to the requirements of ASTM D 2321 and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the requirements of ASTM D 2321 are in conflict, the more stringent provision shall apply.

#### 3.02 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of Section 02222 - Excavation and Backfill for Utilities, and as specified herein.



## SECTION 15008

### PVC NON-PRESSURE PIPE

- B. Unless otherwise specified or shown, the maximum width of trenches shall be as specified in said ASTM D 2321.

#### 3.03 LAYING PIPE

- A. The pipe shall be installed in accordance with the requirements of ASTM D 2321 and as specified herein. Sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for joining, the bedding for the pipe shall be checked for firmness and uniformity of surface.
- B. Proper implements, tools, and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the CONTRACTOR for safe and efficient execution of the Work. All pipe, fittings, valves, and accessories shall be carefully lowered into the trench by means of backhoe, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.
- C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe or will produce ragged, uneven edges.
- D. The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.
- E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the Work shall be furnished by the CONTRACTOR.
- F. Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers, or main drains, the obstruction shall be permanently supported, relocated, removed, or reconstructed by the CONTRACTOR in cooperation with owners of such utility structures.

## SECTION 15008

### PVC NON-PRESSURE PIPE

#### 3.05 HANDLING

- A. Handling of the PVC pipe shall be done with care to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.
- B. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.

#### 3.06 FIELD JOINTING

- A. Each pipe compression type joint shall be joined with a lock-in rubber ring and a ring groove that is designed to resist displacement during pipe insertion.
- B. The ring and the ring seat inside the bell shall be wiped clean before the gasket is inserted. At this time a thin film of lubricant shall be applied to the exposed surface of the ring and to the outside of the clean pipe end. Lubricant other than that furnished with the pipe shall not be used. The end of the pipe shall be then forced into the ring to complete the joint.
- C. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.
- D. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe which has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the OWNER, the trench conditions or weather are unsuitable for such Work.

#### 3.07 INSTALLATION OF BENDS, TEES, AND REDUCERS

- A. PVC fittings shall be installed utilizing standard installation procedures. Fittings shall be lowered into trench by means of rope, cable, chain, or other acceptable means without damage to the fittings. Cable, rope, or other devices used for lowering fitting into trench shall be attached around exterior of fitting for handling. Under no circumstances shall the cable, rope or other device be attached through the fitting's interior for handling. Fittings shall be carefully connected to pipe or other facility, and joint shall be checked to insure a sound and proper joint.

## SECTION 15008

### PVC NON-PRESSURE PIPE

#### 3.09 PIPE-TO-PIPE CONNECTIONS

- A. Pipe-to-pipe connections shall be made by using flexible banded, sheer reinforced couplings or adapter couplings, each with compression joints, in compliance with ASTM C 425.

#### 3.10 PIPE-TO-PIPE MANHOLE CONNECTIONS

- A. When a sound pipe stub-out exists at a manhole to which connection is to be made, a pipe-to-pipe connection shall be made as described above. If a stub-out is not present or is faulty, an opening shall be cut in the manhole wall and the connection made. The connection shall consist of a pipe stub-out with elastomeric waterstop grouted into the opening with non-shrink grout. A flexible band coupling, as shown on the details for new manholes, shall join the pipe stub-out to the replacement pipe. The invert or floor inside the manhole shall be cut and reshaped as necessary.

#### 3.11 GRAVITY SEWER SERVICE LATERALS

- A. Lateral sewers shall be installed in accordance with all the applicable requirements for pipe installation. Branch fittings shall be installed in the main line sewer as it is constructed, in the locations and configuration of the original laterals or as designated by the CITY.
- B. The existing laterals shall be hand excavated to a joint, saw cut, clean and square and the appropriate adapter installed to connect the replacement laterals. Care shall be taken to maintain the slopes of the existing laterals. The laterals shall be removed and replaced from the main line to a point along the existing lateral as determined by the CITY to be in acceptable condition.
- C. The CONTRACTOR shall not excavate trenches for laterals on both sides of the street at the same time unless written permission has been secured in advance to close the street.

