



**Standard Technical Specifications  
for  
Utilities and Related Construction  
August 2015**

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SECTION 00 75 00

SPECIAL PROVISIONS AND SUPPLEMENTAL TECHNICAL SPECIFICATIONS

These Special Provisions provide additional information and modify the Pinellas County Standard Technical Specifications (PC-STS) for Utilities Construction. Unless noted herein, all conditions of the (STS) apply.

ARTICLE SP-1 SUMMARY OF WORK

"INSERT SUMMARY OF WORK"

Insert Project Summary text here.

ARTICLE SP-2 SPECIAL PROVISIONS

ARTICLE SP-3 ADDITIONAL INFORMATION AND STUDIES

ARTICLE SP-4 SUPPLEMENTAL TECHNICAL SPECIFICATIONS

Don't touch this section.

Note: The Supplemental Technical Specifications presented herein are project specific, are only related to this project and are not part of Pinellas County Standard Technical Specifications (STS). All STS will be designated as such in lower right hand corner of document by Pinellas County-STs. All Supplemental Technical Specifications will have a (S) designation following the section title in the Table of Contents and each specification will be designated in lower right hand corner as PCU-XXXX, where XXXX designates the specific Project Job Number.

01 20 01	Measurement and Payment (S)
01 31 13	Coordination (S)
01 33 00	Submittals (S)
05 60 00	Miscellaneous Metals (S)
09 96 00	High Performance Coatings (S)
22 13 19	Rotary Lobe Pumps (S)
25 60 00	Chemical Analyzer Panel Upgrade (S)
26 60 01	General Electric Requirements (S)
26 60 02	Basic Materials and Methods (S)
26 60 03	Motors (S)
40 92 00	Primary Control Devices (S)

Example of Supplemental Specifications.

Replace Job # with Project Number Assigned from PCF.

1  
2 ARTICLE SP-5      MODIFICATIONS TO THE STANDARD TECHNICAL  
3 SPECIFICATIONS  
4

5            1.      01 57 00      Control of Work

6                            A.      Paragraph 1.13, Not Applicable.  
7

8                            B.      Part 3 – Execution, Add:

9                                      Working hours: 7am to 6pm, Monday through Friday.  
10                                     Saturday work requires verbal approval and a 24-hour  
11                                     notice. Sunday and holiday work requires written  
12                                     approval. The Contractor shall make the request to  
13                                     work weekends and/or holidays at least 24 hours in  
14                                     advance. Weekday (M-F) overtime work acceptable if  
15                                     the work performed does not require immediate  
16                                     inspection and the County has granted approval.  
17

Insert Title and Project  
Number Assigned from  
PCF.

## TECHNICAL SPECIFICATION CHECKLIST

Project Name: Insert Title

Project Number: XXXX

The following sections of the Standard Technical Specifications will apply to this contract if marked "X" as shown below:

00 75 00	X	Special Provisions and Supplemental Technical Specifications
01 32 33	<input type="checkbox"/>	Color Audio-Video Construction Records
01 35 00	<input type="checkbox"/>	Special Project Procedures
01 42 01	<input type="checkbox"/>	Reference Standards and Definitions
01 45 17	<input type="checkbox"/>	Pipeline Testing Requirements
01 55 26	<input type="checkbox"/>	Traffic Regulation
01 57 00	<input type="checkbox"/>	Control of Work
01 57 13	<input type="checkbox"/>	Erosion and Sedimentation Control
01 58 01	<input type="checkbox"/>	Project Identification Signs
01 78 39	X	Project Record Documents
03 10 01	<input type="checkbox"/>	Concrete Materials
09 91 00	<input type="checkbox"/>	Painting and Protective Coatings
31 23 33	<input type="checkbox"/>	Excavation and Backfill for Pipes
31 23 34	<input type="checkbox"/>	Excavation and Backfill for Structures
32 12 01	<input type="checkbox"/>	Stabilized and Asphalt Roadway Restoration
32 13 01	<input type="checkbox"/>	Concrete Sidewalks, Driveways and Gutters
32 92 01	<input type="checkbox"/>	Seeding and Sodding
33 01 31	<input type="checkbox"/>	Sanitary Sewer Cured in Place Pipelining
33 01 32	<input type="checkbox"/>	Sanitary Sewer Cleaning and Televising
33 01 33	<input type="checkbox"/>	Manhole Rehabilitation
33 01 34	<input type="checkbox"/>	Sanitary Sewer Pipe Repairs
33 01 35	<input type="checkbox"/>	Multi-Component Stress Panel Manhole Liner System
33 01 36	<input type="checkbox"/>	Urethane/Epoxy, Polyurea Manhole Liner System
33 01 37	<input type="checkbox"/>	Polyurethane Manhole Liner System
33 01 38	<input type="checkbox"/>	Polymorphic Resin Manhole Liner System
33 01 39	<input type="checkbox"/>	Calcium Aluminate Manhole Liner System
33 01 40	<input type="checkbox"/>	CIPP Structural Lateral Connection Lining
33 05 20	<input type="checkbox"/>	Jacking and Boring
33 05 21	<input type="checkbox"/>	Horizontal Directional Drilling
33 05 22	<input type="checkbox"/>	Horizontal Directional Drilling – Subaqueous Crossings and Large Diameter Installations
33 11 01	<input type="checkbox"/>	Potable Water Main Piping and Appurtenances
33 13 01	<input type="checkbox"/>	Disinfection of Potable Water Mains
33 32 00	<input type="checkbox"/>	Submersible Wastewater Pumping Stations
33 33 01	<input type="checkbox"/>	Gravity Sewers
33 34 00	<input type="checkbox"/>	Sanitary Sewage Force Mains and Appurtenances
33 35 01	<input type="checkbox"/>	Reclaimed Water Main Piping and Appurtenances
33 39 00	<input type="checkbox"/>	Sanitary Utility Sewerage Structures

8/24/15

PC – Job #



40 95 01	<input type="checkbox"/>	Wastewater Pump Station SCADA Remote Telemetry Unit (RTU)
48 11 30	<input type="checkbox"/>	Standby Diesel Generators
13 34 19	<input type="checkbox"/>	Metal Building Systems

1

END OF SECTION

SECTION 01 32 33

COLOR AUDIO-VIDEO CONSTRUCTION RECORDS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Audio/Video DVDs of all work areas in the Contract shall be prepared by the Contractor.
- B. Contractor To Prepare Audio/Video Recording - Prior to commencing the Work, the Contractor shall have a continuous color audio/video recording taken along the entire length of the Project including all affected project areas. Streets, easements, rights-of way, lots or construction sites within the Project must be recorded to serve as a record of pre-construction conditions. Two copies of the recordings and video log shall be submitted to the County. The ENGINEER shall designate those areas, if any, to be omitted from or added to the audio-visual coverage. All DVDs and written records shall become property of the County.
- C. Scheduling Of Audio/Video Recording - No construction shall begin prior to review and approval of the recordings covering the Project construction area(s) by the County. The County shall have the authority to reject all or any portion of a recording not conforming to specifications and order that it be redone at no additional charge. The Contractor shall reschedule unacceptable coverage within seven days after being notified. Recordings shall not be made more than 30 days prior to construction in any area.
- D. Professional Videographers - The Contractor shall engage the services of a professional videographer known to be skilled and regularly engaged in the business of preconstruction color audio-video documentation. The videographer through the Contractor shall furnish to the Engineer a list of all equipment to be used for the audio-video recording, i.e., manufacturer's name, model number, specifications and other pertinent information.
- E. Additional information to be furnished by the videographer is the names and addresses of two references that the videographer has performed color audio-video taping for on projects of a similar nature within the last 12 months. Engineer's approval of the selected videographer is required prior to taking first audio-video recording.
- F. Equipment - All equipment, accessories, materials and labor to perform this service shall be finished by the Contractor. The total audio-video

COLOR AUDIO-VIDEO CONSTRUCTION RECORDS

1 system shall reproduce bright, sharp, clear pictures with accurate colors  
2 and shall be free from distortion, tearing, rolls or any other form of  
3 imperfection. The audio portion of the recording shall reproduce the  
4 commentary of the camera operator with proper volume, clarity and be  
5 free from distortion and interruptions. In some instances, audio-video  
6 coverage may be required in areas not accessible by conventional  
7 wheeled vehicles. Such coverage shall be obtained by walking. The color  
8 video camera used in the recording shall be of Industrial Grade and shall  
9 have EIA Standard NTSC type color - 1.0V 75 OHMS. Video output from  
10 camera shall be capable of horizontal resolution of 350 lines at center and  
11 utilize a minimum of 8:1 zoom with a 2/3" Newvicon tube or CCD pick-up  
12 element for optimum color imagery plus minimum lag through of one foot  
13 candle. The recording shall be transferred to DVDs compatible for  
14 playback with any Region 1 American TV Standard DVD player.

15  
16 G. Recorded Information, Audio - Each recording shall begin with the current  
17 date, project name and be followed by the general location, i.e., viewing  
18 side and direction of progress. Accompanying the video recording shall  
19 be a corresponding and simultaneously recorded audio recording. This  
20 audio recording, exclusively containing the commentary of the camera  
21 operator or aide, shall assist in viewer orientation and in any needed  
22 identification, differentiation, clarification, or objective description of the  
23 features being shown in the video portion of the recording. The audio  
24 recording shall also be free from any conversations.

25  
26 H. Recorded Information - Video - All video recordings must continuously  
27 display transparent digital information to include the date and time of  
28 recording. The date information shall contain the month, day and year.  
29 The time information shall contain the hour, minutes and seconds.  
30 Additional information shall be displayed periodically. Such information  
31 shall include, but not be limited to, project name, contract number,  
32 direction of travel and the viewing side. This transparent information shall  
33 appear on the extreme upper left hand third of the screen. Camera pan,  
34 tilt, zoom-in and zoom-out rates shall be sufficiently controlled such that  
35 recorded objects will be clearly viewed during video playback. In addition,  
36 all other camera and recording system controls, such as lens focus and  
37 aperture, video level, pedestal, chrome, white balance, and electrical  
38 focus shall be properly controlled or adjusted to maximize picture quality.  
39 The construction documentation shall be recorded in SP mode.

40  
41 I. Viewer Orientation - The audio and video portions of the recording shall  
42 maintain viewer orientation. To this end, overall establishing views of all  
43 visible house and business addresses shall be utilized. In areas where  
44 the proposed construction location will not be readily apparent to the video  
45 viewer, highly visible yellow flags shall be placed, by the Contractor, in  
46 such a fashion as to clearly indicate the proposed centerline of

1 construction. When conventional wheeled vehicles are used as  
2 conveyances for the recording system, the vertical distance between the  
3 camera lens and the ground shall not exceed 10 feet. The camera shall  
4 be firmly mounted such that transport of the camera during the recording  
5 process will not cause an unsteady picture.  
6

7 J. Lighting - All taping shall be done during time of good visibility. No taping  
8 shall be done during precipitation, mist or fog. The recording shall only be  
9 done when sufficient sunlight is present to properly illuminate the subjects  
10 of recording and to produce bright, sharp video recordings of those  
11 subjects.  
12

13 K. Speed Of Travel - The average rate of travel during a particular segment  
14 of coverage shall be directly proportional to the number, size and value of  
15 the surface features within that construction areas zone of influence. The  
16 rate of speed in the general direction of travel of the vehicle used during  
17 taping shall not exceed 44 feet per minute.  
18

19 L. Video Log/Index - All DVDs shall be permanently labeled and shall be  
20 properly identified by number and project title. Each DVD shall have a log  
21 of its contents. The log shall describe the various segments of coverage  
22 contained on the DVD in terms of the names of the streets or location of  
23 easements, coverage beginning and end, directions of coverage, video  
24 unit counter numbers, engineering survey or coordinate values (if  
25 reasonably available) and the date.  
26

27 M. Area Of Coverage - Recording coverage shall include all surface features  
28 located within the zone of influence of construction supported by  
29 appropriate audio coverage. Such coverage shall include, but not be  
30 limited to, existing driveways, sidewalks, curbs, pavements, drainage  
31 system features, mailboxes, landscaping, culverts, fences, signs,  
32 Contractor staging areas, adjacent structures, etc. within the area covered  
33 by the project. Of particular concern shall be the existence of any faults,  
34 fractures, or defects. Coverage shall be limited to one side of the site,  
35 street, easement or right-of-way at any one time.  
36

37 N. Costs Of Video Services - The cost to complete the requirements under  
38 this section shall be included in the contract items provided in the  
39 proposal sheet. There is no separate pay item for this work.  
40

41 PART 2 - PRODUCTS (NOT USED)

42  
43 PART 3 - EXECUTION (NOT USED)

44  
45 END OF SECTION

SECTION 01 35 00

SPECIAL PROJECT PROCEDURES

PART 1 – GENERAL

1.01 EXISTING UTILITIES

- A. Where existing utility lines (water, gas, telephone, power, etc.) are intersected by proposed Work, the Contractor shall give a minimum of forty-eight (48) hours notice to the owners of such utilities to permit them to locate their lines prior to construction. The "Call Sunshine" Utility Notification Center shall be contacted at 1-800-432-4770 at least forty-eight (48) hours prior to start of excavation. Utilities, which are not members of the Utility Notification Center, shall be contacted individually by the Contractor.

1.02 REPAIRS

A. WORK SCHEDULE AND EMERGENCY RESPONSE TIME

1. Emergency response by the Contractor will be required within one hour of notice by telephone of required repair. The arrival of a repair crew will be required within two hours of the Contractor's assessment of the emergency situation.
2. The County will furnish the Contractor with the size, approximate depth and general location of the proposed repair. The Contractor shall be required to commence work on each assignment within ten (10) consecutive calendar days after the date contained in each written Notification to Proceed (unless such time is extended in writing by the County), and will be obligated to pursue the Work on each assignment with expeditious continuity until completion. The County may order the Contractor to proceed with the Work at a faster rate should a backlog of projects develop. In all cases, the Contractor will be required to begin restoration work within two working days and complete restoration work within ten (10) consecutive calendar days following approval of the repair by the Engineer. At the County's option, the maximum number of repairs assigned to the Contractor at one time may be a maximum of fifteen (15).
3. Each notification to proceed shall be accompanied by or preceded by two copies of the appropriate Atlas Sheet(s), plus other information including photographs (when available).

SPECIAL PROJECT PROCEDURES

1 B. Field Layout

- 2
- 3 1. The County supplied Atlas Sheet, street address and other pertinent
- 4 information will identify the general location of the repair. If there is
- 5 evidence of the defect visible from the surface, such as a depression,
- 6 the Contractor shall center his excavation on the evidence. If there is
- 7 any question as to the general location described by the County, the
- 8 Contractor shall approach the Engineer and address the questions
- 9 before beginning with the excavation.

10

11 C. Restoration Schedule

- 12
- 13 1. All restoration work must be completed within ten (10) consecutive
- 14 calendar days following approval of work at any given site. If the
- 15 restoration work does not progress to the satisfaction of the Engineer,
- 16 the Contractor may be directed to cease repair operations until such
- 17 time as the Engineer may deem the restoration work completed to a
- 18 degree permitting the resumption of repair work or the County may
- 19 elect to perform any such restoration work and bill the Contractor for
- 20 same. (At Engineer's discretion, payment shall be made by the
- 21 Contractor direct to the County, or a like amount deducted by the
- 22 County from monies due the Contractor for Work completed under
- 23 this Contract).

24

25 1.03 POTABLE WATER, RECLAIMED WATER AND SANITARY SEWER SYSTEM

26 CONSTRUCTION

27

28 A. Starting Project

- 29
- 30 1. The Contractor shall notify the Pinellas County Inspector and the
- 31 Engineer FORTY-EIGHT (48) HOURS prior to starting construction
- 32 (Saturday, Sunday and Holidays excluded). Upon notification, a
- 33 meeting will be scheduled between the Pinellas County Inspector
- 34 and the Contractor to review the plans.

35

36 B. Required Field Documents

- 37
- 38 1. The Contractor MUST have the following on the job site at all times
- 39 and readily available prior to any construction:
- 40
- 41 a. The Pinellas County approved "Contractor's Copy" of
- 42 construction plans stamped by the Florida Department of
- 43 Environmental Protection (FDEP) or other permitting agency.
- 44
- 45 2. All required permits including:
- 46

- a. F.D.O.T.
- b. County
- c. Florida Department of Environmental Protection (FDEP)
- d. City/Municipality

- C. If field conditions require deviation from the approved plans, the Contractor shall notify the Project Engineer of the required change. The Project Engineer will make the necessary changes and submit a revised set of plans to the appropriate agency or agencies for approval.
- D. All construction is subject to inspection and certain tasks require that the Pinellas County Inspector be on the site to properly document the procedure, test results and/or material used. On the occasions that the Pinellas County Inspector is required on site to observe these tasks, FORTY-EIGHT (48) hours advance notice will be required (Saturday, Sunday and Holidays excluded).
- E. Should the Contractor suspend work on any given project, the Contractor shall provide written notification detailing the reason for the suspension to Pinellas County within two business days. Additionally, forty-eight (48) hours advance, written notice will be required for a restart of the project.
- F. Should any materials be installed or backfilled prior to inspection by the Pinellas County Inspector, the facilities are subject to uncovering, exposing, and/or disassembly for inspection. It is preferred that all material expected to be required for the project be on site for initial material inspection prior to commencing the project. Material thus delivered to the job site will be protected and stored as to insure preservation of quality and fitness.
- G. Meters shall not be installed on potable and reclaimed water systems until all cleanup work is completed and a final inspection has been made by the Pinellas County Utilities Inspector.
- H. All projects requiring a or Florida Department of Environmental Protection Permit will not receive water service until the Pinellas County Utilities receives a SEALED copy of the Engineer's Certificate of Completion and Compliance (As-built plans, if applicable) and a Release Form from the Florida Department of Environmental Protection (FDEP). The following must also be provided, if applicable:
  - 1. Deed and Agreement to Deed to pipelines and appurtenances as additions to Pinellas County Utilities.
  - 2. Deed of Conveyance to pipelines

#### SPECIAL PROJECT PROCEDURES

1                   3.     Release of Lien/Cost Statement

2  
3                   4.     Easement

4  
5           I.     Taps

6  
7           1.     All taps on existing, in service, pressurized mains for development  
8                   projects will normally be made by Pinellas County personnel. All  
9                   taps for pressure testing and chlorination will be saddle taps, made  
10                  by the Contractor.

11  
12          2.     The Pinellas County Inspector must be present when the  
13                   Contractor is working on an existing, in service, pressurized main.  
14                   The Contractor shall notify all Pinellas County customers (via  
15                   doorknob hangers) forty-eight (48) hours in advance of any  
16                   discontinuance of service associated with this work. UNDER NO  
17                   CIRCUMSTANCES WILL THE CONTRACTOR PERFORM ANY  
18                   TASK THAT INVOLVES AN EXISTING, IN SERVICE,  
19                   PRESSURIZED MAIN WITHOUT THE PINELLAS COUNTY  
20                   INSPECTOR PRESENT ON SITE.

21  
22          3.     On development projects, the Project Engineer and/or Contractor  
23                   will be responsible for staking the location of taps after verifying that  
24                   the field conditions will permit said location and obtaining  
25                   concurrence of the Pinellas County Inspector. Following the  
26                   inspector's field check of the tap location, the inspector will  
27                   schedule the tap through Pinellas County providing all required  
28                   paperwork is in order. The inspector will be notified of the day and  
29                   time for the tap.

30  
31          J.     Additional Requirements for Tapping Asbestos Cement Pipe

32  
33          1.     All taps in asbestos cement (AC) pipe shall be made with the pipe  
34                   under pressure using only a tap machine having a built-in flush  
35                   valve and the flush valve must remain open during the entire  
36                   procedure. All taps shall be made with the pipe in a wet condition.  
37                   The pipe shall remain wet throughout the entire tapping process.  
38                   Extreme care should be taken to prevent any cutting dust from  
39                   becoming airborne and personal protective equipment should be  
40                   worn as the condition warrants.

41  
42          2.     Coupons from the tapping procedure shall be placed in a "zip lock"  
43                   type bag in the wet condition. The bag shall be marked with the  
44                   address where the tap was made and kept for disposal.



3. Water samples shall be taken, as special situations arise or as determined necessary by Utilities Water Quality Management, from the closest in line point downstream from the tap position. Samples shall be taken from this same point before and after the tap has been completed.
4. Open sample source and let water run for three to five minutes. Collect sample in an approved container, available from the Utilities lab, marking the container with the same location information as the coupon. Fill out the chain of custody sheet, also available from the Utilities lab. and deliver sample to the Utilities lab. The Utilities lab will send the sample off for analysis.
5. Disposal of the removed coupons shall follow procedures issued by Pinellas County Utilities, Solid Waste Department. Removed and bagged coupons shall be delivered to Utilities General Maintenance facility located at 6730 142nd Avenue N. Largo, where an authorized disposal barrel shall be located. The person delivering the coupon shall be required to sign a drop off log.

K. Additional Requirements for Tapping Concrete Pressure Pipe

1. Requirements for tapping concrete pipe shall be addressed on a case-by-case basis and specifications for such shall be included in the Special Provisions. Specifications shall be developed based on the pipe manufacturer's recommendations for the specific application.
2. All requirements shall be in accordance with the pipe manufacturer's and the tapping device manufacturer's recommendations.

PART 2 – PRODUCT (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 01 42 01

REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Abbreviations and acronyms are used in the Contract Documents to identify reference standards.

1.02 QUALITY ASSURANCE

- A. Application: When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes establish stricter standards.
- B. Publication Date: The publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

1.03 ABBREVIATIONS, NAMES, AND ADDRESSES OF ORGANIZATIONS

- A. Obtain copies of referenced standards direct from publication source, when needed for proper performance of Work, or when required for submittal by Contract Documents.

AA Aluminum Association  
900 19<sup>th</sup> Street NW  
Washington, DC 20006

AASHTO American Association of State Highway  
and Transportation Officials  
444 North Capitol Street, NW Suite 249  
Washington, DC 20001

ABPA American Backflow Prevention Association  
PO Box 3051  
Bryan, Texas 77805-3051

ACI American Concrete Institute  
38800 Country Club Drive  
Farmington Hills, MI 48331

1	AI	Asphalt Institute
2		2696 Research Park Drive
3		Lexington KY 40511
4		
5	AISC	American Institute of Steel Construction
6		One East Wacker Drive
7		Suite 3100
8		Chicago, IL 60601-2001
9		
10	AISI	American Iron and Steel Institute
11		1140 Connecticut Avenue
12		Suite 705
13		Washington DC 20036
14		
15	ANSI	American National Standards Institute
16		1819 L Street, NW
17		Washington, DC 20036
18		
19	ASME	American Society of Mechanical Engineers
20		Three Park Avenue
21		New York, NY 10016-5990
22		
23	ASTM	American Society for Testing and Materials
24		100 BarrHarbor Drive
25		West Conshohoken, PA, 19428
26		
27	AWWA	American Water Works Association
28		6666 W. Quincy Avenue
29		Denver, CO 80235
30		
31	AWS	American Welding Society
32		550 N.W. LeJeune Road
33		Miami, FL 33126
34		
35	CRSI	Concrete Reinforcing Steel Institute
36		933 N. Plum Grove Road
37		Schaumburg, IL 60173-4758
38		
39	CSI	Construction Specifications Institute
40		99 Canal Center Plaza, Suite 300
41		Alexandria, VA 22314
42		
43	FS	Federal Specification General Services
44		Administration Specifications and Consumer
45		Information Distribution Section (WFSIS)
46		470 L'enfant Plaza – Suite 8100
47		Washington, DC 20407
48		
49		

1	NEMA	National Electrical Manufacturers' Association
2		1300 North 17 <sup>th</sup> Street
3		Suite 1847
4		Rosslyn, VA 22209
5		
6	PCA	Portland Cement Association
7		5420 Old Orchard Road
8		Skokie, IL 60077
9		
10	PCI	Prestressed Concrete Institute
11		209 W. Jackson Blvd.
12		Chicago, IL 60606
13		
14	SSPC	Society for Protective Coatings
15		40 24 <sup>th</sup> Street,. 6 <sup>th</sup> floor
16		Pittsburgh, PA 15222
17		
18	UL	Underwriters' Laboratories, Inc.
19		333 Pfingston Road
20		Northbrook, IL 60062
21		
22	USC	University of Southern California
23		Foundation for Cross-connection Control and
24		Hydraulic Research
25		Los Angeles, CA 90089

B. The following terms when used within these specifications shall be defined as follows:

ADMINISTRATION – shall mean the Pinellas County Administration.

APPLICANT – Shall mean any person making a request for service to be rendered or furnished by the County.

BACKFLOW PREVENTION DEVICES – shall mean either double check valves (DPV) or reduced pressure (RP) principle devices which protect the potable water system at the service connection by isolating within the customers premises actual or potential pollution or contamination through cross-connection.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) – shall mean the particular agency that is the delegated authority for the Safe Drinking Water Act Program effective July 9, 2007 which includes all permitting and compliance for public drinking water programs..

1 PRIVATE FIRE LINES – shall mean unmetered fire lines installed on  
2 private property which serves fire hydrants, sprinkler systems or such  
3 intermittent usages.

4  
5 PRESSURE REDUCING VALVE – shall mean a device utilized to reduce  
6 the pressure in a water or reclaimed water main to a preset value, usually  
7 to provide proper service pressures. Also known as a PRV.  
8

9  
10 WATER QUALITY DIVISION – shall mean that division of the Pinellas  
11 County Utilities that is responsible for the supervision of proper  
12 chlorination of new or existing water lines. Works in conjunction with the  
13 inspector to flush, chlorinate and draw samples for testing. They do not  
14 get involved past master meters, dual check valve assembly (DCVA)'s or  
15 domestic water lines.  
16

17 PART 2 - PRODUCTS (NOT USED)

18  
19 PART 3 - EXECUTION (NOT USED)  
20

21  
22 END OF SECTION

SECTION 01 45 17

PIPELINE PRESSURE AND LEAKAGE TESTING REQUIREMENTS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall pressure and leakage test all pressure pipelines as specified herein. All piping, and equipment shall be tested in the field in the presence of the Engineer or the County's representative.
- B. Prior to testing, all mains shall be flushed and pigged to remove all sand and other foreign matter. Flushing shall be terminated at the direction of the Engineer or County's representative. The Contractor shall dispose of the flushing water without causing a nuisance or property damage and in compliance with the National Pollution Discharge Elimination System (NPDES) and all applicable jurisdictions.
- C. No testing shall be done until all joints are restrained. Temporary thrust blocks or reverse deadmen may be used with the County's prior approval.

1.02 SCHEDULING

- A. All leakage testing, as defined herein, shall be completed by the Contractor under the supervision of the Pinellas County Utilities Inspector.
- B. All leakage tests must be scheduled through the Pinellas County Utilities Inspector, with twenty-four (24) hours minimum notice and ONLY AFTER THE CONTRACTOR ACHIEVES A SUCCESSFUL PRE-PRESSURE TEST.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. All corporation stops used for testing and service lines shall be installed by the Contractor prior to pressure testing.
- B. All hydrant control valves must be open while pressure testing.
- C. All blow-off standpipes and injection points shall be removed upon satisfactory completion of sampling and testing. Corporation stops shall remain in line.

- 1 D. Teflon tape shall be used on all threaded joints to avoid contamination (No  
2 pipe dope allowed).  
3  
4 E. It is the Contractor's sole responsibility to place sample points where  
5 designated by the Pinellas County Health Department.  
6  
7 F. The Contractor shall backfill all pipe and thrust blocking before pressure  
8 testing unless the Engineer directs certain joints or connections left  
9 uncovered. Where thrust blocking is provided the pressure test shall not  
10 be made until at least five days after the thrust blocking has been  
11 installed. A high early strength concrete may be used to reduce this time.  
12  
13 G. Each valved section of pipe shall be slowly filled with water and a pump  
14 shall be hooked to the pipe in a manner satisfactory to the Engineer to  
15 supply the test pressure. The pump, pipe connection and all necessary  
16 apparatus shall be furnished by the Contractor.  
17  
18 H. While the system is being filled with water, air shall be carefully and  
19 completely exhausted. If permanent air vents are not located at all high  
20 points, the Contractor shall install corporation stops or fittings and valves  
21 at such points so the air can be expelled as the pipe system is slowly filled  
22 with water. Service shall be tested as part of the main pipeline.  
23

24 3.02 PRESSURE TEST FOR DUCTILE IRON AND PVC PIPE  
25

- 26 A. All newly laid pipe, including fitting and valves shall be pressure tested by  
27 the Contractor, in accordance with AWWA C600 and C605 to verify the  
28 integrity of the pipeline before the leakage test is scheduled with the  
29 County.  
30  
31 B. Test pressures and durations shall be as follows:  
32
- |                          | Pressure (psi) | Duration (hrs) |
|--------------------------|----------------|----------------|
| 1. Sewage force mains    | 150            | 2              |
| 2. Reclaimed water mains | 150            | 2              |
| 3. Potable water mains   | 150            | 2              |
| 4. Fire mains            | 200            | 2              |
- 33  
34 C. All exposed pipe, fittings, valves, joints and appurtenances shall be  
35 carefully examined during the open-trench test. Any cracked or defective  
36 pipe, fittings, valves or appurtenances discovered in consequence of this  
37 test shall be removed and replaced with acceptable material and the test  
38 shall be repeated to the satisfaction of the Engineer.  
39  
40  
41  
42

1 3.03 LEAKAGE TEST FOR DUCTILE IRON AND PVC PIPE

- 2  
3 A. A leakage test shall be conducted in the presence of the Engineer and  
4 County Inspector, after the pressure test has been satisfactorily  
5 completed. The Contractor shall, as before, furnish all pumps, pipe,  
6 connections and other items required to satisfactorily complete the  
7 leakage test. The leakage test shall have a duration of two hours at the  
8 pressure specified for the pressure test. No pipe installation will be  
9 accepted if the leakage is greater than that determined by the formula for  
10 mechanical and push-on joints per hour:

11  
12 
$$L = \frac{SDP^{1/2}}{148,000}$$
  
13  
14  
15 L= Allowable leakage [gph]  
16 S= Length of pipe tested [feet]  
17 D= Nominal diameter of pipe [inches]  
18 P= Average pressure during test [psig]

19 150 psi (per 1000ft.)  
20 (Table 5.4 AWWA C  
21 600-05 & Table 2  
22 C605-5)

23 2	0.17
24 4	0.33
25 6	0.50
26 8	0.66
27 10	0.83
28 12	0.99
29 16	1.32
30 18	1.49
31 20	1.66
32 24	1.99
33 30	2.48
34 36	2.98
35 42	3.48
36 48	3.97
37 54	4.47

- 38 B. The Engineer, or his duly authorized representative, shall witness these  
39 tests. The Contractor shall be responsible for finding and repairing leaks.  
40 No additional cost may be incurred by the County due to repairs because  
41 of failure of either test. The Engineer has the authority to determine the  
42 number of repairs that will be made within a given length of pipe and has  
43 the right to request the Contractor to remove and relay a section of pipe if  
44 such does not comply with the established leakage rates as calculated  
45 using the formula above.



- 1 C. For the duration of the test, the pressure in the main shall not be allowed  
2 to drop more than 5 psi below the test pressure per AWWA C600 & C605.  
3 Should the pressure drop 5 psi, makeup water shall be added to the line to  
4 restore the pressure to the test pressure. This makeup water shall be  
5 measured and shall be included in the total leakage measured. If loss is  
6 greater than 5 psi, the test fails.  
7  
8  
9

10 3.04 PRESSURE AND LEAKAGE TESTS OF UNDERGROUND HDPE PRESSURE  
11 PIPING INCLUDING COMBINATIONS HDPE & PVC OR DUCTILE IRON  
12

- 13 A. Filled pipelines shall be allowed to thermally stabilize such that the  
14 temperature of the water and the pipe are equal. At temperatures above  
15 one hundred (100) degrees F, the Engineer shall be consulted regarding  
16 the need to reduce the test pressure.  
17  
18 B. The piping shall be tested between valved sections to a maximum length  
19 of five thousand (5,000) feet.  
20  
21 C. For any test pressure from 1.0 to 1.5 times the system design pressure,  
22 the total test time including initial pressurization, initial expansion, and time  
23 at test pressure, shall not exceed eight hours. If the pressure test is not  
24 completed due to leakage, equipment failure or other reason, the test  
25 section shall be depressurized, and allowed to "relax" for at least eight  
26 hours before bringing the test section up to test pressure again.  
27  
28 D. The test procedure consists of initial expansion, and the test phase:  
29  
30 1. During the initial expansion phase, the test section is pressurized to  
31 10 psi above the test pressure (see Table A for Expansion  
32 Pressure), and sufficient make-up water is added each hour for  
33 three hours to return to the expansion phase pressure.  
34  
35 2. After the initial expansion phase, about four hours after  
36 pressurization, the test phase begins.  
37  
38 3. During the test phase, the pipe is stabilized at the test pressure (see  
39 Table A). The pressure shall remain steady within five percent of this  
40 target value for two hours. If the pressure falls below five percent of  
41 the test pressure (see Table A), leakage or insufficient expansion is  
42 indicated, and the test shall be repeated after the pipe is allowed to  
43 "relax" as indicated above. Make-up water is not allowed during the  
44 test phase.  
45  
46

Table A

Pipe Class	Expansion Pressure	Test Pressure	5% Pressure Reduction
SDR 17	150 psi	140 psi	133 psi
SDR 13.5	170 psi	160 psi	152 psi
SDR 11	170 psi	160 psi	152 psi
SDR 9	210 psi	200 psi	190 psi

3.05 REPAIRS

- A. The Contractor shall repair all leaks in the piping at no additional cost to the County.

END OF SECTION

SECTION 01 55 26

TRAFFIC REGULATION

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. This item will consist of providing, installing, moving, replacing, maintaining, cleaning and removal upon completion of Work, all signs, barricades, pavement markings, barriers, cones, lights, signals and other devices necessary for the safe movement of all vehicular and pedestrian traffic through and within the Project.
- B. The Contractor shall arrange his work so that there will be as little disruption of traffic as possible.
- C. The Contractor shall have a Certified Worksite Traffic Supervisor in accordance with the General Conditions.

1.02 REFERENCES

- A. U.S. Department of Transportation (FHWA) Manual of Uniform Traffic Control Devices as adopted by the Florida Department of Transportation (latest edition).
- B. Florida Department of Transportation Design Standards, latest edition.
- C. Florida Department of Transportation Standard Specification for Road and Bridge Construction, latest edition.

1.03 SUBMITTALS

- A. The Contractor shall obtain approval from the City, County or State Agency having jurisdiction over the road or highway for any road crossings and detours required.
- B. Maintenance of Traffic (MOT) plans, if provided in the Contract Drawings, are considered a minimum requirement and it is the Contractor's responsibility to provide a safe traffic, pedestrian and working environment in accordance with the governing regulations. Contractor shall adjust the MOT plan as necessary to meet the field conditions at no additional cost to the County.
- C. If MOT plans are not provided in the Contract Drawings, a detailed traffic control plan and MOT plan shall be developed and submitted by the Contractor to such Agencies having jurisdiction over the road for their approval, and said approval shall be obtained prior to commencing construction.

- 1  
2 D. Any deviations from the Contract Drawings, or MOT plans specifically  
3 developed by the Contractor, shall be submitted to the applicable  
4 permitting entity for approval, and said approval shall be obtained, prior to  
5 commencement of construction. If the alternative MOT plan is deemed  
6 incomplete or unacceptable the Contractor will be required to submit a  
7 revised plan. This process will repeat itself until the revised plan is  
8 accepted by all parties. Contractor will not be granted or approved any  
9 costs or delay resulting from the review process or field adjustments.  
10  
11 E. All traffic control plans shall be prepared by a Florida Certified Traffic  
12 Planner.  
13

## 14 PART 2 – PRODUCTS

### 15 16 2.01 INSTALLATION STANDARDS

- 17  
18 A. All signs, barricades, pavement markings, traffic signals and channelizing  
19 devices used to handle traffic shall be provided for and erected in  
20 accordance with the FDOT Design Standards (latest edition) and to the  
21 details indicated in the above referenced standards. Traffic signs shall be  
22 high-intensity flat-surface reflective sheeting.  
23

## 24 PART 3 – EXECUTION

### 25 26 3.01 GENERAL

- 27  
28 A. In order that the Contractor may properly provide required traffic controls,  
29 the Contractor shall notify the appropriate agencies a minimum of two  
30 working days prior to any construction affecting traffic flow.  
31

### 32 3.02 MAINTENANCE OF TRAFFIC LANE AND ROAD CLOSURES

- 33  
34 A. The Contractor shall arrange his work so that there will be as little  
35 disruption of traffic as possible.  
36  
37 B. The Contractor shall be approved by the City, County or State Agency  
38 having jurisdiction over the road or highway for any road crossings and  
39 detours required. A detailed traffic control plan shall be submitted by the  
40 Contractor to such Agencies having jurisdiction over the road for their  
41 approval at least three weeks prior to commencing construction.  
42  
43 C. In the event that a road closure is approved by the permitting Agency, the  
44 Contractor will be responsible for any rerouting of traffic occasioned by the  
45 closure and will provide all necessary barricades, signs, guards, lights,  
46 etc. in accordance with the Agency's approval of such closure.  
47

### 48 3.03 ACCESS TO PROPERTIES

- 1  
2 A. When construction activities necessitate the closing of a street to through-  
3 traffic, the Contractor shall notify all affected emergency services entities  
4 of the closed road. If no other means of access is available, the  
5 Contractor shall maintain, at all times, a 10-foot-wide lane adjacent to the  
6 work area, free of construction equipment and obstructions, for the use of  
7 emergency vehicles.  
8  
9 B. The Contractor shall provide continuous access to properties adjacent to  
10 work areas.  
11

12 3.04 LOCAL TRAFFIC  
13

- 14 A. The roads shall be kept open to two-way traffic during construction, except  
15 one lane traffic will be permitted provided experienced flag personnel are  
16 used. Necessary barricades, safety vests and flags shall be used. No  
17 residences or places of business will be isolated. Suitable access shall be  
18 provided whenever construction interferes with the existing means of  
19 access.  
20

21 3.05 PEDESTRIAN TRAFFIC  
22

- 23 A. The Contractor shall take precautions to ensure the safety of pedestrians  
24 passing near work areas. This may entail the erection of a temporary  
25 fence on the construction side of pedestrian passageways to delineate  
26 out-of-bounds areas. The pedestrian passageways shall remain open and  
27 clean of dirt and debris at all times unless pedestrian safety cannot be  
28 assured, then the Contractor may close off the sidewalk(s) with signs and  
29 fences and shall direct pedestrians to use other suitable routes.  
30 Pedestrian passageways shall be cleared and swept in the vicinity of  
31 construction.  
32  
33 B. The Contractor shall pay close attention to the issue of pedestrian safety.  
34 The Contractor shall institute measures, including, but not limited to,  
35 temporary surfaces and channeling devices, to ensure the safe passage  
36 of pedestrians.  
37

38 3.06 BUS STOPS  
39

- 40 A. The Contractor shall take care to minimize disruption to existing bus stops.  
41 If a bus stop cannot be preserved, then the Contractor shall make  
42 provisions for its relocation. The Contractor shall be responsible for all  
43 coordination regarding the temporary relocation of bus stops  
44

45 END OF SECTION  
46  
47  
48

SECTION 01 57 00

CONTROL OF WORK

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all Work included in this Contract.
- B. The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies and other means of construction necessary or proper for performing and completing the Work. He shall perform and complete the Work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the County, and in strict accordance with the Contract Documents. The Contractor shall clean up the Work and maintain it during and after construction, until accepted, and shall do all Work and pay all costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the Work.
- C. The Contractor shall supervise and direct the Work in accordance with Pinellas County Utilities Standard Technical Specifications.
- D. The cost of incidental work described in these Construction Specifications, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the Work and shall be included in the prices for the various Contract Pay Items.
- E. The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary to perform in a satisfactory and acceptable manner all the Work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment, prior approval of the County notwithstanding.
- F. Public Utilities and Structures
  - 1. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto whether owned or controlled by the County, other governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity,

CONTROL OF WORK

1 telephone, sewerage, drainage, water or other public or private property  
2 which may be affected by the Work shall be deemed included  
3 hereunder. The Contractor shall protect all public utility installations and  
4 structures from damage during the Work, except those specifically  
5 designated to be removed or relocated. The Contractor shall so  
6 arrange his operations as to avoid any damage to any buried public  
7 utility installation or structure. All required protective devices and  
8 construction shall be provided by the Contractor at his expense. All  
9 existing public utilities damaged by the Contractor, which are shown on  
10 the Plans or have been located in the field by the utility, shall be  
11 repaired by the Contractor, at his expense. No separate payment shall  
12 be made for such protection or repairs to public utility installations or  
13 structures.  
14

15 2. Public utility installations or structures owned or controlled by the  
16 County or other governmental body, which are shown on the Plans to  
17 be removed, relocated, replaced or rebuilt by the Contractor, shall be  
18 considered as a part of the general cost of doing the Work and shall be  
19 included in the prices Bid for the various contract items. No separate  
20 payment shall be made therefor.  
21

22 3. Where public utility installations or structures owned or controlled by the  
23 County or other governmental body are encountered during the course  
24 of the Work, and are not indicated on the Plans or in the Specifications,  
25 and when, removal, relocation, replacement or rebuilding is necessary  
26 to complete the Work under this Contract, such work shall be  
27 accomplished by the utility having jurisdiction, or if required, by the  
28 Contractor.  
29

30 4. The Contractor shall give written notice to governmental utility  
31 departments and other owners of public utilities of the locations of his  
32 proposed construction operations, at least forty-eight (48) hours in  
33 advance of breaking ground in any area or on any unit of the Work.  
34 This can be accomplished by making the appropriate contact with the  
35 "Underground Utility Notification Center for Excavators (Call  
36 Sunshine)."  
37

38 5. The maintenance, repair, removal, relocation or rebuilding of public  
39 utility installations and structures, when accomplished by the Contractor  
40 as herein provided, shall be done by methods approved by the utility  
41 and the County.  
42

43 G. The Contractor shall not enter upon private property for any reason without  
44 securing prior permission from the property owner.  
45

- 1 H. During the progress of the Work the Contractor shall keep the work site free  
2 from an accumulation of rubbish, waste materials or any type of debris  
3 resulting from the construction.  
4

5 1.02 DRAWINGS AND SPECIFICATIONS  
6

- 7 A. The Contractor shall furnish each of the subcontractors, manufacturers, and  
8 suppliers such copies of the Contract Documents as may be required for  
9 their work.  
10

11 1.03 MATERIALS AND EQUIPMENT  
12

- 13 A. All transactions with the manufacturers or subcontractors shall be through  
14 the Contractor.  
15

- 16 B. All materials and equipment shall be new, unless otherwise provided. The  
17 Contractor shall furnish satisfactory evidence as to the type and quality of  
18 materials or equipment to be furnished and installed on this Project.  
19

- 20 C. Materials of fabrication and construction to be furnished and permanently  
21 installed in the Project shall be of the best quality. The workmanship of  
22 construction, fit and finish on the Project shall be equal to the highest  
23 standards of the industry. As indicated above, all materials and equipment  
24 and/or components thereof shall be new and shall not have been in service  
25 at any other installation.  
26

- 27 D. The Contractor shall deliver materials in ample quantities to insure the most  
28 speedy and uninterrupted progress of the Work so as to complete the Work  
29 within the allotted time. The Contractor shall also coordinate deliveries in  
30 order to avoid delay in, or impediment of, the progress of the work of any  
31 related Contractor. The Contractor shall replace, at his own expense, all  
32 such material(s) found to be damaged in shipment or handling or defective in  
33 manufacture. The cost of the replacement material and labor of installation  
34 for the replacement of previously installed material found to be defective prior  
35 to the final acceptance of the work shall also be the responsibility of the  
36 Contractor.  
37

- 38 E. All materials and equipment to be incorporated into the Project shall be  
39 loaded and unloaded by a method that will provide protection against  
40 damage. Every precaution shall be taken to prevent damage or injury to the  
41 equipment and material during transporting and handling. Proper and  
42 suitable power equipment shall be used in the loading or unloading process.  
43 Under no condition shall any items of equipment be dropped or rolled from a  
44 truck or dragged over the ground after being unloaded. When a crane or  
45 similar type equipment is used in loading or unloading, a suitable lifting sling  
46 and hook shall be used.



