City of St Pete Beach
Request for Bid

Wastewater Lift Station
Numbers 8 and 16

Bids due by November 14th, 2016,
3:00 PM at City Hall, St. Pete Beach, FL

CONTENTS

I. CONTRACTOR'S BID SUBMITTAL

The company that is submitting a bid declares that he/she has extensive experience in municipal construction and is also licensed to do so.

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

The Bidder further declares that he/she has examined the site of the work and informed himself/herself fully in regard to all conditions pertaining to the place where the work is to be done; that he/she has examined the RFB, Plans, and Specifications for the work and Contract Documents relative thereto, and has read all special provisions furnished prior to the opening of bids; and that he/she has satisfied himself/herself relative to the materials to supplied and work to be performed.

The bidder certifies that the information and responses provided within this bid are true, accurate, and complete. The City or its designated representatives may contact any entity or references listed in the response and investigate the company as defined in References & Qualifications to verify the bidder's abilities and quality of work. The contractor hereby grants permission for each entity or reference listed in the bidder's response may make any information concerning the Contractor available to the City.

The Bidder proposes and agrees, if the Bid is accepted, to contract with the City of St. Pete Beach, Florida, in the form of Contract/Agreement specified for: "*WASTEWATER LIFT STATION NUMBERS 8 AND 16*"

In St. Pete Beach, Florida, in full and complete accordance with the shown, noted, described, and reasonably intended requirements of the RFP, Plans, Specifications, Contract Documents, and Addenda to the full and entire satisfaction of the City of St. Pete Beach, Florida, the Bidder proposes to furnish all materials, equipment, labor, and perform the work submitted in their bid schedule for the City of St. Pete Beach's project: "*WASTEWATER LIFT STATION NUMBERS 8 AND 16*".

COMPANY: DATE:
ADDRESS: PHONE:

BY: _____
(SIGNATURE)

NAME: _____
(PRINT NAME & TITLE)

Sworn to and subscribed before me on this _____day of_____, 2015

_____
(Notary Public)

_____
(My Commission Expires)

SUBMIT BID ITEMIZATION WITH BID TO:
CITY OF ST. PETE BEACH

BID FORM ST. PETE BEACH LIFT STATION #8 & #16					
No.	**DESCRIPTION**	**QUANTITY**		**UNIT PRICE**	**AMOUNT**
1	MOBILIZATION	1	LS		
2	BY-PASS PUMPING	1	LS		
3	AS-BUILTS	1	LS		
4	O&M MANUALS	1	LS		
				SUBTOTAL	
	I. LIFT STATION #8				
5	DEMOLISH VALVE VAULT, CONCRETE SLAB AND PUMP STATION PIPING SYSTEM INCLUDING PUMPS, VALVES AND ASSOCIATED APPURTENANCES	1	LS		
6	CONCRETE DRIVEWAY AND SIDEWALK RESTORATION	7	SY		
7	SITE RESTORATION AND LANDSCAPING	1	LS		
8	SUBMERSIBLE PUMPS AND CONTROLS INCLUDING PRESSURE TRANSDUCER, GUIDE RAILS, BRACKETS, AND FLOATS	1	LS		
9	MECHANICAL PIPING AND IMPROVEMENTS INCLUDING ALL FITTINGS, VALVES, SUPPORTS, CAMLOCK, AND PRESSURE GAUGE	1	LS		
10	INSTALL RECLAIM WATER LINE SERVICE AND HOSE BIB	1	LS		
11	CEMENTITIOUS REHABILITATION	1	LS		
12	WET WELL TOP SLAB WITH ALUMINUM HATCH ASSEMBLY	1	LS		
13	VALVE VAULT WITH ALUMINUM HATCH ASSEMBLY	1	LS		
14	ELECTRICAL AND I&C	1	LS		
15	PIPE CLEANING	1	LS		
				SUBTOTAL	

	II. LIFT STATION #16				
16	DEMOLISH FENCING, CONCRETE SLAB AND PUMP STATION PIPING SYSTEM INCLUDING PUMPS, VALVES AND ASSOCIATED APPURTENANCES	1	LS		
17	PAVEMENT REPAIR AND ROAD RESTORATION (SUB-BASE, BASE, AND TEMPORARY ASPHALT)	5	SY		
18	INFRARED ROAD RESTORATION	6	SY		
19	DROP CURB	6	LF		
20	SITE RESTORATION AND LANDSCAPING	1	LS		
21	SUBMERSIBLE PUMPS AND CONTROLS INCLUDING PRESSURE TRANSDUCER, GUIDE RAILS, BRACKETS AND FLOATS	1	LS		
22	MECHANICAL PIPING AND IMPROVEMENTS INCLUDING ALL FITTINGS, VALVES, SUPPORTS, CAMLOCK, AND PRESSURE GAUGE	1	LS		
23	RELOCATION OF WATER SERVICE AND HOSE BIB INSTALLATION	1	LS		
24	CEMENTITIOUS REHABILITATION	1	LS		
25	WET WELL TOP SLAB WITH ALUMINUM HATCH ASSEMBLY	1	LS		
26	VALVE VAULT WITH ALUMINUM HATCH ASSEMBLY	1	LS		
27	ELECTRICAL AND I&C	1	LS		
28	PIPE CLEANING	1	LS		
				SUBTOTAL	
				TOTAL	

II. GENERAL CONTRACT DOCUMENTS

REQUEST FOR BID
Wastewater Lift Station Numbers 8 and 16

BID DOCUMENTS

I. Contractor's Bid Submittal & Bid Schedule
II General Contract Documents
III. References & Qualifications
IV. Certificate of Insurance
V. Contractor's Education & Training
VI. Project Plans and Technical Specifications

The City of St. Pete Beach is soliciting bids from qualified General Contractors for the Wastewater Lift Station Numbers 8 and 16 project.

BID SUBMITTALS
Bid documents must include a signed bid, itemized bid description and fee schedule, project schedule, references, contractor's license and insurance certificates. Any major sub-contractor that will be hired by the contractor for this project must also submit references, contractor's license and insurance certificates. The contractor shall submit one original and two (2) copies of their bid documents with their sealed bid package.

BIDDER INFORMATION
All Contractors must contact the Project Manager, via e-mail, with their intention to bid, along with their company name and contact information. The City is not responsible for any Addendums or other supplementary information that is not received due to non-submittal of the aforementioned information. As always, it shall be the contractors' responsibility to refer back to the website (www.stpetebeach.org) for additional project information as it becomes available.

PRE-BID MEETING
A pre-bid meeting will be held on November 1st, 2016, at 10:00 AM. Meeting will be held at the Public Services Building located at 7581 Boca Ciega Dr., St. Pete Beach, FL, 33706. There will be no site visit.

BID PACKAGES
Sealed bids will be received until 3:00 PM on November 14th, 2016, in the Office of the City Clerk, 155 Corey Avenue, St. Pete Beach Florida at which time they will be publicly opened and read. All bidders are invited to attend this bid opening, which will be held immediately following the closing time specified. Bids received after the deadline will not be accepted.

Bids should be addressed to: City of St. Pete Beach
City Clerk's Office
155 Corey Ave.
St. Pete Beach, FL 33706

Plainly marked as: ***"Wastewater Lift Station Numbers 8 and 16"***

CONTACT INFORMATION

Ian Wade, P.E. - Project Manager
155 Corey Avenue
St. Pete Beach, Florida 33706
Office - (727) 363-9254 Fax - (727) 367-2736
E-mail - iwade@stpetebeach.org

SCOPE OF WORK

- Lift Station No. 8 is located on 380 39th Avenue and Lift Station No. 16 is located on 4104 41st Avenue in St. Pete Beach, Florida.
- The Contractor shall furnish all labor, material, equipment and incidentals necessary for the rehabilitation of Lift Station No. 8 & 16, including, but not limited to, bypass pumping, restoration of existing wet well, fencing, demolition of the existing manholes, structural repairs, construction of new valve vaults, submersible pumps, associated force main piping and valves, control panel and associated electrical equipment, and instrumentation.
- Note that Lift Station No. 8 is currently operating on a bypass pumping system due to recent pump failure. The contractor shall assume responsibility for this bypass system immediately upon contract execution
- The work shall also include furnishing all labor, material, and equipment necessary for site restoration including but not limited to fill replacement, grading, roadway, and sidewalk replacement.
- Access to the Work sites shall be over streets, and walkways. Any damage to existing pavement surface and base or other surface improvements outside the Contract Pay Limits, attributable to the Contractor's activities, shall be restored to like-new condition by the Contractor at the Contractor's expense.

DETAILED SPECIFICATIONS

- **Refer to the Project Plans and Specifications from Kimley Horn, dated September 2016, respectively, included in section VII of this RFB.**
- Site and surrounding area must be free of construction debris upon completion.
- Barricades, cones, and traffic control activities are the responsibility of the Contractor.
- Contractor is responsible for all utility locates through Sunshine One-Call.
- Contractor is responsible for field measurement and review of existing conditions.
- All work to be completed within the project limits or City Right-Of-Way.
- All work is to be done Monday through Friday unless approved by the City.
- Equipment left on site must be approved by Project Manager.
- Contractor will coordinate scheduling of work with Project Manager.
- Contractor is responsible for all cut and patch within the project limits as directed in the Project Plans and Specifications included in section VII. Any disturbed areas not specified are to be patched back equal to or better than the existing.
- Contractor is responsible for all Stormwater BMPs. As per DEP's requirements for MS4's, please provide proof of Site Operator Training based on DEP's Stormwater, Erosion, and Sediment Inspector Training Class.

ADDITIONAL WORK DETAILS

Firms or persons wishing to bid on this project must be licensed, bondable and insured in accordance to the requirements of this bid package. Contractors and sub-contractors must be certified, registered and/or licensed

by the proper construction licensing boards for the work being performed. The contractor will furnish all necessary labor, materials, tools, equipment and supplies to complete the scope of work. Bid must also include all costs for licenses, permits and any material disposal fees.

Bidders shall bring questions, discrepancies, omissions, conflicts or doubt as to meaning of any part of the attached project documents to attention of the City of St Pete Beach Public Services Department at least five (5) days before due date for Bids. Clarification of intent of Contract Documents if necessary shall be made available to bidders in form of Addendum. Failure to request clarification of interpretation of Contract Documents shall not relieve bidders of their responsibilities to perform the work.

The City of St. Pete Beach reserves the right to reject any or all bids or parts of bids or accept any bid or part thereof deemed to be in the best interests to the City.

STATEMENT OF WORK

The Contractor shall furnish and pay the cost, including sales tax and all other applicable taxes, licenses, permits and fees, of all the necessary materials not furnished by the City and shall furnish and pay for all the superintendence, labor, tools, equipment and transportation and perform all the work required for the execution of all services listed in the Bidder's Submittal and Bid Schedule attached hereto and in strict accordance with the Plans, Specifications, and requirements of the City of St. Pete Beach which are attached hereto and made a part hereof, and any amendments thereto and such supplemental Plans and Specifications which may hereafter be approved.

BEGINNING DATE

The Contractor shall assume responsibility for the bypass pumping system immediately upon contract execution, which is anticipated to occur upon approval at the City Commission meeting scheduled for **December 12th, 2016**. Additionally, the contractor must commence construction activities within thirty (30) days of Contract execution. Any change to the start date or the work schedule included with this bid must be submitted in writing to and approved by the City Manager or designee.

Work shall not be performed on Saturdays, Sundays and all legal or City designated holidays, except for special operations that may be necessary in order to maintain, check, or protect work already performed. Work may be permitted on weekends or holidays with approval from the City Manager or designee. No work shall be done at night without prior approval of the City Manager or designee.

COMPLETION DATE

May 1st, 2016

EXAMINATION OF SITE

Bidder shall carefully examine project site and be familiar with the work required for the project, investigate all site conditions that may affect execution of work as detailed in the construction documents. Contact the City's Public Services Department or their designee for changes or alterations before proceeding.

ASSURANCES

The responding contractor shall provide a statement of assurance that the contractor is not presently in violation of any statutes or regulatory rules that might have an impact on the firms operations since submittal of the Statement of Qualifications to the City. All applicable laws and regulations of the State of Florida, and ordinances and regulations of the City of St. Pete Beach will apply.

TRAFFIC CONTROL AND STAGING AREA

Contractor shall include all costs associated with traffic control and maintenance during the project. Contractor shall be provided with a staging area but will be required to control the area with fencing or barricades.

ASSIGNMENT AND TRANSFER OF CONTRACT

The Contractor shall not assign or transfer this Contract or any part thereof or any interest therein without consent in writing of the City and the contractor's Surety, and any such assignment or transfer without such written consent shall be null and void.

SUBCONTRACTS

The Contractor shall not subcontract this Contract or any part thereof or any interest therein without consent in writing of the City and the contractor's Surety. Any Subcontractor approved by the City will be subject to the same standards and qualifications as stated in this Contract.

PERFORMANCE AND PAYMENT BOND

Contractor shall furnish the City with a performance and payment bond in a sum equal to the amount of the Contract price; conditioned upon the performance by the Contractor of all undertakings, covenants, terms, conditions, and agreements of this Contract, and upon the prompt payment by the Contractor to all persons supplying labor and materials in the prosecution of the work provided by the Contract. The Contractor shall execute such bond and a corporate bonding company licensed to transact such business in the State of Florida and acceptable to the City.

The expense of this bond shall be borne by the Contractor. If at any time a Surety on such bond becomes irresponsible or loses its right to do business in the State of Florida, the City may require another Surety that the Contractor shall furnish within ten (10) calendar days after receipt of written notice to do so. Evidence of authority of an attorney in fact, acting for the corporate Surety must be provided in the form of a certificate as to his power of attorney and to the effect that it is not terminated and remains in full force and effect on the date of the bond. The form of the bond shall be subject to approval by the City.

LIQUIDATED DAMAGES

If the work embraced by this Contract is not completed on or before the date set for completion or any extension thereof, the actual damages for the delay will be impossible to determine and in lieu thereof, the Contractor shall pay to the City fixed, agreed and liquidated damages in the amount of Five-Hundred Dollars ($500) per day for each calendar day of delay until the work is satisfactorily completed.

PAYMENT

Payment shall be made to the Contractor for work performed under this Contract for the quantities of work as determined in accordance with Payments for Work Completed and Payments Withheld of this Contract. Payment for extra work will be made in accordance with the Changes in Work, Contract Amount, and Contract Time sections below.

CHANGES IN THE WORK

Without invalidating the Contract, the City may, at any time or from time to time, order additions, deletions or revisions in the work authorized by written Change Orders or directive. Upon receipt of a Change Order, the Contractor will proceed with the work involved. All such work shall be executed under the applicable conditions of the Contract documents. If any Change Order causes an increase or decrease in the Contract Amount or any extension or shortening of the Contract Time, an equitable adjustment will be made.

Additional Work performed by the Contractor without authorization of a Change Order will not entitle him/her to an increase in the Contract Amount or any extension of the Contract Time, except in the case of an emergency (subject to approval by City Manager or designee).

It is the Contractor's responsibility to notify his/her Surety of any changes affecting the general scope of the Work or change of the Contract Amount and the amount of the applicable bonds shall be adjusted accordingly, and an amended bond document furnished to the City. In the event the City directs the Contractor to make a change in the Work, and if the City and the Contractor do not arrive at a mutually acceptable increase or decrease in the Contract Amount, the contractor shall not use any such lack of mutual acceptance as a basis or cause to stop or otherwise delay the progress or the execution and completion of any of the work ordered, directed or required pursuant to the Contract Documents.

If the Contractor believes an event or situation has occurred which justifies a change in the Contract Amount or Contract Time, he shall deliver a written notice to the Project Manager. Each such written notice shall be delivered promptly, and in any event no later than fifteen (15) days after the Contractor first discovered the occurrence. The Contractor shall be deemed to have waived the right to collect any and all costs incurred more than fifteen (15) days prior to the date of delivery of the written notice, and shall be deemed to have waived the right to seek an extension of the Contract Time with respect to any delay in the Progress Schedule which accrued more than fifteen (15) days prior to the date of delivery of the written notice.

Any such notice shall include sufficient detail to explain the basis of entitlement to a claim for an adjustment to the Contract Amount of Contract Time. When requested by the City Manager, the Contractor shall furnish any additional information and details as may be required to determine the facts or allegations involved, which shall be provided within fifteen (15) days of the request unless a longer time period is allowed by the City Manager.

The Contractor shall prepare bids detailing proposed adjustments to Contract Amount and/or Contract Time and submit them to the City Manager within fifteen (15) days of the City's issuance of a proposed Change Order or the Contractor's submitting a written notice of a change or claim for an adjustment to the Contract Amount or Contract Time.

Contractor's bids shall be irrevocable for a period of at least sixty (60) days after receipt by the City. Any delay in the submittal of a complete, adequate and acceptable bid will not justify an increase in Contract Amount or Contract Time. Contractor agrees that it shall give the City access to any and all of Contractor's and Subcontractors' books, records and other materials relating to proposed Change Orders and other claims for adjustment to Contract Amount or Contract Time

CHANGE OF CONTRACT AMOUNT

The Contract Amount constitutes the total compensation payable to the Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by the Contractor shall be at his expense without change in the Contract Amount. The Contract Amount may only be changed by written Change Order issued by the City. Any claim for an increase in the Contract Amount shall be in writing and delivered to the City Manager within fifteen (15) days of the occurrence of the event giving rise to the claim.

All claims for adjustment in the Contract Amount shall be determined by the City Manager. However, no claim for an adjustment to the Contract Amount will be considered for unforeseeable causes that were beyond the fault or negligence of the Contractor or his Subcontractors or supplier such as acts of God, floods, riots, etc. This restriction does not restrict submission of claims for additional Contract Time due to events of this nature. Any change in the Contract Amount shall be incorporated in a Change Order.

Contractor bids or claims shall cover all aspects of the Work involved and shall be fully documented and itemized as to all costs, quantities and charges for overhead and profit. Amounts for Subcontractors or Suppliers at any tier shall be similarly supported. When determining Subcontractors' costs, the methods to be used shall be those used for the Contractor's costs, except that the term "Subcontractor" shall replace the term "Contractor," context permitting.

Changes in Contract Amount for extensions in Contract Time shall exclude costs that are unaffected or do not relate to the extension in Contract Time, such as: (a) operating costs of construction equipment assigned to the Work on a continuing basis, (b) operating costs and owned/rental costs of construction equipment (crane used for specific lifts, concrete pump used for specific pours, etc.), and (c) fully paid site facilities, tools, etc.

The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Amount where the Work involved is covered by unit prices contained in the Contract Documents shall be determined by application of unit prices to the quantities of the items involved. If the quantities originally contemplated are so changed in a proposed Change Order, that application of the Unit Prices to the quantities proposed will cause substantial inequity to the City or the Contractor, the applicable unit price(s) shall be equitably adjusted by mutual agreement.

If the value of work covered by a Change Order cannot be established or mutually agreed to utilizing previously established unit rates, the value shall be determined by the City on the basis of an estimate of the out-of-pocket cost and percentages that are acceptable to the City for overhead and profit. The out-of-pocket cost shall only include those direct costs which are needed to perform the work such as labor (including payroll taxes, fringe

benefits, labor burden and workers' insurance), materials, equipment, and other incidental out-of-pocket construction costs directly involved in the work, including but not limited to small tools, expendables and material costs but shall not include project management or project supervisory costs unless the Change Order includes an increase in the Contract time.

In such case, the Contractor will submit in the form prescribed by the City an itemized cost breakdown together with supporting data.

The amount of credit to be allowed by the Contractor to the City for any such change which results in a net decrease in cost, will be the amount of the actual net decrease as determined by the City. When both additions and credits are involved in any one change, the combined overhead and profit shall be figured on the basis of the net increase, if any.

To be eligible for consideration, the Contractor's written claim for a change in the Contract price, including claim(s) from sub-contractors, shall include an itemized cost breakdown with supporting data as described below:

A. For labor: Provide written documentation from the Contractor and Subcontractors or others as appropriate in the form of a detailed breakdown by each labor classification involved indicating the number of hours of Work involved and the hourly payroll rate applicable to each to substantiate the basis and amount of the direct labor cost. The direct labor cost may be increased to provide an allowance for indirect payroll costs (labor burden), such as payroll taxes, fringe benefits, and workers insurance after all premium discounts, rebates and other appropriate reductions have been taken.

   Allowable labor costs shall be limited to craft labor (including foremen) in the direct employ of the Contractor (or Subcontractor) assigned to the site and engaged in furnishing and incorporating materials or equipment in the Work involved in the Change Order or Claim.

   When determining actual payroll costs, daily time sheets certified by the Contractor and verified by the City Manager along with certified payroll records shall be the valid records.

B. For material, supplies, equipment, furnishings, etc., to be installed or included in the Work: Provide written documentation from the Contractor and Subcontractors, suppliers, etc., to substantiate the basis and amount of the various cost items involved. Material costs shall reflect the Contractor's reasonably anticipated net actual cost after consideration of trade discounts and volume rebates.

C. For construction equipment: Provide written documentation in the form of a detailed breakdown by each construction equipment category indicating, the applicable unit rates (i.e., $'s per hour, $'s per day etc.,) and the number of hours, days, etc. to substantiate the basis and amount of the construction equipment out-of-pocket costs.

CHANGE OF CONTRACT TIME

The Contract Time may only be changed by written Change Order. Any claim for an extension in the Contract Time shall be in writing and include an analysis of the Progress Schedule as further described in the Specifications, and shall be delivered to the City Manager within fifteen (15) days of the occurrence of the event giving rise to the claim. All claims for adjustment in the Contract Time shall be determined by the City Manager. Any change in the Contract Time resulting from any such claim shall be incorporated in a Change Order. The Contract Time may be extended for an amount equal to time lost due to unforeseeable causes beyond the control of the Contractor (and his Subcontractors and Suppliers) if he makes a claim therefore. Such delays shall include, but not be restricted to, acts or neglect by any separate Contractor employed by the City; fires; floods; labor disputes; epidemics or acts of God.

All time limits stated in the Contract Documents are of the essence to the Contract. The stated time limits are agreed to be adequate to complete the work, including the procurement, manufacture and delivery of all material and equipment required, and account for any and all potential impact, delays, disruptions and costs that may be expected.

PAYMENTS FOR WORK COMPLETED

Partial payments will be made as the work progresses at the end of each calendar month, or as soon thereafter as practicable on estimates made by the City Manager or designee and as approved by the City, provided that the Contractor is performing the overall job in a diligent manner. In making partial payments, there shall be retained ten percent (10%) on the amount of each estimate until final completion and acceptance of all work covered by the Contract. Upon completion and acceptance of the work, the City Manager or designee shall issue a certificate that the work has been completed and accepted by him under the conditions of this Contract, and shall make and approve the final estimate of the work. The entire balance found to be due the Contractor, including that retained by the City, should be paid to the Contractor. Such payment shall be conditioned, however, upon the submission by the Contractor of evidence satisfactory to the City that all claims for labor, material, and any other outstanding indebtedness in connection with this Contract have been paid. Such payment shall also be conditioned upon approval and acceptance of the construction and improvements by the City.

If after the work has been substantially completed, full completion thereof is materially delayed through no fault of the Contractor and the City Manager or designee so certifies, the City shall upon the Certificate of the City Manager or designee, and without terminating the Contract make payment for the balance due for that portion of the work fully completed and accepted. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claim If such delay occurs and payment is made under this clause, the Contractor shall nevertheless be prepared to complete the work in a timely manner upon the remedy or removal of such delay, and shall be bound under this Contract for the completion of such work unless this Contract is otherwise terminated.

PAYMENTS WITHHELD

The City Manager or designee may withhold, or, on account of subsequently discovered evidence, nullify the whole or part of any estimate to such extent as may be necessary to protect the City from loss on account of:

(a). Defective work not remedied
(b). Claims filed or reasonable evidence indicating probable filing of claims
(c). Failure of the Contractor to make payments properly to Subcontractors or for material or labor.
(d). A reasonable doubt that the Contract can be completed for the balance then unpaid.
(e). Damage to another Contractor.
(f). Failure of the Contractor to keep his/her work progressing in accordance with his/her time schedule.

FINAL PAYMENTS

Upon the completion and acceptance of the work, the City Manager or designee shall issue a certificate that designates that the whole work provided for in this Contract has been completed and accepted by him under the conditions and the terms thereof and shall make the final estimate of the work. After issuance of the certificate, the entire balance found to be due the Contractor, including said retained percentage by the City in accordance with existing state laws as may be retained lawfully by said City, shall pay excepting such sums to the Contractor. Before the approval of the final payment, the Contractor shall submit evidence satisfactory to the City that states that all payrolls, materials, bills and outstanding indebtedness in connection with this Contract have been paid.

LIENS

If at any time there shall be evidence of any lien or claim for which the City might become liable and which is chargeable to the Contractor, the City shall have the right to retain out of any payment then due or thereafter to become due, an amount sufficient for complete indemnification against such lien or claim. In the event the City has already paid to the Contractor all sums due under this contract or the balance remaining unpaid is insufficient to protect the City, the Contractor and his Surety shall be liable to the City for any loss so sustained.

RESPONSIBILITY OF THE CITY MANAGER OR DESIGNEE

The term "City Manager or designee" wherever used in the Contract shall be the City of St. Pete Beach or its duly authorized representative. Notices of any change in the City Manager or designee shall be given in writing by the City to the Contractor. The City Manager or designee shall have full authority to interpret the Plans and Specifications and shall determine the amount, quality, and acceptance of the work and supplies to be paid for under the Contract and every question relative to the fulfillment of the terms and provisions therein. It shall be the duty of the City Manager or designee to enforce the Plans and Specifications in a fair and unbiased manner.

If a variation from any requirements is allowed the City Manager or designee shall grant the same in writing with the reasons for his action outlined, and such action will not invalidate or change the Contract in any other manner.

INTENT OF PLANS AND SPECIFICATIONS

The Contractor shall keep on the job a copy of the Plans and Specifications and shall at any time give the City Manager or designee access thereto. Anything mentioned in the Specifications and not shown on the Plans or shown on the Plans and not mentioned in the Specifications, shall be of like effect as if shown or mentioned in both. The Contractor shall not take advantage of any errors, discrepancies or omissions that may exist in the Plans and Specifications, but shall immediately call them to the attention of the City Manager or designee whose interpretation or correction thereof shall be conclusive. Should a conflict occur between the General Specifications and any Supplemental Specifications and/or Plans, the latter shall govern.

LICENSES AND PERMITS

The Contractor shall obtain and pay for all necessary City licenses and work permits and shall faithfully comply with all laws, ordinances and regulations, (Federal, State or local) which may be applicable to the operations to be conducted hereunder. Chapter II, Section II-4, "Registration of Licenses Obtained From Other Municipalities:" "Persons, partnerships, corporations, or other business entities doing business with the City who are not required to obtain a City occupational license, but who must have either a State or County or Municipal occupational license from another municipality, shall register such occupational license with St. Pete Beach Community Development Department. The City may charge a fee for such registration." The Contractor shall be responsible for obtaining all City, County, State and Federal permits required by those government agencies and must provide documentation of receipt of those permits prior to project commencement. This shall include a notice to commence work letter and the applicable fee, if required. Any sub-contractor hired by the contractor awarded the project, MUST also register their license with the City.

SUPERINTENDENCE

The Contractor shall constantly superintend all the work embraced in this Contract in person or by a responsible agent who shall have in writing, full authority to act for him/her and to carry out all the instructions given by the City Manager or designee.

LABOR PROVISIONS

The Contractor and his Subcontractors shall discharge, whenever ordered to do so by the City Manager or designee, any employee who is disorderly or whose conduct in the opinion of the City Manager or designee is detrimental to the prosecution of the work. No person whose age or physical condition is such as to make this employment dangerous to his/her health and safety or to the health and safety of others shall be employed on the work, and in no event shall any persons under the age of sixteen (16) years be employed.

LIABILITY INSURANCE

The Contractor shall procure and maintain at his/her own expense, during the life of the Contract, liability insurance as hereinafter specified. All such insurance shall be subject to the approval of the City for adequacy of protection, and shall include a provision preventing cancellation without twenty (20) days prior notice to the City in writing. The City shall be included as an additional insured on all liability insurance. The liability insurance required is as follows: Contractor's General Public Liability and Property Damage Insurance issued to the Contractor and protecting the Contractor from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under this Contract, whether

such operations be by the Contractor or by any Subcontractor hired by the Contractor or anyone directly or indirectly employed by the Contractor or hired by the Contractor.

The successful Contractor shall supply and maintain insurance which defends, indemnifies and holds harmless the City of St. Pete Beach, its officers, employees and agents from and against any and all liability, damage claims, demands, costs, judgments, fees, attorney's fees or loss arising directly out of acts or omissions hereunder by the contractor or third party under the direction or control of the contractor. Such general and excess liability coverage shall be primary to any other coverage carried by the City of St Pete Beach. Contractor must furnish the City with Certificate of Insurance prior to commencement of work. An approved Certificate of Insurance furnished by the contractor's carrier to guarantee the contractor being insured with the City of St Pete Beach must be named as a certificate holder for this contract. The following minimum coverage:

Commercial Liability Insurance $1,000,000.00.
Comprehensive General Liability Insurance of $1,000,000.00 each occurrence.
Personal Injury for $1,000,000.00 each occurrence.
Automobile Liability $1,000,000.00.
General Workers Compensation Insurance as required by Florida law.
Builder's Risk Insurance.

PROTECTION OF WORK AND PROPERTY

The Contractor shall continuously maintain adequate protection of all his/her work and materials from damage or theft and shall protect the City's property and all adjacent property from injury or loss arising in connection with activities under his/her Contract. The Contractor shall make good any such damage, injury, or loss, except such as may be caused by agents or employees of the City.

The Contractor shall take, use, provide, and maintain all necessary precautions, safeguards, and protection to prevent accidents, or injury to persons or property on, about, or adjacent to the site of the work. Should the situation arise that physical security is needed the Contractor will provide security on off days and holidays. The Contractor shall be responsible for all charges incurred with such action.

The Contractor shall post danger signs warning against any hazards created by the work being done under his/her Contract. He/She shall designate a responsible member of his/her organization on the work, whose duty shall be the prevention of accidents, and the name of the person so designated shall be reported to the City Manager or designee and City in writing. In an emergency affecting the safety of life, or of the work or adjoining property, the Contractor, without special instruction or authorization from the City Manager or designee or City, is hereby permitted to act, at his/her own discretion, to prevent such threatened loss or injury, and he/she must take such action if so instructed or authorized by the City Manager or designee. The Contractor shall also protect adjacent property as required by law.

PARKING

Arrange with owner for temporary parking areas to accommodate construction personnel and equipment.

TRANSPORTATION, HANDLING and STORAGE

Transport, handle, protect and store products in accordance with manufacturer's instructions and all environmental regulatory agencies.

VEHICLES

Business vehicles shall be identified on both sides with the name of the company or firm operating the vehicle.

ENVIRONMENTAL PROTECTION

It shall be the Contractor's responsibility to implement construction methods, best management practices, and erosion control methods that avoid water pollution as required by the State of Florida Department of Environmental Protection, City of St. Pete Beach and Pinellas County. Any Contractors in violation of the City of St. Pete Beach Regulations, Pinellas County Regulations, Florida Department of Environmental Protection Regulations or any other regulatory agency regulations shall be the sole responsibility of the Contractor. The Contractor shall hold harmless the City of St. Pete Beach and the City Manager or designee from any fines and litigation resulting from the Contractor's actions. The Contractor shall pay all attorneys' fees, fines, penalties and any other such expenses resulting from the Contractor's actions. The Contractor shall provide all necessary measures to prevent any materials whatsoever from entering the waterway except for those materials, which are shown, on the plans as completed structures. The Contractor shall provide MSDS sheets to the City Manager or Designee on all applicable materials before applying those materials. The contractor shall secure the necessary education, certifications, licenses and permits required by state and local agencies to operate and manage a construction site. The contractor shall abide by all rules and regulations set forth and required by the City of St. Pete Beach's MS4 NPDES Permit.

TIMELY DEMAND FOR STAKES AND INSTRUCTIONS

The Contractor shall provide reasonable and necessary materials, opportunities and assistance for setting stakes and making measurements, including the furnishing of a rodman, or a chainman at intermittent times during the construction period. He /she shall not proceed until he/she has received such stakes and instructions as may be necessary as the work progresses. The work shall be done in strict conformity with such stakes and instructions. The Contractor shall carefully preserve bench marks, reference points and stakes, and in case of willful or careless destruction, he /she will be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

WORKMANSHIP

The Contractor acknowledges that he/she has satisfied himself/herself as to the nature and location of the work; the general and local conditions 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, surface conditions, subsurface conditions, tides or similar physical conditions at the site, the character of equipment and facilities required to prosecute the work. Any failure by the Contractor to acquaint himself/herself with any aspect of the work or with any of the applicable conditions shall not relieve the Contractor from the responsibility to successfully perform the work under the Contract Documents, nor shall it be considered the basis for any claim for additional time or compensation.

UTILITIES

The Contractor shall anticipate all underground obstructions such as water lines, gas lines, sewer lines, utility lines, or any other public or private facility concrete and debris. In all cases where existing utility lines may be interfered with by the work, the Contractor shall give a minimum of thirty six (36) hours' notice to the owners of such utilities, to permit them to relocate the lines prior to construction. No extra payment shall be allowed for the removal, replacement, repair or possible increased cost caused by underground obstructions. The location of existing structures and utilities provided in the plans are approximate only. Any damage to existing structures to remain or work of any kind shall be repaired or restored promptly by, and at the expense of the Contractor.

The Contractor shall at all times protect all desirable trees, plants, curbs, sidewalks, irrigation components, and structures not requiring removal to accomplish the work, whether or not they are shown on the plans. The Contractor must contact the City to obtain tree removal permits for the removal of any tree.

In matters of restoration all materials, construction and workmanship shall be acceptable to the City of St. Pete Beach and the City Manager or designee. No changes in size, shape, configuration, location, materials or construction shall be made without prior written authorization from the City Manager or designee.

No interruption of ingress and egress to private property shall be made unless the Contractor has made prior arrangements acceptable to the owner of the affected property. At the direction of the City Manager or his designee the Contractor shall be required to notify affected residents/property owners of impending activity or inconvenience via door hanger.

The Contractor shall provide all traffic control devices utilized during construction and meet the requirements set forth in the Florida State Department of Transportation "Manual on Traffic Control and Safe Practices for Street and Highway Construction, Maintenance, and Utility Operations."

CLEANING UP

Upon completion or termination of the work the Contractor shall, as directed by the City Manager or designee, remove from the vicinity of the work all equipment and temporary structures, waste materials and rubbish resulting from his operations, leaving the premises in a neat and presentable condition. All debris generated by the Contractor will be removed before leaving the area. All areas will be raked to remove smaller debris. All surrounding sidewalks, parking lots and roadways will be cleared of any dust or debris generated by the Contractor. In the event of his/her failure to do so, the City at the expense of the Contractor may do the same, and his/her Surety shall be responsible therefore.

DEFECTIVE WORK OR MATERIAL

The Contractor shall promptly remove from the premises all work and materials condemned by the City Manager or designee as failing to conform to the Contract, whether incorporated or not, and the Contractor shall promptly replace and re-execute his own work in accordance with the Contract and without expense to the City and shall bear the expense of

making good all work of other Contractors destroyed or damaged by such removal or replacement.

If the Contractor does not remove such condemned work or materials within a reasonable time after notice, the City may remove them and store the materials at the expense of the Contractor. If the Contractor does not pay the expense of such removal within ten (10) days' time thereafter, the City may, upon thirty (30) days written notice sell such materials at auction or at private sale and shall account for the net proceeds thereof after deducting all the costs and expenses that should have been borne by the Contractor.

DISPUTE RESOLUTION

The Contract shall be construed under Florida law. The parties agree that all controversies, claims and other matters in question between the parties arising out of or relating to this Contract or its breach shall be resolved through mediation. Upon notice of any party to the Contract of a dispute, question or controversy, the parties shall agree to the appointment of a qualified mediator. A qualified mediator is a person who has received at least forty (40) hours of mediation training and has actual experience as a mediator in resolving contract disputes. If the dispute, question or controversy is not resolved through mediation within sixty (60) days of a notice of the dispute between the parties, the city reserves the right to seek resolution through court action.

INDEMNITY

The Contractor shall indemnify and save harmless the City, and the City's agents and employees, from and against all losses and all claims, demands, payments, suits, actions, recoveries, and judgments of every nature and description brought or recovered against them by reason of any action or omission of the said Contractor, his agents, or employees, in the execution of the work or in guarding the same.

GENERAL WARRANTY

Neither the final certificate nor any provision in the Contract Documents nor partial or entire occupancy of the premises by the City shall constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting there from that shall appear within a period of eighteen (18) months from the date of final acceptance of the work, unless a longer period is specified. The City shall give notice of observed defects with reasonable promptness.

LAND OF CITY, USE OF, BY CONTRACTOR

The City shall provide the land upon which the work under this Contract is to be done, and will, so far as is convenient, permit the Contractor to use as much of the land as is required for the erection of temporary construction facilities and storage of materials, together with the right of access to same, but beyond this, the Contractor shall provide, at his/her cost and expense, any additional land required. It will be the responsibility of the Contractor to repair or restore to the satisfaction of the City, at their own expense, any damage to land used for the above stated activities or any other activities approved by the City.

OTHER WORK

Wherever work being done by the City or by other Contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be

established by the City Manager or designee to secure the completion of the various portions of the work in general harmony.

OTHER CONTRACTS

The City may award other Contracts. The Contractor shall fully cooperate with such other Contractors and carefully fit his/her own work to that provided under other Contracts, as may be with the performance of work by any other Contractor or City.

DELAYS AND EXTENSION OF TIME

If the Contractor should be delayed at any time in the progress of the work by an act or neglect of the city or the City Manager or designee, or of any employee of either, or by any separate Contractor employed by the City, or by changes ordered in the work, or by strike, lockouts, fire, unusual delay in transportation, unavoidable casualties, or any cases beyond the Contractor's control, or by delay authorized by the City Manager or designee, or by any cause which the City Manager or designee shall decide to justify the delay, then the time of completion shall be extended for such reasonable time as the City Manager or designee may decide. No such extension shall be made for a delay that occurs more than seven (7) days before a claim is made in writing to the City Manager or designee. In the case of a continued cause of delay, only one (1) claim is necessary. This section does not exclude the recovery of damages for delay by either party under other provisions in the Contract Documents.

CITY'S RIGHT TO TAKE OVER THE WORK

If the Contractor shall be adjudged bankrupt, or if he/she should make a general assignment for the benefit of his/her creditors, or if a receiver should be appointed to take over his/her affairs, or if he /she should fail to prosecute his/her work with due diligence and carry the work forward in accordance with his/her work schedule and the time limits set forth in the Contract Documents, or if he/she should fail to substantially perform one or more of the provisions of the Contact Documents to be performed by him, the City may serve written notice on the Contractor and the Surety on his/her performance bond, stating its intention to exercise one of the remedies hereinafter set forth and the grounds upon which the City bases its right to exercise such remedy. In any event, unless the matter complained of is satisfactorily cleared within ten (10) days after the service of such notice, the City may, without prejudice to any other right or remedy exercise one of such remedies at once; having first obtained a certificate from the City Manager or designee that such sufficient cause exists to justify such action.

(a) The City may terminate the services of the Contractor, which termination shall take effect immediately upon service of notice thereof on the Contractor and his Surety, whereupon the Surety shall have the right to take over and perform the Contract. If the Surety does not commence performance of the Contract within ten (10) ten days after service of the notice of termination, the City may itself take over the work, take possession of and use all materials, tools, equipment, and appliances on the premises and prosecute the work to completion by such means as it shall deem best. In the event of such termination of his service, the Contractor shall not be entitled to any further payment under his Contract until the work is completed and accepted. If the City takes over the work and if the unpaid balance of the Contract price when the City takes over the work exceeds the cost of completing the work, including compensation for damages or expenses incurred by the City through the default of the contractor, such excess shall be paid to the Contractor. In such event, if such cost, expenses, and

damages shall exceed such unpaid balance of the Contract price, the Contract and his Surety shall pay the difference to the City. The City Manager or designee shall certify such cost, expenses, and damages.

(b) The City may take control of the work and either make good the deficiencies of the Contractor itself or direct the activities of the Contractor in doing so, employing such additional help as the City deems advisable. In such event, the City shall be entitled to collect from the Contractor and his Surety, or to deduct from any payment then or thereafter due the Contractor, the costs incurred by it through the default of the Contractor, provided the City Manager or designee approves the amount thus charged to the Contractor.

(c) The City may require the Surety on the Contractor's bond to take control of the work at once and see to it that all deficiencies of the Contractor are made good with due diligence. As between the City and the Surety, the cost of making good such deficiencies shall all be borne by the Surety. If the Surety takes over the work, either upon termination of the services of the Contractor or upon instructions from the City to do so, the provisions of the Contract Documents shall govern in respect to the work done by the Surety, the Surety being substituted for the Contractor as to such provisions, including provisions as to the payment for the work and provisions of this section as to the right of the City to do the work itself or to take control of the work.

RIGHT OF OCCUPANCY

The City shall have the right, if necessary, to take possession of and to use any completed or partially completed portions of the work, if such use be approved by the City Manager or designee even if the time for completing the entire work or such portions of the work has not expired and even if the work has not been finally accepted. Such possession and use shall not constitute an acceptance of such possession and use if it materially interferes with the Contractor's operations. The City shall also have the right to enter the premises with the Contractor for the purpose of doing work not covered by its Contract.

ACCEPTANCE

Final inspection and acceptance of the work shall be made for the City by the City Manager or designee. Such inspection shall be made as soon as practical after the Contractor has notified the City in writing that the work is ready for such inspection.

WAIVER

It is expressly understood and agreed that any waiver granted by the City Manager or designee of any term, provision or covenants of the Contract shall not constitute a precedent or breach of the same or any other terms, provisions, or covenants of the Contract. Neither the acceptance of the work by the City nor the payment of all or any part of the sum due the Contractor hereunder shall constitute a waiver by the City of any claim which the City may have against the Contractor/Surety under this Contract or otherwise.

INSPECTION

The City Manager or designee and his representative shall, at all times, have access to the work during its construction and shall be furnished with every reasonable facility for ascertaining that the stock and materials used and employed, and the workmanship, are in accordance with the requirements and intentions of the Plans. All work done and all materials furnished shall be subject to their inspection and approval by the City Manager

or his designee. If any work should be covered up without approval or consent of City Manager or designee, it must, if required by the City Manager or designee, be uncovered for examination at the Contractor's expense.

The City Manager or designee may order re-examination of questioned work and if so ordered, the Contractor must uncover the work. If such work were found in accordance with the Contract Documents, the City shall pay the cost of re-examination and replacement. If such work be found not in accordance with the Contract Documents, the Contractor shall pay such cost unless he /she shall show that the defect in the work was caused by another Contractor, and in that event, the City shall pay such cost.

The inspection of the work shall not relieve the Contractor of any of his/her obligations to fulfill his/her Contract as prescribed, and defective work shall be made good and unsuitable materials shall be rejected, notwithstanding that such defective work and materials have been previously overlooked and accepted on estimates for payment. All work shall be tested to the satisfaction of the City Manager or designee before acceptance.

AS-BUILTS

Please submit final as-built drawings in PDF format to the City, delivered either via email or on a USB storage device.

BID REVIEW AND CONTRACT AWARD

Failure to submit all documents requested at the time of bid may deem the contractor's bid ineligible for award. The City of St. Pete Beach reserves the right to reject any or all bids or parts of bids or accept any bid or part thereof deemed to be in the best interests to the City of St. Pete Beach. The City shall be the sole final judge of qualifications of the bidder to perform service and reserves the exclusive right to accept or reject any bids as it deems to be in the best interests of the City. The City may waive any informalities.

LOCAL, STATE AND FEDERAL COMPLAINCE REQUIREMENTS

The laws of the State of Florida do apply to any purchase made under this Request for Bid. Proposers shall comply with all local, state, and federal directives, orders and laws as applicable to their bid and subsequent contracts include but not limited to Equal Employment Opportunity, Minority Business Enterprise, and OSHA as applicable to this contract.

A PROVISION FOR OTHER AGENCIES

Unless otherwise stipulated by the proposer, the proposer agrees to make available to all Government agencies, departments, and municipalities the bid prices submitted in accordance with said bid terms and conditions therein, should any said governmental entity desire to buy under this bid. Eligible users shall meet all State of Florida agencies, the legislative and judicial branches, political subdivisions (counties, local district school boards, community colleges, municipalities, or other public agencies or authorities), which may desire to purchase under the terms and conditions of this contract.

BID BOND

Each bid shall be accompanied by a bid bond or a cashier's check or certified check from a bank insured by the Federal Deposit Insurance Corporation (FDIC) in an amount equal to not less than five percent (5%) of the bid amount.

RESERVES THE RIGHT

The City reserves the right to accept or reject any and/or all bids, to waive irregularities and technicalities, and to request re-submission. If only one bid is received by the bid date and time listed, the bid may or may not be rejected by the City depending upon bid review and the needs of the City.

The City reserves the right to select a firm with or without additional interviews, and may decide to select any of the firms submitting bids. The City reserves the right to award the contract to a responsible proposer submitting a responsible bid, with a resulting negotiated agreement which is most advantageous and in the best interest of the City.

Proposers, bidders, their agents, and associates shall not contact or solicit any City Commission member, City employee, or official regarding this RFB during any phase of the bidding process. Failure to comply with the provision may result in disqualification of the bidder, at the option of the City. Only that individual listed, or an approved designee, as the contact person for this RFB shall be contacted.

Once bids are submitted to the City, they cannot be withdrawn.

III
REFERENCES & QUALIFICATIONS

Provide at least (3) three or more professional, business references with which you have contracted to provide similar services in the past (5) five years. Include the name of the person, their organization and telephone number, fax number, and e-mail address. Include any governmental agencies, with the same contact and descriptive information for which you have provided similar service within the past (5) five years.

Provide a brief description of the history and capabilities of the firm. Describe the types of projects or services the firm performs/has performed and the dollar value of each. Provide information regarding your firm's ability to complete this project. Demonstrate that the firm's personnel have experience with similar projects.

Identify all unresolved and ongoing claims and disputes against your firm in excess of $500,000. Include any claims against the principals of your firm or any claims your company may have against a third party. Provide a history of litigation, including the outcomes, for the past (5) five years.

The responding firm shall provide a statement of assurance that the firm is not presently in violations of any statutes or regulatory rules that might have an impact on the firms operations. All applicable laws and regulations of the State of Florida and ordinances and regulations of the City of St. Pete Beach will apply.

Provide the overall bonding capacity for the company and provide a history of any claims against the bidder's previous bonds for the past five years.

The City shall be the sole final judge of qualifications of bidder to perform service and reserves the exclusive right to accept or reject any bid as it deems to be in the best interests of the City. The City reserves the right to make such investigation, as it deems necessary, to determine the ability of any proposer to perform the work or service requested.

IV
CERTIFICATE OF INSURANCE

INSURANCE

Include in bid an approved Certificate of Insurance furnished by the contractor's carrier to guarantee the contractor is insured. **Some insurance coverage requirements may not be applicable to all RFB's and contracts.**

AWARD OF CONTRACT

The Contactor must file with the City of St Pete Beach certificates of insurance prior to commencement of work evidencing the City as a certificate holder with the following minimum coverage:

- Commercial Liability Insurance $1,000,000.00.
- Comprehensive General Liability Insurance of $1,000,000.00 each occurrence.
- Personal Injury for $1,000,000.00 each occurrence.
- Automobile Liability $1,000,000.00.
- General Workers Compensation Insurance as required by Florida law

V. Contractor Education & Training

City of St. Pete Beach
Public Services Department
155 Corey Avenue
St. Pete Beach, Florida 33706-1839
Phone: 727-363-9254 * Fax: 727-367-2736
www.stpetebeach.org

In concurrence with NPDES MS4 requirements, our staff has reviewed information and training materials on the topic of erosion and sediment control, illicit discharges, along with spill prevention and response as provided by the City of St. Pete Beach through the website and video links provided below.

Illicit Discharges:

Illicit Discharges Illicit Discharge Training Video - Part 1 Illicit Discharge Training Video - Part 2

Construction Activities & BMPs:

Discharges from Construction Activities Construction Site Stormwater Runoff Control
BMP Inspection and Maintenance Stormwater and the Construction Industry

Erosion and Sedimentation Control:

Erosion and Sedimentation Control

Spill Prevention and Control:

Spill Prevention and Control

Local Resources:

Pinellas County Watershed Management - Stormwater Runoff
Pinellas County Watershed Management City of St. Pete Beach Stormwater Fact Sheet
City of St. Pete Beach Public Services Department

Company Name: _____

Signature: _____

Name/Title: _____

Date: _____

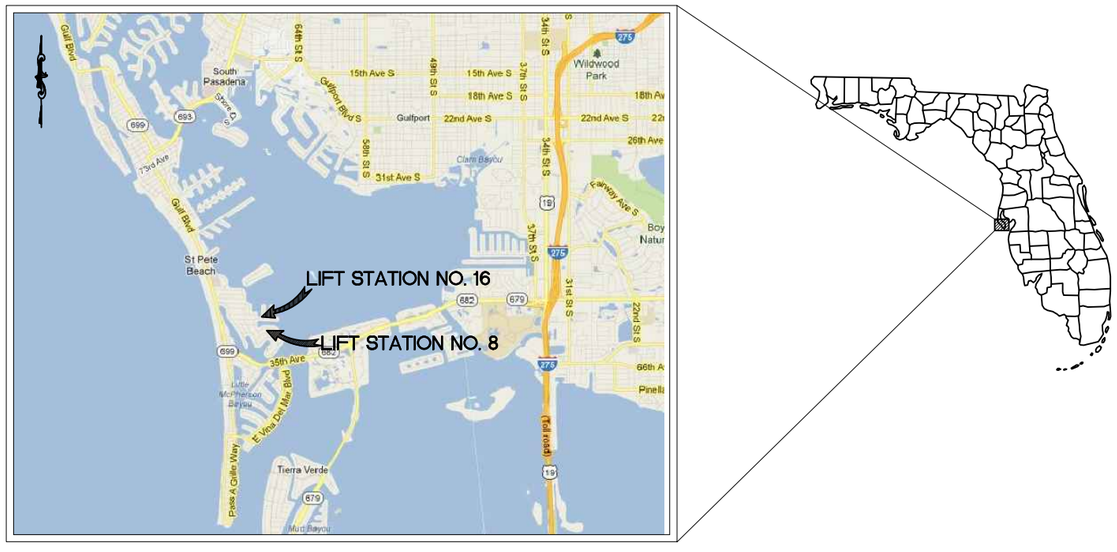
All site inspectors and site operators must be certified through the Florida Stormwater, Erosion and Sedimentation Control Inspector Training and certification program or an equivalent program approved by FDEP. All certification documents and copies of licenses must be provided to the City.

VI.

PROJECT PLANS AND TECHNICAL SPECIFICATIONS

LIFT STATIONS NO. 8 & 16
REHABILITATION
SEPTEMBER 2016

CITY OF ST. PETE BEACH, FLORIDA



PROJECT VICINITY MAP

PREPARED BY
Kimley»Horn

655 NORTH FRANKLIN STREET, SUITE 150
TAMPA, FL 33602
PHONE (813) 620-1460
WWW.KIMLEY-HORN.COM CA 00000696

JORDAN W. WALKER, P.E.
No. 78652

DISCIPLINE	DRAWING	TITLE
GENERAL	G-0.1	COVER SHEET
	G-0.2	DRAWING INDEX AND GENERAL NOTES
SURVEY	SH. 1 OF 1	TOPOGRAPHIC SURVEY FOR LS 8
	SH. 1 OF 1	TOPOGRAPHIC SURVEY FOR LS 16
CIVIL	C-0.1	LS 8 SITE PLAN
	C-0.2	LS 8 DEMOLITION & PROPOSED PLAN
	C-0.3	LS 16 SITE PLAN
	C-0.4	LS 16 DEMOLITION & PROPOSED PLAN
	C-0.5	DETAILS
	C-0.6	DETAILS
	C-0.7	DETAILS
ELECTRICAL	E-0.0	ELECTRICAL LEGEND
	E-0.1	LIFT STATION NO. 8 ELECTRICAL SITE PLAN
	E-0.2	LIFT STATION NO. 16 ELECTRICAL SITE PLAN
	E-3.0	LIFT STATION ELECTRICAL RACK ELEVATIONS
	E-3.1	PUMP CONTROL CABINET DETAILS
	E-3.2	LIFT STATION CONTROL WIRING SCHEMATIC
	E-3.3	LIFT STATION NO. 8 & 16 ONE-LINE DIAGRAM
	E-3.4	LIFT STATION NO. 8 & 16 DETAILS

LEGEND

DEMOLITION

PROPOSED FLANGED JOINT PIPE

PROPOSED MECHANICAL JOINT PIPE

R/W LINE

EX. BURIED TEL. — BT — BT —

CONTOUR LINES — 5' —

PROPOSED CONCRETE

EX. CONCRETE SURFACE

EX. ASPHALT

EX. RECLAIM WATER — RW — RW —

EX. GRAVITY SEWER — SS — SS —

EX. WATER MAIN — W — W —

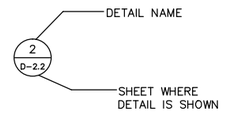
EX. STORM

SPOT ELEVATIONS × 7.00

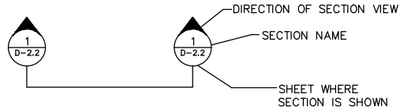
SURVEY LEGEND

	SITE BENCHMARK
R/W	RIGHT-OF-WAY
INV	INVERT
EL	ELEVATION
BFP	BACKFLOW PREVENTER
IP	IRON PIPE
IR	IRON ROD
ND	NAIL W/ DISC
OHW	OVERHEAD WIRES
PB	PLAT BOOK
PG	PAGE
PID	PARCEL IDENTIFICATION
P/O	PART OF
ARV	AIR RELEASE VALVE
MH	MANHOLE
	SANITARY MANHOLE
	UTILITY POLE W/ GUY WIRE
	MAILBOX
	WATER METER
	BACK FLOW PREVENTER
	FIRE HYDRANT
	PALM

DETAIL CALL OUT SYMBOLS



SECTION CUT SYMBOLS



DEMOLITION NOTES

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
2. CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
3. CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY FLOW INTERRUPTION.
4. ALL EXISTING MECHANICAL PIPING AND EQUIPMENT SHALL BE REMOVED AND SALVAGED PER SPECIFICATIONS.
5. CONTRACTOR IS RESPONSIBLE FOR DISPOSAL OF DEMOLISHED MATERIAL. DISPOSAL SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
6. PRESSURE WASH AND CLEAN WETWELL ONCE EQUIPMENT IS REMOVED.

SEQUENCE OF CONSTRUCTION NOTES

1. CONTRACTOR TO SUBMIT A "PUMP-AROUND" PLAN TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PLACING THE "PUMP-AROUND" SYSTEM INTO SERVICE. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE OF TRAFFIC, COST OF SETTING UP PUMP-AROUND SYSTEM, MAINTAINING THE SYSTEM, REMOVAL OF SYSTEM , AND REMOVAL OF ANY WASTE COLLECTED.
2. CONTRACTOR SHALL COORDINATE WITH DUKE ENERGY TO SECURE TEMPORARY POWER FOR "PUMP-AROUND" SYSTEM. CONTRACTOR SHALL PROVIDE A DIESEL-POWERED "PUMP-AROUND" PUMP AS A BACKUP.
3. PUMP-AROUND SYSTEM SHALL MEET CITY OF ST. PETE BEACH NOISE ORDINANCE.
4. AFTER "PUMP-AROUND" SYSTEM HAS BEEN APPROVED AND IS IN OPERATION, CONTRACTOR SHALL BEGIN REPLACEMENT OF THE EXISTING EQUIPMENT AND PIPING AS DELINEATED.
5. CONTRACTOR SHALL TEST THE NEW FACILITY AND RESTORE THE SITE TO PRE EXISTING CONDITION ONCE ALL TESTS ARE COMPLETED.
6. PUMP-AROUND SHALL NOT BE REMOVED UNTIL CLEARANCE THROUGH FDEP IS RECEIVED.

WETWELL NOTES

1. ALL WETWELL AND EXPOSED DUCTILE IRON PIPING IS TO BE FLANGED. ALL BURIED PIPE AND FITTING SHALL BE MECHANICAL JOINT.
2. SEE SITE PLAN FOR CORRECT ORIENTATION OF PIPES, VENTS, AND OTHER FIXTURES.
3. THE CONTRACTOR SHALL COORDINATE PLACEMENT OF ACCESS COVERS WITH THE PUMP MANUFACTURER TO ENSURE THAT PROPER CLEARANCES ARE ATTAINED.