#### 3.12 TESTING

- A. Field testing of gravity sewer pipe shall conform to the requirements of Section 15995 - Pipeline Testing and Disinfection.

- END OF SECTION -

SECTION 15009  
PVC PRESSURE PIPE

**Part 1 - GENERAL**

1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish and install polyvinyl chloride (PVC) pressure pipeline, complete in place, all in accordance with the requirements of the Contract Documents.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 15000 - Piping General
- B. Section 15390 - Piping Schedule
- C. Section 15995 - Pipeline Testing and Disinfection

1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

ASTM D 1784	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
ASTM D 1785	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
ASTM D 2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

1.04 SUBMITTALS

A. Shop Drawings

- 1. The CONTRACTOR shall submit shop drawings of pipe, fittings, and appurtenances in accordance with the requirements in Section 01300 entitled, "Submittals."

SECTION 15009  
PVC PRESSURE PIPE

B. Certifications

1. The CONTRACTOR shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, as specified in the referenced standards.
2. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

1.05 QUALITY ASSURANCE

A. Tests

1. Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of this Section of the Specifications, as specified in the referenced standards, as applicable.
- B. In addition to those tests specifically required, the ENGINEER may request additional samples of any material for testing by the CITY. The additional samples shall be furnished at no additional cost to the CITY.

**Part 2 - PRODUCTS**

2.01 GENERAL

- A. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size, and pressure rating in psi.
- B. The CONTRACTOR shall also require the manufacturer to mark the date of extrusion on the pipe. This dating shall be done in conjunction with records to be held by the manufacturer for 2 years, covering quality control tests, raw material batch number, and other information deemed necessary by the manufacturer.

2.02 PIPE

- A. PVC pipe shall conform to ASTM D1785 and shall be made from a 12454B compound which is a Type 1, Grade 1 plastic as defined by ASTM D1784. Rerun or reclaimed materials will not be acceptable.
- B. Wall Thickness shall be a minimum of Schedule 80, unless otherwise noted in the piping schedule.
- C. PVC pipe exposed to sunlight shall contain U.V. protectant.

SECTION 15009  
PVC PRESSURE PIPE

2.03 JOINTS

- A. Pipe joints shall be provided as specified in the Section 15390 "Piping Schedule".
- B. All PVC pipe four (4) inches in diameter and larger, unless otherwise scheduled, intended for buried service shall be push-on type in accordance with AWWA C-900 and shall utilize ductile iron retainers for restraining pipe joints. Retainers shall be cast from 60-42-10 ductile iron and shall have a sufficient number of ductile tie bolts to restrain working and tests pressures as required. The retainer clamp shall be of two piece construction with serrations on the I.D. sufficient to hold the required pressures. The retainers shall be Series 1500 or 6500 as manufactured by EBAA Iron, Inc.
- C. Socket type joints shall be made up in accordance with ASTM D2855 with a PVC solvent cement complying with ASTM D2564. The cement shall have a minimum viscosity of 2000 cps.
- D. Where flanges are to be used, flanges shall be van stone type with full faced vinyl gaskets.

2.04 FITTINGS

- A. Socket type pipe fittings for Schedule 40 pipe shall conform to ASTM D2466.
- B. Socket type pipe fittings for Schedule 80 pipe shall conform to ASTM D2467.
- C. Fittings shall have the same schedule designation, joint type and be made of the same PVC compound as the connecting pipe.

**Part 3 - EXECUTION**

3.01 GENERAL

- A. All material found during the progress to have defects will be rejected and the CONTRACTOR shall promptly remove such defective materials from the site of the Work.
- B. Installation shall conform to the requirements of ASTM D 2321 and to the supplementary requirements or modifications specified herein. Wherever the provisions of this Section and the requirements of ASTM D 2321 are in conflict, the more stringent provision shall apply.