- 1 F. It will be the responsibility of the Contractor to store delivered materials or  
2 equipment in a secure area. The Contractor will be responsible for any  
3 damages resulting from vandalism or other reasons. Replacement of  
4 materials or equipment lost, stolen, damaged or destroyed, due to careless  
5 or improper storage, will be the Contractor's responsibility. All stored  
6 materials shall be easily and readily accessible for inspection by the County's  
7 representative.  
8
- 9 G. The Contractor shall, unless otherwise stated in the Contract Documents,  
10 furnish with each type, kind or size of equipment, one complete set of  
11 suitably marked high grade special tools and appliances which may be  
12 needed to adjust, operate, maintain or repair the equipment. Such tools and  
13 appliances shall be furnished in approved painted steel cases, properly  
14 labeled and equipped with good grade cylinder locks and duplicate keys.  
15
- 16 H. Each piece of equipment shall be provided with a substantial nameplate,  
17 securely fastened in place and clearly inscribed with the manufacturer's  
18 name, year of manufacture, serial number, weight and principal rating data.  
19
- 20 I. The Contractor shall have on hand sufficient proper equipment and  
21 machinery of ample capacity to facilitate the Work and to handle all  
22 emergencies normally encountered in work of this character.  
23
- 24 J. Equipment shall be erected in a neat and workmanlike manner on the  
25 foundations at the locations and elevations shown on the Drawings. All  
26 equipment shall be correctly aligned, leveled and adjusted for satisfactory  
27 operation and shall be installed so that proper and necessary connections  
28 can be made readily between the various units.  
29
- 30 K. The Contractor shall furnish, install and protect all necessary anchor and  
31 attachment bolts and all other appurtenances needed for the installation of  
32 the devices included in the equipment specified. Stainless steel anchor bolts  
33 shall be ample size and strength for the purpose intended. Substantial  
34 templates and working drawings for installation shall be furnished.  
35
- 36 L. The Contractor shall, at his own expense, furnish all materials and labor for,  
37 and shall properly bed in non-shrink grout, each piece of equipment on its  
38 supporting base that rests on masonry foundations. Grout shall completely  
39 fill the space between the equipment base and the foundation. All metal  
40 surfaces coming in contact with concrete or grout shall receive a coat of coal  
41 tar epoxy.  
42
- 43 M. Obtaining Materials From Pinellas County Utilities  
44
- 45 1. Any material obtained from the Utilities Department shall be  
46 thoroughly inspected by the Contractor so as to determine any

defects, damage or unsoundness of the materials. Items accepted by the Contractor shall be signed for by his authorized representative, and the Contractor shall be responsible for such items from the time he picks them up to the time they are installed and accepted by the Utilities Department.

2. Upon acceptance of any material from Pinellas County Utilities, the Contractor shall be responsible for loading the material at the storage yard and unloading the material at the job site and for the safe transportation of the material between those locations

#### 1.04 INSPECTION AND TESTING

- A. The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have, nor make any claim for damage, which may occur to equipment prior to the time when the County formally takes over the operation thereof.
- B. When requested, the Contractor shall furnish authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.
- C. As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make preliminary field tests. If the preliminary field tests reveal that the system does not comply with the requirements of the Contract Documents, the Contractor shall, prior to the acceptance tests, make all changes, adjustments and replacement required.
- D. Upon completion of the Work and prior to final payment, all equipment and piping shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.
- E. The Contractor shall furnish labor, fuel, energy, and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost. The Supplier shall assist in the final field tests as applicable.
- F. Any defects in the materials and equipment or their failure to meet the tests, guarantee or requirements of the Contract Documents shall be promptly corrected by the Contractor. If the Contractor fails to make these corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees or specified requirements, the materials and equipment may be rejected and removed from the site at the Contractor's expense.

1 1.05 FIRST AID

- 2
- 3 A. The Contractor shall keep upon the site, at each location where work is in
- 4 progress, a completely equipped first aid kit and shall provide ready access
- 5 thereto at all times when people are employed on the work.
- 6

7 1.06 ADJACENT STRUCTURES AND PROPERTY

- 8
- 9 A. The Contractor shall also be entirely responsible and liable for all damage or
- 10 injury as a result of his operations to all other adjacent public and private
- 11 property, structures of any kind and appurtenances thereto met with during
- 12 the progress of the Work. The cost of protection, replacement in their
- 13 original locations and conditions or payment of damages for injuries to such
- 14 adjacent public and private property and structures affected by the Work,
- 15 whether or not shown on the Drawings or specified, shall be included in the
- 16 various Contract Items and no separate payments will be made therefore.
- 17
- 18 B. Contractor is expressly advised that the protection of buildings structures,
- 19 tunnels, tanks, pipelines, etc. and related work adjacent to and in the vicinity
- 20 of his operations, wherever they may be, is solely his responsibility.
- 21 Conditional inspection of buildings or structures in the immediate vicinity of
- 22 the Project, which may reasonably be expected to be affected by the Work,
- 23 shall be performed by and be the responsibility of the Contractor.
- 24
- 25 C. Contractor shall, before starting operations, make an examination of the
- 26 interior and exterior of the adjacent structures, buildings, facilities, etc., and
- 27 record by noted, measurements, photographs, etc., conditions which might
- 28 be aggravated by open excavation and construction. Repairs or replacement
- 29 of all conditions disturbed by the construction shall be made to the
- 30 satisfaction of the County. This does not preclude conforming to the
- 31 requirements of the Insurance Underwriters.
- 32

33 1.07 PROTECTION, REMOVAL AND REPLACEMENT OF TREES AND SHRUBS

- 34
- 35 A. The Contractor shall comply with all local tree ordinances. When, in the
- 36 opinion of the Engineer, trees or shrubs can be protected in place, the
- 37 Contractor shall endeavor to protect the trees or shrubs as necessary.
- 38 When, in the opinion of the Engineer, trees must be removed to permit
- 39 construction, the Contractor shall consider the price for removing, cutting,
- 40 trimming, replacing trees and shrubs incidental to the laying of pipe and no
- 41 additional payment shall be made unless specifically called for in the
- 42 Contract Documents.
- 43
- 44 B. The Contractor is responsible for acquiring necessary permits and replacing
- 45 trees as required by local ordinances and the Pinellas County Department of
- 46 Environmental Management. The Contractor shall provide the services of an
- 47 approved tree specialist when it is necessary to trim or cut a branch from a

tree.

## 1.08 PROTECTION OF WORK AND PUBLIC

### A. Barriers and Lights

1. The Contractor shall provide and maintain proper and adequate barricades, construction signs, torches, flashers, construction tapes, flagmen, guards or other traffic control devices as may be necessary to provide the required safety and protection to the public at and around the perimeter of the construction areas. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public. The Contractor shall comply with all City, County or State regulations.

### B. Smoke Prevention

1. A strict compliance with ordinances regulating the production of emission of smoke will be required. No open fires will be permitted.

### C. Noise

1. The Contractor shall eliminate noise to as great an extent as practicable at all times. Air compressing plants shall be equipped with silencers and the exhaust of all gasoline, diesel, motors or other power equipment shall be provided with mufflers. The Contractor shall strictly observe all local regulations and ordinances covering noise control.
2. If mufflers and silencers cannot achieve the necessary noise reduction, other noise abatement procedures shall be instituted by the Contractor, such as installation of 3/4-inch plywood baffles positioned to break off line-of-sight from the noise source to affected residences and/or commercial structures.

### D. Access to Public Services

1. Neither the materials excavated nor the materials or plant used in the construction of the work shall be placed to prevent free access to all fire hydrants, valves or manholes.

### E. Dust Prevention

1. It is the responsibility of the Contractor to control all dust problems that may occur during the construction, with required watering.. Dust control will be required seven days a week.
- F. Safety
1. The Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Project. He will take all necessary precautions for the safety of and will provide the necessary protection to prevent damage, injury or loss to all employees on the Project and other persons who may be affected thereby, all the work and all material or equipment to be incorporated therein, whether in storage on or off the site.
2. The Contractor shall comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the work, all necessary safeguards for safety and protection. He will notify owners of adjacent utilities when prosecution of the work may affect them. The Contractor will remedy all damage, injury or loss of any property caused, directly or indirectly, in whole or in part, by the Contractor, any subcontractor or anyone directly or indirectly employed by any one of them or anyone for whose acts of any of them be liable.
3. In emergencies affecting the safety of persons or the work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Engineer or Pinellas County Inspector, shall act to prevent threatened damage, injury or loss. He will give Pinellas County prompt written notice of any significant change in the Work or deviations from the approved plans required relating to the emergency.
4. It is the Contractor's responsibility to comply with the Occupational Safety and Health Administration safety standards.
5. Standard 29 CFR 1926.650, Subpart P, trench safety standards are in effect during the period of construction of the Project.
6. The Contractor shall comply with all Occupational Safety and Health Association (OSHA) requirements for work in confined spaces. This shall include, but not be limited to, provision of a force-ventilated working space.
7. Hard hats shall be worn at the work site by all personnel as required by all local, state and federal guidelines. The Engineer is authorized to halt the work if this requirement is not met.

1  
2  
3  
4 G. Pollution Control  
5

- 6 1. The Contractor shall provide for adequate protection against polluting  
7 any private or public lands, streams, ponds, lakes, sanitary or storm  
8 drainage systems, etc., by the disposal of surplus materials in the  
9 form of solids or liquids or any other deleterious materials (fuels, oils,  
10 bitumens, etc.)  
11

12 1.09 CUTTING AND PATCHING  
13

- 14 A. The Contractor shall do all cutting, fitting or patching of his portion of the  
15 work that may be required to make the several parts thereof join and  
16 coordinate in accordance with the Drawings and Specifications. The work  
17 must be done by competent workmen skilled in the trade required.  
18

19 1.10 CLEANING  
20

- 21 A. During construction of the Work, the Contractor shall, at all times, keep the  
22 site of the work and adjacent premises as free from material, debris and  
23 rubbish as is practicable and shall remove the same from any portion of the  
24 site.  
25  
26 B. At the conclusion of the Work, all erection plant, tools, temporary structures  
27 and materials belonging to the Contractor shall be promptly taken away, and  
28 he shall remove and promptly dispose of all water, dirt, rubbish or any other  
29 foreign substances.  
30  
31 C. The Contractor shall thoroughly clean all equipment and materials installed  
32 by him and shall deliver such materials and equipment undamaged in a  
33 bright, clean, polished and new operating condition.  
34

35 1.11 EROSION CONTROL, WETLANDS AND STORM SEWERS  
36

37 A. Protection Against Siltation and Bank Erosion  
38

- 39 1. The Contractor shall arrange his operations to minimize siltation and  
40 bank erosion on construction sites and on existing or proposed water  
41 courses, drainage ditches, wetlands and other areas of concern.  
42  
43 2. The Contractor, at his own expense, shall remove any siltation deposits  
44 and correct any erosion problems, which result from his construction  
45 operations.  
46 3. The Contractor shall be solely responsible for any fines resulting from

the encroachment of any environmentally protected areas.

B. Protection of Wetland Areas

1. The Contractor shall properly dispose of all surplus material, including soil, in accordance with Local, State and Federal regulations. Under no circumstances shall surplus material be disposed of in wetland areas as defined by the Florida Department of Environmental Protection, Southwest Florida Water Management District, U.S. Army Corps of Engineers, etc.

C. Sanitary & Storm Sewer Systems

1. The Contractor shall be entirely responsible for the satisfactory replacement of storm sewer and installation of sanitary sewer systems in substantial conformance to the approved Drawings. It is strongly recommended that no roadway base or paving be constructed until the Contractor has performed televising of these lines to his and the County's satisfaction, and all storm sewer and sanitary sewer invert grades are verified in the field. The lamping of lines and verification of elevations in no way absolves the Contractor from any of his contractual obligations.

1.12 RESTORATION OF PROPERTY

- A. Responsibility. All damage as a result of construction work done to existing structures, wetland areas, roadway pavement, driveways, other paved areas, fences, utilities, traffic control devices and any other obstruction not specifically named herein, shall be repaired, restored or replaced by the Contractor unless otherwise specified.
- B. Temporary Repairs. All damage named in Paragraph A above shall be at least temporarily repaired, restored or replaced immediately following construction efforts at that location. Temporary restoration shall mean putting the affected area back into a safe, usable condition. In no case shall trenches remain open over night within a street right-of-way unless specific approval is granted by the County.
- C. Permanent Repairs. All damage named in Paragraph A above shall be permanently repaired, restored, or replaced before final completion. Permanent repairs shall be accomplished in a professional workmanship-like manner.
- D. In all areas disturbed by the work, the Contractor shall grade and restore the site to a condition as good or better than existed before construction.

Sodded areas shall be sodded with sod matching the existing adjacent sod. Any drives, walks, pavements, structures, survey monuments, property corner markers, trees, shrubs, or any other public or private property damaged or destroyed by the work shall be restored or replaced at the Contractor's expense.

#### 1.13 MAINTENANCE OF TRAFFIC

- A. Maintenance of Traffic shall be in accordance with Specification 01 55 26, Traffic Control.

#### 1.14 MATERIALS

- A. All materials installed in the County's easements or rights-of-way shall be approved in the County's Materials Specification Manual regardless of whether these facilities are to be owned by the County or are to be privately owned.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION



SECTION 01 57 13

EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Take every reasonable precaution throughout construction to prevent the erosion of soil and the sedimentation of streams, bays, storm systems or other water impoundments, ground surfaces, or other property as required by State and Local regulations.

1.02 RELATED WORK

- A. Provide protective covering for disturbed areas upon suspension or completion of land-disturbing activities. Permanent vegetation shall be established at the earliest practicable time. Temporary and permanent erosion control measures shall be coordinated to assure economical, effective, and continuous erosion and siltation control throughout the construction and post construction period.

1.03 REGULATORY REQUIREMENTS

- A. Prevent damage to properties outside the construction limits from siltation due to construction of the project. Assume all responsibilities to the affected property owners for correction of damages, which may occur. Erosion control measures shall be performed conforming to the requirements of, and in accordance with plans approved by applicable state and local agencies and as per the erosion control portion of the construction drawings and these specifications. The Contractor shall not allow mud and debris to accumulate in the streets. Should the Contractor pump water from trenches during construction, appropriate siltation preventative measures shall be taken prior to discharge of pumped water into any storm drain or stream. The Contractor shall dispose of the water without causing a nuisance, property damage and in compliance with the National Pollution Discharge Elimination System (NPDES) and all applicable jurisdictions.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Open mesh biodegradable mulching cloth.

- 1  
2 B. Fertilizer shall be 10-10-10 grade or equivalent.  
3  
4 C. Lime shall be Dolomitic Agricultural Ground limestone, per FDOT Section  
5 982.  
6  
7 D. Provide permanent grass seed in accordance with Section 32 92 01.  
8  
9 E. Provide temporary grass seed in accordance with Section 32 92 01.  
10  
11 F. Silt fence shall consist of non-biodegradable filter fabric (Trevira, Mirafi,  
12 etc.), per FDOT Section 985, wired to galvanized wire mesh fencing and  
13 supported by wood or metal posts.  
14  
15 G. Floating turbidity barriers per FDOT Section 985 and FDOT Standard  
16 Index 103.  
17  
18 H. Staked turbidity barriers  
19  
20 I. Rock bags  
21  
22 J. Erosion Stone: FDOT Section 530  
23 1. Sand-Cement Riprap  
24 2. Concrete Block  
25 3. Rubble 20 to 300 pounds each  
26  
27 K. Filter Fabric for placement under Riprap shall meet the requirements  
28 FDOT Section 985.  
29  
30 L. Baled hay or straw in accordance with FDOT Section 104.  
31  
32 M. Drain pipe with sock (sedimentation control) shall be used to prevent and  
33 control soil erosion runoff and intrusion into stormwater drainage systems.  
34  
35 1. Drain sock products such as "ADSSock" or approved equal.  
36 2. Sock material shall be on ultra-porous filter (synthetic wrap  
37 material) fitted snugly over pipe. Material shall be 100 percent  
38 knitted polyester (or approved equal), equivalent opening size of 30  
39 to 40, burst strength of 100-135 (ASTM D 3786), fiber size of 100-  
40 200 denier filament, 2.5 to 3.5 ounces per square yard (ASTM D  
41 3776).  
42 3. Approval of material is required by County prior to use.  
43 4. Drain pipe with sock shall span the entire opening of the inlet.  
44  
45  
46

## PART 3 - EXECUTION

### 3.01 CLEARING

- A. Clearing and grubbing shall be scheduled and performed in such a manner that subsequent grading operation and erosion control practices can follow immediately thereafter. Excavation, borrow, and embankment operations will be conducted as a continuous operation. All construction areas not otherwise protected shall be planted with permanent vegetative cover within 30 working days after completion of active construction.

### 3.02 STABILIZING

- A. The angle for graded slopes and fills shall be no greater than the angle, which can be retained by vegetative cover or other adequate erosion control devices or structures. All disturbed areas outside of embankment left exposed will, within 30 working days of completion of any phase of grading, be planted or otherwise provided with either temporary or permanent ground cover, devices, or structures sufficient to restrain erosion.

### 3.03 REGULATORY REQUIREMENTS

- A. Whenever land disturbing activity is undertaken on a tract, a ground cover sufficient to restrain erosion must be planted or otherwise provided within 30 working days on that portion of the tract upon which further active construction is to be undertaken.
- B. If any earthwork is to be suspended for any reason whatsoever for longer than 30 calendar days, the areas involved shall be seeded with vegetative cover or otherwise protected against excessive erosion during the suspension period. Suspension of work in any area of operation does not relieve the Contractor of the responsibility for the control of erosion in that area.

## PART 4 - CONSTRUCTION PHASE

### 4.01 PRACTICES

- A. Avoid dumping soil or sediment into any stream bed or watercourse.
- B. Maintain an undisturbed vegetative buffer where possible between a natural watercourse and trenching and grading operations.
- C. Avoid equipment crossings of streams, creeks, and ditches where practicable.

## PART 5 - SEDIMENT CONTROL FEATURES

### 5.01 GENERAL

- A. All devices (silt fences, retention areas, etc.), for sediment control shall be constructed at the locations indicated prior to beginning excavation on the site. All devices shall be properly maintained in place until a structure or paving makes the device unnecessary or until directed to permanently remove the device.

### 5.02 DESIGN APPLICATIONS

- A. Mulch shall be used for temporary stabilization of areas subject to excessive erosion, and for protection of seed beds after planting where required.
- B. Filter Fabric, drain pipe with sock, or other approved methods shall be placed and secured over the grates of each existing inlet, grating or storm pipe opening near the area of excavation to prevent silt and debris from entering the storm systems.
- C. Silt fences, hay bales and floating turbidity barriers shall be used as shown on the plans or as directed by the Project Representative to restrict movement of sediment from the site.
- D. Establish vegetative cover on all unpaved areas disturbed by the work.
  - 1. Preparation of Seedbed. Areas to be seeded shall be scarified a depth of four inches until a firm, well pulverized, uniform seedbed is prepared. Fertilizer shall be applied during the scarification process in accordance with the following rates.
    - a. Fertilizer - 10 to 15 pounds per 1,000 square feet
  - 2. Seeding. Disturbed areas along embankments shall be permanently seeded with mix specified in Section 32-92-01.
  - 3. Mulch all areas immediately after seeding. Mulch shall be applied and anchored as specified herein before.

### 5.03 MAINTENANCE

- A. Maintain all temporary and permanent erosion control measures in functioning order. Temporary structures shall be maintained until such time as vegetation is firmly established and grassed areas shall be maintained until completion of the project. Areas which fail to show a suitable stand of grass or which are damaged by erosion shall be immediately repaired. No additional payment will be made to the

1 Contractor for the re-establishment of erosion control devices, which may  
2 become damaged, destroyed, or otherwise rendered unsuitable for their  
3 intended function during the construction of the Project.  
4

- 5 B. Remove all silt, sediment and debris buildup on a regular basis to  
6 maintain functioning storm systems and erosion control devices.  
7

8 5.04 REMOVAL OF SEDIMENT CONTROL DEVICES  
9

- 10 A. Near completion of the project, when directed by the County's agent, the  
11 Contractor shall dismantle and remove the temporary devices used for  
12 sediment control during construction. All erosion control devices in  
13 seeded areas shall be left in place until the grass is established. Seed  
14 areas around devices and mulch after removing or filling temporary  
15 control devices. Cleanup all areas.  
16

17 END OF SECTION

SECTION 01 58 01

PROJECT IDENTIFICATION SIGNS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Furnish, install and maintain project identification sign on Pinellas County Projects.

B. Remove sign on completion of construction.

1.02 PROJECT IDENTIFICATION SIGNS

A. Signs shall be not less than thirty-two (32) square feet in area, with painted graphic content to include the following and as shown on the following page:

1. Title of Project
2. Name of Owner
3. Names and titles of authorities as directed by County
4. Names and title of:
  - a. Engineer
  - b. Professional Consultants
5. Prime Contractor
6. Major subcontractors
7. Project Cost
8. Pinellas County Web Page
9. County logo
10. Other logos subject to the requirements of the Project.

B. Graphic design, style of lettering and colors: As approved by the Engineer, subject to the approval of the County.

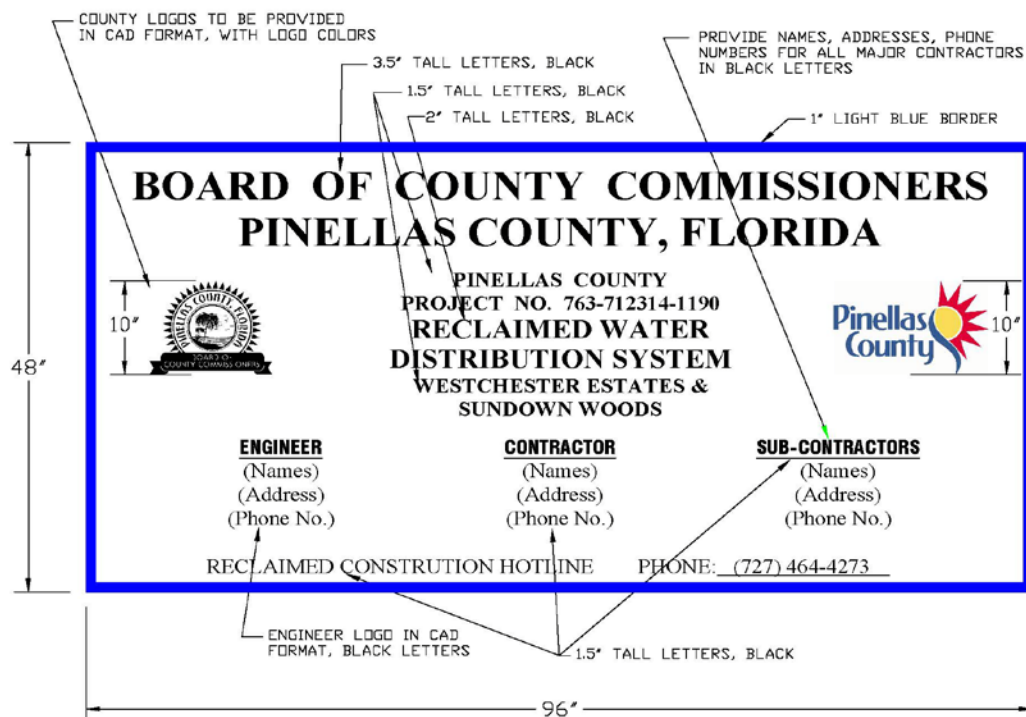
C. Erect on the site at a lighted location of high public visibility, as approved by the Engineer and the County.

1.03 QUALITY ASSURANCE

A. Sign Painter: Professional experience in type of work required.

B. Finishes, Painting: Adequate to resist weathering and fading for scheduled construction period.

PROJECT IDENTIFICATION SIGNS



## PART 2 - PRODUCTS

### 2.01 SIGN MATERIALS

- A. Structure and Framing: May be new or used, wood or metal, in sound condition, structurally adequate to work and suitable for specified finish.
- B. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard large sizes to minimize joints.
  1. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.
- C. Rough Hardware: Galvanized.
- D. Paint: Exterior quality, as specified below.
  1. Wood
    - a. Surface Preparation: Sand smooth, seal knots with white shellac (fill holes with vinyl putty after prime).

1                   b.     Prime: Painted trim and siding - white pigmented non-  
2                   penetrating alkyd based primer applied at the rate of 3.0 mils  
3                   dry film thickness.

4  
5                   c.     Finish: Painted trim and face - apply two coats semi-gloss  
6                   modified acrylic latex applied at a rate of at least 2.0 mils dry  
7                   film thickness, per coat.

8  
9                   2.     Steel

10  
11                  a.     Surface Preparation: Commercial blast according to the  
12                  Steel Structures Painting Council Specifications SP-6.

13  
14                  b.     Prime: One coat of a combination of lead chromate rust  
15                  inhibitive and synthetic pigmented alkyd resins, minimum 1.5  
16                  mils dry film thickness. If shop coat is damaged, reprime  
17                  base areas in field.

18  
19                  c.     Finish: Two coats of semi-gloss medium to long oil alkyd  
20                  resin coating, 1.5 mils dry film thickness per coat.

21  
22                  3.     Use Bulletin colors for graphics.

23  
24     PART 3 - EXECUTION

25  
26     3.01   PROJECT IDENTIFICATION SIGN

27  
28               A.     Paint exposed surfaces of supports, framing and surface material; one  
29               coat of primer and one coat of exterior paint.

30  
31               B.     Paint graphics in styles, sizes and colors selected.

32  
33     3.02   MAINTENANCE

34  
35               A.     Maintain signs and supports in a neat, clean condition; repair damages to  
36               structures, framing or sign.

37  
38     3.03   REMOVAL

39  
40               A.     Remove signs, framings, supports and foundations at completion of  
41               Project.

42  
43  
44                               END OF SECTION



SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 REQUIREMENTS INCLUDED

A. Contractor shall maintain at the site one record copy of:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Engineer's field orders or written instructions.
6. Approved shop drawings, working drawings and samples.
7. Field test records.
8. Construction photographs.
9. Detailed Progress Schedule.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
- B. File documents and samples in accordance with CSI format.
- C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for review by the Engineer and County.
- E. As a prerequisite for monthly progress payments, the Contractor is to exhibit the currently updated "record documents" for review by the Engineer.

1.03 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters.
- B. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
- C. Drawings; Legibly mark to record actual construction:

1. Elevations of various structure elements in relation to grade.
  2. All underground piping with elevations and dimensions. Changes in piping location. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc.
  3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
  4. Field changes of dimension and detail.
  5. Changes made by Field Order or by Change Order.
  6. Details not on original Contract Drawings.
  7. Equipment and piping relocations.
  8. Intersection details: At least three ties to every valve and fitting, blowoff, fire hydrant and air release.
  9. Services based on distance from main line pipe and property lines.
  10. Backflow preventer assemblies locations, with ties to physical features.
- D. All horizontal locations, if not in the right-of-way, must relate to easement.
- E. All elevations shall be in feet and tenths, referenced to NAVD 1988.
- F. Specifications and Addenda; Legibly mark each Section to record:
1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
  2. Changes made by Field Order or by Change Order.
- 1.04 SPECIAL REQUIREMENTS FOR MAIN REPAIRS
- A. The Contractor will not be required to furnish as-built drawings for main repairs, but shall be required to furnish a complete "bill of materials" used at each repair, if requested by the County.
- 1.05 SPECIAL REQUIREMENTS FOR WATER MAINS, RECLAIMED WATER MAINS AND FORCE MAINS
- A. In addition to that specified above, the following information shall be provided on the Record Drawings:
1. Location (vertical and any horizontal) at intervals not to exceed two hundred (200) feet and at all locations where the direction changes by more than ten (10) degrees.
  2. Pipe size and material.

3. Air release manhole (rim and bottom elevation and horizontal location) i.e. ties to back of curb and nearest property corner or permanent control point.
  4. Detailed location of valves (horizontal), i.e., ties to back of curb and nearest property corner or permanent control point.
  5. Service connection locations for each designated meter.
- B. All top of pipe elevations shall be accompanied by a finished grade elevation at the same location.
- C. Horizontal location of the pipe shall be defined using ties to back of curb and nearest property corner, property line or permanent control point.
- D. Should supplemental information be compiled or be available related to the "As-Built" condition of the Project, the Contractor shall provide that information, along with the "As-Built Record Drawing" documentation outlined above, which is required under the terms of the contract. Such supplemental information may include but not be limited to:
1. Length of pipe between fittings with depth every one hundred (100) feet.
  2. Elevation of top of pipe at grade changes.
  3. Manufacturer of pipe.
  4. Manufacturer, number of turns to open and depth of valves
  5. Define location of transition point between differing pipe materials
  6. Flow capacity of fire hydrants if such field information was obtained during construction.

#### 1.06 SPECIAL REQUIREMENTS FOR GRAVITY SEWER

- A. In addition to that specified above, the following information shall be provided on the Record Drawings:
1. Manhole rim and invert elevations (include pipe inverts).
  2. Manhole horizontal location (i.e. ties to back of curb and nearest property corner or permanent control point.)
  3. Service laterals located from nearest down stream manhole (indicate any laterals out of manholes).
  4. Distance between manholes.
  5. Size and material of all pipe.

#### 1.07 SPECIAL REQUIREMENTS FOR WASTEWATER PUMP STATIONS

- A. In addition to that specified above, the following information shall be provided on the Record Drawings:

1. Location ties to back of curb and nearest property corner or permanent control point.
2. Wet well invert elevations.
3. Pipe invert elevations.
4. Valve vault inverts.
5. Top of slab elevations.
6. "As Built" elevations of all construction elevations shown on the Drawings.

#### 1.08 SUBMITTAL

- A. At Final Completion Date, deliver Record Documents to the Engineer.
- B. Provide certified Record Drawings in electronic format (AutoCAD r14 or later version) meeting Pinellas County Standards and one hardcopy signed and sealed by a Florida registered surveyor and mapper.
- C. Accompany submittal with transmittal letter in duplicate, containing:
  1. Date.
  2. Project title and number.
  3. Contractor's name and address.
  4. Title and number of each Record Document.
  5. Signature of Contractor or his authorized representative.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

SECTION 03 10 01

CONCRETE MATERIALS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The work shall include the furnishing of all materials, equipment and labor required to construct all concrete work shown on the Drawings, or incidental to the proper execution of the work.

1.02 RELATED SECTIONS

- A. Section 32 13 01- Concrete Sidewalks, Driveways, and Gutters

1.03 DESIGN MIX

- A. Prior to placing any concrete, the Contractor shall submit for the Engineer's approval, a design mix, calculated by a recognized testing laboratory, and using the approved aggregates to produce a workable mix of the desired strength, together with certified copies of seven day and twenty-eight (28) day tests of cylinders taken from concrete made according to the design mix. The mixes shall be designed to secure concrete having a minimum compressive strength at age twenty-eight (28) days as shown on the Plans or covered in other sections of these Specifications.

PART 2 - PRODUCTS

2.01 CEMENT

- A. Portland cement shall conform to the latest revision of Federal and/or ASTM Specifications enumerated below:
1. For general concrete construction, ASTM designation C-150, Type I or Type II, or Federal Specifications SS-C-192, Type I or II.
  2. For construction of sewage treatment plant and pump station structures Type II cement shall be used.
  3. Slag cement shall conform to ASTM designation C-465.
  4. Slag cement may be used in the maximum ratio of one part of slag cement by weight to six parts of total cement by weight, if approval by the Engineer, is obtained prior to use.

1 B. Concrete Bag Mix

- 2
- 3 1. Quickrete 5000 High Early Strength Concrete Mix #1007 or Engineer
- 4 approved equal.
- 5
- 6 2. Use of bag mix is strictly limited to non-structural use and Engineer
- 7 designated locations only.
- 8
- 9 3. The Contractor is required to strictly adhere to the mixing and installation
- 10 instructions set forth by the manufacturer.
- 11
- 12 4. Testing to be performed at Engineers discretion. Concrete not meeting
- 13 design strength or not properly installed per the manufacturer is subject to
- 14 removal and replacement at no additional cost to the County.
- 15

16 2.02 FINE AGGREGATE

17

18 A. Fine aggregate shall be clean, hard, strong, durable uncoated particles of natural

19 sand known as Lake Wales, Interlachen or approved equal. The source,

20 composition, quality and gradation of the fine aggregate shall be subject to the

21 approval of the Engineer. Samples of the sand shall be furnished, together with

22 certified copies of the gradation and analysis from a recognized testing

23 laboratory.

24

25 B. The weight of extraneous or deleterious substances shall not exceed the

26 following percentages:

27

28 Loss by decantation - 3 percent

29 Shale -1 percent

30 Clay lumps - 1 percent

31 Coal and lignite - 1 percent

32

33 C. The fine aggregate shall be reasonably well graded from coarse to fine and

34 when tested by means of laboratory sieves, shall meet the following

35 requirements in percent of total weight:

36

Total Retained On	Percent Retained		
No. 4 Sieve	0	-	5
No. 10 Sieve	3	-	30
No. 30 Sieve	30	-	70
No. 50 Sieve	65	-	95
No. 100 Sieve	95	-	100

37

38

39

40

41

42

43

44

45 Deficiencies in the percentages of the fine aggregates passing the No. 50

46 and No. 100 sieves may be remedied by the addition of pozzolanic or

1 cementitious materials excepting Portland cement. Such materials must  
2 meet the approval of the Engineer.

3  
4 2.03 COARSE AGGREGATE

5  
6 A. Coarse aggregate shall consist of hard, tough, durable components, free  
7 from adherent coatings and vegetable matter, and shall not contain soft,  
8 friable, thin or elongated particles in quantities considered deleterious by the  
9 Engineer. Coarse aggregate shall be properly graded from fine to coarse to  
10 produce concrete of the desired strength, density, and workability. The  
11 source, composition, quality and gradation of the coarse aggregate shall be  
12 subject to the approval of the Engineer. Samples of the coarse aggregate  
13 shall be furnished together with certified copies of the gradation and analysis  
14 from a recognized testing laboratory.

15 B. All coarse aggregate shall be washed and shall be free from disintegrated  
16 pieces, salt, alkali, vegetable matter and adherent coatings. The total  
17 percentage of all deleterious substances shall not exceed five percent by  
18 weight. The substances designated shall not be present in excess of the  
19 following amounts:

20  
21 Loss by decantation - 1 percent

22 Clay lumps or other soluble materials - 1/4 percent

23 Soft fragments - 5 percent

24  
25 C. Where the cover over reinforcing is two inches or more, the maximum size  
26 of aggregate shall be one and one-half inches. Where the cover over  
27 reinforcing is less than 2-inches, the maximum size of aggregate shall be  
28 three-quarter inch. The maximum size of aggregate shall not exceed one-  
29 fifth of the narrowest dimension between forms nor three quarters of the  
30 minimum clear spacing between reinforcing bars. The grading of the coarse  
31 aggregate in the concrete shall be within the following limits:

32  
33 Percent Passing

34  
35 Maximum size square mesh screen 97 - 100 percent

36 Maximum size square mesh screen 40 - 70 percent

37 No. 4 Sieve 0 - 6 percent

38  
39 2.04 WATER

40  
41 A. The water used in mixing concrete shall be fresh, clean and free from  
42 injurious amounts of oil, acid, alkali or organic matter.

43  
44 B. Water from any source other than a municipal water supply shall be shown  
45 by test to comply with Florida State Road Department requirements for  
46 mixing water.

## 2.05 REINFORCEMENT

A. Reinforcing bars shall conform to the requirements of the latest revision of Federal Specification QQ-S-632 and shall be as follows unless indicated otherwise on the plans:

1. Bent: Type II (deformed), Class B40
2. Straight: Type II (deformed), Class B40
3. Column Ties: Type I (plain), Class B40

B. Wire mesh, unless otherwise shown on the drawings or specified, shall be 6" x 6" No. 10 woven, or electrically welded wire fabric conforming to the requirements of ASTM designation A 185, latest revision.

C. Reinforcing steel shall be detailed, fabricated and placed according to the methods and standards recommended in the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" of the American Concrete Institute.

## 2.06 JOINTS

A. Water Stops

1. Materials for stops shall be 1/8-inch steel plate welded into a continuous strip, or an approved alternate material.

## 2.07 GROUTING AND PATCHING

A. Cement for use in grouting and patching shall be non-shrinking material free of stain-causing agents and matching the adjacent concrete in appearance.

B. Bonding Agent: To be structural epoxy adhesive conforming to ASTM-C881 Type I & II, Grade 2, Class B & C with a minimum bond strength of 1900 psi.

## PART 3 - EXECUTION

### 3.01 REINFORCING STEEL

A. The reinforcing fabricated to shapes and dimensions shown, shall be placed where indicated on the Drawings. Before placing, all reinforcements shall be thoroughly cleaned of rust, mill scale or coatings, which would reduce or destroy the bond.

B. Splices in reinforcing mats shall be staggered. Horizontal mats shall be supported on metal chairs with all sills or pads below subgrade. Spacers



shall be provided for wall and column steel and shall be removed as the concrete is placed.

- C. The concrete covering over steel reinforcement shall be as shown on the Plans.

### 3.02 PROPORTIONING

- A. All materials, except water, shall be proportioned into the mix by weight. Water may be proportioned either by weight or volume.
- B. Delivery tickets for transit mix concrete shall show the weight of cement of each type incorporated in the batch.
- C. Precise control of the proportions and amounts of all materials will be required. Unauthorized changes in proportions, or addition of water, shall be sufficient cause for rejection of the batch. The proportions of the approved design mix may be changed only upon specific approval of the Engineer. The use of admixture to improve workability will not be approved, unless such admixture is a part of the design mix and the submitted design mix test data. Only admixture of pozzolanic, cementitious or silicious nature will be considered.
- D. The amount of water used in the mix shall be kept at the minimum necessary to produce concrete of a workable consistency. Consistency shall be measured at the time of pouring by slump tests, when directed by the Engineer. The slump shall fall within the following tabulated limits:

#### Slump in Inches

Type of Structure	Minimum	Maximum
Massive sections, pavement and slabs on ground	1	4
Heavy slabs, beams or walls	3	5
Thin walls and columns, ordinary slabs or beams	3	6

### 3.03 MIXING AND PLACING

- A. General

1. Concrete shall be machine-mixed in standard equipment in good condition, operated within its rated capacity. The batching plant shall be equipped with facilities for measurement of dry materials by weight, and water by weight or volume. Mixing equipment may be a portable plant (job-mix), or truck mounted (transit-mix). The use of transit-mix concrete will be limited by length of haul. Transit-mixing will be required to meet the requirements for mixing time. Batching plant and handling equipment shall be of sufficient capacity to produce and place concrete without interruption or cold joints. All equipment shall be subject to the approval of the Engineer.