PUMP INSTALLATION NOTES

1. TEST BY WIRING ALL WIRES AND MOTORS. READINGS SHALL BE 20 MEGA-OHMS OR MORE TO GROUND. (DO NO MEGGER LOW VOLTAGE CONTROLS)
2. OPERATE PUMPS, CHECK DIRECTION, RECORD VOLTAGE AND AMPERAGE WITH EACH AND BOTH RUNNING. ALL WORK TO BE COMPLETED WITH THE SUPPLIER'S FIELD REPRESENTATIVE PRESENT.
3. ALL CABLES GOING TO WETWELLS SHALL BE CONTINUOUS WITH NO SPLICES.
4. CABLES FOR PUMP MOTORS SHALL BE SUFFICIENT LENGTH TO ALLOW PUMP MOTORS TO BE REMOVED FOR SERVICING.

GENERAL NOTES

1. LOCATIONS, ELEVATIONS, AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THESE PLANS, BUT DO NOT PURPORT TO BE ABSOLUTELY CORRECT OR COMPLETE. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL VERIFY AND AGREE TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL EXISTING UTILITIES, STRUCTURES, AND OTHER FEATURES AFFECTING HIS WORK. ANYTHING NOT SHOWN ON THESE DRAWINGS SHOULD BE BROUGHT TO THE ATTENTION OF THE ENGINEER AND SHALL NOT CONSTITUTE AN EXTRA EXPENSE, UNLESS APPROVED BY THE OWNER. THE CONTRACTOR SHALL NOTIFY THE RESPECTIVE UTILITY COMPANIES NO LATER THAN 48 HOURS PRIOR TO COMMENCING WORK IN A SPECIFIC AREA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE VERIFICATION OF ALL UTILITIES LOCATIONS WITHIN THE WORK AREA.
2. THE CONTRACTOR SHALL CONTACT THE ENGINEER IMMEDIATELY CONCERNING ANY CONFLICTS ARISING DURING CONSTRUCTION OF ANY IMPROVEMENTS SHOWN ON THESE DRAWINGS.
3. SHOP DRAWINGS SHALL BE FURNISHED TO THE ENGINEER FOR REVIEW OF ALL PIPE CONNECTIONS, TRANSITIONS, AND SPECIAL MATERIALS PRIOR TO FABRICATION OR DELIVERY TO THE JOB SITE.
4. ALL ROADWAYS, CURBS, SIDEWALKS, LAWNS, LANDSCAPING, MAILBOXES, SIGNS, ETC. DISTURBED DURING THE WORK SHALL BE RESTORED TO A CONDITION EQUAL TO THAT EXISTING PRIOR TO CONSTRUCTION AND/OR AS SHOWN ON THE DRAWINGS AND SPECIFICATIONS. CURB, DRIVEWAY, SIDEWALK REPLACEMENT AND ASPHALT SHALL BE IN ACCORDANCE WITH FDOT STANDARD DRAWINGS AND SPECIFICATIONS.
5. ALL JOINTS WHERE REQUIRED SHALL BE RESTRAINED IN ACCORDANCE WITH THE SPECIFICATIONS AND AS SHOWN ON THE DRAWINGS. CONCRETE REACTION BLOCKS WILL NOT BE APPROVED IN LIEU OF RESTRAINED JOINTS UNLESS DIRECTION BY THE ENGINEER AND OWNER.
6. THE CONTRACTOR SHALL CONFINE WORK WITHIN THE LIMITS OF EXISTING RIGHTS-OF-WAYS AND LIMITS OF CONSTRUCTION AS SHOWN ON THE DRAWINGS.
7. CONTRACTOR SHALL PROVIDE MAINTENANCE OF TRAFFIC IN ACCORDANCE WITH THE SPECIFICATIONS.
8. CONTRACTOR SHALL CONTACT MR. DAVID BENEVIDES, PUBLIC SERVICES DEPARTMENT (727) 423-0577 TO COORDINATE THE SHUTDOWN OF ANY EXISTING LIFT STATION.
9. THE CONTRACTOR SHALL NOTIFY THE RESPECTIVE PROPERTY OWNERS A MINIMUM OF 24 HOURS IN ADVANCE OF ANY AND ALL WORK REQUIRING DISRUPTION IN SERVICE TO ANY BUSINESS OR RESIDENCE SHALL NOT EXCEED 2 HOURS FOR WATER AND 4 HOURS FOR SANITARY SEWER SERVICE. ACCESS TO PROPERTY SHALL BE MAINTAINED AT ALL TIMES.
10. PROPERTY MARKERS SHALL BE PROTECTED BY THE CONTRACTOR, THE CONTRACTOR'S REGISTERED SURVEYOR SHALL REPLACE ANY MARKERS THAT ARE DISTURBED.
11. THE CONTRACTOR SHALL PROVIDE AND IMPLEMENT SITE SPECIFIC EROSION AND SEDIMENT CONTROL PROCEDURES SUCH AS HAY BALES OR SILT SCREENS, OR OTHER APPROVED METHODS AS REQUIRED, TO PREVENT THE TRANSPORT OF SEDIMENT DOWNSTREAM INTO STREETS, STORM SEWERS, DITCHES, PONDS, ETC.
12. ALL EXISTING TRAFFIC SIGNS WITHIN THE PROPOSED CONSTRUCTION LIMITS ARE TO BE PROTECTED BY THE CONTRACTOR. CAUTION SHOULD BE EXERCISED WHILE RELOCATING EXISTING SIGNS WHERE DIRECTED. IF THE SIGNS ARE DAMAGED BEYOND USE, AS DETERMINED BY THE ENGINEER, SIGNS SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE.
13. THE CONTRACTOR SHALL ADJUST (AS REQUIRED) PIPELINE ALIGNMENTS HORIZONTALLY AND/OR VERTICALLY TO AVOID CONFLICTS WITH ACTUAL FIELD CONDITIONS AS UNCOVERED DURING CONSTRUCTION. FIELD ADJUSTMENT SHALL BE COORDINATED WITH, AND APPROVED BY, THE ENGINEER.
14. THE CONTRACTOR SHALL PROVIDE ALL DEWATERING EQUIPMENT NECESSARY TO KEEP EXCAVATIONS DRY AND SHALL PROVIDE ALL SHORING, SHEETING, AND BRACING NECESSARY TO PROTECT WORKMEN, ADJACENT STRUCTURES, UTILITIES, EXISTING PAVEMENT, OR TO MINIMIZE TRENCH WIDTH AT NO ADDITIONAL COST.
15. EXISTING PUMPS AND PUMP RAILS ARE TO BE SALVAGED AND DELIVERED BY CONTRACTOR TO CITY OF ST. PETE BEACH PUBLIC SERVICE YARD.
16. THE CONTRACTOR SHALL PROTECT ALL EXISTING STRUCTURES, STORM DRAINS, SEWERS, UTILITIES, AND OTHER FACILITIES IN THE CONSTRUCTION AREA. THE CONTRACTOR SHALL REPAIR ANY DAMAGES DUE TO HIS CONSTRUCTION.
17. WHERE IT IS NECESSARY TO DEFLECT PIPE EITHER HORIZONTALLY OR VERTICALLY, PIPE JOINT DEFLECTION SHALL NOT EXCEED 75% OF THE MANUFACTURERS' MAXIMUM RECOMMENDED DEFLECTION.

UTILITY NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE FOLLOWING JURISDICTIONAL BODIES AND UTILITY COMPANIES:

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DUKE ENERGY
JOHN KRUSZONA
6565 38TH AVE N
ST.PETERSBURG, FL 33710
(727) 593-6934

PINELLAS COUNTY UTILITIES
JAY PERKINS
14 S. FORT HARRISON AVE 6TH FLOOR
CLEARWATER, FL 33756
727-464-3536

FRONTIER COMMUNICATIONS
DAN SULLIVAN
1280 CLEVELAND STREET
CLEARWATER, FL 33755
727-562-1178

CITY OF ST. PETE BEACH
IAN WADE
155 COREY AVE
ST. PETE BEACH, FL 33706
(727) 363-9254

2. ALL BELOW GROUND DUCTILE IRON PIPE AND FITTINGS SHALL BE ENCASED IN A POLYETHYLENE WRAP IN ACCORDANCE WITH AWWA STANDARDS.
3. ALL VALVE BOX COVERS SHALL BE PAINTED TO INDICATE THEIR TYPE OF SERVICE.
4. ALL TEST POINT TAPPING SHALL BE CUT LOOSE FROM THE CORPORATION STOP AND COMPLETELY REMOVED AND DISPOSED OF BY THE CONTRACTOR PRIOR TO FINAL ACCEPTANCE. THE CORPORATION STOP SHALL BE CAPPED AND REMAIN IN PLACE,
5. ADJUST EXISTING MANHOLE FRAMES AND COVERS TO MATCH FINAL GRADE.

GROUNDWATER / DEWATERING NOTE:

THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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655 NORTH FRANKLIN STREET, SUITE 150, TAMPA, FL 33602
PHONE: 813-620-1460
WWW.KIMLEY-HORN.COM CA 00000696

DESIGN ENGINEER: JORDAN W. WALKER, P.E.
FLORIDA REGISTRATION NUMBER: 78652
DATE:

SCALE AS NOTED
DESIGNED BY JRT
DRAWN BY JRT
CHECKED BY JWW

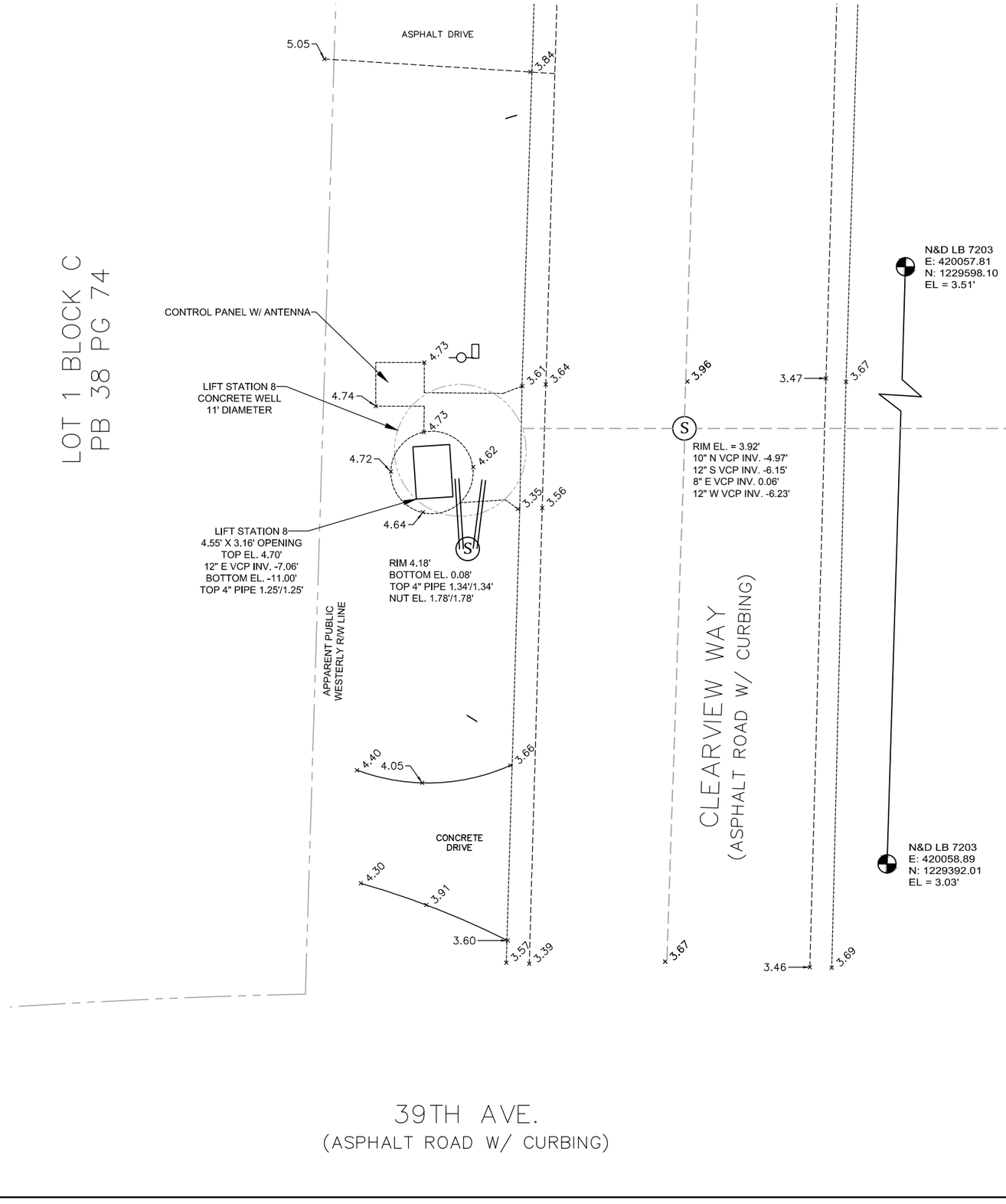
DRAWING INDEX & GENERAL NOTES

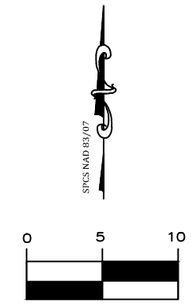
CITY OF ST. PETE BEACH
LIFT STATIONS NO. 8 & 16
REHABILITATION
PINELLAS COUNTY FLORIDA

DATE
SEPTEMBER 2016

PROJECT NO.
148404012

SHEET NUMBER
G-0.2





LEGEND

	SITE BENCHMARK		SANITARY MANHOLE
R/W	RIGHT-OF-WAY	MB	UTILITY POLE W/ GUY WIRE
INV	INVERT		MAILBOX
EL	ELEVATION		WATER METER
BFP	BACKFLOW PREVENTER		BACK FLOW PREVENTER
IP	IRON PIPE		FIRE HYDRANT
IR	IRON ROD		PALM
ND	NAIL W/ DISC		
OHW	OVERHEAD WIRES		
PB	PLAT BOOK		
PG	PAGE		
PID	PARCEL IDENTIFICATION		
P/O	PART OF		
ARV	AIR RELEASE VALVE		
MH	MANHOLE		

SURVEYOR'S NOTES

1. THIS SURVEY IS REFERENCED TO A PROJECTION OF THE STATE PLANE COORDINATE SYSTEM OF FLORIDA WEST ZONE (NAD 83/07).

2. THE FOLLOWING NGS VERTICAL CONTROL POINT WAS RECOVERED AND UTILIZED FOR THE ELEVATIONS INDICATED HEREON:
"BLIND PASS PID # AG0352 ELEV. = 6.47'"

3. LOCATION OF THE RIGHT-OF-WAY LINES ARE THE RESULT OF FOUND BOUNDARY MONUMENTION TOGETHER WITH AVAILABLE PUBLIC RECORD INFORMATION. TITLE WORK WAS NOT PROVIDED. THIS IS NOT A BOUNDARY SURVEY.

4. THIS SURVEY IS SUBJECT TO PERTINENT EASEMENTS, RIGHTS OF WAY AND RESTRICTIONS OF RECORD, IF ANY.

5. THE LOCATION OF UTILITIES, FOUNDATIONS OR STRUCTURES, IF ANY, BENEATH THE SURFACE HAVE NOT BEEN DETERMINED.

6. THIS SURVEY DRAWING WAS PREPARED FOR THE EXCLUSIVE USE OF THE PARTY OR PARTIES CERTIFIED TO BELOW FOR THE EXPRESS PURPOSE STATED HEREON AND/OR CONTAINED IN THE CONTRACT BETWEEN HYATT SURVEY SERVICES, INC. AND THE CLIENT FOR THIS PROJECT. COPYING, DISTRIBUTING AND/OR USING THIS DRAWING, IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN ORIGINALLY INTENDED WITHOUT WRITTEN CONSENT FROM HYATT SURVEY SERVICES, INC. IS STRICTLY PROHIBITED AND RENDERS THE SURVEYOR'S CERTIFICATION, SIGNATURE AND SEAL NULL AND VOID. ANY QUESTIONS CONCERNING THE CONTENT OR PURPOSE OF THIS DRAWING SHOULD BE DIRECTED TO HYATT SURVEY SERVICES, INC.

TOPOGRAPHIC SURVEY
LIFT STATION 8
ST. PETE BEACH
PINELLAS COUNTY, FLORIDA

THIS SURVEY IS NOT VALID WITHOUT THE SIGNATURE AND ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.

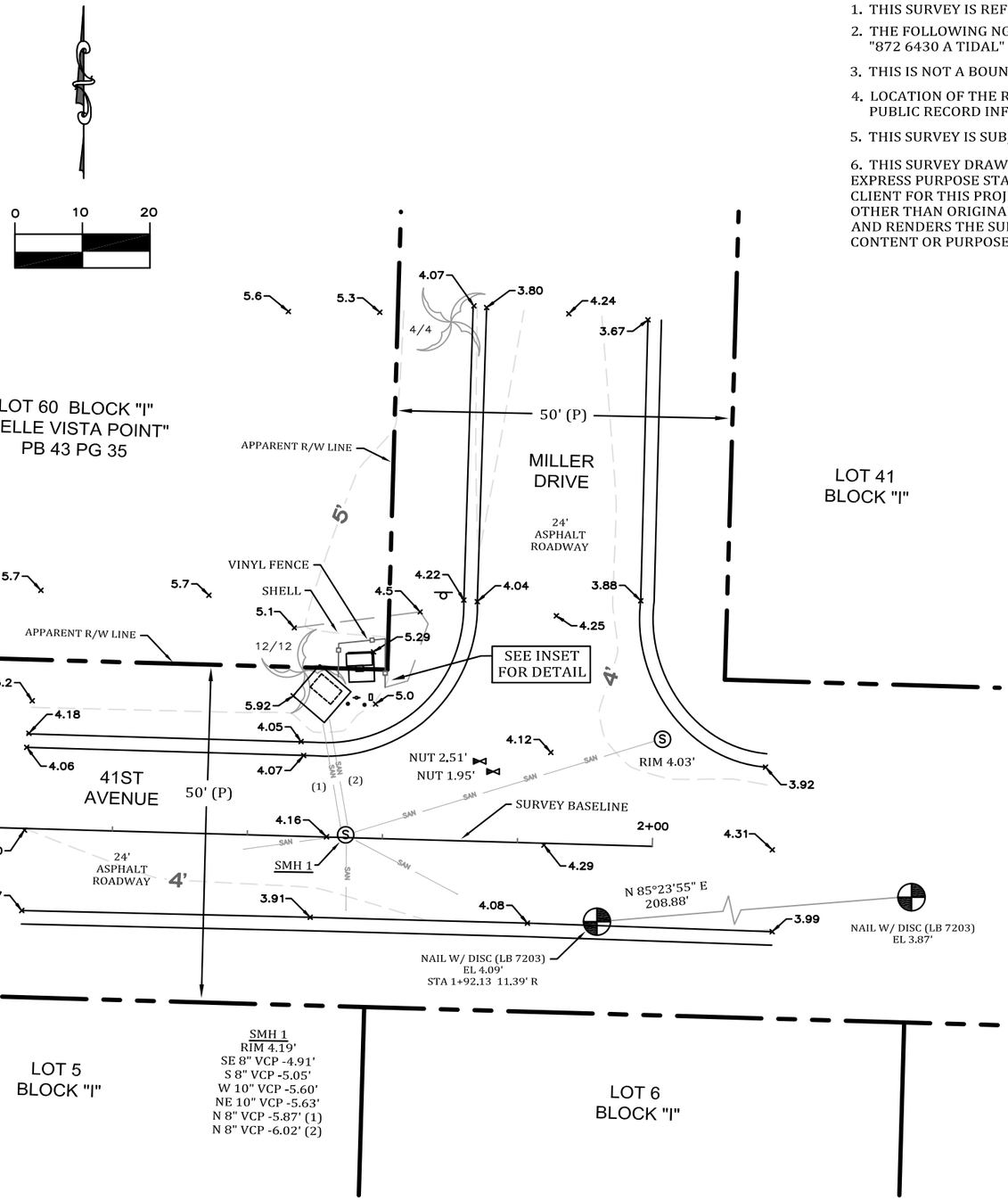
RUSSELL P. HYATT, PSM
FLORIDA SURVEYORS REGISTRATION NO. 5303

Hyatt Survey Services, Inc.
LB No.: 7203 Geographic Data Specialists
11007 8th Avenue East Bradenton, Florida 34212
Phone: (941) 748-4693 Fax: (941) 744-1643

PROJECT #	15-1992	
SURVEY #	LS 8	
SEC./TWN./RGE		
SCALE	1" = 10'	
	BY	DATE
SURVEYED	HYATT	12/2015
DESIGNED		
DRAWN	SC	01/2016
CHECKED	RH	01/2016

SHEET 1 OF 1

TOPOGRAPHIC SURVEY
LIFT STATION 16
ST. PETE BEACH
PINELLAS COUNTY, FLORIDA

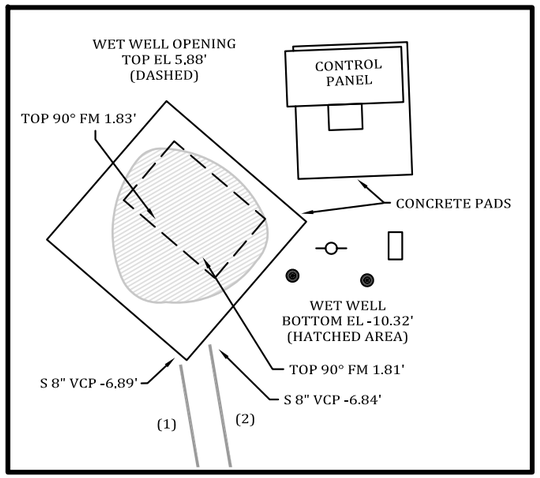


SURVEYOR'S NOTES

1. THIS SURVEY IS REFERENCED TO A PROJECTION OF THE STATE PLANE COORDINATE SYSTEM OF FLORIDA WEST ZONE (NAD 83/11).
2. THE FOLLOWING NGS VERTICAL CONTROL POINT WAS RECOVERED AND UTILIZED FOR THE ELEVATIONS INDICATED HEREON: "872 6430 A TIDAL" NAVD 1988 ELEVATION 4.13'.
3. THIS IS NOT A BOUNDARY SURVEY.
4. LOCATION OF THE RIGHT-OF-WAY LINES ARE THE RESULT OF FOUND BOUNDARY MONUMENTION TOGETHER WITH AVAILABLE PUBLIC RECORD INFORMATION. TITLE WORK WAS NOT PROVIDED.
5. THIS SURVEY IS SUBJECT TO PERTINENT EASEMENTS, RIGHTS OF WAY AND RESTRICTIONS OF RECORD, IF ANY.
6. THIS SURVEY DRAWING WAS PREPARED FOR THE EXCLUSIVE USE OF THE PARTY OR PARTIES CERTIFIED TO BELOW FOR THE EXPRESS PURPOSE STATED HEREON AND/OR CONTAINED IN THE CONTRACT BETWEEN HYATT SURVEY SERVICES, INC. AND THE CLIENT FOR THIS PROJECT. COPYING, DISTRIBUTING AND/OR USING THIS DRAWING, IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN ORIGINALLY INTENDED WITHOUT WRITTEN CONSENT FROM HYATT SURVEY SERVICES, INC. IS STRICTLY PROHIBITED AND RENDERS THE SURVEYOR'S CERTIFICATION, SIGNATURE AND SEAL NULL AND VOID. ANY QUESTIONS CONCERNING THE CONTENT OR PURPOSE OF THIS DRAWING SHOULD BE DIRECTED TO HYATT SURVEY SERVICES, INC.

LEGEND

	SITE BENCHMARK	Ⓢ	SANITARY MANHOLE
R/W	RIGHT-OF-WAY		RECLAIMED VALVE
EL	ELEVATION		WATER METER
PB	PLAT BOOK		BOLLARD
PG	PAGE		SIGN
(P)	PLAT		BACKFLOW PREVENTER
			PALM



LIFT STATION DETAIL
1" = 5'

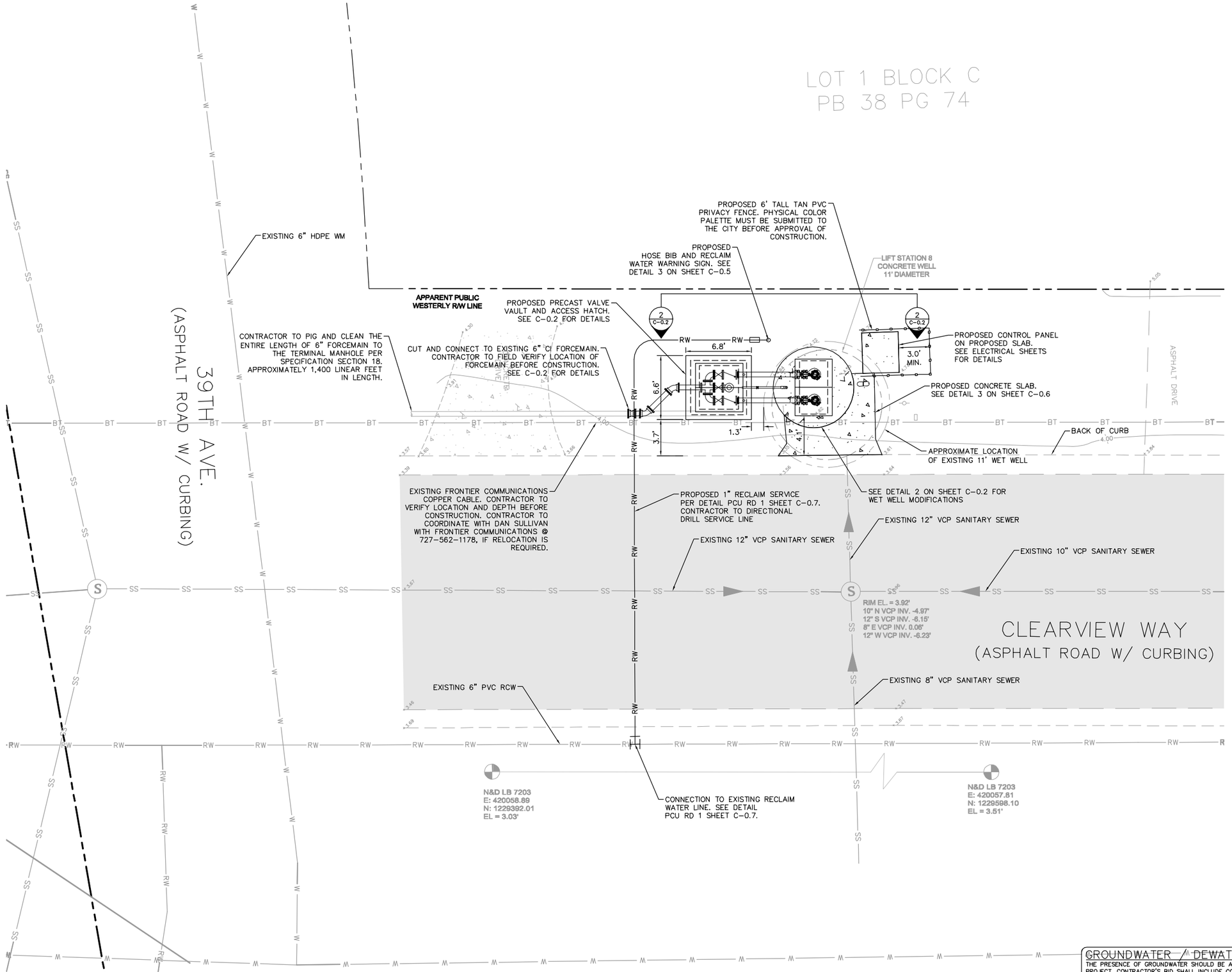
THIS SURVEY IS NOT VALID WITHOUT THE SIGNATURE AND ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.

RUSSELL P. HYATT, PSM
FLORIDA SURVEYORS REGISTRATION NO. 5303

Hyatt Survey Services, Inc.
LB No.: 7203 Geographic Data Specialists
11007 8th Avenue East Bradenton, Florida 34212
Phone: (941) 748-4693 Fax: (941) 744-1643

PROJECT #		16-2021
SURVEY #		LS 16
SEC./TWN./RGE		7/32/16
SCALE		1" = 20'
	BY	DATE
SURVEYED	HYATT	05/2016
DESIGNED		
DRAWN	JM	05/2016
CHECKED	RH	05/2016

SHEET 1 OF 1



NORTH

GRAPHIC SCALE IN FEET
0 2.5 5 10

GENERAL NOTES:

1. CONTRACTOR TO COORDINATE WITH PROPERTY OWNER AND MUST KEEP ACCESS TO RESIDENCE.
2. CONTRACTOR TO FIELD VERIFY LOCATION OF UTILITIES THAT ARE IN THE VICINITY OF CONSTRUCTION. CONTRACTOR TO MAINTAIN MINIMUM HORIZONTAL AND VERTICAL CLEARANCE BETWEEN UTILITIES PER FDEP.
3. CONTRACTOR TO COORDINATE WITH UTILITY COMPANIES PRIOR TO ANY CONSTRUCTION.

GROUNDWATER / DEWATERING NOTE:
THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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PHONE: 813-620-1460
WWW.KIMLEY-HORN.COM CA 00000696

DESIGN ENGINEER: JORDAN W. WALKER, P.E.
FLORIDA REGISTRATION NUMBER: 78652
DATE:

SCALE AS NOTED | DESIGNED BY JRT | DRAWN BY JRT | CHECKED BY JWW

LS 8 SITE PLAN

CITY OF ST. PETE BEACH
LIFT STATIONS NO. 8 & 16
REHABILITATION
PINELLAS COUNTY FLORIDA

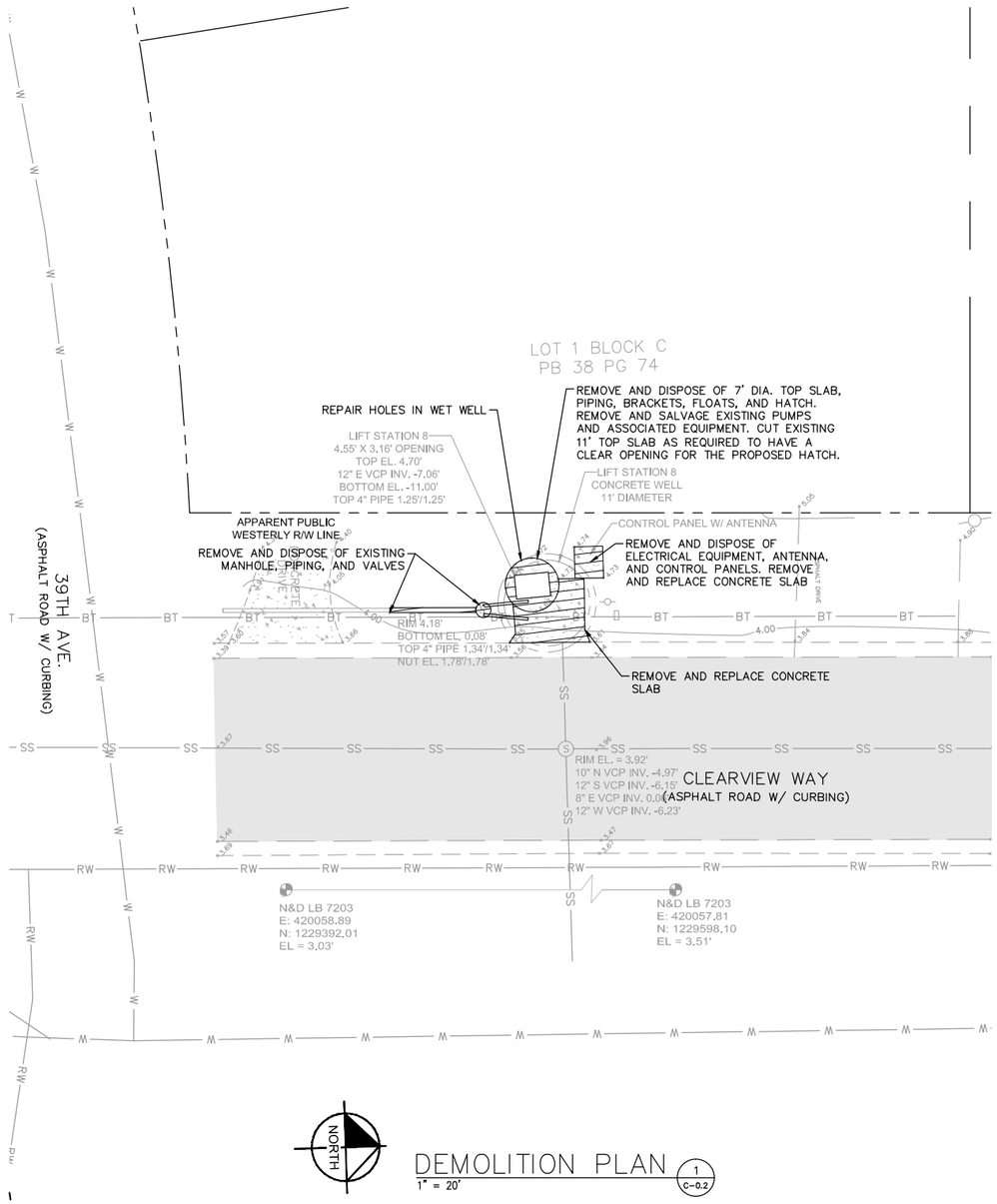
DATE
SEPTEMBER 2016

PROJECT NO.
148404012

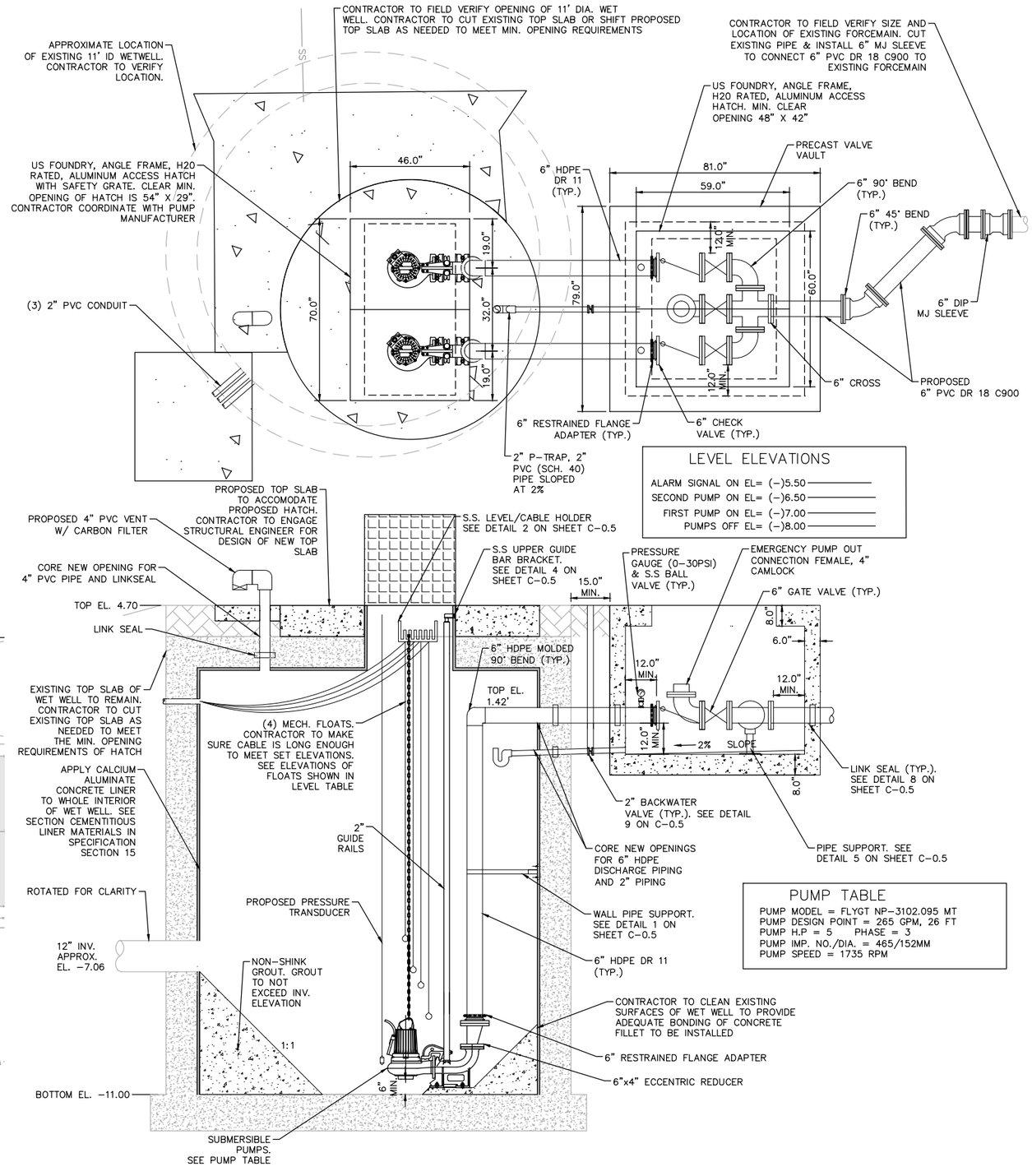
SHEET NUMBER
C-0.1

GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
2. CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
3. CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY FLOW INTERRUPTION.
4. ALL EXISTING MECHANICAL PIPING AND EQUIPMENT SHALL BE REMOVED AND SALVAGED PER SPECIFICATIONS.
5. CONTRACTOR IS RESPONSIBLE FOR DISPOSAL OF DEMOLISHED MATERIAL. DISPOSAL SHALL BE IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
6. PRESSURE WASH, CLEAN, & REPAIR WET WELL ONCE EQUIPMENT IS REMOVED PER COATING MANUFACTURER'S RECOMMENDATION.
7. CONTRACTOR TO ENSURE PROPOSED TOP SLAB IS STRUCTURALLY SOUND ON EXISTING 11' DIAMETER TOP SLAB.



DEMOLITION PLAN (1 / C-0.2)
1" = 20'



PUMP TABLE

PUMP MODEL	= FLYGT NP-3102.095 MT
PUMP DESIGN POINT	= 265 GPM, 26 FT
PUMP H.P	= 5 PHASE = 3
PUMP IMP. NO./DIA.	= 465/152MM
PUMP SPEED	= 1735 RPM

PROPOSED PUMP STATION REHABILITATION AND VALVE VAULT (2 / C-0.2)
N.T.S.

GROUNDWATER / DEWATERING NOTE:
THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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PHONE: 813-620-1460
WWW.KIMLEY-HORN.COM CA 00000696

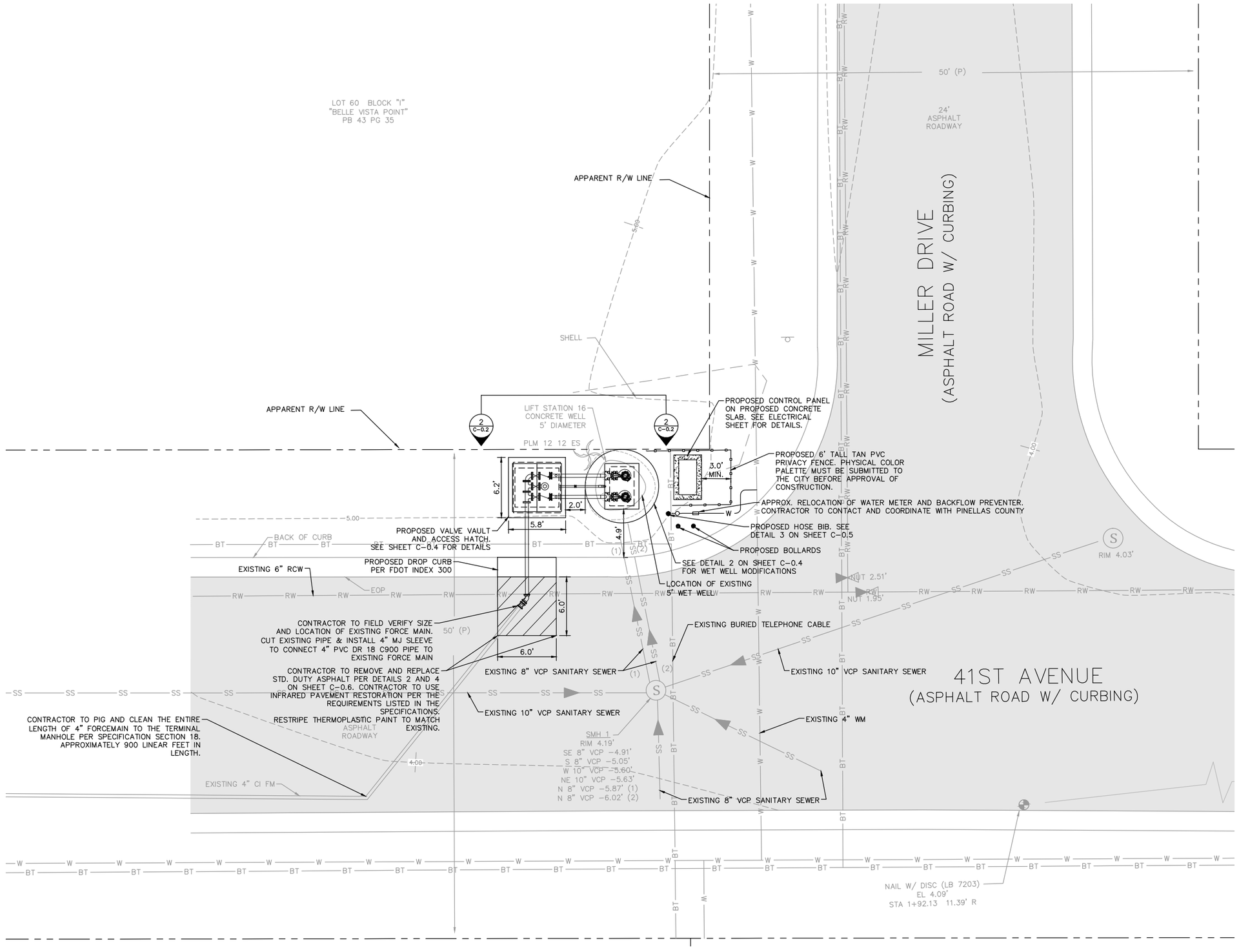
DESIGN ENGINEER: JORDAN W. WALKER, P.E.
FLORIDA REGISTRATION NUMBER: 78652
DATE:

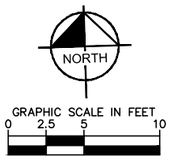
SCALE: AS NOTED | DESIGNED BY: JRT | DRAWN BY: JRT | CHECKED BY: JWW

LS 8 DEMOLITION & PROPOSED PLAN

CITY OF ST. PETE BEACH
LIFT STATIONS NO. 8 & 16
REHABILITATION
PINELLAS COUNTY FLORIDA

DATE: SEPTEMBER 2016
PROJECT NO. 148404012
SHEET NUMBER C-0.2





GRAPHIC SCALE IN FEET
0 2.5 5 10

GENERAL NOTES:

1. CONTRACTOR TO COORDINATE WITH PROPERTY OWNER AND MUST KEEP ACCESS TO RESIDENCE.
2. CONTRACTOR TO FIELD VERIFY LOCATION OF UTILITIES THAT ARE IN THE VICINITY OF CONSTRUCTION. CONTRACTOR TO MAINTAIN MINIMUM HORIZONTAL AND VERTICAL CLEARANCE BETWEEN UTILITIES PER FDEP.
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DESIGN ENGINEER: JORDAN W. WALKER, P.E.
FLORIDA REGISTRATION NUMBER: 78652
DATE:

SCALE AS NOTED
DESIGNED BY JRT
DRAWN BY JRT
CHECKED BY JWW

LS 16 SITE PLAN

CITY OF ST. PETE BEACH
LIFT STATIONS NO. 8 & 16 REHABILITATION
FLORIDA
PINELLAS COUNTY

DATE
SEPTEMBER 2016

PROJECT NO.
148404012

SHEET NUMBER
C-0.3

GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
2. CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
3. CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY FLOW INTERRUPTION.
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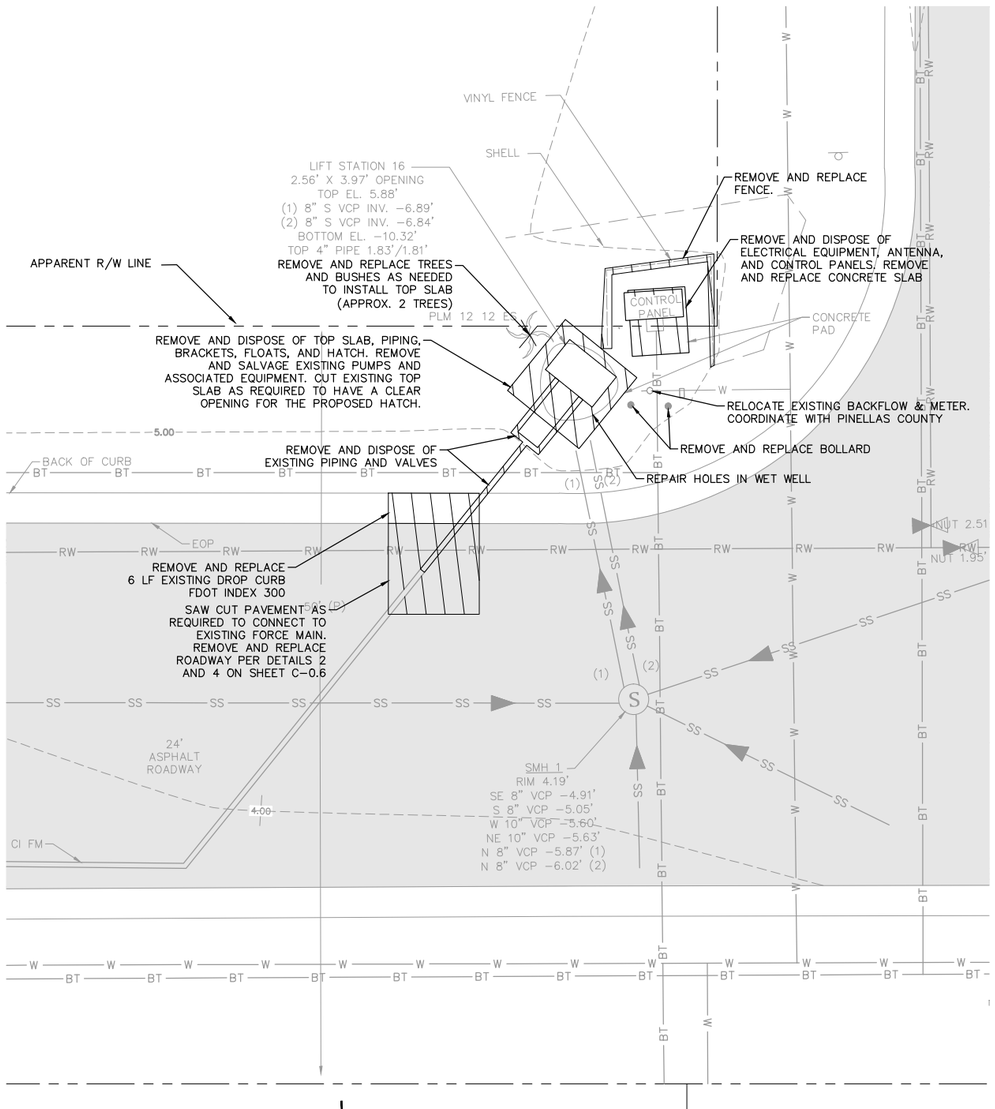
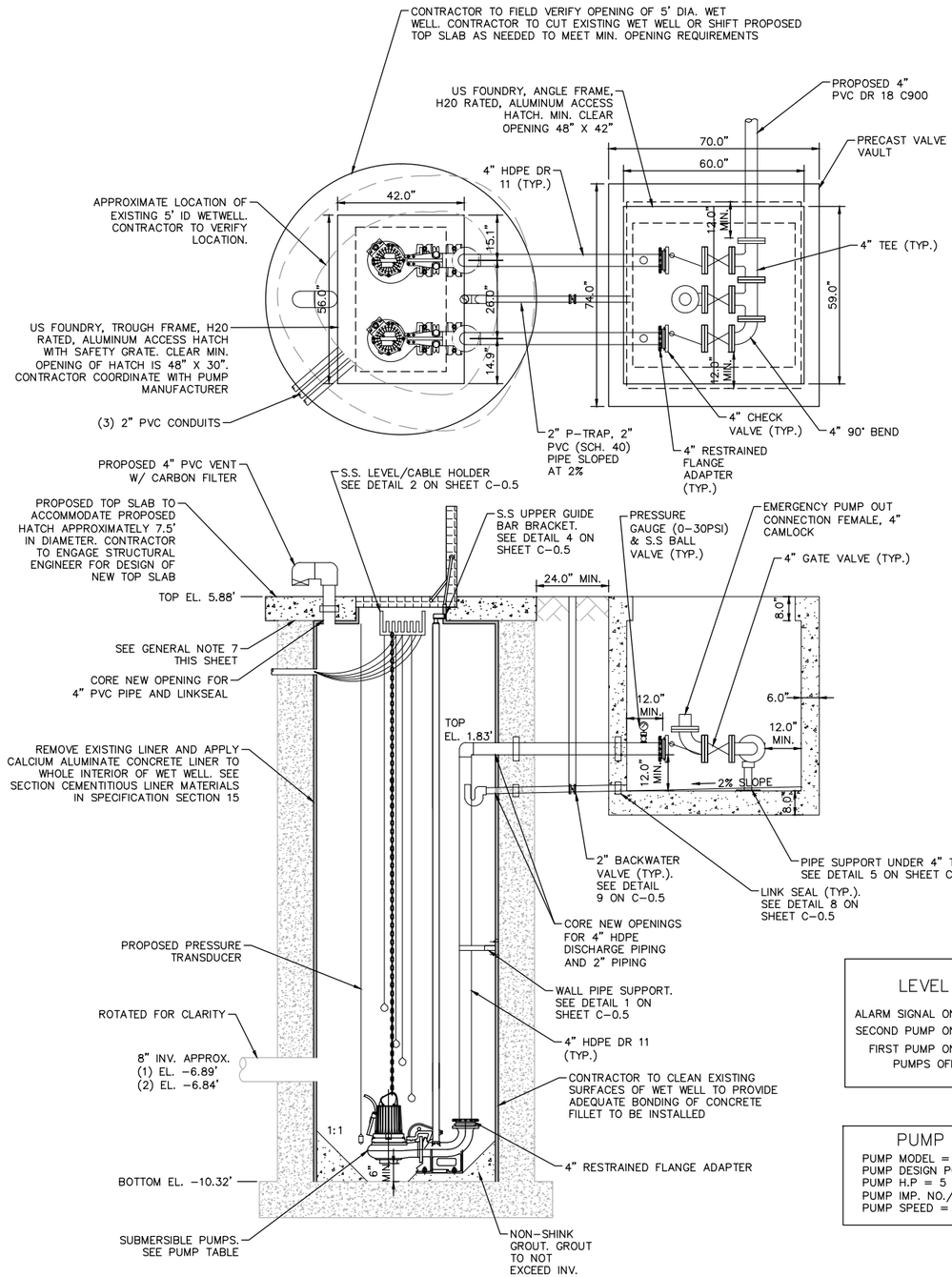
6. PRESSURE WASH, CLEAN, & REPAIR WET WELL ONCE EQUIPMENT IS REMOVED PER COATING MANUFACTURER'S RECOMMENDATION.
7. CONTRACTOR TO ENSURE PROPOSED TOP SLAB IS STRUCTURALLY SOUND ON THE EXISTING WET WELL WALLS.



NORTH

DEMOLITION PLAN (1) C-0.4
1" = 5'



LEVEL ELEVATIONS

ALARM SIGNAL ON EL=	(-)5.32
SECOND PUMP ON EL=	(-)6.32
FIRST PUMP ON EL=	(-)6.82
PUMPS OFF EL=	(-)7.82

PUMP TABLE

PUMP MODEL = FLYGT NP-3102.095 MT
PUMP DESIGN POINT = 138 GPM, 31.5 FT
PUMP H.P = 5 PHASE = 3
PUMP IMP. NO./DIA. = 465/152MM
PUMP SPEED = 1735 RPM

PROPOSED PUMP STATION REHABILITATION AND VALVE VAULT (2) C-0.4
N.T.S.

GROUNDWATER / DEWATERING NOTE:
THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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PHONE: 813-620-1460
WWW.KIMLEY-HORN.COM CA 00000696

DESIGN ENGINEER: JORDAN W. WALKER, P.E.
FLORIDA REGISTRATION NUMBER: 78652
DATE:

SCALE AS NOTED
DESIGNED BY JRT
DRAWN BY JRT
CHECKED BY JWW

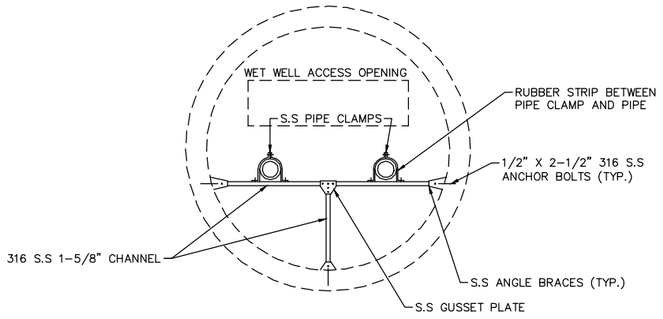
LS 16 DEMOLITION & PROPOSED PLAN

CITY OF ST. PETE BEACH
LIFT STATIONS NO. 8 & 16 REHABILITATION
FLORIDA
PINELLAS COUNTY

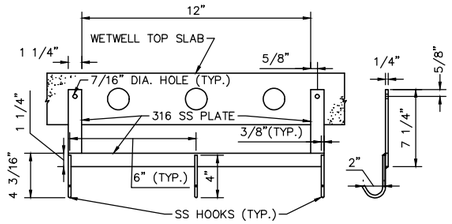
DATE
SEPTEMBER 2016

PROJECT NO.
148404012

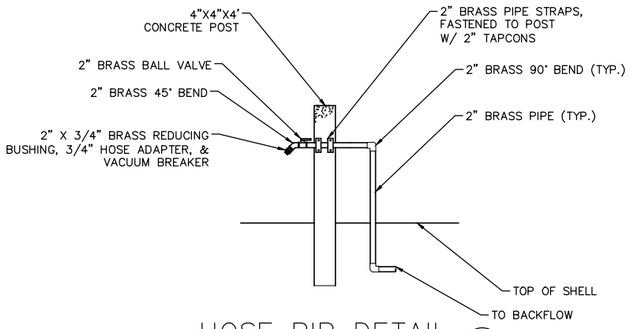
SHEET NUMBER
C-0.4



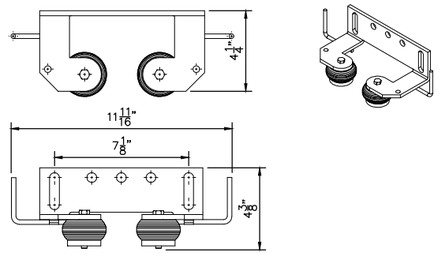
WET WELL PIPE BRACING
N.T.S. (1 / C-0.5)



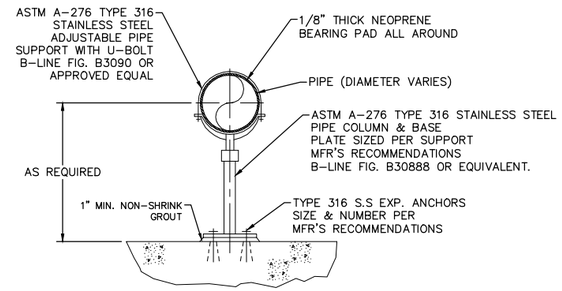
CABLE HOLDER DETAIL
N.T.S. (2 / C-0.5)



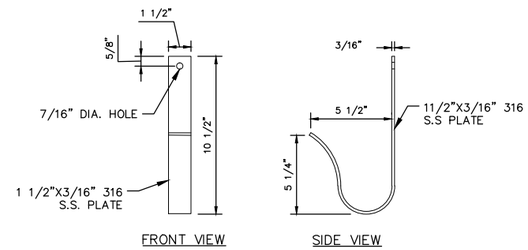
HOSE BIB DETAIL
N.T.S. (3 / C-0.5)



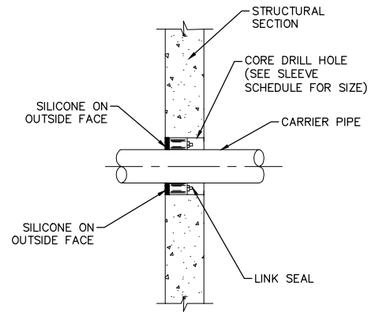
2" UPPER GUIDE BRACKET DETAIL
N.T.S. (4 / C-0.5)



COLUMN PIPE SUPPORT
N.T.S. (5 / C-0.5)



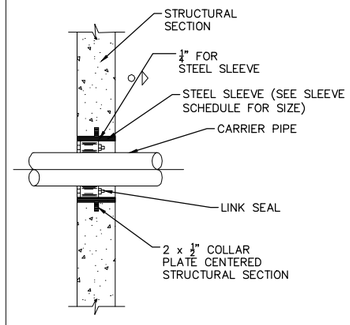
POWER AND TRANSDUCER CABLE HOOK
N.T.S. (7 / C-0.5)



TYPE 1

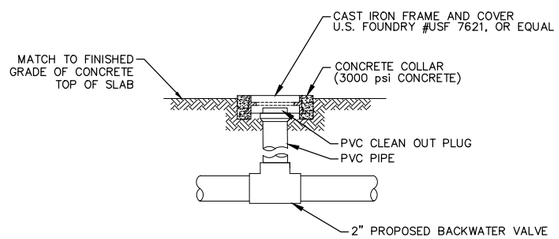
SLEEVE SCHEDULE				
CARRIER PIPE			STEEL SLEEVE INSIDE DIAMATER (INCHES)	CORE DRILLED HOLE INSIDE DIAMETER (INCHES)
NOMINAL DIAMETER INCHES	MATERIAL	OUTSIDE DIAMETER INCHES		
1/2	SCH. 80 PVC	.84	2.07	2
3/4	SCH. 80 PVC	1.05	2.07	3.0
1	SCH. 80 PVC	1.315	2.47	2.5
1 1/2	SCH. 80 PVC	1.90	4.03	4
2	SCH. 80 PVC	2.38	4.03	4
3	SCH. 80 PVC	3.5	5.05	5
4	SCH. 80 PVC	4.5	6.07	6
6	D.I.	6.90	10.02	10
8	D.I.	9.05	12.00	12
10	D.I.	11.10	13.25	14
12	D.I.	13.20	15.25	16
4	HDPE	4.80	6.07	6
6	HDPE	6.90	10.02	10

NOTE:
INSTALL SEALS FROM DRY SIDE OF PENETRATION. WET SIDE FILLED WITH WATERPROOF NON-SHRINK GROUT.