3.02 BEDDING MATERIAL

- A. Unless otherwise specified or shown, all material used for pipe bedding shall conform to the requirements for "Embedment Materials" as specified in ASTM D 2321.

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PVC PRESSURE PIPE

3.03 TRENCHING AND BACKFILL

- A. Trench excavation and backfill shall conform to the requirements of Section 02222 - Excavation and Backfill for Utilities, and as specified herein.
- B. Unless otherwise specified or shown, the maximum width of trenches shall be as specified in ASTM D 2321.
- C. The minimum depth of cover over the top of the pipe shall be 36-inches unless otherwise shown on the Drawings.

3.04 LAYING PIPE

- A. The pipe shall be installed in accordance with the requirements of ASTM D 2321 and as specified herein and shown and the sections shall be closely jointed to form a smooth flow line. Immediately before placing each section of pipe in final position for joining, the bedding for the pipe shall be checked for firmness and uniformity of surface.
- B. Proper implements, tools, and facilities as recommended by the pipe manufacturer's standard printed installation instructions shall be provided and used by the CONTRACTOR for safe and efficient execution of the Work. All pipe, fittings, valves, and accessories shall be carefully lowered into the trench by means of backhoe, ropes, or other suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.
- C. Cutting and machining of the pipe shall be accomplished in accordance with the pipe manufacturer's standard procedures for this operation. Pipe shall not be cut with a cold chisel, standard iron pipe cutter, nor any other method that may fracture the pipe or produce ragged, uneven edges.
- D. The pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged or unsound pipe shall be repaired or replaced. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean during and after laying. All openings in the pipe line shall be closed with water tight expandable type sewer plugs or PVC test plugs at the end of each day's operation or whenever the pipe openings are left unattended. The use of burlap, wood, or other similar temporary plugs will not be permitted.

## SECTION 15009

### PVC PRESSURE PIPE

- E. Adequate protection and maintenance of all underground and surface utility structures, drains, sewers, and other obstructions encountered in the progress of the Work shall be furnished by the CONTRACTOR at its own expense under the direction of the ENGINEER.

#### 3.05 HANDLING

- A. Handling of the PVC pipe shall be done with care to insure that the pipe is not damaged in any manner during storage, transit, loading, unloading, and installation.
- B. Pipe shall be inspected both prior to and after installation in the ditch and all defective lengths shall be rejected and immediately removed from the working area.

#### 3.06 FIELD JOINTING

- A. All pipe joints shall be made in accordance with the manufacturers written instructions.
- B. The pipe shall not be deflected either vertically or horizontally in excess of the printed recommendations of the manufacturer of the coupling.
- C. When pipe laying is not in progress, the open ends of the pipe shall be closed to prevent trench water from entering pipe. Adequate backfill shall be deposited on pipe to prevent floating of pipe. Any pipe which has floated shall be removed from the trench, cleaned, and relaid in an acceptable manner. No pipe shall be laid when, in the opinion of the ENGINEER, the trench conditions or weather are unsuitable for such work.

#### 3.07 PROTECTIVE COATINGS

- A. Protective coating shall be as indicated in Section 15390 – Piping Schedule.

#### 3.08 FIELD TESTING

- A. Field testing and disinfection of water mains shall conform to the requirements of Section 15995 - Pipeline Testing and Disinfection.

- END OF SECTION -



## SECTION 15019 - MISCELLANEOUS PIPING

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. The Contractor shall furnish and install all exposed and buried mill piping as shown and specified, complete, including polyethylene tubing, copper tubing, solvent-welded PVC pipe, fittings, gaskets, bolts, insulating connections, and such other specialties as required for a complete and operable piping system in accordance with the requirements of the Contract Documents.