B. Time

1. The minimum time for mixing each batch after all materials are in the mixer shall be one minute for 1/2 to 1 1/2 cubic yard mixers, and 1 1/2 minutes for mixers over 1 1/2 cubic yard capacity. The mixer shall revolve at a uniform speed, a minimum of twelve (12) revolutions after all materials have been placed therein.
2. Neither the speed, nor the volume capacity of the mixer, shall exceed those recommended by the manufacturer. Excessive over-mixing, requiring addition of water to preserve the consistency, will not be permitted.

C. Placing

1. Concrete shall be placed before the initial set has occurred and in no event after it has contained its water content for more than sixty (60) minutes, unless documented by the testing laboratory justifying a longer truck residence time without deleterious effect.
2. The concrete shall be compacted and worked in an approved manner into all corners and angles of the forms and around reinforcement and embedded fixtures in such a manner as to prevent segregation of the coarse aggregate.
3. All concrete shall be placed with the aid of mechanical vibrating equipment supplemented by hand forking or spading. Vibration shall be transmitted directly to the concrete and not through the forms. The duration of vibration at any location in the forms shall be held to the minimum necessary to produce thorough consolidation.
4. The concrete shall be placed by suitable equipment as nearly as possible to its final location and without any segregation of the aggregate. Any free vertical drop shall not exceed three feet.

- 1 5. Before depositing new concrete, on or against concrete which has  
2 set, the existing surfaces shall be cleaned of all laitance, foreign  
3 matter and loose particles, and covered with a neat cement grout.  
4 Grout for horizontal construction joints shall be of cement and fine  
5 aggregate in the same proportions as in the concrete to be placed,  
6 and shall be from one-half to one inch thick.  
7  
8 6. Exposed formed surfaces shall be rubbed with Carborundum brick or,  
9 otherwise dressed to produce a smooth, true surface. Interior  
10 surfaces of tanks, wet wells, etc., shall be considered as exposed to a  
11 point six inches below low water level. Special care shall be taken in  
12 dressing circular structures to obtain a true circular surface.  
13  
14  
15  
16

17 D. Slabs

- 18  
19 1. No special concrete or cement mortar topping course, shall be used  
20 for slab finish, unless shown on the drawings. The slab shall be  
21 brought to a true and even finish by power or hand-floating. Unless  
22 otherwise specified, the surface shall be floated to a true, regular  
23 surface with a wood float and shall be steel-troweled to a smooth  
24 finish. Troweling shall be the minimum to obtain a smooth, dense  
25 surface and shall not be done until the mortar has hardened  
26 sufficiently to prevent excess fine material from being worked to the  
27 surface. All floor surfaces except those which are to be painted, shall  
28 immediately after troweling, be brushed lightly with a soft bristle  
29 janitor's push broom to produce a non-slip surface. The brushing  
30 shall be sufficient to mark the surface only, without appreciably  
31 disturbing the troweled finish.  
32

33 3.04 FINISHING

- 34  
35 A. Top surfaces which are not covered by forms, and which are not to be  
36 covered by additional concrete or backfill, shall be carried slightly above  
37 grade and struck off by board finish.  
38

39 3.05 CURING AND PROTECTING

40  
41 A. Curing

- 42  
43 1. All concrete shall be kept wet by covering with water, or approved  
44 water saturated covering, or by other method approved by the  
45 Engineer, which will keep all surfaces continuously wet, for a period  
46 of seven days unless otherwise directed by the Engineer.

2. Water for curing shall be clear and entirely free from any elements which might cause staining or discoloration of the concrete.

3. Where wood forms are left in place during curing, they shall be kept wet at all times to prevent opening at the joints and drying out of the concrete.

B. Weather Protection

1. No concrete shall be mixed or placed when the air temperature in the shade and away from artificial heat is as low as forty (40) degrees Fahrenheit, and falling. Concrete may be mixed and placed when the air temperature in the shade, and away from artificial heat is thirty-five (35) degrees Fahrenheit, and rising.

2. Fresh concrete shall be protected from rain, flowing water and mechanical injury and all concrete shall be protected from injurious action by the sun.

3.06 SAND CEMENT AND/OR SOIL CEMENT RIP-RAP

A. Where directed, the Contractor shall prepare sand cement, or if satisfactory material is available from the excavation, soil cement rip-rap.

B. The mixture shall be mixed dry at 4:1 ratio by volume of sand, or soil and Portland cement. The dry mixture shall be placed in burlap or fiberbags as required to form a basic rip-rap unit approximately eighteen (18) inches long, twelve (12) inches wide, and six (6) inches high.

C. Rip-rap shall be placed as directed to provide protection of slopes, pipe ends and bulkheads.

3.07 JOINTS

A. Water Stops

1. Water stops shall be installed at all expansion, contraction and construction joints subject to water pressure and where indicated.

B. Expansion Joints

1. Expansion joints shall be placed as indicated on the Plans. Joint material shall be installed as indicated and as directed by the Engineer.

1 C. Construction Joints

- 2
- 3 1. Vertical construction joints will not be allowed unless detailed in the
- 4 Drawings.
- 5
- 6 2. Construction joints shall be located as shown on the Plans and/or in
- 7 accordance with an approved schedule of pours.
- 8

9 3.08 TESTS

10

11 A. Procedures

12

- 13 1. Compressive strength tests shall be made by breaking standard
- 14 6-inch diameter by 12-inch high test specimens prepared, cured and
- 15 broken in accordance with the American Society for Testing Materials
- 16 Standard Methods, C-31 and C-39, latest revision. Four specimen
- 17 test cylinders shall be taken from each concrete pour of five cubic
- 18 yards or more. One additional test shall be taken from each thirty
- 19 (30) cubic yards or fraction, thereof, in each pour in excess of thirty
- 20 (30) cubic yards. Test specimens shall be taken from manhole
- 21 bottom pours of less than five cubic yards as directed by the
- 22 Engineer. Test specimens shall be taken in the presence of the
- 23 Engineer. One cylinder from each pour shall be broken at seven
- 24 days, the remainder at twenty-eight (28) days. Additional test
- 25 cylinders may be ordered for determining the characteristics of a new
- 26 design mix or changes in equipment or methods, and under adverse
- 27 weather, or curing conditions.
- 28
- 29 2. Slump test shall be made in accordance with ASTM C143, latest
- 30 revision and shall be made whenever directed by the Engineer.
- 31

32 B. Responsibility for Tests and Reports

33

- 34 1. The Contractor shall supply all cylinder molds, slump cones, tools
- 35 and labor for preparing specimens, and shall provide clean, moist
- 36 sand or burlap for curing. Cylinders shall not be shipped to the
- 37 testing laboratory until the third day following preparation, and shall
- 38 be protected from accidental damage at all times.
- 39
- 40 2. The test cylinders shall be tested in a recognized commercial testing
- 41 laboratory.
- 42

43 3.09 CAUSE FOR REJECTION

44

1           A.     Should the concrete fail to conform to all the requirements of this Section,  
2                   the Engineer may require the Contractor to remove the defective concrete  
3                   and reconstruct the Work as directed.  
4  
5  
6

END OF SECTION

SECTION 09 91 00

PAINTING AND PROTECTIVE COATINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide all labor, materials, apparatus, scaffolding, and all appurtenant work in connection with painting and protective coatings, complete as indicated, specified and required.
- B. Principal items include, but are not limited to:
1. All exposed piping, conduits, tanks, equipment and other metal surfaces, interior and exterior, except as hereinafter specifically excluded.
  2. All submerged and intermittently submerged metal surfaces, except stainless steel.
  3. All structural and miscellaneous steel.
  4. Equipment furnished without factory finished surfaces.
  5. Equipment, on which factory applied finishes have been marred, abraded, scratched, nicked, or otherwise damaged.
  6. The interior of concrete tanks, manholes, and similar structures, unless otherwise lined.
  7. Paint coatings on scheduled interior concrete walls and undersides of slabs.
  8. Plasterwork, gypsum drywall surfaces, woodwork, and other architectural work as specified or shown on the Drawings.
  9. Exposed steel lintels.
  10. Interior and exterior CMU walls unless otherwise specified.
  11. Exterior of concrete tanks.

12. Undersides of aluminum access hatches and aluminum checkered plate.
13. Fire hydrants, valve box lids, meter box lids, bollard/ guard post above ground meter and backflow assemblies.
14. All exterior wall surfaces of existing tanks and structures from 6-inches below grade to the top of the wall or structure.

C. The following surfaces, in general, shall not be painted:

1. Concrete surfaces subject to pedestrian or vehicular traffic, except as herein specified.
2. Nonferrous metals and stainless steel unless otherwise noted or indicated. Galvanized metal shall not be considered as a nonferrous metal.
3. Mechanical equipment with factory finish as specified herein.
4. Electrical and instrumentation equipment with approved factory finish or of stainless steel/nonferrous metal construction, unless otherwise specified.
5. Water proofing, dampproofing and roof covering work.
6. Anodized aluminum.
7. Aluminum handrails and ladders.
8. Fiberglass grating and tread plate.
9. Nuts and bolts.
10. Name tags and data tags.

D. Related work not included in this Section:

1. Pavement striping.
2. Sealants and caulking.
3. Waterproofing and dampproofing.

E. The Contractor shall furnish to the Engineer, at no charge for use during this project, one dry film thickness gages and one electrical flaw detection equipment system.

PAINTING AND PROTECTIVE COATINGS



1  
2  
3  
4  
5 1.02 GUARANTEE  
6

- 7 A. A three (3) year guarantee which commences on the date of acceptance  
8 against failure of all coatings shall be provided, unless more stringent  
9 requirements are specified hereinafter. Failure of any coating during the  
10 guarantee period shall be repaired by the Contractor who shall absorb all  
11 costs related to the repair of the coating. Failure shall be defined as  
12 peeling, blistering, delamination or loss of adhesion of any of the coatings.  
13

14 1.03 REFERENCE SPECIFICATIONS AND STANDARDS  
15

- 16 A. Without limiting the generality of other requirements of these  
17 Specifications, all cleaning, surface preparation, and coating shall conform  
18 to the applicable requirements of the referenced portions of the standards  
19 specified herein to the extent that the requirements therein specified are  
20 not in conflict with the provisions of this Section.  
21
- 22 B. Unless otherwise specified, all work and materials for the preparation and  
23 coating of all metal surfaces shall conform to the applicable requirements  
24 specified in the Steel Structures Painting Manual, Volume 2, Systems and  
25 specifications Revised, latest edition, published by the Steel Structures  
26 Painting Council.  
27
- 28 C. The following referenced surface preparation specifications of the Steel  
29 Structures Painting Council shall form a part of this Section.  
30
- 31 1. White Metal Blast Cleaning (SSPC-SP5). Removal of all visible  
32 rust, mill scale, paint, and foreign matter by blast cleaning by wheel  
33 or nozzle (dry) using sand, grit, or shot. (For very corrosive  
34 atmosphere.)  
35
- 36 2. Near-White Blast Cleaning (SSPC-SP10). Blast cleaning nearly to  
37 White Metal Cleanliness, until at least 95 percent of each element  
38 of surface area is free of all visible residues. (For high humidity,  
39 chemical atmosphere, marine or other corrosive environment.)  
40
- 41 3. Commercial Blast (SSPC-SP6). Blast cleaning until at least 67  
42 percent of each element of surface area is free of all visible  
43 residues.  
44
- 45 4. Brush-Off Blast Cleaning (SSPC-SP7). Blast cleaning of all except  
46 tightly adhering residues of mill scale, rust and coatings, exposing  
47 numerous evenly distributed flecks of underlying metal.

5. Solvent Cleaning (SSPC-SP1). Removal of oil, grease, dirt, soil, salts, and contaminants by cleaning with solvent, vapor, alkali, emulsion or steam.

D. Quality Assurance. Evaluation of surface preparation for ferrous metals will be based upon NACE Standard TM-01-Visual Standard for Surface Preparation.

#### 1.04 SUBMITTALS

A. Submittals shall be in accordance with the following:

1. Samples. Prepare and submit for Engineer's approval copies of color samples on 8-1/2" x 11" size cards for each paint and protective coating system. Each sample card shall clearly show each coat of the finish system, and shall be clearly marked with the manufacturer's name and product identification, and shall be submitted in sufficient time to allow for approval and, if necessary, disapproval and resubmittal without causing any delay of the project.

2. Coating Materials List.

a. The Contractor shall provide copies of a paint and coating materials list which indicates the manufacturer and paint number, keyed to the coating schedule herein, for approval by the Engineer prior to or at the time of submittal of samples required herein.

b. The Contractor shall include with his submittal, his protective coating schedule for shop and field coatings of items to receive protection. The schedule shall conform to the specified requirements for surface preparation, priming, and coating for items covered, and shall follow the same requirements for similar work where such work has not been specifically called-out. No bare ferrous nonworking surfaces shall be omitted from the schedule. Particular care shall be taken to cover in sufficient detail the coating of mechanical joints and other mechanical devices which shall conform to the recommended practice of the manufacturer of the joint or other mechanical devices.

c. Coatings to be used on plastic and fiberglass materials shall be certified as acceptable by all plastic and fiberglass manufacturers whose products are to be coated. Certification copies shall be submitted to the Engineer. The

#### PAINTING AND PROTECTIVE COATINGS

Contractor shall be certified in writing by the painting and coating material manufacturers as qualified applicators of their products with copies of the certification submitted to the Engineer.

3. Product Data Sheets. Contractor shall submit paint and coatings material manufacturers' printed technical data sheets for products intended for use in each paint and coating system. Data sheets shall fully describe material as to its intended use, makeup, recommended surface preparation and application conditions, primers, material mixing and application (including recommended dry mil thickness recoat time), precautions, safety and maintenance cleaning directions.
4. Material Safety Data Sheets. Material Safety Data Sheets (MSDS) shall accompany all paint submittals and shall be prominently displayed at the job site during all painting activities.

#### 1.05 PROTECTION OF WORK

- A. The Contractor shall be responsible for any and all damage to his work or the work of others during the time his work is in progress.

#### 1.06 EXTRA STOCK

- A. One (1) gallon of each type and color of finish paint and coating used on the project shall be provided as extra stock. Extra stock paint shall be supplied in appropriate sealed containers and be clearly labeled as to paint type, formula, and color.

#### 1.07 RIGHT OF REJECTION

- A. The Engineer shall have the right to reject all material or work that is unsatisfactory, and require the replacement of either or both at the expense of the Contractor.

#### 1.08 ONE MANUFACTURER

- A. To the maximum extent possible, all products shall be the product of one manufacturer unless a specific specialty coating system is specified. Without exception, all coatings for any service condition specified herein shall be by one manufacturer. Once a paint manufacturer has been selected by the Contractor and approved by the Engineer, the Contractor shall ensure that all equipment manufacturers prime their equipment with the same or a compatible primer. If this cannot be or is not done for any reason, the Contractor shall apply a "universal primer" and recoat with the approved manufacturer's product in the field.

### PAINTING AND PROTECTIVE COATINGS

1  
2 1.09 JOB CONFERENCE  
3

- 4 A. Prior to commencing painting work a pre-job conference shall be held for  
5 the purpose of reviewing the painting and coating requirements of the  
6 project. The County, Engineer, Contractor, Applicator, and the Coatings  
7 and Paint Manufacturer shall be present. A schedule of work to be  
8 accomplished will be established.  
9

10 PART 2 - PRODUCTS  
11

12 2.01 GENERAL  
13

- 14 A. Surfaces to receive paint and protective coating materials as herein  
15 specified in this Section shall be coated in conformance with the  
16 applicable coating systems specified herein. All materials specified by  
17 name and/or manufacturer or approved for use under these  
18 Specifications, shall be delivered unopened at the job site in their original  
19 containers and shall not be opened until inspected by the Engineer.  
20  
21 B. Whenever a manufacturer's brand name is specified, it is intended to  
22 define the general type and quality of paint or coating desired. Other  
23 coatings or paints of equal quality may be used. Coating materials shall  
24 be a product of TNESEC, unless otherwise specified, or approved equal.  
25 All paint and coatings shall be produced and applied as herein called for  
26 or, if not specifically called for, it shall be applied in accordance with the  
27 manufacturer's printed recommendations as approved by Engineer. So  
28 far as possible, all paint and coating materials shall be provided by a  
29 single source supplier. Coating materials shall meet Volatile Organic  
30 Compounds (VOC) requirements of not more than 3.5 lb./gal. as applied  
31 after thinning.  
32  
33 C. General.  
34  
35 1. Paint and protective coating materials shall be sealed in containers  
36 that plainly show the designated name, formula or specification  
37 number, batch number, color, date of manufacture, manufacturer's  
38 directions, and name of manufacturer, all of which shall be plainly  
39 legible at the time of use. Pigmented paints shall be furnished in  
40 containers not larger than five (5) gallons. Materials shall conform  
41 to the specifications shown herein and to the requirements  
42 hereinafter specified.  
43  
44 2. Products shall be standard of recognized manufacturer engaged in  
45 production of such materials for essentially identical or similar  
46 applications in the water and wastewater treatment industry.  
47

1 D. Compatibility. Only compatible materials shall be used in the work.  
2 Particular attention shall be directed to compatibility of primers and finish  
3 coats. If necessary, subject to approval of the Engineer, a compatible  
4 barrier coat shall be applied between all existing prime coat and  
5 subsequent field coats to ensure compatibility.  
6

7 1. Ductile iron pipe that has an exterior bituminous coating shall not  
8 be painted unless the bituminous coating is removed by sand  
9 blasting or an appropriate, compatible, intermediate coat is  
10 applied before top coating in accordance with this specification.  
11

12 E. Colors. All colors and shades of colors of all coats of paints and  
13 protective coating material shall be as identified in the architectural  
14 sketches or schedules or as modified/selected by the County. Each coat  
15 shall be of a slightly different shade, as directed by the Engineer to  
16 facilitate inspection of surface coverage of each coat.  
17

## 18 2.02 SERVICE CONDITION A

19  
20 A. Ferrous and galvanized metals, other than stainless steel, within wet wells  
21 or similar corrosive atmospheres, submerged or intermittently submerged  
22 in sludge, sewage, chemical mixtures or similar corrosive liquids shall be  
23 prepared and coated in accordance with the following requirements.  
24

25 B. Surface Preparation. All metal surfaces shall be field sandblasted in  
26 accordance with Steel Structures Painting Council Specification SSPC-  
27 SP10 (Near White Blast Cleaning). Weld surface, edges, and sharp  
28 corners shall be ground smoothly and all weld splatter removed per  
29 SSPC-SP3 "Power Tool" or SP2 "Hand Tool" Cleaning. Galvanized  
30 metals shall be cleaned per SSPC SP-7 (brush off blast cleaning).  
31

32 C. Application. Application shall be in strict conformance with the  
33 manufacturer's printed recommendations. All sharp edges, nuts, bolts, or  
34 other items difficult to coat shall receive a brush-applied coat of the  
35 specified coating prior to application of each coat.  
36

37 D. Except as otherwise noted, the prime coat shall have a minimum  
38 thickness of 3 mils and the two finish coats shall have a minimum total dry  
39 film thickness of 13 mils. If the finish coat is not applied within  
40 manufacturer's recommended time period, an intermediate special  
41 surface conditioner shall be applied in advance of finish coats or a light  
42 brush blast. The total system shall have a minimum dry film thickness of  
43 16 mils.  
44

45 TNEMEC System: Shop Primer - Series 66-1211  
46 Field Primer - Series 104

## PAINTING AND PROTECTIVE COATINGS

2.03 SERVICE CONDITION B

- A. Ferrous and galvanized metals, other than stainless steel, subject to seacoast salt air exposures or equivalent chemical attack, shall be prepared and coated in accordance with the following requirements.
- B. Surface Preparation. All surfaces shall be free of dirt, dust, grease, or other foreign matter before coating. Ferrous surfaces shall be cleaned in accordance with the Steel Structures Painting Council Specification SSPC-SP7 (Brush-Off Blast Cleaning), and galvanized surfaces shall be cleaned in accordance with SSPC-SP1 (Solvent Cleaning). Weld surface, edges and sharp corners shall be ground smooth and all weld splatter shall be removed per SSPC-SP3 or SP2. Galvanized metal shall be cleaned per SSPC SP-7 (brush off blast cleaning).
- C. Application. Application shall be in strict conformance with the manufacturer's printed recommendations. All sharp edges, nuts, bolts, or other items difficult to coat shall receive a brush-applied coat of the specified coating prior to application of each coat.
- D. Except as specified below, the prime coat shall have a minimum thickness of 3 mils, intermediate coat shall have a minimum thickness of 4 mils and one or more finish coats minimum total dry film thickness of 10.0 mils.

TNEMEC System:	Primer - Series 66
Intermediate Coat:	Series 66
Finish Coats:	Series 73

2.04 SERVICE CONDITION C

- A. Ferrous and galvanized metals, other than stainless steel, subject to mild to moderately severe air exposures or equivalent chemical attack, shall be prepared and coated in accordance with the following requirements.
- B. Surface Preparation. All surfaces shall be free of dirt, dust, grease, or other foreign matter before coating. Ferrous surfaces shall be cleaned in accordance with the Steel Structures Painting Council Specification SSPC-SP7 (Brush-Off Blast Cleaning), and galvanized surfaces shall be cleaned in accordance with SSPC-SP1 (Solvent Cleaning). Weld surface, edges and sharp corners shall be ground smooth and all weld splatter shall be removed per SSPC-SP3 or SP2. Galvanized metal shall be cleaned per SSPC SP-7 (brush off blast cleaning).

PAINTING AND PROTECTIVE COATINGS

C. Application. Application shall be in strict conformance with the manufacturer's printed recommendations. All sharp edges, nuts, bolts, or other items difficult to coat shall receive a brush-applied coat of the specified coating prior to application of each coat.

D. Except as specified below, the prime coat shall have a minimum thickness of 3 mils, intermediate coat shall have a minimum thickness of 4 mils and one or more finish coats minimum total dry film thickness of 10.0 mils.

TNEMEC System:	Primer - Series 66
Intermediate Coat:	Series 66
Finish Coats:	Series H2
PORTER System:	Primer – PP286 or PP296
Intermediate Coat:	2200
Finish Coat:	2200

#### 2.05 SERVICE CONDITION D

A. Coating aluminum and non-ferrous metal surfaces, including undersides of aluminum access hatches, frames, and checkered plate, subject to corrosive atmosphere and condensation shall be prepared and coated in accordance with the following requirements.

B. Surface Preparation. Clean non-ferrous surfaces in accordance with SSPC-SP7 (brush-off blast cleaning).

C. Application. Application shall be in strict conformance with manufacturer's printed recommendations, as approved by the Engineer.

D. The prime coat shall have a minimum 3.0 mil DFT and finish coat shall have a minimum 4 mil DFT for a minimum total dry mil thickness of 7 mils:

TNEMEC System:	Primer - Series 66
	Finish Coats - Series 66

#### 2.06 SERVICE CONDITION E

A. Plastic and fiberglass reinforced plastic (FRP) products subject to seacoast salt air exposures shall be prepared and coated in accordance with the following requirements. Coatings to be used for piping and tankage shall be certified by the manufacturer to be completely acceptable and non-injurious.

B. Surface Preparation. Clean surfaces with SSPC-SP1 solvent cleaner. Lightly sand all surfaces.

1 C. Application. Application shall be in strict conformance with manufacturer's  
2 printed recommendations.

3  
4 D. The prime coat shall have a minimum 3.0 mil DFT and finish coat shall  
5 have a minimum of 3.0 mil DFT for a minimum total dry film thickness of 6  
6 mils.

7  
8 TNE MEC System: Primer - Series 66  
9 Finish Coat - Series 73

10  
11 2.07 SERVICE CONDITION F

12  
13 A. Concrete which is subject to submergence and intermittent submergence  
14 in water and groundwater shall be prepared and coated in accordance  
15 with the following requirements.

16  
17 B. Surface Preparation. All surfaces shall be cleaned of all dirt, dust, oil,  
18 curing compounds, and other deleterious compounds. In general, the  
19 concrete shall be reasonably smooth and free of pockets and cavities. All  
20 surfaces shall be cleaned by brush blasting (NACE #4 or SSPC-SP7). All  
21 surfaces shall be completely dry before application of the coating.

22  
23 For painting of existing structures, in addition to above, patch concrete  
24 with non-shrink grout, replace damaged stucco, and repair cracks in  
25 exterior concrete wall surfaces by epoxy injection.

26  
27 C. Application. Application shall be in strict conformance with the  
28 manufacturer's printed recommendations. All coats shall be applied within  
29 24 hours of the previous coat.

30  
31 D. The prime coat shall have a minimum dry film thickness of 3 mils and  
32 intermediate and finish coat shall have a minimum total dry film thickness  
33 of 5 mils each. The total system shall have a minimum dry film thickness  
34 of 13 mils.

35  
36 TNE MEC System: Primer - Series 66  
37 Intermediate Coat - Series 66  
38 Finish Coat I - Series 66  
39

40 2.08 SERVICE CONDITION G

41  
42 A. Concrete sanitary sewer manholes or similar corrosive atmospheres  
43 which are subject to submergence and intermittent submergence in  
44 domestic sewage, water and groundwater shall be prepared and coated in  
45 accordance with the following requirements.

46  
47 1. Surface Preparation. All surfaces shall be cleaned of all dirt, dust,

PAINTING AND PROTECTIVE COATINGS



oil, curing compounds, and other deleterious compounds. In general, the concrete shall be reasonably smooth and free of pockets and cavities.

2. Allow new concrete to cure for 28 days. All surfaces shall be cleaned by brush blasting (NACE #6 or SSPC-SP13). All surfaces shall be completely dry before application of the coating.

3. For painting of existing structures, in addition to above, patch concrete with non-shrink grout, repair cracks in concrete wall surfaces by epoxy injection.

B. Application. Application shall be in strict conformance with the manufacturer's printed recommendations. All coats shall be applied within 24 hours of the previous coat.

C. A prime coat is not required on concrete. Coating can be applied in one or two coats. When applied in two coats each coat shall have a minimum dry film thickness of 8 to 10 mils. The total system shall have a minimum dry film thickness of 15 to 20 mils.

TNEMEC System:                      Primer – Not required  
   Intermediate Coat - Series 46H-413  
   Finish Coat I – Series 46H-413

## 2.09 ARCHITECTURAL PAINT FINISHES

A. Manufacture. Unless otherwise noted, products listed below are the products of TNEMEC coatings. Approved equivalent products will be acceptable.

B. Interior Finishes:

1. Interior Wet Concrete Surfaces (Non-Aggressive Areas)  
Surface Preparation: Prefer SSPC-SP7: Brush off Blast Cleaning. If brush off Blast Cleaning is not possible, a double acid etching is recommended. Properly prepared surface should have a profile similar to 100 grit sandpaper. A test patch is recommended when applying epoxy coatings over old, existing coatings.

Materials:

Primer: TNEMEC Series 66 @ 3.0 - 5.0 mils

DFT 2nd Coat: TNEMEC Series 66 @ 4.0 - 6.0 mils DFT (optional)

Finish: TNEMEC Series 66 @ 4.0 - 6.0 mils DFT 11.0 - 17.0 mils DFT

- 1                   2.     Concrete Block Walls (Non-aggressive Environment)
- 2                   Surface Preparation: Cure 14 days. Remove mortar spatter.
- 3                   Surfaces must be clean and dry.
- 4
- 5                   Materials:
- 6                   Filler:            TNEMEC Series 130 or 54-562 @ 80 SF/Gal
- 7                   Finish Ct.:    TNEMEC Series 113 or 114 @ 4.0 - 6.0 mils DFT
- 8
- 9                   3.     Poured Concrete Walls ( Non-aggressive Environment)
- 10                  Surface Preparation: Cure for 28 days. All surfaces must be clean
- 11                  and dry.
- 12
- 13                  Materials:
- 14                  Primer: TNEMEC Series 113 or 114 @ 4.0 - 6.0 mils DFT.
- 15                  Finish: TNEMEC Series 113 or 114 @ 4.0 - 6.0 mils DFT.
- 16
- 17       C.     Concrete in aggressive areas (CBW)
- 18
- 19               1.     Surface Preparation. Surfaces shall be cured for 28 days, clean,
- 20               dry and free from curing compounds, oil, grease, dirt or chalk.
- 21
- 22               2.     Filler. TNEMEC Series 54-660 (block walls only).
- 23
- 24               3.     Prime Coat. One coat of TNEMEC Series 66 applied at 5 mils
- 25               DFT.
- 26
- 27               4.     Finish Coats. Two coats of TNEMEC Series 66 applied at 5 mils
- 28               DFT per coat.
- 29
- 30       D.     Concrete Sealed (ECB). Huls Chem-Trete PB at a rate of between 50
- 31               and 100 sf/gal. Application shall be sufficient to guarantee complete
- 32               water repelling for five (5) years.
- 33
- 34       E.     Concrete Waterproof (CWP). One coat, minimum 2lbs. per square yard
- 35               of Thoroseal by Thoro System Products or approved equal.
- 36
- 37   2.10   PATCH COAT FOR GALVANIZED SURFACES
- 38
- 39       A.     All galvanized surfaces which are scratched, marred, or otherwise
- 40               damaged shall be patched with TNEMEC Series 90-97 @ 2.5 - 3.5 mils
- 41               DFT.
- 42
- 43   2.11   PRIMER OVER BITUMINOUS COATING
- 44
- 45       A.     Two coats, TNEMEC Series 66, at 4 mils DFT each. Allow bituminous
- 46               coating to bleed through on first coat. Apply second coat, third coat shall
- 47               be per service condition schedule.
- 48

## PAINTING AND PROTECTIVE COATINGS

1  
2  
3  
4 2.12 UNIVERSAL PRIMER  
5

- 6 A. The "universal-primer" shall be a primer which can be applied over any  
7 other type of solvent based primer, and be compatible with alkyds,  
8 epoxies and urethane finish coats.  
9

10 PART 3 - EXECUTION  
11

12 3.01 MANUFACTURER'S RECOMMENDATIONS  
13

- 14 A. Unless otherwise specified herein, the paint and coating manufacturer's  
15 printed recommendations and instructions for thinning, mixing, handling,  
16 applying, and protection of his coating materials; for preparation of  
17 surfaces for coating; and for all other procedures relative to coating shall  
18 be strictly observed. No substitutions or other deviations will be permitted  
19 without written permission of the Engineer.  
20

21 3.02 DELIVERY AND STORAGE  
22

- 23 A. Materials shall be delivered in manufacturer's original, sealed containers,  
24 with labels and tags intact. Coating materials and equipment shall be  
25 stored in designated areas. Coating containers shall be opened only  
26 when required for use. Coatings shall be mixed only in designated areas  
27 and in the presence of the Engineer, unless otherwise directed. Coatings  
28 shall be thoroughly stirred or agitated to uniformly smooth consistency  
29 and prepared and handled in a manner to prevent deterioration and  
30 inclusion of foreign matter. Unless otherwise specified or approved, no  
31 materials shall be reduced, changed, or used except in accordance with  
32 the manufacturer's label or tag on container.  
33

34 3.03 SAFETY REQUIREMENTS  
35

- 36 A. In accordance with the requirements of applicable OSHA Regulations for  
37 Construction, the Contractor shall provide and require the use of personal  
38 protective equipment for all persons working in or about the project site.  
39  
40 B. Respirators shall be worn by all persons engaged in, and assisting in,  
41 spray painting. In addition, workers engaged in or near the work during  
42 sandblasting shall wear eye and face protection devices meeting the  
43 requirements of ANSI Z87.1 latest revisions, and approved OSHA  
44 Regulations for sand blasting operations and equipment including  
45 approved air-purifying, half-mask or mouthpiece respirator with  
46 appropriate filter.  
47

1 C. Ventilation. Where ventilation is used to control potential exposure to  
2 workers as set forth in Section 1910.94 of the OSHA Regulations for  
3 Construction. Ventilation shall be adequate to reduce the concentration of  
4 the air contaminant to the degree that a hazard to the worker does not  
5 exist. Methods of ventilation shall meet the requirements set forth in  
6 ASNI-Z9.2, latest revision.  
7

8 D. Sound Levels. In accordance with Sections 1926.52 and 1926.101 of  
9 OSHA Regulations for Construction, whenever the occupational noise  
10 exposure exceeds maximum sound levels as set forth in Table D-2 ear  
11 protective devices shall be fitted and used, and a continuing, effective  
12 hearing conservation program shall be administered.  
13

14 E. Cloths and cotton waste that might constitute a fire hazard shall be placed  
15 in closed metal containers or destroyed at the end of each workday.  
16

#### 17 3.04 STORAGE, MIXING AND THINNING 18

19 A. Paint and coating materials shall be protected from exposure to cold  
20 weather, and shall be thoroughly stirred, strained, and kept at a uniform  
21 consistency during application. Materials of different manufacturers shall  
22 not be mixed together. Packaged materials shall be thinned immediately  
23 prior to application in accordance with the manufacturer's directions.  
24

#### 25 3.05 WORKMANSHIP 26

27 A. Skilled craftsmen and experienced supervision shall be used on all work.  
28

29 B. All paint and coatings shall be applied in a workmanlike manner so as to  
30 produce an even film of specified uniform thickness. Edges, corners,  
31 crevices, and joints shall receive special attention to ensure that they have  
32 been thoroughly cleaned and that they receive an adequate thickness of  
33 paint. The finished surfaces shall be free from runs, drops, ridges, waves,  
34 laps, brush marks, and variations in color, texture, and finish. The hiding  
35 shall be so complete that the addition of another coat of paint would not  
36 increase the hiding. All coats shall be applied so as to produce a film of  
37 uniform thickness. Special attention shall be given to ensure that edges,  
38 corners, crevices, welds, and similar areas receive a film thickness  
39 equivalent to adjacent areas, and installations shall be protected by the  
40 use of drop cloths or other approved precautionary measures.  
41

#### 42 3.06 PREPARATION FOR PAINTING AND PROTECTIVE COATING 43

44 A. All surfaces to receive paint and protective coatings shall be cleaned as  
45 specified herein prior to application of coating materials. The Contractor  
46 shall examine all surfaces to be coated, and shall correct all surface  
47 defects before application of any coating material. Beginning the work of

### PAINTING AND PROTECTIVE COATINGS

1 this Section without reporting unsuitable conditions to the Engineer  
2 constitutes acceptance of conditions by the Contractor. Any required  
3 removal, repair, or replacement of this work caused by unsuitable  
4 conditions shall be done at no additional cost to the County. All marred or  
5 abraded spots on shop-primed and factory-finished surfaces shall receive  
6 touch-up restoration prior to any other coating application.  
7

- 8 B. Mildew shall be removed and neutralized by scrubbing affected areas  
9 thoroughly with a solution made by adding two (2) ounces of tri-sodium  
10 phosphate and eight (8) ounces of sodium hypochloride to one (1) gallon  
11 warm water. Use a scouring powder, if necessary, to remove mildew  
12 spores. Rinse with clean water and allow to dry thoroughly before  
13 painting.  
14

### 15 3.07 ITEMS NOT TO BE COATED

16

- 17 A. Hardware (including all nuts, bolts, shafts, and bolt heads on CV plates),  
18 aluminum, stainless steel, switch and receptacle plates, escutcheons,  
19 hardware accessories, name plate data tags, machined surfaces and  
20 similar items shall be removed or masked prior to surface preparation and  
21 painting operations. Following completion of coating of each piece,  
22 removed items shall be reinstalled. Such removal and installation shall be  
23 done by workmen skilled in the trades involved.  
24

### 25 3.08 SANDBLASTING

26

- 27 A. All sandblasting shall be done in strict accordance with the referenced  
28 specifications of the Steel Structures Painting Council.  
29  
30 B. When items are to be shop primed or shop primed and finish coated in  
31 the shop, surface preparation shall be as specified in this Section. The  
32 County or his representative shall have the right to witness, inspect, and  
33 reject any sandblasting done in the shop.  
34  
35 C. When sandblasting is done in the field, care shall be taken to prevent  
36 damage to structures and equipment. Pumps, motors, and other  
37 equipment shall be shielded, covered, or otherwise protected to prevent  
38 the entrance of sand. No sandblasting may begin before the Engineer  
39 inspects and approves the protective measures.  
40  
41 D. After sandblasting, dust and spent sand shall be removed from the  
42 surfaces by brushing or vacuum cleaning.  
43

### 44 3.09 APPLICATION OF PROTECTIVE COATINGS

45

- 46 A. Shop Coating. Fabricated metalwork and equipment which requires  
47 coating shall be shop primed with specified primer. Any such work

## PAINTING AND PROTECTIVE COATINGS

delivered to the job site with any other shop coat shall either have this coating removed or shall be recoated with "universal-primer", and the specified coating applied in the field. Manufactured equipment with approved corrosion resistant factory finishes and galvanized finishes shall be exempt from this requirement.

B. Application of Field Coatings.

1. Except where in conflict with the manufacturer's printed instructions, or where otherwise specified herein, the Contractor may use brush, roller, air spray, or so-called airless spray application; however, any spray painting must first have the approval of the Engineer. Rollers for applying enamel shall have a short nap. Areas inaccessible to spray coating or rolling shall be coated by brushing or other suitable means.
2. The Contractor shall give special attention to the work to ensure that edges, corners, crevices, welds, bolts, and other areas, as determined by the Engineer, receive a film thickness at least equivalent to that of adjacent coated surfaces.
3. All protective coating materials shall be applied in strict accordance with the manufacturer's printed instructions.
4. Prime coat shall be applied to all clean surfaces within a four hour period of the cleaning, and prior to deterioration or oxidation of the surface, and in accordance with the manufacturer's recommendations. Drift from sand-blasting procedures shall not be allowed to settle on freshly painted surfaces.
5. All coatings shall be applied in dry and dust-free environment. No coating or paint shall be applied when the surrounding air temperature, measured in the shade, is below 40 degrees F. No coating or paint shall be applied to wet or damp surfaces and shall not be applied in rain, fog or mist, or when the relative humidity exceeds 90 percent. No coating or paint shall be applied when it is expected that the relative humidity will exceed 90 percent or that the air temperature will drop below 40 degrees F within 8 hours after the application of the coating or paint. Dew or moisture condensation should be anticipated and if such conditions are prevalent, coating or painting shall be delayed until mid-morning to be certain that the surfaces are dry. The day's coating or painting shall be completed well in advance of the probable time of day when condensation will occur, in order to permit the film sufficient drying time prior to the formation of moisture.