TYPE 2

PIPE PENETRATION
N.T.S. (8 / C-0.5)



BACKWATER VALVE
N.T.S. (9 / C-0.5)

GROUNDWATER / DEWATERING NOTE:
THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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No.	REVISIONS	DATE	BY

Kimley»Horn

655 NORTH FRANKLIN STREET, SUITE 150, TAMPA, FL 33602
PHONE: 813-620-1460
WWW.KIMLEY-HORN.COM CA 00000696

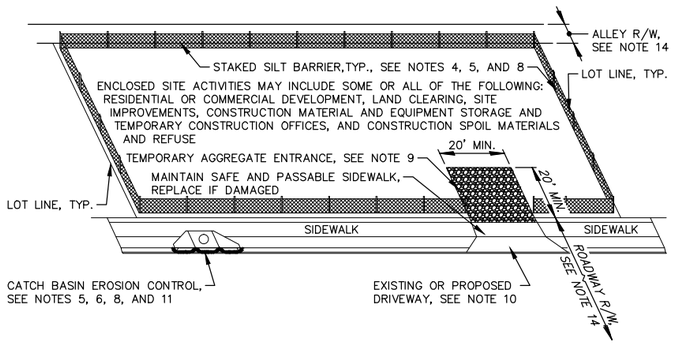
DESIGN ENGINEER: JORDAN W. WALKER, P.E.
FLORIDA REGISTRATION NUMBER: 78652
DATE:

SCALE AS NOTED
DESIGNED BY JRT
DRAWN BY JRT
CHECKED BY JWW

DETAILS

CITY OF ST. PETE BEACH
LIFT STATIONS NO. 8 & 16 REHABILITATION
FLORIDA
PINELLAS COUNTY

DATE SEPTEMBER 2016
PROJECT NO. 148404012
SHEET NUMBER C-0.5



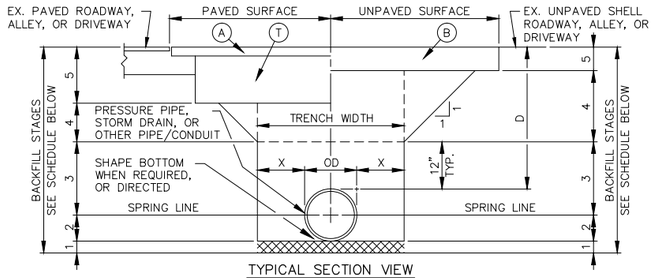
TYPICAL PLAN VIEW

NOTES:

1. NON-CONFORMANCE WITH THE ITEMS LISTED OR SHOWN ON THIS DETAIL MAY RESULT IN A "STOP WORK"
2. THE PURPOSE OF THIS DETAIL IS TO ASSIST THE DEVELOPER, BUILDER, AND/OR CONTRACTOR TO MEET THE MINIMUM REQUIREMENTS OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT ISSUED TO THE CITY OF ST. PETERSBURG.
3. THIS DETAIL IS APPLICABLE FOR ALL CONSTRUCTION SITES AS DESCRIBED ABOVE OF LESS THAN ONE (1) ACRE; THOSE SITES GREATER THAN ONE (1) ACRE ALSO MUST OBTAIN COVERAGE UNDER AN NPDES
4. THE SILT BARRIER SHALL BE INSTALLED ONE FOOT INSIDE THE PROPERTY LINE OR TWO FEET FROM THE SIDEWALK AS SHOWN ABOVE. FOR SILT BARRIER REQUIREMENTS AND INSTALLATION REQUIREMENTS, SEE STANDARD DETAIL-STAKED SILT BARRIER; DRAWING NO. S40-92.
5. INSPECT AND MAINTAIN ALL EROSION CONTROL DEVICES DAILY AND/OR AFTER A RAINFALL.
6. FOR CURB INLET FILTER REQUIREMENTS, SEE STANDARD DETAIL-CURB INLET FILTER FOR EROSION CONTROL AT CATCH BASIN; DWG. NO. S40-93, OR FOR HAY BALE REQUIREMENTS, SEE STANDARD DETAIL-HAY BALES FOR EROSION CONTROL AT CATCH BASIN; DWG. NO. S40-94.
7. EXISTING GRASS VEGETATION SHALL BE MAINTAINED AT A 10 INCH HEIGHT OR LESS, AS PER CITY CODE, CHAPTER 16; SECTIONS 16-1070 THRU 1076.
8. ALL SOIL EROSION CONTROL DEVICES MUST REMAIN IN PLACE UNTIL NEW VEGETATION IS ESTABLISHED. ALL DISTURBED AREAS SHALL BE SODDED AFTER FINAL GRADING.
9. TEMPORARY AGGREGATE ENTRANCE SHALL BE A MINIMUM 6" THICK OF STANDARD GRADATION SIZE #1 OR #2 RANGE AS PER FDOT SECTION 901, AND SHALL BE COMPACTED. AGGREGATE SHALL BE QUARTZ OR CRUSHED GRANITE. LIMEROCK, DOLOMITE OR SANDSTONE SHALL NOT BE ACCEPTABLE.
10. IF THERE IS NO EXISTING DRIVEWAY OR AN ALTERNATE INGRESS/EGRESS IS TO BE USED DURING CONSTRUCTION, THE METHOD OF ACCESS SHALL CONFORM TO THE "TEMPORARY AGGREGATE ENTRANCE" AS DESCRIBED ABOVE. IF THE AGGREGATE IS DEEMED UNSAFE, THE ALTERNATE INGRESS/EGRESS SHALL BE CONSTRUCTED OF 1" ASPHALTIC CONCRETE OVER 6" OF COMPACTED LIMEROCK BASE.
11. REGULARLY REMOVE COLLECTED SEDIMENT AND DEBRIS FROM THE SILT BARRIERS AND GUTTER FLOW LINE.
12. FOR ALL SAND AND SOIL STOCKPILES DUST/EROSION CONTROL MEASURES SHALL BE IMPLEMENTED.
13. KEEP CONSTRUCTION SITE LITTER/DEBRIS, AND LEAKING CONTAINERS IN ORDERLY CONTAINMENT AREAS.
14. SWEEP ENTRANCE AND ADJACENT ROADWAY WEEKLY TO KEEP FREE OF CONSTRUCTION DEBRIS.
15. SWEEP PAVED SURFACES ONLY. DO NOT WASH DOWN UNTIL SITE IS FINISHED.
16. SINGLE FAMILY INFILL LOTS MAY REQUIRE SILT FENCE AS ORDERED OR DIRECTED BY THE CITY BUILDING OFFICIAL.

SITE DEVELOPMENT AND CONSTRUCTION STAGING SITE EROSION CONTROL DETAIL

N.T.S. (1 / C-0.6)



TYPICAL SECTION VIEW

SCHEDULE	
STAGE NO.	MATERIALS
1	BEDDING: WHERE DIRECTED, REPLACE EXISTING MATERIAL WITH 4" TO 6" OF GRANULAR MATERIAL. THE GRANULAR MATERIAL MAY BE ANY OF THE FOLLOWING: CLEAN NATIVE SAND, CONCRETE SAND, GRAVEL, OR RECLAIMED CONCRETE. SEE NOTE 1, BELOW. BOX CULVERTS SHALL HAVE MANDATORY STONE BEDDING PER SPECIFICATIONS.
2	PIPE BEDDING/HAUNCHING: NATIVE SAND IN 6" LIFTS. WHERE DIRECTED, REPLACE EXISTING MATERIAL WITH CLEAN CONSTRUCTION SAND, OR GRAVEL. SEE NOTE 2, BELOW
3	INITIAL BACKFILL: NATIVE SAND IN 6" LIFTS. WHERE DIRECTED, REPLACE EXISTING MATERIAL WITH CLEAN CONSTRUCTION SAND, SEE NOTE 2, BELOW
4	TRENCH BACKFILL: NATIVE SAND IN LIFTS AS LISTED BELOW- WHERE DIRECTED, REPLACE EXISTING MATERIAL WITH CLEAN CONSTRUCTION SAND. PAVED ROADWAYS, PAVED DRIVEWAYS, AND PAVED ALLEYS IN 6" LIFTS UNPAVED ROADWAYS, UNPAVED DRIVEWAYS, UNPAVED ALLEYS, AND SIDEWALKS IN 6" LIFTS SOD, OR MULCHED SURFACES IN 12" LIFTS
5	SURFACE RESTORATION: AS SHOWN BELOW. ALSO SEE NOTES BELOW FOR OTHER STANDARD DETAIL REFERENCES.

PRESSURE PIPE	X	STORM DRAIN-RCP, ERCP, B/C	X	OTHER PIPE/CONDUIT	X
4"	12"	UPTO 18"	12"	UPTO 5"	(2) OR (3)
6"	12"	21" TO 36"	18"	6" TO 18"	12"
8"	12"	42" TO 72"	24"	21" TO 36"	18"
12"	12"	BEYOND 72"	(2) OR (3)	42" TO 72"	24"
16"	12"	--------	------	------	------

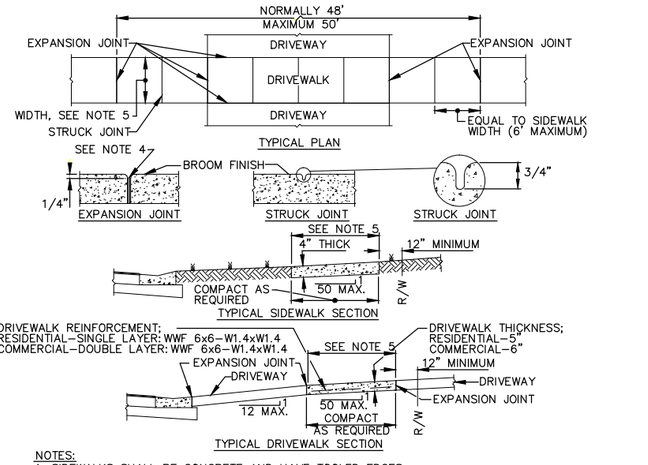
	ITEM	ALLEY OR D/W	STD DUTY RDWY	HVY DUTY RDWY	BRICK RDWY	REMARKS
A	SURFACE PAVING MIN. THICKNESS	1" ASPHALT	2.25" ASPHALT	2.25" ASPHALT	ROADWAY BRICK	
B	SURFACE COVER MIN. THICKNESS	6" SHELL	6" SHELL	N/A	N/A	SOD
T	BASE MATERIAL MIN. THICKNESS	LMRK/SHELL-9" RCLM. CONC. 10.5"	LMRK/SHELL-12" RCLM. CONC. 14"	LMRK/SHELL-16" RCLM. CONC. 19"	1" SAND OVER 12" SHELL BASE	BASE MAT. MAY BE ASPH. EXCEPT W/ BRICK RDWY
D	COVER MIN. DEPTH	PRESS. PIPE-36" ALL OTHER PIPE-30"	PRESS. PIPE-36" ALL OTHER PIPE-30"	PRESS. PIPE-36" ALL OTHER PIPE-36"	PRESS. PIPE-36" ALL OTHER PIPE-30"	

NOTES:

1. ALL BEDDING TYPES REQUIRE AN IMPERMEABLE GROUNDWATER BARRIER AT 100' INTERVALS ALONG THE TRENCH LENGTH.
2. GRAVEL OR RECLAIMED CONCRETE SHOULD NOT CONTACT DUCTILE IRON OR POLYVINYL PIPE OR CONDUIT.
3. FOR PAVED SURFACES SEE STANDARD DETAIL-FLEXIBLE PAVEMENT RESTORATION.
4. FOR UNPAVED SURFACES SEE STANDARD DETAIL-RIGHT-OF-WAY RESTORATION.

PIPE BEDDING DETAIL

N.T.S. (2 / C-0.6)

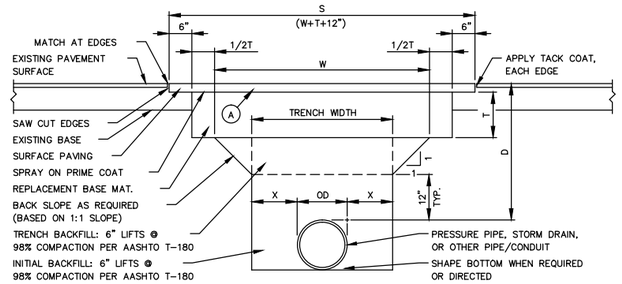


NOTES:

1. SIDEWALKS SHALL BE CONCRETE AND HAVE TOOLED EDGES.
2. RESTORATION AND UTILITY CUTS SHALL BE A MINIMUM FULL PANEL BETWEEN EXISTING JOINTS.
3. EXPANSION JOINTS SHALL BE INSTALLED WHERE SHOWN AND AT 50' MAXIMUM SPACING.
4. EXPANSION JOINTS SHALL CONSIST OF CONTINUOUS 1/2'x6" MINIMUM, BITUMINOUS EXPANSION STRIP.

SIDEWALK AND DRIVEWAY CONSTRUCTION DETAIL

N.T.S. (3 / C-0.6)



TYPICAL SECTION VIEW

SCHEDULE																	
PRESSURE PIPE	X	S IN FEET (2)				STORM DRAIN RCP, ERCP, B/C	X	S IN FEET (2)				OTHER PIPE /CONDUIT	X	S IN FEET (2)			
		ALLEY OR D/W	STD DUTY RDWY	HVY DUTY RDWY	BRICK RDWY (3)			ALLEY OR D/W	STD DUTY RDWY	HVY DUTY RDWY	BRICK RDWY (3)			ALLEY OR D/W	STD DUTY RDWY	HVY DUTY RDWY	BRICK RDWY (3)
4"	12"	6.50	6.00	5.75	5.75	UPTO 18"	12"	8.00	7.50	7.25	7.25	UPTO 5"	---	(7)	(7)	(7)	(7)
6"	12"	6.50	6.25	6.00	6.00	21" TO 36"	18"	10.75	10.25	10.00	10.00	6" TO 18"	12"	8.00	7.50	7.25	7.25
8"	12"	6.75	6.50	6.00	6.00	42" TO 72"	24"	15.25	15.00	14.50	14.50	21" TO 36"	18"	10.75	10.25	10.00	10.00
12"	12"	7.00	6.75	6.25	6.50	BEYOND 72"	(5)	(5)	(5)	(5)	(5)	42" TO 72"	24"	15.25	15.00	14.50	14.50
16"	12"	7.50	7.00	6.75	6.75	--------	---	---	---	---	---	-------	---	---	---	---	---

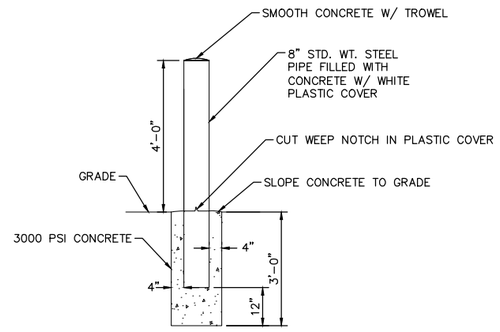
	ITEM	ALLEY OR D/W	STD DUTY RDWY	HVY DUTY RDWY	BRICK RDWY	REMARKS
A	SURFACE PAVING MIN. THICKNESS	1" ASPHALT	2.25" ASPHALT	2.25" ASPHALT	ROADWAY BRICK	
T	BASE MATERIAL MIN. THICKNESS	LMRK/SHELL-9" RCLM. CONC. 10.5"	LMRK/SHELL-12" RCLM. CONC. 14"	LMRK/SHELL-16" RCLM. CONC. 19"	1" SAND OVER 12" SHELL BASE	BASE MAT. MAY BE ASPH. EXCEPT W/ BRICK RDWY
D	COVER MIN. DEPTH	PRESS. PIPE-36" ALL OTHER PIPE-30"	PRESS. PIPE-36" ALL OTHER PIPE-30"	PRESS. PIPE-36" ALL OTHER PIPE-36"	PRESS. PIPE-36" ALL OTHER PIPE-30"	

NOTES:

1. FOR USE WHERE PERMISSION HAS BEEN GRANTED FOR "OPEN CUT" INSTALLATION.
2. DIMENSION S SHOWN IS BASED ON 36" COVER, REPLACEMENT BASE MATERIAL THICKNESS, AND LARGEST PIPE SIZE IN THE RANGE AS SHOWN ABOVE.
3. DIMENSION S FOR BRICK RDWY MAY BE ADJUSTED TO MEET THE ACTUAL DISTANCE BETWEEN EXISTING COURSES OF BRICK.
4. ALL RESTORATION ITEMS SHALL MEET CITY SPECIFICATIONS.
5. DIMENSIONS X AND S SHALL BE BASED ON TRENCH WIDTH AS REQUIRED. RESTORATION SHALL BE THE SAME AS SHOWN ABOVE, OVER THE PIPE/CONDUIT.
6. BASE MATERIAL SHALL BE LIMEROCK OR SHELL TO MATCH EXISTING BASE MATERIAL, BUT TO THOSE THICKNESSES SHOWN ABOVE. RECLAIMED CONCRETE MAY BE USED TO REPLACE LIMEROCK OR SHELL TO THOSE THICKNESSES SHOWN ABOVE.
7. FOR PIPES/CONDUITS LESS THAN 5" OD, DITCH WIDTH MAY BE REDUCED TO THE WIDTH OF THE MECHANICAL TAMPER IF BACKFILLED WITH DRY 15:1 SAND/CEMENT MIX, OR OTHER APPROVED MATERIAL, TO 4" ABOVE PIPE/CONDUIT. THE OPEN CUT RESTORATION SHALL BE THE SAME METHOD AS SHOWN ABOVE OVER THE PIPE/CONDUIT.

FLEXIBLE PAVEMENT RESTORATION

N.T.S. (4 / C-0.6)



BOLLARD DETAIL

N.T.S. (5 / C-0.6)

GROUNDWATER / DEWATERING NOTE:

THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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BY	DATE	REVISIONS	No.

Kimley»Horn

655 NORTH FRANKLIN STREET, SUITE 150, TAMPA, FL 33602
PHONE: 813-620-1460
WWW.KIMLEY-HORN.COM CA 00000696

DESIGN ENGINEER: JORDAN W. WALKER, P.E.
FLORIDA REGISTRATION NUMBER: 78652
DATE:

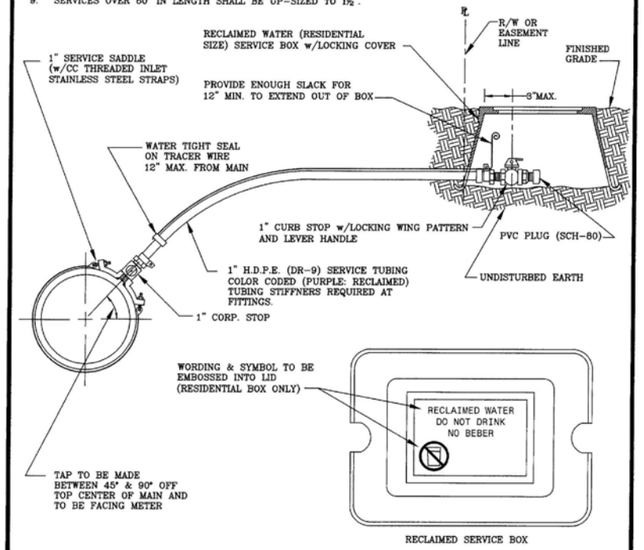
SCALE AS NOTED
DESIGNED BY JRT
DRAWN BY JRT
CHECKED BY JWW

DETAILS

CITY OF ST. PETE BEACH
LIFT STATIONS NO. 8 & 16
REHABILITATION
FLORIDA
PINELLAS COUNTY

DATE SEPTEMBER 2016
PROJECT NO. 148404012
SHEET NUMBER C-0.6

NOTES:
1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST P.C.U. APPROVED MATERIAL SPECIFICATION MANUAL.
2. CORPORATION STOPS SHALL BE COMPATIBLE WITH DR 9 (C.T.S.) H.D.P.E. TUBING.
3. SERVICE SADDLE REQUIRED FOR ALL TAPS EXCEPT FOR 1" TAPS AND SMALLER ON D.I.P.
4. METER ONLY, TO BE FURNISHED BY P.C.U. (IF REQUIRED).
5. RESIDENTIAL SIZE RECLAIM METER BOX SHALL BE USED FOR UNMETERED SERVICES AND COMMERCIAL SIZE FOR METERED.
6. ALL METER BOXES LOCATED WITHIN VEHICULAR AREAS SHALL BE H-20 LOADING. ALL OTHERS SHALL BE H-10 LOADING.
7. TRACER WIRE REQUIRED ON ALL SERVICES.
8. TAP AND METER SHALL BE INSTALLED BY P.C.U. ON ALL PRIVATELY DEVELOPED PROJECTS.
9. SERVICES OVER 60' IN LENGTH SHALL BE UP-SIZED TO 1½".



PINELLAS COUNTY

1" RECLAIMED SERVICE CONNECTION (NON-METERED) DETAIL

DETAIL INDEX I.D.: PCU RD 1
DATE: FEB/2016
KEVIN BECOTTE, P.E.
REVISION:

WATER SERVICE CONNECTION
N.T.S. (1 / C-0.7)

NOTES:
1. ALL MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST P.C.U. APPROVED MATERIAL SPECIFICATION.
2. MANUAL. THIS TABLE SHALL BE UTILIZED FOR ALL PRESSURE MAIN INSTALLATIONS. ALL FITTINGS SHALL BE RESTRAINED TO THE LENGTHS INDICATED, AT A MINIMUM.
3. THIS TABLE WAS DEVELOPED USING THE FOLLOWING ASSUMPTIONS:
   - o D.I. PIPE WITH POLY WRAP
   - o SAFETY FACTOR OF 1.5 TO 1
   - o TEST PRESSURE OF 150 P.S.I.
   - o SOIL TYPE = S.M.
   - o TYPE 3 TRENCH
   - o DEPTH OF COVER = 2.5' UP TO 16" AND 3' FOR 20" AND ABOVE.
4. WHEN A TEE HAS A VALVE ON THE RUN, THE BRANCH AND THE RUNS SHALL BE RESTRAINED AS A 90° BEND FOR THE SIZE OF THE PIPE.
5. ALL BENDS, TEES, AND VALVES SHALL BE RESTRAINED ON EACH SIDE OF THE FITTING.
6. ALL RESTRAINED PIPE LENGTHS ARE IN FEET.
7. "F" REPRESENTS THE RESTRAINED JOINTS AT THE FITTINGS.
8. HDPE TRANSITION VALVE IS FOR STRAIGHT TIE-INS, IF A BEND IS USED, THE VALVE FOR THE BEND MUST BE ADDED.
9. LINE VALVES SHALL BE RESTRAINED UPSTREAM AND DOWNSTREAM AS A DEAD END.

PIPE SIZE	FITTINGS					
	TEE BRANCH ONLY	90°	45°	22½°	11¼°	DEAD END
2"	F	40	17	F	F	40
4"	19	49	20	10	5	49
6"	33	69	28	14	7	69
8"	58	88	37	18	9	88
10"	76	107	44	21	11	107
12"	93	125	52	25	12	125
14"	110	142	59	28	14	142
16"	127	159	66	32	16	159
18"	143	175	73	35	17	175
20"	132	164	68	33	16	164
24"	159	192	79	38	19	192
30"	195	229	95	46	23	229
36"	230	264	109	53	26	264

PRESSURE MAIN RESTRAINED JOINT

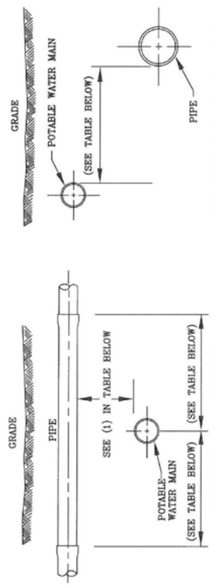
BRANCH / RUN / RUN

FITTINGS			
REDUCERS			LARGER PIPE
LG. SIZE	SM. SIZE	LENGTH	
4"	2"	17'	24
6"	4"	50'	35
8"	4"	91'	64
	6"	53'	37
10"	4"	123'	87
	6"	93'	66
	8"	51'	36
12"	4"	154'	108
	6"	129'	91
	8"	94'	66
	10"	52'	37
14"	6"	160'	113
	8"	131'	92
	10"	95'	67
	12"	52'	36
16"	6"	190'	134
	8"	165'	116
	10"	134'	94
	12"	96'	67
	14"	52'	36
18"	8"	196'	137
	10"	169'	118
	12"	135'	95
	14"	96'	67
	16"	51'	36
20"	10"	172'	121
	12"	147'	103
	14"	117'	82
	16"	82'	58
	18"	44'	30
24"	12"	201'	141
	14"	177'	124
	16"	149'	104
	18"	117'	82
	20"	82'	57
30"	18"	206'	144
	20"	178'	125
	24"	115'	80
36"	20"	258'	180
	24"	207'	144
	30"	114'	80

PINELLAS COUNTY
DEPARTMENT OF ENVIRONMENT AND INFRASTRUCTURE (D.E.I.)
PRESSURE MAIN RESTRAINED JOINT DETAIL

DETAIL INDEX I.D.: PCU GD 11
DATE: SEPTEMBER/2012
DIV. DIRECTOR OF ENGR./TECH. SUPPORT
REVISION:

RESTRAINED JOINT LENGTHS
N.T.S. (2 / C-0.7)



PIPE	HORIZONTAL SEPARATION	CROSSINGS (1)	JOINT SPACING @ CROSSINGS
VACUUM-TYPE SANITARY SEWER, STORM SEWER, STORMWATER FORCE MAIN, RECLAIMED WATER (3)	3 FT. MINIMUM	12 INCHES IS THE MINIMUM, EXCEPT FOR STORM SEWER, THEN 6 INCHES IS THE MINIMUM AND 12 INCHES IS PREFERRED	(FULL JOINT CENTERED, LENGTH OF PIPE MINIMUM FROM ALL JOINTS)
GRAVITY OR PRESSURE SANITARY SEWER, SANITARY SEWER FORCE MAIN, RECLAIMED WATER (4)	10 FT. PREFERRED 6 FT. MINIMUM (3)	12 INCHES IS THE MINIMUM, EXCEPT FOR GRAVITY SEWER, THEN 6 INCHES IS THE MINIMUM AND 12 INCHES IS PREFERRED	(FULL JOINT CENTERED, LENGTH OF PIPE MINIMUM FROM ALL JOINTS)
ON-SITE SEWAGE TREATMENT & DISPOSAL SYSTEM	10 FT. MINIMUM	–	–

NOTES: (IN ACCORDANCE WITH F.A.C. RULE 62-555.314)
1. POTABLE WATER MAIN SHOULD CROSS ABOVE OTHER PIPE. WHEN POTABLE WATER MAIN MUST BE BELOW OTHER PIPE, THE MINIMUM SEPARATION IS 12 INCHES.
2. RECLAIMED WATER REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.
3. FOR GRAVITY SANITARY SEWER, THE BOTTOM OF THE WATER MAIN IS 12 INCHES MINIMUM ABOVE THE TOP OF THE SANITARY SEWER.
4. RECLAIMED WATER NOT REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.
5. ALL MATERIALS SHALL BE IN ACCORDANCE WITH THE LATEST APPROVED MATERIALS SPECIFICATIONS MANUAL.EE

PINELLAS COUNTY
DEPARTMENT OF ENVIRONMENT AND INFRASTRUCTURE (D.E.I.)
MAIN CLEARANCES DETAIL

DETAIL INDEX I.D.: PCU GD 2
DATE: SEPTEMBER/2012
DIV. DIRECTOR OF ENGR./TECH. SUPPORT
REVISION:

MAIN CLEARANCES DETAIL
N.T.S. (3 / C-0.7)

GROUNDWATER / DEWATERING NOTE:
THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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NO.	REVISIONS	DATE	BY

DESIGN ENGINEER: JORDAN W. WALKER, P.E.
FLORIDA REGISTRATION NUMBER: 78652
DATE:

Kimley»Horn

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SCALE: AS NOTED
DESIGNED BY: JRT
DRAWN BY: JRT
CHECKED BY: JWW

DETAILS

CITY OF ST. PETE BEACH
LIFT STATIONS NO. 8 & 16
REHABILITATION
PINELLAS COUNTY FLORIDA

DATE: SEPTEMBER 2016
PROJECT NO.: 148404012
SHEET NUMBER: C-0.7

CONDUIT RUN EXPOSED

CONDUIT RUN CONCEALED UNDERGROUND

CONDUIT RUN CONCEALED IN FLOOR, SLAB OR WALL

GROUNDING ELECTRODE CONDUCTOR

CONDUIT STUB OUT AND CAP

GROUND ROD

JUNCTION BOX

JUNCTION BOX WITH FLEXIBLE CONNECTION

480V
15 KVA, 1*
120/240V

TRANSFORMER, 480V INDICATED PRIMARY VOLTAGE, 120/240V INDICATES SECONDARY VOLTAGE, 15 KVA REPRESENTS POWER RATING, AND 1* INDICATES SINGLE PHASE (THREE PHASE IF NOT INDICATED)

3P
30A

THERMAL MAGNETIC CIRCUIT BREAKER WITH NUMBER OF POLES AND AMPERE RATING

XX

COMBINATION MAGNETIC STARTER WITH CONTROL POWER TRANSFORMER (SIZED FOR LOAD). LETTERS INDICATE TYPE :
N – NON-REVERSING
R – REVERSING
2S – TWO-SPEED
C – CONTACTOR
SS – SOLID STATE SOFT START

XXX

XXX DEVICE	DESCRIPTION
HLS	HIGH LEVEL SWITCH
HOA	HAND-OFF-AUTO
LD	LEAK DETECTION
LLS	LOW LEVEL SWITCH
LOR	LOCAL-OFF-REMOTE
PB	PUSH BUTTON
RTU	REMOTE TERMINAL UNIT
SS	SOFT STARTER
SS/B	SOFT START OR BYPASS
TS	TEMPERATURE SWITCH
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
ZS	POSTION SENSOR (LIMIT SWITCH)

FUSE

XX

MOTOR

THERMAL OVERLOAD

UTILITY METER

TRANSFER SWITCH

ELECTRIC PANELBOARD

DISCONNECT OR SAFETY SWITCH

FIELD WIRING

FLOAT SWITCH. OPENS ON LOW LEVEL.

FLOAT SWITCH. CLOSES ON LOW LEVEL.

NORMALLY OPEN (N.O.) CONTACT

NORMALLY CLOSED (N.C.) CONTACT

FUSE

GROUND CONNECTION

R

INDICATING PILOT LIGHT LETTER INDICATES COLOR OF LENS

DISCONNECT OR TOGGLE SWITCH

NORMALLY OPEN MOMENTARY CIRCUIT CLOSING PUSH-BUTTON SWITCH SPRING OPEN. NUMBER OF ELECTRICAL CONTACTS ON SWITCH SHOWN ON CONTROL SCHEMATIC

NORMALLY CLOSED MOMENTARY CIRCUIT OPENING PUSH-BUTTON SWITCH SPRING CLOSE. NUMBER OF ELECTRICAL CONTACTS ON SWITCH SHOWN ON CONTROL SCHEMATIC

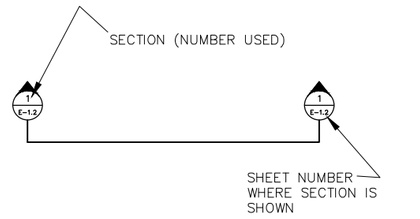
LIMIT SWITCH NORMALLY CLOSED CONTACT CONTACT OPENS WHEN ACTUATED

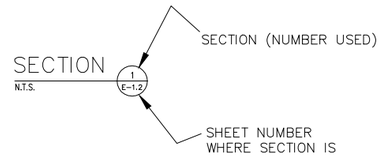
TORQUE SWITCH NORMALLY CLOSED CONTACT CONTACT OPENS WHEN ACTUATED

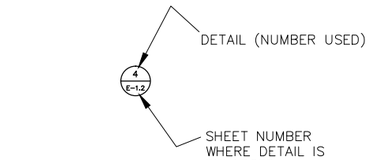
PUMP THERMAL SENSOR

FAN THERMOSTAT

EXAMPLE OF SECTION CUT AND DETAIL







ABBREVIATIONS:

A	AMPS
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
C	CONDUIT
DIA	DIAMETER
EX	EXISTING
ELEC	ELECTRICAL
GFI	GROUND FAULT INTERRUPTER
GND	GROUNDING CONDUCTOR
HP	HORSEPOWER
HZ	HERTZ
IG	ISOLATED GROUND
KVA	KILOVOLT AMPERES
KW	KILOWATTS
MAX	MAXIMUM
MIN	MINIMUM
N/A	NOT APPLICABLE
PH	PHASE
PLC	PROGRAMMABLE LOGIC CONTROLLER
RECP	RECEPTACLE
RPM	REVOLUTIONS PER MINUTE
RTU	REMOTE TERMINAL UNIT
SPD	SURGE PROTECTION DEVICE
SS	STAINLESS STEEL
TYP	TYPICAL
V	VOLTS
VFD	VARIABLE FREQUENCY DRIVE
WP	WEATHERPROOF
XFMR	TRANSFORMER

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Certificate of Authorization No. 00031028

GROUNDWATER / DEWATERING NOTE:
THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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No.	REVISIONS	DATE	BY

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DESIGN ENGINEER:
TIMOTHY THOMAS, P.E.
FLORIDA REGISTRATION NUMBER:
47079
DATE:

SCALE: AS NOTED
DESIGNED BY TDT
DRAWN BY JLH
CHECKED BY TDT

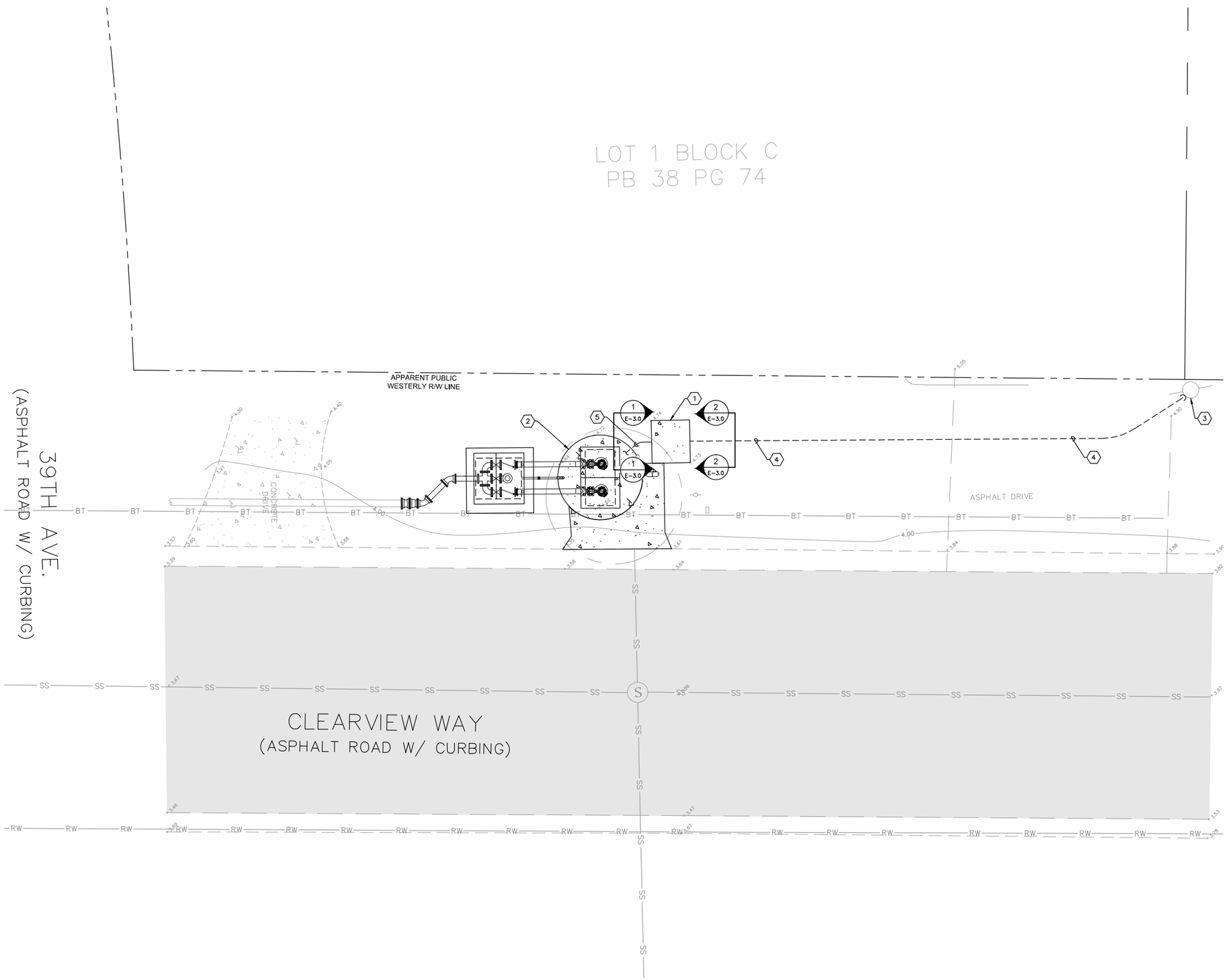
ELECTRICAL LEGEND

CITY OF ST. PETE BEACH
LIFT STATION NO. 8
REHABILITATION
PINELLAS COUNTY FLORIDA

DATE
SEPTEMBER 2016

PROJECT NO.
148404012

SHEET NUMBER
E-0.0



NORTH

GRAPHIC SCALE IN FEET
0 2.5 5 10

GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
2. CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
3. CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY PUMP STATION INTERRUPTION.
4. CONTRACTOR SHALL DEMOLISH EXISTING CONCRETE PAD AT EXISTING LIFT STATION CONTROL PANEL AND REMOVE EXISTING ELECTRICAL COMPONENTS. THE CONTRACTOR SHALL POUR NEW PAD AFTER ALL NEW CONDUITS HAVE BEEN INSTALLED. CONTRACTOR SHALL REUSE EXISTING 1-1/4" CONDUIT TO EXISTING DUKE ENERGY POWER POLE AND INSTALL NEW SERVICE ENTRANCE CONDUCTORS AS SHOWN.
5. CONTRACTOR SHALL PROVIDE AND INSTALL #4 CU GROUNDING ELECTRODE CONDUCTORS, GROUND RODS AND GROUND TEST WELLS AS INDICATED ON SHEET E-3.3.
6. CONTRACTOR SHALL COORDINATE ALL PORTIONS OF THE NEW ELECTRICAL SERVICE WITH DUKE ENERGY (JOHN KRUSZONA 727-893-9372).
7. REFER TO CIVIL SITE PLANS FOR EXISTING UNDERGROUND UTILITIES.

KEY NOTES

(1) CONTRACTOR TO REMOVE EXISTING LIFT STATION ELECTRICAL EQUIPMENT, THEN PROVIDE AND INSTALL NEW ELECTRICAL EQUIPMENT RACK. NOTE: EXISTING PUMP WATCH MONITORING SYSTEM TO BE REUSED. REFER TO SHEET E-3.0 FOR FRONT AND REAR ELEVATIONS OF NEW ELECTRICAL EQUIPMENT RACK. REFER ALSO TO GENERAL NOTES ON THIS SHEET.

(2) EXISTING WET WELL TO BE MODIFIED. REFER TO CIVIL DRAWINGS.

(3) NEW DUKE ENERGY TRANSFORMERS TO BE LOCATED ON EXISTING PRIMARY DISTRIBUTION POLE (120/240V, 3ø, 4-WIRE DISTRIBUTION VOLTAGE). REFER ALSO TO LIFT STATION ONE-LINE DIAGRAMS ON SHEET E-3.3.

(4) PROVIDE AND INSTALL NEW 3-#6 THWN CU + 1-#6 THWN CU NEUTRAL IN 1-1/4" CONDUIT FROM NEW METER TO EXISTING DUKE ENERGY POWER DISTRIBUTION POLE. NOTE: CONTRACTOR SHALL INSTALL CONDUCTOR AND CONDUIT UP EXISTING POLE TO NEW DUKE ENERGY TRANSFORMERS. PROVIDE SLACK CONDUCTOR AT TOP OF POWER DISTRIBUTION POLE. COORDINATE ALL REQUIREMENTS WITH DUKE ENERGY (JOHN KRUSZONA 727-893-9372).

(5) REFER TO DETAILS AND ELEVATIONS FOR CONDUIT/CONDUCTORS REQUIRED TO NEW WET WELL.

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Certificate of Authorization No. 00031028

GROUNDWATER / DEWATERING NOTE:
THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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No.	REVISIONS	DATE	BY

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DESIGN ENGINEER: TIMOTHY THOMAS, P.E.
FLORIDA REGISTRATION NUMBER: 47079
DATE:

SCALE AS NOTED
DESIGNED BY TDT
DRAWN BY JLH
CHECKED BY TDT

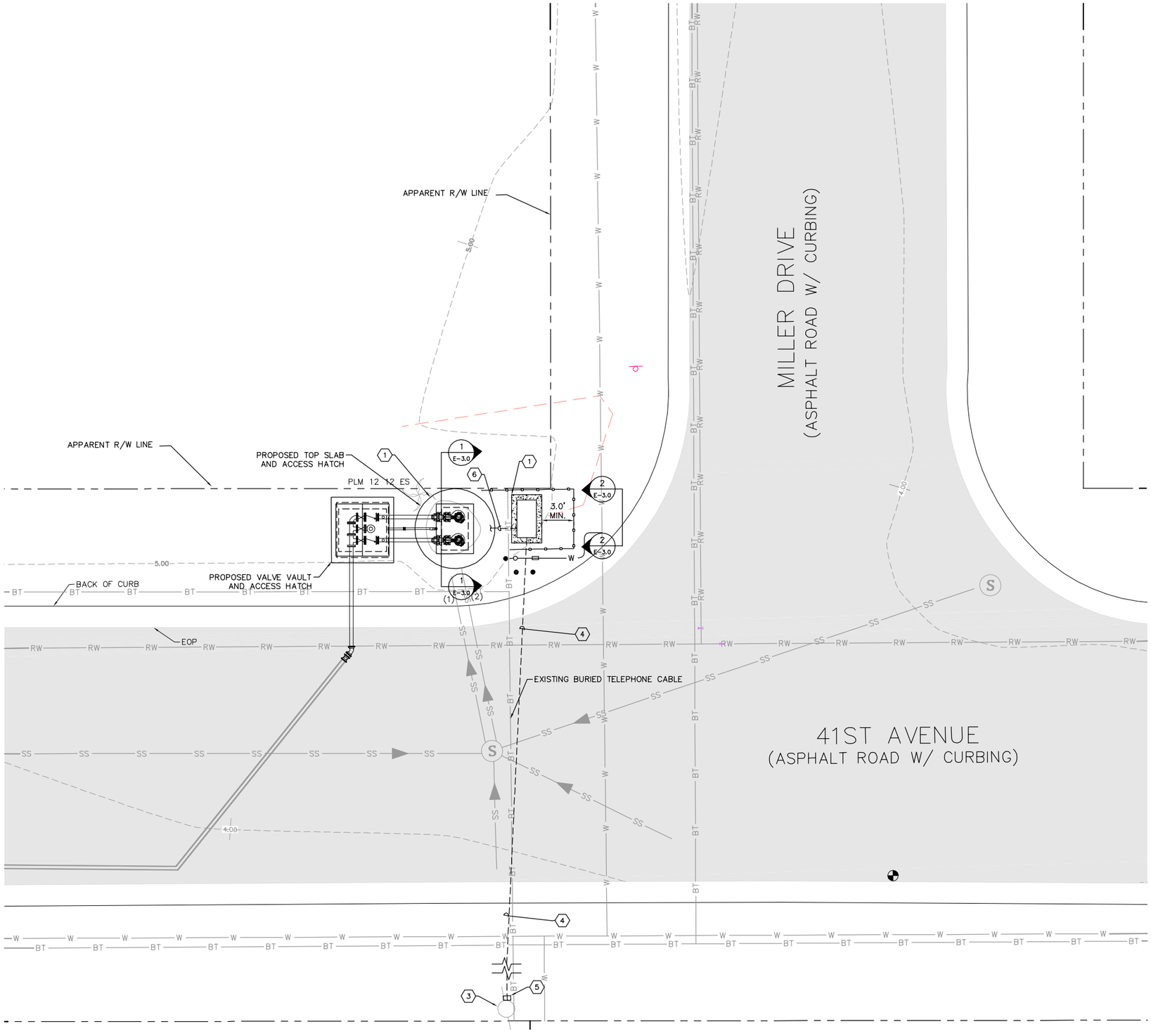
LIFT STATION NO. 8 ELECTRICAL SITE PLAN

CITY OF ST. PETE BEACH
LIFT STATION NO. 8
REHABILITATION
PINELLAS COUNTY FLORIDA

DATE
SEPTEMBER 2016

PROJECT NO.
148404012

SHEET NUMBER
E-0.1



NORTH

GRAPHIC SCALE IN FEET
0 2.5 5 10

GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
2. CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
3. CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY PUMP STATION INTERRUPTION.
4. CONTRACTOR SHALL DEMOLISH EXISTING CONCRETE PAD AT EXISTING LIFT STATION CONTROL PANEL AND REMOVE EXISTING ELECTRICAL COMPONENTS. THE CONTRACTOR SHALL POUR NEW PAD AFTER ALL NEW CONDUITS HAVE BEEN INSTALLED. CONTRACTOR SHALL REUSE EXISTING 1-1/4" CONDUIT TO EXISTING DUKE ENERGY POWER POLE AND INSTALL NEW SERVICE ENTRANCE CONDUCTORS AS SHOWN.
5. CONTRACTOR SHALL PROVIDE AND INSTALL #4 CU GROUNDING ELECTRODE CONDUCTORS, GROUND RODS AND GROUND TEST WELLS AS INDICATED ON SHEET E-3.3.
6. CONTRACTOR SHALL COORDINATE ALL PORTIONS OF THE NEW ELECTRICAL SERVICE WITH DUKE ENERGY (JOHN KRUSZONA 727-893-9372).
7. REFER TO CIVIL SITE PLANS FOR EXISTING UNDERGROUND UTILITIES.

KEY NOTES

(1) CONTRACTOR TO REMOVE EXISTING LIFT STATION ELECTRICAL EQUIPMENT, THEN PROVIDE AND INSTALL NEW ELECTRICAL EQUIPMENT RACK. NOTE: EXISTING PUMP WATCH MONITORING SYSTEM TO BE REUSED. REFER TO SHEET E-3.0 FOR FRONT AND REAR ELEVATIONS OF NEW ELECTRICAL EQUIPMENT RACK. REFER ALSO TO GENERAL NOTES ON THIS SHEET.

(2) EXISTING WET WELL TO BE MODIFIED. REFER TO CIVIL DRAWINGS.

(3) NEW DUKE ENERGY TRANSFORMERS TO BE LOCATED ON EXISTING PRIMARY DISTRIBUTION POLE (120/240V, 3ø, 4-WIRE DISTRIBUTION VOLTAGE). REFER ALSO TO LIFT STATION ONE-LINE DIAGRAMS ON SHEET E-3.3.

(4) PROVIDE AND INSTALL NEW 3-#6 THWN CU + 1-#6 THWN CU NEUTRAL IN 1-1/4" CONDUIT FROM NEW METER TO EXISTING DUKE ENERGY PEDESTAL (REFER TO NOTE #5) AT BASE OF POWER DISTRIBUTION POLE. NOTE: CONTRACTOR SHALL INSTALL CONDUCTOR AND CONDUIT UP EXISTING POLE TO NEW DUKE ENERGY TRANSFORMERS. PROVIDE SLACK CONDUCTOR AT TOP OF POWER DISTRIBUTION POLE. COORDINATE ALL REQUIREMENTS WITH DUKE ENERGY (JOHN KRUSZONA 727-893-9372).

(5) EXISTING PEDESTAL AT BASE OF EXISTING DUKE ENERGY POLE.

(6) REFER TO DETAILS AND ELEVATIONS FOR CONDUIT/CONDUCTORS REQUIRED TO NEW WET WELL.

(8) APPROXIMATE LOCATION OF EXISTING 5' WET WELL

GROUNDWATER / DEWATERING NOTE:
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DESIGN ENGINEER: TIMOTHY THOMAS, P.E.
FLORIDA REGISTRATION NUMBER: 47079
DATE:

SCALE AS NOTED
DESIGNED BY TDT
DRAWN BY JLH
CHECKED BY TDT

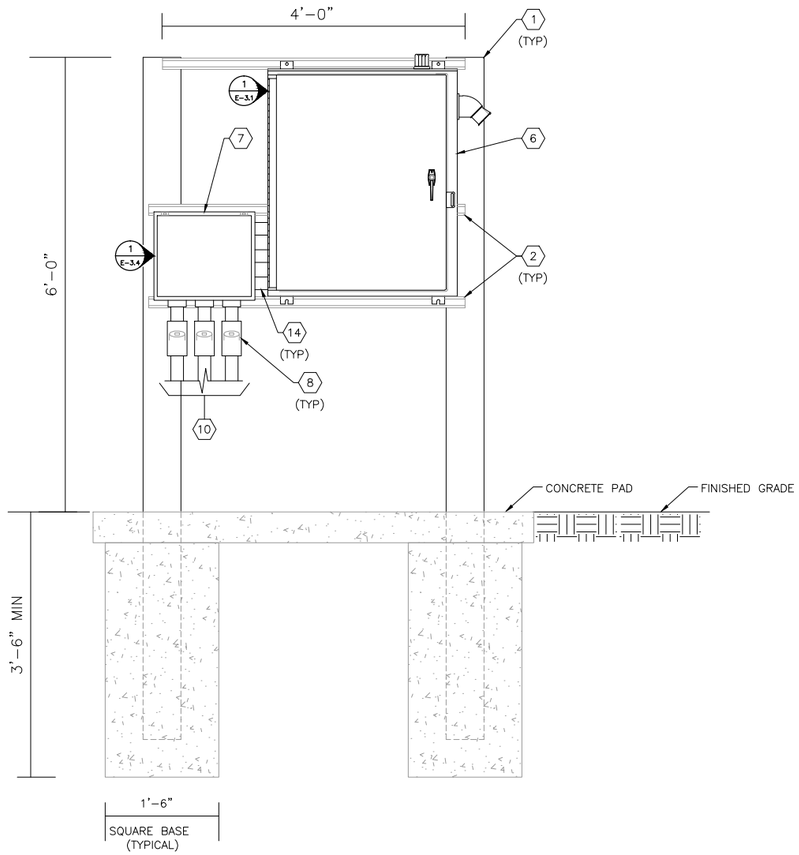
LIFT STATION NO. 16 ELECTRICAL SITE PLAN

CITY OF ST. PETE BEACH
LIFT STATION NO. 8
REHABILITATION
FLORIDA
PINELLAS COUNTY

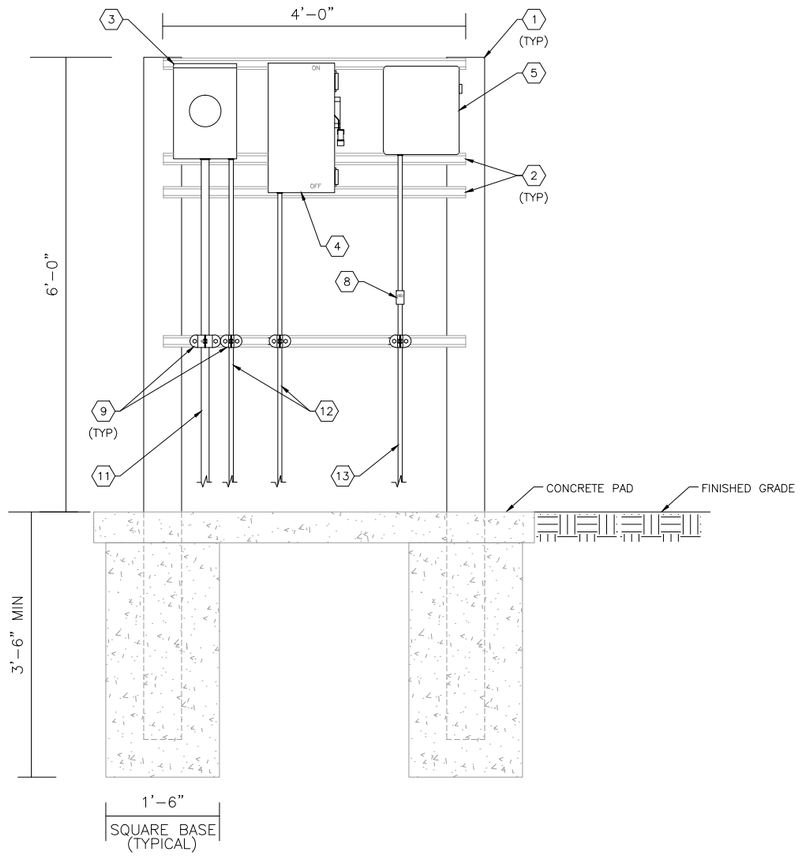
DATE
SEPTEMBER 2016

PROJECT NO.
148404012

SHEET NUMBER
E-0.2



FRONT ELEVATION
N.T.S.
1 E-3.0



REAR ELEVATION
N.T.S.
2 E-3.0

GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
2. CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
3. CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY PUMP STATION INTERRUPTION.
4. NEW ELECTRICAL SERVICE SHALL BE 120/240V, 3ø, 4-WIRE WITH 208V 'HIGH-LEG'. CONTRACTOR SHALL INSURE THAT 120V CIRCUITS TO BE PROVIDED ARE NOT SUPPLIED BY HIGH-LEG.
5. EQUIPMENT ELEVATIONS PRESENTED ARE FOR REFERENCE AS TYPICAL CONSTRUCTION REQUIRED. EQUIPMENT LAYOUT MAY BE MIRRORED, ROTATED OR OTHERWISE MANIPULATED AS REQUIRED TO ACCOMMODATE ANY CONDITIONS SPECIFIC TO THE INDIVIDUAL SITE.