#### 1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Excavation and Backfill for Utilities
- B. Piping, General.
- C. Pipeline Testing and Disinfection

#### 1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

##### A. Commercial Standards:

ANSI/ASME B1.20 1	Pipe Threads, General Purpose (inch)
ASTM B 62	Specification for Composition Bronze or Ounce Metal Castings
ASTM B 584	Specification for Copper Alloy Sand Castings for General Applications
ASTM D 2000	Classification System for Rubber Products in Automotive Applications
ASTM D-1248	Polyethylene Plastics Molding and Extrusion Materials
AWWA C 901	Polyethylene (PE) Pressure Pipe and tubing, ½" through 3" for Water Service

#### 1.04 SUBMITTALS

- A. For the materials and equipment items supplied under the provisions of this Section, the Contractor shall submit copies of the manufacturer's product specifications and performance details according to the requirements of Section entitled "Submittals."

#### 1.05 QUALITY ASSURANCE

- A. Tests: Except where otherwise specified, all material used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards.

- B. Certificates: Manufacturer's notarized certificates of compliance shall be furnished by the Contractor.
- C. The pipe shall be subjected to the specified hydrostatic strength tests, flexure tests, and crushing tests. The crushing tests shall be made on samples taken from the center of full-length sections of pipe.

#### 1.06 CLEANUP

- A. In addition to the requirements of Section entitled "Project Closeout", the Contractor, upon completion of backfilling and grading over trenches shall remove all excess materials and equipment from the site.

### PART 2 -- PRODUCTS

#### 2.01 COPPER TUBING

- A. Copper tubing shall conform to the requirements of ASTM B 88 and shall be Type K, soft temper for buried tubing and hard-drawn for above-ground application. Fittings shall be soldered or sweated on and shall be of wrought copper to ANSI B16.22. Soldered joints shall contain 95-percent tin and 5-percent antimony. No solders or fluxes containing more than 0.2 percent of lead shall be used.

#### 2.02 PVC (POLYVINYL CHLORIDE) PRESSURE PIPE, SOLVENT-WELDED

- A. PVC pipe shall be made from all new rigid unplasticized polyvinyl chloride and shall be Normal Impact Class 12454-B, Schedule 80 to conform to ASTM D 1785, unless otherwise shown. Schedule 40 PVC pipe shall be used for piping sleeves under pavement, as shown on the drawings. Elbows and tees shall be of the same material as the pipe. Unless otherwise shown, joint design shall be for solvent-welded construction.

#### 2.03 COMPRESSIONS COUPLINGS

- A. Compression couplings shall be provided for connections of the new service connection piping at the corporation stop, angle key meter valve branch assembly, pipe joints, and the service meter. The compression couplings shall be of similar material to the meter or pipe and shall be of the sizes to fit the pipe and fittings. The compression coupling shall have stainless steel clamp or set screws, pack joint nut with beveled gasket and a gap for adjustability. Compression couplings shall be Pack Joint Couplings as manufactured by Ford Meter Box Company or equal. Meter couplings shall be model C38-23-2.5 as manufactured by Ford Meter Box Company, or equal.

#### 2.04 PIPE THREADS

- A. All pipe threads shall be in accordance with ANSI/ASME B1.20.

## 2.05 POLYETHYLENE TUBING

- A. The polyethylene compound from which the tubing is made shall be an ethylene hexene copolymer and shall comply with the applicable requirements as specified in ASTM D3350 providing a cell classification of 355434C and simultaneously be as specified in ASTM D1248 for Type 111 Category 5, Grade P34, Class C,. PE3408 very high molecular weight, high density polyethylene plastic material.
- B. Polyethylene tubing shall have a working pressure at 200 PSI at 73.4 degrees F.
- C. All tubing furnished under these specifications shall conform to the following standards:
  - 1. AWWA C-901, ASTM D2239, ASTM D2737, ASTM D3350, ASTM D1248, ASTM F1248, ASTM D1693, ASTM D2837, and ASTM D3140.
- D. Tubing dimensions and tolerances shall conform to the following requirements:
  - 1. Polyethylene tubing surfaces shall be mirror smooth, and shall be free from bumps and irregularities. Materials must be completely homogenous and uniform in appearance.
- E. Tubing dimensions and tolerances shall correspond with the values listed in AWWA C901 with a dimension ratio (DR) of 9.
- F. Tubing shall be fully labeled at intervals of not more than 5 feet with brand name and manufacturer, the nominal size, PE 3408, the word "Tubing" and DR9, PC200, AWWA C901, and the seal, or mark, of the testing agency.