- 1 6. Each coat shall be applied evenly, at the proper consistency, and  
2 free of brush marks, sags, runs, and other evidence of poor  
3 workmanship. Care shall be exercised to avoid lapping paint on  
4 glass or hardware. Coatings shall be sharply cut to lines. Finished  
5 coated surfaces shall be free from defects or blemishes. Protective  
6 coverings shall be used to protect floors, fixtures, and equipment.  
7 Care shall be exercised to prevent paint from being spattered onto  
8 surfaces from which such paint cannot be removed satisfactorily.  
9 Surfaces from which paint cannot be removed satisfactorily shall be  
10 painted or repainted as required to produce a finish satisfactory to  
11 the Engineer. Whenever two (2) coats of a dark colored paint are  
12 specified, the first coat shall contain sufficient powdered aluminum  
13 to act as an indicator of proper coverage, or the two (2) coatings  
14 shall be of a contrasting color.  
15  
16 7. Touch-up of all surfaces shall be performed after installation.  
17  
18 8. All surfaces to be coated shall be clean and dry at the time of  
19 application.  
20

21 C. Time of Coating.

- 22  
23 1. Sufficient time shall be allowed to elapse between successive  
24 coats to permit satisfactory recoating, but, once commenced, the  
25 entire coating operation shall be completed without delay. No  
26 additional coating of any structure, equipment, or other items  
27 designated to be painted shall be undertaken without specified  
28 permission of the Engineer until the previous coating has been  
29 completed for the entire structure, piece of equipment, or other  
30 items.  
31  
32 2. Piping shall not be finish coated until it has been pressure tested  
33 and approved.  
34

35 D. Thickness of Coating. The dry film mil-thickness specified shall be  
36 achieved and verified for each coat.  
37

38 E. Safety Color Coatings. Existing surfaces to remain which have been  
39 previously safety-color coated to identify a potential tripping or low head-  
40 room area shall be prepared and recoated with a similar safety color  
41 scheme unless directed otherwise by the Engineer.  
42

43 Any newly constructed areas which will present a potential tripping or low  
44 head-room area shall be coated safety yellow in accordance with the  
45 appropriate coating system as directed by the Engineer.  
46

47 3.10 TESTING AND INSPECTION

PAINING AND PROTECTIVE COATINGS

- 1  
2 A. Inspection Devices. The Contractor shall furnish, until final acceptance of  
3 coating and painting, inspection devices in good working condition for  
4 detection of holidays and measurement of dry-film thickness of coatings  
5 and paints. The Contractor shall also furnish U.S. department of  
6 Commerce, National Bureau of Standards certified thickness calibration  
7 plates to test accuracy of dry-film thickness gauge and certified  
8 instrumentation to test accuracy. Dry-film thickness gauges shall be  
9 made available for the Engineer's use at all times until final acceptance of  
10 application.  
11
- 12 B. The Contractor shall conduct film thickness measurements and electrical  
13 inspection of the coated surfaces with equipment furnished by him and  
14 shall recoat and repair as necessary for compliance with the  
15 Specifications.  
16
- 17 C. After repaired and recoated ferrous metals areas have cured, final  
18 inspection tests will be conducted by the Engineer with equipment provide  
19 by the Contractor. Coating thickness specified in mils on ferrous  
20 substrates will be measured with a nondestructive magnetic type dry-film  
21 thickness gage such as the Elecometer, manufactured by Gardner  
22 Laboratories, Inc. Discontinuities, voids, and pinholes in the coatings will  
23 be determined with a nondestructive type electrical holiday detector.  
24 Epoxy coatings and other thin film coatings will be checked for  
25 discontinuities and voids with a low voltage detector of the wet-sponge  
26 type, such as Model M1 as manufactured by Tinker and Rasor. Use a  
27 non-sudsing type wetting agent, such as Kodak Photo-Flo, which shall be  
28 added to the water prior to wetting the sponge. A high voltage, low  
29 current, spark type detector such as Model EP, manufactured by Tinker  
30 and Rasor, will be used for electrical inspection of only coal tar enamel.  
31 Tape type coatings will be inspected for holidays using a device designed  
32 for use in detecting such flaws. All pinholes shall be marked, repaired in  
33 accordance with the manufacture's printed recommendations and  
34 retested. No pinholes or other irregularities will be permitted. Film  
35 thickness discrepancies shall be measured and verified with a micrometer  
36 or other approved measuring instrument with 5 readings taken every 100  
37 ft<sup>2</sup> of painted surface. Coatings not in compliance with the Specifications  
38 will not be acceptable and shall be replaced, and reinspected at  
39 Contractor's expense until the Specifications are met.  
40
- 41 D. On non-ferrous surfaces, dry film thickness readings shall be taken at  
42 random locations with a Tooke Gauge at the rate of approximately five  
43 readings per 100 square feet of surface. Grooves cut into coatings shall  
44 be repaired by application of all coats of paint or coating film being tested.  
45 The average of all readings for a given area or surface shall be within  
46 required dry film thickness range and no individual reading shall be more



1 than 20 percent below the recommended dry film thickness. Any areas  
2 that are found to be below standard shall be marked and recoated to  
3 obtain proper film thickness.  
4

5 3.11 CLEAN-UP  
6

- 7 A. Upon completion of the work, staging, scaffolding, and containers shall be  
8 removed from the site or destroyed in an approved manner. Paint spots,  
9 oil, or stains upon adjacent surfaces shall be removed.  
10

11 3.12 PAINT AND COATING SCHEDULE  
12

- 13 A. General. The following schedule shall indicate the coating systems to be  
14 used and applies to all new and renovated facilities, unless otherwise  
15 specified. Color selection shall be as selected by the County. The list  
16 shall not be construed as a complete list of all surfaces to be coated but  
17 rather as a guide as to the application of the various coating systems. All  
18 surfaces shall be painted except those specifically excluded herein.  
19 Where reference is made to ferrous metal in this schedule, it shall not  
20 include stainless steel.  
21

- 22 B. General Coating System. The following table shall indicate the coating  
23 system. For the coating systems, "Piping" shall be defined as all pipes,  
24 valves, fittings, supports, and guides. Mechanical equipment shall include  
25 all motors, pumps and accessory equipment requiring a protective  
26 coating.  
27

TABLE I

COATING SYSTEM SCHEDULE

Item

Service Condition

Exposed ferrous and galvanized metal piping and equipment (interior and exterior).	B
Exterior exposed ferrous metal, Fire hydrants, valve box lids, meter box lids, ballard/ guard post, above ground meter and backflow assemblies not exposed to a corrosive atmosphere	C
Exposed plastic and FRP pipe, conduit, and tankage.	E
Exterior of manholes, storm inlets, and interior/exterior of reject pond intake structure.	F
Exterior exposed wall surfaces of new and existing concrete tank or structure walls	F
Interior of sanitary manholes.	G
Guard posts (bollards) and hydrants.	B
Interior concrete and concrete block surfaces.	FDB
Exterior new and existing stucco surfaces	FDB

END OF SECTION

SECTION 31 23 33

EXCAVATION AND BACKFILL FOR PIPES

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This work covers clearing and grubbing, site work, excavation, and backfill for sanitary sewers, force mains, potable water mains, reclaimed water mains and their appurtenances.

1.02. BURNING

- A. Burning of debris will not be permitted.

1.03 CLEAN-UP

- A. Clean-up is an essential part of the work. As the work progresses and is completed, the Contractor shall clean the various sites of all operations and completely restore all work areas to the satisfaction of the Engineer and the County. This clean-up shall be done as promptly as practical and shall not be left until the end of the construction period. No part of the work shall be considered complete, and no payment will be made, until clean-up is completed.
- B. It is the Contractor's responsibility to assure that all construction sites and all other affected properties are restored to a condition equal to, or better than, the existing conditions prior to construction. All restoration is subject to the approval of the Engineer and/or Property Owners.

1.04 DRAINAGE

- A. It is the responsibility of the Contractor to maintain the existing drainage systems during construction. Any damage done to an existing drainage structure or system is to be immediately repaired to a condition equal to or better than its original condition.

1.05 DUST CONTROL

- A. It is the responsibility of the Contractor to control all dust problems that may occur during the construction with required watering. Dust control will be required seven days a week.

1 1.06 SPRINKLERS

- 2 A. The Contractor shall be responsible for sprinklers encountered within the  
3 area of excavation and shall make sure that if disturbed or damaged, they  
4 shall be rebuilt to the satisfaction of the Engineer or property Owner and  
5 with no additional cost to the County.  
6

7 1.07 EROSION CONTROL

- 8  
9 A. It is the Contractor's responsibility to erect suitable silt fences, hay bales or  
10 other erosion runoff control devices prior to commencement of earth moving  
11 or excavation activities. The Contractor shall be responsible for maintaining  
12 the silt fences, hay bales or other erosion runoff control devices in an  
13 effective manner, repairing or replacing damaged or ineffective section  
14 during the course of the work until a ground cover of grass is established  
15 and final environmental approval has been obtained.  
16

17 1.08 PERMITS FOR DEWATERING OPERATIONS

- 18  
19 A. The Contractor is responsible for obtaining all permits required for  
20 dewatering discharges, including a Florida Department of Environmental  
21 Protection Generic Permit for Produced Groundwater.  
22

23 PART 2 - PRODUCTS

24  
25 2.01 MATERIALS

26  
27 A. General

- 28  
29 1. Materials for use as fill are described below. For each material, the  
30 Contractor shall notify the testing lab of the source of the material at  
31 least ten (10) calendar days prior to the date of anticipated use of  
32 such material.  
33  
34 2. Materials shall be furnished as required from off site sources and  
35 hauled to the site.  
36  
37 3. Disposal of unsuitable material is specified in this Section.  
38

39 B. Common Fill

- 40  
41 1. Common fill shall consist of mineral soil, free of organic material,  
42 loam, wood, trash and other objectionable materials, which may be  
43 compressible or which cannot be compacted properly. Common fill  
44 shall not contain stones larger than four inches in any dimension,  
45 broken concrete, masonry, rubble, or other similar materials. It

shall have physical properties such that it can be readily spread and compacted during filling.

2. Material falling within the above Specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material, which in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.

C. Crushed Stone

1. Crushed stone for pipe bedding shall be FDOT No. 57 in accordance with Section 901-2 of the FDOT Standard Specifications for Road and Bridge Construction.

D. Select Fill

1. Select fill shall be noncohesive, non-plastic material free of all debris, lumps or clods. Fill material shall be clean earth fill composed of sand or an approved mixture of clay and sand. Backfill material placed within one foot of piping and appurtenances shall not contain any stones or rocks larger than two inches in diameter, or three-quarter inch in diameter for PVC pipe.

## PART 3 - EXECUTION

### 3.01 SAFETY PRECAUTIONS AND TEMPORARY WORKS

- A. The Contractor shall provide and maintain adequate barricades, construction signs, torches, flashers and guards as required in pedestrian and vehicular traffic areas. All safety rules and regulations of local authorities shall be observed. Local fire officials shall be kept advised of roads closed and roads re-opened.
- B. Where required, the Contractor shall provide suitable crossings at street intersections and driveways, and supply such aid, as may be required for pedestrians and motorists, including delivery vehicles, to safely negotiate the construction area. "Street Closed to Through Traffic" signs and "Detour" routes shall be indicated and maintained by the Contractor when the job is located in a public or private street or way. In the case of dead end streets, the Contractor shall advise all concerned residents and make all arrangements to maintain reasonable ingress and egress for the residents. Particular attention shall be given to residents in bad health, emergencies and emergency vehicles. The Contractor shall be responsible for building and maintaining all by-pass roadway areas and restoring those areas to their original condition.
- C. The Contractor shall furnish temporary or permanent support, adequate protection and maintenance of all underground facilities and utilities

## EXCAVATION AND BACKFILL FOR PIPES

encountered. Support, protection, maintenance and restoration are the Contractor's responsibility at no additional cost to the County.

### 3.02 CLEARING AND GRUBBING

- A. The Contractor shall remove only vegetation such as trees, shrubs, and grass which interferes with the construction, as may be determined by the Engineer, and he shall preserve and protect all other existing vegetation.

### 3.03 EXCAVATION

#### A. General

1. The Contractor shall perform all excavation of every description, and of whatever substances encountered, to the depth indicated on the Drawings, or as otherwise specified.
2. Trench excavation shall be such that the pipe can be laid to the alignment and grade required. Trenches shall be shored and drained in such a manner that work may proceed safely and efficiently.
3. Trench dewatering pumps shall discharge to natural drainage channels, drains or sewers and shall be adequate to remove accumulated storm and/or subsurface water. The Contractor shall take necessary action to prevent surface water from flowing into the trenches. It is the responsibility of the Contractor to assure that all trench walls and trench bottoms are dry and remain dry during pipeline construction.
4. The Contractor shall separate, remove and dispose of excavated material not suitable for backfill, as directed by the Engineer.
5. All excavated material retained for backfill shall be piled in such a manner as not to endanger the work or obstruct the sidewalks, driveways or drainage. Fire hydrants, valve pit covers and hoses, curb stop boxes, fire and police call boxes and other utility controls shall be unobstructed and accessible at all times during construction.

#### B. Unclassified Excavation

1. Unclassified excavation shall include soil, clay, silt, sand, muck, gravel, hardpan, loose shale, loose stones in masses and boulders measuring less than one-half cubic yard in volume.

#### C. Classified Excavation

1. Classified excavation shall be rock further defined as follows:  
boulders, measuring one-half cubic yard or more in volume, rock material in ledges, bedded deposits and unstratified masses, conglomerate deposits firmly cemented and concrete or masonry structures, except sidewalks and paving, that in the opinion of the Engineer required for its removal drilling and blasting, wedging, sledging, barring or breaking up with a power operated hand tool.
2. No soft or disintegrated rock that can be removed with a hand pick or power operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the minimum limits of measurement allowed, which may fall into the excavation, will be considered as rock.

#### 3.04 TRENCH PREPARATION

- A. Unsupported trench width shall be limited to the minimum practicable width allowing working space to place and compact the haunching material. The maximum width shall be the pipe diameter plus one foot on each side of the pipe at springline for pipe in unsupported trenches. In sheeted trenches the width of trench between faces of the sheeting shall be adequate to allow the pipe bedding and haunching to be placed and completed, and the sheeting removed without disturbing the bedding and haunching material within two pipe diameters on each side of the pipe. Trench boxes and moveable sheeting shall be wide enough to allow moving without disturbing the bedding and haunching within two pipe diameters on each side of the pipe. Trench boxes and moveable sheeting shall be constructed and used in the trench to avoid disturbing the piping, bedding and haunching when being moved forward in the trench.
- B. Dewatering of the trench bottom shall be accomplished using adequate means to allow preparation of bedding, placement of haunching and pipe in a trench environment without standing water. Dewatering shall continue until sufficient backfill is placed above the pipe to prevent flotation.
- C. The trench shall be dug so that the pipe can be laid to the alignment and depth required, and it shall be excavated only so far in advance of the pipe laying as allowed by the Engineer. The trench shall be so braced and drained that the workmen may work in it safely and efficiently. All trench preparation shall comply with all of the latest applicable Local, State (Florida Trench Safety Act) and Federal Regulations (OSHA: Safe Trench Act). It is essential that the discharge of the trench dewatering pumps be conducted to natural drainage channels, drains or storm sewers.
- D. Bell holes shall be provided at each joint to permit the joint to be made properly. Ledge rock, boulders and large stones shall be removed to

provide a clearance of six inches on all pipe twenty-four (24) inches and smaller and nine inches on pipe larger than twenty-four (24) inches. If such removal is required, backfilling will be done with selected material approved by the Engineer and tamped to establish the proper grade.

E. Trench Bottom

1. Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, refuse, vegetable or other organic matter, or large pieces or fragments of inorganic material that, in the judgment of the Engineer, should be removed, the Contractor shall excavate and remove such unsuitable material to the width and depth as directed by the Engineer. Before the pipe is laid, the subgrade shall be made by backfilling with an approved material in three inch uncompacted layers. The layers shall be thoroughly tamped as specified by the Engineer to provide the uniform and continuous bearing support as heretofore described.

2. The trench shall be dry when the bottom is prepared. The trench bottom shall be excavated, or filled and compacted, as required to bring it to grade and shaped to receive and support the pipe barrel. In addition, bell holes shall be excavated so that after placement only the barrel of the pipe receives bearing pressure from and is uniformly supported by, the bottom of the trench. Preparation of the trench bottom and placement of the pipe shall be such that the final position of the pipe is true to line and grade, and uniformly supported throughout the barrel of each length. When pipe is placed in refill material, additional refill of the same material shall be tamped on each side of the barrel to the springline, thus forming a trough of firm bedding.

F. All materials that, in the opinion of the Engineer, are suitable for reuse in restoring the disturbed surface shall be kept separated from the general excavation material and can only be used as directed by the Engineer.

G. All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants, valve pit covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters, drainage inlets, natural water courses and miscellaneous drainage structures shall be kept clear or other satisfactory provisions made for their proper operation.

H. Hand methods for excavation shall be employed when damage to existing facilities is likely if heavy equipment is utilized or as directed by the Engineer.



1  
2 3.05 DEPTH

3  
4 A. Gravity Sewers

- 5  
6 1. The depth of trenches for gravity sewers shall be such that the invert  
7 of the pipe will be at elevations shown on the plan .Gravity sewers  
8 shall be on straight alignment and constant grade between manholes.  
9

10  
11 B. Overdepth

- 12  
13 1. When classified excavation is required, the rock shall be excavated to  
14 a minimum depth of six inches below the trench depths as indicated  
15 on the drawings or Specifications. Authorized overdepths in rock  
16 excavation shall be refilled to grade with loose granular moist earth or  
17 shell thoroughly tamped in place.  
18

- 19 C. Trench shall be excavated to the depth required so as to provide a uniform  
20 and continuous bearing and support for the pipe on solid and undisturbed  
21 ground at every point between bell holes, except as necessary for removal  
22 of pipe slings or other lifting tackle. Any part of the bottom of the trench  
23 excavated to a point below the specified grade shall be corrected with  
24 approved material at the Contractor's expense and thoroughly tamped as  
25 directed by the Engineer.  
26

- 27 D. Wherever unstable soil or muck that is determined by the Engineer to be  
28 incapable of properly supporting the pipe is encountered in the bottom of the  
29 trench, such material shall be removed to the required depth and the trench  
30 refilled as specified to proper grade. If, in the opinion of the Engineer,  
31 removal of the unstable material by this method is impractical, then the  
32 Contractor shall support the pipe as detailed on the plans, or as directed by  
33 the Engineer.  
34

35 3.06 BACKFILL

36  
37 A. General

- 38  
39 1. The Contractor shall not perform any of the backfilling operations until  
40 after he has inspected the lines and found them to be acceptable to  
41 the County.  
42  
43 2. Backfill material shall consist of earth, loam, sandy clay, sand, gravel,  
44 soft shale or other materials, free from organic materials, large clods  
45 of earth, or stones. Where excavated material is not suitable for

backfill, it shall be replaced by excess excavated material from other areas.

3. In all areas, backfill material shall be deposited in six -inch layers and carefully tamped until the compacted backfill depth reaches one foot above the top of pipe.
4. No mechanical equipment, or machinery other than a hand operated mechanical vibrator, will be allowed within the trench area until the backfill has been properly tamped to one foot above the top of pipe. The remainder of the backfill shall be deposited in one foot layers and thoroughly tamped. Settling the backfill with water will be permitted, if approved by the Engineer.
5. Where trenches are improperly backfilled, or where settlement occurs, the trenches shall be reopened to the depth required for proper compaction, refilled and compacted, and the surface restored to the required grade and compaction, mounded over and smoothed off.

B. Gravity Sewers

1. Haunching of native material shall be placed to the springline and compacted. If ground water, or trench bottom conditions, is such as to require use of Class I material, either to aid in dewatering, or to provide foundation and bedding for the pipe, the haunching shall also be of Class I material. Class I material contains angular, 1/4 inch to 1 1/2 inch graded stone. Care shall be taken to place the haunching material, without voids, completely filling the trench from pipe wall to trench wall.

C. Compaction Requirements

1. Trenches located under pavement or inside the two feet horizontal to one foot vertical slope, downward from roadway shoulder or the back of curb and from spring line to bottom of sub-grade or the finished surface of the embankment, as appropriate, shall be compacted to a density of one hundred (100) percent as determined by AASHTO T-99 Method C.
2. Trenches located outside of the two feet horizontal to one foot vertical slope downward from roadway shoulder or the back of curb and where no vehicular traffic will pass over the trenches, back fill shall be compacted to a density approximately equal to that soil adjacent to

the trench but not less than ninety-five (95) percent of the maximum density as determined by AASHTO T-99, Method-C.

3. Backfill testing shall be performed in accordance with Pinellas County Minimum Testing Frequency Requirements, latest edition, unless called out differently by the Engineer on the plan documents.

D. Testing of Backfill

1. Trenching within, or across roadways, or other areas to be paved, or stabilized shall be backfilled and compacted to their full depth. Compaction shall be as specified in the Special Provisions or on the Plans.
2. Density tests for backfilled trenches within, or across roadways, shall be performed as specified or as directed by the Engineer, with at least one test taken at different locations for each vertical foot beginning from two feet over pipe to ground level.
3. Backfill testing shall be performed in accordance with Pinellas County Minimum Testing Frequency Requirements, latest edition, unless called out differently by the Engineer on the plan documents.
4. Where unsatisfactory compaction is revealed by the test, the Contractor shall re-excavate, backfill, re-compact and/or rework the backfill as required, to obtain the required degree of compaction over the entire depth of the trench.
5. Satisfactory backfill compaction is an integral part of pipe laying, paving, and stabilizing. Satisfactory density reports shall be on file before each Contractor's statement is submitted for payment.

E. Disturbance of Sewer Mains

1. Sewer mains shall be checked by the Contractor to determine whether any displacement of the pipe has occurred after the trench has been backfilled to two feet above the pipe. If such inspection shows poor alignment, displaced pipe or any defects, these defects shall be remedied to the satisfaction of the Engineer by the Contractor at his expense.

3.07 DISPOSAL OF SURPLUS MATERIAL

- A. All excavated material not required or not suitable for fill, or backfill, shall be disposed of by the Contractor, as directed by the Engineer.

- 1  
2 B. Material suitable for backfill is to be stockpiled on, or near site, until released  
3 by the Engineer for disposal.  
4

5 3.08 SHEETING AND BRACING  
6

- 7 A. The Contractor shall do all shoring and sheeting required to perform and  
8 protect the excavation and, as required, for the safety of the employees.  
9  
10 B. All trenches shall be sheeted and braced as required by the Engineer and  
11 all applicable Federal, State, County and Municipal regulations. Sheeting  
12 and bracing shall be used to prevent shifting of adjacent soil and to  
13 prevent damage to structures or the work. The sole responsibility for the  
14 design, methods of installation, and adequacy of the sheeting and bracing,  
15 shall be and shall remain that of the Contractor.  
16  
17 C. Sheeting and bracing or approved laying box shall be used in all trenches  
18 unless the slopes are excavated until the natural angle of repose of the  
19 soil is encountered.  
20  
21 D. In general, sheeting and bracing shall be removed as the excavation is  
22 backfilled in such a manner as to avoid the caving in of the bank or  
23 disturbance of adjacent areas or structures. The voids left by withdrawal  
24 of the sheeting and bracing shall be carefully filled by jetting, ramming or  
25 other means approved by the Engineer. Permission shall be obtained  
26 from the Engineer prior to removal of any sheeting or bracing. Permission  
27 shall not relieve the Contractor of any responsibility for damage due to  
28 failure to leave such sheeting and bracing in place.  
29  
30 E. The Engineer may order, in writing, any or all sheeting or bracing to be left  
31 in place for the purpose of preventing injury to adjacent structures,  
32 property, etc. If left in place, such sheeting shall be cut off at the elevation  
33 ordered, but in no case less than thirty-six (36) inches below the existing  
34 grade. Bracing remaining in place shall be driven in tight. The right of the  
35 Engineer to order sheeting and bracing to remain in place shall not be  
36 construed as creating any obligation on his part to issue such orders.  
37 Payment for sheeting and bracing, unless specifically called for on the  
38 Drawings shall not be paid under separate item, but shall be included in  
39 the payment for other items of Work.  
40

41 3.09 DEWATERING BY WELLPOINT  
42

- 43 A. Wellpoints shall be spaced and at sufficient depths as required to  
44 eliminate water during the excavation period until the work is completed.  
45 Ample means and equipment shall be provided with which to remove  
46 promptly, and dispose properly all water entering any excavation. This

1 includes the use of sand or gravel as required to maintain adequate flow  
2 during the pipe laying or installation of other items of work within the  
3 excavation.  
4

- 5 B. Water pumped or drained shall be disposed of in a suitable manner  
6 without damage to adjacent property to other work under construction or  
7 to street pavements or public parks. Water shall not be discharged onto  
8 streets without adequate protection of the surface at the point of  
9 discharge. All gutter, drains, culverts, sewers and inlets shall be kept  
10 clean and open for surface drainage. Water shall not be directed across  
11 or over pavements except through approved pipes or properly constructed  
12 troughs. Contractor shall obtain permission from the owner of any  
13 property involved before digging ditches or constructing water courses for  
14 removal of water, and provide for disposal of the water without ponding or  
15 creating a public nuisance. Water may be discharged into storm sewers.  
16 Payment for dewatering shall not be paid for under a separate item, but  
17 shall be included in the payment for other items of work, unless it is  
18 specifically included as a Pay Item in the Contract.  
19

20 3.10 APPURTENANCES  
21

- 22 A. Excavation for manholes and other appurtenances shall be made to size  
23 that will allow at least twelve (12) inches between their outer surfaces and  
24 the embankment or shoring. Overdepth excavation and backfill to required  
25 depth below such appurtenances that have not been directed by the  
26 Engineer shall be at the expense of the Contractor.  
27  
28

29 END OF SECTION  
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SECTION 31 23 34

EXCAVATION AND BACKFILL FOR STRUCTURES

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. This work involves clearing and grubbing, site work, excavation and backfill for sanitary sewer manholes, wet wells and other buried utility structures.

1.02 BURNING

- A. Burning of debris will not be permitted.

1.03 CLEANUP

- A. Cleanup is an essential part of the work. As the work progresses and is completed, the Contractor shall clean the site of all operations and completely restore the area to the satisfaction of the Engineer. This cleanup shall be done as promptly as practicable and shall not be left until the end of the construction period. No part of the work shall be considered complete and no payment will be made until cleanup is completed.
- B. It is the Contractor's responsibility to assure that all construction sites and all other affected properties are restored to a condition equal to, or better than, the existing conditions prior to construction. All restoration is subject to the approval of the Engineer.

1.04 DRAINAGE

- A. It is the responsibility of the Contractor to maintain the existing drainage systems during construction. Any damage done to an existing drainage structure or system is to be immediately repaired to a condition equal to or better than its original condition.

1.05 DUST CONTROL

- A. It is the responsibility of the Contractor to control all dust problems that may occur during the construction with required watering. Dust control will be required seven days a week.

1.06 SPRINKLERS

- 1  
2 A. The Contractor shall be responsible for sprinklers encountered within the  
3 area of excavation and shall make sure that if disturbed or damaged, they  
4 shall be rebuilt to the satisfaction of the Engineer and with no additional  
5 cost to the County.  
6

7 1.07 EROSION CONTROL  
8

- 9 A. It is the Contractor's responsibility to erect suitable silt fences, hay bales or other  
10 erosion runoff control devices prior to commencement of earth moving or  
11 excavation activities at the locations indicated on the plans. The Contractor shall  
12 be responsible for maintaining the silt fences, hay bales or other erosion runoff  
13 control devices in an effective manner, repairing or replacing damaged or  
14 ineffective section during the course of the work until a ground cover of grass is  
15 established.  
16

17 1.08 PERMITS FOR DEWATERING OPERATIONS  
18

- 19 A. The Contractor is responsible for obtaining all permits required for  
20 dewatering discharges, including a Florida Department of Environmental  
21 Protection Generic Permit for Produced Groundwater.  
22

23 PART 2 – PRODUCTS  
24

25 2.01 FILL MATERIALS  
26

- 27 A. Compacted granular fill which will provide support for building or structure  
28 foundations will be referred to as "structural fill." Backfill which is placed  
29 against the exterior side of the building walls or structures, or as fill over  
30 pipe lines, will be referred to as "common fill."  
31  
32 B. Materials for compacted structural granular fill shall be gravel, sandy  
33 gravel, or gravely sand free of organic material, loam, wood, trash, and  
34 other objectionable material and shall be well-graded within the following  
35 limits:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
6-in.	100
No. 4	20 - 95
No. 40	0 - 60
No. 200	0 - 8

- 41  
42 C. Common Fill  
43

- 44 1. Common fill shall consist of mineral soil, free of organic material,  
45 loam, wood, trash and other objectionable material which may be  
46 compressible or which cannot be compacted properly. Common fill

shall not contain stones larger than ten (10) inches in any dimension, broken concrete, masonry, rubble or other such materials. It shall have physical properties such that it can be readily spread and compacted during filling.

2. Material falling within the above Specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.

#### D. Crushed Stone

1. Crushed stone shall be used for a drainage layer below structures with underdrains and at other locations indicated on the Drawings.
2. Crushed stone shall be size No. 57 with gradation as noted in Table 1, Section 901 of Department of Transportation, Construction of Roads and Bridges.

### 2.02 UNSUITABLE MATERIAL

- A. Highly organic soil ASTM D 2487 Group PT, topsoil, roots, vegetable matter, trash and debris.

## PART 3 – EXECUTION

### 3.01 SAFETY PRECAUTIONS AND TEMPORARY WORKS

- A. The Contractor shall provide and maintain adequate barricades, construction signs, torches, flashers and guards as required in pedestrian and vehicular traffic areas. All safety rules and regulations of local authorities shall be observed. Local fire officials shall be kept advised of roads closed and roads re-opened.
- B. Where required, the Contractor shall provide suitable crossings at street intersections and driveways, and supply such aid, as may be required for pedestrians and motorists, including delivery vehicles, to safely negotiate the construction area. "Street Closed to Through Traffic" signs and "Detour" routes shall be indicated and maintained by the Contractor when the job is located in a public or private street or way. In the case of dead end streets, the Contractor shall advise all concerned residents and make all arrangements to maintain reasonable ingress and egress for the residents. Particular attention shall be given to residents in bad health, emergencies and emergency vehicles. The Contractor shall be responsible for building and maintaining all by-pass roadway areas and restoring those areas to their original condition.



- 1  
2 C. The Contractor shall furnish temporary or permanent support, adequate  
3 protection and maintenance of all underground facilities and utilities  
4 encountered. Support, protection, maintenance and restoration are the  
5 Contractor's responsibility at no additional cost to the County.  
6

7 3.02 CLEARING AND GRUBBING  
8

- 9 A. The Contractor shall remove only vegetation such as trees, shrubs, and  
10 grass which interfere with the construction, as may be determined by the  
11 Engineer, and he shall preserve and protect all other existing vegetation.  
12

13 3.03 JOB CONDITIONS  
14

- 15 A. Lateral Support of Excavation for Structures  
16

- 17 1. Furnish, put in place, and maintain sheeting and bracing required to  
18 support the sides of the excavations, to prevent any movement  
19 which could in any way diminish the width of the excavation below  
20 that necessary for proper construction, and to protect structures,  
21 pipe and utilities from damage due to lateral movement or  
22 settlement of ground. If the Engineer is of the opinion that at any  
23 point sufficient or proper supports have not been provided, he may  
24 order additional supports put in at the expense of the Contractor,  
25 and compliance with such order shall not relieve or release the  
26 Contractor from his responsibility for the sufficiency of such  
27 supports.  
28

- 29 B. Dewatering for Structures  
30

- 31 1. Furnish, install, maintain, operate, and remove a temporary  
32 dewatering system, as required to lower and control the  
33 groundwater level, so that the structures may be constructed in the  
34 dry. The Contractor shall, at his own expense, correct all damage  
35 resulting from inadequacy of the dewatering system or from  
36 flooding or the construction site from other causes.  
37  
38 2. The dewatering system shall be adequate to drain any excavated  
39 area, to maintain the water at such a level as to permit construction  
40 in the dry, and to maintain the lowered water table until the  
41 structure has been completed to the required stages.  
42  
43 3. Continuously maintain excavation in a dry condition to prevent  
44 damage to the subsoil or fill during interruptions due to weather,  
45 labor strikes, power failures or other delays. Provide and have  
46 ready for immediate use at all times diesel or gasoline powered

standby pumping units to serve the system in case of failure of the normal pumping units.

4. Piping and boiling, or any form of uncontrolled seepage, in the bottom or sides of the excavation shall be prevented at all times. If for any reason the dewatering system is found to be inadequate to meet the requirements set forth herein, the Contractor shall, at his own expense, make such additions, changes and/or replacements as necessary to provide a satisfactory dewatering system.

#### C. Control of Groundwater Level

1. Maintain the groundwater level at or below subgrade of the structure until the concrete structures are up high enough to: (1) prevent flooding the structure, (2) support both bottom and top levels of walls, and (3) prevent flotation.
2. After the structure has been completed in its entirety, backfill as described hereinafter.
3. Flotation shall be prevented by maintaining a positive and continuous operation of the dewatering system. The Contractor shall be fully responsible and liable for all damages which may result from failure of this system.
4. Disposal of drainage water shall be in an area approved by the Engineer. Precautions shall be taken to prevent the flow or seepage of drainage back into the drainage area. Particular care shall be taken to prevent the discharge of unsuitable drainage to a water supply or surface water body.
5. Removal of the dewatering system shall be accomplished after the dewatering system is no longer required.

### 3.04 EXCAVATION

#### A. General

1. The Contractor shall perform all excavation of every description, and of whatever substances encountered, to the depth indicated on the Drawings, or as otherwise specified.
2. Excavation shall be such that the structures can be installed at the grades required. Excavations shall be shored and drained in such a manner that work may proceed safely and efficiently.

3. Dewatering pumps shall discharge to natural drainage channels, drains or sewers and shall be adequate to remove accumulated storm and/or subsurface water. The Contractor shall take necessary action to prevent surface water from flowing into the excavations. It is the responsibility of the Contractor to assure that all excavation walls and bottoms are dry and remain dry during construction.
4. The Contractor shall separate, remove and dispose of excavated material not suitable for backfill, as directed by the Engineer.
5. All excavated material retained for backfill shall be piled in such a manner as not to endanger the work or obstruct the sidewalks, driveways or drainage. Fire hydrants, valve pit covers and hoses, curb stop boxes, fire and police call boxes and other utility controls shall be unobstructed and accessible at all times during construction.

B. Unclassified Excavation

1. Unclassified excavation shall include soil, clay, silt, sand, muck, gravel, hardpan, loose shale, loose stones in masses and boulders measuring less than one-half cubic yard in volume.

C. Classified Excavation

1. Classified excavation shall be rock further defined as follows: boulders, measuring one-half cubic yard or more in volume, rock material in ledges, bedded deposits and unstratified masses, conglomerate deposits firmly cemented and concrete or masonry structures, except sidewalks and paving, that in the opinion of the Engineer required for its removal drilling and blasting, wedging, sledging, barring or breaking up with a power operated hand tool.
2. No soft or disintegrated rock that can be removed with a hand pick or power operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the minimum limits of measurement allowed, which may fall into the excavation, will be considered as rock.

3.05 STRUCTURE EXCAVATION AND COMPACTION PROCEDURES - GENERAL

- A. Excavation shall be made to such widths as will give suitable room for construction of the structures, for bracing and supporting, pumping and drainage; and the bottom of the excavations shall be rendered firm and dry and in all respects acceptable to the Engineer.

- 1 B. Excavation and dewatering shall be accomplished by methods which  
2 preserve the undisturbed state of subgrade soils. Subgrade soil which  
3 becomes soft, loose, "quick," or otherwise unsatisfactory for support of  
4 structures as a result of inadequate excavation, dewatering or other  
5 construction methods shall be removed and replaced by structural fill as  
6 required by the Engineer at the Contractor's expense.  
7
- 8 C. Dewatering shall be such as to prevent boiling or detrimental  
9 underseepage at the base of the excavation as specified herein. The  
10 Contractor shall install such means as required to preserve the stability of  
11 the base of the operation.  
12
- 13 D. Excavating equipment shall be satisfactory for carrying out the work in  
14 accordance with the Specifications. In no case shall the earth be  
15 ploughed, scraped or dug with machinery so near to the finished subgrade  
16 as to result in excavation of, or disturbance of material below grade, the  
17 last of the excavated material being removed with pick and shovel just  
18 before placing of concrete or working mat thereon.  
19
- 20 E. During final excavation to subgrade level, take whatever precautions are  
21 required to prevent disturbance and remolding of the subgrade. Material  
22 which has become softened and mixed with water shall be removed.  
23 Hand excavation of the final three to six inches will be required as  
24 necessary to obtain a satisfactory undisturbed bottom. The Engineer will  
25 be the sole judge as to whether the work has been accomplished  
26 satisfactorily.  
27
- 28 F. All structure areas shall be stripped, cleared and grubbed of all surface  
29 vegetation and root laden top soils.  
30
- 31 G. After stripping, the structure areas should be leveled sufficiently to permit  
32 equipment traffic and then proof-rolled with a vibratory roller with at least a  
33 twenty (20) ton static weight. Careful observations should be made during  
34 proof-rolling of the stripped subgrade area to identify any areas of soft  
35 yielding soils that may require over excavation and replacement.  
36
- 37 H. Compaction should continue until the minimum density specified in the  
38 Special Provisions or on the Plans is achieved.  
39

#### 40 3.06 BACKFILLING AND COMPACTION

41

- 42 A. Structural fill shall be placed in loose lifts not exceeding twelve (12) inches  
43 and should be compacted to the minimum density specified in the Special  
44 Provisions or on the plans.  
45

- 1 B. Common fill may be used as backfill against the exterior walls of the  
2 structures, including manholes, wet wells and storm structures, or in other  
3 areas as designated by the Engineer. Common fill shall be placed in  
4 loose lifts not exceeding twelve (12) inches and should be compacted to  
5 the minimum density specified in the Special Provisions or on the plans.  
6
- 7 C. Materials placed in fill areas shall be deposited to the lines and grades  
8 shown on the Drawings making due allowance for settlement of the  
9 material and for the placing of topsoil thereon.  
10
- 11 D. The surfaces of filled areas shall be grades to smooth true lines, strictly  
12 conforming to grades indicated on the paving and grading Drawings, and  
13 no soft spots or uncompacted areas will be allowed in the work.  
14
- 15 E. No compacting shall be done when the material is too wet either from rain  
16 or from excess application of water. At such times, work shall be  
17 suspended until the previously placed and new materials have dried  
18 sufficiently to permit proper compaction.  
19
- 20 F. Density tests shall be performed by an engineering testing laboratory as  
21 specified or as directed by the Engineer.  
22
- 23 G. When a density test is scheduled and a time agreed upon by the Engineer  
24 and Contractor, it shall be the Contractor's responsibility to properly prepare  
25 the area in advance.  
26
- 27 H. Where unsatisfactory compaction is revealed by the test, the Contractor  
28 shall re-excavate, backfill, re-compact and/or rework the backfill as required,  
29 to obtain the required degree of compaction.  
30
- 31 3.07 SHEETING LEFT IN PLACE  
32
- 33 A. Where damage is likely to result from withdrawing sheeting, upon direction of  
34 the Engineer, the sheeting shall be left in place.  
35
- 36 3.08 DISPOSAL OF SURPLUS MATERIAL  
37
- 38 A. All excavated material not required or not suitable for fill, or backfill, shall be  
39 disposed of by the Contractor, as directed by the Engineer.  
40
- 41 B. Material suitable for backfill is to be stockpiled on, or near site, until released  
42 by the Engineer for disposal.  
43
- 44 3.09 GRADING  
45
- 46 A. Grading in preparation for placing of topsoil, planting areas, paved walks  
47 and drives, and appurtenances shall be performed at all places that are  
indicated on the Drawings, to the lines, grades, and elevations shown and

#### EXCAVATION AND BACKFILL FOR STRUCTURES

1 otherwise as directed by the Engineer. Such work shall be performed in a  
2 manner that the requirements for formation of slopes, lines, and grades  
3 can be followed. All material encountered, of whatever nature, within the  
4 limits indicated, shall be removed and disposed of as directed. During the  
5 process of grading, the subgrade shall be maintained in such condition  
6 that it will be well drained at all times. When directed, temporary drains  
7 and drainage ditches shall be installed to intercept or divert surface water  
8 which may affect the progress or condition of the work.  
9

- 10 B. If, at the time of grading, it is not possible to place any material in its  
11 proper section of the permanent structure, it shall be stockpiled for later  
12 use. No extra payment will be made for the stockpiling or double handling  
13 of excavated material.  
14
- 15 C. The right is reserved to make minor adjustments or revisions in lines or  
16 grades, if found necessary as the work progresses, due to discrepancies  
17 on the Drawings or in order to obtain satisfactory construction.  
18
- 19 D. Stones or rock fragments larger than four inches in their greatest  
20 dimensions will not be permitted in the top six inches of the finished  
21 subgrade of all fills or embankments.  
22
- 23 E. In cuts, all loose or protruding rocks on the back slopes shall be barred  
24 loose or otherwise removed to line or finished grade of slope. All cut and  
25 fill slopes shall be uniformly dressed to the slope, cross section, and  
26 alignment shown on the Drawings or as directed by the Engineer.  
27
- 28 F. No grading is to be done in areas where there are existing pipe lines that may  
29 be uncovered or damaged until such lines have been located and it has been  
30 determined if such lines must be maintained are relocated, or where lines are  
31 to be abandoned, all required valves are closed and remaining pipes are  
32 plugged.  
33  
34  
35

END OF SECTION

SECTION 32 12 01

STABILIZED AND ASPHALT ROADWAY RESTORATION

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Contractor shall furnish all labor and materials required to restore stabilized roadways and asphalt paving as specified herein.
- B. Workmanship and materials shall be in accordance with Department of Transportation requirements for new pavement for roads under their jurisdiction. Any local or County Road shall be restored in accordance with permits or ordinances of the municipality having jurisdiction over such road or street. Restoration of flexible pavement shall conform to the approved permit or utility license for each road crossing.
- C. Where applicable, all work shall conform to the Technical Specifications of Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", latest edition (Divisions II and III) and "Roadway and Traffic Design Standards", latest edition, including any amendments thereto. The Contractor shall acquire his own copies of the Department of Transportation Standards. In the event of conflict between the Department of Transportation Standards and the Specifications listed in these documents, the Engineer shall determine which shall govern.

1.02 SUBMITTALS

- A. Shop drawings for the proposed materials of construction, including an asphalt job mix formula, shall be submitted to the Engineer for approval at least two weeks prior to the application of stabilized or paved surfaces.

PART 2 – PRODUCTS

2.01 SUBBASE

- A. Materials used should be high bearing value soil, sand-clay, ground limestone, crushed limerock, coquina, or any other material suitable for stabilization. Muck shall not be used.

2.02 BASE

- A. Limerock for use as base material shall meet the requirements of Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Section 911. The limerock producer shall address

each truck receipt to the Contractor and the job site. Each receipt will show the source of the material by D.O.T. pit number. One copy of each receipt will be submitted daily to the County for his records.