KEY NOTES

1. PROVIDE AND INSTALL 6" X 6" X 9' REINFORCED SQUARE CONCRETE POST.
2. PROVIDE AND INSTALL 1-5/8" X 1-5/8" STAINLESS STEEL UNISTRUT WITH STAINLESS STEEL HARDWARE. NOTE: INSTALL ALL BOLTS FOR UNISTRUT COMPLETELY THROUGH CONCRETE POSTS.
3. PROVIDE AND INSTALL 60A, 240V, 3ø NEMA 3R METER SOCKET. COORDINATE REQUIREMENTS ALL METER REQUIREMENTS WITH JOHN KRUSZONA OF DUKE ENERGY (727-893-9372).
4. PROVIDE AND INSTALL NEW 3-POLE, 60A, 240V, FUSIBLE DISCONNECT WITH SOLID NEUTRAL IN NEMA 4X STAINLESS STEEL ENCLOSURE. FUSE DISCONNECT AT 60 AMPERES WITH CLASS RK5 TIME DELAY FUSES. DISCONNECT SHALL BE SERVICE ENTRANCE RATED.
5. CONTRACTOR TO REUSE THE EXISTING PUMP WATCH MONITORING SYSTEM CURRENTLY LOCATED AT THE ASSOCIATED LIFT STATION. REFER ALSO TO SPECIFICATIONS.
6. PROVIDE AND INSTALL NEW PUMP CONTROL CABINET. REFER ALSO TO DETAILS ON SHEET E-3.1.
7. PROVIDE AND INSTALL NEW 16" X 14" X 6" NEMA 4X STAINLESS STEEL WET WELL JUNCTION BOX.
8. PROVIDE AND INSTALL NEW EYS SEAL.
9. PROVIDE AND INSTALL STAINLESS STEEL CONDUIT CLAMPS WITH STAINLESS STEEL HARDWARE.
10. NEW 2" CONDUITS THAT CONTINUE TO WETWELL. REFER ALSO TO SHEET E-3.3.
11. PROVIDE AND INSTALL NEW 3-#6 THWN CU + 1-#6 THWN CU NEUTRAL IN 1-1/4" CONDUIT TO NEW DUKE ENERGY POLE-MOUNTED TRANSFOREMRS. REFER ALSO TO SHEET E-0.1.
12. PROVIDE AND INSTALL #4 AWG BARE COPPER GROUNDING ELECTRODE CONDUCTOR TO GROUND GRID SYSTEM.
13. PROVIDE AND INSTALL LEVEL TRANSDUCER CABLE (TRANSDUCER CABLE TO BE SUPPLIED AS PART OF LEVEL TRANSDUCER) IN 1" CONDUIT TO WETWELL. REFER ALSO TO SHEET E-3.3.
14. NEW 2" CONDUITS FROM PUMP CONTROL CABINET TO WETWELL JUNCTION BOX.

GROUNDWATER / DEWATERING NOTE:
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NO.	REVISIONS	DATE	BY

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DESIGN ENGINEER: TIMOTHY THOMAS, P.E.
FLORIDA REGISTRATION NUMBER: 47079
DATE:

SCALE AS NOTED
DESIGNED BY TDT
DRAWN BY JLH
CHECKED BY TDT

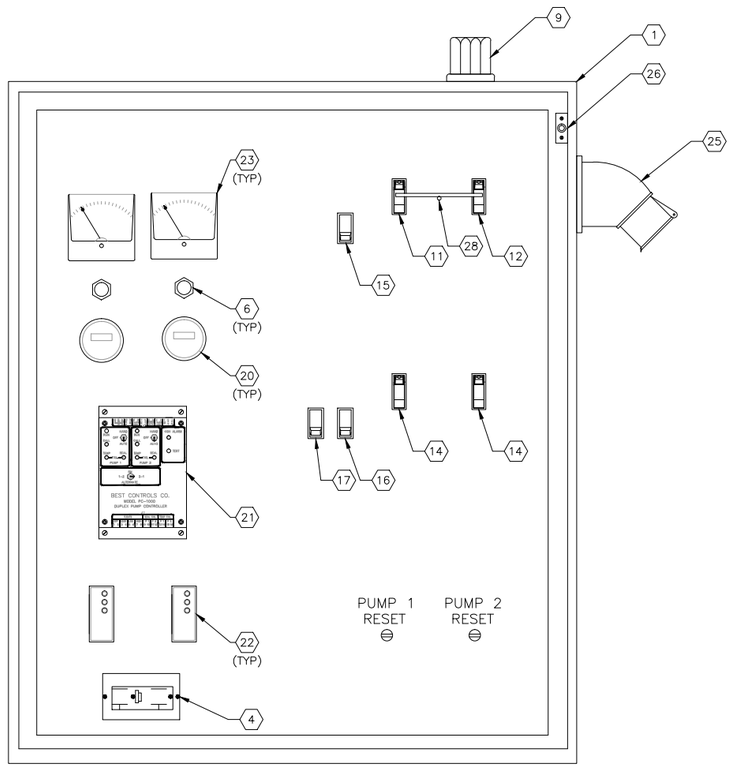
LIFT STATION ELECTRICAL RACK ELEVATIONS

CITY OF ST. PETE BEACH
LIFT STATION NO. 8
REHABILITATION
PINELLAS COUNTY FLORIDA

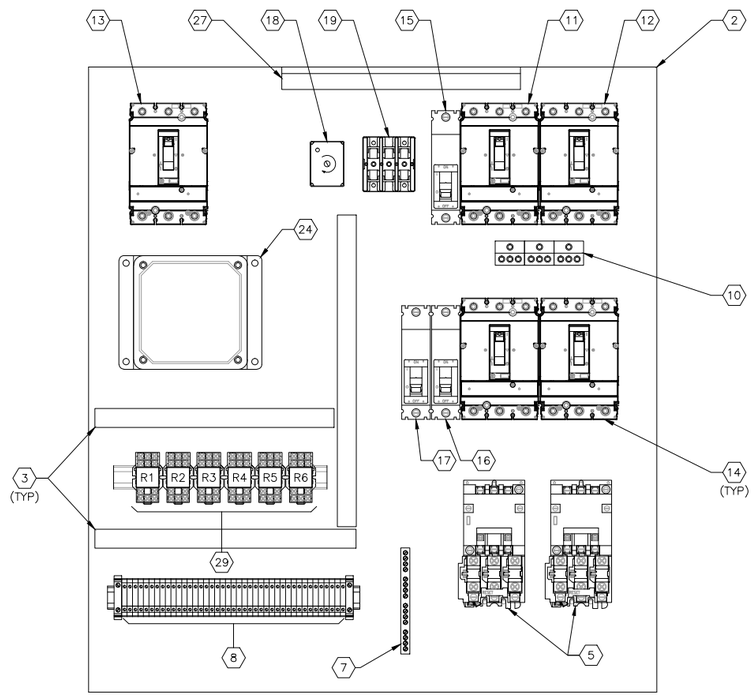
DATE
SEPTEMBER 2016

PROJECT NO.
148404012

SHEET NUMBER
E-3.0



DEADFRONT ELEVATION



INTERIOR ELEVATION

PUMP CONTROL CABINET DETAIL (1 / E-3.1)
N.T.S.

GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
2. CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
3. CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY PUMP STATION INTERRUPTION.
4. NEW ELECTRICAL SERVICE SHALL BE 120/240V, 3ø, 4-WIRE WITH 208V 'HIGH-LEG'. CONTRACTOR SHALL INSURE THAT 120V CIRCUITS TO BE PROVIDED ARE NOT SUPPLIED BY HIGH-LEG.

KEY NOTES

(1) PROVIDE AND INSTALL 36" X 30" X 12", 316 STAINLESS STEEL ENCLOSURE WITH WHITE ENAMEL PAINT ON ALL EXTERIOR SURFACES. INCLUDE BACKPANEL, PAD-LOCKABLE 3-POINT LATCH, DEADFRONT INTERIOR DOOR AND DOOR-STOP KIT.

(2) PROVIDE 36" X 30" STEEL BACK PANEL.

(3) PROVIDE 1"X1" PANDUIT (OR EQUAL) WIRING SYSTEM WITH COVERS.

(4) PROVIDE DUPLEX GFI RECEPTACLE. HUBBELL, GFR5352IA OR EQUAL.

(5) PROVIDE 3-POLE, NEMA SIZE 1 STARTERS WITH 120V COILS. SQUARE-D CLASS 8536, TYPE SCO3. SIZE OVERLOADS AS REQUIRED.

(6) PROVIDE AMP TEST PUSHBUTTON. SQUARE-D CAT# 9001 CONTACTS AS REQUIRED.

(7) PROVIDE EQUIPMENT GROUND ASSEMBLY. SQUARE-D #PK15GTA.

(8) PROVIDE DIN-RAIL MOUNTED TERMINAL BLOCKS, ALLEN-BRADLEY 1492-W10.

(9) PROVIDE ALARM LIGHT, 120V, UL 4X, 25W, INGRAM MODEL #LRX-25 RED ON CABINET EXTERIOR.

(10) PROVIDE POWER DISTRIBUTION BLOCK.

(11) PROVIDE 3-POLE 60A, 600V, MAIN CIRCUIT BREAKER, SQUARE-D CAT# HDL36060.

(12) PROVIDE 3-POLE 60A, 600V, EMERGENCY CIRCUIT BREAKER, SQUARE-D CAT# HDL36060.

(13) PROVIDE 3-POLE 30A, 600V, SPD CIRCUIT BREAKER, SQUARE-D CAT# HDL36030.

(14) PROVIDE 3-POLE 30A, 600V, MOTOR CIRCUIT BREAKER, SQUARE-D CAT# HJL36060.

(15) PROVIDE 1-POLE 20A, 120V, GFI CIRCUIT BREAKER, SQUARE-D CAT# FAL12020.

(16) PROVIDE 1-POLE 15A, 120V, CONTROL POWER CIRCUIT BREAKER, SQUARE-D CAT# FAL12015.

(17) PROVIDE 1-POLE 15A, 120V, PUMP WATCH CIRCUIT BREAKER, SQUARE-D CAT# FAL12015.

(18) PROVIDE PHASE MONITOR RELAY. DIVERSIFIED ELECTRONICS CAT# SLA-230-ALE.

(19) PROVIDE FUSEHOLDERS FOR PHASE MONITOR RELAY FUSES.

(20) PROVIDE ELAPSED TIME METER. CRAMER 635G.

(21) PROVIDE DUPLEX PUMP CONTROLLER. BEST CONTROLS COMPANY MODEL PC-1000.

(22) INSTALL MINI CAS ii SUPERVISORY RELAY. RELAY TO BE PROVIDED BY PUMP MANUFACTURER.

(23) PROVIDE ANALOG AC AMMETER. 3-1/2" SIMPSON WIDE-VUE MODEL 1357, CAT # 35073. CONTRACTOR TO ALSO PROVIDE APPROPRIATE 50/5 RATIO, CURRENT TRANSFORMERS TO ACCOMMODATE ANALOG METERS.

(24) PROVIDE SURGE PROTECTION DEVICE (SPD). 120/240V, 3ø, 4-WIRE. APT MODEL # TE03XDS104X.

(25) PROVIDE EMERGENCY GENERATOR RECEPTACLE. COORDINATE REQUIREMENTS WITH THE CITY OF ST. PETE BEACH.

(26) PROVIDE LIMIT SWITCH FOR CABINET LIGHT. CUTLER HAMMER E47BCC06.

(27) PROVIDE AND INSTALL 120V, 8W, CABINET LIGHT. PRESCOLITE UCS12-1-08-PH-120-WSW WITH INTEGRAL SWITCH. PROVIDE F8T5/CW LAMP AND TIE TO LIMIT SWITCH IN NOTE #26.

(28) PROVIDE MECHANICAL INTERLOCK FOR MAIN AND EMERGENCY CIRCUIT BREAKERS.

(29) PROVIDE CONTROL RELAYS. SQUARE-D CLASS 8501, TYPE R WITH 120V COILS.

GROUNDWATER / DEWATERING NOTE:
THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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DESIGN ENGINEER: TIMOTHY THOMAS, P.E.
FLORIDA REGISTRATION NUMBER: 47079
DATE:

SCALE	AS NOTED
DESIGNED BY	TDT
DRAWN BY	JLH
CHECKED BY	TDT

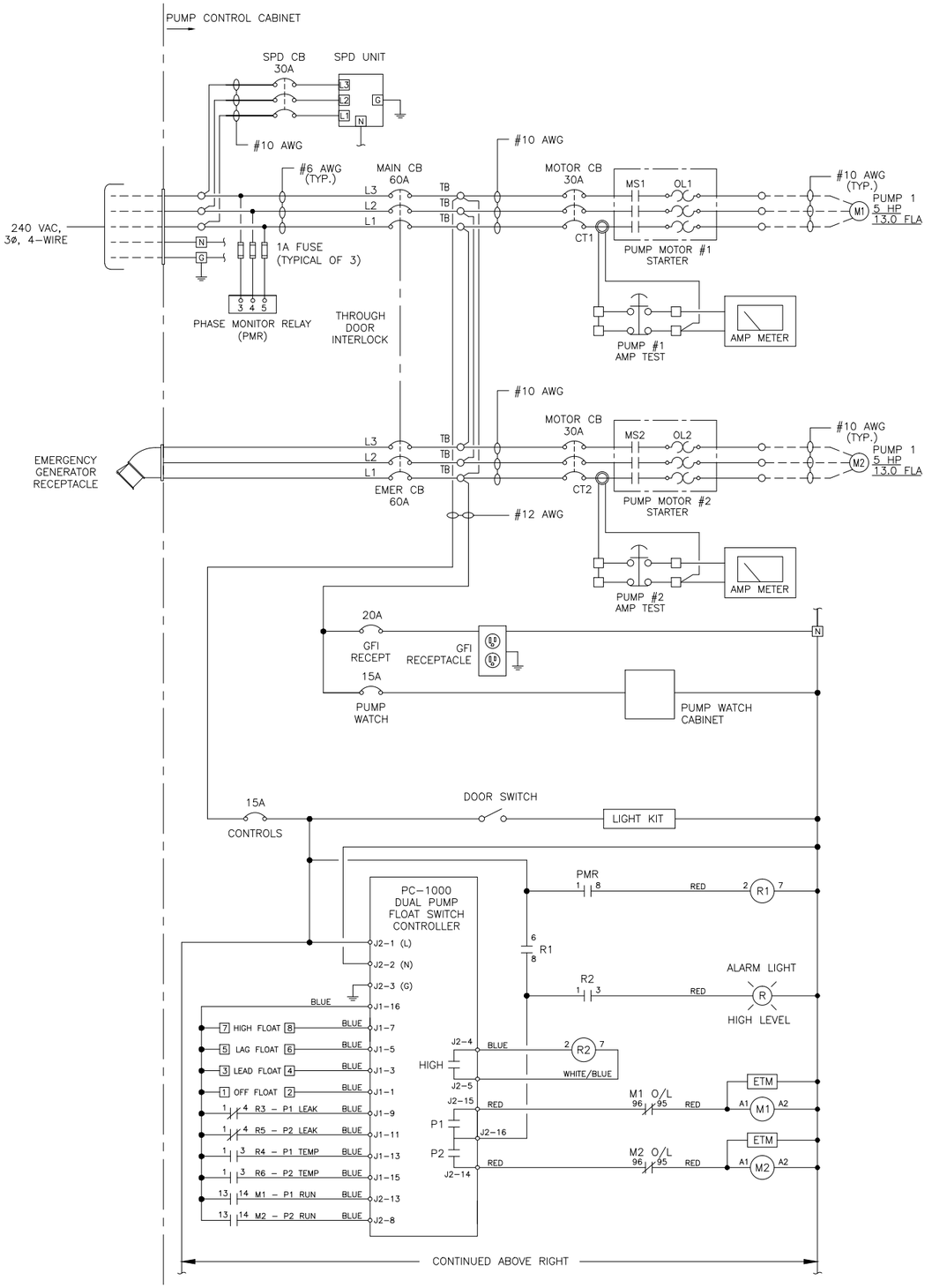
PUMP CONTROL CABINET DETAILS

CITY OF ST. PETE BEACH
LIFT STATION NO. 8
REHABILITATION
FLORIDA
PINELLAS COUNTY

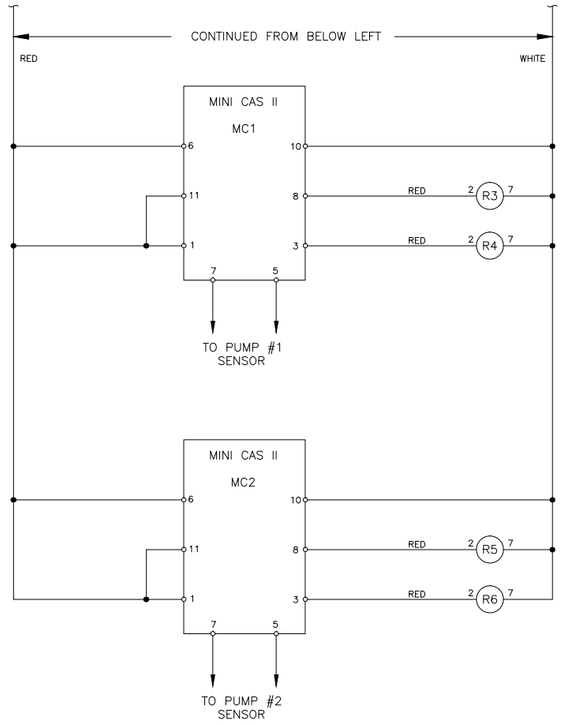
DATE
SEPTEMBER 2016

PROJECT NO.
148404012

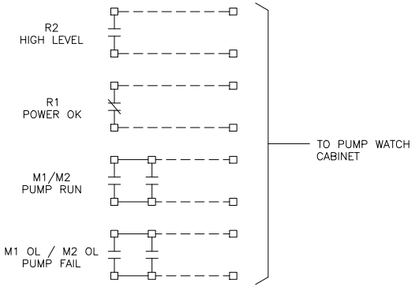
SHEET NUMBER
E-3.1



LIFT STATION NO. 8 AND NO. 16 CONTROL WIRING SCHEMATIC



OUTPUTS TO PUMP WATCH CABINET



GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION AND ORDERING EQUIPMENT. CONTRACTOR SHALL NOTIFY ENGINEER OF DISCREPANCIES.
2. CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING EQUIPMENT, UTILITIES, STRUCTURES, AND PERSONNEL FROM DAMAGE OR INJURY DURING CONSTRUCTION.
3. CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO AVOID ANY PUMP STATION INTERRUPTION.
4. NEW ELECTRICAL SERVICE SHALL BE 120/240V, 3ø, 4-WIRE WITH 208V 'HIGH-LEG'. CONTRACTOR SHALL INSURE THAT 120V CIRCUITS TO BE PROVIDED ARE NOT SUPPLIED BY HIGH-LEG.

GROUNDWATER / DEWATERING NOTE:
THE PRESENCE OF GROUNDWATER SHOULD BE ANTICIPATED ON THIS PROJECT. CONTRACTOR'S BID SHALL INCLUDE CONSIDERATION FOR THIS ISSUE. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS.

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DESIGN ENGINEER: TIMOTHY THOMAS, P.E.
FLORIDA REGISTRATION NUMBER: 47079
DATE:

SCALE AS NOTED
DESIGNED BY TDT
DRAWN BY JLH
CHECKED BY TDT

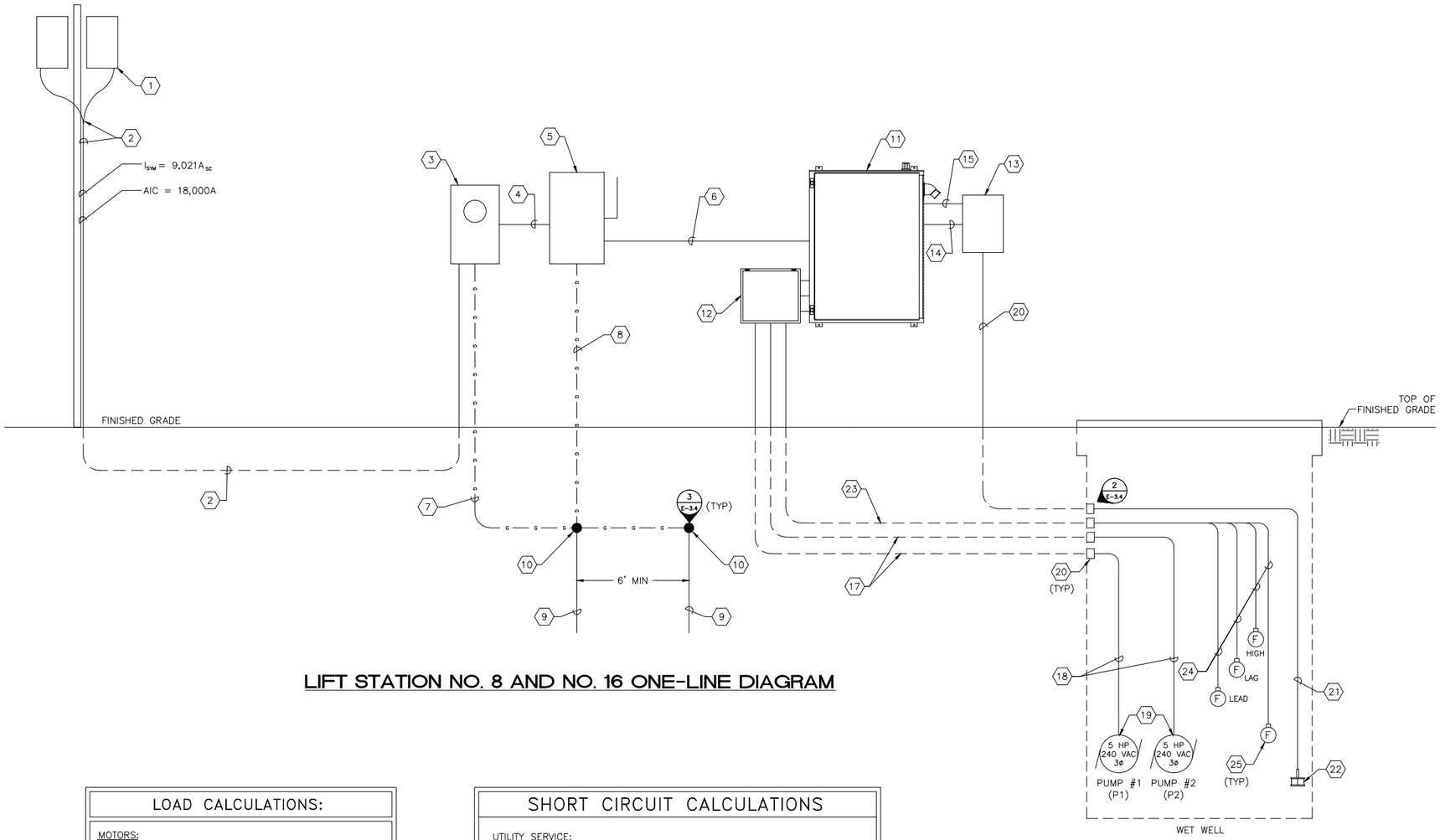
LIFT STATION CONTROL WIRING SCHEMATIC

CITY OF ST. PETE BEACH
LIFT STATION NO. 8 REHABILITATION
PINELLAS COUNTY FLORIDA

DATE
SEPTEMBER 2016

PROJECT NO.
148404012

SHEET NUMBER
E-3.2



LIFT STATION NO. 8 AND NO. 16 ONE-LINE DIAGRAM

LOAD CALCULATIONS:

MOTORS:

PUMP NO. 1:	5.0	HP, 240	VAC, 3	ø,	13.0	A
PUMP NO. 2:	5.0	HP, 240	VAC, 3	ø,	13.0	A
MOTOR SUB-TOTAL					26.0	A
+ 25% OF LARGEST MOTOR					3.3	A
SUB-TOTAL					29.3	A
AUXILIARY EQUIPMENT					10.0	A
TOTAL MAXIMUM PHASE AMPERES					39.3	A

SERVICE SIZE:

60 A, 240 VAC, 3 ø, 4 – WIRE MINIMUM.

SHORT CIRCUIT CALCULATIONS

UTILITY SERVICE:

120/240V, 3ø, 4–WIRE, ELECTRICAL SERVICE. AVAILABLE FAULT CURRENT AT SECONDARY SIDE OF UTILITY TRANSFOMERS: 9,021 AMP RMS SYM. SERVICE CONDUCTOR LENGTH: 75 FEET #6 AWG COPPER SERVICE ENTRANCE

ISCA AT THE SERVICE DISCONNECT:

$$ISCA = \left[\frac{1}{1 + \left[\frac{(1.73)(75)(9{,}021)}{(1{,}940)(240)}\right]}\right] \times (9{,}021)$$

ISCA = 2,567 AMPS RMS SYM.

MAIN DISCONNECT FUSED WITH CLASS RK5, 200KAIC FUSES. ALL BREAKERS RATED GREATER THAN 10,000 AIC.

KEY NOTES

1. NEW DUKE ENERGY TRANSFORMERS TO BE LOCATED ON EXISTING PRIMARY DISTRIBUTION POLE (120/240V, 3ø, 4–WIRE DISTRIBUTION VOLTAGE).
2. PROVIDE AND INSTALL NEW 3–#6 THWN CU + 1–#6 THWN CU NEUTRAL IN 1–1/4" CONDUIT FROM NEW METER TO EXISTING DUKE ENERGY POWER DISTRIBUTION POLE. NOTE: CONTRACTOR SHALL INSTALL CONDUCTOR AND CONDUIT UP EXISTING POLE TO NEW DUKE ENERGY TRANSFORMERS. PROVIDE SLACK CONDUCTOR AT TOP OF POWER DISTRIBUTION POLE. COORDINATE ALL REQUIREMENTS WITH DUKE ENERGY (JOHN KRUSZONA 727–893–9372).
3. PROVIDE AND INSTALL 60A, 240V, 3ø METER SOCKET. COORDINATE REQUIREMENTS ALL METER REQUIREMENTS WITH JOHN KRUSZONA OF DUKE ENERGY (727–893–9372).
4. PROVIDE AND INSTALL 3–#6 THWN CU + 1–#6 THWN CU NEUTRAL IN 1–1/4" CONDUIT.
5. PROVIDE AND INSTALL NEW 3–POLE, 60A, 240V, FUSIBLE DISCONNECT WITH SOLID NEUTRAL IN NEMA 4X STAINLESS STEEL ENCLOSURE. FUSE DISCONNECT AT 60 AMPERES WITH CLASS RK5 TIME DELAY FUSES. DISCONNECT SHALL BE SERVICE ENTRANCE RATED.
6. PROVIDE AND INSTALL 3–#6 THWN CU + 1–#6 THWN CU NEUTRAL + 1–#8 CU GND IN 1–1/4" CONDUIT. INSTALL CONDUIT NIPPLE BETWEEN BACKSIDE OF DISCONNECT AND BACKSIDE OF PUMP CONTROL CABINET.
7. PROVIDE AND INSTALL #4 CU GROUNDING ELECTRODE CONDUCTOR IN 3/4"C. COORDINATE REQUIREMENTS WITH DUKE ENERGY.
8. PROVIDE AND INSTALL #4 CU GROUNDING ELECTRODE CONDUCTOR IN 3/4"C.
9. PROVIDE AND INSTALL 5/8" X 20'–0" GROUNDING ELECTRODE.
10. PROVIDE EXOTHERMIC WELD.
11. PROVIDE AND INSTALL PUMP CONTROL CABINET. REFER TO DETAILS ON SHEET E–3.1.
12. PROVIDE AND INSTALL NEW 16" X 14" X 6" NEMA 4X STAINLESS STEEL WETWELL JUNCTION BOX. REFER TO DETAIL ON SHEET E–3.4.
13. CONTRACTOR TO REUSE EXISTING PUMP WATCH MONITORING SYSTEM. REFER ALSO TO SPECIFICATIONS.
14. PROVIDE AND INSTALL 2–#12 THWN CU + 1–#12 THWN CU GND IN 3/4" CONDUIT FOR PUMP WATCH 120V POWER. INSTALL CONDUIT NIPPLE BETWEEN BACKSIDE OF OF PUMP CONTROL CABINET AND BACKSIDE OF PUMP WATCH CABINET.
15. PROVIDE AND INSTALL 8–#12 THWN CU + 1–#12 THWN CU GND IN 3/4" CONDUIT FOR PUMP WATCH SIGNALS. INSTALL CONDUIT NIPPLE BETWEEN BACKSIDE OF OF PUMP CONTROL CABINET AND BACKSIDE OF PUMP WATCH CABINET.
16. PROVIDE AND INSTALL LEVEL TRANSDUCER CABLE (TRANSDUCER CABLE TO BE SUPPLIED AS PART OF LEVEL TRANSDUCER) IN 1" CONDUIT TO WETWELL. REFER ALSO TO SHEET E–3.4.
17. SUBMERSIBLE PUMP POWER CABLES: 3–#10 PHASE CONDUCTORS, 4–#14 FOR MOISTURE AND THERMAL DETECTION, 1–#10 GND. INSTALL IN 2"C. TO WET WELL. CABLE BY PUMP VENDOR.
18. SUBMERSIBLE PUMP POWER CABLES: 3–#10 PHASE CONDUCTORS, 4–#14 FOR MOISTURE AND THERMAL DETECTION, 1–#10 GND. CABLE BY PUMP VENDOR.
19. SUBMERSIBLE PUMP MOTOR. 5.0 HP 240 VOLTS, 3ø, 16.0 FLA. MOTOR SHALL BE EQUIPPED WITH AN INTEGRALLY MOUNTED CONDUCTANCE PROBE TO INDICATE SEAL FAILURE.
20. INSTALL 2/C–#18 SHIELDED CABLE FOR PRESSURE TRANSDUCER 4–20mA SIGNAL IN 1–1/4"C. CABLE BY TRANSDUCER MANUFACTURER.
21. 2/C–#18 SHIELDED CABLE FOR PRESSURE TRANSDUCER 4–20mA SIGNAL. CABLE BY TRANSDUCER MANUFACTURER.
22. SUBMERSIBLE PRESSURE TRANSDUCER. REFER TO SPECIFICATIONS.
23. INSTALL FOUR (4) :: 2/C–#14 FLOAT SWITCH CABLES IN 2"C. TO WET WELL. CABLES BY FLOAT SWITCH MANUFACTURER.
24. 2/C–#14 FLOAT SWITCH CABLES. CABLES BY FLOAT SWITCH MANUFACTURER.
25. PROVIDE AND INSTALL LEVEL FLOAT. REFER TO SPECIFICATIONS.

GROUNDWATER / DEWATERING NOTE:
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DESIGN ENGINEER: TIMOTHY THOMAS, P.E.
FLORIDA REGISTRATION NUMBER: 47079

SCALE	DESIGNED BY	DRAWN BY	CHECKED BY
AS NOTED	TDT	JLH	TDT

DATE:

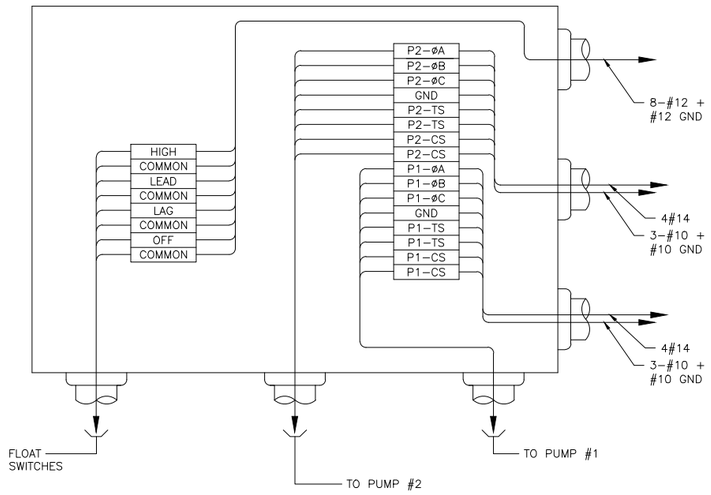
LIFT STATION NO. 8 AND 16 ONE-LINE DIAGRAM

CITY OF ST. PETE BEACH
LIFT STATION NO. 8
REHABILITATION
PINELLAS COUNTY FLORIDA

DATE
SEPTEMBER 2016

PROJECT NO.
148404012

SHEET NUMBER
E-3.3

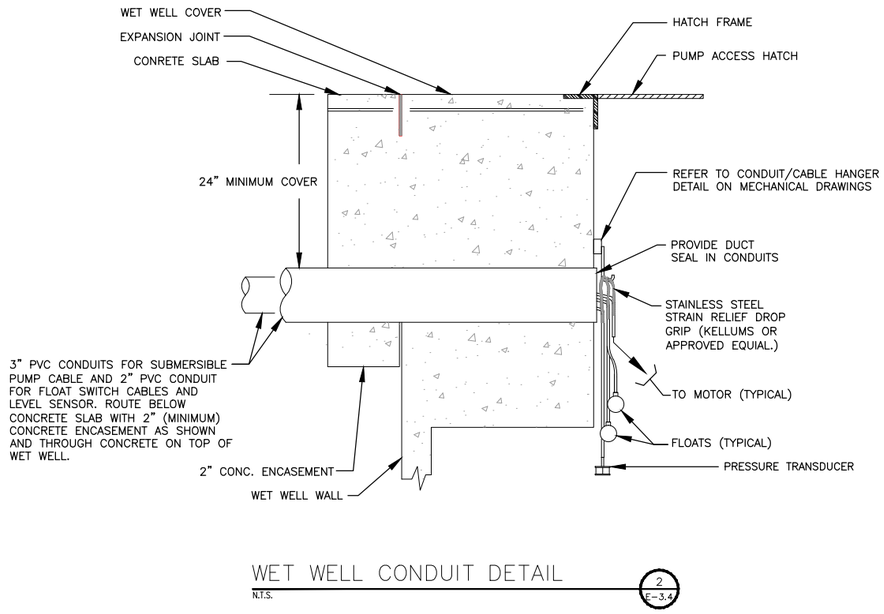


NOTES:

1. COVER NOT SHOWN FOR CLARITY.
2. BOND GROUNDING CONDUCTORS TO ENCLOSURE BACK PANEL.

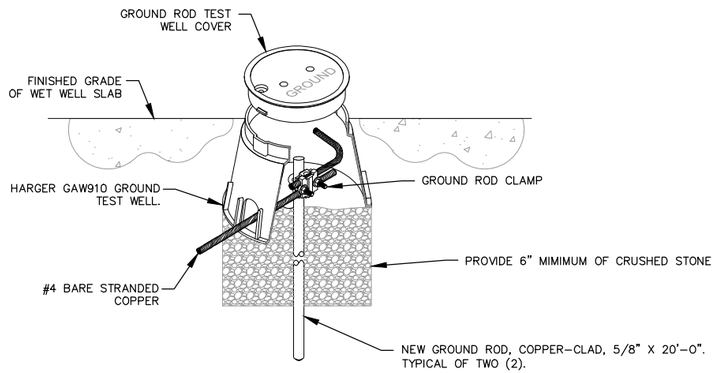
WET WELL JUNCTION BOX DETAIL

N.T.S. — 1 / E-3.4



WET WELL CONDUIT DETAIL

N.T.S. — 2 / E-3.4



GROUND ROD TEST WELL

N.T.S. — 3 / E-3.4

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GROUNDWATER / DEWATERING NOTE:
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DESIGN ENGINEER: TIMOTHY THOMAS, P.E.
FLORIDA REGISTRATION NUMBER: 47079

SCALE	DESIGNED BY	DRAWN BY	CHECKED BY	DATE:
AS NOTED	TDT	JLH	TDT	

LIFT STATION NO. 8 AND 16 DETAILS

CITY OF ST. PETE BEACH
LIFT STATION NO. 8
REHABILITATION
PINELLAS COUNTY FLORIDA

DATE
SEPTEMBER 2016

PROJECT NO.
148404012

SHEET NUMBER
E-3.4

CITY OF ST. PETE BEACH

PUBLIC SERVICES DEPARTMENT

Lift Station No. 8 & 16 Rehabilitation

2015-2016 CIP

St. Pete Beach, Florida

Technical Specifications

September 2016

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Lift Station No. 8 & 16 Rehabilitation
2015-2016 CIP

Technical Specifications

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2015-2016 CIP

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Lift Station No. 8 & 16 Rehabilitation
2015-2016 CIP

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SECTION 1 - GENERAL

1.01 LOCATION OF THE WORK SITE AND ACCESS

Lift Station No. 8 & 16 is located at different locations throughout the City of St. Pete Beach. Lift Station No. 8 is located on 380 39th Avenue in St. Pete Beach, Pinellas County, Florida. Lift Station No. 16 is located on 4104 Miller Drive in St. Pete Beach, Pinellas County, Florida. Access to the work sites shall be over streets, and walkways. Any damage to existing pavement surface and base or other surface improvements outside the Contract Pay Limits, attributable to the Contractor's activities, shall be restored to like-new condition by the Contractor at the Contractor's expense.

1.02 SCOPE OF WORK

The Contractor shall furnish all labor, material, equipment and incidentals necessary for the rehabilitation of Lift Station No. 8 & 16, including, but not limited to, bypass pumping, restoration of existing wet well, fencing, demolition of the existing manholes, structural repairs, construction of new valve vaults, submersible pumps, associated force main piping and valves, control panel and associated electrical equipment, and instrumentation. The work shall also include furnishing all labor, material, and equipment necessary for site restoration including but not limited to fill replacement, grading, roadway, and sidewalk replacement.

All work shall be performed as described in the Contract Documents and as shown on the Plans. Estimated quantities and Contract Pay Items are listed in the Proposal.

1.03 PLANS AND SPECIFICATIONS

Where the Plans and Specifications are not in agreement, the Plans shall govern. The Contractor shall furnish all labor, equipment, and materials to construct the Project and all miscellaneous and appurtenant work complete in place as specifically described and included under said each Contract Pay Item as shown, specified, or directed by the Engineer in accordance with the obvious or expressed intent of the Contract.

1.04 FIELD ENGINEERING

The Contractor shall establish and provide all vertical and horizontal control points for this Project including benchmarks. The Contractor shall provide the field layout surveying necessary to properly construct the Work as indicated on the Plans.

All field layout surveying shall be performed under the supervision of a Professional Land Surveyor (Chapter 472, Florida Statutes). The Contractor shall submit the name and registration number of Surveyor as directed by the Engineer. The Engineer reserves the right to check all survey staking and to require adjustments or re-staking by the Contractor in the event that conflicts or errors are detected.

Water pressure pipelines that are 8-inch or less diameter shall be installed with the required cover using horizontal control stakes provided by the Contractor. Storm drains, sanitary sewers, sanitary

pressure pipelines, and water pressure pipelines greater than 8-inch diameter shall be installed using an approved method for line and grade control. Methods for line and grade control shall be submitted to the Engineer for approval, as specified for shop drawings. Sketches shall be provided by the Contractor showing vertical adjustment necessary for pressure pipelines to adequately clear storm drains and other utilities, unless otherwise shown on the Plans.

1.05 SAFEGUARDING SURVEY MARKS

The Contractor shall safeguard all existing property monuments, benchmarks, and other survey marks adjacent to and within the Project limits, and shall bear the cost of re-establishing them if disturbed or destroyed.

1.06 INSPECTION AUTHORITY

The City or Engineer has ultimate responsibility for contract administration and inspection for this Project. The City or Engineer may assign field inspection responsibilities to a Design Professional and/or City Inspector. Each step of construction is subject to approval by the City or Engineer prior to proceeding with a subsequent step.

During the progress of the Work and up to the date of final acceptance, the Contractor shall at all times afford representatives of the City, the County, the State, the Department of Environmental Protection, the Department of Labor, or any other agency with jurisdiction, every reasonable, safe, and proper facility for observation of the Work done or being done at the site, and also the manufacture or preparation of materials and equipment at the place of such manufacture or preparation.

The Project line of authority will be presented at the Preconstruction Conference.

1.07 PROJECT SCHEDULE

The Contractor shall submit an electronic version in PDF form. Project schedule in accordance with *General Conditions* articles headed "Project Schedule" and "Progress Charts" and as supplemented herein.

Scheduling and progress reporting shall be accomplished by the use of a bar chart to provide a clear and concise comparison of progress.

1.08 MATERIALS AND EQUIPMENT

All materials, appliances, and types of construction shall be in accordance with the Technical Specifications and shall, in no event, be less than that necessary to conform to the requirements of any applicable laws, ordinances, and codes.

All materials and equipment to be incorporated into the Work shall be new, unused, and correctly designed. They shall be of standard first grade quality, produced by expert workmen, and be

intended for the use for which they are offered. Materials or equipment which, in the opinion of the Engineer, are inferior or of a lower grade than indicated, specified, or required, will not be accepted.

1.09 MANUFACTURER

The names of proposed manufacturers, manufacturers' representatives, suppliers, and dealers who are to furnish materials, equipment, or other fittings, shall be submitted by the Contractor to the Engineer for approval. Such approval must be obtained before Shop Drawings will be accepted for review. All transactions with the manufacturer and subcontractors shall be through the Contractor. Any two or more pieces of material or equipment of the same kind, type, or classification and being used for identical types of service, shall be made by the same manufacturer.

1.10 SAMPLES

The Contractor shall, when required, submit to the Engineer for approval, typical samples of material and appliances. The samples shall be properly identified by tags and shall be submitted sufficiently in advance of the time when they are to be incorporated into the Work so that rejections thereof will not cause delay. A letter of transmittal from the Contractor requesting approval shall accompany all such samples.

1.11 EQUIVALENT QUALITY

In the Contract Documents, whenever an article, material, apparatus, equipment, or process is called for by trade name or by name of a patentee, manufacturer, or dealer, or by reference to catalog of a manufacturer or dealer, it shall be understood as intending to mean and specify the article, material, apparatus, equipment, or process designated, or any equal thereto in quality, finish, design, efficiency, and durability, and equally serviceable for the purposes for which it is intended.

Whenever material or equipment is submitted for approval as being equal to that specified, the submittal shall include sufficient information and data to demonstrate that the material or equipment conforms to the Contract requirements. The decision as to whether or not such material or equipment is equal to that specified shall be made by the Engineer.

Upon rejection of any material or equipment submitted as the equivalent of that specifically named in the Contract, the Contractor shall immediately proceed to furnish the designated material or equipment.

Neither the approval by the Engineer of alternate material or equipment as being equivalent to that specified, nor the furnishing of the material or equipment specified, shall in any way relieve the Contractor of responsibility for failure of the material or equipment, due to faulty design, material, or workmanship, to perform the functions required of them by the Contract Documents.

1.12 MATERIAL AND EQUIPMENT DELIVERY AND STORAGE

In conformance to the *General Conditions* article headed "Material and Equipment Delivery" the Contractor shall deliver materials in ample quantities to ensure the most speedy and uninterrupted progress of the Work to complete the Work within the allotted time. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the Work of any related contractor. The Contractor shall provide space for storage of materials and equipment.

Pipe strung along roads and rights-of-way shall be placed in a manner that will not endanger or restrict pedestrian or vehicular traffic.

1.13 SERVICE OF MANUFACTURER'S REPRESENTATIVE

The Contract amount shall include but is not limited to the cost of furnishing a competent and experienced representative of the equipment manufacturer who shall assist the Contractor, when required, to install, adjust, test, and place in operation the equipment in conformity with the Contract Documents. After the equipment is placed in operation, the representative shall make all adjustments and tests required by the Engineer to prove that the installed equipment is in proper and satisfactory operating condition. The representative shall instruct personnel as may be designated by the Engineer in the proper operation and maintenance of such equipment.

1.14 CONTAMINANTS CONTAINMENT/DISPOSITION

A. Prior to the installation of well points for dewatering, the Contractor shall visually inspect the Work area for indications of existing ground water monitoring, wells, or metal caps at grade. The Contractor shall review the Work area for monitoring wells or abandoned fuel tanks, and shall notify the Engineer in writing if any of the above items exist.

   During dewatering activities, contractor to test water for contaminants before discharge. If the water is odorous, contaminated, or discolored (excluding tannic acid or iron), the Contractor shall stop the dewatering activities and shall notify the Engineer in writing of such, and request direction.

B. When Work activities encounter or expose any abnormal condition that may indicate the existence of a hazardous or toxic waste, Work activities shall stop in the vicinity of the abnormal condition and the Contractor shall notify the Engineer immediately. The presence of tanks or barrels; discolored earth, metal, wood, or groundwater; visible fumes; abnormal odors; excessively hot earth; smoke; or other conditions that appear abnormal, may be signs of hazardous or toxic wastes and shall be treated with extraordinary caution.

   Every effort shall be made by the Contractor to minimize the spread of any hazardous or toxic waste into uncontaminated areas.

   The Contractor's operations shall not resume until directed in writing by the Engineer.

   Disposition of the hazardous or toxic waste will be made in accordance with the requirements and regulations of any City, County, State, or Federal agency having jurisdiction. Where the

Contractor performs work necessary to dispose of hazardous or toxic waste, and the Contract does not include Pay Items for disposal, payment may be made as provided in the *Contract Standards: General Conditions* section headed "Unforeseen Subsurface Conditions."

1.15 PREVENTION, CONTROL, AND ABATEMENT OF EROSION AND WATER POLLUTION

The Contractor shall be responsible for prevention, control, and abatement of erosion, siltation, and water pollution resulting from construction of the Project until final acceptance of the Project.

The Contractor shall implement all appropriate turbidity management practices at the point of discharge into a storm sewer, gutter, or other conveyance to ensure that state water quality standards are not violated at the point where the storm drain, gutter, or other conveyance discharges into a surface water.

All necessary provisions shall be taken to ensure compliance with the water quality standards of the State of Florida. Attention is called to Chapter 62-302, Florida Administrative Code, and in particular, the requirements that turbidity shall not exceed 29 NTUs above background level. Adequate silt containment procedures and equipment shall be used to control turbidity, at no additional cost to the City.

1.16 MAINTENANCE OF STORM DRAINAGE SYSTEM

The Contractor shall be responsible at all times to maintain the operation of existing stormwater facilities, or, when existing stormwater facilities are removed, to provide equivalent capacity alternate forms of stormwater removal adequate to prevent upstream flooding in excess of existing conditions. This responsibility shall include but is not limited to the installation of temporary connections, bypass pumping, or other temporary means necessary until the new drainage system is fully operational.

1.17 SPILL OR DISCHARGE OF WASTEWATER OR RECLAIMED WATER

The discharge of wastewater or effluent (reclaimed water) into waters of the State and/or into canals, ditches, and ponds that are connected to waters of the State is prohibited. Any spill or discharge of wastewater or reclaimed water shall be immediately reported to the Engineer, the City's Project Manager (363-9254), and the City's Emergency Dispatch Center (363-9200). In the event of a spill or discharge, the Contractor shall immediately control, contain, and stop the spill or discharge and shall repair any damage to the City's facilities.

The Contractor shall be responsible for any penalties and costs charged to the City by the FDEP and for all costs incurred by the City as a result of the Contractor's actions or as a result of the Contractor's negligence. The fines, and anticipated costs, which may be incurred by the City as a result of the Contractor's actions or negligence, shall be paid to the City within 30 days, or the costs incurred will be deducted from the total Contract amount.

1.18 SEQUENCE OF OPERATION

A. General - Pipeline Work

It is the intent of the City that all pipeline work associated with the Project is installed to completion in a timely and orderly manner so as to minimize inconvenience to the Public.

The Contractor shall include in the Project Schedule a Sequence of Operations conforming to the following order:

1. Store or string pipe materials at locations and in a manner as approved by the Engineer. Pipe and pipe materials shall not be stored or strung in residential areas more than 3 weeks in advance of pipe installation unless otherwise approved by the Engineer.

2. Ensure that proper pump bypassing is coordinated with the City in order to continue functionality of existing utility service.

3. Backfill installed pipe in accordance with the Technical Specifications as soon as practical.

4. Test the installed pipe, if required, in accordance with the Technical Specifications. Make repairs as necessary.

5. Disinfect the installed pipe, if required, in accordance with the Technical Specifications.

6. Restore the ground surface in accordance with the Technical Specifications.

B. **General – Lift Station and Miscellaneous**

It is essential that any Project Work conducted at Lift Station site be sequenced to minimize obstruction of normal daily operations of the Lift Station.

The Contractor shall include in the Project Schedule a Sequence of Operations conforming to the following order:

1. Store equipment and materials at locations and in a manner approved by the Engineer.

2. Ensure that proper pump bypassing is coordinated with the City in order to continue functionality of existing utility service.

3. Confine work and personnel to designated areas in accordance with the Specifications.

4. Clean up work areas daily so as to present a safe and neat appearing Work site.

C. Utility Companies may be present on the Work site adjusting their facilities and installing new facilities. The Contractor's work shall be scheduled in such a manner as to minimize conflicts with various utility companies.

D. The Contractor shall clean up the site for each phase of Work in accordance with the Contract Documents before proceeding to a subsequent phase of Work, unless otherwise approved by the Engineer.

E. **No Time Extension**

If the Engineer orders construction, or a phase of construction, to be stopped due to the Contractor's neglect to adhere to the Sequence of Operations as outlined herein, the Stop Work Order shall not constitute a basis for extension of time.

1.19 WORK IN STREETS AND HIGHWAYS

All Work within streets and highways shall be subject to the regulations and requirements of the appropriate agencies. Streets and highways are under the jurisdiction of City of St. Pete Beach for this Project.

Methods and materials of construction used in restoration within such streets and highways shall conform to the requirements, inspection, and approval of the duly authorized representatives of the appropriate agency having jurisdiction. Restoration Work shall include but not limited to: removal and replacement of pavement, sidewalk, curb, and gutter; replacement of storm sewer facilities; excavation and backfilling; and storage of materials and equipment.

1.20 WORK IN PRIVATE PROPERTY

In the event that, in the opinion of the Contractor, obtaining a temporary construction easement outside the limits of the right-of-way, of City-owned property, or of the easement(s) obtained by the City is necessary or desirable, it shall be the sole responsibility of the Contractor to obtain such easement from the owner of the property. If such easement is obtained by the Contractor it shall contain provision to hold the City harmless from any operations of the Contractor within the easement limits. The Contractor shall not conduct construction operations on private property outside the limits of the right-of-way, of City-owned property, or of the easement(s) obtained by the City unless a copy of the Temporary Construction Easement Agreement is filed with the Engineer.

Upon completion of Work in easements, the Contractor shall restore the property, including all fences or other structures disturbed by his operations, as nearly as possible to the condition in which he found it.

1.21 PERMITS

Construction projects performed for the City will require licenses and permits in the same manner as private construction projects within the City.

The Contractor shall secure, at his expense, all licenses and permits, and shall comply with all applicable laws, regulations, and codes as required by the State of Florida and/or the City of St. Pete Beach whether performed by the Contractor or by others. The Contractor must be registered to complete such work within Pinellas County.

City permits for this Project will include: Demolition
Building

Plumbing
Electrical
Mechanical
Parking, Paving, Landscaping

1.22 FIELD OFFICE AND APPURTENANT STRUCTURES

General: No field office or appurtenant structures by the Contractor, any subcontractor, or any material supplier, will be allowed on the Project site.

Space on City property or rights-of-way proposed to be used for storage and a field office for the Contractor shall be approved by the Engineer prior to installation providing such uses will not interfere in any manner with the construction of the Work or the operation of existing facilities.

1.23 CONTRACTOR'S SIGN

No sign by the Contractor, any subcontractor, or any material supplier, will be allowed on the Project site.

1.24 MOBILIZATION

Mobilization shall include but is not limited to all preparatory work and operations necessary to begin the Project, including moving of personnel, equipment, traffic control, and all else necessary to commence work. The cost of bonds, insurance, shop drawings, and preconstruction expenses shall also be included.

If a separate Pay Item is included for mobilization, payment will be as specified for that Pay Item. If no Pay Item is included, costs for mobilization shall be included with the costs for the major Work items included in the Proposal.

1.25 WATER PURCHASE

Water used in connection with this Project must be coordinated with Pinellas County.

1.26 TRAFFIC CONTROL

The Contractor shall provide required traffic controls under City observation. The Contractor shall notify the City's Project Manager a minimum of 2 working days prior to any construction affecting traffic flow. A Maintenance of Traffic plan drawing shall be submitted for review by the Engineer prior to each lane closure or opening during the course of construction. All traffic control devices utilized during construction shall be provided by the Contractor and meet the requirements set forth in the latest revision of U.S. Department of Transportation Federal Highway Administration's "Manual on Uniform Traffic Control Devices for Streets and Highways" and the Florida State Department of Transportation's "Design Standards." Failure or refusal, on the part of the Contractor, to install,

maintain and/or position traffic control devices promptly, fully, and in an acceptable manner, shall be sufficient cause for the City, after 24-hour notice, to perform the traffic control with its own organization, or to contract with any other individual, firm, or corporation to perform the required traffic control. All costs and expenses incurred thereby shall be charged against the defaulting Contractor, and the amount thereof deducted from any money due, or which may become due him, or shall be charged against the Contract Bond. Any Work performed as described by this paragraph, shall not relieve the Contractor in any way of his responsibility for the Work performed by him.

Traffic shall be performed so that vehicular traffic shall be maintained on with at least one 10-foot wide lane in each direction at all times. An acceptable detour route shall be developed by the Contractor to redirect traffic when and where necessary, with the approval of the Transportation Special Events Division. Temporary lanes shall be constructed with a minimum 1-inch thick asphaltic concrete surface over a 6-inch thick limerock base compacted to 98% of the maximum density in accordance with AASHTO T-180.

Failure of the Contractor to comply with any of the above traffic control requirements may result in issuance of a stop work order until the violation is corrected.

1.27 TREE PROTECTION

Particular care shall be taken by the Contractor to protect trees during construction by erecting approved barricades to prevent unnecessary damage to trunk and roots during construction. Such barriers shall protect the area within the dripline.

The Contractor shall prune all branches that interfere with construction in accordance with American Forestry Association Standards. Roots over 2-inch diameter shall be preserved wherever possible. If root pruning is required, roots shall be cut cleanly.

Temporary soil deposits, concrete block, concrete wash, or solvents shall not be placed within the dripline. The grade within the dripline shall be preserved. If adjacent grade is altered, protective measures such as those described in the Florida State Division of Forestry "Tree Protection Manual for Builders and Developers" shall be constructed to protect the tree(s) from deleterious effects of the grade change.

1.28 TREE REMOVAL AND REPLACEMENT

The Contractor shall obtain any necessary tree removal permit, shall furnish and replace trees as required, and shall perform this Work in a manner conforming to all applicable provisions of said regulations or permit.

The cost of tree removal and obtaining the tree removal permits shall be included in the cost of the appropriate associated Contract Pay Item under which the Work is to be performed. The Contractor shall remove trees as required and approved by the Engineer whether or not said trees are shown on the Plans. Trees that have to be removed, except for Australian pine, Brazilian pepper, punk, and other exempt species, shall be replaced as directed. Replacement trees shall be of native species at least 8 feet tall and at least 3-inch caliper diameter.

1.29 UTILITIES

Prior to construction, the Contractor shall familiarize himself with the location of all existing utilities and facilities within the Project Site and with the applicable provisions of the *General Conditions* article headed "Convenience and Safety."

The Contractor shall notify utility companies at least 48 hours, excluding Saturdays, Sundays, and legal holidays, prior to excavation. Utility companies shall be contacted by calling the utility notification center "Sunshine" at 1-800-432-4770. The City will furnish to the Contractor the available records of City utilities. The Contractor shall locate and mark all City utilities for his reference and for use by utility companies. The Contractor shall act as the City's agent for locating and marking City underground utilities within the Project limits, in accordance with the Florida Underground Facilities Damage Prevention and Safety Act (FS 556).

In all cases where existing utility lines may be interfered with by the Work, the Contractor shall give a minimum of 48 hours notice to the owners of such utilities to permit them to relocate the lines prior to construction. Existing utilities have been shown on the Plans insofar as information is reasonably available. However, it will be the Contractor's responsibility to preserve all existing utilities whether shown on the Plans or not.

1.30 NEIGHBORHOOD NOTIFICATION

Not less than 7 days prior to the commencement of Work in the right-of-way, the Contractor shall notify all residents and businesses along the construction route with a printed door hanger notice indicating the scheduled date of construction, the type of construction, and the Contractor's and Superintendent's name, address, and telephone number. The notice shall contain wording indicating that the property owners or businesses should remove from the right-of-way any bush, flower, planting, landscaping materials, etc., that they wish to save. The door hanger text and a list of residents and businesses to which the notification has been delivered shall be compiled and submitted to the Engineer prior to the Contractor commencing Work in a particular block. After such notification, any such item remaining in the right-of-way and requiring removal shall be removed and disposed of by the Contractor. Restoration of such items will not be required of the Contractor, except for sodding of disturbed yard and parkway areas. However, the Contractor shall exercise reasonable caution in order to avoid damaging such items where possible.

1.31 SHOP, FIELD, AND LABORATORY TESTING

The Engineer may require testing by certified personnel of certain materials to be incorporated in the Work, such as: soils density, pavement, concrete pipe and appurtenances, and welds.

In the event any such testing is required by the Engineer, a detailed description will be found in these Technical Specifications concerned with the specific item of Work.