## 2.06 HIGH DENSITY POLYETHYLENE PIPE

- A. General: High density polyethylene pipe shall be used for sewer replacement by pipe bursting.
- B. The materials of the replacement pipe shall be PE 3408 High Density Polyethylene (HDPE) pipe and conform to requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) based on outside diameter, ASTM D1248, ASTM D3350 - Cell Classification PE 345434C. Sizes of the insertions to be used shall be such to increase to or renew as indicated on the Drawings. All pipe shall be made of virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults. The minimum wall thickness of the polyethylene pipe shall have SDR 17 for gravity sewer installation and SDR 11 for force main installation, or as directed otherwise by the ENGINEER.
- C. The replacement pipe shall be 1100 Series Driscopipe, SDR17 with 100 psi pressure rating for gravity sewer, and 1000 Series Driscopipe, SDR 11 with 160 psi pressure rating for force main, as manufactured by Philips 66, or equal.

- D. The inside diameter of the replacement pipe for gravity sewer shall be color coded and equivalent to the soft white Driscopipe Opticore pipe, or equal.

### PART 3 -- EXECUTION

#### 3.01 INSTALLATION

- A. Couplings: Pipe couplings shall be installed in strict accordance with the manufacturer's printed recommendations, using the correct style coupling and gasket for any given application.
- B. Plastic Pipe: PVC pipe joints shall be solvent-welded in accordance with the manufacturer's instructions. Expansion joints or pipe bends shall be provided to absorb pipe expansion over a temperature range of 100 degrees F, unless otherwise shown. Care shall be taken to provide sufficient supports, anchors, and guides, to avoid stress on the piping. The Contractor shall obtain the services of the pipe supplier, to instruct the pipe fitters in the correct way of making solvent welded joints. Only clean, fresh solvent shall be used at any time.

- END OF SECTION -

## SECTION 15390 – PIPING SCHEDULE

### PART 1 -- GENERAL

#### 1.01 THE REQUIREMENT

- A. Reference Section 15000, Piping.

#### 1.02 PIPING SYSTEM SCHEDULES

- A. Piping requirements for this Section are defined on the Drawings, and in the Piping System Schedule. In the absence of a specified test pressure, pipe shall be tested at a pressure 50 percent greater than the normal operating pressure as determined by the ENGINEER or 10 psig, whichever is greater unless the Schedule indicates that no test is required.
- B. Non-critical gravity lines such as drains, floor drains, roof drains, etc., do not typically require a pressure test.

#### PIPING SCHEDULE ABBREVIATIONS

- A. Material
  - 316 SS - 316 Stainless Steel (nonwelded joints) or 316L Stainless Steel – low carbon (welded joints)
  - BSP - Black Steel Pipe
  - CMP - Corrugated Metal Pipe
  - CSP - Carbon Steel Pipe
  - CU - Copper
  - DI - Ductile Iron
  - FRP - Fiberglass Reinforced Plastic Pipe
  - GSP - Galvanized Steel Pipe
  - HDPE - High Density Polyethylene
  - PVC - Polyvinylchloride
- B. Wall Thickness, Class or Schedule
  - CL - Class
  - DR - Diameter Ratio
  - Sch - Schedule
  - SDR - Standard Diameter Ratio
- C. Joint Type
  - BFW - Butt Fusion Weld
  - CJ - Compression Joint
  - Flg - Flanged
  - PO - Push on Joint
  - RJ - Restrained Joint
  - SW - Solvent Welded
  - Thd - Threaded
  - Wld - Welded