- B. Coquina shell used in the base course shall have an organic material of not greater than 0.5 percent nor contain significant quantities of sand or other impurities, which would prevent bonding. At least ninety-seven (97) percent of the coquina used shall pass through a 3 1/2-inch ring.
- C. Crushed concrete base material shall conform to the following gradation:

Sieve Size	Percent by Weight Passing
2"	100
1 1/2"	95-100
3/4"	65-90
3/8"	45-75
No. 4	35-60
No. 10	24-45
No. 50	5-25
No. 200	0-10

1. Material for Crushed Concrete Base shall consist only of crushed concrete and such additive materials as may be approved by the Engineer for the purpose of facilitating construction and achieving the desired characteristics of the finished in-place product. Material which shows a significant tendency toward adverse chemical or physical change on exposure to moisture will not be acceptable. The material shall be free of any ferrous metals.



2. The material shall not contain lumps, balls, or pockets of sand or clay material in size or quantity sufficient to be detrimental to the proper bonding, finishing or strength of the crushed concrete base.
3. The specific mechanical and physical properties of crushed concrete aggregate and any additive materials permitted in the construction of crushed concrete base shall be determined on the basis of test results as the work progresses.

D. Reclaimed Asphalt Pavement Base

1. Reclaimed asphalt base material may be used on paved shoulders, bike paths and other non-traffic applications. Materials shall be in accordance with Section 283 of the FDOT Standard Specifications for Road and Bridge Construction.

2.03 PRIME AND TACK COATS

- A. Bituminous prime coats shall be applied to previously prepared bases. Bituminous tack coats shall be placed on existing paved surfaces and between successive lifts of asphalt material.
- B. The prime coat shall be cut-back asphalt Grade RC-70 or RC-250, emulsified asphalt Grades SS-I or CSS-I, or other types and grades of bituminous material specified or approved by the Engineer.
- C. The tack coat shall be emulsified asphalt, Grades RS-2, SSI-I, CSS-I, SS-IH, CSS-IH, AS-60, AE-90, AE-150, or asphalt emulsion prime.
- D. A cover material must be placed on the prime coat to insure that the prime coat remains intact until the surface course is placed.

2.04 ASPHALT WEARING SURFACE

- A. The bituminous wearing surface applied shall be that specified in the Plans or contract documents.
- B. Asphalt mixes for FDOT roadways shall be as required by the FDOT permit or as specified.
- C. If no asphalt mix is specified on Pinellas County roads, Type PC-III asphaltic concrete shall be used as the paving material, unless otherwise indicated. Design mix properties shall be in accordance with Pinellas County's Specifications.

1 PART 3 - EXECUTION

2  
3 3.01 PAVEMENT AND BASE REMOVAL

- 4  
5 A. Pavement removal shall be held to the minimum width consistent with  
6 good construction practice. The pavement material shall be carefully  
7 separated from other excavated materials and will not be permitted to be  
8 included in the backfill, but shall be satisfactorily disposed of by the  
9 Contractor. Base materials may be salvaged and stockpiled for reuse as  
10 stabilizer, subject to the approval of the Engineer. Reuse of salvaged  
11 base material as new base material is not permitted.  
12

13 3.02 ASPHALT REMOVAL

- 14  
15 A. All asphalt street pavement removed shall be replaced with base and  
16 surface materials which are of a quality and thickness equal to or more  
17 than the materials removed. The edges of the paving shall be cut to neat  
18 lines beyond any settled or broken areas. Pavement shall be replaced as  
19 soon as practicable after compaction of backfill.  
20

21 3.03 SURFACE TREATED STREETS

- 22  
23 A. All surface treated streets removed shall be replaced with at least six  
24 inches of compacted shell or limerock as directed by the Engineer. This  
25 base shall be primed and sanded and maintained until overlaid.  
26

27 3.04 REPLACING STABILIZED ROADWAY

- 28  
29 A. The Contractor shall restore cuts in all stabilized roadway surfaces using  
30 the same type and grade of material used on the existing street surface.  
31 After the pipelines and/or appurtenances have been installed and properly  
32 backfilled as herein specified, the Contractor shall bring the roadway  
33 surface to grade and ready the surface to receive the stabilization  
34 material. The stabilizing materials shall be of high-bearing value such as  
35 sand, clay, oyster shell, coquina shell, rock screening, crushed concrete or  
36 any other material which, as allowed by the agency with jurisdiction over  
37 such road and that, in the opinion of the Engineer, is suitable for  
38 stabilization.  
39  
40 B. The stabilizing material shall be applied in such quantities as may be  
41 necessary to bring the top six inches of the roadway surface to a bearing  
42 value as hereinafter specified and to the proper line and grade. The  
43 material shall be incorporated with the roadbed material by plowing,  
44 disking, harrowing, blading, and mixing with a rotary tiller, or any other  
45 equipment approved by the Engineer. The mixed materials shall be of  
46 uniform density throughout the width and depth of the layer being

processed. After thoroughly mixing to a uniform texture, the surface shall be compacted by rolling with any type of equipment that will produce the density required. Compaction shall continue until the entire depth to be stabilized has a value determined from tests made on the 6-inch compacted thickness, of not less than the requirements set forth by the agency having jurisdiction over the road.

### 3.05 RESURFACING

- A. When pavement replacement is complete, certain streets as directed by the County, shall be resurfaced for the full width of the existing paved section. Resurfacing shall be consistent with the requirements set forth by the governmental agency that has jurisdiction over the road.
- B. Materials for resurfacing shall be as specified on the Drawings.

### 3.06 SUBBASE PREPARATION

- A. Prior to installation of base material, the area shall be graded to within  $0.2\pm$  feet, and soft, spongy or mucky material removed. Sufficient stabilizing material shall be cut in to achieve a Florida Bearing Value (FBV) in excess of 75 psi or limerock bearing ratio (LBR) greater than forty (40) pounds at a minimum density of ninety-eight (98) percent of a maximum density as defined and measured in ASSTHO T-180 (Modified Proctor), to a six inch minimum depth.
- B. Density tests for subbase materials shall be taken at three hundred (300) foot intervals in a staggered pattern and around structures as required. If compaction procedures allow, testing requirements may be reduced or increased at the Engineer's discretion.

### 3.07 BASE COURSE CONSTRUCTION

- A. General
  - 1. The base course shall be constructed on the prepared subgrade, in accordance with the Specifications and Plans. All base material shall be placed in accordance with the lines, grades, notes, and typical cross sections shown on the Plans. Any deviation from the Plans is subject to the approval of the Engineer. Any deviations not approved by the Engineer shall be repaired to the satisfaction of the Engineer at no expense to the County.

1           B.     Limerock, Reclaimed Asphalt or Crushed Concrete Base Course

- 2
- 3           1.     Base shall be spread by mechanical spreaders, equipped to produce
- 4                 an even distribution with a uniform thickness. When the specified
- 5                 compacted thickness of the base is greater than six inches, the base
- 6                 shall be constructed in two courses. The thickness of the first course
- 7                 shall be one-half the total thickness of the finished base. After
- 8                 spreading is completed, the entire surface shall be scarified and
- 9                 shaped so as to produce the required grade and cross section after
- 10                compaction. If two courses are required, each lift shall be prepared
- 11                as previously described. Prior to spreading of the upper course,
- 12                density tests will have been taken for the lower and determined to be
- 13                satisfactory.
- 14
- 15           2.     When the material does not have the proper moisture content to
- 16                 ensure the required density, it shall be wet or dried as required.
- 17                 When adding water, it shall be uniformly mixed in by disking to the
- 18                 full depth of the course that is being compacted.
- 19
- 20           3.     All materials shall be compacted to a density of not less than
- 21                 ninety-eight (98) percent of maximum density as determined by
- 22                 AASHTO T 180. Density tests shall be taken at three hundred (300)
- 23                 foot intervals in a staggered pattern and around structures as
- 24                 required. Density determinations shall be made at more frequent
- 25                 intervals, at no extra cost, if deemed necessary by the Engineer.
- 26
- 27           4.     The finished surface of the base course shall be checked with a
- 28                 template cut to the required crown and a fifteen foot straight edge laid
- 29                 parallel to the center line of the road. All irregularities greater than
- 30                 one-quarter inch shall be corrected to the satisfaction of the
- 31                 Engineer.
- 32
- 33           5.     The base material shall extend at least twelve (12) inches outside the
- 34                 edge of the finished paved surface, unless otherwise indicated.
- 35                 Thickness of the base shall be measured at two hundred (200) foot
- 36                 intervals at various points in the cross section. Measurements shall
- 37                 be taken at various points on the cross section through holes not less
- 38                 than three inches in diameter and at locations, as specified by the
- 39                 Engineer. Where the compacted thickness is deficient by one-half
- 40                 inches or more, the Contractor shall correct the deficiency by
- 41                 scarifying and adding material for a distance of one hundred (100)
- 42                 feet in each direction from the edge of the deficient area. The
- 43                 required thickness, compaction and cross section will then be
- 44                 achieved.
- 45
- 46

- 1 6. Prime coat shall be applied only when the base meets the specified  
2 density and the moisture content in the top half of the base does not  
3 exceed ninety (90) percent of the optimum moisture of the base  
4 material.

5  
6 C. Asphalt Base Course.

- 7  
8 1. Asphalt base courses shall be applied in accordance with DOT  
9 Standards and Specifications, Section 234. The job mix formula  
10 approved for the Project shall be used. Any deviation from the  
11 approved mix must be submitted to the Engineer and approved  
12 before being implemented.  
13  
14 2. The base course material shall be placed with an approved paving  
15 machine. A motor grader may be required if a leveling course is  
16 needed. The base mix may be placed when the air temperature is  
17 at least forty (40) degrees F and rising, provided that the sub-grade  
18 is not frozen or affected by frost.  
19  
20 3. A paver, equipped with automatic screed control, shall be used for  
21 all machine-laid courses. The automatic joint matcher shall be  
22 used on the top course of the base after the first pass with a paving  
23 machine. All mixtures shall be laid by the stringline method, with  
24 the exception of areas adjacent to curb and gutter or other true  
25 edges. The temperature of the mix shall be between three hundred  
26 (300) degrees F and three hundred fifty (350) degrees F. Any  
27 mixture caught by rain in transit may be laid at the Contractor's own  
28 risk; if removal and replacement is required, it shall be at the  
29 expense of the Contractor. In no case shall the mixture be spread  
30 when rain is falling or when there is water on the surface to be  
31 covered. The layer thickness for asphalt concrete structure  
32 courses shall be as shown on the Drawings.  
33  
34 4. Compaction  
35  
36 a. After the asphalt mixture has been spread to the proper  
37 lines, grades, and cross sections, compaction operations  
38 may begin. The Contractor shall establish rolling procedures  
39 and submit his sequence of compaction operations to the  
40 Engineer for approval. The equipment used may include,  
41 but is not committed to steel-wheeled rollers, pneumatic tired  
42 rollers, and vibratory rollers. Areas which are inaccessible to  
43 a roller shall be compacted by the use of hand tamps or  
44 other satisfactory means. An entire sequence of compaction  
45 operations shall be performed for each layer of applied  
46 material, density determinations shall also be made.

- 1  
2 b. The in-place density of each course shall be determined  
3 through core samples and the nuclear backscatter method.  
4 A core sample of a representative paving section shall be  
5 taken every two hundred fifty (250) feet. Additional testing  
6 around manholes or other structures may be required. In  
7 addition to density tests via core samples, Marshall stability  
8 tests are also required. Marshall stability tests will be taken  
9 for every day of asphalt pavement production.

10  
11 E. Shell Base Course

- 12  
13 1. Shell base material shall be constructed on the prepared subgrade  
14 in accordance with these Specifications and in conformity with the  
15 lines, grades and cross sections shown on the Plans. The shell  
16 base shall be spread uniformly and evenly; during spreading  
17 operations the shell shall be thoroughly saturated with water.  
18  
19 2. After spreading the shell shall be compacted, with water being  
20 added as required, until the required density is obtained.  
21 Compaction and density shall be as required for limerock base,  
22 except that the testing methods shall be modified in the laboratory  
23 and in the field. At least three density determinations shall be made  
24 on each day's final compaction operations.  
25  
26 3. Upon completion of initial compaction, the entire surface shall be  
27 scarified and shaped to exact crown and cross section. The base  
28 shall then be rewatered and compacted to the required density.  
29 The finished surface shall be tested with a template and fifteen (15)  
30 foot straight edge. All irregularities greater than one-quarter inch  
31 shall be corrected to the satisfaction of the Engineer. The prime  
32 coat shall be applied after the base meets all density and finish  
33 requirements.  
34

35 3.08 ASPHALT WEARING SURFACE

- 36  
37 A. The asphalt wearing surface shall be constructed on the prepared base in  
38 accordance with the Plans and Specifications and in conformity with the  
39 indicated lines, grades, and cross sections.  
40  
41 B. The mixture shall be spread only when the base is clean, dry, properly  
42 cured, and approved by the Engineer. The temperature shall be at least  
43 forty (40) degrees F and rising. No paving operations will be permitted if it  
44 is raining or rain is imminent. The mix shall be between three hundred  
45 (300) F and three hundred fifty (350) degrees F.  
46

- 1 C. The asphalt mixture shall be spread with an approved paving machine to
- 2 the required width and depth. All mixes, except those adjacent to curb
- 3 and gutter, shall be laid according to the stringline method. The depth of
- 4 each layer shall be checked every fifty (50) feet.
- 5
- 6 D. The mixture shall be compacted to its final depth, no less than one and
- 7 one half inch and thicker for new roads and one inch for overlays.
- 8 Compaction and layering procedures specified for asphalt base courses
- 9 shall apply to surface courses. All testing and density requirements will
- 10 also apply.
- 11
- 12 E. When laying operations are interrupted, a transverse joint shall be
- 13 constructed by cutting back on the previous run to expose the full depth of
- 14 material. Longitudinal joints are to be sloped or rolled over and sealed.
- 15 When the adjacent strip is constructed, the edge shall be trimmed back to
- 16 expose the unsealed face. All longitudinal construction joints shall be
- 17 offset six inches to twelve (12) inches laterally between layers.
- 18
- 19 F. When fresh mixture is laid against transverse or longitudinal joints, it shall
- 20 be placed in contact to produce an even, well compacted joint after rolling.
- 21
- 22 G. The finished surface shall be tested with a template and fifteen (15) foot
- 23 straight edge. Any irregularities shall be repaired to the satisfaction of the
- 24 Engineer. The surface shall be of uniform texture and compaction. No sand
- 25 spots, ripples, or loosened portions shall be evident. No traffic shall be
- 26 allowed onto the finished surface until it is deemed acceptable by the
- 27 Engineer.
- 28
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## **Pinellas County** **Public Works Roadway Pavement Guidelines**

*In accordance with County Ordinance 92-62, Article III, Section 154 (Ordinance Needs to be updated to show Superpave Surface Course)*

	<b>Arterial</b>	<b>Collector (Major/Minor) Commercial / Industrial</b>	<b>Residential Medium Traffic</b>	<b>Residential Light Traffic</b>
<b>Structural Coefficient</b>	<b>4.17</b>	<b>3.28</b>	<b>3.06</b>	<b>2.46</b>
<b>Asphalt Superpave Surface</b>	Type SP-12.5 Fine, Traffic Level "C" 3" min. thick (2 lifts) (0.44) (1.32 Total)	Type SP-12.5 Fine, Traffic Level "C" 2" min. thick (0.44) (0.88 Total)	Type SP-9.5 Fine, Traffic Level "C" 1-1/2" min. thick (0.44) (0.66 Total)	Type SP-9.5 Fine, Traffic Level "C" 1-1/2" min. thick (0.44) (0.66 Total)
<b>Base (Compacted 98% of AASHTO T-180)</b>	Limerock 10 1/2" Min. Thickness (Min. 100 LBR) (0.18) (1.89 Total)	Limerock 8" Min. Thickness (Min. 100 LBR) (0.18) (1.44 Total)	Limerock 8" Min. Thickness (Min. 100 LBR) (0.18) (1.44 Total)	Limerock 6" Min. Thickness (Min. 100 LBR) (0.18) (1.08 Total)
<b>Sub-Base (Compacted 98% of AASHTO T-180)</b>	12" min. thickness (Stab. w/min. 40 LBR) (0.08) (0.96 Total)	12" min. thickness (Stab. w/min. 40 LBR) (0.08) (0.96 Total)	12" min. thickness (Stab. w/min. 40 LBR) (0.08) (0.96 Total)	9" min. thickness (Stab. w/min. 40 LBR) (0.08) (0.72 Total)
<b>Two Lane Roadway Pavement Width</b>	28' Total (with or without curbs)	28' Total (with or without curbs)	24' Total (with or without curbs) (28' for type F curb)	24' Total (with or without curbs) (28' for type F curb)
				4-10-08

Structural Layer Coefficients for Optional Base: Superpave Type B-12.5 Base= 0.30, Crushed Concrete Base= 0.15

10  
11  
12  
13

**END OF SECTION**



SECTION 32 13 01

CONCRETE SIDEWALKS, DRIVEWAYS AND GUTTERS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Contractor shall furnish all labor and materials required to restore and construct concrete sidewalks, driveways and gutters as specified herein.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Sidewalk shall be 3000 psi concrete, at least four feet wide, five feet wide on arterial and collector streets, and four inches thick, except at driveways. Driveway sidewalks shall be six inches thick with six inches by six inches #10 wire mesh reinforcing.
- B. Replacement of concrete driveways shall be in accordance with County Standards (six inches, 3000 psi/28 day with 6 x 6 # 10 mesh from back of curb to property line).
- C. Curb and curb and gutter shall consist of 3000 psi/28 day concrete.
- D. Expansion joints shall be installed between the back-of-curb and concrete driveways, and between concrete driveways and sidewalks, where new concrete abuts old concrete.

PART 3 – EXECUTION

3.01 CURB AND GUTTER

- A. Curb or curb and gutter removal, where required in the construction of this work, shall be held to a minimum. Curb and gutter material to be removed shall be carefully separated from the trench excavation material and shall be disposed of as directed. The Contractor shall replace all curb or curb and gutter which has been removed. Curb and gutter shall be removed up to the nearest regular joint on each side of the trench.
- B. Curb or curb and gutter shall be replaced as soon as possible after the backfill is placed and compacted and shall duplicate in all respects the original construction. Workmanship shall be in accordance with the best standard practices for this type of work. Curb and curb and gutter shall

1 consist of 3,000 psi/28 day concrete reinforced with bars or mesh of the  
2 same size, spacing and number as the section of curb or curb and gutter it  
3 replaces.  
4

### 5 3.02 SIDEWALKS 6

7 A. Sidewalk removal, where required in the construction of this work, shall be  
8 held to a minimum. Sidewalk material removed shall be carefully  
9 separated from the trench excavation material and shall be disposed of as  
10 directed. Sidewalk shall be cut at the nearest regular joint on each side of  
11 the trench.  
12

13 B. The Contractor shall replace all sidewalks which are removed. Sidewalks  
14 shall be replaced as soon as practicable after the backfill is placed and  
15 compacted and shall duplicate, in all respects, the original sidewalk.  
16

17 C. The Contractor shall replace all sidewalks which are damaged by the  
18 construction operation or by the heavy equipment traveling over them and  
19 shall replace them at their own expense.  
20

21 D. The top surface of all sidewalks shall be given a light broom finish.  
22

### 23 3.03 DRIVEWAYS 24

25 A. Concrete driveways that are crossed or traversed by the trenches shall be  
26 restored to the conditions existing prior to the excavation.  
27

28 B. Removal shall be held to a minimum, but when necessary removal shall  
29 be made in neat sawcut lines or to the nearest joint if approved by the  
30 Engineer.  
31

### 32 3.04 TESTS 33

34 A. The quality of the concrete as to conformance to the specifications is the  
35 entire responsibility of the Contractor until it is accepted in place. When  
36 required by the County or the Engineer, the Contractor shall arrange for  
37 field testing. Field testing shall include, but may not be limited to, the  
38 following:  
39

- 40 1. Compressive Strength Test: Compressive strength tests shall be  
41 made by breaking standard six inch diameter by twelve (12) inch  
42 high test specimens prepared, cured and broken in accordance  
43 with the American Society for Testing Materials Standard Methods  
44 C 31 and C 39, Latest Revision. Four specimen test cylinders shall  
45 be taken from each concrete pour of five cubic yards or more. One  
46 additional test shall be taken from each fifty (50) cubic yards or

1 fraction thereof in each pour in excess of thirty (30) cubic yards.  
2 One cylinder from each pour shall be broken at seven days, the  
3 remainder at twenty-eight (28) days. Additional test cylinders may  
4 be ordered for determining the characteristics of a new design mix  
5 or changes in equipment or methods, and under adverse weather  
6 or curing conditions.  
7

8 2. Slump Test: Slump test shall be made in accordance with ASTM  
9 C 143, and shall be made on each load of concrete unless directed  
10 differently by the County or Engineer.  
11

12 3. Reports: Proper reports of all tests performed by the laboratory  
13 shall be prepared by the laboratory and submitted promptly to the  
14 County and Engineer. Such reports shall be properly labeled so as  
15 to identify the portions of the Project into which the materials are  
16 being placed, and the results of the test indicating whether or not  
17 the test met the requirements of these specifications.  
18

19 3.05 CAUSE FOR REJECTION  
20

21 A. Should the concrete fail to conform to all the requirements of this  
22 Section, the Engineer may require the Contractor to remove the  
23 defective concrete and reconstruct the work as directed.  
24  
25

26  
27 END OF SECTION  
28  
29

SECTION 32 92 01

SEEDING AND SODDING

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. Where required by the Engineer, areas along the work shall be grassed and mulched in accordance with Section 570, of the latest edition of the State of Florida Department of Transportation "Standard Specifications for Road and Bridge Construction".
- B. The area to be grassed and mulched along the work shall include all damaged cover over the backfilled trench and area adjacent thereto irrespective of the cause of damage, whether it be from handling of pipe, trenching or driving equipment.

1.02 QUALITY ASSURANCE

A. Requirements

- 1. It is the intent of this Specification that the Contractor is obliged to deliver a satisfactory stand of grass as specified. If necessary, the Contractor shall repeat any or all of the work, including grading, fertilizing, watering, and seeding or sodding at no additional cost to the County until a satisfactory stand is obtained.

B. Satisfactory Stand

- 1. For purposes of grassing, a satisfactory stand of grass is herein defined as a full lawn cover over areas to be seeded or sodded, with grass free of weeds, alive and growing, leaving no bare spots larger than 3/4 square yard within a radius of ten (10) feet.

1.03 SUBMITTALS

- A. Provide technical data as required for shop drawings on all materials or installation procedures required under this Section.
- B. When required by the Engineer, submit representative topsoil samples for analysis by a private laboratory to determine nutrient deficiencies and outline a proper fertilization program.

1 PART 2 - PRODUCTS

2  
3 2.01 MATERIALS

4  
5 A. Fertilizer

- 6  
7 1. Fertilizer shall be a complete fertilizer, the elements of which are  
8 derived from organic sources. Fertilizer shall be a standard product  
9 complying with State and Federal fertilizer laws.  
10  
11 2. Percentages of nitrogen, phosphorus and potash shall be based on  
12 laboratory tests on the actual soils. For purpose of bidding, assume  
13 four percent nitrogen, eight percent phosphorus and four percent  
14 potash by weight. At least fifty (50) percent of the total nitrogen shall  
15 contain no less than three percent water-insoluble nitrogen.  
16  
17 3. Fertilizer shall be delivered to the site, mixed as specified, in the  
18 original unopened standard size bags showing weight, analysis and  
19 name of manufacturer. Containers shall bear the manufacturer's  
20 guaranteed statement of analysis, or a manufacturer's certificate of  
21 compliance covering analysis shall be furnished to the Engineer.  
22 Store fertilizer in a weatherproof place and in such a manner that it  
23 will be kept dry and its effectiveness will not be impaired.  
24  
25 4. Superphosphate shall be composed of finely ground phosphate rock  
26 as commonly used for agricultural purposes containing not less than  
27 twenty (20) percent available phosphoric acid.  
28

29 B. Seed

- 30  
31 1. Grass seed shall be the same as existed prior to construction or as  
32 approved by the Engineer and shall be ninety-nine (99) percent  
33 minimum purity, eighty (80) percent minimum germination and one  
34 percent maximum weed seed, labeled in accordance with U.S.  
35 Department of Agriculture Rules and Regulations under Federal Seed  
36 Act in effect. Seed which has become wet, moldy, or otherwise  
37 damaged in transit or storage shall not be acceptable.  
38  
39 2. Hydroseed may be utilized if approved for use by the Engineer.  
40

41 C. Sod

- 42  
43 1. Sod shall be St. Augustine or Argentine Bahia, or the same as existed  
44 prior to construction, of firm texture having a compacted growth and  
45 good root development as approved.

- 1                   2.     Sod shall be certified to meet Florida State Plant Board  
2                   Specifications, absolutely true to varietal type, and free from weeds or  
3                   other objectionable vegetation, fungus, insects and disease of any  
4                   kind.  
5  
6                   3.     Before being cut and lifted the sod shall have been mowed three  
7                   times with the final mowing not more than a week before cutting into  
8                   uniform dimensions.  
9         D.     Mulch  
10  
11               1.     Mulch for use with seeding shall be fresh hay. Rate of application  
12               specified herein shall correspond to depth not less than one inch or  
13               more than three inches according to texture and moisture content of  
14               mulch material.  
15         E.     Water  
16  
17               1.     It is the Contractor's responsibility to water the site, as required during  
18               seeding and sodding operations and through the maintenance period  
19               and until the work is accepted. The Contractor shall make whatever  
20               arrangements may be necessary to ensure an adequate supply of  
21               water to meet the needs for his work. The Contractor shall also  
22               furnish all necessary hose, equipment, attachments and accessories  
23               for the adequate irrigation of lawns and planted areas as may be  
24               required.  
25

### 26     PART 3 - EXECUTION

#### 27     3.01   SHOULDER STABILIZATION, SEEDING, MULCHING AND SODDING

- 28               A.     The Contractor shall protect and restore road shoulders, ditch banks and  
29               other natural or artificial slopes as directed by the Engineer. Except where  
30               soil-cement rip-rap is shown and/or directed, protection shall be provided by  
31               stabilizing to a minimum LBR as set forth by the agency with jurisdiction over  
32               such road, and/or seeding and mulching the shoulders of the road.  
33  
34               B.     The Contractor shall apply 4-8-4 fertilizer at a rate of six hundred (600)  
35               pounds per acre on all seeded areas. All seed or seed mixture used is  
36               subject to the approval of the Engineer.  
37  
38  
39

#### 40     3.02   GRASS AND SHRUBBERY PLOTS

- 41               A.     Grass plots and graded areas shall be restored to the condition existing prior  
42               to making the excavation. All shrubbery, ornamental trees and other planting  
43               shall be fully protected. If it is necessary to remove any shrubbery or  
44               planting to accomplish the work, it shall be satisfactorily replaced before the  
45               work will be accepted. A 4-8-4 fertilizer shall be applied to all replaced sod at  
46

1 a rate of six hundred pounds per acre.

- 2
- 3 B. The areas in which the grass plots and shrubbery are to be replaced shall
- 4 contain sufficient moisture, as determined by the Engineer, for optimum
- 5 results after being placed. The areas shall be kept in a moist condition for no
- 6 less than three weeks. The moistened condition shall extend at least to the
- 7 full depth of the rooting zone.
- 8

9 3.03 NEW SOD PLACEMENT

- 10
- 11 A. Whenever a suitable area has been graded and requires sodding, the
- 12 Contractor shall, when directed by the Engineer, proceed at once with the
- 13 sodding of the available areas. Sodding shall be incorporated into the
- 14 Project at the earliest practical time in the life of the contract. No sod which
- 15 has been cut for more than seventy-two (72) hours shall be used unless
- 16 specifically authorized by the Engineer after his careful inspection thereof.
- 17 Any sod which is not placed within twenty-four (24) hours after cutting shall
- 18 be stacked in an approved manner and properly maintained,.
- 19
- 20 B. The sod shall be placed on the prepared surface, with edges in close
- 21 contact, and shall be firmly and smoothly embedded by light tamping or
- 22 rolling with appropriate tools or equipment.
- 23
- 24 C. Where sodding is used in drainage ditches, the setting of the pieces shall be
- 25 staggered, such as to avoid a continuous seam along the line of flow. Along
- 26 the edges of such staggered areas the offsets of individual strips shall not
- 27 exceed six inches. In order to prevent erosion caused by vertical edges at
- 28 the outer limits, the outer pieces of sod shall be tamped so as to produce a
- 29 feather-edge effect.
- 30
- 31 D. On areas where the sod may slide, due to height and slope, the Engineer
- 32 may direct that the sod be pegged with pegs driven through the sod blocks
- 33 into firm earth, at suitable intervals.
- 34
- 35 E. Any pieces of sod which, after placing, show an appearance of extreme
- 36 dryness shall be removed and replaced with new sod.
- 37
- 38 F. Ditch banks disturbed during the construction of ditch and creek crossings
- 39 shall be sodded when directed by the Engineer or when called for in the
- 40 permit requirements.
- 41
- 42 G. Watering and fertilizing requirements shall conform in all respects to those
- 43 specified above.
- 44

END OF SECTION

SECTION 33 01 31

SANITARY SEWER CURED IN PLACE PIPELINING

PART I – GENERAL

1.01 SCOPE OF WORK

- A. The Work includes furnishing all plant, labor, tools, equipment, materials, and performing all operations in connection with rehabilitation of 8-inch through 42-inch gravity sanitary sewer lines with cured-in-place pipe (CIPP).
- B. The CIPP shall be continuous and jointless from manhole to manhole and shall be free of all defects that will affect the long term life and operation of the pipe.
- C. All lining material shall be suitable for use in domestic sewage.
- D. Pipelines to be rehabilitated may be in backyard easements, light traffic subdivision roadways or highways requiring Maintenance of Traffic plans conforming to Florida Department of Transportation and Pinellas County requirements. . No additional compensation will be made for these locations unless specified within the Contract.
- D. It shall be assumed that pipelines to be rehabilitated will only need light cleaning, removal of protruding services and sewage bypass pumping to successfully install the liner system. If the Contractor feels point repairs are necessary to complete lining of a particular main line segment, the County will make the individual necessary repair or cancel that section of Work at no cost to the County. The Contractor shall be responsible for all material removed from the sewer and shall properly dispose of materials in accordance with the appropriate regulatory agency requirements.
- E. Any main line or service line damage occurring during the rehabilitation process shall be the responsibility of the Contractor including, but not limited to, point repairs, main line replacement, service line replacement, any and all required permits, traffic control, by pass pumping, including a back-up system pipe/structure ventilation systems, Personal Protection Systems, such personal fresh air respirators, and restoration of all disturbed areas.
- F. The Contractor shall be responsible for any wastewater spills during any bypass operation and pay any and all fines, fees, property damage,



environmental damage and cleanup costs that are associated with wastewater spill.

#### 1.02 QUALITY CONTROL

- A. Products and Installers seeking approval must meet all of the following criteria to be deemed acceptable:
- B. Acceptable products shall have a minimum of 500,000 linear feet (LF) of documented acceptable wastewater installations in the United States.
- C. The Contractor must have a minimum of three years experience with the specific product and have installed a minimum of 150,000 L.F. of documented acceptable wastewater installations in the State of Florida.
- D. A client/reference list shall be supplied with the Bid, which shall include the product utilized for the referenced installations along with the dates of installation and the lineal footage of the individual installations.
- E. Liner materials shall be as specified in the Material Specification Manual.

#### 1.03 SUBMITTALS

- A. The Contractor shall submit the following information:
  - 1. Manufacturer's certification that the materials to be used meet the referenced standards and these specifications.
  - 2. License or certificate verifying Manufacturer's/ Licensor's approval of the installer.
  - 3. Proposed equipment and procedures for accomplishing the work.
  - 4. Lining Manufacturer's product data and instructions for resin and catalyst system.
  - 5. Design Calculations, in accordance with the Appendix of ASTM F-1216, for each length of liner to be installed including the thickness of each proposed CIPP. It will be acceptable for the Contractor to submit a design for the most severe line condition and apply that design to all of the line sections. To be completed and certified by a Professional Engineer proficient in the design of pipeline systems. All calculations shall include data that conforms to the requirements of these specifications.
  - 6. A detailed installation plan describing all preparation work, cleaning operation, pre-closed circuit television (CCTV) inspections, bypass pumping, traffic control, installation procedure, method of curing, service reconnection, quality control, testing to be performed, final CCTV inspection, and all else necessary and appropriate for a complete CIPP liner installation.

7. Tube wet-out and cure method including: a complete description of the proposed wet-out procedure, manufacturer's recommended cure method- for each diameter and thickness of CIPP liner to be installed, and detailed curing procedure detailing the curing medium and the method of application.
8. A detailed installation schedule.
9. All MSDS sheets for all materials to be furnished for the project.
10. Weekly work schedules shall be submitted no later than close of business on proceeding Thursdays for the work on the following week. Scope of the schedule shall include the following: cleaning operations, CCTV pre & post operations, lining, and crew leader's information including phone number.

#### 1.04 SUBSTITUTIONS

- A. Only after execution of the contract will Engineer consider requests from Contractor for substitutions. Substitutions will be considered only when a product becomes unavailable due to no fault of Contractor.
- B. Items identified as "equal" shall be accompanied by product literature and a written itemized comparison of the published specifications (feature by feature from the manufacturer's literature) for the item specified and for the item proposed. The burden of proof of "equality" shall be on the supplier.
- C. Request constitutes a representation that Contractor:
  1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
  2. Will provide the same warranty for substitution as for specified product.
  3. Will coordinate installation and make other changes which may be required for Work to be complete in all respects.
  4. Waives claims for additional costs which may subsequently become apparent.
- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.
- E. Engineer will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

#### PART 2 – PRODUCTS

2.01 CURED-IN-PLACE PIPE (CIPP) LINING

- A. The liner material shall be an epoxy vinyl ester or polyester fiber felt resin-impregnated tubing or Engineer approved equal, sized to tightly fit the internal circumference and length of the designated gravity sewer. The cured liner shall meet the minimum initial structural properties as listed in ASTM F-1216. The liner shall be designed in accordance with the Appendices in ASTM F-1216. It shall be assumed that a fully deteriorated gravity sewer pipeline having no structural strength will be rehabilitated with H-20 traffic loading, the water table's at the ground surface and the product installed will have a minimum expected lifetime of fifty (50) years. In no case shall the liner thickness be less than 0.236 inches (6 mm) for pipe sizes eight inches through twelve (12) inches in diameter. Minimum liner thickness for pipes greater than eight inches shall be as specified by the Engineer. Liner shall be sized by Contractor to provide a tight fit to the inside circumference of the host pipe and shall be a continuous joint – less lining from manhole to manhole.
- B. Unless otherwise specified, the Contractor shall use an epoxy vinyl ester or polyester resin and catalyst system and a fiber felt tube compatible with the inversion or other approved alternate installation process and having the following minimum physical properties for the cured pipe:

<u>PROPERTY</u>	<u>TEST METHOD</u>	<u>MINIMUM VALUE</u>
Tensile Strength	ASTM D 638	3,000 psi
Flexural Strength	Modified ASTM D 790	4,500 psi
Flexural Modulus of Elasticity	Modified ASTM D 790	250,000 psi
Minimum Long-Term (50 year)	Modulus of Elasticity (ASTM D 7790)	125,000 psi

- C. The epoxy vinyl ester or polyester resin and fiber felt tubing system shall be in accordance with the requirements of ASTM F-1216 and be fabricated to a size that, when installed, will neatly fit the interior of the host pipe. Allowance shall be made for circumferential stretching during a direct (non-inversion) pull in. The CIPP product shall fit tightly to the host sewer pipe (with minimal shrinkage) in such a way as to minimize water migration (tracking) between the liner and the host pipe. A vacuum impregnation process shall be used in conjunction with a roller system to achieve a uniform distribution of the resin throughout the tube under controlled conditions. The volume shall be adjusted by adding five to ten (10) percent excess resin for the change in resin volume due to polymerization and to allow for any migration of resin into cracks or joints in the host pipe.

- 1  
2 D. The outside of the fabric tube shall be marked every 5 feet with the name  
3 of the manufacturer or CIPP system, manufacturing lot and production  
4 footage.  
5

6 2.02 CHEMICAL JOINT, CRACK AND ANNULAR SPACE SEALING MATERIALS  
7 FOR ACTIVE LEAKS AND SERVICE LATERAL CONNECTIONS  
8

- 9 A. Chemical joint and crack sealing materials used on this Project shall have  
10 the following properties:  
11

- 12 1. React quickly to form a permanent watertight seal;  
13 2. Resultant seal shall be flexible and immune to the effects of wet/dry  
14 cycles;  
15 3. Non-biodegradable and immune to the effects of acids, alkalis, and  
16 organics in sewage;  
17 4. Component packaging and mixing compatible with field conditions  
18 and worker safety;  
19 5. Extraneous sealant left inside pipe shall be readily removable; and  
20 shall be compatible with the repair resin utilized.  
21

- 22 B. Chemical joint sealing material shall be acrylic resin type and shall be  
23 furnished with activators, initiators, inhibitors and any other materials  
24 recommended by the manufacturer for a complete grout system.  
25

- 26 C. Sealing grout shall be furnished in liquid form in standard manufacturer's  
27 containers. Sealing grout shall be as specified in the Pinellas County  
28 Material Specification Manual..  
29

30 PART 3 - EXECUTION  
31

32 3.01 PUBLIC NOTIFICATION  
33

- 34 A. All residences and businesses that may be affected by work performed in  
35 the installation of CIPP liners shall be notified by delivery of a notification.  
36 Notifications are to be delivered at least 72 hours before any work  
37 commences at a site.  
38

- 39 B. Notifications shall include the following: and explanation of the work to be  
40 performed; when the work is anticipated to commence; where the work is  
41 to be performed in reference to local streets; the name and office  
42 telephone numbers of Contractor representatives; the nature of the  
43 inconvenience(s) anticipated to be experienced by the resident/ business  
44 owner; the anticipated duration of the work; that the work is being  
45 performed on behalf of Pinellas County and a Pinellas County Pinellas  
46 County contact and telephone number as provided by the County.

- 1
- 2 C. Information included in the notifications regarding Contractor
- 3 representatives shall include both the name and twenty-four (24) hour
- 4 telephone number of the Contractor's supervisor at the work site(s) and
- 5 the name and business telephone number of a Contractor representative
- 6 who is responsible for the administration of the project from the location of
- 7 the offices of the Contractor.
- 8
- 9 D. The proposed format of all correspondence from the Contractor, to the
- 10 public, shall be reviewed, and approved, by the Engineer or a Designee.
- 11
- 12 E. Complete public notification is to be the exclusive responsibility of the
- 13 Contractor.
- 14
- 15 F. Cost associated with public notifications shall be included in the contract
- 16 price of CIPP installation.
- 17

18 3.02 WASTEWATER FLOW CONTROL

19

- 20 A. The Contractor shall bypass sewage around the section of pipe being
- 21 lined by plugging the upstream manhole and discharging to a downstream
- 22 manhole. Bypass shall be set up to cause minimum disruption to
- 23 residents, commercial establishments and traffic. Pumps shall be of
- 24 sufficient capacity to accommodate daily peak flows and wet weather
- 25 flows.
- 26
- 27 B. Where lines to be rehabilitated are determined by the Engineer to be of a
- 28 critical nature and cannot be bypassed during normal work hours, lining
- 29 may have to be scheduled at low flow during nighttime hours.
- 30
- 31 C. If wastewater flow is minimal and lining can be installed in a timely
- 32 manner, bypass may not be required.
- 33
- 34 D. The Contractor shall make every effort possible to notify each customer
- 35 whose service is affected by the lining operation.
- 36
- 37 E. The Contractor shall be responsible for any back-up or any damage
- 38 caused by the lining process.
- 39

40 3.03 PRE-CLEANING AND TELEVISION INSPECTION

41

- 42 A. The Contractor shall clean and televise the assigned gravity sewer to be
- 43 rehabilitated prior to construction in accordance with specification
- 44 33 01 32 - Sanitary Sewer Cleaning and Televising. Only National
- 45 Association of Sewer Companies (NASSCO) Pipeline Assessment and
- 46 Certification Program (PACP) certified personnel trained in locating

breaks, obstacles and service connections by closed circuit television using PACP certified software shall perform the inspection. The interior surface of the pipeline shall be cleaned with high pressure water jet equipment prior to receiving the new liner. All service locations and obstructions, such as dropped joints and protruding services, shall be noted on the inspection.

- B. Pre-Cleaning and television inspection to occur a minimum of five working days prior to installation of the liner, or as otherwise directed by engineer.
- C. The Contractor shall notify the Engineer if any severe problems are discovered during televising that would prohibit the installation of the liner. If conditions such as broken pipe or major blockages are found that will prevent proper cleaning, or where additional damage would occur if cleaning is attempted or continued, the Contractor shall advise the Engineer.
- D. The Contractor shall notify the Engineer if pipe joint offsets greater than 20% of the interior diameter of the pipe are present. No liners shall be installed through joint offset greater than 20% of the interior diameter of the pipe unless otherwise directed by Engineer.
- E. Any damage done by the Contractor to any existing sewer pipe or structure by the Contractor will be immediately repaired to a condition equal to or better than its original condition at the Contractor's expense.
- F. Cost associated with pre-televising and cleaning shall be included in the contract price of CIPP installation.

#### 3.04 PROTRUDING SERVICE CONNECTIONS

- A. Existing service connections that protrude into the main line shall be removed to within one-quarter inch of the inside wall of the main line pipe by means of robotic equipment. The protrusion shall be ground using grinding tools specifically designed for that purpose. The finished product shall be uniform and smooth to accept main line lining product and provide a proper seal.