Where reference is made in the DOT-SSRBC for design mixes, tests of materials, or work performed, or where in the opinion of the Engineer, tests are required to ascertain compliance with the Specifications, the Contractor shall have such tests made by an approved testing laboratory. No

additional payment will be made for these tests.

1.32 SALVAGED MATERIALS

The Contractor shall not proceed with demolition of existing materials or equipment without approval from the Engineer for the method of disposal.

All materials which are not returned to the City yard shall be disposed in an approved disposal site. The Engineer may request confirmation of the site's approval for disposal of the specific materials.

Salvaged materials shall be loaded on Contractor trucks and returned to the Public Services yard at 7581 Boca Ciega Drive, St. Pete Beach, Florida. The City will designate the specific location at the yard for placement of salvaged materials by the Contractor.

The following materials shall be removed and returned by the Contractor: pumps and pump rails, and all other materials as directed by the Engineer.

1.33 AS-BUILT DRAWINGS

A. **General**: For all elements of construction, the Contractor shall furnish the Engineer one set of marked-up Contract Plans blueline prints showing as-built conditions, as specified in the *General Conditions* section headed "As-Built Drawings."

   The drawings shall show the name, address, and phone number of the Contractor. Each drawing shall be certified by a responsible representative of the Contractor and dated.

   The as-built drawings shall reflect any differences from the original Contract Plans in the same level of detail and units of dimension as the Plans.

B. **Potable Water and Reclaimed Water Distribution Systems**: The as-built drawings shall conform as follows.

   Pipeline 2-inch and larger shall be dimensioned to the face of the curb or other approved landmark. If the Work is done prior to the installation of curbs, the dimensions may be taken from known property lines.

   All valves, hydrants, fittings, meters, taps, thrust blocks, harnessed joint pipe, and all other appurtenances shall be shown on intersection drawing sketches and on the as-built drawings. Pipe material shall also be shown.

   Stations and elevations shall be shown for pipeline 6-inch and larger for all horizontal and vertical changes in the pipeline alignment or grade. Valves, outlets, fittings, and other appurtenances shall be stationed.

   Intersection drawings shall be sketched at a scale of one inch equals 30 feet and submitted on 8-1/2-inch by 11-inch paper sheets with the Contractor's monthly request for partial payment, or

prior to placing the pipeline into service, whichever occurs first. A typical intersection drawing example may be requested from the Engineer.

C. **Sanitary and Storm Sewer Piping Systems**: The as-built drawings shall conform as follows:

Manholes, inlets, headwalls and other drainage structures shall be dimensioned from the face of curb or roadway centerline, or construction baseline, and stationed along the baseline. New service connections and replaced service connections shall be dimensioned to the nearest downstream manhole.

All dimensions shown on the Plans shall be verified. All manhole, inlet and other drainage structure top and invert elevations shall be recorded. Top elevations for manholes shall be the north rim elevation. Inlets shall have recorded curb type, curb top, and gutter elevations. Invert elevations, direction, and size shall be recorded for every pipe/culvert connecting to a structure (including conflict pipes). All drainage structure inside dimensions shall be recorded. Special structures such as headwalls/endwalls and weir/control boxes shall have recorded all pipe/culvert invert elevations, direction, and size as well as flow lines for weirs and dimensions of oil skimmers and other devices.

All pipe materials shall be recorded, and all areas of special construction shall be noted.

D. **Paving**: The as-built drawings shall conform as follows.

The as-built drawings shall show all changes to the horizontal and vertical alignment in the plan, profile, and cross sections. Drawings shall indicate changes in elevations for curbs and roadway crowns, base type and thickness, curb type, limits of new sidewalk, driveway replacement (including paving materials used), and other surface features.

E. **Electrical and Control Wiring**: The as-built drawings shall conform as follows.

The as-built drawings shall include all changes to the original Contract Plans. The as-built drawings shall also include the size, color, and number of wires and conduit. For Projects where this information is too voluminous to be contained on the blueline prints, the Contractor shall prepare supplemental drawings, on same size sheets as the blueline prints, showing the additional conduit runs, 1-line diagrams, ladder diagrams, and other information. The wiring schematic diagrams shall show termination location and wiring identification at each point on the ladder diagram.

END OF SECTION

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SECTION 2 - EXCAVATION AND BACKFILL

2.01 GENERAL

The Work in this section includes furnishing all labor, materials, tools, and equipment for excavation and backfill of roadways, sidewalks, curbs, driveways, pipelines, and structures. The Work also includes removing and disposing of leftover material, and furnishing and placing off-site fill.

Bidders shall examine the site of the Work, make their own additional soil borings and tests, and make their own determination of the character of materials and the conditions to be encountered on the Work; their Proposal shall be based upon their own investigation.

2.02 TRENCH SAFETY

The Contractor shall be responsible for maintaining safety at each excavation. The Contractor shall adhere to the Florida Trench Safety Act (FS 90-96), OSHA trench excavation safety standards (29 CFR, Subpart P, 1926.650), and OSHA trench excavation shielding, sloping, or sheeting requirements. Inspections required by OSHA trench excavation safety standards shall be provided by the Contractor's "competent person," as defined by OSHA 29 CF, Subpart P, 1926. The Contractor's "competent person" shall be identified at the Project preconstruction meeting.

The Contractor certifies by submitting the bid and subsequently executing this Contract, that all trench excavation done within his control shall be accomplished in strict adherence with OSHA trench safety standards, the Florida Trench Safety Act, and public safety.

The Contractor also agrees to produce or obtain, prior to award of the subcontracts, identical certification from subcontractors who will perform trench excavation, and to retain such certification for at least 3 years following Final Acceptance.

The Contractor shall consider all available geotechnical information when designing the trench excavation safety system. If sufficient geotechnical information is not available, the Contractor may obtain such to support the requirements set forth above, at no additional cost to the City.

2.03 WORK IN WETLANDS, MANGROVES, AND PRESERVATION AREAS

Strict adherence to all permits is required. Damage to wetlands, periodically wet areas, mangroves, and preservation areas is prohibited. Any such damage by the Contractor shall be duly rectified at no additional cost to the City and as approved by the regulatory agencies.

2.04 CLEARING AND GRUBBING

All clearing and grubbing Work shall conform to all applicable requirements of DOT-SSRBC Section 110 "Clearing and Grubbing" except as modified herein.

The Contractor shall remove only those trees and bushes necessary to complete the specified Work. Not all the trees and bushes have been located or shown on the Plans. The Contractor shall flag those trees and bushes to be removed. All other trees and bushes shall be protected as specified in Technical Specifications section headed "General," subsection headed "Tree Protection."

All roots, stumps, and other debris shall be removed to a depth not less than 12 inches below a bearing surface. The disturbed surface shall be backfilled, graded, and compacted as specified.

No tree or bush shall be removed without the approval of the Engineer. The Contractor shall obtain all necessary City or County permits for each tree to be removed. Tree removal shall conform to the provisions of the Technical Specifications section headed "General," subsection headed "Tree Removal and Replacement."

2.05 ROADWAY EXCAVATION

The extent of excavation shall be as shown on the Plans or otherwise approved by the City, and shall include roadway excavation and/or filling and grading, together with the removal of trees, bushes, existing asphalt, concrete, or other material, as required to facilitate construction and restoration as directed by the City.

All excavation Work shall conform to all applicable requirements of DOT-SSRBC Section 120 “Excavation and Embankment” except as modified herein.

2.06 TRENCH EXCAVATION

Mechanical excavation shall be terminated at least 2 inches above the proposed pipe bed and trench bottom, then shaped and compacted so as to provide uniform bearing on the barrel of the pipe. Particular care shall be taken to recess the bottom of the trench at the bell of the pipe to relieve the bell of all load.

A minimum trench width shall be maintained, allowing room for the jointing and proper compaction of the backfill. If material is encountered that is unsuitable in the opinion of the Engineer, it shall be removed by the Contractor and replaced with acceptable material compacted in place as specified. In the event the Contractor excavates below the elevation required without approval, the Contractor shall backfill with approved materials compacted to obtain a suitable trench bottom, all to the satisfaction of the Engineer and at no additional cost to the City.

The amount of open trench shall be limited so that no more than 100 feet of open trench in advance of the backfilling operation will remain at the end of that working day. All open trench shall be protected by the Contractor with barriers, warning devices, and traffic control devices, which shall be kept in the correct position, properly directed, anchored when required, and clearly visible at all times. The barriers, warning devices, and traffic control devices shall be suitably lighted at all times when vehicular traffic lights are required.

2.07 STRUCTURE EXCAVATION

Excavation shall be of the size and depth required for construction of structures and their foundations. Unsuitable material encountered shall be removed to the depth required to obtain sound foundation material or as ordered by the Engineer. Over-excavated areas shall be filled with approved backfill material compacted as specified, at no additional cost to the City.

Unsuitable existing soil shall be removed and replaced with compacted material, as approved by the Engineer and as specified in the subsection herein headed "Excavation of Unsuitable Material."

2.08 EXCAVATION OF UNSUITABLE MATERIAL

Unsuitable material shall include rock, concrete, and boulders. Unsuitable soft material shall include logs, muck, other soft soils, organic soils, and other soils as specified or as ordered by the Engineer to be unsuitable.

All excavation of unsuitable material shall conform to all applicable requirements of DOT-SSRBC Section 120 “Excavation and Embankment” except as modified herein.

Unsuitable material encountered below or within the roadway stabilized subgrade, the trench bottom, or a structure bottom, shall be removed by the Contractor to the limits established by the Engineer and disposed of from the Work area at an approved disposal area. Unsuitable material shall be replaced with approved material and compacted as specified.

No additional payment will be made for backfill material obtained from any source and used to replace any unsuitable material except as otherwise specified.

2.09 SHEETING, SHIELDING, AND SLOPING

All excavations shall be properly sheeted, shielded, or sloped to the required slope to furnish safe working conditions, to prevent shifting of material, to prevent damage to structures or other Work, and to avoid delay to the Work, all in accordance with applicable safety and health regulations. The minimum sheeting and shielding for trench excavations shall meet the general trenching requirements of the Florida Trench Safety Act and OSHA standards.

The sheeting and shielding shall be of adequate strength and quantity for the purpose intended. Any sheeting extending below the level of above the top of pipeline shall be cut off as ordered by the Engineer and left in place. In addition, the Engineer may order the Contractor to cut off and leave in place any sheeting, shielding, or other approved support where required to protect construction, property, or existing facilities or utilities.

Damages resulting in the installation or removal of sheet piling shall be rectified by the Contractor at no additional cost to the City.

2.10 DEWATERING

All pipeline and appurtenances shall be laid entirely in a dry trench. All foundations and structure walls shall be constructed or installed in a dry excavation.

Before commencing any excavation at the site of the Work, the Contractor shall submit to the Engineer for review, the methods, equipment, and arrangement of facilities proposed for dewatering and disposal of water at the site and of all water entering any excavation or other part of the Work from any source whatsoever.

Water discharged from dewatering equipment shall be carried into surface drainage facilities except water quality treatment systems and shall not be discharged into sanitary sewer lines. The Contractor shall prevent water from puddling in streets or on private properties. The depositing of dirt in storm drains and ditches and staining of existing facilities shall not be permitted.

Adequate standby facilities shall be provided to ensure that the excavation will be kept dry in the event of power failure or mechanical breakdown. Facilities for the removal and disposal of water shall be of sufficient capacity to keep the excavation dry under all circumstances with one-half of the facilities out of service. If well points are used, provision shall be made for removing and resetting individual well points without taking the system of which they are a part out of service.

The City reserves the right to require the Contractor to replace noisy equipment in order to keep disturbance to a minimum.

The cost of dewatering and disposal of water shall be included in the unit quantity for each appropriate item bid.

Refer to the Technical Specifications Section headed "General," subsection headed "Contaminants Containment/Disposition," for requirements concerning encountered groundwater contaminates.

2.11 BORROW MATERIAL

Any borrow excavation Work shall consist of the excavation and satisfactory utilization of material from areas provided by the Contractor when necessary material is not available from the normal excavation or grading operations. This Work shall conform to DOT-SSRBC Section 120 “Excavation and Embankment” except as modified herein.

If additional fill material is required, it shall be City approved material supplied and compacted by the Contractor. All compaction under roadway, alley, driveway, curb, walk, or other improved surface shall be to a density as specified. Unless otherwise directed by the City, all material not required for construction shall be removed from the premises and disposed of by the Contractor.

2.12 BEDDING MATERIAL

Where shown, ordered, or required, the Contractor shall place bedding material prior to placing pipelines, structures, or slabs. Bedding material may be either excavated approved native sand, concrete sand, gravel, or reclaimed concrete.

Off-site bedding material shall be sand or gravel. Sand bedding material shall be a clean concrete sand of uniform gradation between sieve sizes No. 4 and No. 50. All particles shall pass a 3/8-inch sieve and no particles shall pass a No. 100 sieve.

Gravel bedding material shall meet the requirements of ASTM C33 and shall be coarse aggregate, DOT Size No. 67 (3/4-inch to No. 4) or approved equal.

Reclaimed concrete bedding material shall be graded to meet the size requirements as specified for gravel bedding.

Bedding material, where required, shall be placed in lifts and compacted in a manner to achieve the specified density as described elsewhere.

If gravel bedding is used, an impermeable groundwater barrier shall be placed at 100-foot intervals in the gravel bedding.

The impermeable groundwater barrier shall consist of a 10 mil sheet of polyethylene covering the full cross sectional area of the gravel, embedded 6 inches into the trench sides and bottom, and extending to the top of the gravel. The barrier shall be offset a minimum of 2 feet from any culvert or pipe joint. Ends and splice points shall be lapped a minimum of 12 inches.

2.13 STRUCTURAL SLAB BEDDING

Structural slabs for manhole bases, footings, and similar structures shall be placed on approved compacted bedding material and leveled as specified and/or as shown.

2.14 BACKFILL COMPACTION

All backfill shall be compacted as specified herein and shall meet the following minimum density as determined by the AASHTO T-180 method for backfill outside the right-of-way and in City streets, and by the AASHTO T-99 method if in County or State right-of-way.

AASHTO T-180 Method C or D will be used for stabilized subgrade and base compaction tests, and Method A or B will be used for backfill testing, or as directed by the Engineer or jurisdiction.

	T-180	**T-99**
Roadway stabilized subgrade	98%	N/A*
Roadway base	98%	N/A*
Curb base	98%	N/A
Sidewalk and driveway base	98%	N/A
Pipe bedding	98%	100%
Pipe backfill - under pavement	98%	100%
Pipe backfill - under grass	95%	100%
Structure base slabs	100%	N/A
Structure backfill	98%	N/A

*Roadway stabilized subgrade and base material shall meet LBR requirements as specified in the construction plans.

2.15 BACKFILLING OF TRENCH

Backfilling shall be accomplished with suitable material, and shall commence only after the pipelines have been laid and tentatively accepted by the City. The space between the pipe and the sides of the trench shall be packed full by hand-shoveled earth free from lumps or debris.

The backfill material shall be placed in 6-inch lifts and compacted, using approved tampers to the required compaction, to a point 12 inches over the top of the pipe. The remaining backfill (under areas other than roadways) shall be placed in uniform lifts not greater than 12 inches thick (or less as approved for mechanical equipment available) and tamped to the required compaction. Backfill under roadways shall be compacted in 6-inch lifts.

2.16 BACKFILLING STRUCTURES

Backfill around structures shall be of suitable job-excavated material, suitable off-site fill material, or other material approved by the Engineer. Such backfill shall extend from the bottom of the excavation or top of bedding to the bottom of pavement base course, the bottom of the subgrade for lawns or lawn replacement, the top of the existing ground surface, or to such other grades as may be shown or required.

The backfill shall be placed in uniform lifts not greater than 12 inches thick, and thoroughly compacted in place.

2.17 BACKFILLING UNDER ROADWAYS

Backfill placed under roadways and other paved surfaces shall be compacted in 6-inch lifts and thoroughly compacted in place, with suitable equipment as specified herein.

2.18 DISPOSING OF LEFTOVER MATERIAL

The Contractor shall bring the surface to the same level as existed prior to the excavation. All leftover material shall be hauled from the site and disposed of by the Contractor. Leftover material shall not be stored in or along rights-of-way or easements.

2.19 ADJACENT FACILITIES

The Contractor shall be responsible for the protection, removal, and replacement of all adjacent structures, utilities, trees, shrubbery, curbs, culverts, headwalls, fences, signs, and other miscellaneous structures encountered during the course of the Work.

2.20 TEMPORARY SUPPORTS

Temporary supports for 16-inch and larger pressure and gravity pipes shall be designed by the Contractor and submitted to the City as required by the *Contract Standards: General Conditions* section headed "Shop Drawings and Submittals." Temporary supports that include a structural beam, or other such member(s), shall be designed, signed and sealed by a Professional Engineer.

2.21 FLOWABLE FILL

Where shown on the Plans, or where ordered by the Engineer, the Contractor shall backfill a void area or an excavation with flowable fill. Flowable fill may be shown, or ordered, to fill abandoned pipes, abandoned underground steel storage tanks, trench backfill, washout area under structural slabs or behind walls, or other similar locations.

Flowable fill shall be produced and delivered to the site. Placing of flowable fill shall be by chute, pumping, or other approved methods. Flowable fill shall be placed to the designated fill line without vibration. The Contractor shall take all necessary precautions to prevent any damage caused by hydraulic pressure of the fill during placement prior to hardening. Flowable fill shall not be used for pipe bedding and backfill in the zone from the bottom of a pipe to 12 inches above the top of pipe.

Flowable fill shall consist of materials conforming to DOT-SSRBC Sections as follows:

Cement (Type I or II)	Section 921	"Portland Cement and Blended Cement"
Fly ash (Type F)	Section 929	"Fly Ash, Slag, Microsilica and Other Pozzolanic Materials for Portland Cement Concrete"
Fine aggregate (sand)	Section 902	"Fine Aggregate"
Water	Section 923	"Water for Concrete"

The Contractor shall submit a proposed design mix that will produce a flowable fill meeting the strength requirements specified herein, using the following materials:

	Pounds per cubic yard
Cement (Type I or II)	50 - 200
Fly ash (Type F)	0 - 2,000
Fine aggregate (sand)	2,500 - 3,000
Water 325 - 550	

Note: 6-inch to 10-inch slump

Flowable fill material shall be proportioned to produce a 28-day compressive strength approximately as follows:

	Pounds per square inch
Pipe trench backfill	50 - 150
Fill abandoned pipes or tanks	30 - 150
Under slabs, behind walls	300 - 1000

Note: Density in place 115 to 145 pounds per cubic foot.

Not more than 60 minutes shall elapse between the start of moist mixing and the placement of the flowable fill.

Flowable fill placed on slopes shall have a reduced slump with a reduction in water, and shall be able to be shaped as required.

The Contractor shall place the flowable fill in such a manner as to eliminate all cavities.

Flowable fill shall not be placed in salt water. When within a tidal area, the flowable fill shall be placed immediately after the salt water has receded.

When flowable fill is used adjacent to ductile iron pipe, the pipe shall be polyethylene encased.

END OF SECTION

SECTION 3 - CONCRETE, MASONRY, AND REINFORCING STEEL

3.01 GENERAL

The Work in this section includes furnishing, placing, finishing, and curing all reinforced and plain concrete, prestressed concrete, reinforcing steel, welded wire fabric, brick, masonry block, mortar, and related work. Brick used for paving and hexagon block used for sidewalks are not included in this section.

3.02 PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to the applicable requirements of the DOT-SSRBC Sections 346, 347, and 921.

Class IV concrete shall be used for all concrete in contact with, or over, salt or brackish water.

Concrete used for structures in contact with sewage shall be mixed from Type II portland cement containing the lowest calcium thiosulfate available as specified in AASHTO M 85.

Concrete shall meet the following minimum 28-day compressive strength:

Miscellaneous concrete (thrust blocks, pipe encasement, etc.)	2,500 psi
Concrete curb/gutter/sidewalk/pavement	3,000 psi
Cast-in-place/precast structures	4,000 psi
Prestressed structures	5,000 psi

3.03 REINFORCING STEEL

Reinforcing steel shall conform to ASTM A 615, Grade 60 deformed bars and to the applicable requirements of DOT-SSRBC Sections 415 and 931.

Reinforcing steel shall not be coated, except as specifically specified on the Plans.

All welded wire fabric shall conform to ASTM A 497 (deformed) or ASTM A 185 (plain) and to the applicable requirements of DOT-SSRBC Article 415-6.

3.04 FIBROUS CONCRETE REINFORCEMENT

Fibrous concrete reinforcement may be used, where shown or approved, in lieu of welded wire fabric for shrinkage and thermal contraction/expansion in concrete pavement, driveway, and sidewalk.

Fibrous concrete reinforcement shall conform to ASTM C 1116, ASTM C 94, and ASTM E 119-83.

Fibrous concrete reinforcement shall be 100 percent virgin polypropylene fibrillated material mixed with concrete at a minimum of 1.5 pounds per cubic yard of concrete.

3.05 PLACEMENT OF REINFORCEMENT

Reinforcing steel placement shall conform to the applicable requirements of DOT-SSRBC Articles 350-7 and 415-5.

The following minimum concrete cover shall be provided for all reinforcement:

Concrete cast against and permanently exposed to earth	3-inch
Concrete exposed to earth or weather	
Primary reinforcement	2-inch
Stirrups, ties, and spirals	1 1/2-inch
Concrete deck slabs, top and bottom	2-inch
Concrete not exposed to earth or weather	
Primary reinforcement	1 1/2-inch
Stirrups, ties, and spirals	1-inch

For bundled bars, the minimum concrete cover shall be equal to the equivalent diameter of the bundle, but need not be greater than 2-inch, except against and permanently exposed to earth, in which case the minimum cover shall be 3-inch.

Minimum concrete cover shall be increased in corrosive environment areas.

3.06 PLACEMENT OF CONCRETE

Placement of portland cement concrete shall conform to the applicable requirements of DOT-SSRBC Article 400-7.

Unless specific permission is granted prior to each occurrence, no concrete shall be delivered to the job site before 7:30 a.m. or after 4:30 p.m.

No concrete shall be placed until the reinforcing steel placement has been inspected and approved by the Engineer.

3.07 CURING OF CONCRETE

Curing of portland cement concrete shall conform to the applicable requirements of DOT-SSRBC Article 520-8.

3.08 FINISHING OF CONCRETE

Finishing of portland cement concrete shall conform to the applicable requirements of DOT-SSRBC Article 400-15.

3.09 CONCRETE BRICK

Concrete brick for use in drainage structures and where shown on the Plans shall be approximately 3 5/8-inch by 7 5/8-inch by 2 1/4-inch in size and shall conform to ASTM C 55, Grade N-II or S-II.

3.10 CLAY BRICK

Brick shall be sound, hard, and uniformly burned regular and uniform in shape and size or compact texture and conforming to ASTM C 32, "Specification for Sewer and Manhole Brick (Made from Clay or Shale) Grade MS or MM."

3.11 MASONRY BLOCK

Load bearing units shall be hollow or solid, as shown on the Plans, and shall conform to ASTM C 90, Type I, 8-inch by 16-inch or 4-inch by 16-inch nominal face dimension.

Non-load bearing units shall conform to ASTM C 129, Type I, 8-inch by 16-inch or 4-inch by 16-inch nominal face dimension.

Horizontal continuous joint reinforcement shall be provided at every other joint. Reinforcement shall be a minimum of #9 gage steel, Grade 50. Wire shall be hot-dip galvanized, conforming to ASTM A 153, Class B-2 (1.5 ounce per square foot of wire surface) for zinc coating after prefabrication into units. Mortar coverage shall be not less than 5/8-inch on joint faces exposed to exterior, and not less than 1/2-inch elsewhere.

3.12 MORTAR

Mortar shall consist of a mixture of cementitious materials, aggregate, and water. All proportions shall be by volume and/or weight. Masonry cement shall conform to ASTM C 91 and C 270. Fine aggregate and portland cement shall conform to the applicable requirements of DOT-SSRBC Sections 902 and 921 respectively.

Mortar shall have a minimum compressive strength of 1,500 psi.

3.13 GROUT

Grout shall be identical to mortar in all respects.

END OF SECTION

SECTION 4 - PIPING MATERIALS: DUCTILE IRON PIPE

4.01 GENERAL

The Work in this section includes furnishing all ductile iron pipe, fittings, joints, and appurtenant materials. All castings furnished shall have been cast in the United States of America unless complete certification is furnished in accordance with the latest edition of ANSI/AWWA C 110.

Standards referenced in this section are the latest revision of the following specifications:

ANSI/AWWA C104	"Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water"
ANSI/AWWA C110	"Ductile-Iron and Gray Iron Fittings, 3-Inch through 48-Inch, for Water and Other Liquids"
ANSI/AWWA C111	"Rubber-Gasket Joints for Ductile-Iron and Pressure Pipe and Fittings"
ANSI/AWWA C115	"Flanged Ductile-Iron Pipe with Threaded Flanges"
ANSI/AWWA C150	"Thickness Design of Ductile-Iron Pipe"
ANSI/AWWA C151	"Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids"
ANSI/AWWA C153	"Ductile-Iron Compact Fittings, 3-Inch through 24-Inch, for Water and Other Liquids"
ASTM D 1248	"Polyethylene Plastics Molding and Extrusion Materials"

4.02 PIPE

A. General

All ductile iron pipe shall be designed in accordance with ANSI/AWWA C150. Pipe shall be minimum pressure class as follows:

Size	Pressure Class
3-inch through 18-inch	350
20-inch through 24-inch	300
30-inch through 48-inch	200

For threaded flanged pipe the minimum thickness shall be the nominal thickness as shown on Table 15.1 of ANSI/AWWA C115.

Thickness shall be designed for Laying Condition Type 2: Flat-bottom trench backfill lightly consolidated to centerline of pipe.

Pipe shall be manufactured in accordance with ANSI/AWWA C151.

The pressure rating, metal thickness class, net weight of pipe (without lining) length of pipe, name of manufacturer, "DI" or "DUCTILE," and country where cast, shall be clearly marked on each length of pipe.

B. **Lining**

1. **Potable Water Lines and Reclaimed Water Lines**: Ductile iron pipe and fittings for use in potable and reclaimed water lines shall be cement mortar lined. Cement lining shall conform to ANSI/AWWA C104, and seal coated with approved bituminous seal coat in accordance with ANSI/AWWA C151. Seal coating shall be UL listed or NSF approved for use in potable water mains.

2. **Sanitary Force Mains and Gravity Sanitary Pipe**: Ductile iron pipe and fittings for sanitary sewer force mains and gravity sewer pipe shall be polyethylene, polyurethane, or epoxy lined.

   Epoxy lining shall be 40 mil minimum thickness (multi-pass process) and shall be Protecto 401 Ceramic Epoxy, as manufactured by the Protecto Division of Vulcan Painters, Inc., or approved equal.

   Polyethylene lining shall be factory furnished with a fusion bonded polyethylene liner of 60 mil minimum thickness conforming to ASTM D1248, such as Polybond Plus as furnished by American Cast Iron Pipe Co, or approved equal.

   Polyurethane lining shall be factory applied conforming to Corropipe, as manufactured by Madison Chemical Industries, Inc., or an approved equal. Material shall be applied in conformance with the manufacturer's recommendation and shall be a 40 mil final dry film thickness.

3. **Storm Drain Gravity Pipe**: Ductile iron pipe and fittings for storm drain gravity pipe shall be epoxy lined as per sanitary pipe or cement mortar lined as per water pipe, at the Contractor's option.

4.03 FITTINGS

Ductile iron fittings shall conform to ANSI/AWWA C110 or ANSI/AWWA C153.

Fittings shall be suitable for a minimum water pressure plus water hammer as follows:

Size	Type	Pressure Rating
3-inch through 12-inch	DI	350
14-inch through 24-inch	DI	350
30-inch through 48-inch	DI	250

Fittings shall be coated outside with petroleum asphaltic coating, 1 mil minimum thickness.

Fittings shall be lined as specified herein headed "4.02 Pipe."

Anchor couplings equal to McWayne Clow F-1211 for fire hydrant assemblies may be substituted with an anchoring tee equal to Catalog No. A-10180 locked hydrant tee as manufactured by American Ductile Iron Pipe Co. or hydrant tee with rotatable MJ gland as manufactured by U.S. Pipe Co. in place of the MJ tee and anchor coupling as shown, at the Contractor's option.

4.04 JOINTS - BURIED PIPE AND FITTINGS

Joints for ductile iron pipe and fittings shall conform to ANSI/AWWA C111, except as otherwise specified. All pipe and fittings shall be furnished complete with joint accessories necessary for installation conforming to ANSI/AWWA C111. No additional payment will be made for joint accessories, including retainer glands, unless otherwise specified.

The Contractor shall furnish and install all necessary materials, equipment, and appurtenances required to complete the work.

A. **Unrestrained Joints**: Joints for unrestrained pipe shall be push-on joint. Joints for fittings, when installed with unrestrained pipe, shall be mechanical joint with DI retainer glands, as specified herein for restrained joints.

B. **Restrained Joints**: All joints in restrained pipe systems shall be of the same type (pipe and fittings), except valves shall be mechanical joint with DI retainer glands as specified.

1. **12-inch and Smaller**: Joints for restrained pipe and fittings, 12-inch and smaller, shall be one of the following:

    a. Push-on restrained joint utilizing a retainer ring, equal to U.S. Pipe TR Flex. It shall be UL listed, FM approved, or shall be certified by an approved laboratory that the restrained joint will not separate at the specified test pressure.

    b. Push-on restrained joint using a locking type gasket, equal to Field-Lok, as manufactured by U.S. Pipe and Foundry, Inc. It shall be UL listed, FM approved, or shall be certified by an approved laboratory that the restrained joint will not separate at the specified test pressure.

    c. Mechanical joint with DI retainer glands shall be furnished with retainer glands equal to Series 1100 Megalug, as manufactured by EBAA Iron Inc., Stargrip 3000 as manufactured by Star Pipe Products, or DI MJ Gripper Gland as manufactured by U.S. Pipe and Foundry Co. for use with ductile iron pipe. All retainer glands shall be UL listed, FM approved, or shall be certified for 350 psi pressure rating with a 2:1 safety factor.

2. **Larger than 12-inch**: Joints for restrained pipe and fittings larger than 12-inch shall be as follows:

    a. Restrained pipe joints shall be modified push-on restrained joint, equal to U.S. Pipe TR Flex, and shall be UL listed or FM approved.

    b. Fittings joints shall be equal to U.S. Pipe TR Flex or shall be mechanical joint with DI retainer glands. Retainer glands shall be equal to Series 1100 Megalug or Stargrip

3000 for 16-inch and larger pipe. All retainer glands shall be UL listed, FM approved, or certified for 350 psi pressure rating (for 16-inch) and 250 psi pressure rating (for larger than 16-inch) with a 2:1 safety factor.

c. Valve joints shall be mechanical joint with DI retainer glands as specified herein for larger than 12-inch fittings joints.

4.05 JOINTS - EXPOSED PIPE AND FITTINGS

Joints for exposed ductile iron pipe and fittings shall be restrained, except as otherwise noted on the Plans. Joints for exposed pipe in plants and in vaults shall be flanged where noted on the Plans.

Joints for exposed pipe and fittings 12-inch and smaller shall be modified push-on restrained joint using a retainer ring, or modified push-on joint using a locking type gasket, as specified herein headed "4.04 Joints - Buried Pipe and Fittings."

Joints for exposed pipe and fittings larger than 12-inch shall be modified push-on restrained joint using a retainer ring as specified herein headed "4.04 Joints - Buried Pipe and Fittings."

SECTION 5 - PIPING MATERIALS: PVC PRESSURE PIPE

5.01 GENERAL

The Work in this section includes furnishing all Polyvinyl Chloride (PVC) pressure pipe and fittings. PVC pressure pipe includes all PVC pressure pipes 2-inch through 36-inch.

Standards referenced in this Section are the latest revision of the following specifications:

ANSI/AWWA C900	"Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-Inch through 12-Inch, for Water Distribution"
ANSI/AWWA C905	"Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 14-Inch through 48-Inch, for Water Transmission and Distribution"
ANSI/AWWA C110	"Ductile-Iron and Gray-Iron Fittings, 3-Inch through 48-Inch for Water"
ANSI/AWWA C111	"Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings"
ANSI/AWWA C153	"Ductile-Iron and Gray-Iron Fittings, 3-Inch through 48-Inch for Water"
ASTM D 1784	"Standard 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	"Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)"
ASTM D 3139	"Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals"

5.02 PIPE

A. **Two-inch Pipes**: All 2-inch PVC pipe shall meet ASTM D 1784 specification for rigid PVC compounds and ASTM D 2241 specification for PVC plastic pipe. PVC pipe shall be suitable for use at maximum hydrostatic working pressure of 160 psi at 73^{o}F. Pipe shall have a standard dimension ratio (SDR) 26 and bear the NSF Seal for potable water pipe.

B. **Four-inch Through 12-inch Pipes**: PVC pressure pipe 4-inch through 12-inch shall meet the requirements of ANSI/AWWA C900, with outside diameter dimensions of ductile iron pipe. All 4-inch through 12-inch PVC pressure pipe shall be Class 150 and DR18 with a pressure rating of 188 psi.

C. **14-inch through 36-inch Pipes**: PVC pressure pipe 14-inch through 36-inch shall meet the requirements of ANSI/AWWA C905, with outside diameter dimensions of ductile iron pipe. All 14-inch through 36-inch PVC pressure pipe shall be Class 100 and DR25 with a pressure rating of 133 psi.

D. **UV Resistant PVC Pipe**: All PVC piping exposed to sunlight shall contain titanium dioxide for UV resistance, and shall conform to ASTM D 1784 and ASTM D 1785 (IPS). The Contractor shall submit the manufacturer's certificate of conformance to the City. Pipe shall be marked with manufacturer's identification.

5.03 FITTINGS

A. **Two-inch Pipes**: Gasketed joint standard dimension ratio (SDR) 21 PVC or galvanized steel fittings shall be used with all 2-inch PVC pipe. PVC adapters, Harco as manufactured by the Harrinton Corporation or approved equal, shall be used for jointing to 2-inch gate valves, galvanized fittings, and existing threaded pipe.

B. **Four-inch Through 36-inch Pipes**

1. **Molded PVC Pressure Fittings**: Fittings for 4-inch through 8-inch sanitary sewer pressure pipe shall be molded PVC pressure fittings, unless DI fittings are directed by the Engineer. Molded PVC fittings shall meet the requirements of ANSI/AWWA C900, and shall be Harco Class 150 as manufactured by the Harrington Corporation, or approved equal, as directed by the Engineer.

2. **DI Fittings**: Fittings for pipe larger than 8-inch shall be DI. DI fittings for 4-inch through 36-inch PVC pressure pipe shall conform to ANSI/AWWA C110 or C153 and shall conform to the Technical Specifications section headed "Piping Materials: Ductile Iron Pipe."

C. Where flanged fittings are shown, specified, or directed by the Engineer, adapter flanges shall be used on plain end PVC pipe. Adapter flanges shall be suitable for PVC pipe and be equal to Uni-Flange Series 900 as manufactured by Ford/Uni-Flange, Wabash, Indiana.

5.04 JOINTS

Pipe joints shall be plain end, rubber gasket push-on joints, unless otherwise shown. Push-on joints shall meet the requirements of ASTM D 3139.

Joints to DI fittings shall be rubber gasket mechanical joints with retainer glands, unless otherwise shown. All retainer glands shall be UL listed or FM approved. The retainer glands shall be installed in accordance with the manufacturer's recommendations.

Mechanical joints shall meet the requirements of ANSI/AWWA C111.

5.05 MARKINGS AND COLOR CODING

In addition to the standard markings required by ANSI/AWWA C900 and C905, the letters NSF denoting National Sanitation Foundation approval shall be included in the marking system, on each pipe length and fitting.

PVC pipe shall be manufactured of solid color as specified, or white with continuous colored ink lettering. The applicable color codes, with light color stabilant, are as follows:

Pipe Use	**Color Coding**
Potable Water	Safety Blue
Sanitary Sewer	Safety Green
Reclaimed Water	Safety Purple

UV resistant PVC pipe shall be solid color as specified above, or white with colored lettering as specified above.

5.06 HARNESSING

Ductile iron fittings with mechanical joints used with PVC pipe that require harnessing, shall be provided with ductile iron retainer glands such as Series 2000 PV Megalug as manufactured by EBAA Iron Inc., Stargrip 4000 as manufactured by Star Pipe Products, or approved equal.

PVC push-on joints for pipe in casings, for joints to PVC pressure fittings, or where shown, shall be harnessed using a ductile iron retainer for push-on joint PVC pipe, such as Series 1600 as manufactured by EBAA Iron Inc. , Series 1100 as manufactured by Star Pipe Products, or approved equal.

END OF SECTION

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SECTION 6 - PIPING MATERIALS: HDPE PRESSURE PIPE

6.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install polyethylene pressure pipe, fittings and appurtenances as shown on the Drawings and specified in the Contract Documents and these Standards.

B. Newly installed pipe shall be kept clean and free of all foreign matter & gouges.

C. All pipe shall be correctly color coded / identified.

6.02 QUALIFICATIONS

All polyethylene pipe, fittings and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the items to be furnished.

6.03 POLYETHYLENE PRESSURE PIPE

A. Polyethylene pipe 4" diameter and larger shall be high-density PE 4710 polyethylene resin per ASTM D 3350, Cell Classification 445574, Class 202, DR 11, CPChem DriscoPlex 4000, 4300 or 4500 or an approved equal, meeting the requirements of AWWA C906. All pipe materials used in potable water systems shall comply with NSF Standard 61. Outside diameters of water, reclaimed water and pressure sewer HDPE pipes shall be ductile iron size (DIPS).

B. Polyethylene pipe and tubing 3" diameter and smaller shall be pressure Class 200, DR 9 "Driscopipe 5100", Endo Pure by Endot, or equal, meeting the requirements of AWWA C901 (latest revision) and the following ASTM requirements:

Material Designation PPI/ASTM PE 4710
Material Classification ASTM D-3350
Cell Classification ASTM D-3350

6.04 JOINTS

A. Where PE pipe is joined to PE pipe, it shall be by thermal butt fusion. Thermal fusion shall be accomplished in accordance with the written instructions of the pipe manufacturer and fusion equipment supplier. The installer of the thermal butt fused PE pipe shall have received training in heat fusion pipe joining methods and shall have had experience in performing this type of work.

B. Where thermal butt fusion cannot be used, or when specifically called for on the plans, electro-fused couplings may be used. Fusion shall be in accordance with the written instructions of the fitting manufacturer.

C. Flanged joints, mechanical joints, tapping saddles, and molded fittings shall be in accordance with AWWA C901, C906 or C909, ASTM D3350 and D3140, as applicable. Fusion and mechanical connections are allowed, chemical (solvents, epoxies, etc.) are not allowed.

6.05 DETECTION

A. Direct buried HDPE pipe shall have 3" detectable metallic tape of the proper color placed directly above the pipe and 12" below finished grade or 6" detectable tape between 12" and 24" below finished grade.

B Direct buried or horizontal directional drilled HDPE pipe shall also have tracer wire installed along the pipe alignment. The tracer wire to be used shall be a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color manufactured by Copperhead Industries or approved equal.

6.06 IDENTIFICATION

A. Pipe shall bear identification markings in accordance with AWWA C906.

B. Pipe shall be color coded blue for water, purple (Pantone 522 C) for reclaimed water or green for pressure sewer using a solid pipe color or embedded colored stripes. Where stripes are used, there shall be a minimum of three stripes equally spaced.

6.07 INSTALLING POLYETHYLENE PRESSURE PIPE AND FITTINGS

All polyethylene pressure pipe shall be installed by direct bury, directional bore, or a method approved by the City prior to construction. If directional bore is used, or if directed by the City, the entire area of construction shall be surrounded by silt barriers during construction.

END OF SECTION

SECTION 7 - SANITARY SEWER CONSTRUCTION

7.01 GENERAL

The Work in this section includes construction of sanitary sewer gravity pipes, force mains, manholes, and appurtenances.

Sanitary Sewers are to be constructed at locations indicated on the Plans. The City reserves the right, however, to make minor changes in grade and/or alignment as the Work progresses.

All Work shall be fully completed within the established limits as outlined for the various Pay Items listed in the Proposal. It is not the intent of the City to allow additional compensation for obstructions, interferences, or similar contingencies on this Project.

All force main pipe and fittings shall be furnished and installed in accordance with the applicable requirements of the Technical Specifications sections headed “Piping Materials: Ductile Iron Pipe,” “Piping Materials: PVC Pressure Pipe,” “Piping Materials: HDPE Pressure Pipe,” and "Pressure Pipe Construction."

At the ends of the sections where adjoining pipelines have not been completed and are not ready to connect, temporary bulkheads or plugs (as specified herein) approved by the Engineer shall be installed. All such bulkheads or plugs shall be removed when they are no longer needed or when ordered by the Engineer.

All pipelines shall be tested and closed circuit television video (CCTV) inspected. Any leak or defect shall be repaired and re-televised. Tests shall be conducted in accordance with these Specifications.

PVC pipe for gravity sewers shall be tested for allowable deflection. Tests shall be conducted in accordance with the requirements of these Specifications.

Connections between dissimilar gravity pipe materials or diameters shall be made as specified herein.

Connections between pressure pipes shall be made with solid sleeves as specified herein.

The ends of all new sanitary laterals shall be marked by witness posts or protruding galvanized pipe, as directed by the Engineer. Witness posts shall be 4-inch diameter PVC pipe filled with concrete; 4 to 5 feet of the pipe shall be exposed and wrapped with green tape. The 1-inch diameter galvanized pipe shall protrude 1 inch above grade.

The following Standards are referenced in this section:

ASTM C 12	“Practice for Installing Vitrified Clay Pipe Lines”
ASTM C 76	"Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe"
ASTM C 443	"Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets”

ASTM C 478	"Standard Specification for Precast Reinforced Concrete Manhole Sections"
ASTM C 1107	"Standard Specification for Packaged Dry, Hydraulic-Cement Grout (NonShrink)"
ASTM D 2321	"Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications"
ASTM D 3034	"Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings"
ASTM D 3753	"Standard Specification for Glass-Fiber-Reinforced Polyester Manholes@
ASTM F 477	"Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe"
ASTM F 679	"Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings"
UNI-B-6-98	“Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe” Uni-Bell Plastic Pipe Association, Dallas, Texas

7.02 DATA TO BE SUBMITTED

The Contractor shall submit shop drawings in accordance with the General Conditions, Article 36, for the following materials:

Piping materials
Fittings and couplings
Grouting rings
Pipe-to-manhole connectors
Precast manholes
Precast valve vaults
Fiberglass manholes
Castings
Wall sleeves
Special construction methods
Interior cementitious coating (including applicator’s certification from manufacturer)

7.03 MATERIALS

All materials shall be furnished by the Contractor, unless otherwise noted on the Plans. All materials shall be new and of the best quality available. Materials not specifically specified shall confirm to applicable provisions of the DOT-SSRBC.

A. **Piping Materials**: Sanitary sewer pipe shall either be green in color or shall be white with continuous colored green ink lettering or shall be continuously painted green along the top 1/3 of the pipe with 2-part high-build epoxy-polyamide paint. All sanitary sewers shall be installed accompanied by green-colored metallic identification tape laid 1 foot above the pipe, cut every 10 feet.

1. Ductile iron pipe and fittings for force mains or gravity sewers shall conform to the Technical Specifications section headed "Piping Materials: Ductile Iron Pipe."

2. PVC gravity sewer pipe and fittings 4-inch through 15-inch, intended for non-pressure service, shall comply with ASTM D 3034, Type PSM, with a dimension ratio of 35 and a minimum stiffness of 46 psi; or, at the direction of the Engineer, pipe with a dimension ratio of 26 and a minimum pipe stiffness of 115 psi shall be used. Joints and gaskets shall comply with ASTM F 477. PVC fittings for use on 4-inch through 15-inch PVC pipe shall be Harco Gasketed PVC Sewer Fittings as manufactured by Harrington Corp. or approved equal.

   PVC gravity sewer pipe and fittings 18-inch through 27-inch, intended for non-pressure service, shall comply with ASTM F 679, with T-1 wall thickness and a minimum pipe stiffness of 46 psi. Joints and gaskets shall comply with ASTM F 477.

3. PVC pressure pipe and fittings for force mains or gravity sewers shall conform to the Technical Specifications section headed "Piping Materials: PVC Pressure Pipe." Fittings shall be PVC or ductile iron as specified, as directed by the Engineer.

4. High Density Polyethylene (HDPE) pressure pipe for force mains shall conform to the Technical Specifications section headed “Piping Materials: HDPE Pressure Pipe.”

B. **Other Materials**

1. Castings for manholes and cleanouts shall be cast iron of the sizes, shapes, and catalog references shown on the Plans. Where no reference is made on the Plans, castings shall be equivalent in quality to those manufactured by U.S. Foundry. Unless otherwise noted, all castings shall be designed for an HS-20 truck loading. Castings shall be marked "Sanitary Sewer."

2. Concrete, reinforcing, and masonry for precast, cast-in-place, or site assembled manholes and structures shall conform to the Technical Specifications section headed "Concrete, Masonry, and Reinforcing Steel."

3. Precast manholes shall be manufactured as specified herein and in accordance with the sizes and details shown on the Plans, and with the approved shop drawings.

4. Fiberglass Reinforced Polyester (FRP) manholes shall be manufactured in accordance with ASTM D 3753, the sizes and details shown on the Plans, and the approved shop drawings.

7.04 CONNECTIONS TO EXISTING SANITARY SEWERS

The Contractor shall connect new sanitary sewers to existing sanitary sewers as shown on the Plans and as specified.

All connections to existing sanitary sewers shall be by Flex-Seal Adjustable Repair Coupling Series MR-ARC with Series 316 stainless steel shear rings as manufactured by Mission Rubber Company or approved equal. All couplings shall be centered between pipe ends and shall be tightened at both ends by Series 316 stainless steel clamps or approved equal.

The Engineer shall be notified at least 2 working days prior to making final connections. The time at which the connections are to be made shall be subject to approval by the Engineer.

7.05 CONSTRUCTION OPERATIONS

Pipes shall be laid in open cut, except when another method, such as jacking, augering, directional drilling, or tunneling, is shown on the Plans, specified, or ordered.

A. No excavations shall be left open over a weekend. All pavement openings shall be completely repaired within 7 days of opening.

B. Sanitary sewers may be constructed in short tunnels to protect trees, shrubs, and existing surface or subsurface utilities and structures. Short tunnels shall be constructed to the lengths shown on the Plans, specified, or directed by the Engineer. No separate payment will be made for short tunnels.

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

D. In the course of the Work, it will be necessary to install the sanitary sewer under or closely adjacent to existing culverts and other storm and water main facilities. Where so indicated on the Plans, the Contractor shall remove storm drains to permit construction of the sanitary sewer and shall then reconstruct the storm drain. Where removal and reconstruction are not indicated on the Plans, the Contractor shall protect all existing storm and water main facilities which are shown on the Plans or located in the field during the course of the Work.

E. Sewers crossing water mains may be required to be constructed of ductile iron pipe, PVC pressure pipe, or heavy wall PVC pipe (SDR 26) as ordered by the Engineer, to conform to DEP and Pinellas County Public Health Unit requirements.

   Sanitary sewers and service laterals which cross under the new water pipe with less than 18 inches clear vertical separation, or which cross over the new water pipe, shall be replaced with ductile iron pipe or PVC pressure pipe, or heavy wall PVC pipe (SDR 26) for 10 feet on both sides of the new water main, or as directed by the Engineer.

F. All ground surfaces disturbed by the Contractor shall be restored to their original condition in conformance to the Technical Specifications section headed "Surface Restoration."

G. Sanitary sewers shall not be cut or pumped around without an approved sanitary sewer pump-around plan and submittal of same, a minimum of 72 hours prior to implementation, to the Water Resources Department Dispatch, 893-7261. The pump-around plan shall include size of pipes and pumps, and discharge location.

7.06 LAYING AND JOINTING PIPELINES

A. Ductile iron pipelines, PVC pressure pipelines, and HDPE pressure pipelines for force mains shall be laid and jointed as specified in the Technical Specifications section headed "Pressure Pipe Construction." Retainer glands used for PVC force mains shall be UL listed or FM approved and shall have factory certification for pressures up to 188 psi.

B. PVC, concrete, and FRPMP gravity pipelines shall be laid in conformance to applicable requirements of ASTM C 12 for concrete pipe, ASTM D 2321 for PVC pipe, and ASTM D 3262 and D 4161 for FRPMP.

C. **Line and Grade**: Sewers shall be laid to exact line and grade using approved methods consistent with common practice and approved by the Engineer. All line and grade controls shall be furnished by the Contractor.

D. **Pipe**: Before the pipe is jointed in the trench, the outside of the spigot end and the inside of the bell shall be thoroughly cleaned, wiped, and brushed out to ensure that no dirt or foreign material gets into the finished line. Each pipe shall be inspected for defects and cracks prior to being lowered into the trench. Any cracked or otherwise rejected pipe shall be immediately removed from the site. All pipeline work must be performed in the presence of the Engineer. When work is not in progress, water shall be kept out of the pipe, and the pipe shall be kept closed by means of a test plug.

E. **Service Connections**: Service lateral connections shall conform to the Details and shall be installed as indicated or as directed by the Engineer. The Contractor shall locate and record the exact position of such service lateral connections and include actual data on the As-Built Drawings to be furnished to the City.

F. **Watertight Plugs**: Watertight plugs of an approved type shall be installed in the ends of all pipe at times when pipe laying is not in progress or as ordered to prevent any contaminated material or vermin from entering the pipe.

G. Excavation and backfilling shall conform to the Technical Specifications section headed "Excavation and Backfill."

7.07 MANHOLE CONSTRUCTION

A. **Brick Manholes**: Brick manholes shall be constructed in accordance with the details shown on the Plans and these Specifications. Twenty-four hours shall elapse between the pouring of the slab and the beginning of laying the brick work.

1. **Base Slabs**: Bases shall be cast in place on a level, compacted trench bottom.

2. **Mortar**: Brick shall be laid in mortar that has been machine mixed for a minimum of 1.5 minutes before water is added, and then mixed until a homogeneous mixture is obtained.

Mortar of improper consistency and/or partly set shall not be used in the Work. The brick shall be laid with 3/8-inch nominal mortar joint, and care shall be taken to produce true and smooth alignments, particularly for the inside surfaces.

3. **Brick**: Clay brick shall be as specified in the Technical Specifications section headed "Concrete, Masonry, and Reinforcing Steel."

4. **Exterior and Interior Brick Surface**: Exterior and interior brick surface of manholes shall be given a 3/4-inch application of cement plaster. This plaster shall be the same type mix as the mortar in which the bricks are laid, and it shall be applied in 2 applications. Any visible seepage through the manhole walls shall be corrected by the Contractor.

5. **Inverts**: Inverts shall be formed using poured-in-place concrete conforming to the Technical Specifications section headed "Concrete, Masonry, and Reinforcing Steel" and shall have a minimum strength of 2,500 psi. Invert pipe (stub out) shall not extend more than 6 inches outside manhole walls (as measured to back of bell), and shall be grouted with the same mortar used for making mortar joints.

6. **Exterior Epoxy Coating**: A protective coal tar epoxy coating of Carboline (formerly Kop-Coat) Bitumastic 300-M, or approved equal, shall be applied to the exterior surfaces of manholes. One coat shall be applied to the outside and shall yield a final dry film thickness of 9 mils.

7. **Interior Cementitious Coating**: A dense and durable concrete lining of 100 percent pure fused calcium-aluminate cementitious lining of SewperCoat PG as manufactured by Lafarge Calcium Aluminates, shall be applied in accordance with manufacturer's recommendations, to all interior surfaces of manholes including walls, benches, flow channels, and inverts. Lining shall have a final minimum thickness of 1/2 inch.

8. **Manhole Wall Penetrations**: New brick manholes shall have a grouting ring. New wall penetrations and repair penetrations, for connections to existing manholes, shall be core-drilled and a grouting ring shall be installed. Grouting ring shall be WS Series Waterstop Grouting Ring as manufactured by Press-Seal Gasket Corporation or Engineer approved equal. Installation shall be in accordance with manufacturer's recommendations. Non-shrink grout shall comply with ASTM C 1107. Material shall be 1107 Advantage Grout manufactured by Dayton Superior, Burke Multi-purpose Grout as manufactured by Burke Company, or approved equal.

B. **Precast Concrete Manholes**: Precast manholes shall be constructed in accordance with the details shown on the Plans. Full shop drawing information including design, materials, fabrication details, and installation methods of the proposed precast manholes shall be submitted to the Engineer as specified.

1. **Base Slabs**: Base slabs for precast manholes 48-inch in diameter shall have a minimum thickness of 8 inches as detailed on the Plans. The diameter of the base slab shall be as detailed on the Plans. Reinforcement shall be placed with 2 inches of concrete cover over the top row of steel. Base slabs for precast manholes shall be cast with the lower manhole section and placed on a level, compacted trench bottom.

2. **Riser Sections**: Riser sections, grade rings, and tops shall comply with ASTM C 478 with the exception that Article No. 11 shall be deleted. Base riser sections shall be provided with

preformed pipe holes to fit the connectors. The tops of pipe holes shall not be within 4 inches of the bell or socket portion of the riser.

3. **Riser Joints**: Riser joint shall conform to ASTM C 443, to the manufacturer's recommendations and as shown on the Plans. Riser shall be jointed with rubber, plastic, or preformed bituminous joint sealing compound equal to Ram-Nek as manufactured by K.T. Snyder.

4. **Manhole Sizes**: Manhole sizes up to 10 feet in depth (invert to bottom of brick adjustment ring) shall be a minimum of 48-inch inside diameter for 18-inch diameter and smaller pipe. Manholes over 10 feet in depth shall be the specified diameter for a minimum of 6 feet above the manhole invert; the remaining portion may, at the Contractor's option, be reduced to 48-inch diameter. In no case shall the manhole diameter be less than that required to adequately enclose the sewer pipe.

5. **Tops**: Tops shall have a minimum opening 24 inches in diameter for pipes 18-inch and smaller and 32-inch minimum for pipes 21-inch and larger, with an 8-inch wide flange at the top. For Type I manholes, only concentric cones are acceptable.

6. **Top Grades**: Top grades of precast manholes shall be established so that a minimum of 3, but no more than 6, courses of brick are placed under the ring and cover casting.

7. **Inverts**: Inverts shall be formed using poured-in-place concrete conforming to the Technical Specifications section headed "Concrete, Masonry and Reinforcing Steel" and shall have a minimum strength of 2500 psi.

8. **Drop Inlets**: Drop inlets shall be provided where directed by the Engineer or shown on the Plans, and such drop inlets shall conform to details shown on the Plans.

9. **Exterior Epoxy Coating**: Coating shall be applied to the outside surfaces of precast manholes as specified for brick manholes.

10. **Interior Cementitious Coating**: Coating shall be applied to the inside surfaces of precast manholes as specified for brick manholes.

11. **Manhole Wall Penetrations**: Manhole wall penetrations for precast manholes shall be as specified for brick manholes.

12. **Pipe-to-Manhole Connections (for New Precast)**: Pipe-to-manhole connections shall be made with a flexible watertight connector such as Kwik Seal or PSX: Positive Seal as manufactured by Press-Seal Gasket Corporation, or Kor-N-Seal I connectors for pipe sizes up to 15-inch and Kor-N-Seal II connectors for pipe sizes 15-inch through 30-inch as manufactured by NPC Inc. Pipe-to-manhole connection shall be installed by the precaster for new manholes, unless specified otherwise.

C. **Fiberglass Reinforced Polyester (FRP) Manholes**: The construction of FRP manholes shall conform to the details on the Plans. Full shop drawing information including design, materials, fabrication details, and installation methods of the proposed fiberglass manholes shall be submitted to the Engineer as specified.

FRP manhole shall be a one piece unit consisting of a watertight base and corbel section with a concentric cone, as manufactured by LF Manufacturing, Containment Solutions, or an approved equal.

A minimum wall thickness of 1/2 inch shall be maintained. All manholes shall have a U/V inhibitor that is homogeneous with the resin mixture.

All FRP manholes shall have a minimum 20 year manufacturer's warranty against corrosion and structural defects.

All FRP manholes shall have a minimum AASHTO HS-20 axle loading.

1. **Base Slabs**: FRP manhole base slabs shall be precast or cast-in-place concrete and shall conform to the thickness specified in the details on the Plans. Cast-in-place concrete base slab reinforcement shall be placed with 3 inches of concrete cover in accordance with the Technical Specifications section headed "Concrete, Masonry, and Reinforcing Steel."

   Cast-in-place base slabs for FRP manholes shall be cast in place on a level, compacted bottom.