D. Fitting Type

316 SS	-	316 Stainless Steel (nonwelded joints) or 316L Stainless Steel – low carbon (welded joints)
BSP	-	Black Steel Pipe
CSP	-	Carbon Steel Pipe
CU	-	Copper
DI	-	Ductile Iron
GSP	-	Galvanized Steel Pipe
PVC	-	Polyvinylchloride
Stl	-	Carbon Steel
Mol	-	Molded HDPE

E. Interior Surface Protection

AC	-	Asphalt Coated
ACCL	-	Asphalt Coated Cement Lined
EL	-	Epoxy Lined
PL	-	Polyethylene Lined
GAL	-	Galvanized

F. Exterior Surface Protective Coating

AC	-	Asphalt Coated
P	-	Painted
GAL	-	Galvanized
PE		Polyethylene Encased

### 1.03 PIPING SCHEDULE

Service	Nominal Pipe Diameter (Inches)	Material	Thickness Class or Schedule	Working Pressure (PSIG)	Type of Joints	Type of Fittings	Protective Coating		Remarks
							Interior	Exterior	
AIR RELEASE VENT AIR / VACUUM VENT	All	GSP	Sch 40	100	Thd	GSP	Gal	Gal/P	
EFFLUENT BYPASS PIPE Above Ground	36 / 48	DI	CL 51	20	Flg	DI	EL	P	--

- 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 entitled "Submittals" and Section 01700 entitled "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 City as a condition precedent to the approval and acceptance of the system.
- D. All water mains shall be flushed to remove all sand, debris, rock and other foreign matter. Dispose of the flushing water without causing a nuisance or property damage.

## SECTION 15995

### PIPELINE TESTING AND DISINFECTION

#### **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.
- 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

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### PIPELINE TESTING AND DISINFECTION

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

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### PIPELINE TESTING AND DISINFECTION

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.

#### 3.05 BACTERIOLOGICAL ANALYSES

- A. Sample points for the purpose of collecting water samples for bacteriological analysis shall be provided by the contractor as indicated on the plans and as directed by the Health Department at no additional cost to the Contract.

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### PIPELINE TESTING AND DISINFECTION

Sampling points may be temporary and consist of a corporation tap, 1-inch copper tubing and 1-inch gate valve specifically provided for sample collection. Temporary sampling points may not be removed until the sample results are approved by the Health Department. Sampling points may be permanent, such as a terminal blow-off, fire hydrant, etc.

- B. The Contractor shall be responsible for retaining the services of a testing laboratory certified by State of Florida, and approved by the BCHD in the collection, storage and analysis of water samples from public water systems in accordance with Chapter 62-550.550 (FAC), "Certified Laboratories and Analytical Methods for Public Water Systems".
- C. Bacteriological samples shall be collected from all sampling points shown on the plans, or as directed by the Health Department, and tested against the drinking water standards from Chapter 62-550.310 (FAC), "Primary Drinking Water Standards: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels". Samples shall be tested using methods from AWWA M12, "Simplified Procedures for Water Examination".
- D. Samples shall be collected and tested on each of two successive days. The disinfection process shall be repeated if any individual test results reflect presence of harmful bacteria in the water.
- E. The Contractor shall be responsible for any re-chlorination and re-testing that may be required until the BCHD'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.
- F. No public water mains shall be placed into service until the results of the drinking water analyses are approved by the BCHD, and until they issue a letter releasing the main for service.
- G. Submittals
  - 1. Submit name of testing laboratory and evidence of certification with the State and County Health Departments.
  - 2. Submit three copies of reports.
- H. Project Record Documents
  - 1. Submit reports under provisions of Sections entitled "Submittals" and "Project Closeout".
  - 2. Bacteriological report; accurately record:

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### PIPELINE TESTING AND DISINFECTION

- (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 -