#### 3.05 LINER INSERTION

- A. Installation of CIPP shall proceed only after all necessary preparation has been completed, including the following: all affected residences and businesses have been notified in accordance with these specifications; pre-installation cleaning and television inspection; implementation of adequate flow control; and the placement of traffic control measures in accordance with these specifications.

- 1  
2 B. The Contractor shall obtain all field measurements required to properly  
3 size the liner for installation. The proposed liner shall be sized to provide  
4 for a tight fit to the inside circumference of the host pipe and extend  
5 sufficiently from manhole to manhole. Liner shall be installed in strict  
6 accordance with methods and requirements of ASTM F-1216 and of the  
7 liner manufacturer. Liner shall be free of irregularities, pinholes, tears,  
8 cracks, excessive wrinkling and sealed so as to eliminate any possibility of  
9 infiltration at the manhole wall.
- 10  
11 C. The Contractor shall notify the Engineer in a timely fashion if the lining  
12 process is delayed and would continue to cause continued service  
13 interruption to customers affected by the lining operation. In this situation,  
14 the Contractor shall be responsible for taking steps necessary to  
15 reconnect services or provide a bypass operation, satisfactory to the  
16 Engineer, for the affected services at no additional cost to the County.
- 17  
18 D. Pressure requirements: Before the curing begins, the pressure required to  
19 hold the flexible tube tight against the existing conduit, and the maximum  
20 allowable pressure so as not to damage the tube, shall be specified by the  
21 tube manufacture and provided to the County for each line segment.
- 22  
23 E. Once the cure has started and dimpling for laterals is completed, the  
24 required pressure shall be maintained until the cure has been completed.  
25 Should the pressure deviate more than 2.3 ft. of water (1psi.) from the  
26 required pressure, the installed tube shall be removed from the existing  
27 conduit. A continuous log of pressure during cure shall be maintained and  
28 submitted to the County for each lined segment.
- 29  
30 F. Prior to installation and as recommended by the manufacturer remote  
31 temperature gauges or sensors shall be placed inside the host pipe to  
32 monitor the temperature during the cure cycle. Liner and/or host pipe  
33 interface temperature shall be monitored and logged during curing of the  
34 liner.
- 35  
36 G. Curing shall be accomplished by utilizing the appropriate medium (water  
37 or steam) in accordance with the manufacturer's recommended cure  
38 schedule. The curing source or in and output temperatures shall be  
39 monitored and logged during the cure cycles. The manufacturer's  
40 recommended cure schedule shall be used for each line segment  
41 installed.
- 42  
43 H. The Contractor shall cool the CIPP in accordance with the approved  
44 manufacturer's recommendations.
- 45  
46 I. Temperatures and curing data shall be monitored and recorded, by the  
47 Contractor, throughout the installation process to ensure that each phase

in achieved as approved in accordance with the CIPP System manufacturer's recommendations.

J. The installed CIPP shall be continuous over the entire length of sewer line section and be free from visual defects such as foreign inclusions, dry spots, pinholes, major wrinkles and de-lamination.

K. Contractor shall submit an inversion and cure record report for each liner. This record shall include location, from & to manhole numbers, direction of inversion, date, time, pressure and temperature throughout the entire inversion and curing process for each liner.

### 3.06 MANHOLE CONNECTIONS

A. A seal, consisting of a resin mixture or hydrophilic seal compatible with the installed CIPP shall be applied at manhole walls in accordance with the CIPP System manufacturer's recommendation.

B. Cost associated with manhole seals shall be included in the contract price of CIPP installation.

### 3.07 SERVICE RECONNECTIONS

A. Service reconnections shall be completed as soon as possible upon completion of the main line rehabilitation and with the approval of the Engineer.

B. Re-connection shall be accomplished without excavation using a robotic cutter. Cuts shall be neat and smooth with the service line opened to ninety-five (95) percent of the inside diameter in order to prevent blockages, and the bottom of both openings must match. The edges of the opening shall not have pipe fragments or liner fragments, which may obstruct flow or snag debris. All over-cut service connections will be properly repaired to meet the requirements of these specifications.

C. In the event that service reinstatements result in openings that are greater than 100 percent of the service connection opening, the Contractor shall install a CIPP type repair, sufficiently in size to completely cover the over-cut service connection. No additional compensation will be paid for the repair of over-cut service connections.

D. All cuttings and coupons of pipe material resulting from service tap cutting shall be recovered at the downstream manhole of the pipe rehabilitation operation prior to leaving the site and putting the main line back in service. Coupons may not be allowed to pass through the system.



- 1
- 2 E. The Contractor shall stop all visible service line leaks and seal each
- 3 service lateral connection to the new liner with a chemical sealant
- 4 compatible with liner material. The chemical sealant shall be injected by
- 5 the use of standard packer device and equipment to create a water tight
- 6 seal at each connection.
- 7
- 8 F. In the event reconnection within the pipe cannot be accomplished or
- 9 failure occurs during the reconnection process, the Contractor may be
- 10 permitted to excavate, at the Contractor's expense, and reconnect to the
- 11 existing main using an approved sewer saddle.
- 12
- 13 G. Due to the critical nature of service reconnection, the Contractor shall
- 14 keep backup robotic equipment on site to eliminate any delay to the
- 15 reactivation of service to customers. This specification shall also apply to
- 16 the Pay Item to grinding and sealing existing service openings on
- 17 previously lined pipe.
- 18

19 3.08 TRAFFIC CONTROL AND MAINTENANCE OF TRAFFIC

20

- 21 A. The Contractor shall implement a Maintenance of Traffic Plan in
- 22 accordance with specification 01 55 26- Traffic Regulation.
- 23

24 3.09 CIPP REPAIR/ REPLACEMENT

25

- 26 A. Occasionally installation will result in the need to repair or replace a
- 27 defective CIPP. The Contractor shall outline specific repair or
- 28 replacement procedures for potential defects that may occur in the
- 29 installed CIPP. Repair/replacement procedures shall be as recommended
- 30 by the CIPP system manufacturer and shall be submitted to the County.
- 31
- 32 B. Defects in the installed CIPP that will not affect the operation and long
- 33 term life of the product shall be identified and defined.
- 34
- 35 C. Repairable defects that may occur in the installed CIPP shall be
- 36 specifically defined by the Contractor based on manufacturer's
- 37 recommendations, including a detailed step-by-step repair procedure,
- 38 resulting in a finished product meeting the requirements of these contract
- 39 specifications.
- 40
- 41 D. Un-repairable defects that may occur to the CIPP shall be clearly defined
- 42 by the Contractor based on manufacturer's recommendations, including a
- 43 recommended procedure for the removal and replacement of the CIPP.
- 44

45 3.10 POST CLEANING AND TELEVISION INSPECTION/ FINAL ACCEPTANCE

46

- 1 A. Post cleaning and television inspection shall proceed only after all  
2 necessary work and preparation has been completed, including the  
3 following: installation on CIPP liner in accordance with specifications, all  
4 services re-instated including grout sealing in accordance with these  
5 specifications; pre-installation cleaning and television inspection;  
6 implementation of adequate flow control; and the placement of traffic  
7 control measures in accordance with these specifications.  
8
- 9 B. The Contractor shall clean and televise the assigned gravity sewer after  
10 rehabilitation in accordance with specification 33 01 32- Sanitary Sewer  
11 Cleaning and Televising. Only NASSCO PACP certified personnel trained  
12 in locating breaks, obstacles and service connections by closed circuit  
13 television using PACP certified software shall perform the inspection. The  
14 interior surface of the pipeline shall be cleaned with high pressure water  
15 jet equipment immediately prior to conducting the post television  
16 inspection. All service locations, gouges, cracks, bumps, bulges and  
17 obstructions, such as dropped joints, shall be noted on the inspection.  
18
- 19 C. In the case of bellies in the line, the pipe shall be cleared of any standing  
20 water to provide continuous visibility during the post inspection.  
21
- 22 D. The Contractor shall provide all inspections in digital PACP format  
23 including printed inspection logs.  
24
- 25 E. Cost associated with post-televising and cleaning shall be included in the  
26 contract price of CIPP installation.  
27
- 28 F. The finished liner shall be free of significant visual defects, damage,  
29 deflection, holes, leaks and other defects.  
30
- 31 G. Each individual location contained in a Work Order is to be considered an  
32 "individual project" such that all work, including all deliverables shall be  
33 reviewed and accepted prior to the County accepting and processing  
34 payment for that individual project. No partial payments will be made on  
35 individual projects.  
36

### 37 3.11 CLEANUP

38

- 39 A. Cleanup is an essential part of the Work. As the work progresses and is  
40 completed, the Contractor shall clean the various sites of all operations  
41 and completely restore all work areas to the satisfaction of the Engineer  
42 and the County. This cleanup shall be done as promptly as practicable  
43 and shall not be left until the end of the construction period. No part of the  
44 Work shall be considered complete and no payment will be made until  
45 cleanup is completed.  
46

1  
2

END OF SECTION

SECTION 33 01 32

SANITARY SEWER CLEANING AND TELEVISIONING

PART 1 – GENERAL

1.01 SCOPE

- A. The Contractor shall provide for routine maintenance cleaning and closed circuit television inspection (CCTV) of assigned pipes and inspection of manholes within the Pinellas County sanitary sewer collection system including removal and disposal of debris removed during the cleaning process, which is preventing the design flow of the pipe, prevent blockages and restore the sewer to near full capacity and self-scouring velocity. The contractor shall be aware that this specification requires work in active sewers.
- B. The Work includes furnishing all plant, labor, tools, equipment and materials including various forms of specialized pipe cleaning, and televising of sanitary sewage mains and related manholes, and all operations to support the primary maintenance cleaning and inspection activities are also to be provided.
- C. This specification section also applies to new installation, replacement and repair inspection for compliance documentation of construction specifications.

1.02 SAFETY CODE REQUIREMENTS

- A. The Contractor shall conduct his operations in strict accordance with all applicable Federal, State, and Local safety codes and statutes and shall be fully responsible and obligated to maintain procedures for safety of the public as well as work, personnel and equipment involved in the project.
- B. The Contractor shall at all times during the course of the cleaning and televising conform to Occupational Safety and Health Administration (OSHA) and all other applicable safety codes or standards. No additional compensation will be allowed for OSHA or other safety code standards or requirements.
- C. The Contractors shall conform to traffic control requirements of the State of Florida Department of Transportation at all sites within roadway right-of-ways.

1.03 SUBMITTALS

SANITARY SEWER CLEANING AND TELEVISIONING

1  
2 A. The Contractor shall submit the following information:  
3

- 4 1. Information on all types of processes that will be used for cleaning.  
5 2. Copies of PACP/ MACP certifications for personnel performing  
6 television and manhole inspections.  
7 3. Manufacturer's certification that the equipment to be used meets  
8 the referenced standards and these specifications.  
9 4. Proposed equipment and procedures for accomplishing the work.  
10 5. Proposed personnel assigned to the cleaning work.  
11

12 PART 2 – EQUIPMENT  
13

14 2.01 CLEANING EQUIPMENT  
15

- 16 A. All sanitary sewer pipes shall be cleaned with truck-mounted high velocity  
17 hydraulic cleaning (hydra-cleaning) equipment and equipped vacuum  
18 debris removal system. Sufficient high pressure hose length should be  
19 available on the vehicle described to perform cleaning on manhole runs up  
20 to 900 linear feet in length. High pressure hose should be at least 1 inch  
21 in diameter with the ability to deliver at least 80 gallons per minute at  
22 3,000 PSI. Water tanks on the vehicle should be at least 1,200 gallons in  
23 capacity. All controls for cleaning equipment shall be located so that the  
24 equipment can be operated above ground.  
25  
26 B. The nozzle and skids used for cleaning should be designed for use in a  
27 manner consistent with the diameter of the pipe being cleaned. Specialty  
28 heads and nozzles may be required for hardened debris, grease, and  
29 scale removal.  
30  
31 C. Cutting heads to remove intruding roots or projecting obstructions will also  
32 be required and shall be designed specifically for the diameter of the pipe  
33 in which they are used.  
34  
35 D. Vacuum debris removal system shall be used to remove sand, silt, grease,  
36 rocks, bricks, and all other debris from manholes during the cleaning  
37 process. It is essential that the debris be removed from the wastewater  
38 system and not allowed to move into adjacent pipes or manholes.  
39 Wastewater removed from the collection system during the vacuuming  
40 process can be decanted back into the system only after being allowed to  
41 settle sufficiently to prevent solid materials from also re-entering the  
42 system.  
43  
44 E. Contractor shall provide equipment capable of removing all sand, dirt,  
45 rocks and other debris from the sewer reach to allow unobstructed remote  
46 television internal inspection of all internal surfaces.

- 1  
2 F. Cleaning system shall utilize a device capable of dislodging sediments  
3 found in sewer lines without damaging the structural integrity of the pipe.  
4 Cleaning devices shall have sufficient power to force and move the debris  
5 commonly found in large diameter sewers to a manhole for extraction.  
6 Cleaning method may maintain normal sewer flows during the cleaning  
7 process.  
8  
9 G. Contractor shall certify that backup cleaning equipment, including  
10 machines, devices, tools, etc, is available and can be delivered to the site  
11 with in 24 hours.  
12  
13 H. Contractor shall provide all equipment required for specialty cleaning  
14 including removing roots and de-scaling sewer pipes.  
15

16 2.02 CLOSED CIRCUIT TELEVISION EQUIPMENT  
17

- 18 A. Video inspection shall be performed using National Association of Sewer  
19 Companies (NASSCO) Pipeline Assessment and Certification Program  
20 (PACP) certified software.  
21  
22 B. Closed Circuit Television Inspection Equipment shall produce a color  
23 video.  
24  
25 C. Pipe inspection camera shall be a pan-and-tilt and radial viewing pipe  
26 inspection camera that pans a minimum of  $\pm 275$  degrees and rotates 360  
27 degrees.  
28  
29 D. A slope indicator shall be included on the camera and accurately  
30 calibrated per manufacture's instructions for measurement of pipe slope.  
31  
32 E. A camera with an accurate footage counter shall be used, which displays  
33 on the monitor the exact distance of the camera from the centerline of the  
34 starting manhole.  
35  
36 F. The camera will be capable of height adjustment so that the camera lens  
37 is always centered at one-half the inside diameter, or higher, in the pipe  
38 being televised.  
39  
40 G. Lighting for the camera shall be suitable to allow a clean picture of the  
41 entire periphery of the pipe. A reflector in front of the camera may be  
42 required to enhance lighting in dark or large diameter pipe.  
43  
44 H. The camera, television monitor and other components of the video system  
45 shall be capable of producing a minimum 500-line resolution colored video  
46 picture.

- 1
- 2 I. Video data shall be provided to the County in a digital format such as a
- 3 external removable drive, or other device or media, as required by the
- 4 County to be uploaded to the CCTV inspection database.
- 5
- 6 J. Video data shall be PACP database compliant and compatible with the
- 7 County's existing Granite XP software database system.
- 8
- 9

10 PART 3 – EXECUTION

11

12 3.01 NEIGHBORHOOD NOTIFICATION

13

- 14 A. Not less than 48 hours prior to the commencement of work in a right-of-
- 15 way, the Contractor shall notify all residents and businesses affected by
- 16 the work with an approved printed door hanger notice indicating the
- 17 schedule date of work, the type of work, and Contractor's and
- 18 superintendent's name, address and telephone number. The notice shall
- 19 contain wording indicating any disruption of sanitary service or access to
- 20 property that may be required to perform the work. Disruption in sanitary
- 21 sewer service shall not exceed four hours. Access to private property
- 22 shall be maintained at all times.
- 23

24 3.02 DEWATERING

25

- 26 A. All gravity sanitary sewer pipes (lines) less than 48" in diameter shall be
- 27 dewatered for cleaning and inspection purposes. Lines 48" and larger
- 28 may be cleaned and inspected without dewatering only when the County
- 29 agrees that dewatering is not feasible. Each exception to the dewatering
- 30 requirement shall be considered on a case by case basis. Contractor will
- 31 assume that dewatering is required for bidding purposes.
- 32
- 33 B. Dewatering may be accomplished by pumping water around the work area
- 34 or by plugging off pipes to isolate the portion of the system being worked
- 35 on while cleaning and performing inspection. If plugging the line is used
- 36 for dewatering purposes, the system must be properly monitored so that
- 37 no overflows occur. If a pipe that has been rehabilitated by the installation
- 38 of a liner is plugged, the liner must be braced at the manhole to prevent
- 39 movement of the liner pipe.
- 40

41 3.03 CLEANING

42

- 43
- 44 A. The sewers shall be cleaned by removing dirt, rock, sand, roots and other
- 45 deleterious materials from the pipe and manholes. The cleaning

equipment shall remove grease or roots and restore ninety-five (95) percent of original pipe inside diameter.

B. All necessary precautions are to be taken to protect the sewer lines from damage resulting from the cleaning and inspection process. Reimbursement for damage to the sewer infrastructure or damage or flooding of private or public property, as a direct or indirect result of the cleaning and inspection operation shall be the responsibility of the Contractor.

C. Contractor shall be responsible for all permits required to perform assigned Work.

D. Contractor shall obtain permission from the property owner whenever access to manholes in easements and right-of-way is required for equipment.

E. Cleaning and inspection work required includes, but not limited to the following:

- a. Field locating all manholes along the sewer pipes to be cleaned.
- b. Maintaining and protecting both vehicular and pedestrian traffic, and meeting all requirements of the County and all other government agencies having jurisdiction.
- c. Cleaning and inspecting existing sanitary sewer pipes and manholes, as herein specified, and to record the inspection information in the format identified by the County.
- d. Disposal of waste, sediment and debris as specified herein.
- e. Removal of roots, scale, and protrusions as specified herein.
- f. Cleaning and restoring the work area as the work progresses and after the completion of all work activities.
- g. All other work required for the complete and satisfactory cleaning and inspection of the pipeline and adjacent manholes.

### 3.04 CLEANING PROCEDURE

A. After determining and performing all preliminary requirements, Contractor shall thoroughly clean assigned pipelines sufficiently to permit an unrestricted inspection by closed circuit television. The Contractor shall remove accumulated grease, roots, sand, rock, bricks, sludge and all other debris that obstructs video inspection such that all portions of the pipe being inspected will be clearly visible.



- 1 B. Contractor shall remove all brick, rocks, debris, sludge, dirt, sand, grease,  
2 roots and other materials from the sewers shown in the work order, and  
3 collect and remove the resulting debris from the manholes of the sewer  
4 section being cleaned. Equipment shall decant or separate the water from  
5 the solids before it is transported to the designated disposal site. Liquid  
6 decanted from the solids shall be returned to the sewer. Debris remaining  
7 in the sewer after cleaning shall not exceed 5% of the pipe diameter.  
8 Passing waste material between manholes, causing line stoppages,  
9 accumulations of sand, or damage to the pumping equipment, shall not be  
10 permitted.  
11  
12  
13 C. Contractor shall complete a NASSCO Manhole Assessment and  
14 Certification Program (MACP) manhole inspection form for both upstream  
15 and downstream terminal manholes during cleaning and inspection  
16 operation.  
17  
18  
19 D. Normal cleaning consists of removing all debris and requires a minimum  
20 of two passes. The first pass shall be restricted to 800 psi at the nozzle  
21 head. The second and subsequent passes shall be at 1200 psi.  
22  
23  
24 E. Specialty cleaning consists of removing all heavy grease, roots and  
25 tuberculation by use of special equipment such as a high pressure de-  
26 scaling head, root cutter, or other mechanical means approved by the  
27 County.  
28  
29  
30 F. Contractor is responsible for damage to the sewer as a direct result of the  
31 cleaning method.  
32  
33  
34 G. Contractor shall use all cleaning equipment in accordance with  
35 manufacturer's recommendations to prevent damage to sewer lines.  
36  
37  
38 H. Contractor shall immediately notify the County if fresh soil, pieces of pipe,  
39 or other visible signs of potential problems occur during cleaning  
40 operations.  
41  
42  
43 I. Contractor shall ensure that water pressure created does not cause  
44 damage due to flooding of property being served by sewer section(s)  
45 involved.  
46

1  
2 J. Contractor shall conform to the following requirements:  
3  
4

5 a. Cleaning of upstream reached of sewers shall be completed before the  
6 downstream reached are cleaned.  
7

8 b. Hydraulic cleaning equipment shall be inserted in the downstream  
9 manhole of the reach and the work shall proceed upstream unless  
10 otherwise approved by the County.  
11

12 K. Any blockages of lateral building connections resulting from the cleaning  
13 or other items of work shall be removed by cleaning of the building  
14 connection by Contractor, at its own expense. Any damage caused by  
15 flooding of lateral building connections shall be corrected by Contractor, at  
16 its own expense.  
17  
18  
19

20 3.05 WASTE DISPOSAL  
21

22 A. Waste materials and debris resulting from sanitary sewer cleaning  
23 operations shall be removed and conveyed by the Contractor to an  
24 approved waste site. The disposal site shall be accessible during the  
25 Contractor's working hours. All permits required shall be the responsibility  
26 of the Contractor. Waste material and debris resulting from the cleaning  
27 operation shall be drained in the collection system and disposed of at  
28 Pinellas County Solid Waste Operations, located at 3095 114th Avenue  
29 North. The material deposited at Solid Waste Operations, shall not exhibit  
30 any liquid when deposited at the location as specified by Pinellas County  
31 Solid Waste Operations. Disposal manifest records shall be supplied to  
32 Pinellas County Utilities. Under no circumstances shall sewage or solids  
33 removed from sewer lines be dumped onto the streets or into ditches,  
34 catch basins or storm drains. It shall not be necessary to stop the  
35 cleaning operation while the debris is transported to the disposal site.  
36

37 3.06 CLOSE CURICUIT TELEVISION INSPECTION PROCEDURE  
38

39 A. The Contractor shall provide Pinellas County with digital media that  
40 includes video and data base file that is compatible with Granite XP in  
41 NASSCO PACP format. Compatibility issues with software other than  
42 Granite XP latest version are the Contractor's responsibility.  
43

44 B. CCTV inspection shall be performed by NASSCO PACP certified  
45 operators who use NASSCO certified software that is compatible with  
46 Granite XP latest version using PACP defect coding methodology.

- 1
- 2 C. Perform CCTV inspection immediately after line cleaning. Before insertion
- 3 of the camera into the sewer, the camera shall record on video the
- 4 upstream and downstream manhole, pipe size, specific location of the
- 5 sewer, and the direction in which the camera will travel. The camera shall
- 6 be moved through the line in either direction at a moderate rate, stopping
- 7 when necessary to permit proper documentation of the sewer's condition
- 8 in audio and documented on the television inspection log.
- 9
- 10 D. The camera height shall be adjustment so that the camera lens is always
- 11 centered at one-half the inside diameter, or higher, in the pipe being
- 12 televised.
- 13
- 14 E. The camera shall not travel at a speed greater than thirty (30) feet per
- 15 minute. To better understand the flow from each individual lateral the
- 16 camera shall be positioned at each lateral for a sufficient duration to
- 17 determine the nature of flow and condition of the lateral (minimum of 30-
- 18 seconds).
- 19
- 20 F. Videos shall pan beginning and ending manholes to demonstrate that all
- 21 debris has been removed. A manhole inspection shall be performed for all
- 22 manholes.
- 23
- 24 G. Manual winches, power winches, TV cable powered rewinds, or self-
- 25 propelled cameras may be used to move the camera through the sewer
- 26 line.
- 27
- 28 H. When manually operated winches are used to pull the television camera
- 29 through the line, telephones or other suitable means of communication
- 30 should be set up between the two manholes of the section being
- 31 inspected to insure good communication between members of the crew.
- 32
- 33 I. If during CCTV inspection of a pipeline, the television camera is unable to
- 34 pass through the entire manhole section, the Contractor shall set up his
- 35 equipment so that the inspection can be performed from the opposite
- 36 direction (reverse setup) in order to obtain a complete video of the line. If,
- 37 again, the camera fails to pass through the manhole section, the
- 38 inspection of the entire manhole section will be considered complete for
- 39 purposes of payment. Whenever such a condition arises, notify the
- 40 County to determine if an obstruction removal or point repair is necessary.
- 41
- 42 J. In the event that the TV camera encounters broken pipe and there is a
- 43 possibility that continuation of the inspection could cause the TV Camera
- 44 to become stuck or result in additional pipe damage or collapse, the
- 45 Engineer may elect to discontinue the inspection.
- 46

- 1 K. Distance Measurements: The accuracy of the measurements for location  
2 of defects, service connections, changes in pipe materials, and all other  
3 PACP recognized conditions is paramount, particularly when it may  
4 require later corrective action or a dig-up. The accuracy of the footage  
5 meter shall be checked by taking a reading at the entrance to the away  
6 manhole and comparing with a surface measurement made with a steel  
7 tape or walking meter (Roll-A-Tape). These measurements shall be  
8 performed by the Contractor in the presents of the Pinellas County  
9 inspector. Measurement meters shall be accurate to one-tenth of a foot  
10 over the entire length of the sewer line section being inspected.  
11 Otherwise, the Contractor shall take corrective action.  
12
- 13 L. The video inspection shall be clear and visible with adequate lighting to  
14 enable the viewer to discern even small defects in the pipe being  
15 inspected. Camera distortions, inadequate lighting, dirty lens, or  
16 blurred/hazy picture will be cause for rejection of a video and rejection of  
17 the associated line segment. Any pipeline reach television inspection  
18 video that does not meet this requirement or fails to meet PACP  
19 specifications shall be cause for Contractor to re-inspect the pipe at no  
20 additional cost to the County. Payment for television inspection and sewer  
21 rehabilitation will not be made until the County approves the quality of the  
22 video and logs.  
23
- 24 M. CCTV inspection video shall be continuous for pipe segments between  
25 manholes. Do not leave gaps in the video of a segment between  
26 manholes and do not show a single segment on more than one video,  
27 unless specifically allowed by the County.  
28
- 29 N. Documentation of television inspection by the Contractor shall be  
30 performed in accordance with the Specifications. TV reports can be  
31 assembled elsewhere, but documentation must be done in the field. A  
32 video inspection report shall be prepared by the Contractor for every  
33 segment and manhole that is CCTV-inspected. The Contractor shall  
34 provide written records that show the location in relation to an identified  
35 manhole of each infiltration point observed during inspection. In addition,  
36 other points of significance such as locations of building sewers, unusual  
37 conditions, roots, sewer connections, broken pipe, presence of scale and  
38 corrosion, and other discernible features shall be recorded on the PACP  
39 television inspection report. The video, PACP television inspection report  
40 and the NASSCO Manhole Inspection Form version 4.3 or higher, with all  
41 applicable fields accurately completed per PACP format, shall be supplied  
42 to the County with each Pay Request.  
43

44 3.07 REMOVAL OF DEBRIS  
45

- 1 A. Materials generated by the cleaning operation shall be removed by  
2 vacuuming at the upstream or downstream manhole of the section being  
3 cleaned. Suitable traps or weirs shall be used to prevent the movement of  
4 solids to adjacent sections of pipe.  
5

6 3.08 WATER  
7

- 8 A. The use of potable water from the municipal, private, or reclaimed water  
9 systems for filling the water tanks on cleaning vehicles shall be permitted  
10 however, Contractor shall be required to acquire and use a meter  
11 approved by the County to monitor the use of this water and will be  
12 charged for water use in accordance with the current rate as described in  
13 PCU Policy Manual and the schedule of rates and fees. Contractor shall  
14 be responsible for obtaining and hooking up the potable water meter at his  
15 own expense. A reduce pressure type backflow preventer approved by  
16 the County shall be used to prevent contamination of the potable water  
17 system. Contractor is responsible for any damage resulting from improper  
18 operation of hydrants. Contractor shall not use or obstruct a fire hydrant  
19 when there is a fire in the area.  
20  
21 B. Contractor shall not waste water from the public water supply because of  
22 improper connections or from hydrants left open.  
23  
24

25 3.09 FINAL ACCEPTANCE OF SEWER LINE CLEANING  
26

- 27 A. Acceptance of sewer line cleaning work is contingent upon the completion  
28 of the CCTV inspection and successful review of the television inspection  
29 video by the County. If the inspection shows the cleaning to be  
30 unsatisfactory, Contractor shall be required to re-clean and re-inspect the  
31 sewer line until the cleaning is shown to be satisfactory. Such re-cleaning  
32 and re-inspection shall be made at Contractor's expense.  
33

34 3.10 TRAFFIC CONTROL AND MAINTENANCE OF TRAFFIC  
35

- 36 A. Refer to Section 01 55 26, Traffic Regulation  
37  
38 B. If required, the Contractor shall employ a uniformed off-duty police officer  
39 to maintain and regulate traffic through the work area.  
40  
41  
42  
43

END OF SECTION

SECTION 33 01 33

MANHOLE REHABILITATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The intent of manhole repair is to provide a structurally sound and watertight manhole in place of an existing deteriorated manhole.
- B. Several types of manhole repair may be ordered: rebuilding, lining and replacement. The Engineer may change the type of repair for a particular manhole after visually inspecting the manhole.
- C. Costs for traffic control shall be included in the work item in right-of-ways with a County Functional Classification of Collector or less and locations not requiring more than Standard Index 612.
- D. Minor infiltration shall be considered as a part of manhole work effort. Very active infiltration as determined by the Engineer shall be paid in a separate Pay Item, if it is specifically included as a pay item in the Contract.

1.02 SUBMITTALS

- A: All materials and procedures required to establish compliance with the Specifications shall be submitted to the County/Engineer for review/approval.
- B. Submittals shall include at least the following:
  - 1. Descriptive literature, bulletins and/or catalogs of materials.
  - 2. Work procedures including flow diversion plan, method of repair, etc.
  - 3. Materials and method for repair of leaks or cracks in concrete structure.
  - 4. Final installation report on completed structures.

1.03 WARRANTY

- A. Manufacturer shall warrant all products against failure for a period of ten (10) years, performing repairs to the damage and restore the coating at no cost to the County within sixty (60) days after written notification of the failure. For

warranty requirements for other lining material refer to specific liner system specification sections.

#### 1.04 SUBSTITUTIONS

- A. Only after execution of the contract will Engineer consider requests from Contractor for substitutions. Substitutions will be considered only when a product becomes unavailable due to no fault of Contractor.
- B. Items identified as "equal" shall be accompanied by product literature and a written itemized comparison of the published specifications (feature by feature from the manufacturer's literature) for the item specified and for the item proposed. The burden of proof of "equality" shall be on the supplier.
- C. Request constitutes a representation that Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
  - 2. Will provide the same warranty for substitution as for specified product.
  - 3. Will coordinate installation and make other changes which may be required for Work to be complete in all respects.
  - 4. Waives claims for additional costs which may subsequently become apparent.
- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.
- E. Engineer will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

#### PART 2 – PRODUCTS

##### 2.01 PATCHING MATERIAL FOR MANHOLES

- A. Manhole patching material shall be as specified in the Materials Specification Manual.
- B. Active leaks shall be stopped using a rapid setting cementitious grout. Some leaks may require weep holes to localize the infiltration during the application after which the weep holes shall be plugged with rapid setting mix prior to the final liner application. When severe infiltration is present, drilling may be required in order to pressure grout.

1  
2 2.02 PRESSURE GROUTING

- 3  
4 A. Severe infiltration shall be repaired by pressure grouting using material  
5 specified in the Material Specification Manual. equal.  
6

7 2.03 CALCIUM ALUMINATE MANHOLE LINER  
8

9 The coating to be applied shall be pure fused calcium aluminate mortar with pure  
10 fused calcium aluminate as specified in Materials Specification Manual.  
11

12 2.04 FIBERGLASS MANHOLE LINER  
13

- 14 A. Fiberglass Liners shall be specifically manufactured for sewer use as  
15 specified in Material Specification Manual.. These products shall meet all  
16 requirements of latest ASTM designation C-582 (plastic laminates) and  
17 ASTM designation C-581 (chemical resistance). The properly installed  
18 liners shall not fail under H-20 dynamic wheel load applied vertically.  
19 Liner shall be installed in accordance with manufacturer's requirements.  
20

21 2.05 MULTI-COMPONENT STRESS PANEL MANHOLE LINER SYSTEM  
22

- 23 A. Multi-component stress panel liner system shall be as specified in  
24 Material Specification Manual.  
25

26 2.06 URETHANE/ EPOXY, POLYUREA MANHOLE LINER SYSTEM  
27

- 28 A. Urethane/epoxy, polyurea liner system shall be as specified in Material  
29 Specifications Manual.  
30

31 2.07 POLYURETHANE MANHOLE LINER SYSTEM  
32

33 Polyurethane liner system shall be as specified in Material Specification Manual  
34

35 2.08 POLYMORPHIC RESIN MANHOLE LINER SYSTEM

- 36 A. Polymorphic Resin liner system shall be as specified in Materials  
37 Specifications Manual.  
38

39 PART 3 – EXECUTION

40 f

41 3.01 FIELD LAYOUT  
42

- 43 A. The County supplied Atlas sheet, street address and other pertinent  
44 information will identify the general location of the manhole. If there is any  
45 question as to the general location described by the County, the Contractor



1 shall approach the Engineer and address the questions before beginning  
2 with the excavation.

### 3 4 3.02 MANHOLE ADJUSTMENT

5  
6 A. Manhole ring and covers found to be above or below grade shall be adjusted  
7 by adding or removing rows of brick and mortar to meet the following  
8 specifications:

- 9  
10 1. The top of the cone shall be set between two and one-half inches and  
11 fourteen and one-half (14 1/2) inches below the bottom of the  
12 manhole cover frame. It is the intent of the specifications to provide a  
13 minimum of two and one-half inches to accommodate future grade  
14 changes without disturbing the manhole.  
15  
16 2. Where the distance between the bottom of the manhole cover frame  
17 and the top of the cone is greater than fourteen and one-half (14 1/2)  
18 inches, 12-inch riser units shall be used to bring the top of the cone to  
19 within the limits specified.  
20

### 21 3.03 MANHOLE REBUILDING

22  
23 A. Manholes that have cracked rings, leaky risers or covers below grade may  
24 be designated to be rebuilt. The rebuilding shall include all labor,  
25 equipment, materials, including excavation and dewatering to accomplish  
26 the following:

- 27  
28 1. Removing existing manhole down to required elevation and rebuild  
29 using brick or precast sections as directed by the Engineer.  
30  
31 2. The Contractor shall then install a new manhole ring and cover as  
32 directed by the Engineer.  
33  
34 3. The contractor shall install new stainless steel manhole insert to  
35 prevent surface water inflow into the collection system through the  
36 manhole lid, as directed by the engineer.  
37

### 38 3.04 MANHOLE LINING

39  
40 A. Manholes may be designated to receive a new fiberglass liner and reducer  
41 cone. This lining will only be specified for forty-eight (48) inches in diameter  
42 or larger manholes. Installation of fiberglass liners and reducer cones shall  
43 include:  
44

1. Excavation of an area sufficiently wide and deep for removal of the old castings, mortar and brick riser and the existing manhole top section.
2. The bottom of the manhole liner shall be cut to fit the existing manhole base as closely as possible. Cutouts in manhole liner shall be made to accommodate existing inlets, drops, and clean-outs. Cuts should be precisely made with a power saw fitted with masonry-type blade or with a special jigsaw. Fresh cut fiberglass shall receive two coats of polyester resin to resist wicking.
3. The manhole liner shall be lowered into the existing brick or concrete manhole and set into a quick-setting grout mixture. Good bottom seal shall be obtained in order to prevent loss of grout from the annular space between the outside of the manhole liner and the interior of the old manhole. A six inch height of a quick-setting grout shall be placed above the initial bottom seal in the annular space between the manhole liner and the existing brick or concrete manhole to insure adequacy of the bottom seal. The gap from drops, clean-outs materials, and existing piping between the existing manhole wall and the new manhole liner wall shall be bridged with short lengths of PVC or other corrosion-resistant pipe approved by the County. Quick-setting mortar shall be used to seal around all pipes.
4. The annular space between the manhole liner and existing brick or concrete manhole shall be filled with a Portland cement and sand grout. The grout shall be made with six bags of cement per cubic yard of grout.
5. As directed by the Engineer, the new ring and cover shall be replaced and finished to grade by constructing a chimney on the flat shoulder of the manhole liner using brick and mortar or precast concrete rings. In no case, shall the cast iron ring be placed directly on the manhole liner. All new rings and covers will be furnished by the Contractor.

### 3.05 MANHOLE PATCHING AND LINING

- A. This Section shall govern all work, materials and equipment required for manhole rehabilitation for the purpose of eliminating infiltration, providing corrosion protection, repair of voids and restoration of structural integrity of the manhole, as a result of spray applying a monolithic fiber-reinforced cementitious liner to the wall and bench surfaces of brick, concrete or any other construction material.
- B. The Applicator must be approved, trained and certified as having successfully completed factory training. The Applicator/Contractor shall

furnish all labor, equipment and materials for applying the coating directly to the contour of the manhole to form a structural cementitious liner of a minimum of one-half inch thickness using a machine specially designed for the application. All aspects of the installation shall be in accordance with manufacturer's recommendations and shall include the elimination of active infiltration prior to applying lining, the repair and sealing of inverts and benches, the removal of any loose or unsound material and patching.

- C. The manhole shall be prepared for coating by placing boards over inverts to prevent extraneous material from entering the sewer lines and to prevent up stream line from flooding the manhole. All foreign material shall be removed from the manhole wall and bench using a high pressure water spray (minimum 1,200 psi). Loose and protruding brick, mortar and concrete shall be removed using a mason's hammer and chisel or scraper.
- D. Active leaks shall be stopped using a rapid setting cementitious grout according to the manufacturer's recommendations. Some leaks may require weep holes to localize the infiltration during the application after which the weep holes shall be plugged with rapid setting mix prior to the final liner application. When severe infiltration is present, drilling may be required in order to pressure grout. Manufacturer's recommendations shall be followed when pressure grouting is required.
- E. Any bench, invert or service line repairs shall be made at this time using a quick-setting mix and following the manufacturer's recommendations.
- F. The surface, prior to spraying on the lining system, shall be damp without noticeable free water droplets, or running water. Materials shall be sprayed, applied to a minimum uniform thickness to insure that all cracks, crevices and voids are filled and a somewhat smooth surface remains after light troweling. The light troweling is performed to compact the material into voids and to set the bond.
- G. Not before the first application has begun to take an initial set (disappearance of surface sheen which could be fifteen (15) minutes to one hour depending upon ambient conditions) the second application should be made to assure a minimum total finished thickness of one-half inch. The surface shall then be troweled to a smooth finish being careful not to over trowel, so as to bring additional water to the surface to weaken it. A brush finish may be applied to the finished coat to remove trowel marks. Manufacturer's recommendation shall be followed whenever more than twenty-four (24) hours have elapsed between applications.
- H. The wooden bench covers shall be removed and when the bench is sprayed such that a gradual slope is produced from the walls to the invert

1 with the thickness at the edge of the invert being no less than one-half  
2 inch. The wall-bench intersection shall be rounded to a uniform radius,  
3 the circumference of the intersection.  
4

- 5 I. For calcium aluminate mortar systems, curing should be implemented as  
6 soon as the surface begins to harden and dry (as early as one hour after  
7 application). Several layers of ASTM C-309 liquid membrane curing  
8 compound or a 100%-humid moisture cure may be used.  
9

### 10 3.06 TESTS

#### 11 A. Procedure

- 12  
13  
14 1. Compressive strength tests shall be made by breaking 2-inch cube test  
15 specimens prepared, cured and broken in accordance with the  
16 American Society for Testing Materials Standard Method C-109, latest  
17 version. Four specimen test cubes shall be taken from every fifty (50)  
18 bags of product used or eight (8) manholes. One cube shall be broken  
19 at seven days, the remainder at twenty-eight (28) days. Additional test  
20 cubes may be ordered for changes in equipment or method, and under  
21 adverse weather, or curing conditions.  
22

#### 23 B. Responsibility for Tests and Reports

- 24  
25 1. The Contractor shall supply all cube molds, tools and labor for  
26 preparing specimens.  
27  
28 2. The test cubes shall be tested in a recognized commercial testing  
29 laboratory.  
30

### 31 3.07 FINAL ACCEPTANCE

- 32  
33 A. All completed manhole work will be inspected by the County. Any leaks or  
34 cracks or defective workmanship shall be repaired to the satisfaction of  
35 the Engineer at no cost to the County. Final acceptance will be granted  
36 after surface restoration, if required, is complete.  
37

38  
END OF SECTION

SECTION 33 01 34

SANITARY SEWER PIPE REPAIRS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor and materials to repair sanitary sewer pipelines as specified herein.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

- A. The Contractor shall excavate and expose suspected damaged pipeline at general locations described by the County. The pipeline shall be exposed for visual inspection four feet on each side of the damaged area or as directed by the County. The County may authorize replacing bad joint materials (vitrified clay or concrete pipe) or removing and replacing the pipe.
- B. Crushed stone shall be used in pipe bedding and to help stabilize trench bottoms. Special attention shall be given to compacting the bedding underneath the pipeline and its haunches.
- C. Backfilling of repaired pipe shall proceed only in the presence of the Inspector.