2. **Watertight Bottom:** The FRP manhole shall have a resin fiber-reinforced bottom and a 3-inch-wide anti-floatation flange as a homogeneous part of the bottom section. The manhole bottom shall be a minimum 1/2-inch thick.

   For FRP manhole depths greater than 10 feet, the manufacturer shall install a minimum of two 1 and 1/2-inch-deep by 3 and 1/2-inch-wide stiffening ribs. Stiffening ribs shall be completely enclosed with resin fiber-reinforcement.

3. **Anchors and Washers**: FRP manholes shall be anchored to the cast-in-place concrete base slab with 316 stainless steel Kwik Bolt II Wedge anchors and washers as manufactured by Hilti, or approved equal. The size, number of anchors, and embedment depth shall be as shown on the Plans. The anchors shall be installed a minimum of 1 and 1/2 inches from the outer edge of the anchoring flange and shall be equally spaced around the circumference of the manhole bottom.

4. **Manhole Height**: No fiberglass manhole shall have less than 4 feet clear inside height (measured from invert of bench to finished grade.)

5. **Inverts**: Inverts shall be as shown on the Plans.

   A concrete invert may be formed in the field using poured-in-place concrete conforming to the Technical Specifications section headed "Concrete, Masonry, and Reinforcing Steel" and shall have a minimum strength of 2,500 psi.

6. **Stub Outs**: FRP stubouts shall be installed as shown on the Plans or directed by the Engineer, in accordance with approved shop drawings.

   Pipe-to-manhole connectors for new manholes shall be installed by the FRP manhole manufacturer, unless specified otherwise. Connections for 4-inch through 15-inch pipe shall be made with an Inserta Tee boot as manufactured by Inserta Fittings, or Kor N Seal boot as

manufactured by NPC Inc., or approved equal, and laminated sleeve, as shown in the details on the Plans. Connections of PVC sewer pipe, and connections 18-inch and larger, shall be with a Link-Seal connector and laminated sleeve as manufactured by Thunderline Corp., or Kor N Seal II Connector, or approved equal. Installation of PVC sewer pipe must be performed by sanding, priming, and using resin fiber-reinforced hand layup, by a manufacturer's certified representative or a Contractor-certified person.

Laminated sleeves shall be formed using resin and fiberglass of same type and grade as used in the fabrication of the fiberglass manhole. Laminated sleeves may be factory installed or field installed. Field installation shall be by a manufacturer's certified representative or a Contractor-certified person.

All holes cut into the FRP manhole shall be by core methods recommended by the manhole manufacturer. A minimum of 12-inch clear wall between cutouts shall be maintained in all directions for each cored hole.

7.08 TESTING OF SEWER PIPELINES

A. Pressure Pipelines

Pressure sanitary sewer pipelines shall be tested in accordance with the applicable requirements of the Technical Specifications section headed "Pressure Pipe Construction." Pressure sanitary sewer pipelines shall not be disinfected.

B. Gravity Pipelines

1. Gravity pipelines shall be tested for infiltration, exfiltration, deflection, or low pressure air test, at the Engineer's direction. The Contractor shall provide a closed circuit television video camera inspection, in the presence of the City (or engineer) for all sanitary sewer pipe repairs and all new sanitary sewer construction. The video tape, CD, or DVD shall include time and date, footage, and audio describing any pipe abnormality; also, a CCTV inspection log shall be provided with each completed inspection. Any sewer pipeline found to be unacceptable by the Engineer shall be corrected, repaired, or replaced as directed by the Engineer, at no additional cost to the City.

2. **Infiltration Test**: Upon completion of a section of sewer line, a test for infiltration shall be conducted as directed by the City Inspector. Dewatering of the line to be tested shall terminate at least 2 days prior to the infiltration test. The maximum infiltration allowed in a 24-hour period shall not exceed 200 gallons per inch of diameter per mile of sewer from any section between successive manholes. If the infiltration exceeds the allowable limits, the line shall be further checked and repaired by the Contractor until the infiltration requirements have been met. If any particular location indicates concentrated infiltration, such location shall be investigated and corrected regardless of the overall infiltration requirement.

   Groundwater level measuring pipes shall be installed at manholes. The groundwater level shall be measured prior to testing. If the groundwater level is at least 2 feet above the highest section of the work being tested, infiltration methods of measurement shall be used. If there is insufficient groundwater head to perform infiltration testing, exfiltration tests will be made.

3. **Exfiltration Test**: If, in the opinion of the City Inspector, the position of a sewer line is above the normal groundwater table, the Engineer may direct the Contractor to perform an exfiltration test. The maximum allowable exfiltration during a 24-hour period shall not exceed 200 gallons per inch of diameter per mile of sewer from any section between successive manholes. An allowance of an additional 10 percent of gallonage shall be permitted for each additional 2 feet of head over a basic 2-foot minimum internal head.

   The exfiltration test shall be performed by plugging the upstream and downstream manholes of the test section, filling the line with water, and maintaining a minimum of 2 feet head of water in the section of line being tested. The rate of exfiltration shall be calculated from the water level drop in the upstream manhole during the 24-hour test period.

4. **Low pressure air test**: At the direction of the City Inspector or Engineer, each pipeline reach may alternatively be tested with air pressure (minimum 3.5 psi, maximum 5 psi) in accordance with UNI-BELL UNI-B-6-98 "Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe." The system passes the test if the pressure drop due to leakage through the pipe or pipe joints is less than or equal to 0.5 psig over the time period described below.

   Minimum time period for a 0.5 psig pressure drop

   The time period for the test shall be calculated from UNI-B-6-98 as follows:
   T = 28.33 DK,
   T = Shortest time, in seconds allowed for the air pressure to drop 0.5 psig,
   K = .000419 DL, but not less than 1.0,
   D = Nominal pipe diameter in inches, and
   L = Length of pipe being tested in feet.

5. **Deflection Test**: Prior to final acceptance of the Project, all PVC pipelines shall be deflection tested. The Contractor or a City-approved test lab shall perform the deflection testing at the expense of the Contractor. The deflection test shall be performed a minimum of 7 days after the base has been compacted and sealed.

   The PVC pipe/soil system has been designed so that the maximum installed deflection does not exceed 5 percent and 7.5 percent of the base inside diameter of the pipe as listed in the following table:

Nominal Size (inches)	Base Inside Diameter (inches)	5% Deflection After 7 Days Mandrel (inches)	7.5% Deflection after 30 Days Mandrel (inches)
		ASTM D 3034 SDR-35	
8	7.665	7.28	7.09
10	9.563	9.08	8.85
12	11.361	10.79	10.51
15	13.898	13.20	12.86
		ASTM F 679 TYPE T-1	
18	16.976	16.13	15.70
21	20.004	19.01	18.50
24	22.480	21.36	20.79
27	25.327	24.06	23.43

		ASTM D 3034 SDR-26	
8	7.488	7.11	6.93
10	9.342	8.87	8.64
12	11.102	10.55	10.27
15	13.575	12.90	12.56
		ASTM F 679 TYPE T-2	
18	17.054	16.20	15.77
21	20.098	19.09	18.59
24	22.586	21.46	20.89
27	25.446	24.17	23.54

The Contractor shall have the option of testing for 5 percent deflection after the base has been compacted and sealed for 7 days; or for 7 and 1/2 percent deflection after the base has been compacted and sealed for 30 days.

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

If the pipe fails the 7 and 1/2 percent deflection test after 7 days or at 30 days, the Contractor shall repair that section immediately.

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

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

   - Serial Number
   - Nominal Pipe Diameter
   - Either “ASTM D 3034,” year and either “SDR-35” or SDR-26” or “ASTM F 679,” year and either “Type T-1” or Type T-2”
   - Percent deflection as stated above

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

END OF SECTION

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SECTION 8 - PRESSURE PIPE CONSTRUCTION

8.01 GENERAL

The Work in this section includes construction of potable water mains, reclaimed water mains, sanitary force mains, and appurtenances.

Pressure pipelines are to be constructed at locations shown on the Plans. The City reserves the right to make minor changes in grade and/or alignments as the Work progresses.

Piping materials for pressure pipe installations shall be as follows:

Potable Water Main

PVC Pipe	2-inch	
DI Pipe	6-inch and larger	
HDPE Pipe	2-inch and larger	ASTM D3350 meeting PE 3408 code designation
Galvanized Pipe	2-inch blow-off assemblies, 2-inch connections, 2-inch short tunneling, and 2-inch short relocations	
Fittings	2-inch PVC pipe: 2-inch galvanized pipe: 6-inch and larger pipe:	PVC with gasketed joint Galvanized steel with threaded joint Ductile Iron (DI) with push-on or mechanical joint

Sanitary Force Main

PVC Pipe	4-inch through 12-inch: 14-inch through 36-inch:	ANSI/AWWA C900 ANSI/AWWA C905
DI Pipe	14-inch and larger pipe:	ANSI/AWWA C151
HDPE Pipe	2-inch and larger	ASTM D3350 meeting PE 4710 code designation
PVC Fittings	4-inch through 12-inch pipe: 14-inch through 36-inch pipe:	DI with push-on or mechanical joint DI with push-on or mechanical joint
DI Fittings	4-inch and larger pipe:	DI with push-on or mechanical joint
HDPE Fittings	2-inch and larger pipe:	ASTM D3350 meeting PE 4710 code designation or DI with HDPE mechanical joint adapter

All existing water services shall be kept in service during the construction of water mains and the preparation of new service connections. Water meters requiring disconnection by the Contractor to accomplish the Work shall be promptly restored to service by the Contractor. The Contractor shall give a minimum of 24 hours prior written notice to all affected water customers of the intended service interruption.

All pipe, fittings, and appurtenances shall be furnished by the Contractor and be transported, delivered, and installed by the Contractor in accordance with the requirements of the subsection headed "Laying and Jointing Pipelines."

All pipelines shall be tested in accordance with the requirements of the subsection headed "Testing and Disinfection of Pressure Pipelines: Pressure Test."

All potable water and reclaimed water pipelines shall be disinfected before they are put into service as specified in the subsection headed "Testing and Disinfection of Pressure Pipelines: Disinfection."

As-built drawings shall be submitted to the Engineer prior to acceptance of the Work and prior to commencement of the warranty period.

Standards referenced in this Section are the latest revision of the following specifications:

ANSI/AWWA C105	"Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids"
ANSI/AWWA C110	"Ductile-Iron and Gray-Iron Fittings, 3-Inch through 48-Inch
ANSI/AWWA C111	"Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings"
ANSI/AWWA C504	"Rubber-Seated Butterfly Valves"
ANSI/AWWA C509	"Resilient-Seated Gate Valves for Water and Sewerage Systems"
ANSI/AWWA C515	“Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service”
ANSI/AWWA C550	"Protective Epoxy Interior Coating for Valves and Hydrants"
ANSI/AWWA C600	"Installation of Ductile-Iron Water Mains and Their Appurtenances"
ANSI/AWWA C605	"Underground Installation of PVC Pressure Pipe and Fittings for Water"
ANSI/AWWA C651	"Disinfecting Water Mains"
ANSI/AWWA C800	"Underground Service Line Valves and Fittings"
ANSI/AWWA C900	"Polyvinyl Chloride (PVC) Pressure Pipe, 4-Inch through 12-Inch, for Water Distribution"
ANSI/AWWA C901	"Polyethylene (PE) Pressure Pipe and Tubing, 1/2-Inch through 3-Inch

	for Water Service"
ANSI/AWWA C905	"Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 14-Inch through 48-Inch, for Water"
ANSI/AWWA C906	"Polyvinyl Chloride (PVC) Pressure Pipe and Fittings 4-Inch through 63-Inch, for Water Distribution and Transmission"
ANSI/AWWA C901	"Polyethylene (PE) Pressure Pipe and Tubing, 1/2-Inch through 3-Inch for Water Service"
ASTM A 126	"Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings"
ASTM D 429	"Test Methods for Rubber Property - Adhesion to Rigid Substrates"
ASTM D 3139	"Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals"

8.02 DATA TO BE SUBMITTED

The Contractor shall submit shop drawings in accordance with the *General Conditions* Article headed "Shop Drawings and Submittals."

Pipe
Valves
Joints and joint accessories
Fittings
Specials and accessories
Special linings and coatings
Water service materials

8.03 MATERIALS

All pressure pipe materials shall be in accordance with the applicable requirements of the Technical Specifications sections headed:

DIP	"Piping Materials: Ductile Iron Pipe"
PVC	"Piping Materials: PVC Pressure Pipe"
HDPE	"Piping Materials: HDPE Pressure Pipe"

All pressure pipe materials (pipe, fittings, valves, valve boxes, tapping valves and sleeves, precast thrust blocks, blow-offs, house services, etc.) except fire hydrants, shall be furnished by the Contractor. All pressure pipe fittings and valves shall be cast and manufactured in the United States of America unless complete certification is furnished in accordance with ANSI/AWWA C110.

All materials furnished shall be new. Materials not specified herein or on the Plans shall conform to

AWWA Standards and Industry Standards.

Piping, concrete, masonry, and all other materials shall conform to those materials as specified in the appropriate Technical Specifications sections for those materials. Specific pressure pipe and appurtenances materials shall conform to the following specifications:

A. **2-Inch Diameter Pipe**

1. Steel pipe shall be standard galvanized steel, Schedule 40, furnished in 21-foot lengths with both ends threaded.

2. All 2-inch steel fittings shall have screw type joints.

3. Pipe thread compound shall not be used. Threads shall be wrapped with teflon joint tape, non-hardening, Mil. Spec. T27730A. Cutting oils shall be dark, non-toxic, and equal to cutting oil manufactured by the Rigid Tool Company. The Contractor shall take caution not to allow cutting oil inside the pipe, and shall remove all cuttings. Cutting oils shall be UL listed or NSF approved for use in potable water systems.

4. PVC pressure pipe to be used in the potable water system shall be Safety Blue in color or white with Safety Blue identification tape or color coded approved ink lettering as specified. PVC pressure pipe to be used in the reclaimed water system shall be Safety Purple in color or white with Safety Purple identification tape or approved color coded ink lettering as specified.

   PVC pipe shall conform to the Technical Specifications section headed "Piping Materials - PVC Pressure Pipe."

5. HDPE pressure pipe shall conform to the Technical Specifications section headed, “Piping Materials – HDPE Pressure Pipe.”

B. **Valves - General**

Valves shall be iron body, bronze mounted, and have joint ends as shown or specified. Valves shall have O-ring seals, unless otherwise specified.

A standard 2-inch square AWWA operating nut shall be provided on each valve. Valves shall have non-rising stems and shall open when the nut is turned counterclockwise. Each nut shall be marked with an arrow.

All valves of the same type shall be from the same manufacturer. Parts of valves of the same type and size shall be interchangeable. Unless otherwise specified, all valves shall be designed for a cold water working pressure of 150 psi.

All valves shall be furnished complete with gaskets, bolts, nuts, and glands necessary for installation.

All valves larger than 2-inch shall have restrained rubber gasketed compression joints, or mechanical joints with retainer glands, conforming to ANSI/AWWA C111, at the Contractor's option unless otherwise noted.

All valves shall be factory lined with an epoxy coating conforming to ANSI/AWWA C550.

Valves used for sanitary force mains shall be the same as those used in other pressure pipe applications, unless otherwise specified.

Upon request, the valve manufacturer shall provide an affidavit of compliance, proof of design testing, and proof of production testing.

C. **Valves - Specific**

1. **2-Inch Valves**: Valves shall be resilient seated gate valve, cast iron body. Joint ends shall have NPT pipe threads. The minimum stem diameter shall be 0.85 inch.

   Valves used with PVC pipe shall be connected to the pipe using thread/push-on adapters with push-on joint conforming to ASTM D 3139, 200 psi pressure rating.

2. **Gate Valves**: 3-Inch gate valves shall be resilient seated, shall meet the requirements of ANSI/AWWA C509, and shall be U.S. Pipe Metro-Seal or approved equal. Gate valves 4-inch through 12-inch shall be resilient seated, shall meet the requirements of ANSI/AWWA C509 or ANSI/AWWA C515, and shall be U.S. Pipe Metro-Seal or approved equal. Valves shall be designed for buried service, with O-ring seals and mechanical joint ends, or push-on joints, at the Contractor's option.

3. **Butterfly Valves**: Valves shall be cast iron body, rubber seated, tight closure, direct burial, and shall conform to the applicable sections of ANSI/AWWA Standard C504, Class 150B. Valve disc shall rotate 90 degrees from full open position to tight shut position, and valve disc shall be of ductile iron or cast iron.

   Valve shafts shall be constructed of Type 304 stainless steel; shaft seals shall be designed for standard V-type packing, O-ring seals, or approved equal. If stub shafts are furnished, the shafts shall extend a minimum of 1.5 diameters into the disk.

   Valve seats shall be of synthetic or new natural rubber, and shall be either disc-mounted and clamped, or bonded to the valve body according to ASTM D 429, Method B. The mating seat surface shall be constructed of Type 316 stainless steel or approved equal.

   Valve actuators shall be designed for buried service and shall be of the traveling nut, self-locking type. Actuators shall be designed to withstand a torque of 450 foot pounds.

4. **Tapping Valves**: Valves 4-inch through 12-inch shall be resilient seated gate valves meeting the applicable requirements of ANSI/AWWA C509 or ANSI/AWWA C515. The valves shall be specially designed for pressure tapping, and shall be U.S. Pipe Metro-Seal, or approved equal.

   Tapping valves 16-inch and larger shall be horizontal gate valves with bypass valve, rollers, and scrapers as specified. Tapping valves shall conform to the applicable provisions of ANSI/AWWA C509 or ANSI/AWWA C515.

Tapping valves shall be furnished with joint accessories and shall include rubber gasket for the tapping flange joint. Tapping valves shall have a full waterway opening capable of passing a full-sized shell cutter. The flange shall have a raised face designed to engage the corresponding recess in the tapping sleeve flange.

5. **Ballcentric Plug Valves**: Plug Valves shall be non-lubricated, eccentric type and designed for a working pressure of 175 psi for valves 12-inch and smaller, and 150 psi for valves 14-inch and larger. Valves 20-inch and smaller shall be round port design. Valves shall be manufactured by Henry Pratt Company.

   End connections shall be mechanical joint.

   The plug valve body shall be cast iron ASTM A126 Class B with a welded-in overlay of 90% nickel alloy content on all surfaces contacting the face of the plug. Sprayed, plated, nickel welded rings or seats screwed into the body are not acceptable.

   The valve plug shall be cast iron ASTM A 126 Class B, with Buna N resilient seating surface to mate with the body seat.

   Plug valves shall be furnished with permanently lubricated, sleeve type metallic bearings. Grit excluder seals shall be provided in the upper and lower journals to isolate the bearings.

   Plug valves shaft seals shall be the self adjusting type, replaceable without removing the valve bonnet.

   Manual gear actuators shall be totally enclosed worm and gear type permanently lubricated. Above ground valves 8-inch and larger shall be provided with gear actuators. Buried valves 6-inch and larger shall be provided with gear actuators.

D. **Tapping Sleeves**

Sleeves shall be cast iron, ductile iron, or fabricated steel. Iron body tapping sleeves shall have standard mechanical joint ends and shall be complete with necessary nuts, bolts, gaskets, and glands. Tapping sleeves shall be suitable for installation on centrifugally or pit cast iron pipe (Class A-B or C-D).

All iron body tapping sleeves shall be U.S. Pipe T-9 tapping sleeve or approved equal.

Steel fabricated tapping sleeves epoxy coated with stainless steel nuts and bolts may be used when the tapped line is larger than the tapping diameter (i.e., 12 x 8 allowed, 12 x 12 not allowed). Fabricated tapping sleeves for DI pipe and PVC pipe shall be Smith-Blair 622 or approved equal.

Tapping sleeves shall have a 3/4-inch NPT test plug for pressure testing.

Taps for 2-inch connections shall be installed using a service saddle clamp as described in these Specifications.

E. **Valve Boxes**

Valves to be buried in the ground shall be provided with cast iron valve boxes. The valve boxes shall be of proper size to fit over the valve bonnets and extend slightly above the finished ground surface or flush with pavement or sidewalk. The tops shall be complete with stay-put cover.

Valve boxes for potable water system shall be adjustable slip type valve box and cover such as Series 6855 manufactured by Tyler Utilities, or Russco, Universal Part No. 461-A,, or approved equal, and the cover shall be marked "WATER."

Valve boxes for reclaimed water system shall be Russco, Bottom Part No. VB4612X and Top Part No. VB2503L (a slip type bottom with a screw type top, lid to be installed unlocked), or approved equal, with a square cover marked "RECLAIMED WATER."

The interior and exterior surfaces of valve boxes shall be coated with asphalt varnish in accordance with ANSI/AWWA C509.

8.04 CONNECTIONS TO EXISTING MAINS

The Contractor shall connect the new pressure pipelines to the existing pressure pipelines at locations as shown on the Plans and as specified. The Engineer shall be notified at least 2 working days prior to making connections. The time at which the connections are to be made and the manner of making the connections shall be subject to approval by the Engineer.

The connections to the existing pressure pipeline shall be made so as to minimize the time during which the existing pressure pipeline will be out of service. The Contractor shall utilize the necessary number of crews and types of equipment, and shall work the necessary hours to ensure completion of the connections within the time specified.

8.05 CONSTRUCTION OPERATIONS

Pressure pipelines shall be installed in open trenches, except when another method, such as jacking, boring, or tunneling, is shown on the Plans, specified, or ordered. Jetting shall not be allowed under roadway, alley, or driveway.

Pipe and fittings shall not be strung in residential areas more than 3 weeks in advance of pipelaying, unless otherwise approved by the Engineer. The Contractor shall install pipelines, pressure test, disinfect, and restore the ground surface in pipeline segments of 3,500 linear feet or less, except as otherwise approved by the Engineer. The new segment of pipelaying shall not start until restoration has commenced on the previous segment, or as approved by the Engineer.

Pipeline segments shall be pressure tested and disinfected after pipelaying is complete, to minimize inconvenience to the Public, except as otherwise approved by the Engineer.

No excavation shall be left open over a weekend. All pavement openings shall be completely repaired as specified in the Technical Specifications section headed "Surface Restoration" within 7 days of opening, or a temporary asphaltic pavement patch placed and maintained daily.

Where shown on the Plans or where directed by the Engineer, the Contractor shall remove existing pipelines which are shown to be abandoned. Any such pipe, fitting, etc., shall be removed after the new pipeline (replacing the existing line) is accepted and put into service by the City. Removed pipe and appurtenances 6 inches or larger which are described elsewhere or deemed by the Engineer to be reusable shall be delivered to the City by the Contractor. All material not deemed reusable shall become the Contractor's property and shall be removed from the site by the Contractor. No additional payment will be made for salvaging pipe and fittings.

Short tunneling of pressure pipe shall be constructed as required to protect trees, shrubs, and existing surface or subsurface utilities and structures. Short tunnels shall be constructed to the lengths shown on the Plans, specified, or directed by the Engineer.

Existing fences shall be restored by the Contractor and shall be finished and installed so that the restoration is equal to or better than the original. Only those portions of original fencing or materials there from, that the Engineer approves for re-use, shall be used by the Contractor in fence restoration. All other materials, including lumber, paint, wood preservative, concrete, and metal products shall be furnished by the Contractor.

The cost of protecting, replacing, relocating, and maintaining (including using hay bales) storm and sanitary sewerage facilities shall be included in the various unit price Pay Items, and no separate payment will be made therefore unless otherwise specified in other Pay Items.

8.06 LAYING AND JOINTING PRESSURE PIPELINES

All pressure pipeline installation shall comply with applicable standards of ANSI/AWWA C600, C605, and C906, and with these Specifications.

Mechanical joint fittings and valves installed in sections of unrestrained pipe, and in blow-offs, shall be installed using ductile iron retainer glands, as set forth in the Technical Specifications section headed "Piping Materials: Ductile Iron Pipe."

PVC push-on fittings for pressure pipelines shall conform to the Technical Specifications section headed "Piping Materials: PVC Pressure Pipe."

Laying and jointing of HDPE pressure pipe shall conform to the Technical Specifications section headed “Piping Materials: HDPE Pressure Pipe.”

Excavation and backfill shall conform to the Technical Specifications section headed "Excavation and Backfill."

In lieu of jacking and boring or pushing of pipe up to 4-inch in diameter, the Contractor may use a softbore directional drilling process as provided by Flow Mole Corporation or approved equal.

Cover for all pressure pipeline Work, if not shown on the Plans, shall be not less than:

	2-inch and 4-inch	**6-inch and larger**
Under roadways and alleys:	36 inches	36 inches
Under grass and sidewalks:	24 inches	30 inches

Unless otherwise noted on the Plans or in other sections of this Specification, the pressure pipeline shall be handled and installed in strict accordance with the manufacturer's instructions and with the applicable AWWA Standards. If a conflict exists between the manufacturer's instructions and the AWWA Standards, the manufacturer's instructions shall govern.

Any defective material shall be removed from the job site immediately. Should a defect be discovered after the item has been placed in the trench, the replacement will be at the Contractor's expense. Materials shall be stored along installation routes in a manner acceptable to the Engineer or as described elsewhere in the Specifications.

Polyethylene wrapping shall be installed on ductile iron pipe and appurtenances where shown on the Plans or where ordered by the Engineer.

Polyethylene encasement materials and installation shall meet the applicable requirements of ANSI/AWWA C105. Care shall be taken while backfilling to prevent puncturing, tearing, or otherwise damaging the polyethylene wrapping.

The Contractor shall use every precaution during construction to protect the pressure pipeline against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder or contaminate the operation of the pipeline. Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering equipment.

All dewatering shall meet the requirements set forth in the Technical Specifications section headed "Excavation and Backfill."

Watertight plugs of an approved type shall be installed in the ends of all pipe, fittings, and valves during 24-hour or longer periods when installation is not in progress, or as required to prevent ditch water, sand, etc. from entering the pipe.

Concrete thrust blocks of the proper size and type shall be furnished and installed at all locations where a change in the pipe alignment exceeds 7 degrees or dead ends, unless Plans show that adjacent pipe, in excess of 2 bells each direction, shall be restrained. Concrete thrust blocks used on 12-inch and larger mains shall be poured in place. Precast thrust blocks may be used on mains less than 12-inch in diameter. Thrust block concrete shall conform to the Technical Specifications section headed "Concrete, Masonry, and Reinforcing Steel."

Boring, soft boring, and jacking work other than new services shall strictly conform to all applicable stipulations of the State of Florida Department of Transportation Utility Accommodation Manual, unless otherwise specified. Softbore shall utilize a guided boring system, equal to FlowMole or DirectLine.

A. **Expose Existing Pressure Pipeline and Record Elevation**

The Contractor shall expose the existing pressure pipelines prior to the construction stake-out to determine the station, offset, and elevation, before actual construction begins. The Plans may be modified by the Engineer, as necessary, to accommodate the pressure pipelines which must remain.

B. **Conflict Adjustment of Existing Pressure Pipelines**

In some locations existing pressure pipelines intended to remain in service may need to be adjusted horizontally or vertically to avoid conflicts with the proposed storm drains, sanitary sewers, roadway base, manholes, inlets, or other proposed improvements. The conflict may not be shown on the Plans.

In the event that a conflict is encountered and confirmed by the Engineer, the adjustment to alleviate the conflict shall be constructed in accordance with the applicable "Obstruction Detail" or as ordered by the Engineer.

C. **Pipe Joints**

1. **Standard Mechanical Joints**: In making mechanical joints, the pipe shall be centered in the bells. The surfaces of ductile iron pipe with which the rubber gasket comes in contact shall be thoroughly brushed with a wire brush just prior to assembly of the joint. The surfaces of PVC pipe shall be wiped clean with a cloth and soapy water. A pipe lubricant shall be brushed over the gasket just prior to installation. The gasket and gland shall be placed in position, the bolts inserted, and the nuts tightened finger tight. The nuts shall be tightened by means of a torque wrench, or as approved by the City, in such a manner that the gland shall be brought up evenly into the joint. The following range of bolt torques shall be applied:

Bolt Size (inch dia.)	**Range of Torque (foot lbs.)**
5/8	45 - 60
3/4	75 - 90
1	70 - 100

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

2. **DI Pipe Push-On Joints**: In making up the push-on rubber gasket joint, the gasket seat in the socket shall be thoroughly brushed with a wire brush and the gasket shall be wiped with a clean cloth. The gasket shall be placed in the socket with the large round end entering first so that the groove fits over the bend in the seat. A thin film of approved lubricant shall then be applied to the inside surface of the gasket that will come in contact with the entering pipe. The plain end of the pipe to be entered shall be thoroughly brushed with a wire brush and placed in alignment with the bell of the pipe to which it is to be joined. Ends of cut pipe shall be ground to a smooth bevel edge before inserting in bell. The joint shall be made up by exerting sufficient force on the entering pipe so that its plain end is moved past the gasket until it makes contact with the base of the socket.

   Backhoe buckets or excavation equipment are not to be applied directly to the pipe.

3. **PVC Pipe Push-On Joints**: Procedures for the making of PVC pipe push-on joints shall be similar in nature to those set forth in the preceding paragraph (except the bell shall be wiped with a clean cloth). Procedures shall strictly follow the manufacturer's printed instruction for the making of joints. In a like manner, all other PVC pipeline Work shall be performed in accordance with the manufacturer's recommendations.

4. **Restrained Joints**: Ductile iron mechanical joint pipe, fittings, and valves 12-inch and smaller that require restraint shall be installed using ductile iron retainer glands, as specified. The glands shall be installed in accordance with the manufacturer's recommendations. Glands using a frangible bolt for setting the restraining devices shall be tightened with standard wrenches.

   Glands using standard bolts for setting the restraining devices shall be tightened with a torque wrench. The assembly shall be given 2 heavy coats of a bituminous coating after installation.

   Restrained push-on joint pipe, fittings, and valves, where shown on the Plans, shall be with a restraining gland or restraining gasket, as specified.

   At locations where the restraining gasket type joint is used, the words "RESTRAINED JOINT" shall be painted near the top of the bell of each such joint, in brick red 1-inch letters.

   Pipe, fittings, and valve joints shall be restrained at locations shown on the Plans, or as specified. In addition, all other fittings and valves shall be installed using a ductile iron retainer gland.

   The following shall apply to various restrained joint/pipe size type:

Pipe Size (Inches)	Restrained Joint Type
2	No restrained joint allowed.
4 through 12	Mechanical joint/retainer glands Tyton Pipe/Loc Fast Gasket, or equal
16 and larger	Mechanical joint/retainer glands TR Flex, or equal, pipe valves and fittings

D. **Color Coding**

Prior to backfilling, all pressure pipelines shall be identified with color coding. The applicable color codes, with light color stabilant, are:

Pipe Use	Color Coding
Potable Water	Safety Blue
Sanitary Sewer	Safety Green
Reclaimed Water	Safety Purple

1. **Coding on the Pipe**: HDPE and PVC pipe shall be colored at the point of manufacture. If black or white pipe must be used, pipe shall have City approved color coded ink lettering stamped on the pipe, or shall be continuously taped with plastic adhesive tape using the color coding as stated above. Plastic adhesive tape shall be applied as follows:

   Black and white 2-inch and 4-inch pipe -- continuously taped at top center.

Black and white 6-inch and larger pipe -- continuously taped at "10, 12, and 2 o'clock."

Ductile iron pipe shall be continuously painted along the top one-third of the pipe with a 2-part high build epoxy-polyamide paint or approved equal. The paint shall be dry prior to the pipe being installed.

Ductile iron pipe wrapped in color coded polyethylene wrapping is not required to be painted.

2. **Coding above the Pipe**: HDPE and PVC pipe shall also be color coded by installation of a metal tape, equal to Teratape, laid continuously 1 foot above all pipe. Tape shall be cut in 5-foot lengths and installed with no gaps, to facilitate future field location and pipe protection. Color coded tape shall be labeled "Water Main," "Reclaimed Water Main," or "Sanitary Force Main," as required.

   Ductile iron pipe shall not require coded tape above the pipe, nor shall HDPE or PVC pipe installed by directional boring.

E. **Valves and Valve Boxes**

Valves shall be installed in a closed position, free from all distortion and strain, and left in satisfactory operating condition. Valves shall be tested in place by the Contractor, as far as practicable, and any defects in valves or connections shall be corrected to the satisfaction of the Engineer.

Tapping sleeves shall be pressure tested prior to making the tap.

Valve boxes with stay-put cover shall be vertical and concentric with the valve stem. Any valve box which is moved from its original position, preventing the operation of the valve stem, shall be satisfactorily reset by the Contractor at his expense.

F. **Connections (Tie-ins) and Shutdowns**

The Contractor shall furnish all labor and equipment necessary for the connection of approved pipelines to the existing system and the shutdown, removal or disconnection and plugging of existing pipelines as indicated on the Plans or as directed by the Engineer.

This may be required in instances where existing pipelines are to be abandoned or where a short segment of existing pipeline must be cut out and adjusted either vertically or horizontally to avoid a conflict with a proposed storm drain or storm drain structure, sanitary sewer, or other proposed improvement.

The Contractor shall make all taps and tie-ins required, under the direct observation of the Engineer.

8.07 TESTING AND DISINFECTION OF PRESSURE PIPELINES

All new pressure pipelines shall be subjected to a water pressure test between valves. In order to expedite the restoration of certain surface facilities, it may be required that individual sections

between valves be tested as soon as the valves are installed. Disinfection shall be accomplished after the pressure test requirements have been met for the entire segment of pressure pipe.

The Contractor shall furnish all labor, materials, equipment, and chemicals to perform the required pressure tests and disinfection. All testing and disinfection will be subject to City inspection. All new valves shall be operated by the Contractor. However, all tie-in valves to the existing water system shall only be operated with the approval of, and in the presence of, the City, and shall be scheduled to be performed during the standard work hours of City staff, unless otherwise approved by the Engineer.

All existing valves shall be operated by the City or by the Contractor under the direct supervision of the City.

A. **Blow-off Assemblies**

Pressure pipelines shall be flushed through a blow-off assembly at those locations as shown on the Plans or as ordered by the Engineer.

Potable and reclaimed water pipelines 2-inch through 12-inch shall have a permanent or temporary blow-off assembly at those locations as shown on the Plans or as ordered by the Engineer.

B. **Pressure Test**

All lines shall be subjected to a water pressure test as follows:

Water pipelines 2-inch through 12-inch	100 psi
Water pipelines 14-inch and larger	150 psi
Sewer force mains - all sizes	100 psi

Temporary plugs or caps shall be furnished by the Contractor for this purpose, and the Contractor shall furnish personnel and all other necessary equipment required to accomplish the test. The pipeline or force main shall be entirely free of air when subjected to the pressure test.

The test pressure shall be applied to the piping through a corporation tap in the main by means of a pump or other approved method and maintained for a minimum of 2 hours. Air shall not be used for testing. Potable water shall be used for testing potable water pipelines. Reclaimed water shall be used for testing reclaimed water pipelines. Potable water shall be used for testing sanitary force mains when reclaimed water is not available.

The allowable leakage is tabulated as follows, as the allowable leakage for pressure pipelines permitted by Section 5 of ANSI/AWWA C600 for ductile iron and Section 7 of ANSI/AWWA C605 for PVC:

Allowable Leakage per 1,000 Feet of Pipeline
(gallons per hour)

Nominal Pipe Diameter (inches)												
2	4	6	8	10	12	14	16	18	20	24	30	36

Test Pressure													
100 psi	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	1.5	1.8	2.3	2.7
150 psi	0.3	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.8	2.2	2.8	3.3

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

All restrained pipe sections and thrust blocks shall be completely backfilled before testing.

All tests shall be under the observation of the Engineer. All tests and inspections shall be conducted in a manner to minimize as much as possible any interference with the Contractor's work or progress. All tests shall be made with water at the pressures specified herein.

The Contractor shall notify the City Inspector 48 hours in advance of when the work is ready for testing and inspection. Tests and inspection shall be made as soon thereafter as practicable.

8.08 SURFACE RESTORATION AND MISCELLANEOUS

A. All surfaces disturbed by the Contractor shall be restored to their original condition in conformance to the Technical Specifications sections headed "Surface Restoration".

B. Sanitary sewers and laterals which cross a new potable water pipeline with less than 18 inches clear vertical separation, shall be replaced with 20 linear feet of ductile iron pipe, PVC pressure pipe (ANSI/AWWA C900 or C905 depending on pipe size), or SDR26 gravity pipe centered on the new pipeline, or as ordered by the Engineer.

   Sanitary sewers and/or laterals which conflict with the new pipeline or are damaged by pipeline construction shall be reconstructed with ductile iron pipe, PVC pressure pipe (ANSI/AWWA C900 or C905), or SDR26 gravity pipe, as ordered by the Engineer.

C. Each valve box in an unpaved area shall have an 18-inch by 18-inch by 4-inch concrete pad. Pad shall be 1 inch above grade, and sod shall be so placed to maintain this 1 inch.

END OF SECTION

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SECTION 9 - SURFACE RESTORATION

9.01 GENERAL

The Work in this section includes restoring and maintaining pavements and pavement bases, curbing, sidewalks, driveways, and grass surfaces that are disturbed, damaged, or destroyed during the course of the Work under this Contract.

The quality of workmanship and materials used in the restoration shall produce a surface equal to or better than the condition before the Work began.

Prior to restoration, the Contractor shall saw cut and remove all existing pavement within 2 feet of the edge of the excavation, or within such widths as may be ordered by the Engineer.

Compaction of soil and base materials shall be tested using the AASHTO T 180 method.

Surface restoration workmanship and materials shall conform to the applicable sections of the DOT-SSRBC.

All dirt areas disturbed shall be restored with sod, unless otherwise specified.

The City reserves the right to delete any or all of the restoration work.

9.02 ROADWAY RESTORATION

Where the installation of pipe or structures occurs within an existing roadway, the limits of excavation shall be saw cut leaving a straight and square edge. The upper portion of the trench backfill shall be replaced with a compacted shell, crushed (reclaimed) concrete, or limerock base as shown on the Plans, and paved to match the surrounding surface. Replacement base material shall be the same as the existing base. Roadway restoration shall conform to the detail for "Flexible Pavement Restoration."

9.03 TEMPORARY PAVEMENT

Immediately upon completion of backfilling, the pavement surfaces damaged or destroyed shall be temporarily restored by placing a shell (DOT-SSRBC Section 913), crushed (reclaimed) concrete (DOT-SSRBC Section 204 applicable sections), or limerock (DOT-SSRBC Section 911) base on the backfilled, compacted subgrade, and an adequate temporary asphaltic patch as shown or as approved by the Engineer. Shell, crushed (reclaimed) concrete, or limerock shall be used as a base for all bituminous pavements.

Temporary work shall be maintained in a suitable and safe condition for traffic until the permanent pavement is laid or until final acceptance of the Work.

9.04 SHELL BASE

Shell base shall be constructed on the prepared subgrade to not less than 98 percent of maximum density, in accordance with the requirements of DOT-SSRBC Section 250. The minimum compacted thickness of shell base shall conform to the detail for "Flexible Pavement Restoration."

9.05 LIMEROCK BASE

Limerock base shall be constructed on the prepared subgrade to not less than 98 percent of maximum density, in accordance with the requirements of DOT-SSRBC Section 200. The minimum compacted thickness of limerock base shall conform to the detail for "Flexible Pavement Restoration."

9.06 CRUSHED (RECLAIMED) CONCRETE BASE

Crushed (reclaimed) concrete base shall be constructed on the prepared subgrade to not less than 98 percent of maximum density, in accordance with the requirements of DOT-SSRBC Section 204. The minimum compacted thickness of crushed (reclaimed) concrete base shall conform to the detail for "Flexible Pavement Restoration."

The minimum limerock bearing ratio (LBR) value shall be 150.

9.07 ASPHALTIC CONCRETE PAVEMENT

A prime coat shall be applied to the prepared base in accordance with DOT-SSRBC Section 300 prior to permanent asphaltic concrete pavement.

Unless specified elsewhere, all permanent asphaltic concrete pavement replacement shall be Type SP-9.5 and shall be constructed in accordance with the requirements of DOT-SSRBC Sections 320, 330, 331, and 334. Compacted thickness shall conform to the detail for "Flexible Pavement Restoration."

9.08 BRICK PAVEMENT

Construction of brick pavement shall follow the details as shown on the Plans and City standard practice using City standard paving brick or red clay brick conforming to ASTM C 32, Grade SS with City standard dimensions.

Streets with exposed brick surface shall be restored with brick. Brick pavers removed from streets that are not to be restored with brick shall remain the property of the City of St. Petersburg. Bricks not required for restoration, even those that have been overlaid with asphalt, shall be delivered by the Contractor to the City of St. Petersburg Maintenance Storage Yard, 3rd Avenue North and17th Street. Brick streets that are restored shall be restored to a condition of a new well-defined and contoured cross section with a surface appearance equal to or better than that which previously existed.

Bricks which are broken or damaged by the Contractor shall not be reused. Replacement bricks shall be purchased from the Maintenance Storage Yard. The Contractor shall obtain the current brick charge from the Engineering, Stormwater and Traffic Operations Department, Pavement Maintenance, phone 893-7260.

Brick street abutting asphalt pavement shall have a minimum 6-inch-wide flush Type A Header Curb.

9.09 CURB AND GUTTER

All permanent restoration of street curb, or curb and gutter, shall be of the same type and thickness as the curb, or curb and gutter, which abuts. The grade of the restored curb, or curb and gutter, shall conform to the grade of the existing adjacent curb, or curb and gutter, so that positive drainage is maintained.

9.10 CONCRETE SIDEWALK

The restoration and construction of concrete sidewalks shall conform to applicable requirements of DOT-SSRBC Section 522 and the Plans, and shall be constructed where shown on the Plans and directed by the City. Sidewalk expansion joints with bituminous filler shall be installed at a maximum of 50-foot intervals on center, and struck joints shall be spaced equidistant with walk width (joints wider than 6 feet shall be spaced as directed by the City). Where new construction is to be tied into existing facilities, the old material is to be removed back to the nearest construction joint, or sawcut to a straight line as directed by the Engineer. The soil under sidewalks and driveways shall be compacted to 98 percent of the maximum density.

New sidewalks shall be 4 inches thick. Concrete pour for walk construction shall be made only on dampened subgrade. A soft broom finish shall be given the walk surface as directed by the Engineer.

Sidewalks crossing driveways shall be constructed according to the Specifications for concrete driveways.

Curb ramps for physically handicapped shall be constructed at all locations where sidewalks cross the curb or where directed by the Engineer. Those existing sidewalks which are removed to accomplish associated work as a part of this Project shall be replaced with a curb ramp when the sidewalk crosses the curb. The cost of curb ramps shall be included in the appropriate proposal item for sidewalk restoration.

Where sidewalks are replaced, the replacement shall be the full width of the walk and the minimum length shall be 60 inches. Restoration of adjacent lawn is incidental to sidewalk replacement and no separate payment will be made therefore.

9.11 HEXAGON BLOCK SIDEWALK

The restoration and construction of hexagon block sidewalks shall conform to the details shown on the Plans and City standard practice using City standard hexagon blocks.

The soil under sidewalks and driveways shall be compacted to 98 percent of the maximum density. New hexagon block sidewalks shall be 2 inches thick.

Curb ramps for physically handicapped shall be constructed at all locations where sidewalks cross the curb, or where directed by the Engineer. Those existing sidewalks which are removed to accomplish associated work as a part of this Project shall be replaced with a curb ramp when the sidewalk crosses the curb. The cost of curb ramps shall be included in the appropriate Pay Item for sidewalk restoration.

Where sidewalks are replaced, the replacement shall be the full width of the walk. Restoration of adjacent grass is incidental to sidewalk replacement and no separate payment will be made therefore.

Hexagon block removed from a sidewalk that is not to be restored with hexagon block shall remain the property of the City of St. Petersburg. Hexagon block not required for restoration shall be delivered by the Contractor to the City of St. Petersburg Maintenance Storage Yard, 3rd Avenue North and 17th Street. Hexagon block that is broken or damaged by the Contractor shall not be reused. Replacement hexagon block may be purchased from the Maintenance Storage Yard. The Contractor shall obtain the current hexagon block charge from the Engineering, Stormwater and Traffic Operations Department, Pavement Maintenance, phone 893-7260.

9.12 DRIVEWAY AND PARKING LOT

Except as otherwise specified, all permanent restoration of base and surface of driveways, parking aprons, and sidewalks shall match the materials, thicknesses, elevations, lines, and grades of the existing construction, all to the Engineer's satisfaction. Patching of Portland cement driveway areas will not be allowed between joints or dummy joints.

For areas where streets are to be paved, or where more than 50 percent of the driveway apron is disturbed, concrete or brick driveways shall be replaced in kind. All other driveways, including shell and dirt, shall be restored with an asphalt concrete surface from the street to the property line or front of sidewalk, as directed by the Engineer.

All base compaction under driveways shall be to a minimum density of 98 percent of the maximum density.

9.13 DRIVEWAY - ASPHALT

Residential asphalt driveway restoration shall include 1-inch thick asphaltic concrete surface over 2 inches of compacted sand-asphalt hot mix base, or 5 inches of compacted limerock or shell base.

Commercial asphalt driveway restoration shall be constructed of 1-inch thick asphaltic concrete surface over 8 inches of limerock base compacted in 2 lifts.

9.14 DRIVEWAY - CONCRETE

The restoration and construction of concrete driveways shall conform to applicable requirements of DOT-SSRBC Section 522 and the Plans, and shall be constructed where shown on the Plans and directed by the Engineer.

Residential concrete driveway restoration shall be 5 inches thick and shall include placing a single layer of 6-inch by 6-inch wire mesh (WWF 6 x 6 - W1.4 x W1.4).

Commercial concrete driveways shall be 6 inches thick with a double layer of 6-inch by 6-inch wire mesh (WWF 6 x 6 - W1.4 x W1.4).

9.15 DRIVEWAY - PEAGRAVEL

Where less than 50 percent of the driveway apron is disturbed, peagravel driveways shall be restored to match the existing driveway. Peagravel driveway restoration shall include asphalt treated shell base 5 inches thick after compaction to a minimum density of 98 percent of the maximum.

9.16 DRIVEWAY - SHELL

Where less than 50 percent of the driveway apron is disturbed, shell driveways shall be restored to match the existing driveway. Shell driveway restoration shall be 5 inches thick after compaction to a minimum density of 98 percent.

9.17 GRASS

A. Sodding

Sod shall be planted as soon as practical after paving, pipeline, or other work has been completed. Sodding shall always be used over seeding.

All work and materials shall meet the applicable requirements DOT-SSRBC Section 575 (Sodding).

Sodding shall be done as directed by the Engineer, using only material which, in the opinion of the Engineer, is healthy and free of weeds, and (unless specified otherwise by the Engineer) of the same variety predominating at time of removal. Sod may be St. Augustine, Bahia, or other varieties as selected by the Engineer.

Sod shall be planted within 72 hours of being cut. Only moist, green sod having a virile root system may be planted. Sod shall be cut into adjacent sod to provide a smooth surface, and "top dressed" where necessary. Sod shall be rolled or tamped after planting to provide a uniform and consistent grade.

B. Grass Maintenance

The Contractor shall properly water and otherwise maintain all seeded and sodded areas for a minimum of 60 consecutive calendar days after completion of sodding operations. After the 60

days, and upon receipt of written request from the Contractor, the Engineer will inspect the areas for acceptance by the City. Any area that is washed or eroded, fails to show a uniform stand of healthy, vigorous grassing, or does not appear to be otherwise developing satisfactorily, shall be resodded and maintained until suitable for acceptance by the Engineer.

In the event that the stand of grass is found to be contaminated by weeds or other undesirable growth, the Contractor will be required to effectively eliminate such undesirable growth at his own expense.

9.18 EXPANSION JOINT MATERIAL

Expansion joint material for concrete pavement surfaces, including sidewalks and driveways, shall be the bituminous strip type, 1/2-inch thick, and shall conform to applicable requirements of DOT-SSRBC Section 932.

END OF SECTION

SECTION 10 – SUBMERSIBLE SEWAGE PUMPS

10.01 GENERAL

The Contractor shall furnish and install, as described hereinafter and shown on the plans, two submersible non-clog wastewater pumps at the following lift station: Lift Station No. 8 (Two(2) Pumps Total). Pumps must be installed following the demolition work and installation of the new wet well indicated by the Contract Documents. The principal items shall include explosion-proof submersible centrifugal sewage pumps, plus base elbows, discharge piping and valves, stainless steel guide rails, and all miscellaneous and associated equipment required for a complete operating installation.

Each pump shall be equipped with a 5 HP submersible electric motor, connected for operation on 240 volts, 3 phase, 60 hertz, with 50 feet of submersible cable (SUBCAB) suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards and also meet with P-MSHA Approval.

The Contractor shall also perform such start-up operations and tests as delineated.

Pumps shall be tested to Hydraulic Institute (HI) Standards; International Standards Organization (ISO) Standards are not acceptable. Certification must accompany pumps.

All metal components not specified otherwise shall be 316 stainless steel. The pumps, motors, control panel, and H20 load rated aluminum access frame and safety hatch shall be coordinated with the pump supplier to insure compatibility of all these components as a system.

All equipment shall be installed by skilled workmen in accordance with the instructions of the equipment supplier.

All equipment supplied shall have ample means of lubrication for all bearings and other metal surfaces in sliding contact. The Contractor shall provide all lubricants, fuel and power necessary to start-up, test, and place the pumping facility in operation.

10.02 DATA TO BE SUBMITTED

The Contractor shall provide the following information and documents:

A. Shop Drawings

1. Make, model, weight and horsepower of each equipment assembly

2. Complete catalog information, descriptive literature, specifications and identification of materials of construction.

3. Performance data curves showing: head, capacity, horsepower demand and pump efficiency over the entire pump operating range, from shut-off to maximum capacity. Indicate separately the head, capacity, horsepower demand, overall efficiency and minimum submergence required at the guarantee point.

4. Detailed structural, mechanical and electrical drawings, showing the equipment dimensions, size and locations of connections, and weights of associated equipment.

5. Power and control wiring diagrams, including terminals and numbers.

B. Quality Control Submittals

1. Factory Functional, Performance Hydrostatic Test Reports and logs certified by pump manufacturer.

2. Special shipping, storage and protection, and handling instructions.

3. Manufacturer's printed installation instructions.

4. Manufacturer's Certificate of Compliance that the factory finish system is identical to the requirements specified herein.

5. Manufacturer's Certificate of Proper Installation.

6. List of special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.

7. Suggested spare parts list to maintain the equipment in service for a period through 5 years. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information.

8. Operation and Maintenance Manuals.

9. Service records for maintenance performed during construction.

10. Field Test Reports.

10.03 PUMPS

Pumps to be furnished and installed at the lift station shall be non-clog, heavy–duty municipal-type explosion-proof submersible pumps. Each pump shall have a four-inch diameter discharge and shall be capable of passing any trash, stringy material or three-inch solid. Each pump/motor unit must be non-overloading across the complete head capacity range of the pump.

Pumps shall meet the following listed minimum operating conditions:

Lift Station	LS 8	LS 16
Flow (GPM)	265	138
Total Dynamic Head (FT)	26.0	31.5
Shut Off Head (FT)	38.0	38.0

The pump(s) shall be automatically and firmly connected to the discharge connection, guided by no less than two guide bars extending from the top of the station to the discharge connection. There shall be no need for personnel to enter the wet-well. Sealing of the pumping unit to the discharge

connection shall be accomplished by a machined metal to metal watertight contact. **Sealing of the discharge interface with a diaphragm, O-ring or profile gasket will not be acceptable**. No portion of the pump shall bear directly on the sump floor. Each pump shall be fitted a 316 stainless steel wire rope of sufficient length shall be attached to each pump to permit withdrawal from the wetwell. The working load of the lifting system shall be 50% greater than the pump unit weight. Impellers shall be of the non-clog type, one-piece construction and mounted directly on a stainless steel pump motor shaft. Impellers shall be N-type impeller as manufactured by ITT-FLYGT.

For informational purposes, the design of these facilities and dimensional layouts are based on the pump model provided on the drawings.

FLYGT Pumps is the accepted pump manufacturer on this project. Base bids for the pumps shall be as manufactured by FLYGT Pumps. Pumps shall be as follows:

- Lift Station No. 8 & 16
  FLYGT Model NP- 3102.095 MT (4-inch discharge w/ 152mm impeller)

Contractors may provide a Deductive Alternate which must be a pre-approved deductive alternate manufacturer(s), as per 10.04 of this specification. The Base Bid equipment shall be FLYGT.

Pumps and motors shall be constructed as integral units and shall be the products of one manufacture/supplier. Each motor shall be UL listed, explosion-proof, hermetically sealed, submersible-type electric motors.

The pump system, including pump, motor and power cable, shall be approved for use in areas classified as hazardous locations in accordance with the NEC Class I, Division I, Group C and D service as determined and approved by a U.S. nationally recognized testing agency such as Factory Mutual.

10.04 ENGINEER'S PRE-APPROVAL OF DEDUCTIVE ALTERNATE EQUIPMENT

A. Manufacturer of deductive alternate equipment shall submit a pre-approval submittal package to engineer at least fourteen (14) days prior to the bid date. Only approved deductive alternates listed by addendum will be acceptable. Deductive alternate manufacturer shall submit the following information and supporting documentation:

1. A complete set of drawings with dimensions specific to this project showing the individual pumps, their installation in the wetwell, specifications, catalog cut-sheets, and detailed descriptive material. Drawings shall show all relevant details of each unit. This information shall identify all technical and performance requirements stipulated on the drawings and in the specification. If the proposed equipment does not meet these specifications, any deviation from the specification must be expressly noted. All deviations shall be listed on a single document.

2. Detailed installation drawings illustrating how the proposed pumps will fit in the wetwell and how it will mate to ancillary equipment. The drawings shall include dimensioned plan, and elevational and sectional views of each individual system as well as the overall installation.

3. Hydraulic performance data showing the relationship of head loss (ft) versus discharge flow (gpm). See Section 10.04 – Basin of Design for Hydraulic

performance data.

4. Complete electrical and controls submittals including control schematics, PLC programming logic, detailed cut sheets on electrical components and a P&ID. Details of the control and instrumentation system including complete wiring diagrams per the wiring requirements shown on the drawings for this project.

5. Motor characteristics and performance information.

6. Complete reference list of all current and active installations of same and similar equipment including contact names and phone numbers, showing at least 5 installations.

7. Complete bill of materials for all equipment, showing dimensions and materials of construction of all components.

The preapproval submittal shall be signed and sealed by a registered professional engineer in the State of Florida.

10.05 PUMP CONSTRUCTION

Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts or bolts shall be AISI type 316 stainless steel construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

Sealing design shall incorporate **metal-to-metal contact** between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or optional Viton rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

10.06 COOLING SYSTEM

Motors are sufficiently cooled by the surrounding environment or pumped media. A water jacket is not required.

10.07 CABLE ENTRY SEAL

The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable. The assembly shall provide ease of changing the cable when necessary using the same entry seal. **The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the interior from foreign**

material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

10.08 MOTOR

The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31.The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable. The motor shall be designed for continuous duty handling pumped media of 40°C (104°F) and capable of no less than 30 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum. Thermal switches set to open at 125°C (260°F) shall be embedded in the stator end coils to monitor the temperature of each phase winding. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The junction chamber containing the terminal board, shall be hermetically sealed from the motor by an elastomer compression seal. Connection between the cable conductors and stator leads shall be made with threaded compression type binding posts permanently affixed to a terminal board. The motor and the pump shall be produced by the same manufacturer.

The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.15. The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for operation up to 40°C (104°F) ambient and with a temperature rise not to exceed 80°C. A performance chart shall be provided upon request showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics. The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.
The motor shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber. The cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

10.09 BEARINGS

The pump shaft shall rotate on two bearings. Motor bearings shall be permanently grease lubricated. The upper bearing shall be a single deep groove ball bearing. The lower bearing shall be a two row angular contact bearing to compensate for axial thrust and radial forces. **Single row lower bearings are not acceptable.**

10.10 MECHANICAL SEALS

Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating,

corrosion resistant **tungsten-carbide** ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, corrosion resistant **tungsten-carbide** seal ring. Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment nor **depend on direction of rotation for sealing**. The position of both mechanical seals shall depend on the shaft. Mounting of the lower mechanical seal on the impeller hub will not be acceptable. For special applications, other seal face materials shall be available.

The following seal types shall not be considered acceptable or equal to the dual independent seal specified: shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces. No system requiring a pressure differential to offset pressure and to effect sealing shall be used.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. **The motor shall be able to operate dry without damage while pumping under load.**

Seal lubricant shall be FDA Approved, nontoxic.

10.11 PUMP SHAFT

Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The pump shaft shall be stainless steel – ASTM A479 S43100-T.

If a shaft material of lower quality than stainless steel – ASTM A479 S43100-T is used, a shaft sleeve of stainless steel – ASTM A479 S43100-T is used to protect the shaft material. However, shaft sleeves only protect the shaft around the lower mechanical seal. No protection is provided for in the oil housing and above. Therefore, the use of stainless steel sleeves will not be considered equal to stainless steel shafts.

10.12 IMPELLER

The impeller shall be of (ASTM A-48, Class 35B gray iron or ASTM A-532 (Alloy III A) 25% chrome cast iron) dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The screw-shaped leading edges of the gray iron impeller shall be hardened to Rc 45 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impellers shall be locked to the shaft, held by an impeller bolt and shall be coated with alkyd resin primer.

10.13 VOLUTE/SUCTION COVER

The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction

cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. The insert ring shall be cast of (ASTM A-48, Class 35B gray iron or ASTM A-532 (Alloy III A) 25% chrome cast iron) and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

10.14 PROTECTION

All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. The thermal switches shall open at 125°C (260°F), stop the motor and activate an alarm.

A leakage sensor shall be available as an option to detect water in the stator chamber. The Float Leakage Sensor (FLS) is a small float switch used to detect the presence of water in the stator chamber. When activated, the FLS will stop the motor and send an alarm both local and/or remote. **USE OF VOLTAGE SENSITIVE SOLID STATE SENSORS AND TRIP TEMPERATURE ABOVE 125°C (260°F) SHALL NOT BE ALLOWED.**

The thermal switches and FLS shall be connected to a Mini CAS (Control and Status) monitoring unit. The Mini CAS shall be designed to be mounted in any control panel.

Note: FLS not available in CZ, NZ configurations.

10.15 TESTING

Upon completion of installation, the Contractor shall test the facilities to demonstrate that the station performs as specified. He shall perform the initial testing to assure himself that acceptance testing can be satisfactorily completed.

The Contractor shall then arrange the for the equipment manufacturer to furnish a qualified representative to check the installation and conduct testing for final acceptance, and shall give the Engineer written notice as to the date and time of the test. An acceptance test shall demonstrate that all items are in compliance with the function as specified. Testing shall illustrate the following:

A. That the quick-release lift-off feature functions properly and allows the pump to be raised and lowered without draining the pit.

B. That all units have been properly installed and are in correct alignment

C. That all units operate without overheating or overloading any parts and without objectionable vibrations.

D. That there are no mechanical defects in any of the parts.

E. That all pumps can deliver that specified and certified pressure and quantity and have correct rotation, volts and amps as verified by a drawdown test and a closed discharge pressure test.

F. That the pumps shall be capable of pumping raw, unscreened sewage.

G. That all pumps, sensors, and controls perform satisfactory as to sequence control, correct start and stop elevations, and proper high level alarm functions.

In addition to furnishing, delivering, installing, and testing equipment, the Contractor shall provide the services or competent manufacturing representatives for the period indicated. Additional time, beyond that specified which is necessitated by installation or other non-City related requirements, shall be paid for by the Contractor. Such representatives shall assist the City's personnel on start-up, instructing operating personnel of the City in the maintenance and operation of the equipment, conducting tests, and making recommendations for producing the most efficient results. These services shall be made during the initial operation of the pumping station and shall be over and above any services necessary during construction and to correct defective materials or workmanship during the guarantee period. These representatives shall be specially trained and qualified for installation, adjustment, start-up and testing work and shall not be sales representatives only. The cost for such representation, including subsistence and travel, shall be included under this contract. The time required for instructing the City's personnel in the proper operation and maintenance of the stations, not to exceed one day.

10.16 WARRANTY

The pump manufacturer shall warrant pumps being supplied to the City against defects in workmanship for a period of five years under normal use, operation and service. In addition, the manufacturer shall replace certain parts which shall become defective through normal use and wear and on a progressive schedule of cost for a period of five years; parts included are the mechanical seal, impeller, pump housing, wear ring and ball bearings. The warranty shall be in published form and apply to all similar units.

10.17 SPARES

Contractor shall provide an additive optional price to the bid to furnish one spare pump for each station, delivered to the City's Public Services Yard at 7581 Boca Ciega Drive, St. Pete Beach, Florida.

END OF SECTION

SECTION 11 – PUMP STATION CONTROLS

GENERAL

11.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required for a complete electrical system for the City of St. Pete Beach's : Pump Station #8 as hereinafter specified and shown on the Drawings.

11.02 SERVICE AND METERING

A. Permanent electrical service and metering will be provided at the Pump Station. Contact John Kruszona of Duke Energy at 727-893-9372.

11.03 CODES

A. All material and installation shall be in accordance with the 2011 edition of the National Electrical Code (N.E.C.), and NFPA 70 code articles that are applicable to the minimum electrical installation requirements for sewer lift stations.

PRODUCTS

11.04 GENERAL

A. The materials used in all systems shall be new, unused and as hereinafter specified. All materials where not specified shall be of the very best of their respective kinds. Samples of materials or Manufacturer's specifications shall be submitted for approval as required by the Engineer.

B. Materials and equipment used shall be Underwriters Laboratories, Inc. listed and conform with applicable standards of NEMA and ANSI.

C. Electrical equipment shall, at all times during construction, be adequately protected against mechanical injury or damage by water. Electrical equipment shall not be stored out-of-doors. Electrical equipment shall be stored in dry permanent shelters. If any apparatus has been damaged, such damage shall be repaired by the CONTRACTOR at his expense. If any apparatus has been subject to possible injury by water, it shall be thoroughly dried out and put through such special tests as directed by the Engineer, at the cost and expense of the CONTRACTOR, or shall be replaced by the CONTRACTOR at his own expense.

11.05 MISCELLANEOUS EQUIPMENT

A. Boxes and Fittings:

1. NEMA 4X boxes shall be used outdoors or in "wet" locations. Construction shall be 316 stainless steel.

2. Conduit hubs shall be used for all outdoor conduit terminations and shall be as manufactured by Meyers Electric Products, Inc., Raco Div., Appleton Electric Co., or approved equal.

3. Conduit sealing bushings shall be O.Z./Gedney Type CSB or approved equal.

4. All panels shall be protected from internal corrosion by the use of corrosion – inhibiting vapor capsules, Northern Instruments Model Zerust VC, Hoffman Model A-HCI, or equal.

11.06 PUMP CONTROL SYSTEM

A. PANEL CONSTRUCTION:

1. The electrical control equipment shall be mounted within a NEMA Type 4X, dead front enclosure, constructed of not less than #14 gauge stainless steel (316 gauge). The enclosure shall be equipped with an inner aluminum door and shall incorporate a removable back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. Outer panel door shall be equipped with door stop. Panel shall have 3-point latching system.

B. PUMP CONTROL CABINET COMPONENTS

1. Enclosure: Enclosure shall be NEMA 4X by Hoffman or approved equivalent with a heavy-duty padlock hasp. Enclosure shall be 316 Stainless Steel.

2. Inner Safety Door: Panel shall include one aluminum inner safety door, 12 gauge nominal thickness (minimum) with 3/4-inch, 90 degree break bend on all edges for rigidity; full length aluminum hinge; positive twist lock handle; safety latch to keep door open during maintenance.

3. Provide 120V, 8 Watt cabinet light. Prescolite UCS12-1-08-PH-120-WSW with integral switch. Provide limit switch for cabinet light. Cutler Hammer E47BCC06.

C. PUMP CONTROLLER HARDWARE

1. The duplex pump controller shall be a model PC-1000 as manufactured by Best Controls Company of Clearwater, Florida. There shall be no approved equals.

D. PUMP STATION MONITORING EQUIPMENT

1. The City of St. Pete Beach has standardized their pump station cellular communications based on a Pump Watch Remote Terminal Unit as manufactured by Primex. The CONTRACTOR shall coordinate the cellular data service plan to be utilized with the City of St. Pete Beach. Antenna requirements and all other system requirements shall coordinated with the unit manufacturer.

2. Primex shall supply the Pump Watch RTU and a StationView Controller (for Pump Station I/O) in a 14" x 12" x 6" NEMA 4X enclosure with integral DC power supply, circuit breaker, fuses, 24V DC loop power for level transducer, terminal blocks, surge protection and battery back-up unit.

3. Primex shall provide cellular antenna as required for proper system performance.

4. Primex shall provide 2 year of cellular data service (Verizon CDMA)

E SURGE PROTECTION DEVICE

1. A Surge Protection Device (SPD) meeting the requirements of ANSI Standard C-62.41 (latest revision) shall be provided.

2. The Surge Protection Device (SPD) shall be 120/240V, 3∅, 4-wire. Advanced Protection Technologies (APT) model # TE03XDS104X.

F. CONTROL RELAYS

1. Control Relays: All relays shall meet the following:

   a. Compact, general-purpose, plug-in type.

   b. Socket mounted.

   c. Contacts rated for not less than 10 amperes at 120V.

   d. Square-D Class 8501, Type R, miniature plug-in with relay base. Poles and coil voltages vary, refer to contract drawings.

G. PHASE MONITOR RELAY

1. An integral 240 VAC three-phase monitor shall be provided in the pump control cabinet. The phase monitor shall detect loss of phase, phase reversal, low phase and high phase faults. All phase monitor adjustments shall be adjustable. Phase monitor relay shall be Diversified Electronics cat# SLA-230-ALE.

H. CIRCUIT BREAKERS

1. Main, Emergency and Motor Circuit Breakers: The panel shall include main and motor circuit breakers sized as shown. The breakers shall be mounted on the subpanel with handle through the inner door. The main and motor circuit breakers shall be products of Square-D, HGL or HJL as indicated.

2. The main and emergency circuit breakers shall be installed with a mechanical interlock to insure both breakers cannot be in the ”ON” position simultaneously.

I. MOTOR STARTERS

1. Pump starters shall be full voltage type, 3-pole, NEMA 1 size rated for 3-phase operation. Overloads shall be provided and be class 20 bi-metallic. Two (2) auxiliary contacts and line and load termination points shall be provided. The starter ratings shall be as indicated on the drawings. The starters shall be Square D, Class 8536, type SCO3. Size overloads as required.

J. GENERATOR RECEPTACLE

1. A 100 ampere generator receptacle shall be provided for emergency power. The contractor shall coordinate the specifications of the receptacle with the City of St. Pete Beach to insure the receptacle is compatible with the City’s existing fleet of portable generators.

K. ELECTRICAL WIRING

1. Panel (or site) lighting, receptacles, heaters, controls, telemetry and fans on separate branch circuits.

2. Branch circuit breakers shall be Square-D FAL12015 and FAL12020 as applicable.

   i. Power wiring shall be 600 volt, type THWN stranded copper, No. 14 AWG size, for 120V service.

   ii. Discrete wiring shall be 600-volt type THWN stranded copper, sized for the current carried, but not smaller than No. 14 AWG.

   iii. Analog signal wiring shall be 300 volt, stranded copper in twisted shield pairs, no smaller than No. 18 AWG.

   iv. Panel wiring shall be routed within 1” x 1” panduits.

   v. Hinge wiring shall be secured at each end with the bend portion protected by a plastic sleeve.

   vi. Analog or DC wiring shall be separated from any AC power or control wiring by at least six inches.

   vii. Each wire shall be uniquely identified using plastic, snap-on numbered tags.

viii. Terminal blocks shall be provided for all field wiring entering the panel. The greater of 4 or 15% spare terminal blocks shall be provided. Terminal blocks shall be Square-D, Class 9080 type G.

ix. No more than one wire per screw and yoke termination.

x. Duplex receptacles shall be Ground Fault Interrupting (GFI) type, Hubbell model number GFR5352IA or equal.

L. PANEL MOUNTED DEVICES

1. Pushbutton. Units shall meet the following:

a. Heavy-duty, oil-tight, industrial type push buttons rated for NEMA 4 service.

b. Contacts rated for 120-volt ac service at 10 amperes continuous.

c. Number of positions and contact arrangements as required.

d. Factory-engraved legend plate indicating function.

e. Panel mounting accommodating panel thickness between 1/16 to ¼ inch.

d. Operator: black flush head for alarm silence.

e. Square D Class 9001, Type K; Allen-Bradley type 800T, or equal.

2. Elapsed time meter. Cramer 635G.

3. Analog AC ammeter :

a. 3-1/2" Simpson Wide-Vue model 1357, cat # 35073. Contractor to also provide appropriate 50/5 ratio, current transformers to accommodate analog meters.

4. MINI CAS II Unit:

a. MINI CAS II supervisory relay to be provided by pump manufacturer.

5. Alarm System :

a. The pump control cabinet shall include a vapor-proof red light mounted on the exterior of the cabinet as shown on the drawings for alarm visual indication.

M. SPARES AND EXPENDABLES

1. Provide the following spare parts:

a. Five (5) spare relays of each type provided.

b. Provide the following expendables:

i. Two year supply of corrosion inhibitor capsules

ii. Six (6) spare fuses.

N. Operating Controls and Instruments:

1. All operating controls and instruments shall be securely mounted on the control compartment door. All controls and instruments shall be clearly labeled to indicate function.

O. Miscellaneous Equipment:

1. All panels shall be protected from internal corrosion by the use of corrosion – inhibiting vapor capsules, Northern Instruments Model Zerust VC, Hoffman Model A-HCI, or equal.

P. Installation:

1. Unless otherwise noted on the Drawings, top of cabinets shall be mounted six feet above grade, properly aligned and adequately supported independently of the connecting raceways.
2. All wiring in the control panel shall be neatly formed, grouped, and identified to provide a neat and orderly appearance.

3. All nameplates shall be properly secured.

11.07 SUBMERSIBLE PRESSURE TRANSDUCER

A. The level sensor for monitoring the sewage level in wet well shall consist of a submersible bonded strain gauge inconel pressure-sensing element, encased in a watertight case with a 316 stainless steel FM approved explosion resistant body. It shall be supplied with 40 feet of shielded and vented cable, able to withstand 200 pounds of tensile strength, allowing the transducer to be suspended directly by it's own cable. The cable shall be connected directly to the signal input terminals on the StationView RTU with no intervening junction box or calibration device required. The device shall require a 10-30 VDC low voltage power supply. The output shall be a standard 4-20 MADC control signal, factory set proportional to the selected fixed range of the transducer, and shall have an accuracy of <0.5% across the temperature band, with a one year stability of <0.2% FSO.

B. The transducer shall be an FM approved Explosion Proof* Unit and when used with a vented cable, shall be FM approved intrinsically safe when used with an approved barrier (supplied by the customer). The transducer shall meet DO 160 for lightening and surge protection for FAA and MILSTD test and launch standard electrical surge requirements.

C. The transducer shall be provided with a sealed airbag for compensating for atmospheric changes and to insure that no external moisture reaches the internal electronics. The nose of

the transducer shall be threaded onto a protective device consisting of the top half of a 316 stainless steel chemical seal with a welded 316s/s diaphragm. The fill fluid shall be glycerin or silicone depending on the extremes of the temperatures expected to be encountered. Eight 304 stainless steel spacers and bolts and nuts hold a stand-off ring in position so as to fully protect the diaphragm from the debris frequently encountered in lift stations.

D. Analog signals shall be communicated using shielded stranded signal cable with braided shield and water proof jacket, suitable for the service intended. The transducer supplier shall provide the signal cable of a length required for the installation, coordinate the installation of the signal wiring, and provide appropriate installation procedures.

E. This device shall be the Birdcage® Lift Station Sensor as assembled and fabricated by Blue Ribbon Industrial Components Corp. Winter Park, FL., incorporating the GP50 model 311Z submersible transducer, or equal.

*Class I, II, III, Div I, Group A, B, C, D, E, F, G.

11.08 FLOAT SWITCHES

Levels shall be sensed by polypropylene weighted floats. The floats shall be heavy-duty type, with hermitically sealed non-mercury switch inside each float. Weights shall be 20 ounces minimum. The floats shall be secured at the top of the wetwell via a stainless steel wall mount bracket designed specifically for float installation.

EXECUTION

11.09 CONDUIT INSTALLATION

A. Where conduits enter or leave all outlet boxes, cabinets safety switches, tap boxes, motor controllers, etc., threaded hubs shall be used. Bushings 1-inch and larger shall be of an approved insulated type. Unless otherwise indicated, conduit 2-inches shall be supported at intervals not exceeding ten (10) feet.

B. During construction, all installed raceways shall be temporarily plugged or otherwise protected from the entrance of moisture, dirt, trash, plaster, moisture, etc., through neglect of the CONTRACTOR to so protect them, shall be replaced by the CONTRACTOR without additional expense to the Owner. No kinked, clogged or deformed raceways will be permitted on the job. Raceways shall be cut to proper length so that ends will fit accurately in the outlets. Where raceways cross building expansion joints, a suitable raceway expansion fitting shall be used.

C. Size of raceway shall not be less than NEC requirements, but in no case shall beless than indicated on the Drawings. Combining of circuits, other than detailed, will not be permitted. The CONTRACTOR shall install larger size raceways than detailed where there is excessive length of unbroken run or excessive number of bends.

D. Bends in metallic raceways shall be made while "cold" and in no case shall the raceways be heated. Raceways shall not be bent through more than 90º. The radius of bends shall not be less than six (6) times the internal diameter of the raceway. Not more than four (4) (equivalent 90º) bends will be permitted between outlets, the bends at the outlets being counted.

E. Raceways shall be properly aligned, grouped and supported. Exposed raceways shall be installed at the right angles to or parallel to the principal structural members. Concealed raceways, unless otherwise indicated, may take the most direct route between outlets. Raceways shall be firmly held in place. Raceways shall run to avoid trapping wherever possible. Where areas are indicated for future openings, foundations, etc., all raceways shall be run around such areas. The CONTRACTOR shall provide necessary inserts in poured concrete areas and shall furnish and install all necessary sleeves through walls, floors and roofs for passage of raceways. Sleeves through roofs and/or exterior walls shall be properly sealed by the CONTRACTOR against entrance of moisture, etc., into the building. Where necessary repairs to the building structure using material in no way inferior to that originally installed and using labor skilled in the trades involved.

11.10 CONDUCTORS

A. Splices, taps and attachments of fittings and lugs shall be electrically and mechanically secure. Approved solderless lugs and connectors shall be sued for all conductors with 2-bolt type being used for sized No. 4/0 and larger. There shall be plenty of slack cable in boxes, outlets and cabinets to insure that there is no binding at the bushings. All lugs shall be of the correct sizes for the conductor in order to fit the conductor into a lug.

B. Splices or joints to other than lugs or terminals shall not be allowed.

11.11 GROUNDING

A. The entire electrical system shall be completely and effectively grounded as required by the NEC and as specified hereinafter.

B. All metallic raceways shall be mechanically and electrically secure at all joints and at all boxes, cabinets, fittings and equipment. Metallic raceways entering the motor control center control panels or other electrical boxes shall be grounded to the appropriate ground bus. All metallic raceways shall be electrically continuous throughout the entire conduit system. Bond wires shall be used in exterior concrete pull boxes.

11.12 SUPPORTS

A. The CONTRACTOR shall furnish and install all necessary supports for properly mounting all electrical equipment and raceways. Such supports shall be fabricated and installed in a neat and workmanlike manner, and care shall be taken that at no time shall any portion of the building structure be overloaded. Should the building structure sustain damage through carelessness or through failure of the CONTRACTOR to properly support and install the

electrical equipment, the CONTRACTOR shall bear all costs involved in repairing or replacing such installation.

B. All steel shapes exposed to the weather shall be galvanized after all cutting, drilling, and/or welding is done. All shop connections shall be welded or riveted and all field connections shall be bolted on all outdoor structures. Where the field cutting or drilling of galvanized steel is necessary, the CONTRACTOR shall apply one (1) coat of priming paint and one (1) finish coat of aluminum and oil paint.

11.13 TESTS AND CHECKS

A. The following minimum tests and checks shall be made prior to the termination of any field wiring.

1. Megger terminals and buses after disconnecting devices sensitive to megger voltage.

2. A 1,000V DC megger shall be used for these tests.

3. The first test shall be made with main circuit breaker closed and all remaining breakers open. A second test shall be made with all circuit breakers closed.

4. The test results shall be recorded and forwarded to the Engineer for his review. Minimum megger readings shall be 500 megohms in both tests.

B. The following shall be done before energizing any equipment or control panel.

1. Remove all current transformer shunts after completing the secondary circuit.

   i. Install overload relay heaters based on actual motor nameplate current.

2. Vacuum clean all interior equipment.

11.14 SPARE PARTS

A. Spare parts shall be furnished to permit convenient and quick service restoration upon failure of a particular unit.

B. The spare parts shall be packed in a manner suitable for long-term storage and shall be adequately protected against corrosion, humidity, and temperature.

11.15 WARRANTY

A. Warranty - The SYSTEM SUPPLIER shall warrant all hardware and software provided under this contract against all defects in material and workmanship for a period of one year. The system supplier shall warrant the telemetry software to be free of defects for as long as it is operational in the county. The SYSTEM SUPPLIER shall also provide free updates to this software for the life of the system. The function modules utilized in the remote terminal units

shall carry an additional two year return-to-factory warranty. The two year return-to-factory warranty shall also cover damage due to lightning.

END OF SECTION

SECTION 12 - ELECTRICAL

GENERAL

12.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required for complete electrical system for St. Pete Beach's Pump Station #8 as hereinafter specified and shown on the Drawings.

B. The work, apparatus and materials, which shall be furnished under these Specifications and accompanying Drawings, shall include all items listed hereinafter and/or shown on the Drawings. Certain equipment, which will require wiring thereto and/or complete installation, is indicated. All materials necessary for the complete installation shall be furnished and installed by the CONTRACTOR to provide complete power, lighting, instrumentation, wiring and control systems as indicated on the Drawings and/or as specified herein.

C. The CONTRACTOR shall furnish and install the necessary cables, protective devices, conductors, supports, raceways, exterior electrical system, etc., to serve lighting loads and miscellaneous electrical loads as indicated on the Drawings and/or as specified. The CONTRACTOR shall install any control panel provided under this or any other sections on the specifications.

D. The work shall include complete testing of all equipment and wiring at the completion of the work and making any minor connection changes or adjustments necessary for the proper functioning of the system and equipment. All workmanship shall be of the highest quality; sub-standard work will be rejected.

E. For process instrumentation furnish and install all conduit, wire and interconnections between primary elements, transmitters, local indicators and receivers.

F. It is the intent of these Specifications that the electrical system shall be suitable in every way for the service required. All material and all work, which may be reasonably implied as being incidental to the work of this Section, shall be furnished at no extra cost.

12.02 CODES, INSPECTION AND FEES

A. All material and installation shall be in accordance with the latest edition of the National Electrical Code and all applicable national, local and state codes, laws and ordinances.

B. Pay all fees required for permits and inspections.

12.03 TESTS

A. Test all systems and repair or replace all defective work. Make all necessary adjustments to the systems and instruct OWNER's personnel in the proper operation of the systems.

B. The following minimum tests and checks shall be made prior to the energizing of electrical equipment. Test shall be by the CONTRACTOR and a certified test report shall be submitted providing all test results and stating that the equipment meets and operates in accordance with the Manufacturer's and job specifications, and that equipment and installation conforms to all applicable Standards and Specifications:

1. Test all 600-volt wire insulation with a megohm meter after installation. Make tests at not less than 1000 volts. Submit a written test report of the results to the engineer.
2. Mechanical inspection of all circuit breakers to assure proper operation.

C. The Engineer shall be notified forty-eight (48) hours before tests are made to enable the Owner to have designated personnel present.

12.04 CUTTING AND PATCHING

A. All cutting and patching shall be done in a thoroughly workmanlike manner.

12.05 INTERPRETATION OF DRAWINGS

A. The Drawings are not intended to show exact locations of conduit runs.

B. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Drawings.

C. Unless otherwise approved by the Engineer, conduit shown exposed shall be installed exposed; conduit shown concealed shall be installed concealed.

D. Where circuits are shown as "home-runs," all necessary fittings and boxes shall be provided for a complete raceway installation.

E. The CONTRACTOR shall harmonize the work of the different trades so that interferences between conduits, piping, equipment, architectural and structural work will be avoided. All necessary offsets shall be furnished so as to take up a minimum space and all such offsets, fittings, etc., required to accomplish this shall be furnished and installed by the CONTRACTOR without additional expense to the Owner. In case interference develops, the Owner's authorized representative is to decide which equipment, piping, etc., must be relocated, regardless of which was installed first.

F. The locations of equipment, fixtures, outlets, and similar devices shown on the Drawings are approximate only. Exact locations shall be as approved by the Engineer during construction. Obtain in the field all information relevant to the placing of electrical work and in case of any interference with other work, proceed as directed by the Engineer and furnish all labor and materials necessary to complete the work in an approved manner.

G. Circuit layouts shown are not intended to show the number of fittings, or other installation details. Furnish all labor and materials necessary to install and place in satisfactory operation all power, lighting, and other electrical systems shown. Additional circuits shall be installed wherever needed to conform to the specific requirements of the equipment.

H. The ratings of motors and other electrically operated devices together with the size shown for their branch circuit conductors and conduits are approximate only and are indicative of the probable power requirements insofar as they can be determined in advance of the purchase of equipment.

I. All connections to equipment shall be made as shown, specified and directed and in accordance with the approved shop drawings, regardless of the number of conductors shown on the Electrical Drawings.

12.06 RECORD DRAWINGS

A. As the work progresses, legibly record all field changes on a set of project Contract Drawings. When the project is complete, furnish a complete set of reproducible "As-built" drawings for the Project Record Documents.

12.07 COMPONENT INTERCONNECTIONS

A. Component equipment furnished under this Specification will not be furnished as integrated systems.

B. Analyze all systems components and their shop drawings; identify all terminals and prepare drawings or wiring tables necessary for component interconnection.

12.08 SHOP DRAWINGS

A. As specified under other Sections, shop drawings shall be submitted for approval for all materials, equipment, apparatus, and other items as required by the Engineer.

B. Shop drawings shall be submitted for the following equipment:

1. Pump Control Cabinet
2. Pump Watch RTU
3. Disconnects
4. Circuit Breakers
5. Surge Protection Device
6. Junction Boxes
7. Wire & cable
8. Conduit

C. The Manufacturer's name and product designation and catalog cutsheets shall be submitted for the following material:

1. Conduit
2. Boxes and fittings

D. Prior to submittal by the CONTRACTOR, all shop drawings shall be checked for accuracy and contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to Specifications and Drawings. This statement shall also list all discrepancies with the Specifications and Drawings. Shop drawings not so checked and noted shall be returned.

E. The Engineer's check shall be only for conformance with the design concept of the project and compliance with the Specifications and Drawings. The responsibility of, or the necessity of, furnishing materials and workmanship required by the Specifications and Drawings, which may not be indicated on the shop drawings, is included under the work of this Section.

F. The responsibility for all dimensions to be confirmed and correlated at the job site and for coordination of this work with the work of all other trades is also included under the work of this Section.

G. No material shall be ordered or shop work started until the Engineer's approval of shop drawings has been given.

12.09 WARRANTY

A. Provide a warranty for all the electrical equipment in accordance with the requirements of other Sections. Under no circumstances shall the warranty be for less than one year starting from substantial completion.

12.10 ELECTRICAL INDENTIFICATION

SUMMARY

A. Section Includes:

1. Nameplates.
2. Labels.
3. Wire markers.
4. Conduit markers.
5. Stencils.
6. Underground Warning Tape.
7. Lockout Devices.

CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

DELIVERY, STORAGE, AND HANDLING

A. Division 1 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept identification products on site in original containers. Inspect for damage.

C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

ENVIRONMENTAL REQUIREMENTS

A. Division 1 - Product Requirements: Environmental conditions affecting products on site.

B. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

NAMEPLATES

C. Product Description: Laminated three-layer plastic with engraved white letters on black background color.

D. Letter Size:

1. 1/8 inch high letters for identifying individual equipment and loads.

2. 1/4 inch high letters for identifying grouped equipment and loads.

E. Minimum nameplate thickness: 1/8 inch.

LABELS

F. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

WIRE MARKERS

G. Description: Cloth tape, split sleeve, or tubing type wire markers.

H. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number.

2. Control Circuits: Control wire number as indicated on shop drawings.

CONDUIT AND RACEWAY MARKERS

I. Description: Stencils.

J. Color:

1. Medium Voltage System: Black lettering on white background.

K. Legend:

1. Medium Voltage System: HIGH VOLTAGE.

STENCILS

L. Stencils: With clean cut symbols and letters of following size:

1. Up to 2 inches Outside Diameter of Raceway: 1/2 inch high letters.
2. 2-1/2 to 6 inches Outside Diameter of Raceway: 1 inch high letters.

M. Stencil Paint: As specified in other sections of specifications, semi-gloss enamel, colors.

UNDERGROUND WARNING TAPE

N. Description: 6 inch wide plastic tape, colored red with suitable warning legend describing buried electrical lines.

LOCKOUT DEVICES

O. Lockout Hasps:

1. Anodized aluminum hasp with erasable label surface; size minimum 7-1/4 x 3 inches.

PREPARATION

P. Degrease and clean surfaces to receive adhesive for identification materials.

Q. Prepare surfaces in accordance with Division 9 for stencil painting.

INSTALLATION

R. Install identifying devices after completion of painting.

S. Nameplate Installation:

1. Install nameplate parallel to equipment lines.
2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.

3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.

4. Secure nameplate to equipment front using screws or adhesive.

5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.

6. Install nameplates for the following:

    a. Pump Control Cabinet.

    b. Pump Watch RTU.

    c. Disconnect Switches.

T. Label Installation:

7. Install label parallel to equipment lines.

8. Install label for identification of individual control device stations, and wall switches where their purpose is not readily obvious.

9. Install labels for permanent adhesion and seal with clear lacquer.

U. Wire Marker Installation:

10. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.

11. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.

12. Install labels at data outlets identifying patch panel and port designation.

V. Raceway Marker Installation:

13. Install raceway marker for each raceway longer than 6 feet.

14. Raceway Marker Spacing: 20 feet on center.

15. Raceway Painting: Identify conduit using field painting in accordance with Division 9.

W. Stencil Installation:

16. Apply stencil painting in accordance with Division 9.

X. Underground Warning Tape Installation:

17. Install underground warning tape along length of each underground conduit, raceway, or cable 12 inches below finished grade, directly above buried conduit, raceway, or cable.

12.11 RACEWAYS AND FITTINGS

GENERAL

SCOPE OF WORK

A. All aboveground, exterior conduit shall be rigid aluminum. All conduit installed in slabs, ductbank or below grade shall be rigid non-metallic heavy wall conduit. Minimum conduit size in floor slabs, walls, or below grade shall be ¾-inch.

PRODUCTS

MATERIALS

A. Rigid Non-metallic Conduit and Fittings : Rigid non-metallic conduit and fittings of heavy wall polyvinyl chloride (PVC) meeting ASTM Specification D 1785, approved by UL for the specific purpose, may be used in locations not prohibited by the NEC Section 347-3. When equipment grounding is required by Article 250 of the NEC, a separate grounding conductor shall be installed in the conduit. Installation methods of rigid non-metallic conduit shall conform to Section 347-5 through 347-15 of the NEC. Supports shall be in accordance with Table 347-8.

B. Rigid Aluminum Conduit and Fittings : All electric aluminum conduit and fittings shall conform ANSI C80.5. Rigid aluminum conduit shall not be used for concealed work. The use of dissimilar metals shall be avoided throughout the system. Installation methods of metallic conduit shall be in accordance with Sections 348-4 through 348-13 of the NEC.

C. Flexible Metallic Conduit: All motors and all other indicated or necessary equipment shall be connected with liquid-tight flexible metallic conduit of the size required for the conductors to the equipment. Liquid-tight flexible metallic conduit shall be UL, type UA. It shall be installed in such a manner that liquids tend to run off the surface and not drain toward the fittings. Sufficient slack shall be provided to reduce the effects of vibration. Where the fittings are brought into an enclosure with a knock-out, a gasket assembly consisting of an O-ring and retainer shall be installed. These fittings shall be nylon insulated-throat type. Conduit shall be galvanized, PVC covered and shall be constructed to provide a continuous metallic bond. It shall be equal to that manufactured by Appleton “Sealtite”.

EXECUTION

INSTALLATION:

A. Conduit shall be concealed unless otherwise shown. Exposed conduit shall run parallel or perpendicular to building planes. Concealed conduits shall be run in a direct line with long

sweep bends and offsets. Conduit shall be continuous and installed in such a manner that the system shall be electrically continuous throughout. Conduit ends shall be capped during construction. The ends of all conduits shall be carefully reamed free from burrs after threading and before installation. All cuts shall be made square. All joints shall be made up tight. Care shall be taken to see that all light and power conduit runs form a permanent and continuous ground connection point.

B. The Contractor shall permanently and effectively ground service neutral and all raceways, devices, and utilized equipment in accordance with the requirements of the NEC, and as shown or required. All grounding electrodes shall have rigid clamp jaws and be UL listed for the application. A separate ground wire shall be provided in all lighting and power raceways.

C. Conduit stubs shall be located to conform to location of connection boxes on motors and/or other equipment served. Traps in conduit runs shall be avoided. Device boxes in concrete shall be set true and packed as necessary to exclude concrete during placement.

D. Final connections from the end of the conduit run to equipment or controls for both interior and exterior work shall be made by means of liquid-tight flexible conduit. The length of these sections of flexible conduit shall not exceed 36 inches in length.

E. Conductors shall be installed in a workmanlike manner. Damage to insulation or a reduction of the wire size when pulled into the conduit shall be avoided.

F. All areas of the project are considered to be wet locations and construction within these areas shall be moisture and weather resistant. Work below grade, on grade, or beneath slabs shall be waterproof.

G. Electrical work shall not rest upon, be supported by or hung from ductwork, piping or equipment. Adequate supports shall be provided to assure that this is achieved.

H. Boxes, conduit, hangers, panels, etc., shall be fastened to steel by machine bolts and nuts, and by expansion bolts in concrete. Wood or composition plugs shall not be used.

I. Buried conduit shall be installed so as to assure a watertight system. Turns and bends shall be made using watertight fittings or field-made bends. Trenchwork for installation of conduits and equipment underground shall conform to applicable sections of these specifications. Locations for buried conduit shall be carefully plotted to avoid conflict with other installations. Unless otherwise noted, all buried electrical installations shall be installed at least 24-inches below finished grade.

J. Where installations pass through walls, slabs, or other structures, all cutting shall be accomplished without damage to the structure. Boring and cutting shall be done with proper equipment and without delivering excessive vibration or shock to the structure.

12.12 WIRES AND CABLES

GENERAL

SCOPE

A. This section includes the furnishing, installation, and connection of all low voltage and power wiring. This shall include all wires and cables utilized for controls. Conductors specified for low voltage controls shall be coordinated with and approved by equipment manufacturers.

B. Control wiring specified herein shall be installed and connected by the Electrical Contractor to perform the functions specified in other sections of these specifications.

C. REFERENCE STANDARDS: The following specifications and standards, except as hereinafter modified, are incorporated herein by reference and form a part of this specification to the extent indicated by the references thereto. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of Invitation for Bids shall be applicable. In text such specifications and standards are referred to by basic designation only.

1) Federal Specifications (Fed. Spec.)
   J-C-30A(1) - Cable and Wire Electrical (Power, Fixed Installation)
   HH-I-595C - Insulation Tape, Electrical, Pressure Sensitive Adhesive, Plastic

2) National Fire Protection Association (NFPA) Publications:
   No. 70 - National Electrical Code (NEC) WIRES AND CABLES

3) Underwriter's Laboratories, Inc (UL) Publications:
   No. 83 - Thermoplastic – Insulated Wires
   No. 493 - Thermoplastic – Insulated Underground Feeder and Branch Circuit Cables
   No. 486 - Wire Connectors and Soldering Lugs

PRODUCTS

MATERIALS

A. Conductors for 4-20mA signals and where twisted, shielded conductors are shown on the drawings shall have :

1. 2 conductor, #18 tinned copper conductors.

2. Polyethylene insulation material.

3. Aluminum foil-polyesther tape with shorting fold

4. Shall be Belden Part Number 8760 or equal as determined by the engineer.

B. Power Conductors shall consist of annealed copper wire having a minimum of 98% conductivity and shall be sized and insulated or isolated in accordance with the NEC for the current and voltage of the individual circuit. All conductors, unless specifically noted, shall have type "THWN", 75 degrees F, 600 Volt insulation.

C. Joints shall be made with mechanical connectors and insulated with two layers of Scotch No. 33 or Slipnot No. 3201 tape.

D. All splices for conductors #12 through #6 AWG solid or stranded shall be made with "Scotchlock" spring connectors or the pressure wire type. For wire sizes larger than #6,

splices shall be made with "OZ" type "XW" or "XTP" as appropriate to the splice being installed. Equal fittings of Burndy and Penn Union may be used. Tape shall be equal to Scotch No. 33 or Slipnot NO. 3201 over splice and filler tape on splices shall be equal to "Scotchfill".

E. Flexible cords and cables shall be of the size and number of conductors as indicated on drawings. Cords shall comply with the requirements of Article 400 of the NEC.

F. Contractor shall coordinate the requirements for flow meter signal converter cable with the respective equipment manufacturers.

EXECUTION

INSTALLATION

A. All conductors shall be coded throughout, using different colors for phases, white for neutral (white with other color stripe for neutral of a different voltage system) and green for ground. The same color code for a particular phase or part of a circuit shall be run with the same conductor throughout the job. Colors used for each voltage system shall be different. Conductors No. 8 AWG and larger may be black in color but shall be identified with colored tape in all outlet, junction or pull boxes and at the terminals of the equipment.

Phase	120/240V, 3PH, System
A	Black
B	Orange
C	Blue
Neutral	White
Ground	Green

B. All wires in cabinets, boxes, panels, pull and junction boxes shall be trained neatly and tied.

C. All wires and cables, larger than No. 12 AWG, shall be continuous from origin to destination without splices unless written permission is given by the ENGINEER.

D. Conductors shall be sized in accordance with NEC requirements. No conductor shall be smaller than No. 12 AWG, except control and signal circuit conductors which may be No. 14 AWG, unless otherwise specified on the drawings.

TERMINATIONS AND SPLICES

A. Power Conductors: Terminations shall be die type or set screw type pressure connectors as specified. Splices (where allowed) shall be die type compression connector and waterproof with heat shrink boot or epoxy filling.

B. Control Conductors: Termination on saddle-type terminals shall be wired directly with a maximum of two conductors per termination. Termination on screw type terminals shall be made with a maximum of two spade connectors. Splices (where allowed) shall be made with insulated compression type connectors. Heat shrink boots shall be utilized for all outdoor splices.

C. Instrumentation Signal Conductors: Terminations permitted shall be typical of control conductors. Splices are allowed at instrumentation terminal boxes only.

D. Except where otherwise approved by the Engineer no splices will be allowed in manholes, handholes or other below grade located boxes.

E. Splices shall not be made in control devices (i.e., pressure switches, flow switches, etc.), conduit bodies, etc.

12.13 BOXES

GENERAL

SCOPE

A. Boxes shall be provided where required by the NEC and other portions of this division of Specifications.

DESIGN REQUIREMENTS

A. Where more than one feeder passes through a junction box or pull box, the conductors shall be identified with electrical characteristics, system designation, source and destination. Barriers shall be provided where required by Code.

PRODUCTS

MANUFACTURED UNITS

A. Boxes shall conform to Federal Specification W-5-800 and sized in accordance with Section 370 of the NEC.

B. All device outlet boxes and fittings used in the Chlorine and Fluoride Equipment Rooms shall be corrosion resistant, equal to Bell #5322. All other device outlet boxes and fittings including all lighting fixture outlet boxes shall be constructed of galvanized metal and shall be as manufactured by Steel City or equal.

C. Outlet boxes at a minimum shall be 4-inch square not less than 1 ½- inch deep. Extra large boxes shall be used in accordance with the NEC where necessary to prevent undue crowding of wires. Gang boxes shall be used for gang switches.

D. Pullboxes shall be constructed of code gauge metal and shall be galvanized. Any box that is tack or spot welded shall be galvanized after fabrication. All boxes shall bear the UL label. Flush boxes shall be equal to Columbia, Type “FC”, surface type shall be Type “SC” or equal.

E. Cast metal boxes shall be equal to those manufactured by Crouse-Hinds or Pyle National.

EXECUTION

INSTALLATION

A. Junction and pull boxes shall be installed where required by the NEC and where necessary to facilitate pulling of wire or cable. Consideration shall be given for all sizes of wire and cable, number of bends in raceways and conductor support requirements in vertical raceways. Maximum distance between terminations at junction or pull boxes, cabinets or other points of

termination shall not exceed 100 feet for straight horizontal runs. This length shall be decreased by 50 feet for each 90 degree bend.

B. Minimum size of junction and pullboxes shall be determined by the NEC, and by minimum raceway spacing requirements. The minimum raceway spacing shall be such as to allow ¼ inch space between knockouts.

C. When splices and taps are to be made in junction or pull boxes, the minimum dimensions for straight through pull shall be 12 times the diameter of largest raceway. For angle pulls, the distance between raceway entry and opposite wall shall be 10 times the diameter of largest raceway, plus the sum of diameters of all other raceways entering the same wall. Additionally for angle pulls, the distance between the raceway entries enclosing the same conductor shall be 10 times the diameter of the largest raceway. Wires in junction or pull boxes that are spliced shall be covered with fire-proofing as specified below.

D. Entries for raceways enclosing the same conductors shall provide the longest sweep or radius for the conductors.

E. Junction and pull boxes shall be securely supported to the structure, or to a structural member. Raceways shall carry no weight of the box. Boxes embedded in concrete or masonry need not be additionally supported

12.14 MAIN DISCONNECT

GENERAL

SYSTEM DESCRIPTION

A. All disconnecting means shall meet the requirements of the NEC.

PRODUCTS

ACCESSORIES

A. Main Disconnect: Fused switch shall be heavy-duty type “HD”. The blades of switches shall be quick-make, quick-break operating type. All lugs the switch shall be equal to Burdy’s solderless quick lugs or shall be compression type. Switch shall be 3-pole and shall have fuse sizes as indicated on the drawings. Enclosure shall be NEMA 4X stainless steel. The switch shall conform to NEMA Standards and shall be UL listed. Switches shall be equal to General Electric, Square-D, or Cutler-Hammer.

B. Main disconnect shall have a solid neutral, ground lug and shall be listed for use as service entrance equipment.

EXECUTION

INSTALLATION

A. Install disconnect as recommended by the manufacturer, required by Code, and as shown on the drawings.

12.15 SUPPORTING DEVICES

GENERAL

WORK INCLUDED

A. Conduit supports.

B. Channel supports for equipment.

REFERENCE STANDARDS

A. National Electrical Code

PRODUCTS

CONDUIT SUPPORTS

A. Single Runs: Galvanized conduit straps or ring bolt type hangers with specialty spring clips. Plumbers perforated straps or wire will not be acceptable.

B. Multiple Runs: Conduit rack with 25 percent spare capacity.

C. Vertical Runs: Channel support with conduit fittings.

CHANNEL SUPPORTS

A. Stainless steel channel sections shall be rolled from AISI 1008 commercial grade steel and be in conformance with ASTM A 240.

B. The cross sectional width dimension of the channel shall be a minimum of 1-5/8-inch. The depth will be as required to satisfy the load requirements. Channel with 1-5/8-inch depth or greater shall be rolled from manufacturer's standard 12 gauge steel. Channel smaller than 1½-inch may be manufacturer's standard 14 gauge steel.

C. Attachment holes, when required, shall be factory punched on hole centers equal to the channel cross sectional width dimension and shall be a maximum of 9/16-inch in diameter.

D. Channel attachment nuts shall be designed to prelocate in the channel and provide a bearing surface on the turned down lips while making positive contact with the side walls of the channel.

E. Straps for the support of conduit shall be designed such that the attachment nut is captivated on the shoulder of the strap when tightened, and the attachment bolt shall allow tightening by either a screwdriver or wrench.

F. All nuts, bolts, straps, threaded rod and miscellaneous hardware shall be stainless steel.

G. When tested in accordance with ASTM B117-73 procedure, there shall be no sign of red rust after 1,000 hours of testing. Certified test results to support this must be submitted upon request.

ANCHOR METHODS

A. Hollow Masonary: Toggle bolts, spider type expansion anchors, or tapcons.

B. Solid Masonary: Lead expansion anchors, preset inserts, or tapcons.

C. Metal Surfaces: machine screws, bolts, welded studs, or beam type clamps on steel joints.

D. Wood Surfaces: Wood Screws

E. Concrete Surfaces: Self-drilling anchors, power-driven studs, expansion bolts, or tapcons.

F. See drawings for special mounting and installation.

EXECUTION

INSTALLATION

A. Layout to maintain headroom, neat mechanical appearance, and to support equipment loads required.

B. Verify exact mounting and installation requirements with the Owner's representative prior to installation.

12.16 GROUNDING

GENERAL

SCOPE OF WORK

A. Furnish and install a complete grounding system in strict accordance with Article 250 of the National Electrical Code and as hereinafter specified and shown on the Drawings.

PRODUCTS

MATERIALS

A. Ground rods: Ground rods shall be Copperclad steel 3/4-inch x 20 foot. Ground rods shall be Copperweld or be an approved equal product.

EXECUTION

GENERAL

A. Grounding electrodes shall be driven as required. Where rock is encountered, grounding plates may be used in lieu of grounding rods.

B. All equipment enclosures, motor and transformer frames, conduits systems, cable armor, exposed structural steel and similar items shall be grounded.

C. Exposed connections shall be made by means of approved grounding clamps. Exposed connections between different metals shall be sealed with No-Oxide Paint Grade A or approved equal. All buried connections shall be made by welding process equal to Cadweld.

D. All underground conductors shall be laid slack and where exposed to mechanical injury shall be protected by pipes or other substantial guards. If guards are iron pipe or other magnetic material, conductors shall be electrically connected to both ends of the guard.

E. The Contractor shall exercise care to insure good ground continuity, in particular between the conduit system and equipment frames and enclosures. Where necessary, jumper wires shall be installed.

F. Provide grounding test wells where indicated on the drawings.

TESTS

A. The Contractor shall test the ground resistance of the system. All test equipment shall be provided by the Contractor and approved by the Engineer. Dry season resistance of the system shall not exceed 2 ohms. If such resistance cannot be obtained with the system as shown, the Contractor shall provide additional grounding as directed by the Engineer, without additional payment. The Contractor shall submit all grounding system test results to the Engineer for review.

12.17 TESTS AND INSPECTIONS

GENERAL

SCOPE OF WORK

A. The CONTRACTOR shall arrange for all inspections required by the local authority having jurisdiction. Approval of the installation by any such local authority shall not relieve the CONTRACTOR of any portion of his responsibility for adequate performance of the completed installation.

SUBMITTALS

A. The CONTRACTOR shall furnish at least two copies of test records to the ENGINEER. At the completion of all tests specified herein and any others required to make operational all equipment, all records shall be viewed by the CONTRACTOR, then transmitted directly to the ENGINEER. All prints shall be corrected and verified for corrections of in-field changes by the CONTACTOR prior to submittal.

PRODUCTS (Not Used)

EXECUTION

PREPARATION

A. After completion and prior to being energized, the electrical installation shall be tested to the extent necessary to demonstrate that all systems are complete and ready for operation. The CONTRACTOR shall notify the ENGINEER and the OWNER for the final inspection prior to energizing the system.

B. The CONTRACTOR shall furnish all necessary test equipment to satisfactorily perform all tests specified herein or required by applicable codes and standards.

TESTING

A. The CONTRACTOR shall test all wire, cable, equipment, and systems installed or connected under the Agreement to assure proper installation, settings, connection, and functioning in accordance with the Drawings, Specifications and the manufacturer's recommendations.

B. When conducting tests the CONTRACTOR shall:

1. Include all tests and inspections recommended by the equipment manufacturer and applicable Codes and Standards.

2. Include any additional tests required by the ENGINEER that he deems necessary because of field conditions to determine that equipment, material, and systems meet the requirements of the Specifications.

3. Maintain in quadruplicate a written record of all tests showing date, personnel conducting tests, equipment or material tested, tests performed, manufacturer and serial number of testing equipment and results.

C. Tests to be accomplished as a minimum are as follows:

1. Control Panels/Panelboards : provide temporary power source to all control circuits and check for proper operation prior to energizing equipment served.

2. Wires and Cables:

a. High-potential test shall be conducted on all service entrance conductors. The insulation resistance between conductors and also between conductors and ground shall be measured.

b. All other cables and wires shall be checked for continuity and shall be determined to be free of grounds prior to energizing.

3. Motor Test: Motor rotation will be checked by momentary energizing of motor. Correction of rotation shall be made by changing leads on the motor. Motors shall only be energized in the presence of a representative of the OWNER.

4. Check phase rotation on all bussing. Phasing shall be A-B-C, left to right, top to bottom, front to rear, as viewed from the front.

D. CONTRACTOR shall be responsible for any damage to equipment or material due to improper test procedures or test apparatus handling, and shall replace or restore to original condition any damaged equipment or material.

E. CONTRACTOR shall furnish and use safety devices such as rubber gloves and blankets, protective screens, barriers, and danger signs to adequately protect and warn all personnel in the vicinity of the tests.

DEMONSTRATION OF COMPLETED ELECTRICAL SYSTEMS

A. Upon the completion of the installation and testing, the CONTRACTOR shall demonstrate and familiarize representatives of the OWNER with the system.

END OF SECTION

SECTION 13 – VALVES AND ACCESSORIES

13.01 GENERAL

All valves shall be suitable for the purpose specified or as shown on the plans. All valves shall be complete with all necessary actuating handwheels and worm and gear actuators, as shown on the plans and which are required for proper operation upon completion of the work included in this project.

Renewable parts, including discs, packing and seats, shall be of types recommended by the valve manufacturer for the intended service.

All units shall have the name of the manufacturer, size and pressure rating of the valve cast on the body or bonnet or shown on a permanently attached metal plate in raised letters.

All units shall be cleaned and installed in accordance with the manufacturer's recommendations.

13.02 DATA TO BE SUBMITTED

The contractor shall submit the following information and documents:

A. Shop Drawings

1. Product data sheets for make and model.
2. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
3. Power and control wiring diagrams, including terminals and numbers.
4. Complete motor nameplate data.
5. Open/Close and throttle actuators sizing calculations.

B. Quality Control Submittals

1. Certificates of Compliance.
2. Tests and inspection data.
3. Operation and Maintenance Manuals.

13.03 ACTUATORS AND ACCESSORIES

The valve actuator types, as specified herein, describe only the general characteristics of the actuator. It shall be understood that the actuator shall be compatible with the valve that it will be used with and shall be of the same manufacturer, or a product that is recommend by the valve manufacturer.

When the maximum force required to actuate a valve under full operating head exceeds 40 pounds, gear reduction actuators shall be provided.

Worm and gear actuators used on manual actuated valves shall be of totally-enclosed design, so proportioned as to permit actuation of the valve under full operating head with a maximum pull of 40 pounds on the handwheel, chainwheel or crank. The valve actuators shall be of the self-locking type to prevent the disc or plug from creeping. Self-locking worm gears shall be of one-piece design of gear bronze material, accurately machine cut. The worm shall be of hardened alloy steel, with thread ground and polished. The reduction gearing shall run in a proper lubricant. Valve actuators shall be provided with position indicators, where shown, to show the position of the valve disc or plug. Ferrous handwheels shall be galvanized and painted the same color as the valve and associated pipeline.

All valve actuators shall open by turning counterclockwise.

Handwheel actuator shall be the manufacturer's standard and shall be of rugged non-corrosive construction for the service intended.

13.04 SEWAGE SERVICE VALVES

Valves for use with wastewater shall be lined with the same materials as the adjacent ferrous piping, fusion-bonded epoxy in accordance with AWWA C-550, or an otherwise specially approved. Valves located aboveground shall be painted in accordance the appropriate coating system specified elsewhere.

A. Plug Valves

1. Plug Valves shall be of the non-lubricated eccentric type, with resilient plugs faced with natural or synthetic rubber suitable for service indicated on the plans.

2. Port areas shall be unobstructed when open and have smoothly-shaped waterways of not less than 100 percent of full-pipe area except valves 12-inches and larger shall have not less than 80 percent open area. Bodies shall be semi-steel (cast iron), suitable for 150 psi working water pressure and shall have raised seats. Valves three inches and larger shall have seats with a welded-in overlay of high, nickel content on all surfaces contacting the plug face. Valves less than three inches shall have plastic covered seats.

3. Valves up to 20 inches in size shall have permanently lubricated stainless steel bearings.

4. Valves for buried pipelines shall be designed for buried service and shall be equipped with a totally enclosed actuator housing permanently sealed with stainless bolts, springs and washers.

5. A suitable lever or wrench shall be provided for each wrench-actuated valve and at least one wrench for each operating station. Wrenches shall be suitable size and sufficient length for easy actuation of the valves at their rated working pressure.

6. In general, valves less than eight inches shall be wrench-actuated unless otherwise indicated on the plans. Where there is a lack of space for the valve wrench to operate, gear-operator handwheels shall be provided in lieu of the wrench.

7. Plug valves shall be manufactured by DeZurik, McWane or approved equal.

B. Check Valves

1. All check valves three inches and above, unless indicated otherwise, shall be swing check, iron body and bronze-mounted. Valve shall be designed for the purpose and operating conditions shown on the plans and meet a minimum working pressure of 150 psi and shall be factory-tested to double that pressure prior to shipment. The valve shall have a removable cover for inspection and removal of the disc assembly.

2. Ends of check valves shall be of the type conforming with the pipeline where installed. Discs shall be fully revolving and designed to swing freely without jamming in the open position.

3. Check valve bodies shall provide excess area through the valves to assure full delivery of line capacity. Unless otherwise required, all check valves shall be furnished with outside weighted levers.

4. Check valves shall be as manufactured by Mueller, M&H, or Kennedy. These are the only manufacturers that will be accepted on this project. No substitutions will be allowed.

C. Resilient Seated Gate Valves

1. Gate valves shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 of latest revision and in accordance with the following specifications. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.

2. The valves are to be non-rising stem with the stem made of cast, forged or rolled bronze shown in AWWA C509. The stem seals shall be provided and shall be of the O-ring type, one above and one below the thrust collar.

3. The sealing mechanism shall consist of a cast iron gate having a vulcanized synthetic rubber coating, or natural rubber seat ring. The resilient sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.

4. The valve body, bonnet, and bonnet cover shall be cast iron ASTM A126, Class B. All ferrous surface inside and outside shall have a fusion-bonded epoxy coating in accordance with AWWA C-550. A handwheel shall be provided for operating the valve. All valves are to be tested in strict accordance with AWWA C509.

5. Gaskets for Flanges: Gaskets for flanged valves shall be described in the piping specification.

6. Valve Field Testing: Operate manual valves through two full cycles of opening and closing. Valves shall operate from full open to full close without sticking or binding. If valves stick or bind, repair or replace the valve and repeat the tests.

7. Valves shall be equal to those as manufactured by American M&H, Kennedy, Mueller, or equal.

13.05 BACKWATER VALVES WITH EXTENSION KIT

All thermoplastic valves shall be Backwater type constructed from PVC Type I, ASTM D 1784 Cell Classification 12454. All Valve Seats shall be EPDM. All valves shall have external Arrow Flow Indicator. All valves shall be pressure rated to 43 psi (100 feet of Head) for water @ 73°F as manufactured by Spears Manufacturing Company.

Available as a complete unit, with or without valve, factory assembled to internal flap assembly, extension pipe, and external extension housing with top access adapter in convenient Increments of 12", 16", 20", 24", 36", and 48" (measured from top of valve to top of extension). All extension kits can be cut shorter in the field for custom fits. Also available as Extension Components Kits, with or without valve for assembly with user-supplied Class 125 or Schedule 40 pipe. Kits without valve require use of existing valve top Access Plug, all kits require solvent cement assembly to valve. Contact Spears® for pricing on custom cut lengths.

13.06 MISCELLANEOUS FITTINGS

This subsection provides for the furnishing and installing of miscellaneous pipe fittings and "specials."

Pipe for Use with Couplings:

A. Flexible Connections: Where flexible connections in the piping are specified or indicated on the plans, they shall be obtained by the use of sleeve-type couplings, split couplings or mechanical joint pipe and/or fittings as herein specified.

B. Sleeve-Type Couplings:

1. To insure correct fittings of pipe and couplings, all sleeve-type couplings and accessories shall be furnished by the supplier of the pipe and shall be of a pressure rating at least equal to that of the pipeline in which they are to be installed. Sleeve-type couplings shall be made by Dresser Manufacturing Division, Rockwell International, or be approved equivalent products.

2. Non-insulating couplings for buried pipe shall be of cast iron and shall be Dresser Style 53, Rockwell #431, or approved equivalent products. The couplings shall be provided with 304 stainless steel or monei bolts and nuts.

3. Mechanical joint "cutting-in sleeves" for buried pipe shall be of cast iron and shall be McWane style F-1220, or approved equal. The gland shall be provided with set screws. All bolts and nuts shall be 304 stainless steel.