3.02 VITRIFIED CLAY PIPE REPAIRS

- A. Repairs to VCP including cracked or crushed pipe, cracked bells, offset joints, holes, etc. shall be accomplished by replacing a section of damaged pipe with a piece of new C-900 PVC pipe. Such replacement shall be performed in accordance with the clay pipe manufacturer's recommendations. PVC repair sleeves shall be supplied by Contractor.

3.03 IRON PIPE REPAIRS

- A. Repairs to iron pipe shall be accomplished using one of two methods
1. One method will consist of the application of an appropriate repair sleeve. Refer to Material Specification Manual.

1                   2.     The second method will be used when the damaged area of pipe is  
2                             larger than recommended for the repair sleeves. This method  
3                             consists of cutting out the damaged section of pipe and replacing it  
4                             with a section of new ductile iron pipe.  
5

6           B.     The connections of new and old pipe shall be accomplished with two new  
7                     ductile iron solid sleeves. All iron pipe repair work shall be performed in  
8                     accordance with the manufacturer's recommendations. All repairs, including  
9                     sleeves, shall be wrapped in polyethylene encasement.  
10

#### 11 3.04 REINFORCED CONCRETE PIPE REPAIR 12

13           A.     Reinforced concrete pipe repair shall be accomplished by the use of a  
14                     reinforced concrete collar. Reinforcing shall be circumferential with a  
15                     minimum cross-section area as specified in ASTM Des: C76 for Class V,  
16                     R.C.P. of the same diameter as the damaged pipe. For damaged areas  
17                     less than two feet in diameter, the collar may be the sole element of repair.  
18                     A cutout of corrugated metal pipe shall be placed over the damaged area  
19                     only to aid in the formation of the collar. The collar shall extend three  
20                     hundred sixty (360) degrees around the pipe and two feet past the damaged  
21                     area and corrugated metal in the longitudinal axis.  
22

23           B.     For larger repairs, the collar shall be used as a closure. The damaged pipe  
24                     length shall be removed and become the property of the Contractor. The  
25                     replacement length may be jointed with the existing pipe on one end only.  
26                     The existing portion of the joint shall be thoroughly cleaned and the rubber  
27                     gasket replaced. After fully seating the joint, the other end shall receive a  
28                     concrete collar closure extending two feet past the joint in the longitudinal  
29                     direction. If the new and existing joints are not identical, the closure shall be  
30                     used at both ends.  
31

#### 32 3.05 POLYVINYL CHLORIDE PIPE REPAIR 33

34           A.     For non-pressure applications, existing and new pipe shall be jointed with  
35                     flexible couplings with stainless steel straps as approved in the County's  
36                     Material Specification Manual. Only the flexible coupling recommended by  
37                     the manufacturer for the particular pipes to be jointed shall be used.  
38

39           B.     For pressure pipe applications, repairs shall be made by one of the two  
40                     methods as specified for iron pipe, except replacement pipe shall be PVC  
41                     pressure pipe.  
42

#### 43 3.06 FINAL ACCEPTANCE 44

45           A.     In the case of pressure pipe applications, after the pipe repair is complete  
46                     and still exposed, the pipeline will be placed in service. Visual inspection, by

1 the Engineer, of the repair while the pipeline is pressurized will provide  
2 tentative acceptance of the repair, provided no leaks are present. Repair of  
3 leaks or unsatisfactory work shall be performed at no cost to the County.  
4 Final acceptance will be granted after proper backfilling and surface  
5 restoration is accomplished.  
6

7 B. In the case of non-pressure service, the Contractor shall backfill and have  
8 the line inspected by a County Inspector. The line shall be inspected by one  
9 of two methods: (1) inspection by mirrors and sunlight and/or (2) television  
10 inspection as directed by the Engineer.  
11

12 1. Upon submission of CD/DVD the County will review and verbally  
13 respond within one working day. If the repair is not satisfactory to the  
14 Engineer, the Contractor will, at no cost to the County, re-excavate,  
15 make repairs, television inspect and backfill.  
16

17 2. When the repair is satisfactory to the Engineer, the Contractor will be  
18 directed to complete surface restoration. Upon satisfactory  
19 completion of surface restoration, final acceptance will be granted.  
20

### 21 3.07 PUMPING AND BYPASSING

22

23 A. When pumping and bypassing is required or ordered by the Engineer, the  
24 Contractor shall supply the pumps, conduits, and other equipment to divert  
25 the flow of sewage around the pipeline on which work is to be performed.  
26 The bypass system shall be of sufficient capacity to handle existing peak  
27 flow plus additional flow that may occur during a rainstorm. The Contractor  
28 will be responsible for furnishing the necessary labor and supervision to set  
29 up and operate the pumping and bypassing system.  
30

31 B. When flow in a sewer line is plugged, blocked, or bypassed, sufficient  
32 precautions must be taken to protect the sewer lines from damage that  
33 might result from sewer surcharging. Further, precautions must be taken to  
34 insure that sewer flow control operations do not cause flooding or damage to  
35 public or private property being served by the sewers involved. Under no  
36 circumstances shall sewage be discharged into/onto any place other than  
37 another sewer manhole or a piece of equipment designed to carry sewage.  
38 Any damage caused from the Contractor's neglect of these precautions is  
39 solely the responsibility of the Contractor.  
40

41  
42 END OF SECTION

SECTION 33 01 35

MULTI-COMPONENT STRESS PANEL MANHOLE LINER SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Work described within details a complete program for application of multi-component liner system coating to manholes, wet wells, junction chamber, or other concrete structures. The completed system will provide a corrosion resistant liner to prevent deterioration from hydrogen sulfide and other corrosive gases/acids within the wastewater stream.

1.02 SUBMITTALS

- A: All materials and procedures required to establish compliance with the Specifications shall be submitted to the County/Engineer for review/approval.
- B. Submittals shall include at least the following:
1. Descriptive literature, bulletins and/or catalogs of materials.
  2. Work procedures including flow diversion plan, method of repair, etc.
  3. Materials and method for repair of leaks or cracks in concrete structure.
  4. Final installation report on completed structures.

1.03 WARRANTY

- A. Manufacturer shall warrant all coatings against failure for a period of ten (10) years, performing repairs to the damage and restore the coating at no cost to the County within sixty (60) days after written notification of the failure.

1.04 QUALITY ASSURANCE

- A. The manufacturer and/or installer of the total liner system of concrete structures shall be a company that specializes in the design, manufacture or installation of corrosion protection systems for concrete structures including manholes, wet wells, junction chambers, etc. Installer shall be completely trained in leak repair, surface preparation and corrosion material application on concrete structures. Corrosion materials/products shall be suitable for



1 installation in a severe hydrogen sulfide environment without any deterioration  
2 to the liner and shall completely prevent the breakdown of concrete surfaces.

3  
4 B. To ensure total unit responsibility, all materials and installation thereof shall  
5 be furnished and coordinated with/by one supplier/installer who turnkeys the  
6 Work and assumes full responsibility for entire operation.

7  
8 C. Multi-Component Stress Panel Liner System shall be as specified in  
9 Materials Specification Manual.

10  
11 1.05 SUBSTITUTIONS

12  
13 A. Only after execution of the contract will Engineer consider requests from  
14 Contractor for substitutions. Substitutions will be considered only when a  
15 product becomes unavailable due to no fault of Contractor.

16  
17 B. Items identified as "equal" shall be accompanied by product literature and  
18 a written itemized comparison of the published specifications (feature by  
19 feature from the manufacturer's literature) for the item specified and for  
20 the item proposed. The burden of proof of "equality" shall be on the  
21 supplier.

22  
23 C. Request constitutes a representation that Contractor:  
24 1. Has investigated proposed product and determined that it meets or  
25 exceeds, in all respects, specified product.  
26 2. Will provide the same warranty for substitution as for specified  
27 product.  
28 3. Will coordinate installation and make other changes which may be  
29 required for Work to be complete in all respects.  
30 4. Waives claims for additional costs which may subsequently  
31 become apparent.

32  
33 D. Substitutions will not be considered when they are indicated or implied on  
34 shop drawing or product data submittals without separate written request,  
35 or when acceptance will require substantial revision of Contract  
36 Documents.

37  
38 E. Engineer will determine acceptability of proposed substitution, and will  
39 notify Contractor of acceptance or rejection in writing within a reasonable  
40 time.

41  
42 PART II – PRODUCTS

43  
44 2.01 MATERIALS AND EQUIPMENT

- 1 A. The materials to be utilized in the lining of concrete structures shall be  
2 designed and manufactured to withstand the severe effects of hydrogen  
3 sulfide in a wastewater environment. Manufacturer of corrosion protection  
4 products shall have long proven experience in the production of the coating  
5 products utilized and shall have satisfactory installation record.  
6
- 7 B. Abrasive blasting equipment shall be suited to completely remove  
8 deteriorated concrete and hard contaminants from the existing concrete  
9 surfaces. Containment unit to capture spent abrasive material shall be  
10 provided unless otherwise approved by the County/Engineer.  
11
- 12 C. Equipment for installation of lining materials shall be high quality grade and be  
13 as recommended by the manufacturer.  
14
- 15 D. The lining system to be utilized for new concrete structures shall be a multi-  
16 component stress panel liner system as described below.  
17
- 18 1. Liner (Installation -- Liner)  
19
- 20 a. Moisture displacement barrier -- Primer  
21 b. Moisture barrier -- Modified Polymer  
22 c. Surfacer -- Polyurethane/polymeric blend foam  
23 d. Final corrosion barrier -- Modified Polymer  
24
- 25 2. Primer shall be one hundred (100) percent solids.  
26
- 27 3. Modified polymer shall be spreadable, solvent-free, two-component  
28 polymeric, moisture/chemical barrier specifically developed for the  
29 corrosive environment of wastewater.  
30  
31  
32

### 33 **TYPICAL CHEMICAL ANALYSIS**

#### 34 **"A" Component**

35 Viscosity, 77 degrees F, cps., ASTM D-1638 -- 400

36 Physical State -- Liquid

37 Color -- Clear

38 Hygroscopicity -- Reacts with water  
39  
40

#### 41 **"B" Component**

42 Viscosity, 160 degrees F, cps., ASTM D-1638 -- 400

43 Physical State -- Liquid

44 Color -- Flamingo Pink

45 Hygroscopicity -- 100%  
46  
47

#### **Reaction Profile --**

MULTI-COMPONENT STRESS PANEL MANHOLE LINER SYSTEM

7/07/15

33 01 35 - 3

PC-ST5

1                                   **(100 grams, 175 degrees F Sample)**

2  
3                                   Gel Time, seconds -- 1-2  
4                                   Tack Free Time, seconds -- 15  
5                                   Cure Time, seconds -- 30  
6

7                                   **Processing**

8                                   A System/ B System volume ratio -- 1.00/1.00  
9

10                                  **Typical Physical Properties**

11                                  Tensile Strength, PSI -- 1500  
12                                  Elongation, percent -- 125  
13                                  Tear Strength, PSI -- 350  
14                                  Shore D Hardness -- 55  
15                                  100% Modulus, PSI -- 1500  
16

17                                  **Typical Chemical Analysis**

18                                  "A" Component  
19                                  Viscosity, 77 degrees F, cps., ASTM D-1638 -- 200  
20                                  Physical State -- Liquid  
21                                  Color -- Dark Brown  
22                                  Hygroscopicity -- Reacts with water and evolves CO2 Gas  
23

24                                  **"B" Component**

25                                  Viscosity, 160 degrees F, cps., ASTM D-1638 -- 1800  
26                                  Physical State -- Liquid  
27                                  Color -- Tan  
28                                  Hygroscopicity -- Absorbs water rapidly thus changing ratio  
29  
30

31  
32  
33                                  **Reaction Profile**

34                                  (100 grams, 77 degrees F Sample)  
35                                  Cream Time, seconds -- 1-4  
36                                  Tack Free Time, seconds -- 5-8  
37                                  Rise Time, seconds -- 6-10  
38

39                                  **Processing**

40                                  A System / B System, volume ratio -- 1.00/1.00  
41                                  Typical Physical Properties  
42

43   PART 3 – EXECUTION

44  
45   3.01   BYPASS PUMPING  
46

- 1 A. Prior to conducting any work, Contractor is to establish an approved bypass  
2 pumping system in accordance with these specifications and all local noise  
3 ordinances. Submit plan for bypass and maintenance of traffic to the  
4 Engineer for approval prior to conducting the Work.

5  
6 3.02 SURFACE PREPARATION  
7

- 8 A. Abrasive blasting equipment shall remove all deteriorated concrete, hard  
9 contaminants, localized micro-organisms, gas contaminants, from the  
10 concrete walls, floors or other structures. Final product shall be a cleaned,  
11 exposed and virgin concrete aggregate ready for rehabilitation material.

- 12  
13 B. After completion of surface preparation, blasting phase, perform the seven  
14 point check list, which is the inspection for:

- 15  
16 1. Leaks  
17 2. Cracks  
18 3. Holes  
19 4. Exposed rebar  
20 5. Ring and Cover Condition  
21 6. Invert Condition  
22 7. Inlet and Outlet Pipe Condition  
23

- 24 C. After the defects in the structure are identified, repair all leaks with a chemical  
25 or hydraulic sealant designed for use in field sealing of ground water. Severe  
26 cracks shall be "repaired using a urethane based chemical" sealant. Product  
27 to be utilized shall be as approved by County/Engineer prior to installation.  
28 Repairs to exposed rebar, defective pipe penetrations or inverts, etc. shall be  
29 repaired utilizing non-shrink grout or approved alternative method.

- 30  
31 D. Prior to application of final liner application, if required, reblast the entire  
32 structure and remove all abrasive materials.  
33

34 3.03 MATERIAL INSTALLATION  
35

- 36 A. The limits of the corrosion protection system shall be all exposed interior to  
37 end at the drywell hatch opening concrete surfaces including walls, tap  
38 sections, risers, etc., unless otherwise directed by the County/Engineer.  
39

- 40 B. Application of multi-component system shall be in strict accordance with  
41 manufacturer's recommendation. Final installation shall be a minimum  
42 thickness of 500 mils. A permanent identification number and date of work  
43 performed shall be affixed to the structure in a readily visible location.  
44

- 45 C. Provide final written report to County/Engineer detailing the location, date of  
46 report, and description of repair.

1  
2 3.04 INSPECTION  
3

- 4 A. Final concrete structure corrosion protection system shall be completely free  
5 of pinholes or voids. Entire exposed concrete surface shall be protected with  
6 corrosion protection system. Liner thickness shall be the minimum value as  
7 described here and shown on the project drawings.  
8

9 3.05 REPAIRS OF DEFECTS  
10

- 11 A. All defects identified during inspection such as pinholes, low film mileage, etc.  
12 shall be repaired with same material.  
13

14 END OF SECTION

SECTION 33 01 36

URETHANE/ EPOXY, POLYUREA MANHOLE LINER SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Work described within details a complete program for application of urethane/epoxy, polyurea liner system coating to manholes, wet wells, junction chamber, or other concrete structures. The completed system will provide a corrosion resistant liner to prevent deterioration from hydrogen sulfide and other corrosive gases/acids within the wastewater stream.

1.02 SUBMITTALS

- A: All materials and procedures required to establish compliance with the Specifications shall be submitted to the County/Engineer for review/approval.
- B. Submittals shall include at least the following:
1. Descriptive literature, bulletins and/or catalogs of materials.
  2. Work procedures including flow diversion plan, method of repair, etc.
  3. Materials and method for repair of leaks or cracks in concrete structure.
  4. Final installation report on completed structures.

1.03 WARRANTY

- A. Manufacturer shall warrant all coatings against failure for a period of ten (10) years, performing repairs to the damage and restore the coating at no cost to the County within sixty (60) days after written notification of the failure.

1.04 QUALITY ASSURANCE

- A. The manufacturer and/or installer of the total liner system of concrete structures shall be a company that specializes in the design, manufacture or installation of corrosion protection systems for concrete structures including manholes, wet wells, junction chambers, etc. Installer shall be completely trained in leak repair, surface preparation and corrosion material application on concrete structures. Corrosion materials/products shall be suitable for

1 installation in a severe hydrogen sulfide environment without any deterioration  
2 to the liner and shall completely prevent the breakdown of concrete surfaces.  
3

4 B. To ensure total unit responsibility, all materials and installation thereof shall  
5 be furnished and coordinated with/by one supplier/installer who turnkeys the  
6 Work and assumes full responsibility for entire operation.  
7

8 C. Urethane/Epoxy, Polyurea Liner System shall be as specified in Material  
9 Specification Manual.  
10

## 11 1.05 SUBSTITUTIONS 12

13 A. Only after execution of the contract will Engineer consider requests from  
14 Contractor for substitutions. Substitutions will be considered only when a  
15 product becomes unavailable due to no fault of Contractor.  
16

17 B. Items identified as "equal" shall be accompanied by product literature and  
18 a written itemized comparison of the published specifications (feature by  
19 feature from the manufacturer's literature) for the item specified and for  
20 the item proposed. The burden of proof of "equality" shall be on the  
21 supplier.  
22

23 C. Request constitutes a representation that Contractor:  
24 1. Has investigated proposed product and determined that it meets or  
25 exceeds, in all respects, specified product.  
26 2. Will provide the same warranty for substitution as for specified  
27 product.  
28 3. Will coordinate installation and make other changes which may be  
29 required for Work to be complete in all respects.  
30 4. Waives claims for additional costs which may subsequently  
31 become apparent.  
32

33 D. Substitutions will not be considered when they are indicated or implied on  
34 shop drawing or product data submittals without separate written request,  
35 or when acceptance will require substantial revision of Contract  
36 Documents.  
37

38 E. Engineer will determine acceptability of proposed substitution, and will  
39 notify Contractor of acceptance or rejection in writing within a reasonable  
40 time.  
41

## 42 PART II – PRODUCTS 43

### 44 2.01 MATERIALS AND EQUIPMENT 45

- A. The materials to be utilized in the lining of concrete structures shall be designed and manufactured to withstand the severe effects of hydrogen sulfide in a wastewater environment. Manufacturer of corrosion protection products shall have long proven experience in the production of the coating products utilized and shall have satisfactory installation record.
- B. Abrasive blasting equipment shall be suited to completely remove deteriorated concrete and hard contaminants from the existing concrete surfaces. Containment unit to capture spent abrasive material shall be provided unless otherwise approved by the County/Engineer.
- C. Equipment for installation of lining materials shall be high quality grade and be as recommended by the manufacturer.
- D. Shall use a system tested approved high early strength, non-corrosive, cementitious concrete to rebuild the substrate profile and create a surface for coating in concrete and masonry structures.
- E. The lining system to be utilized for rehabilitate and protect concrete, steel, fiberglass, or masonry structures shall be a multi-component, urethane/epoxy, polyurea liner system as described below.
  1. Liner system
    - a. Primer- Urethane/ epoxy polymer
    - b. Final corrosion barrier – Pure Polyurea
  2. Primer shall be one hundred (100) percent solids.

#### PRIMER TYPICAL PROPERTIES (1:1 BY VOL.)

Tensile strength, PSI-	ASTM D638	4500
Elongation, %-	ASTM D638	6
Compressive Strength, neat	ASTM D695	3800
Compressive Strength, sand	ASTM D695	4450
Shrinkage		none
Exudation		none
Bond strength, psi	ASTM D4541	1200
Hardness, shore D	ASTM D2240	71
Solids content, %		89
Color		amber
Viscosity, cps, neat		25
VOC, g/l		2.3
Pot life @ 72° F		3 min
Tack free @ 72° F		10 min
Final cure @ 72° F		20 min

#### URETHANE/EPOXY, POLYUREA MANHOLE LINER SYSTEM



## LINER TYPICAL PROPERTIES

Tensile strength, PSI-	ASTM D412	4500
Elongation, %-	ASTM D412	460
100% Modulus	ASTM D412	1460
200% Modulus	ASTM D412	1960
300% Modulus	ASTM D412	2650
Tear strength, PLI	ASTM D624	570
Hardness, shore A	ASTM D2240	98
Hardness, shore D	ASTM D2240	52
Flexibility, 1/8" mandrel	ASTM D1737	Pass
Flash point, °F	Pensky-Martin	>200
Taber abrasion, MG Loss	ASTM D4060	17.0
CS 17 wheels	1KG, 1000 revs	
Color		Light green
Viscosity B-side (75°F)	CPS	650
Viscosity B-side (75°F)	CPS	350
A-side hose temperature	°F	140-160
B-side hose temperature	°F	140-160
Block temperature	°F	160
Constant pressure, PSI		
Clas-Craft, Probler®		2000
Gel Time	Seconds	20
Tack free time	Seconds	45
Volume Ratio	V:V	1:1

### ADHESION RESULTS:

ASTM D-4541 Patti Tester  
Concrete (direct to concrete)

	(No primer)	>350PSI
	-Glue failure	
Concrete	Green Monster Primer	600 PSI
	-Epoxy glue failure	
	-1/8" Concrete on dolly	
Carbon Steel (direct)		900PSI

## PART 3 – EXECUTION

### 3.01 BYPASS PUMPING

- A. Prior to conducting any work, Contractor is to establish an approved bypass pumping system in accordance with these specifications and all local noise

ordinances. Submit plan for bypass and maintenance of traffic to the Engineer for approval prior to conducting the Work.

### 3.02 SURFACE PREPARATION

- A. Abrasive blasting equipment shall remove all deteriorated concrete, hard contaminants, localized micro-organisms, and gas contaminants, from the walls, ceiling, benches, floors, pipes or other structures. Final product shall be a cleaned, exposed and virgin concrete aggregate ready for rehabilitation material.
- B. After completion of surface preparation, blasting phase, perform the seven point check list, which is the inspection for:
  - 1. Leaks
  - 2. Cracks
  - 3. Holes
  - 4. Exposed rebar
  - 5. Ring and Cover Condition
  - 6. Invert Condition
  - 7. Inlet and Outlet Pipe Condition
- C. After the defects in the structure are identified, repair all leaks with a chemical or hydraulic sealant designed for use in field sealing of ground water. Severe cracks shall be "repaired using a urethane based chemical" sealant. Product to be utilized shall be as approved by County/Engineer prior to installation. Repairs to exposed rebar, defective pipe penetrations or inverts, etc. shall be repaired utilizing non-shrink grout or approved alternative method.
- D. Prior to application of final liner application, if required, reblast the entire structure and remove all abrasive materials.

### 3.03 MATERIAL INSTALLATION

- A. The limits of the corrosion protection system shall be all exposed interior to end at the drywell hatch opening concrete surfaces including walls, tap sections, risers, etc., unless otherwise directed by the County/Engineer.
- B. Application of multi-component system shall be in strict accordance with manufacturer's recommendation. Final installation shall be a minimum thickness of 90 mils to an unlimited build thickness.
- C. Provide final written report to County/Engineer detailing the location, date of report, and description of repair.

1  
2 3.04 INSPECTION  
3

- 4 A. Final structure corrosion protection system shall be completely free of  
5 pinholes or voids. Entire exposed surface shall be protected with corrosion  
6 protection system. Liner thickness shall be the minimum value as described  
7 here and shown on the project drawings.  
8

9 3.05 REPAIRS OF DEFECTS  
10

- 11 A. All defects identified during inspection such as pinholes, low film mileage, etc.  
12 shall be repaired with same material.  
13

14 END OF SECTION

SECTION 33 01 37

POLYURETHANE MANHOLE LINER SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Work described within details a complete program for application of polyurethane liner system coating to manholes, wet wells, junction chamber, or other concrete structures. The completed system will provide a waterproof, corrosion resistant liner to prevent deterioration from hydrogen sulfide and other corrosive gases/acids within the wastewater stream. This liner system shall restore structural integrity (over 500,000 psi flexural modulus) of brick/concrete structures

1.02 SUBMITTALS

- A: All materials and procedures required to establish compliance with the Specifications shall be submitted to the County/Engineer for review/approval.
- B. Submittals shall include at least the following:
1. Descriptive literature, bulletins and/or catalogs of materials.
  2. Work procedures including flow diversion plan, method of repair, etc.
  3. Materials and method for repair of leaks or cracks in concrete structure.
  4. Final installation report on completed structures.

1.03 WARRANTY

- A. Manufacturer shall warrant all coatings against failure for a minimum period of ten (10) years, performing repairs to the damage and restore the coating at no cost to the County within sixty (60) days after written notification of the failure.

1.04 QUALITY ASSURANCE

- A. The manufacturer and/or installer of the total liner system of concrete structures shall be a company that specializes in the design, manufacture or installation of corrosion protection systems for concrete structures including

manholes, wet wells, junction chambers, etc. Installer shall be completely trained in leak repair, surface preparation and corrosion material application on concrete structures. Corrosion materials/products shall be suitable for installation in a severe hydrogen sulfide environment without any deterioration to the liner and shall completely prevent the breakdown of concrete surfaces.

B. To ensure total unit responsibility, all materials and installation thereof shall be furnished and coordinated with/by one supplier/installer who turnkeys the Work and assumes full responsibility for entire operation.

C. Polyurethane liner system shall be as specified in Materials Specifications Manual,

#### 1.05 SUBSTITUTIONS

A. Only after execution of the contract will Engineer consider requests from Contractor for substitutions. Substitutions will be considered only when a product becomes unavailable due to no fault of Contractor.

B. Items identified as "equal" shall be accompanied by product literature and a written itemized comparison of the published specifications (feature by feature from the manufacturer's literature) for the item specified and for the item proposed. The burden of proof of "equality" shall be on the supplier.

C. Request constitutes a representation that Contractor:

1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
2. Will provide the same warranty for substitution as for specified product.
3. Will coordinate installation and make other changes which may be required for Work to be complete in all respects.
4. Waives claims for additional costs which may subsequently become apparent.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.

E. Engineer will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

#### PART II – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. The materials to be utilized in the lining of concrete structures shall be designed and manufactured to withstand the severe effects of hydrogen sulfide in a wastewater environment. Manufacturer of corrosion protection products shall have long proven experience in the production of the coating products utilized and shall have satisfactory installation record.
- B. Abrasive blasting equipment shall be suited to completely remove deteriorated concrete and hard contaminants from the existing concrete surfaces. Containment unit to capture spent abrasive material shall be provided unless otherwise approved by the County/Engineer.
- C. Equipment for installation of lining materials shall be high quality grade and be as recommended by the manufacturer.
- D. The lining system to be utilized for rehabilitation of brick/ concrete structures shall be a polyurethane liner system as described below.
1. Liner (Installation -- Liner)
- a. Self-priming polyurethane

**MINIMUM PHYSICAL/ MATERIAL PROPERTIES**

Flexural Modulus	ASTM D790	735,000 psi
Long Term Flexural Modulus of Elasticity	ASTM D2990	529,000 psi
Compressive Strength	ASTM D695	18,000 psi
Tensile strength	ASTM D638	7,450 psi
Tensile modulus	ASTM D638	425,000 psi
Elongation	ASTM D638	4% at break
Taber abrasion, CS 17 wheels	ASTM D4060	17.7 mg loss
Hardness, shore D	ASTM D2240	90
Density		87 lbs. /cf

**ADHESION RESULTS:**

ASTM D-4541

Concrete (direct to concrete) Substrate Failure

1  
2 PART 3 – EXECUTION

3  
4 3.01 BYPASS PUMPING

- 5  
6 A. Prior to conducting any work, Contractor is to establish an approved bypass  
7 pumping system in accordance with these specifications and all local noise  
8 ordinances. Submit plan for bypass and maintenance of traffic to the  
9 Engineer for approval prior to conducting the Work.

10  
11 3.02 SURFACE PREPARATION

- 12  
13 A. Abrasive blasting equipment shall remove all deteriorated concrete, hard  
14 contaminants, localized micro-organisms, gas contaminants, from the  
15 concrete walls, floors or other structures. Final product shall be a cleaned,  
16 exposed and virgin concrete aggregate ready for rehabilitation material.

- 17  
18 B. After completion of surface preparation, blasting phase, perform the seven  
19 point check list, which is the inspection for:

- 20  
21 1. Leaks  
22 2. Cracks  
23 3. Holes  
24 4. Exposed rebar  
25 5. Ring and Cover Condition  
26 6. Invert Condition  
27 7. Inlet and Outlet Pipe Condition  
28

- 29 C. After the defects in the structure are identified, repair all leaks with a chemical  
30 or hydraulic sealant designed for use in field sealing of ground water. Severe  
31 cracks shall be "repaired using a urethane based chemical" sealant. Product  
32 to be utilized shall be as approved by County/Engineer prior to installation.  
33 Repairs to exposed rebar, defective pipe penetrations or inverts, etc. shall be  
34 repaired utilizing non-shrink grout or approved alternative method.

- 35  
36 D. Prior to application of final liner application, if required, reblast the entire  
37 structure and remove all abrasive materials.

38  
39 3.03 MATERIAL INSTALLATION

- 40  
41 A. The limits of the corrosion protection system shall be all exposed interior to  
42 end at the drywell hatch opening concrete surfaces including walls, tap  
43 sections, risers, etc., unless otherwise directed by the County/Engineer.  
44

1 B. Application of polyurethane liner system shall be in strict accordance with  
2 manufacturer's recommendation. Final installation shall be a minimum  
3 thickness of 250 mils and not more than 500 mils.

4  
5 C. Provide final written report to County/Engineer detailing the location, date of  
6 report, and description of repair.

7  
8 3.04 INSPECTION

9  
10 A. Final concrete structure corrosion protection system shall be completely free  
11 of pinholes or voids. Entire exposed concrete surface shall be protected with  
12 corrosion protection system. Liner thickness shall be the minimum value as  
13 described here and shown on the project drawings.

14  
15 3.05 REPAIRS OF DEFECTS

16  
17 A. All defects identified during inspection such as pinholes, low film mileage, etc.  
18 shall be repaired with same material.

19  
20 END OF SECTION



SECTION 33 01 38

POLYMORPHIC RESIN MANHOLE LINER SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Work described within details a complete program for application of polymorphic resin liner system coating to manholes, wet wells, junction chamber, or other concrete structures. The completed system will provide a waterproof, corrosion resistant liner to prevent deterioration from hydrogen sulfide and other corrosive gases/acids within the wastewater stream. This liner system shall restore structural integrity (over 500,000 psi flexural modulus) of brick/ concrete structures

1.02 SUBMITTALS

- A: All materials and procedures required to establish compliance with the Specifications shall be submitted to the County/Engineer for review/approval.
- B. Submittals shall include at least the following:
1. Descriptive literature, bulletins and/or catalogs of materials.
  2. Work procedures including flow diversion plan, method of repair, etc.
  3. Materials and method for repair of leaks or cracks in concrete structure.
  4. Final installation report on completed structures.

1.03 WARRANTY

- A. Manufacturer shall warrant all coatings against failure for a minimum period of ten (10) years, performing repairs to the damage and restore the coating at no cost to the County within sixty (60) days after written notification of the failure.

1.04 QUALITY ASSURANCE

- A. The manufacturer and/or installer of the total liner system of concrete structures shall be a company that specializes in the design, manufacture or installation of corrosion protection systems for concrete structures including

manholes, wet wells, junction chambers, etc. Installer shall be completely trained in leak repair, surface preparation and corrosion material application on concrete structures. Corrosion materials/products shall be suitable for installation in a severe hydrogen sulfide environment without any deterioration to the liner and shall completely prevent the breakdown of concrete surfaces.

B. To ensure total unit responsibility, all materials and installation thereof shall be furnished and coordinated with/by one supplier/installer who turnkeys the Work and assumes full responsibility for entire operation.

C. Polymorphic Resin Liner System shall be as specified in Materials Specification Manual.

#### 1.05 SUBSTITUTIONS

A. Only after execution of the contract will Engineer consider requests from Contractor for substitutions. Substitutions will be considered only when a product becomes unavailable due to no fault of Contractor.

B. Items identified as "equal" shall be accompanied by product literature and a written itemized comparison of the published specifications (feature by feature from the manufacturer's literature) for the item specified and for the item proposed. The burden of proof of "equality" shall be on the supplier.

C. Request constitutes a representation that Contractor:

1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.
2. Will provide the same warranty for substitution as for specified product.
3. Will coordinate installation and make other changes which may be required for Work to be complete in all respects.
4. Waives claims for additional costs which may subsequently become apparent.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.

E. Engineer will determine acceptability of proposed substitution, and will notify Contractor of acceptance or rejection in writing within a reasonable time.

#### PART II – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. The materials to be utilized in the lining of concrete structures shall be designed and manufactured to withstand the severe effects of hydrogen sulfide in a wastewater environment. Manufacturer of corrosion protection products shall have long proven experience in the production of the coating products utilized and shall have satisfactory installation record.
- B. Abrasive blasting equipment shall be suited to completely remove deteriorated concrete and hard contaminants from the existing concrete surfaces. Containment unit to capture spent abrasive material shall be provided unless otherwise approved by the County/Engineer.
- C. Equipment for installation of lining materials shall be high quality grade and be as recommended by the manufacturer.
- D. Shall use a system tested approved high early strength, non-corrosive, cementitious concrete to rebuild the substrate profile and create a surface for coating concrete and masonry structures.
- E. The lining system to be utilized for rehabilitation of brick/ concrete structures shall be modified ispthalic polyester liner system made of two-components, 100% solid, known as polymorphic resin as described below.

1. Liner (Cured Resin -- Liner)

**MINIMUM PHYSICAL/ MATERIAL PROPERTIES**

Flexural Strength	ASTM D790	8,630 psi
Compressive Strength	ASTM D695	15,120 psi
Tensile Strength	ASTM D638	4,900 psi
Barcol Hardness	Impressor # L25	72 to75
Adhesive Strength	direct to metal	1,582 psi
Adhesive Strength	direct to concrete	substrate failure

1  
2 PART 3 – EXECUTION

3  
4 3.01 BYPASS PUMPING

- 5  
6 A. Prior to conducting any work, Contractor is to establish an approved bypass  
7 pumping system in accordance with these specifications and all local noise  
8 ordinances. Submit plan for bypass and maintenance of traffic to the  
9 Engineer for approval prior to conducting the Work.

10  
11 3.02 SURFACE PREPARATION

- 12  
13 A. Abrasive blasting equipment shall remove all deteriorated concrete, hard  
14 contaminants, localized micro-organisms, gas contaminants, from the  
15 concrete walls, floors or other structures. Final product shall be a cleaned,  
16 exposed and virgin concrete aggregate ready for rehabilitation material.

- 17  
18 B. After completion of surface preparation, blasting phase, perform the seven  
19 point check list, which is the inspection for:

- 20  
21 1. Leaks  
22 2. Cracks  
23 3. Holes  
24 4. Exposed rebar  
25 5. Ring and Cover Condition  
26 6. Invert Condition  
27 7. Inlet and Outlet Pipe Condition  
28

- 29 C. After the defects in the structure are identified, repair all leaks with a chemical  
30 or hydraulic sealant designed for use in field sealing of ground water. Severe  
31 cracks shall be "repaired using a polyurethane based chemical" sealant.  
32 Product to be utilized shall be as approved by County/Engineer prior to  
33 installation. Repairs to exposed rebar, defective pipe penetrations or inverts,  
34 etc. shall be repaired utilizing non-shrink grout or approved alternative  
35 method.  
36

- 37 D. Prior to application of final liner application, if required, reblast the entire  
38 structure and remove all abrasive materials.  
39

40 3.03 MATERIAL INSTALLATION

- 41  
42 A. The limits of the corrosion protection system shall be all exposed interior  
43 surfaces, from the invert to the manhole cover opening, all concrete surfaces  
44 including walls, top sections, risers, etc., unless otherwise directed by the  
45 County/Engineer.  
46

- 1 B. Application of polymorphic resin liner system shall be in strict accordance with  
2 manufacturer's recommendation. The three coat system is made of a prime  
3 coat (DS-101 10- 25 mils thick), intermediate coat (DS-301 75- 150 mils  
4 thick), and a final coat (DS-401 10- 25 mils thick). Final installation shall be a  
5 minimum thickness of 150 mils and not more than 250 mils thick.  
6  
7 C. Provide final written report to County/Engineer detailing the location, date of  
8 report, and description of repair.  
9

10 3.04 INSPECTION  
11

- 12 A. Final concrete structure corrosion protection system shall be completely free  
13 of pinholes or voids. Entire exposed concrete surface shall be protected with  
14 corrosion protection system. Liner thickness shall be the minimum value as  
15 described here and shown on the project drawings.  
16

17 3.05 REPAIRS OF DEFECTS  
18

- 19 A. All defects identified during inspection such as pinholes, low film mileage, etc.  
20 shall be repaired with same material.  
21  
22

END OF SECTION

SECTION 33 01 39

CALCIUM ALUMINATE MANHOLE LINER SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Work described within details a complete program for application of calcium aluminate liner system coating to manholes, wet wells, junction chamber, or other concrete structures. The completed system will provide a corrosion resistant liner to prevent deterioration from hydrogen sulfide and other corrosive gases/acids within the wastewater stream.

1.02 SUBMITTALS

- A: All materials and procedures required to establish compliance with the Specifications shall be submitted to the County/Engineer for review/approval.
- B. Submittals shall include at least the following:
1. Descriptive literature, bulletins and/or catalogs of materials.
  2. Work procedures including flow diversion plan, method of repair, etc.
  3. Materials and method for repair of leaks or cracks in concrete structure.
  4. Final installation report on completed structures.

1.03 WARRANTY

- A. Manufacturer shall warrant all coatings against failure for a period of ten (10) years, performing repairs to the damage and restore the coating at no cost to the County within sixty (60) days after written notification of the failure.

1.04 QUALITY ASSURANCE

- A. The manufacturer and/or installer of the total liner system of concrete structures shall be a company that specializes in the design, manufacture or installation of corrosion protection systems for concrete structures including manholes, wet wells, junction chambers, etc. Installer shall be completely trained in leak repair, surface preparation and corrosion material application on concrete structures. Corrosion materials/products shall be suitable for

1 installation in a severe hydrogen sulfide environment without any deterioration  
2 to the liner and shall completely prevent the breakdown of concrete surfaces.

3  
4 B. To ensure total unit responsibility, all materials and installation thereof shall  
5 be furnished and coordinated with/by one supplier/installer who turnkeys the  
6 Work and assumes full responsibility for entire operation.

7  
8 C. Calcium Aluminate liner system shall be as specified in Materials  
9 Specification Manual.

## 10 11 1.05 SUBSTITUTIONS

12  
13 A. Only after execution of the contract with Pinellas County will Engineer  
14 consider requests from Contractor for substitutions. Substitutions will be  
15 considered only when a product becomes unavailable due to no fault of  
16 Contractor.

17  
18 B. Items identified as "equal" shall be accompanied by product literature and  
19 a written itemized comparison of the published specifications (feature by  
20 feature from the manufacturer's literature) for the item specified and for  
21 the item proposed. The burden of proof of "equality" shall be on the  
22 supplier.

23  
24 C. Request constitutes a representation that Contractor:  
25 1. Has investigated proposed product and determined that it meets or  
26 exceeds, in all respects, specified product.  
27 2. Will provide the same warranty for substitution as for specified  
28 product.  
29 3. Will coordinate installation and make other changes which may be  
30 required for Work to be complete in all respects.  
31 4. Waives claims for additional costs which may subsequently  
32 become apparent.

33  
34 D. Substitutions will not be considered when they are indicated or implied on  
35 shop drawing or product data submittals without separate written request,  
36 or when acceptance will require substantial revision of the Contract  
37 Documents.

38  
39 E. Engineer will determine acceptability of proposed substitution, and will  
40 notify Contractor of acceptance or rejection in writing within a reasonable  
41 time.