4. Insulating couplings for buried pipe shall be of cast iron and shall be Dresser Style 39, Rockwell #438, or an approved equivalent product. The couplings shall be provided with 304 stainless steel bolts and nuts.

5. Couplings for exposed pipe shall be of steel and shall be Dresser Style 38, Rockwell #411, or approved equivalent products. The couplings shall be suitable for installation on ductile iron pipe and provide with low carbon alloy steel bolts and nuts, center stops and harnesses as required.

6. All non-insulating couplings shall be furnished with the pipe stop removed.

7. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.

C. Flange Adapter Couplings: Couplings shall be of the size and pressure rating required for each installation and shall be suitable for use on ductile iron pipe, similar and equal to Dresser Manufacturing Division, Style 127 or Rockwell #912 for pipe up to 12 inches in diameter. Larger pipe shall be approved and equal to Dresser Style 128, Rockwell #913.

D. Flanged Fillers: The Contractor shall provide suitable flange fillers where the layout of the flanged piping is such as to necessitate their use. In materials, workmanship, facing and drilling, such rings shall conform to the ANSI standard for flanged pipe. Filling rings shall be of suitable length with non-parallel faces and corresponding drilling if necessary, to insure correct assembly of the adjoining pipe or equipment.

E. Tapped Connections: Tapped connections in pipe and fittings shall be made in such a manner as to provide a watertight joint and adequate strength against pullout. The maximum size of taps in ductile iron pipe or fittings without bosses shall not exceed that listed in the appropriate table of the Appendix to AWWA Standard C 151/ANSI Standard A21.51 based on three full threads for cast iron and two full threads for ductile iron. Pipe taps shall be at bosses where available.

F. Pressure Gage Cocks: Gage cocks shall be furnished with a brass body and plug, and operate by a tee handle. They will be furnished with ¼-inch female national pipe threads on both ends. Two ¼-inch by 2-inch brass nipples and one ¼-inch brass 90° elbow shall also be furnished and installed as shown on the Plans.

G. Ductile Iron Flange Adapter: Flange adapters shall be used in lieu of threaded flanges where called out on the drawings. The flanges shall be cast from 60-42-10 as cast iron per ASTM 536-77 and shall have bolt circles and bolt holes to most ASNI B16.1 – 125 lbs. These flanges shall contain set screws made from ductile iron. The screws shall have a Rockwell hardness of C40-45 converted from Brinnell. Flange adapters shall be as manufactured by EBAA Iron, Inc., Series 1000, or an approved equal.

H. Mechanical Joint Ductile Iron Retainer Glands: Retainer glands shall be used for underground pipe joints as called out on the Plans. They shall be designed to fit standard MJ bells with standard T-head bolts conforming to ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53 of latest revision. Glands shall be manufactured of ductile iron conforming to ASTM A536-80 grade 60-42-10. Set screws shall be hardened ductile iron and required the same torque in all sizes. Stud set screws are not permitted. These devices shall have the stated pressure rating with minimum safety factor of 2:1 and shall be EBAA Iron, Inc., Series 1200, or approved equal.

13.07 CARBON VENT PIPE

All PVC vent pipes for lift stations must have a passive carbon odor treatment system. Vent shall be GENERAL CARBON's **VENT PURE "G"** or approved equivalent. Unit shall be designed for 4" vent pipe and contain 10 lbs of activated carbon to keep chemical odors from escaping through atmospheric vents.

Unit shall be made from PVC for chemical resistance and can be mounted upright or inverted.

13.08 MANUAL OPERATORS

General Requirements

A. Operator force not to exceed 40 pounds under any operating condition, including initial breakaway. Gear reduction operator when force exceeds 40 pounds.

B. Operator self-locking type or equipped with self-locking device.

C. Position indicator on quarter-turn valves.

D. Worm and gear operators one-piece design worm-gears of gear bronze material. Worm hardened alloy steel with thread ground and polished. Traveling type nut operators threaded steel reach rods with internally threaded bronze or ductile iron nut.

Exposed Operators

A. Galvanized and painted handwheels.

B. Lever operators allowed on quarter-turn valves 8 inches and smaller.

C. Cranks on gear type operators.

D. Chain wheel operator with tiebacks, extension stem, floor stands, and other accessories to permit operation from normal operation level.

E. Valve handles to take a padlock, and wheels a chain and padlock.

13.09 TESTING

Field valve testing, while testing pipelines or as a separate step shall be performed. Test that valves open and close smoothly with operating pressure on one side and atmospheric pressure on the other, in both direction for two-way valve and applications.

Count and record the number of turns to open and close valves; account for any discrepancies with manufacturer's data.

END OF SECTION

SECTION 14 – PAINTING

14.01 GENERAL

Painting materials for each system shall be manufactured by one manufacturer. Painting materials not obtainable from the prime manufacturer shall be obtained from a second source recommended by the prime manufacturer for compatibility. All products furnished shall meet current Federal Regulations for lead, mercury and other heavy metals, as well as current VOC air quality regulations. Products of the following acceptable manufacturers may be used on this project, except where noted otherwise.

A. Ameron – Corrosion Control Division

B. Devoe & Raynolds Company

C. Indurall

D. KopCoat –RPM

E. MAB Paints

F. PPG Industries, Inc.

G. Rust-Oleum Corporation

H. Sherwin-Williams

I. Tnemec Company, Inc.

The Contractor shall paint or provide a protective coating for all interior and exterior wood and metal surfaces, all interior masonry, valves, and all submerged piping and other metal, whether specifically called for or not. In addition, all exposed piping shall be painted and further identified in accordance with other sections of these specifications. Because of their very nature, some areas or items do not require specific painting or coating for protection or appearance. The following generally do not require painting or coating unless specifically noted otherwise or required by manufacture, color coding, insulation from dissimilar metals, insulation from concrete or cement products, or architectural considerations:

A.	Non-Ferrous Alloys:	Aluminum Monel Stainless Steel
B.	Corrosion Resistant Metals:	Chromium Plated Steel Weathering Steel Galvanized Steel
C.	Non-Metallic Materials:	Exterior Brick Concrete Glass Plastic &FRP PVC Porcelain

D. Pre-Finished Manufactured Items:
- Cabinets
- Louvers
- Motor Control Centers
- Panels
- Signs and Nameplates
- Switchgear
- Switchboards
- Transformers
- Tile

E. Electrical Conduits Attached to Unpainted Surfaces.

F. Insulation and Insulation Jackets.

All exposed piping and conduit within the fence enclosure shall be color-coded in accordance with the following Color Coding Schedule:

A.	Electric	Gray
B.	Gas, Oil, Dangerous Materials	Red
C.	Telephone, Telegraph, Television, Communications	Safety Alert Orange
D.	Potable Water	Safety Blue
E.	Treated Sewage	Safety Green

Other paint colors will be selected by the Engineer

All materials shall be pure and first quality. Materials listed shall be the standard for each such type of material. Primers and finish coats shall be compatible and of the same manufacture where possible. Emulsion and alkyd paints shall contain a mildewcide, and both the paint and mildewcide shall conform to OSHA and Federal requirements, including Fed. Spec. TT-P-19.

14.02 PAINTING SCHEDULES AND SYSTEMS

Painting and coating of surfaces shall conform to the following schedules and systems, unless otherwise specified or shown on the drawings:

A. Schedule A: System 1 – Exposed exterior structural and miscellaneous steel, piping, equipment to include all stainless steel and carbon steel electrical control cabinets non-submerged, not exposed to corrosion, splash, fumes or immersion conditions.

1. Prime: One sprayed coat of a combination of a two-part epoxy primer, gray, of 3.0 mils, minimum dry film thickness as by Devoe Paints, Tru-Glaze Epoxy Primer Nos. 12735 and 12702 (ratio 19:1) or equal. If shop coat is damaged, re-prime bare areas in the field. The exterior of electrical cabinets, in stainless steel, shall be sand-blasted and spray-primed per the paint manufacturer's instructions.

2. Finish: Two coats of "hanging moss green" (Devoe Paints FX-70), Semi-Gloss Advanced Technology Acrylic Resin of 1.5 to 2.0 mils, dry thickness as Exterior Waterborne Semi-

Gloss Enamel #83XX by Devoe Paints, or equal. Coats to be applied by spray painting in the shop.

B. Schedule B: System 2 – Piping and pumping equipment – submerged or non-submerged, exposed to spray, splash or corrosive atmosphere, excluding chains and sprockets, and stainless steel bracing in the wetwell:

1. Prime: One coat chemical resistant red iron oxide, based on a polyamide cured epoxy resin, minimum of 3.0-5.0 mils dry film thickness as by Devoe Paints, Devron 201. If shop coat is damaged, re-prime bare areas in the field.

2. Finish: Two coats of polyamide cured, epoxy resin coating, minimum of 4.0-6.0 mils dry film thickness per coat as by Devoe Paints, Devron 224HS-color, moss green as required above.

C. Schedule C: System 3 – Non-Potable water exposed concrete surfaces inside valve vaults, meter vaults, and sanitary sewer manholes.

1. Coal Tar Epoxy (Non-Potable Only)

Must be recoated within four days at 75deg F. Higher temperature will shorten recoat time.

Surface Preparation: Brush-Off Blast Cleaning

1st Coat: 46-413 Tnemec Tar	8.0 - 10.0 mils
2nd Coat: 46-413 Tnemec Tar	8.0 - 10.0 mils

D. Schedule D: System 4 – Lift Station wetwell concrete must be rehabilitated and coated per specification section, “Cementitious Rehabilitation.”

14.03 EXECUTION

All painting shall be done by skilled and experienced craftsmen and shall be of highest quality workmanship. Application of materials shall be done only on properly prepared surfaces as herein specified.

Before commencing work, the painter shall make certain that surfaces to be covered are in good condition. Should the painter find such surfaces not to be totally acceptable for covering, he shall report such fact to the Engineer. The application of paint shall be held as acceptance of the surfaces and working conditions and the painter will be held responsible for the results reasonably expected from the materials and processes specified.
Hardware, hardware accessories, machined surfaces, nameplates giving manufacturer’s data, cover plates, grease fittings, lighting fixtures and similar items in contact with painted surfaces and not to be painted shall be removed, masked, or otherwise protected prior to surface preparation and painting operations so they remain clean and free from paint.

Ferrous metals (not shop primed) shall be sandblasted per SSPC-SP6 to remove mill scale and rust. Ferrous surfaces to be submerged or exposed to spray, splash, fumes or corrosive atmosphere shall be sandblasted to near-white metal blast cleaning according to SSPC-SP 10. Brush blast or clean other metals as appropriate to provide suitable surface. Surface profile as obtained from sandblasting shall be recommended by the coating manufacturer. All metal surfaces shall be completely degreased by solvent cleaning in compliance with SSPC-SP 1.

Galvanized surfaces shall be cleaned of dirt, grease and other foreign substances and solvent cleaned. Surfaces shall be pro-treated with one coat of proprietary acid bound resinous or crystalline zinc phosphate preparation, used in accordance with the manufacturer's directions.

Remove glaze, of florescence, dirt, loose particles and grease (and existing paint, if applicable) from concrete receiving masonry paint. Fill all cracks, cut out defective joints and repaint.

In addition to the above listed surface preparations, all dirt, rust, scale, splinters, loose particles, disintegrated paint grease, oil and other deleterious substances shall be removed from all surfaces that are to be coated.

Work shall be done only under favorable weather conditions and as recommended by paint supplier. Exterior painting shall be done only in dry weather. Any surface coating damaged by moisture or rain shall be removed and redone as directed by the Engineer. Coatings shall be mixed, thinned, tinted and applied in accordance with the manufacturer's recommendations. The Contractor shall tint or match colors as selected by the Owner. A sample shall be applied on the job for review and approval before work is actually done. No thinners shall be used except those specifically mentioned and only in such quantity as directed by the manufacturer's instructions. If thinning is used, sufficient additional coat shall be applied to assure the required dry film thickness is achieved.

The manufacturer's recommended thinner or cleanup solvent shall be used for all cleanup. Application by brush, spray, airless spray or roller shall be as recommend by the manufacturer for optimum performance and appearance. Paint shall be applied in a neat manner with finished surface free of runs, sags, ridges, laps and brush marks.

Each coat shall be applied in a manner that will produce an even film of uniform and proper thickness, and no variation in sheen or color. Where more than one coat of paint is specified, each coat shall be sufficiently tinted to result in a perceptible difference in shades of the various coats of paints so that the application of subsequent coats can be properly and uniformly spread and inspected. Provision shall be made to allow thorough drying between coats as recommended by the manufacturer before the next coat is applied, and paint used in successive field coats shall be produced by the same manufacturer.

Seal coats shall be used over bitumen-coated surfaces as applicable. Plastic pipe shall be painted in accordance with the pipe manufacturer's recommendations. Pipes, shoot metal ducts and other metal items which are to be installed in inaccessible locations shall be painted prior to installation.

Pumps, motors, machinery, equipment, electrical panels and other manufactured items shall have surfaces prepared, primed and coating in accordance with the recommendations of the manufacturer, and be given at least one touch-up coat with the intermediate coat material and one compete finish cost in the field.

The prime and intermediate coats for the various coating systems shall be as specified earlier, and shall be compatible with the field coat or coats. Paint used in the first field coat over shop painted or previously painted surfaces shall cause no wrinkling, lifting or other damage to underlying paint.

All completed surfaces will be checked by the Engineer, and the Contractor shall provide the necessary properly calibrated gages. All non-ferrous surfaces shall be checked for number of coats and thickness by use of a Tooke gage. All ferrous surfaces shall be checked for film thickness by use of Elcometer or Micro-Test magnetic dry film gauge properly calibrated. All defects shall be corrected to the satisfaction of the Engineer.

All paint brushed, splattered, spilled, or splashed on any surface not specified to be painted shall be removed. Upon completion of the painting work, the Owner shall be furnished one (1) gallon of each type and color of finish paint for touching up at no additional cost. Paint container labels, in addition to other required information, shall have location of color and type marked thereon.

Surfaces to be painted shall be inspected before any paint materials are applied, and after preparation has been completed.

Painted surfaces shall be inspected between coats, prior to application of next coat of painting material. Failure to get acceptance between coats will nullify credits for coats previously applied.

All paint shall be delivered to the job site in unopened original containers.

All paint not intended for the job shall be removed from the job site.

END OF SECTION

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SECTION 15 – WET WELL REHABILITATION

GENERAL

15.01 SCOPE

A. Wet well rehabilitation shall be accomplished by the application of materials that will improve the overall structural condition of the wet well. The intent of this portion of the work is to provide for aspects of wet well 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 wet well scheduled for rehabilitation.

1. Wet well Preparation: These work items include cleaning the wet well, sealing walls, and patching the interior surfaces.

2. Wet well Repairs -Critical Leak Areas: These work items include repairing leaks in the wall to base areas, pipe penetrations, and wet well joints.

3. Wet well Liners: These work items include installation of cementitious liners, cementitious/polymeric 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.

15.02 SUBMITTALS

A. With the bid, the following submittals are required:

1. Name, business address, and telephone number of the wet well Rehabilitation CONTRACTOR.

2. The name of the wet well lining product suppliers and a list of materials to be furnished, as well as CONTRACTOR's experience with the specified wet well lining products (number of years installing the products, number of wet wells lined with the products, and list of references going back five years including customer names, addresses, telephone numbers, and number of wet wells). Where the CONTRACTOR proposes to utilize a sub-contractor to apply a wet well lining product, submit all required information for the sub-contractor as well.

3. Five years of previous related experience, as documented by verifiable references, shall be required to be qualified in bidding this project. The Contractor performing the work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner and shall be an

approved installer of the wet well lining systems as certified and licensed by the manufacturers.

4. The Owner reserves the right to approve or disapprove the Contractor, based on the submitted qualifications.

PRODUCTS

15.03 WET WELL FRAMES AND COVERS

A. All wet well frame and cover material and installation requirements shall be as indicated in the Drawings.

15.04 RUBBER SEALS

A. The wet well frame-chimney joint area of wet wells and the precast wet well barrel joints shall be sealed with internal flexible rubber seals meeting the following requirements.

B. Internal rubber seals used for sealing the joints between the wet well 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 4B±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 wet well 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.

15.05 PREPATORY INFILTRATION CONTROL PRODUCTS

A. Infiltration Control/Plugging Material

1. Prior to installing the wet well lining system, active infiltration shall be controlled according to the specifications of the lining manufacturer. Infiltration control materials shall be rapid-setting, high early strength, hand applied cementitious material for stopping infiltrating water and making repairs to concrete, brick or other masonry constructed wet wells. The material shall be non-shrinking, non-metallic and non-corrosive. It shall be formulated at the factory and supplied in factory sealed and labeled pre-measured containers. The material shall be compatible with the lining material to be used. The material shall have the following minimum characteristics:

a.	Comprehensive Strength	ASTM C109	600 psi at 1 hour 2,400 psi at 24 hours
b.	Expansion	ASTM C827	0.10 percent
c.	Set Time	ASTM C191-92	45 to 60 Seconds

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. The chemical grout shall be compatible with the lining material to be used.

C. Patching Material

1. Voids in the existing wet well walls or damaged inverts must be repaired prior to installing the wet well lining system. The patching material shall be a rapid setting, high early strength, corrosion resistant hand mixed and hand applied cementitious material intended for filling voids and repairing inverts in concrete, brick or other masonry constructed wet wells. It shall be formulated in the factory and supplied in factory sealed and labeled pre-measured containers. The material shall be compatible with the lining material to be used. The material shall have the following minimum characteristics:

a.	Compressive Strength	ASTM C109	2,000 psi at 24 hours
b.	Shrinkage	ASTM C596	0% at 90% relative humidity
c.	Set time	ASTM C191-92	3 to 5 minutes

15.06 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. Both cement and aggregate within mortar must be fused with calcium aluminate producing at 100% pure calcium aluminate mortar. 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 wet well surfaces, including the bench, and shall have the following minimum requirements at 28 days:

a.	Compressive Strength	ASTM C109	>8,000 psi
b.	Tensile Strength	ASTM C496	>600 psi
c.	Flexural Strength	ASTM C 293	>800 psi
d.	Shrinkage	ASTM C 596	0% @95%R.H.
e.	Bond	ASTM C 882	>1,000 psi
f.	Applied Density		125 pcf ± 5 lbs

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.

15.07 HIGH DENSITY POLYETHYLENE (HDPE) LINER MATERIAL

A. The CONTRACTOR shall furnish and install all labor, materials, equipment, and incidentals required to rehabilitate existing wet wells 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 wet wells 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-welder's 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/cm3
Melt Flow Index	ASTM D 1238	0.7-1 .0 g/10 min. (190/5)
Heat Reversion	ASTM D 1637	<2 %
Yield Stress	ASTM D 638	≥ 2,320 psi
Elongation at 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^2
Max Working Temp		140 Degrees F

H. Studded HDPE liner sheets used for wet well rehabilitation shall have a minimum design thickness of 2 mm (0.079 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 wet well structure.

15.08 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. Wet well seal shall be designed to prevent leakage of water into the wet well through the frame joint area and the area above the wet well 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 ash landfill environments. It shall have the following properties:

Property	Test Method	Value
Movement Capability	ASTM C 719	50%
Tensile Strength	ASTM D 412	1,100 psi
Adhesive Strength	ASTM D 903	1751b/in
Tear Resistance	ASTM D 1004	165 1b/in
Ultimate Elongation	ASTM D 412	750%
Hardness (Shore A)	ASTM C 661	50
Low Temperature (Flexibility @ -4"F)	ASTM D 1790	Pass
Heat Aging	ASTM C 920	2%
Shelf Life @70°F in sealed containers		9 months

Recovery	ASTM C 920 98%
Bond Durability	Test Blocked at 25% for 48 hours
Water Immersion	Samples on masonry block will withstand water immersion while elongated 50%

B. A primer coat of 2-3 mils thickness shall be applied to the prepared surface. The primer shall have the following properties:

Property	Test Method	Value
Tensile Strength	ASTM D 412	3,000 psi
Elongation	ASTM D 412	400%
Adhesive Strength	ASTM D 903	350 lb/in
Tear Resistance	ASTM D 1004	220lb/in
Hardness	ASTM D 2240	85

C. 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.

15.09 CEMENTITIOUS AND POLYMERIC COATING SYSTEMS

A. Cementitious Coating

1. The material applied onto the surface of the wet well shall be a microsilica and fiber enhanced cement mortar repair product formulated for the application within waste water 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:

Property	Test Method	Value
Compressive Strength	ASTM C 109	9,000 psi at 28 days
Tensile Strength	ASTM C 496	700 psi at 28 days
Flexural Strength	ASTM C 78	1,000 psi at 28 days
Shrinkage	ASTM C 596	0 percent at 28 days, 90 percent relative humidity
Shear Bond	ASTM C 882	> 1,000 psi

Freeze/Thaw Resistance	ASTM C 666	Method A = 100 cycles, no visible damage

2. The cured cementitious base coat shall be continuously bonded to all the brick, mortar, concrete, chemical sealant, grout, pipe and other surfaces inside the wet well. The cementitious base coat shall be applied to the following minimum total thicknesses:

   a. For block and cast concrete wet wells in good condition, apply to a minimum thickness of 0.5 inch.

   b. For all brick wet wells and for block or cast concrete wet wells in poor condition, apply to a minimum thickness of 1.0 inch.

B. Polymeric Coating

1. The topcoat material shall be 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.

2. The product shall conform to the following minimum physical characteristics:

Property	Test Method	Minimum Valve
Compressive	Strength ASTM 0695	9,000 psi
Flexural Strength	ASTM 0790	6,000 psi
Tensile Strength	ASTM 02370	4,000 psi
Adhesion Strength	ACI503R Appendix A	300 psi

3. The polymeric material shall be suitable for all the specified design conditions. The polymeric material shall be compatible with the base coat material, as per manufacturer's recommendations.

4. The polymeric material shall be self-priming; moisture tolerant to moisture levels of concrete up to 90 percent; able to react/perform in the presence of water; able to tie back into itself, overcoat or repair itself indefinitely with proper preparation; and capable of curing properly within the specified environment within a short time period.

5. The polymeric lining system shall be installed over the cementitious base coat previously applied on the walls of the designated wet wells. The polymeric liner shall be applied only after the cementitious base coat has set sufficiently, per manufacturers recommendations.

6. When cured, the monolithic polymeric lining shall form a continuous, tight-fitting, hard, impermeable surfacing which is suitable for waste water management

system service and chemically resistant to any chemicals or vapors normally found in waste water. The polymeric lining shall be continuously bonded to the base coat. The cured surface of the polymeric liner shall be smooth and continuous with proper sealing connections to all unsurfaced areas.

7. The polymeric lining shall be installed so as to overlap the bottom of the wet well cover frame by a minimum of 1 inch. The lining shall be continuously bonded to the wet well cover frame around the circumference of the frame. Where the cementitious base coat has been stopped below the wet well frame in traffic areas, additional polymeric material shall be applied to the gap to bring the final surface flush with the surrounding top coat material.

8. The polymeric top coat materials shall be applied to the minimum dry film thickness of 100 mils (0.10 inches).

9. Any polymeric lining system that has failed the testing program conducted by the County Sanitation Districts of Los Angeles County (the Redner Tests) will not be allowed.

C. Other Materials

1. No other materials shall be used with the above mixes unless approved by the manufacturers and acceptable to the OWNER.

EXECUTION

15.10 GENERAL

A. 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. The CONTRACTOR shall be aware of the presence of hydrogen sulfide (H_2S) within and around the waste water collection system. Hydrogen sulfide is a colorless gas known for its pungent "rotten egg" odor at low concentrations. It is extremely flammable and highly toxic. Because it is heavier than air, hydrogen sulfide can collect in low-lying and enclosed spaces, such as wet wells, sewers, and underground telephone vaults. Its presence makes work in confined spaces potentially very dangerous.

The health effects of hydrogen sulfide depend on how much of the gas a worker breathes and for how long. However, many effects are seen even at low concentrations. Effects range from mild, headaches or eye irritation, to very serious, unconsciousness and death.

The CONTRACTOR shall provide air circulation equipment, air monitoring devices, and supplied air respirators or self-contained breathing apparatus as recommended by OSHA in Title 29, C.F.R. Section 1910.

C. Prior to beginning work, the ENGINEER will visually inspect the wet well and confirm the repair procedure to be used.

15.11 PREPARATION

A. General:

1. All wet wells listed for repairs shall 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.

2. The wet well surface and any exposed rebar shall be sandblasted to remove any loose material and rust.

3. The CONTRACTOR shall clean all accumulations of debris, such as dirt and grease, loose mortar, bricks and concrete, and dispose of properly.

4. The wet well 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 wet well may require the use of an environmentally safe degreasing compound; if so, the surface shall be thoroughly rinsed to eliminate any residue.

5 .All existing wet well rungs/steps shall be removed and the void patched or cut off and ground smooth.

6. When a cementitious liner or cementitious/epoxy liner is called for in the Work Order, wet well 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 wet well 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.

B. Sealing of Wet wells Walls:

1. After the completion of the cleaning operation, wet well 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 wet wells. 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 Wet wells): At each point of leakage within the wet well structure, a hole shall be carefully drilled from within the wet well and shall extend through the entire wet well wall. In cases where there are multiple leaks around the circumference of the wet well, 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 wet well 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 wet well walls or other surfaces. The mortar used shall be a nonshrink patching mortar.

      iii. Sealing Procedures (Brick and Block Wet wells): When chemical grouting is used to seal random or isolated leaks or leaking

sections of a brick or block wet well, it shall be done in accordance with section B.1.c.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 wet well 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 0.5 inches and patched with nonshrink patching mortar.

15.12 WET WELL LINERS

A. Cementitious Liner (Spray or Spin Applied): On those wet wells 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 wet well 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 0.5 inches.

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 inches. 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 1 inch. The wall I 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.

d. Where the wet well to be rehabilitated is subject to vehicular traffic, the cementitious lining shall be installed to no closer than 1 inch below the bottom of the wet well frame so as to avoid transfer of impact loads to the new liner. Where the wet well to be rehabilitated is not subject to vehicular loads, the cementitious liner shall be continuous up to the wet well frame.

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 wet well 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 wet well 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 wet wells 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 wet well 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 wet well cone, including all extension to the chimney area. Cost for this item shall be included in the bid item for cementitious wet well 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 proper1y 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: This shall be installed on wet wells indicated by the OWNER.

1. It is the intent of this portion of the specification to provide for reconstruction of the wet well by the utilization of a pre-fabricated thermo-welded liner. The liner shall continuously cover the exposed surfaces of the wet well and provide structural enhancement and corrosion resistance.

2. The existing wet well 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 wet well wall surface shall be cleaned to remove corroded and loose material and check for through wall leaks and repair if needed.

3. n wet wells with a concrete base, drill hole up to %-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 wet well 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 wet well. 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 %-inch thickness. The alternate application shall be pre-approved by the OWNER.

4. The existing bench and invert shall be removed so that the liner can be extended to, and cover, the bottom of the wet well. Flow channel and benches shall be reconstructed after liner installation.

5. The HDPE liner shall continue from the cone section to include the chimney up to the existing wet well 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 wet well walls. The HDPEHDPE/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 wet well walls.

6. The following steps shall be followed for the installation of wet well liners:

a. Insert pre-fabricated 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 wet well. 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 / Polymeric Liners

1. Those wet wells identified by the OWNER shall be coated with an extremely low shrinkage cementitious repair product to waterproof and enhance the structural integrity of the wet well and then polymeric topcoat for corrosion protection after the wet well has been properly prepared.

2. The material used shall be designed, manufactured, and intended for wet well 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.

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 wet well 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 wet well 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. The CONTRACTOR shall furnish and place the cementitious base coat in each wet well as and where directed by the OWNER. The installation and curing of the base coat shall be in complete accordance with the manufacturers' specifications.

i. Prior to placing the base coat, the OWNER and the CONTRACTOR must inspect and approve the surface preparation work. The CONTRACTOR shall notify the OWNER when the wet wells are ready for inspection. The CONTRACTOR is responsible for ensuring proper installation conditions including surface preparation, temperature and moisture.

ii. All bottom and horizontal surfaces shall have the base coat material applied to the required thickness by hand troweling or spray-on methods. All cementitious linings shall be troweled smooth after application.

iii. All side vertical surfaces shall have the cementitious base coat applied to the required thickness in one pass or application. Non-vertical surfaces may be completed in multiple passes to prevent sloughing of material.

iv. Temperature limitations must be handled as appropriate and as approved by the manufacturer.

b. Where the wet well to be rehabilitated is subject to vehicular traffic, the cementitious lining shall be installed to no closer than 1 inch below the bottom of the wet well frame so as to avoid transfer of impact loads to the new liner. Where the wet well to be rehabilitated is not subject to vehicular loads, the cementitious liner shall be continuous up to the wet well frame.

7. Polymeric Topcoat Application

a. The Contractor shall furnish and place polymeric lining as a top coat over the previously installed cementitious base coat in each wet well as and where directed by the OWNER. The installation and curing of the polymeric lining top coat shall be in complete accordance with the applicable provisions of the manufacturers' specifications.

i. Prior to placing the top coat, the OWNER and the CONTRACTOR must inspect and approve the base coat. The CONTRACTOR shall notify the OWNER when the wet wells are ready for inspection. The Contractor is responsible for ensuring proper installation conditions including base coat conditions, temperature and moisture.

ii. All surfaces shall have the monolithic polymeric lining applied by a spray-on method or by hand troweled applications in multiple passes to gradually build up to the required thickness.

Iii. CONTRACTOR shall regularly perform and record polymeric coating thickness readings with a wet film thickness gauge to ensure uniform thickness during application.

iii. Temperature limitations must be handled as appropriate and as approved by the manufacturer.

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.

15.13 FRAME AND COVERS REPAIRS (REPLACEMENT)

A. Work Orders will identify one of the following repairs:

1. Realign, Grout, and Seal Wet well 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 o

   Where vertical realignment is required, grade rings may be required in order to raise the wet well frame and cover to the existing grade elevation. A minimum of seven (7) days after the wet well casting has been realigned and grouted, the CONTRACTOR shall install an aromatic urethane internal wet well sealing system through the frame-joint area.

2. Replace Wet Well Access Hatches: 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 wet well wall as described in Paragraph 1 entitled "Realign, Grout, and Seal Wet well Casting (Frame)" above. A minimum of seven (7) days after the wet well casting has been realigned and grouted, the CONTRACTOR shall install an aromatic urethane internal wet well sealing system through the frame-joint area.

15.14 TESTING

A. After the specified rehabilitation work has been completed, the wet wells shall be visually inspected and tested in accordance with manufacturer's testing procedures by the CONTRACTOR in the presence of the OWNER and found to be acceptable. The wet well environment shall be properly vented prior to testing to ensure hazardous conditions do not exist.

   1. Visual Inspection:

      a. All rehabilitated wet wells shall be visually inspected for water tightness against leakage of water into the wet well. All visible leaks and defects observed during the inspection shall be repaired to the OWNER's satisfaction at no additional cost to the OWNER. There shall be no visible infiltration.

      b. All pipe connections shall be open and clear.

c. There shall be no cracks, voids, pinholes, uncured spots, dry spots, lifts, de-laminations or other type defects in the lining.

d. The polymeric lining top coat shall provide a continuous monolithic surfacing with uniform thickness throughout the wet well interior and be free of pinholes, slumps and drips.

2. Exfiltration Testing:

a. Incoming and outgoing pipes shall be plugged, the plugs restrained and the wet well filled with water to the top of the wet well frame. A soaking period of up to one hour will be allowed if bypassing of the is not required or has been provided for. At the end of this optional soaking period, the wet well 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 wet well 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 wet well.

b. Exfiltration testing shall be done on 10 percent of the wet wells, or on one (1) wet well, 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 polymeric coating.

iii. HDPE liner.

c. Wet wells that fail the exfiltration test shall be reworked and retested by the Contractor at no additional compensation and additional wet wells will be retested at the Contractor's expense. Any wet wells 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 polymeric 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 wet well wall shall be leak-free, smooth and free of honeycomb or areas of segregated aggregate.

b. The HDPE plastic liner shall be securely embedded into the concrete to produce a continuous protective barrier.

c. Polymeric 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. All repair procedures shall follow manufacturer's recommended procedures. Inspection and testing shall be performed by the Certified Applicator in the presence of the OWNER.

B. Field acceptance of the polymeric wet well lining system shall be based on the OWNER's evaluation of the appropriate installation of the base coat and top coat per field inspections and on observation of the measurements of the wet film thickness. Acceptance shall also be based on the OWNER's evaluation of the curing test data and final testing.

C. If any defective lining is discovered after it has been installed, it shall be repaired or replaced in a satisfactory manner within a 72-hour period and at no additional cost to the OWNER. This requirement shall apply for the entire guarantee period.

END OF SECTION

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SECTION 16 - PAY ITEM DESCRIPTIONS

16.01 SCOPE

A. The scope of this section of the Contract Documents is to further define the items included in each Pay Item in the Bid Form section of the Contract Documents. Payment will be made based on the specified items included in the description in this section for each Pay Item.

B. All contract prices included in the Bid Form section will be full compensation for all shop drawings, working drawings, labor, materials, tools, equipment and incidentals necessary to complete the construction as shown on the Drawings and/or as specified in the Contract Documents to be performed under this Contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction in the manner set up for each item in this section of the Specifications. Payment for all items listed in the Bid Form will constitute full compensation for all work shown and/or specified to be performed under this Contract.

16.03 ESTIMATED QUANTITIES

The quantities shown are approximate and are given only as a basis of calculation upon which the award of the Contract is to be made. The City does not assume any responsibility for the final quantities, nor shall the Contractor claim misunderstanding because of such estimate of quantities. Final payment will be made only for satisfactorily completed quantity of each item.

16.04 WORK OUTSIDE AUTHORIZED LIMITS

No payment will be made for work constructed outside the authorized limits of work.

16.05 MEASUREMENT STANDARDS

Unless otherwise specified for the particular items involved, all measurements of distance shall be taken horizontally or vertically.

16.06 AREA MEASUREMENTS

In the measurement of items to be paid for on the basis of area of finished work, the lengths and/or widths to be used in the calculations shall be the final dimensions measured along the surface of the completed work within the neat lines shown or designated.

16.07 LUMP SUM ITEMS

Where payment for items is shown to be paid for on a lump sum basis, no separate payment will be made for any item of work required to complete the lump sum items.

Lump sum contracts shall be complete, tested and fully operable prior to request for final payment. Contractor may be required to provide a break-down of the lump sum totals.

16.08 UNIT PRICE ITEM

Separate payment will be made for the items of work described herein and listed on the Bid Form. Any related work not specifically listed, but required for satisfactory completion of the work shall be considered to be included in the scope of the appropriate listed work items.

No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work. Final payments shall not be requested by the Contractor or made by the City until as-built (record) drawings have been submitted and approved by the City.

1. Shop Drawings, Working Drawings.
2. Clearing, grubbing and grading except as hereinafter specified.
3. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
4. Dewatering and disposal of surplus water.
5. Structural fill, backfill, and grading.
6. Replacement of unpaved roadways, and shrubbery plots.
7. Cleanup and miscellaneous work.
8. Foundation and borrow materials, except as hereinafter specified.
9. Testing and placing system in operation.
10. Any material and equipment required to be installed and utilized for the tests.
11. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
12. Maintaining the existing quality of service during construction.
13. Maintaining or detouring of traffic.
14. Appurtenant work as required for a complete and operable system.
15. Seeding and hydro mulching.
16. As-built Record Drawings.

16.09 PAY ITEMS

PAY ITEM NO. 1– MOBILIZATION

Measurement and payment for this Pay Item shall include full compensation for the required 100 percent (100%) Performance Bond, 100 Percent (100%) Payment Bond, all required insurance for the project and the Contractor's mobilization and demobilization costs as shown in the Bid Form. Mobilization includes, but it not limited to: preparation and movement of personnel, equipment, supplies and incidentals such as safety and sanitary supplies/ facilities.

Payment for mobilization shall not exceed 10 percent (10%) of the total Contract cost unless the Contractor can prove to the City that his actual mobilization cost exceeds 10 percent (10%).

Partial payments for this Pay Item will be made in accordance with the following schedule:

Percent of Original Contract Amount:	Percent Allowable Payment of Mobilization/Demobilization Pay Item Price:
5	25
10	35
25	45
50	50
75	75
100	100

These payments will be subject to the standard retainage provided in the Contract. Payment of the retainage will be made after completion of the work and demobilization.

PAY ITEM NO. 2 – BY-PASS PUMPING

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the monthly price bid for all by-pass pumping, including coordination with the City and Engineer. Cost includes all equipment and manpower necessary to comply with the specifications.

Lift Station No. 8 is currently under bypass because of maintenance issues. Contractor must take over Lift Station No. 8 bypassing operations upon execution of the contract.

Measurement for periodic payments for this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

PAY ITEM NO. 3 – AS-BUILTS

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for as-built record drawings or any other required certifications to put proposed project into service. All items are subject to approval by the Engineer.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

PAY ITEM NO. 4 – O&M MANUALS

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid preparation, revisions, and delivery of operation and maintenance manuals for all proposed equipment. All items are subject to approval

by the Engineer.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

LIFT STATION NO. 8 BID ITEMS

PAY ITEM NO. 5 – DEMOLISH VALVE VAULT, CONCRETE SLAB, AND LIFT STATION PIPING SYSTEM INCLUDING PUMPS, VALVES AND ASSOCIATED APPURTENANCES

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the demolition of the existing valve vault, concrete slab and lift station piping system including pumps, valves, and all associated appurtenances. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work. Any equipment in working condition shall be salvaged as requested by the City.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

PAY ITEM NO. 6 – CONCRETE DRIVEWAY AND SIDEWALK RESTORATION

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the unit price bid per square yard for the construction of the concrete driveway and sidewalk. Driveway and sidewalk shall be constructed in accordance with the Construction Drawings and Specifications. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

PAY ITEM NO. 7 –SITE RESTORATION AND LANDSCAPING

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for all tree removal and tree and shrub replacement as directed by the City, site restoration, misc. concrete, fencing, grouting, sod, mulching, and additional landscaping in accordance with the Construction Drawings and Specifications. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work.

Payment shall represent full compensation for all labor, materials, equipment, and incidental items necessary to complete. Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in

accordance with the Contract Documents.

PAY ITEM NO. 8 – SUBMERSIBLE PUMPS AND CONTROLS INCLUDING PRESSURE TRANSDUCER, GUIDE RAILS, BRACKETS AND FLOATS

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the purchase and installation of the submersible pumps, controls, aluminum hatch, pressure transducers, and floats in accordance with Construction Drawings and Specifications**.**

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

PAY ITEM NO. 9 – MECHANICAL PIPING AND IMPROVEMENTS INCLUDING ALL FITTINGS, VALVES, SUPPORTS, CAMLOCK, AND PRESSURE GAUGE

Payment for all work included under this Pay Item shall represent full compensation in accordance with the lump sum price bid for all piping, valves, assemblies, and mechanical adjustments. This item includes pipe support assemblies, vents, fittings, valves, piping, restraints, camlocks, pressure gauges, trenching, backfilling, compaction, connections to existing pipe penetrations, priming and coating of all pipe, appurtenances, and equipment, and any mechanical adjustments needed. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

PAY ITEM NO. 10 – INSTALL RECLAIM WATER LINE SERVICE AND HOSE BIB

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the proposed connection to existing reclaim water main and install of service line and hose bib assembly as shown in the Construction Drawings.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

PAY ITEM NO. 11 – CEMENTITIOUS REHABILITATION

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the purchase and installation of

cementitious liner inside the interior of the wet well in accordance with Construction Drawings and Specifications**.** Payment includes preparation, application, testing, and all other items necessary to complete work.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

PAY ITEM NO. 12 – WET WELL TOP SLAB WITH ALUMINUM HATCH ASSEMBLY

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the installation of the wet well top slab and aluminum safety hatch in accordance with the Construction Drawings and Specifications. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

PAY ITEM NO. 13 – VALVE VAULT WITH ALUMINUM HATCH ASSEMBLY

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the installation of the valve vault and aluminum safety hatch in accordance with the Construction Drawings and Specifications. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

PAY ITEM NO. 14 – ELECTRICAL, INSTRUMENTATION AND CONTROLS

Payment for all work included under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the Submersible Pump Station Electrical and Instrumentation work including new conduit and wiring; disconnects; new electrical and control equipment; modifications to existing SCADA, testing of power and control wiring to each of the submersible pumps; and all other materials and equipment necessary for a complete and fully operable system, including testing and start-up, all as shown on the Contract Documents, ready for approval by the Engineer and acceptance by the Owner.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

PAY ITEM NO. 15 – PIPE CLEANING

Payment for all work included under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the pipe cleaning work including furnishing all labor, materials, equipment and incidentals required to clean the existing 6-inch force main and the installation of all pig launching and retrieval devices and the appropriate pigs for the cleaning procedure, and all necessary excavations, shutdowns, fittings and valves required as specified in the Contract Documents.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

LIFT STATION NO. 16 BID ITEMS

PAY ITEM NO. 16 – DEMOLISH CONCRETE SLAB, AND LIFT STATION PIPING SYSTEM INCLUDING PUMPS, VALVES, AND ASSOCIATED APPURTENANCES

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the demolition of the existing concrete slab, and lift station piping system including pumps, valves, and all associated appurtenances. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work. Any equipment in working condition shall be salvaged as requested by the City.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

PAY ITEM NO. 17 - PAVEMENT REPAIR AND ROAD RESTORATION (SUB-BASE, BASE, AND TEMPORARY ASPHALT)

Payment for all work included under this Pay Item will be made at the Contract unit price bid per square yard of base, subbase and temporary asphalt for furnishing, installing and testing the road restoration pavement section within these Contract Drawings and as listed on the Bid Form. Measurement will be based on the actual number of square yards of road restoration installed, tested, completed and approved. The measurement will be from face of curb to face of curb or as specified, but not greater than the width of the existing roadway prior to construction. Payment will include complete restoration of the roadway section in accordance with the applicable details on the Contract Drawings, including the temporary asphaltic concrete, the necessary base, subbase or compacted suitable excavation material all in accordance with these Specifications. Payment shall include all items and incidentals necessary to complete the road restoration in accordance with the requirements of City, ready for approval and acceptance by the City.

PAY ITEM NO. 18 – INFRARED ROAD RESTORATION

Payment for all work included under this Pay Item will be made at the Contract unit price bid per square yard of infrared road restoration. Measurement will be based on the actual number of square yards of infrared road restoration installed, tested, completed and approved. Payment will include, but not be limited to, the process, equipment, and materials required in accordance with the Contract Drawings. Payment shall include all items and incidentals necessary to complete the infrared road restoration in accordance with the requirements of City, ready for approval and acceptance by the City.

PAY ITEM NO. 19 – DROP CURB

Payment for all work included in this Bid Item will be made at the applicable Contract unit price bid per linear foot for removal of existing curbing and for furnishing and placing the curb as shown on the Drawings and listed on the Bid Form. Measurement will be per actual number of linear feet of curbing installed. Payment shall represent full compensation for removal of existing curb and all labor, material and equipment for compacting subgrade, forming, furnishing, placing the concrete, and finishing as specified and all incidentals necessary for completion of this Bid Item, ready for approval and acceptance by the City.

PAY ITEM NO. 20 –SITE RESTORATION AND LANDSCAPING

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for all tree removal and tree and shrub replacement as directed by the City, site restoration, PVC brown fencing, removal and installation of bollards, misc. concrete, grouting, sod, mulching, and additional landscaping in accordance with the Construction Drawings and Specifications. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work.

Payment shall represent full compensation for all labor, materials, equipment, and incidental items necessary to complete. Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

PAY ITEM NO. 21 – SUBMERSIBLE PUMPS AND CONTROLS INCLUDING PRESSURE TRANSDUCER, GUIDE RAILS, BRACKETS AND FLOATS

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the purchase and installation of the submersible pumps, controls, aluminum hatch, pressure transducers, and floats in accordance with Construction Drawings and Specifications**.**

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

PAY ITEM NO. 22 – MECHANICAL PIPING AND IMPROVEMENTS INCLUDING ALL FITTINGS, VALVES, SUPPORTS, CAMLOCK, AND PRESSURE GAUGE

Payment for all work included under this Pay Item shall represent full compensation in accordance with the lump sum price bid for all piping, valves, assemblies, and mechanical adjustments. This item includes pipe support assemblies, vents, fittings, valves, piping, restraints, camlocks, pressure gauges, trenching, backfilling, compaction, connections to existing pipe penetrations, priming and coating of all pipe, appurtenances, and equipment, and any mechanical adjustments needed. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

PAY ITEM NO. 23 – RELOCATION OF WATER SERVICE AND HOSE BIB INSTALLATION

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the proposed relocation of the water service, water meter, and backflow preventer and the installation of the hose bib assembly as shown in the Construction Drawings.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

PAY ITEM NO. 24 – CEMENTITIOUS REHABILITATION

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the purchase and installation of cementitious liner inside the interior of the wet well in accordance with Construction Drawings and Specifications**.** Payment includes preparation, application, testing, and all other items necessary to complete work.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

PAY ITEM NO. 25 – WET WELL TOP SLAB WITH ALUMINUM HATCH ASSEMBLY

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the installation of the wet well top slab and aluminum safety hatch in accordance with the Construction Drawings and Specifications. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the

approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

PAY ITEM NO. 26 – VALVE VAULT WITH ALUMINUM HATCH ASSEMBLY

Payment for all work included, but is not limited to, under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the installation of the valve vault and aluminum safety hatch in accordance with the Construction Drawings and Specifications. Payment includes any required excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary to complete work.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

PAY ITEM NO. 27 – ELECTRICAL, INSTRUMENTATION AND CONTROLS

Payment for all work included under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the Submersible Pump Station Electrical and Instrumentation work including new conduit and wiring; disconnects; new electrical and control equipment; modifications to existing SCADA, testing of power and control wiring to each of the submersible pumps; and all other materials and equipment necessary for a complete and fully operable system, including testing and start-up, all as shown on the Contract Documents, ready for approval by the Engineer and acceptance by the Owner.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents

PAY ITEM NO. 28 – PIPE CLEANING

Payment for all work included under this Pay Item shall represent full compensation in accordance with the lump sum price bid for the pipe cleaning work including furnishing all labor, materials, equipment and incidentals required to clean the existing 4-inch force main and the installation of all pig launching and retrieval devices and the appropriate pigs for the cleaning procedure, and all necessary excavations, shutdowns, fittings and valves required as specified in the Contract Documents.

Measurement for periodic payments of this lump sum Pay Item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor in accordance with the Contract Documents.

END OF SECTION

SECTION 17 - INFRARED PAVEMENT RESTORATION FOR REPAIRING DAMAGED ASPHALT OR SURFACE FAILURES

17.01 GENERAL

A. The purpose of this document is to specify the process for utilizing Infrared Restoration for repairing asphalt surface failures.

B. The work shall consist of furnishing materials (see 17.02) and performing a permanent repair on an area of damaged asphalt pavement. The location to be restored shall be identified prior to the commencement of repair activities.

17.02 MATERIALS

A. If needed a one-component emulsified maltenes recycling agent (rejuvenator) is to be applied to the restored area in a ratio of 1:1 with water. This solution shall be well dispersed with a commercial grade sprayer at a rate of 8 ounces per square yard of heated area. This application area shall include both the area under repair as well as the area heated but left undisturbed around the perimeter of the repair. The application shall take place after the area has been scarified and just prior to the addition of new asphalt. This rejuvenator replaces the light oil component of asphalt, which has oxidized out over time.

B. The Infrared repair contractor shall provide FDOT Type SP 9.5 67-22 mix at plant mix temperature (275-325 degrees Fahrenheit) to be added to the repair to bring the area up to grade with the existing road.

17.03 EQUIPMENT

A. General:
The infrared restoration equipment shall consist of a truck mounted KASI MODEL PATRIOT or PRO-HEAT MINUTEMAN self contained asphalt restoration system using ultimate air burner apparatus or approved equal.

B. Infrared Heater:
The heating chamber shall contain eight 6 foot long stainless steel converters to generate the infrared radiation. The converters shall be made from a single piece of stainless steel pipe with NO WELDED ORIFICES. There shall be 48 linear feet of Inconel grids generating the infrared radiation. The chamber used shall consume no more than 12,500 BTU per square foot of heated area. This rate of consumption shall translate into the ability of the heater to soften asphalt to a depth of 1 ½ -2 ½ inches in 4 -8 minutes without burning the surface.

C. Asphalt Storage Unit:
A thermostatically controlled storage unit will be utilized to insure that sufficient hot virgin asphalt is on hand. The reclaimer/storage unit shall contain two 37,000 BTU atmospheric infrared heaters. Thermostats shall work in conjunction with timers to insure proper temperature is maintained without harming the asphalt. Electronic ignition shall be standard. An automatic switchover regulator shall be used to reduce the tank pressure to 11" water column.

D. Compactor/Roller:
The compaction equipment used shall be vibratory capable of generating at least 3200 lbs. of applied force/square inch

E. Steel Rake
A steel rake shall be used to delineate the repair area along the chalk line and to scarify the heated area of the patch inside the chalk line to a depth of at least 2 inches.

F. Asphalt Lute:
A 36" wide lute shall be used to evenly distribute the added asphalt and to establish the proper grade.

17.04 METHODS OF CONSTRUCTION

A. General:
Before the Infrared Restoration is begun, the proper authorities, in conjunction with the contractor will mark out the areas to be restored.

B. Safety:
Proper safety precautions shall be taken including traffic cones, signage, and flagmen (if necessary) to insure a safe workplace for workers, pedestrians and automobile traffic.

C. Defining and Preparing the Work Area:
1. The area shall be swept clean of dirt, loose aggregate or standing water.
2. A chalk line shall be drawn 6-12 inches back from the damage.

D. Heating the Repair Area:
1. The infrared chamber is lowered over the repair being sure to allow at least 4 - 8 inches of heated area beyond the perimeter of the original opening.
2. To insure the proper heating time, the contractor shall check the surface temperature of the asphalt at six minutes and every minute thereafter using an infrared thermometer so as not to allow the surface temperature to exceed 400 degrees Fahrenheit. The heating time is influenced by the ambient temperature, the color of the pavement, the size of the aggregate, and the moisture content
3. After the appropriate heating time (typically 5 - 8 minutes), the asphalt surface will be softened to a depth of 2-2.5 inches.
4. The infrared chamber is then removed from the heated area.

E. Raking the Heated Area:
   1. The backside of a steel rake is used to neatly square off the repair, cutting 6 - 12 inches back from the damage along the chalk line.
   2. The area inside the repair is then deeply scarified, taking special care to eliminate the original seam between the repair and the road.
   3. The maltenes rejuvenator shall be applied if needed, to the repair and the surrounding heated asphalt surface.

F. Adding Plant Mix Asphalt:
   1. FDOT Type SP 9.5 67-22 mix is then added to the area to bring it up to proper grade.
   2. The repair is luted smooth.

G. Compaction:
   1. The area is properly compacted being sure to roll the edges first to fuse the hot repair to the heated but untouched surrounding pavement.
   2. A light coating of stone dust can then be spread over the repair to remove the tackiness. The road can then be opened to traffic.

H. The total time for a typical single heat restoration should be no more than 20-25 minutes. This timeframe shall be strictly adhered to so as to insure that both the heated pavement and added asphalt have not been allowed to cool significantly. This guarantees the proper fusion between the repair and the existing road surface.

17.05 STANDARD WARRANTY

The infrared restoration installed under this specification shall be guaranteed by the contractor against failure resulting from defective materials or methods of application for a period of one year from date of installation. The contractor shall guarantee to repair, without cost to the customer that part of the original restoration installed under this contract that, in the opinion of the property owner, has not remained in useful service. The repair installed under this warranty shall be guaranteed the same as the original material- from the date of the original restoration. This warranty shall not include depressions or areas of settlement caused by lack of proper compaction of the base or sub-base material.

END OF SECTION

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SECTION 18 – PIPELINE CLEANING

18.01 GENERAL

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to clean all new lines 4" and larger, and existing pipelines as specified in this specification and as indicated on the Drawings.

B. This work shall include the furnishing and installation of all pig launching and retrieval devices and the appropriate pigs for the cleaning procedure, and all necessary excavations, shutdowns, fittings and valves required.

18.02 RELATED WORK

A. The contractor is responsible for all necessary supply water.

B. The contractor is responsible for all necessary bypass pumping.

C. The contractor is responsible for the proper disposal of any materials removed from the pipe lines as a result of the cleaning procedure.

18.03 SUBMITTALS

A. The Contractor shall submit prior to construction, a cleaning plan, Shop Drawings, and layout diagram for approval to the City.

B. The Contractor shall submit to the City a list of materials to be furnished, and the names of suppliers.

18.04 QUALIFICATIONS

A. The Contractor performing this work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner.

B. The Contractor shall also be capable of providing crews as needed to complete this work without undue delay.

C. The City reserves the right to approve or disapprove the Contractor, based on the submitted qualifications.

18.05 PRODUCTS - GENERAL

A. The contractor shall be responsible for furnishing pigs in sufficient numbers and sizes, of appropriate densities, coatings and configurations to properly clean the piping systems.

B. All pigs used for the cleaning of sewer or reclaimed water lines shall not be used in the cleaning of potable water lines.

18.06 PRODUCTS - MATERIALS

A. The pig launching and retrieval equipment shall be of the latest design and construction and shall include the means to maintain constant monitoring of the in-line flows and pressures of the system being cleaned and the constant location of the cleaning pigs in the system. Launching and retrieval systems shall be fabricated, designed and manufactured according to ANSI standards and capable of withstanding working pressures of 150 psi. Launching and receiving devices shall be sized one diameter larger than the system to which it will be attached with a minimum length of 2.5 times the diameter.

B. The contractor shall have available for immediate use an electronic pig detector for use in the system being cleaned to provide a means of tracking the passage of the pig in the system to locate areas of potential or suspected blockage and other disparities in the system.

C. The pig shall be constructed of elastomer polyurethane with an open cell construction and a density equal to or suitable for use in the piping system being cleaned. Pig configuration shall consist of a parabolic nose with a concave base and coated with a resilient surface material that will maintain a peripheral seal and will effectively clean the piping system without over abrading the interior pipe wall. Pig characteristics shall include the ability to navigate through 90 degree bends, 180 degree turns, bi-directional fittings, full port valves, reduce its cross sectional area and return to its original design configuration and be propelled by hydraulic pressure.

18.07 PIPELINE CLEANING

A. The cleaning of the pipe line shall be done by the controlled and pressurized passage of a polyurethane pig of varying dimensions, coatings and densities as determined by the City through the piping system.

B. A series of pigs shall be entered into the system at a point as near to the beginning as is logistically and mechanically feasible.

C. A launching assembly shall be used as the entrance point for the pig. This assembly shall allow for the following:

1. The entering of pigs into the system by providing the means to induce flow from an external source, independent of the flows and pressures immediately available from the system, on the back of the pig to develop sufficient pressure to force the pig through the system.
2. A means to control and regulate the flow.
3. A means to monitor the flows and pressures.
4. A means to connect and disconnect from the system without any disruption

to the operation of the system.

D. The pig shall be removed or discharged from the system at a point as near to the end as is logistically and mechanically feasible.

E. The contractor shall be responsible for the retrieval of the pig at the discharge point. This may include setting a trap that will not disrupt normal flow and operations but will capture the pig and any debris. A retrieval assembly may also be used but said assembly shall be able to connect and disconnect from the system without any disruption to the operation of the system.

F. Alternative launching and retrieval methods shall be done with the prior approval of the City.

G. Any pig that cannot progress through the piping system shall be located by the contractor and removed by excavation of the pipe in order to remove the blockage. All pipe repairs shall be the responsibility of the contractor and shall be performed with as little disruption to the system as possible.

H. Any increase in pressure that cannot be accounted for, i.e. fittings or valves or additional cleaning runs, shall be investigated, per the Engineers' approval, by locating the pig at the beginning of the increased pressure and excavating to determine the cause of the pressure increase. All pipe repairs shall be the responsibility of the contractor and shall be performed with as little disruption to the system as possible.

I. Final flushing of the cleansed lines shall be performed after the last successful run of the pig as determined by the City. The contractor shall be responsible for all applicable flushing and disinfection requirements for potable water lines.

18.08 ACCEPTANCE

A. The contractor shall maintain and provide a report at the end of the cleaning procedure containing the following:

1. The pressures in the pipe during the pigging procedure.
2. Any inline problems encountered during the procedure including all excavations with detailed locations, reason for the excavation and any corrective measures taken to the pipeline.
3. A record of the pigs used, their sizes, styles and other pertinent information regarding what materials were used during the cleaning.
4. An analysis of the condition of the pipeline before and after the cleaning procedure.

END OF SECTION

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