## 42 43 PART II – PRODUCTS

### 44 45 2.01 MATERIALS AND EQUIPMENT

46

- A. The materials to be utilized in the lining of concrete structures shall be designed and manufactured to withstand the severe effects of hydrogen sulfide in a wastewater environment. Manufacturer of corrosion protection products shall have long proven experience in the production of the coating products utilized and shall have satisfactory installation record.
- B. Abrasive blasting equipment shall be suited to completely remove deteriorated concrete and hard contaminants from the existing concrete surfaces. Containment unit to capture spent abrasive material shall be provided unless otherwise approved by the County/Engineer.
- C. Equipment for installation of lining materials shall be high quality grade and be as recommended by the manufacturer.
- D. As required, contractor shall use a system tested approved high early strength, non-corrosive, cementitious concrete to rebuild the substrate profile and create a surface for coating concrete and masonry structures.
- E. The lining system to be utilized shall be a calcium aluminate liner system as described below.
1. Shall be 100% calcium aluminate cement with 100% calcium aluminate aggregate.
  2. The chemical composition of the cement portion as well as the aggregates of the mortar mix shall be as follows:
- |                                    |         |
|------------------------------------|---------|
| Al <sub>2</sub> O <sub>3</sub>     | 41%-46% |
| CaO                                | 33%-38% |
| FeO+Fe <sub>2</sub> O <sub>3</sub> | 8%-13%  |
| SiO <sub>2</sub>                   | 4%-9%   |
3. The design properties of the mortar mix shall be as follows:

		<b>24 HRS</b>	<b>7 DAYS</b>	<b>28 DAYS</b>
ASTM C 109	Compressive Strength, psi	>5,500	>7,000	>8,000
ASTM C 293	Flexural Strength, psi	>1,300	>1,400	>1,600
ASTM C 596	Shrinkage at 90% Humidity, %	< 0.04	< 0.06	< 0.08
ASTM C 666	Freeze-Thaw After 300 Cycles		No Damage	
ASTM C 496	Splitting Tensile Strength		> 900 psi	
ASTM C 882	Bond Strength by Slant Shear		> 2,300 psi at 28 days	
ASTM C 457	Air Void Content (7 Days)		2-4%	
ASTM C 642	Specific Gravity/Absorption Test (7 Days)		3-5%	
	Static Modulus of Elasticity (24 hrs)		7.1 x 106 psi	

### PART 3 – EXECUTION



1 3.01 BYPASS PUMPING

- 2  
3 A. Prior to conducting any work, Contractor is to establish an approved bypass  
4 pumping system in accordance with these specifications and all local noise  
5 ordinances. Submit plan for bypass and maintenance of traffic to the  
6 Engineer for approval prior to conducting the Work.  
7

8 3.02 SURFACE PREPARATION  
9

- 10 A. Abrasive blasting equipment shall remove all deteriorated concrete, hard  
11 contaminants, localized micro-organisms, gas contaminants, from the  
12 concrete walls, floors or other structures. Final product shall be a cleaned,  
13 exposed and virgin concrete aggregate ready for rehabilitation material.  
14  
15 B. After completion of surface preparation, blasting phase, perform the seven  
16 point check list, which is the inspection for:  
17  
18 1. Leaks  
19 2. Cracks  
20 3. Holes  
21 4. Exposed rebar  
22 5. Ring and Cover Condition  
23 6. Invert Condition  
24 7. Inlet and Outlet Pipe Condition  
25  
26 C. After the defects in the structure are identified, repair all leaks with a chemical  
27 or hydraulic sealant designed for use in field sealing of ground water. Severe  
28 cracks shall be "repaired using a urethane based chemical" sealant. Product  
29 to be utilized shall be as approved by County/Engineer prior to installation.  
30 Repairs to exposed rebar, defective pipe penetrations or inverts, etc. shall be  
31 repaired utilizing non-shrink grout or approved alternative method.  
32  
33 D. Prior to application of final liner application, if required, reblast the entire  
34 structure and remove all abrasive materials.  
35

36 3.03 MATERIAL INSTALLATION  
37

- 38 A. The limits of the corrosion protection system shall be all exposed interior  
39 surfaces, from the invert to the manhole cover opening, including walls, top  
40 sections, risers, etc., unless otherwise directed by the County/Engineer.  
41  
42 B. Application of calcium aluminate lining system shall be in strict accordance  
43 with manufacturer's recommendation. Final installation shall be a minimum  
44 thickness as recommended by manufacturer. A permanent identification  
45 number and date of work performed shall be affixed to the structure in a  
46 readily visible location.

- 1  
2 C. Provide final written report to County/Engineer detailing the location, date of  
3 report, and description of repair.  
4

5 3.04 INSPECTION  
6

- 7 A. Final concrete structure corrosion protection system shall be completely free  
8 of pinholes or voids. Entire exposed concrete surface shall be protected with  
9 corrosion protection system. Liner thickness shall be the minimum value as  
10 described here and shown on the project drawings.  
11

12 3.05 REPAIRS OF DEFECTS  
13

- 14 A. All defects identified during inspection shall be repaired with same material.  
15  
16

END OF SECTION

SECTION 33 01 40

CIPP STRUCTURAL LATERAL CONNECTION LINING

PART 1 -- GENERAL

1.01 SCOPE

- A. The work specified in this section consists of providing for the reconstruction of a particular mainline section and the adjacent lateral sewer pipe without excavation while providing a structural one piece leak free connection at the interface of the mainline and lateral pipelines.
- B. Pipelines to be rehabilitated may be in backyard easements, light traffic subdivision roadways or highways requiring Maintenance of Traffic plans conforming to Florida Department of Transportation and Pinellas County requirements. No additional compensation will be made for these locations unless specified within the Contract
- C. It shall be assumed that pipelines to be rehabilitated will only need light cleaning and sewage bypass pumping to successfully install the liner system. If the Contractor feels point repairs are necessary to complete lining of a particular lateral line segment, the County will make the individual necessary repair or cancel that section of Work at no cost to the County. The Contractor shall be responsible for all material removed from the sewer and shall properly dispose of materials in accordance with the appropriate regulatory agency requirements.

1.02 GENERAL

- A. The reconstruction will be accomplished using a non-woven fabric tube of particular length and a thermoset resin with physical and chemical properties appropriate for the application. The lateral tube within a translucent inversion bladder is vacuum impregnated with the resin then placed inside a protective carrying device. The mainline liner that is physically attached to the lateral tube is affixed around a rigid launching device. The launching device and protective carrying device are winched into the existing sewer. When the launching device is properly positioned at the lateral connection, the mainline liner is inflated and the resin saturated tube is inverted up through the lateral pipe, using air or water pressure, by the action of the inversion bladder. Once the tube/resin composite is cured, the inversion bladder and launching/carrying devices are removed.
- B. The cured-in-place mainline/lateral connection repair system shall be as specified in Materials Specification Manual, or as otherwise specified by County Engineer.

1 1.03 SUBMITTALS

- 2  
3 A. The CONTRACTOR shall submit shop drawings, samples of materials, and other  
4 information to the OWNER for review. Included shall be design calculations for the  
5 work.  
6

7 1.04 QUALIFICATIONS

- 8  
9 A. The Qualifications of the CONTRACTOR shall be submitted with the bid. The  
10 Contractor is defined as the entity that holds the contracting license ("the state or  
11 county licensed company") to perform contracting work under these bid documents,  
12 the Contractor Qualifications must be submitted in this name. Individual  
13 qualifications will not be considered in the product experience. These Qualifications  
14 shall include detailed descriptions of the following:

- 15 1. Name, business address and telephone number of the CONTRACTOR.  
16 2. Name(s) of all supervisory personnel to be directly involved with this project.  
17 3. Specialty technicians shall be certified by the proposed product manufacturer  
18 and/or its authorized representative. Certifications shall be submitted to the  
19 OWNER.  
20 4. The CONTRACTOR shall provide the references of previous project lists  
21 going back five years including his customer's names, city contact name,  
22 phone number, city project number, city project name. The list must include  
23 the number of laterals rehabilitated as well as the number and type of  
24 connection seals installed. If there have been any changes in the materials it  
25 shall be brought to the attention of the OWNER and is to be noted on the  
26 submitted projects used for references showing the date and type of the  
27 changes.  
28 5. To be acceptable, the installer (the company bidding) must have a minimum  
29 of 1,500 full circle structural connection installations of the specific product  
30 bid, which must be documented, in Florida.  
31 6. To be acceptable, the installer (the company bidding) must have applicable  
32 experience in the commercial installation of the product bid.  
33

34 PART 2 -- PRODUCTS

35  
36 2.01 GENERAL  
37

- A. The finished liner shall be fabricated from material as specified in this section which when cured will be resistant to the corrosive effects of the raw sewage and hydrogen sulfide.

## 2.02 LINER SIZING

- A. The liner shall be fabricated to a size that when installed will neatly fit the internal circumference of the conduit to be repaired..

## 2.03 LINER MATERIAL

- A. The liner shall be one piece and will consist of a lateral portion and the mainline portion with one or more layers of flexible needled felt or an equivalent non-woven material. The liner will be continuous in length and the wall thickness shall be uniform. No overlapping sections shall be allowed in the circumference or the length of the lateral liner. The tube will be capable of conforming to offset joints, bells, and disfigured pipe sections. The mainline liner will be flat with one end overlapping the second end and sized accordingly to create a circular lining equal to the full diameter of the mainline pipe. The resin will be polyester or vinyl ester or epoxy, with proper catalysts as designed for the specific application. The cured-in-place pipe shall provide a smooth bore interior. Both the lateral pipe and the main connection shall have a design report documenting the design criteria, fully deteriorated pipe section for the lateral and partially deteriorated for the main (if the main has already been lined), relative to the hydrostatic pressures, depth of soil cover, and type of soil. The mainline sectional liner shall be a full-circle 16-inch long CIPP liner integrally manufactured to the lateral liner providing a seamless connection between the mainline pipe liner and the lateral liner. Installation will be accomplished remotely using air or water for inversion and curing. The cured pipe repair system shall be watertight and shall conform to the existing pipe and eliminate any leakage or connection to the outside of the host pipe/service.

- B. The liner shall meet or exceed ASTM F2561-06.

- C. The composite of the materials above will, upon installation inside the host pipe, exceed the minimum test standards specified by the American Society for Testing Methods.

Physical Characteristics	Test Procedure	Minimum Value
Flexural Strength	ASTM D790	4,500 psi
Flexural Modulus	ASTM D790	250,000 psi
Long Term Modulus	Reduction for Creep	50%

Design Considerations	Criteria	
Tube Design	ASTM F 1216	Appendix X1

Hydrostatic Buckling	ASTM F 1216	Appendix X1
----------------------	-------------	-------------

The CIPP design for the lateral tube and mainline structural connection shall assume no bonding to the original host pipe.

#### 2.04 LINER DESIGN

- A. The minimum required structural CIPP wall thickness shall be based on the physical properties described above and in accordance with the design equations in the appendix of ASTM F 1216, and the following design parameters:

Design Safety Factor	2.0
Retention Factor for Long-Term Flexural Modulus to be used in Design	50 %
Ovality*	2 %
Groundwater Depth = Pipe Depth (above invert)*	ft.
Soil Depth (above crown)*	ft.
Soil Modulus	700 psi
Soil Density	120 pcf
Live Load	One H20 passing truck
Design Condition (lateral pipe)	Fully deteriorated
Design Condition (main pipe) Lined Main Pipe	Partially deteriorated
Design Condition (main pipe) Unlined Main Pipe	Fully deteriorated
<i>*Denotes information which can be provided here or in inspection video tapes or project construction plans. Multiple line segments may require a table of values.</i>	

Note: There are two conditions that require design calculation in accordance with ASTM F1216. 1) Lateral piping. 2) The connection in the main, lined or unlined main.

- B. The lining manufacturer shall submit to the OWNER for review complete design calculations for the liner, both main connection and lateral pipe designs, signed and sealed by a Professional Engineer registered in the State of Florida and certified by the manufacturer as to the compliance of his materials to the values used in the calculations. A safety factor of 2 shall be applied in the design calculation. The lateral host pipe shall be considered fully deteriorated, the previously lined main pipe shall be considered partially deteriorated. The liner shall be designed to withstand a live load equivalent to one H-20 passing truck plus all pertinent dead loads, hydrostatic pressure and grout pressure (if any). For design purposes, the water table shall be considered at grade elevation. The liner shall be designed in accordance with ASTM F 1216. The buckling analysis shall account for the

combination of dead load, live load, hydrostatic pressure and grout pressure (if any). The liner side support shall be considered as if provided by soil pressure against the liner. The existing lateral pipe shall not be considered as providing any structural support. If the main pipe has been lined a partially deteriorated condition is to be used for the design of the main. Hydrostatic loads must be considered in three existing pipe conditions 1) mainline design, for previously lined mains and 2) unlined mains as well as 3) the lateral pipe design for unlined pipe. Modulus of soil reaction shall be 700, corresponding to a moderate degree of compaction of bedding and a fine-grained soil as shown in AWWA Manual M45, Fiberglass Pipe Design.

- C. The design of the finished main / lateral connection liner shall include compression gaskets at the termination points of the liner. When the hydrophilic gaskets come in contact with water they swell to create a compression gasket fit between the host pipe and the newly installed lateral connection.

Because of inconsistencies during application of, chemical grout, hydrophilic caulks or hydrophilic paste, these sealing attempts are not an acceptable alternative. Acceptable seals are Insignia™ seals or approved equal.

- D. Liner shall be neither accepted nor installed until design calculations are acceptable to the OWNER for the three existing pipe conditions.

### PART 3 -- EXECUTION

#### 3.01 PUBLIC NOTIFICATION

- A. All residences and businesses that may be affected by work performed in the installation of CIP liners shall be notified by delivery of a notification. Notifications are to be delivered at least 72 hours before any work commences at a site.
- B. Notifications shall include the following: and explanation of the work to be performed; when the work is anticipated to commence; where the work is to be performed in reference to local streets; the name and office telephone numbers of Contractor representatives; the nature of the inconvenience(s) anticipated to be experienced by the resident/ business owner; the anticipated duration of the work; that the work is being performed on behalf of Pinellas County; and a Pinellas County contact and telephone number as provided by the County.
- C. Information included in the notifications regarding Contractor representatives shall include both the name and twenty-four (24) hour telephone number of the Contractor's supervisor at the work site(s) and the name and business telephone

1 number of a Contractor representative who is responsible for the administration of  
2 the project from the location of the offices of the Contractor.

3  
4 D. The proposed format of all correspondence from the Contractor, to the public, shall  
5 be reviewed, and approved, by the Engineer or a Designee.

6  
7 E. Complete public notification is to be the exclusive responsibility of the Contractor.

8  
9 F. Cost associated with public notifications shall be included in the contract price of  
10 CIPP installation.

11  
12 3.02 WASTEWATER FLOW CONTROL

13  
14 A. The Contractor shall bypass sewage around the section of pipe being lined. Bypass  
15 shall be set up to cause minimum disruption to residents, commercial  
16 establishments and traffic.

17  
18 B. Where lines to be rehabilitated are determined by the Engineer to be of a critical  
19 nature and cannot be bypassed during normal work hours, lining may have to be  
20 scheduled at low flow during nighttime hours.

21  
22 C. If wastewater flow is minimal and lining can be installed in a timely manner, bypass  
23 may not be required.

24  
25 D. The Contractor shall make every effort possible to notify each customer whose  
26 service is affected by the lining operation.

27  
28 E. The Contractor shall be responsible for any back-up or any damage caused by the  
29 lining process.

30  
31 3.03 PRE-CLEANING AND TELEVISION INSPECTION

32  
33 A. The Contractor shall clean and televise the assigned gravity sewer to be  
34 rehabilitated prior to construction in accordance with specification 33 01 32 -  
35 Sanitary Sewer Cleaning and Televising. Only National Association of Sewer  
36 Companies (NASSCO) Pipeline Assessment and Certification Program (PACP)  
37 certified personnel trained in locating breaks, obstacles and service connections by  
38 closed circuit television using NASSCO certified software shall perform the  
39 inspection. The interior surface of the pipeline shall be cleaned with high pressure  
40 water jet equipment prior to receiving the new liner. All service locations and  
41 obstructions, such as dropped joints and protruding services, shall be noted on the  
42 inspection.



- 1  
2 B. Pre-Cleaning and television inspection to occur a minimum of five working days  
3 prior to installation of the liner, or as otherwise directed by Engineer.  
4
- 5 C. The Contractor shall notify the Engineer if any severe problems are discovered  
6 during televising that would prohibit the installation of the liner. If conditions such as  
7 broken pipe or major blockages are found that will prevent proper cleaning, or  
8 where additional damage would occur if cleaning is attempted or continued, the  
9 Contractor shall advise the Engineer.  
10
- 11 D. The Contractor shall notify the Engineer if pipe joint offsets greater than 20% the  
12 interior diameter of the pipe are present. No liners shall be installed through joints  
13 offset greater than 20% the interior diameter of the pipe unless otherwise directed  
14 by Engineer.  
15
- 16 E. Any damage done by the Contractor to any existing sewer pipe or structure by the  
17 Contractor will be immediately repaired to a condition equal to or better than its  
18 original condition at the Contractor's expense.  
19
- 20 F. Cost associated with pre-televising and cleaning shall be included in the contract  
21 price of CIPP installation.  
22  
23  
24

25 3.04 LINER INSTALLATION  
26

- 27 A. The tube is inspected for tears and frayed sections. The tube, in good condition,  
28 will be vacuum impregnated with the thermostat resin. The resin will be introduced  
29 into the tube creating a slug of resin at the beginning of the tube. A calibration roller  
30 will assist the resin slug to move throughout the tube. All air in the tube shall be  
31 removed by vacuum allowing the resin to thoroughly impregnate the tube. All resin  
32 shall be contained to ensure no public property or persons are exposed to the liquid  
33 resin. The mainline liner will be saturated upon a wet-out platform. The resin  
34 impregnated sample (wick), shall be retained by the installer to provide verification  
35 of the curing process taking place in the host pipe.
- 36 B. The saturated tube along with the inversion bladder will be inserted into the carrying  
37 device. The mainline liner is affixed on the launching device. Both the launching  
38 and carrying device is pulled into the pipe using a cable winch. The pull is complete  
39 when the open port of the launching device is aligned with the interface of the  
40 service connection and mainline pipe. The resin saturated lateral tube is completely  
41 protected during the pull. No resin shall be lost by contact with manhole walls or the  
42 pipe during the pull. The resin saturated mainline liner is supported upon the rigid

launcher that is elevated above the pipe invert by means of rotating skid system.  
The mainline liner should not be contaminated or diluted by exposure to dirt, debris, or water during the pull.

C. The installer shall document the placement of the liner by internal video inspection with the camera being inserted from the lateral pipe down to the mainline pipe.

D. The mainline liner is expanded against the mainline pipe and lateral tube is inverted out of the launcher/carrying device by controlled air or water pressure. The installer shall be capable of viewing the lateral liner contacting the lateral pipe from the beginning to the end of the repair. The mainline liner and the lateral tube are held tightly in place against the wall of the host pipe by controlled pressure until the cure is complete.

E. When the curing process is complete, the pressure will be released. The inversion bladder and launching device shall be removed from the host pipe with the winch. No barriers, coatings, or any material other than the cured tube/resin composite, specifically designed for desirable physical and chemical resistance properties, should ever be left in the host pipe. Any materials used in the installation other than the cured tube/resin composite are to be removed from the pipe by the installer.

### 3.05 POST CLEANING AND TELEVISION INSPECTION

A. Post cleaning and television inspection shall occur only after all necessary work and preparation has been completed, including the following: installation on CIP liner in accordance with specifications, pre-installation cleaning and television inspection; implementation of adequate flow control; and the placement of traffic control measures in accordance with these specifications.

B. The Contractor shall clean and televise the assigned gravity sewer after rehabilitation in accordance with specification 33 01 32- Sanitary Sewer Cleaning and Televising. Only NASSCO PACP certified personnel trained in locating breaks, obstacles and service connections by closed circuit television using PACP/ LACP certified software shall perform the inspection. The interior surface of the pipeline shall be cleaned with high pressure water jet equipment immediately prior to conducting the post television inspection. All gouges, cracks, bumps, bulges and obstructions, such as dropped joints, shall be noted on the inspection.

C. In the case of bellies in the line, the pipe shall be cleared of any standing water to provide continuous visibility during the post inspection.

1 D. The Contractor shall provide all inspections in digital PACP/ LACP format including  
2 printed inspection logs. All lateral inspections shall, at a minimum, be compatible  
3 with Granite XP currently used by the County.  
4

5 E. Cost associated with post-televising and cleaning shall be included in the contract  
6 price of CIPP installation.  
7

### 8 3.06 ACCEPTANCE AND TESTING 9

10 A. The finished liner shall be continuous over the entire length of the installation. The  
11 liner shall be free from visual defects, damage, deflection, holes, delamination,  
12 uncured resin, and the like. There shall be no visible infiltration through the liner or  
13 from behind the liner.

14 B. Verification of a non-leaking lateral liner and service connection shall require an air  
15 test in accordance with the following specifications. Testing shall be performed at  
16 the OWNER'S discretion. The cost for the test shall be included in the liner  
17 installation cost, and no separate payment shall be made.

18 1. A camera shall be inserted into the lateral pipe via a clean-out upstream of  
19 the upper most portion of the cured in-place lateral liner. The camera is then  
20 moved through the lateral pipe until it becomes positioned at the lateral/main  
21 connection. The camera is utilized to assist in positioning and placing a pair  
22 of plugs in the mainline on either side of the lateral opening. A test device  
23 with a minimum of a ten-inch clear separation shall be centered on the lateral  
24 opening and spanning the brim of the lined connection.

25 2. Next, an air test plug shall be introduced into the lateral pipe. The test plug  
26 will be placed inside of the cured in-place lateral liner at its upper most  
27 portion. The test plug shall be inflated and sealed against the cured in-place  
28 lateral liner at the upstream end of the liner.

29 3. The testing device within the mainline are then inflated and sealed across the  
30 service connection.

31 4. Air-pressure not less than 4 PSI shall be introduced through the test plug.  
32 The void area between the three plugs shall be pressurized at 4 PSI, held for  
33 2 minutes and during this time the pressure shall not drop below 3.0 PSI.

34 5. If an installed cured in-place lateral liner fails the specified air test, the  
35 following corrective measures shall be taken.

36 a. The cured in-place lateral liner shall be re-inspected by use of a  
37 closed circuit television camera in attempt to identify the defect.

### CIP STRUCTURAL LATERAL CONNECTION LINING 33 01 40-9

1           b.     Any repairs made shall consist of materials that are structural and  
2                 meet or exceed the same criteria as the cured in-place lateral liner is  
3                 required to meet in a domestic sewer collection system. Such  
4                 materials shall have a minimum life expectancy of 50 years in  
5                 accordance with ASTM F-1216 (most recent standard) Appendix X1  
6                 Design Considerations and Appendix X2 Chemical-Resistance Test.

7           c.     Once the defect has been corrected, the renewed lateral pipe shall be  
8                 re-tested in accordance with the air test procedure as described  
9                 above.

10          d.     Any corrective measures shall be performed at the CONTRACTOR's  
11                 expense.

12          6.     If any of the air tests fail, the OWNER at its option may require the  
13                 CONTRACTOR to test an additional lateral at no additional charge to the  
14                 OWNER. If a second air test shall fail, the OWNER at its option may require  
15                 the CONTRACTOR to test additional or all of the installed cured in-place  
16                 lateral linings at no additional charge to the OWNER.

17          C.     Each individual location contained in a Work Order is to be considered an  
18                 "individual project" such that all work, including all deliverables shall be reviewed  
19                 and accepted prior to the County accepting and processing payment for that  
20                 individual project. No partial payments will be made on individual projects.  
21

### 22   3.07   CLEANUP

23  
24          A.     After the liner installation has been completed and accepted, the CONTRACTOR  
25                 shall clean up the entire project area and return the ground cover to grade. All  
26                 excess material and debris not incorporated into the permanent installation shall be  
27                 disposed of by the CONTRACTOR.  
28

29                                 END OF SECTION  
30  
31

SECTION 33 05 20

JACKING AND BORING

PART 1 - GENERAL

- A. Special crossings shall be constructed in accordance with the details shown on the plans, or as directed. All materials and workmanship shall be as specified, herein.
- B. The Contractor is responsible for verifying the location of all utilities in the ground before commencing the jack and bore operation. No compensation will be allowed for labor or materials for unused casing. The Contractor will be responsible for all damage incurred to roadways or utilities by his operation.

PART 2 - PRODUCTS

2.01 CASINGS

- A. All casings shall be installed accurately to line and grade and shall meet all requirements of the prevailing rights-of-way holder. Casings shall be new and of domestic material and manufacture.
- B. Pipe casing shall be welded steel. The pipe casing shall be steel and conform to the requirements of AWWA Standard C-200 and ASTM A-139, Grade B. The pipe shall be coated internally and externally with coal-tar primer followed by a hot coal-tar enamel in accordance with AWWA Standard C-203.
- C. Joints shall be full penetration butt welded in accordance with the requirements of AWWA Standard C-206. The joints shall be double groove welded with continuous circumferential welds and field lined and coated in accordance with AWWA C-203.
- D. All casings shall be in conformance with the specifications as shown on the plans and detail sheets.

2.02 CARRIER PIPE

- A. All carrier pipe shall be Class 50 ductile iron pipe with joint restraints or fully restrained PVC pipe.

1 2.03 CASING SPACERS

- 2
- 3 A. The carrier pipe shall be installed in the casing on spacer skids. Casing
- 4 spacer skids shall be as specified in the Material Specification Manual. The
- 5 supports shall be dimensioned to center the carrier pipe in the casing with a
- 6 top clearance of one-half inch. The height of the supports and runners
- 7 combined shall be sufficient to provide not less than three-quarter inch
- 8 between the casing pipe and outside diameter of the carrier pipe joints.
- 9
- 10 B. Adequate casing spacers shall be provided to properly support the carrier
- 11 pipe and maintain pipe deflection within the pipe manufacturer's
- 12 requirements. In any case, not less than three spacers for each individual
- 13 length of carrier pipe shall be provided.
- 14

15 2.04 TUNNEL LINER PLATES

- 16
- 17 A. Tunnel liner plates shall be asphalt coated galvanized steel plates. The
- 18 Contractor shall submit plans signed and sealed by a registered Engineer
- 19 in the State of Florida and written installation procedures with his request
- 20 for approval.
- 21

22 2.05 MATERIAL MANUFACTURERS

- 23
- 24 A. All materials shall be per Pinellas County Utility Material Specifications
- 25 Manual.
- 26

27 PART 3 – EXECUTION

28

29 3.01 CONSTRUCTION

- 30
- 31 A. Tunneling for the installation of large carrier pipe may be substituted for
- 32 jacking and boring when approved by the Engineer.
- 33
- 34 B. The casing pipe shall be installed by jacking and/or boring, to the length
- 35 shown on the plans through which the pipe provided is to be laid to the
- 36 required line and grade as shown on the plans, and extreme care shall be
- 37 taken to keep the jacking pipe to accurate line and grade.
- 38
- 39 C. All surfaces shall be smooth and uniform without bulges, dents, or warping
- 40 of lengths, and only new pipe shall be used. Finished lengths of pipe shall
- 41 be furnished with beveled cut ends to facilitate proper welding of
- 42 transverse joints. The diameter and wall thickness of the pipe shown on
- 43 the drawings is the minimum required and no extra compensation shall be
- 44 claimed by the Contractor if a larger and thicker pipe is used. It will be the
- 45 Contractor's responsibility in the event that the casing does buckle or
- 46 collapse during these operations.

1 D. The installation of the casing and boring at the head of the casing shall be  
2 one simultaneously. Track guides of sufficient length to carry the power  
3 unit and pipe installation shall be used, in order to maintain proper line and  
4 grade of the casing. Surplus and unsuitable excavated material shall be  
5 disposed of by the Contractor.  
6

7 E. The jacking and exit pits shall have adequate backing provided for the  
8 jacks in such a manner as to avoid any disturbance of adjacent structures  
9 or utilities. The Contractor shall use sheeting for jacking and exit pits if the  
10 angle of repose is exceeded or if by excavating for the pits results in  
11 undermining nearby structures. The sheeting shall be cut three feet below  
12 finished grade and left in place within the right-of-way if it is used. The  
13 Contractor shall install adequate protective railing or temporary fences  
14 around the pits within the crossing right-of-way at all times during  
15 construction.  
16  
17  
18

END OF SECTION

SECTION 33 05 21

HORIZONTAL DIRECTIONAL DRILLING

STANDARD SMALL DIAMETER INSTALLATIONS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Work specified in this section consists of furnishing and installing underground utilities using the horizontal directional drilling (HDD) method of installation, also commonly referred to as directional boring or guided horizontal boring. This Work shall include all services, equipment, materials, and labor for the complete and proper installation, testing, restoration of underground utilities and environmental protection and restoration.
- B. Small Diameter Installation shall be defined as a HDD that the nominal outside diameter of the product pipe is twelve (12) inches or less.

1.02 SUBMITTALS

- A. Prior to beginning work, the Contractor must submit to the Engineer a Work plan detailing the procedure and schedule to be used to execute the Project. The Work plan should include a description of all equipment to be used, down-hole tools, a list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable), list of subcontractors, a schedule of work activity, a safety plan (including MSDS of any potentially hazardous substances to be used), traffic control plan (if applicable), an environmental protection plan and contingency plans for possible problems. Work plan should be comprehensive, realistic and based on actual working conditions for this particular Project. Plan should document the thoughtful planning required to successfully complete the Project.
- B. The Contractor shall submit documentation that the proposed electrofusion personnel have been certified by the pipe or electrofusion accessory manufacturer.
- C. All drilling fluids and loose cuttings shall be contained. No fluids shall be allowed to enter any unapproved areas or natural waterways. Upon completion of the directional drill project, all excess drilling fluid and material shall be removed by the Contractor.

HORIZONTAL DIRECTIONAL DRILLING  
STANDARD SMALL DIAMETER INSTALLATIONS



1  
2 D. The Contractor shall submit a Bentonite Management Plan that includes the  
3 following as a minimum.  
4

5 1. Rapid response procedures - directional drilling shall be performed by  
6 a Contractor who has the expertise required to perform the related  
7 work. The Contractor shall designate qualified personnel and  
8 equipment on the site during directional drilling operations responsible  
9 for monitoring drilling fluid pressure, and watching surface conditions  
10 for visual signs of frac-out. Contractor shall provide immediate  
11 response and initiate containment procedures in the event of an  
12 occurrence of a bentonite spill. In the event of a bentonite spill or  
13 frac-out all drilling activities shall be stopped. Drill stem shall be  
14 removed from the bore hole and the hole abandoned.  
15

16 2. Containment procedures - sediment control systems such as: silt  
17 fence or earth berms on uplands, and floating silt barriers or other  
18 aquatic barriers in water, and other means necessary to prevent the  
19 spread of the bentonite spill shall be installed immediately.  
20

21 3. Timely cleanup capability - remediation of the lost bentonite shall  
22 begin immediately. Cleanup shall include removal of the material  
23 from the site by an approved method, and disposal of the material by  
24 an approved method in an appropriate location as directed by the  
25 County representative.  
26

27 E. Contractor shall submit Specifications on directional drilling equipment to be  
28 used to ensure that the equipment will be adequate to complete the Project.  
29 Equipment shall include but not be limited to: drilling rig, mud system, mud  
30 motors (if applicable), down-hole tools, guidance system and rig safety  
31 systems. Calibration records for guidance equipment shall be included.  
32 Specifications for any drilling fluid additives that Contractor intends to use or  
33 might use will be submitted.  
34

35 F. Specifications on material to be used shall be submitted to Engineer and  
36 material shall include the pipe, fittings, drilling mud, drilling additives and any  
37 other item which is to be an installed component of the Project or used  
38 during construction.  
39

#### 40 1.03 QUALITY ASSURANCE 41

42 A. The requirements set forth in this Specification include a wide range of  
43 procedural precautions necessary to insure that the very basic, essential  
44 aspects of a proper directional bore installation are adequately controlled.  
45 Strict adherence shall be required under specifically covered conditions

#### HORIZONTAL DIRECTIONAL DRILLING STANDARD SMALL DIAMETER INSTALLATIONS

outlined in this Specification. Adherence to the Specifications contained herein, or the Engineer's approval of any aspect of any directional bore operation covered by this Specification, shall in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the Work authorized under the Contract.

- B. Drilling Notes: The pipe shall be installed to the exact lines and grades shown on the plans by a State of Florida licensed and bonded underground utility Contractor, with minimum two years experience in Directional Drilling.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing, delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this Project.

### 2.02 PRODUCT PIPE, JOINTS AND FITTINGS

#### A. PIPE

1. All product pipe to be installed by the HDD operation will be High Density Polyethylene (HDPE), Restrained Joint PVC or Restrained Joint Ductile Iron pipe.
2. Refer to material specifications for material requirements.
3. Refer to piping sections of this specification for pipe handling requirements.

#### B. FITTINGS

1. Refer to material specifications for material requirements.

#### C. DRILLING FLUID (MUD) SYSTEM

1. Drilling fluid shall be composed of a carrier fluid (water) and drilling fluid additives (bentonite and/or polymers). Bentonite is a naturally occurring clay mineral (montmorillonite) that forms a mud when mixed with water.

## HORIZONTAL DIRECTIONAL DRILLING STANDARD SMALL DIAMETER INSTALLATIONS

- 1                   2.     The composition of the drill fluid is determined by the results of  
2                   geological investigation executed in line with the framework of the  
3                   project planned before construction.  
4  
5                   3.     The principal functions of drilling fluids used in HDD are:  
6  
7                   a.     Transporting drill cuttings to the surface by suspending and  
8                   carrying them in the fluid stream flowing in the annulus  
9                   between the borehole wall and the drill  
10                  pipe/product.  
11  
12                  b.     Cleaning build-up on drill bits or reamer cutters by directing  
13                  fluid streams at the cutters.  
14  
15                  c.     Cooling the downhole tools and electronic equipment.  
16  
17                  d.     Lubricating to reduce the friction between the drill pipe/product  
18                  pipe and the borehole wall.  
19  
20                  e.     Stabilizing the borehole, especially in loose or soft soils by  
21                  building a low permeability filter cake, and exerting a positive  
22                  hydrostatic pressure against the borehole wall. The filter cake  
23                  along with positive hydrostatic pressure reduces collapse of  
24                  the borehole and prevents formation fluids (i.e. groundwater)  
25                  from flowing into the borehole or drilling fluids from exiting the  
26                  borehole into the formation (loss of circulation).  
27  
28                  f.     The Contractor shall provide hydraulic power to the borehole  
29                  with a downhole mud motor.  
30  
31                  g.     The following fluid properties are to be tested and considered  
32                  to assure compatibility between the drilling fluid mixture and  
33                  the native soil after proper identification and characterization.  
34                  These fluid properties are density, viscosity, pH – value,  
35                  circulation, volume and solid content.  
36  
37                  h.     The drilling fluid pressures and flow rates shall be continuously  
38                  monitored and recorded by the Contractor at the pump and  
39                  within the annular space within thirty (30) feet of the drilling  
40                  head.  
41

## 42   2.03   DRILLING SYSTEM

- 43  
44           A.     The directional drilling machine shall consist of a hydraulically powered  
45           system to rotate, push and pull hollow drill pipe into the ground at a variable

### HORIZONTAL DIRECTIONAL DRILLING STANDARD SMALL DIAMETER INSTALLATIONS

1 angle while delivering a pressurized fluid mixture to a guidable drill (bore)  
2 head. The machine shall be anchored to the ground to withstand the pulling,  
3 pushing and rotating pressure required to complete the crossing. The  
4 hydraulic power system shall be self-contained with sufficient pressure and  
5 volume to power drilling operations. Hydraulic system shall be free of leaks.  
6 Rig shall have a system to monitor and record maximum pull-back pressure  
7 during pull-back operations. The rig shall be grounded during drilling and  
8 pull-back operations. There shall be a system to detect electrical current from  
9 the drill string and an audible alarm which automatically sounds when an  
10 electrical current is detected.

11  
12 B. The drill head shall be steerable by changing its rotation and shall provide  
13 the necessary cutting surfaces and drilling fluid jets.

14  
15 C. Mud motors (if required) shall be of adequate power to turn the required  
16 drilling tools.

17  
18 D. The drill pipe shall be constructed of high quality 4130 seamless tubing,  
19 grade D or better with thread.

## 20 21 2.04 GUIDANCE SYSTEM

22  
23 A. The method of guidance utilized in locating and steering the pilot string from  
24 entry to exit shall be state of the art. Readings shall be recorded after the  
25 advancement of each successive drill pipe and the readings plotted. Access  
26 to all recorded readings and plan and profile information shall be made  
27 available to the Engineer, or his representative at all times.

## 28 29 2.05 DRILLING FLUID (MUD) SYSTEM

30  
31 A. A self-contained, closed, drilling fluid mixing system shall be of sufficient size  
32 to mix and deliver drilling fluid composed of bentonite clay, potable water and  
33 appropriate additives. Mixing system shall be able to molecularly shear  
34 individual bentonite particles from the dry powder to avoid clumping and  
35 ensure thorough mixing. The drilling fluid reservoir tank shall be a minimum  
36 of five hundred (500) gallons. Mixing system shall continually agitate the  
37 drilling fluid during drilling operations.

38  
39 B. Drilling fluid shall be composed of clean water and bentonite clay. Water  
40 shall be from an authorized source with a pH of 8.5 - 10. Water of a lower pH  
41 or with excessive calcium shall be treated with the appropriate amount of  
42 sodium carbonate or equal. The water and bentonite clay shall be mixed  
43 thoroughly and be free of any clumps or clods. No additional material may be  
44 used in drilling fluid without prior approval from Engineer. Contractor is  
45 responsible for provisions to obtain clean water for the fluid.

### HORIZONTAL DIRECTIONAL DRILLING STANDARD SMALL DIAMETER INSTALLATIONS

The Bentonite mixture used shall have the minimum viscosities as measured by a March Funnel:

Rock, Clay - 60 sec.

Hard Clay - 40 sec.

Soft Clay - 45 sec.

Sandy Clay - 90 sec.

Stable Sand - 80 sec.

Loose Sand - 110 sec.

Wet Sand - 110 sec.

These viscosities may be varied to best fit the soil conditions encountered, as approved by the Engineer.

C. Additives to drilling fluid such as drill soap, polymers, etc. shall be "environmentally safe" and be approved for such usage. No diesel fuel will be used.

D. The mud pumping system shall have a minimum capacity of 50 GPM and be capable of delivering the drilling fluid at a constant minimum pressure of 1000 psi. The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. A berm, or equivalent, shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system to prevent spills into the surrounding environment. Pumps and or vacuum truck(s) of sufficient size shall be in place to convey excess drilling fluid from containment areas to storage and facilities.

## 2.06 OTHER EQUIPMENT

A. Pipe rollers shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall be used to prevent excess sagging of pipe. Rollers shall be used as necessary to assist in pull back operations and in layout/fusing of material.

B. Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of Engineer.

C. Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the Engineer prior to commencement of the Work.

### HORIZONTAL DIRECTIONAL DRILLING STANDARD SMALL DIAMETER INSTALLATIONS

1 Consideration for approval will be made on an individual basis for each  
2 specified location. The proposed device or system will be evaluated prior to  
3 approval or rejection on its potential ability to complete the utility placement  
4 satisfactorily without undue stoppage and to maintain line and grade within  
5 the tolerances prescribed by the particular conditions of the Project.  
6

## 7 PART 3 – EXECUTION

8

### 9 3.01 GENERAL

10

11 A. Contractor to contact Pinellas County Utilities at least forty-eight (48) hours  
12 before each of the following activities: 1) the set up of a drilling pit, 2) the  
13 start of drilling operation, 3) the installation of service pipe. Upon completion  
14 of the pilot hole phase of the operation, a complete set of as-built records  
15 shall be submitted in duplicate to the Engineer. These records shall include  
16 copies of the plan and profile drawing, as well as directional readings  
17 recorded during the drilling operation.  
18

19 B. The drawings show existing utilities that are believed to be near the  
20 directional drill alignment. There is no guarantee that these utilities are  
21 located as shown or that other utilities may not be present. The Contractor is  
22 to field locate existing utilities in advance of the work so as not to delay work  
23 and avoid conflict or disruption of utility services.  
24

25 C.  
26

### 27 3.02 PERSONNEL REQUIREMENTS

28

29 A. All personnel shall be fully trained in their respective duties as part of the  
30 directional drilling crew and in safety. Each person must have at least two  
31 years directional drilling experience. A competent and experienced  
32 supervisor representing the Contractor and Drilling Subcontractor shall be  
33 present at all times during the actual drilling operations. A responsible  
34 representative who is thoroughly familiar with the equipment and type work to  
35 be performed, must be in direct charge and control of the operation at all  
36 times. In all cases the supervisor must be continually present at the job site  
37 during the actual directional bore operation. The Contractor and  
38 Subcontractor shall have a sufficient number of competent workers on the  
39 job at all times to insure the directional bore is made in a timely and  
40 satisfactory manner.  
41

42 Personnel who are unqualified, incompetent or otherwise not suitable for the  
43 performance of this Project shall be removed from the jobsite and replaced  
44 with a suitable person.

### 45 3.03 DRILLING PROCEDURE

## HORIZONTAL DIRECTIONAL DRILLING STANDARD SMALL DIAMETER INSTALLATIONS

- 1  
2 A. Work site as indicated on drawings, within right-of-way, shall be graded or  
3 filled to provide a level working area. No alterations beyond what is required  
4 for operations are to be made. Contractor shall confine all activities to  
5 designated work areas.  
6  
7 B. Entire drill path shall be accurately surveyed with entry and exit stakes  
8 placed in the appropriate locations within the areas indicated on Drawings. If  
9 Contractor is using a magnetic guidance system, drill path will be surveyed  
10 for any surface geo-magnetic variations or anomalies.  
11  
12 C. Contractor shall place silt fence between all drilling operations and any  
13 drainage, wetland, waterway or other area designated for such protection by  
14 contract documents, state, federal and local regulations. Additional  
15 environmental protection necessary to contain any hydraulic or drilling fluid  
16 spills shall be put in place, including berms, liners, turbidity curtains and other  
17 measures. Contractor shall adhere to all applicable environmental  
18 regulations. Fuel or oil may not be stored in bulk containers within two  
19 hundred (200) feet of any water-body or wetland.  
20  
21 D. Contractor shall adhere to all applicable state, federal and local safety  
22 regulations and all operations shall be conducted in a safe manner. Safety  
23 meetings shall be conducted at least weekly with a written record of  
24 attendance and topic submitted to Engineer.  
25  
26 E. Pipe shall be welded/fused together in one length, if space permits. Pipe will  
27 be placed on pipe rollers before pulling into bore hole with rollers spaced  
28 close enough to prevent excessive sagging of pipe.  
29  
30 F. Pilot hole shall be drilled on bore path with no deviations greater than five  
31 percent of depth over a length of one hundred (100) feet. In the event that  
32 pilot does deviate from bore path more than five percent of depth in one  
33 hundred (100) feet, Contractor shall notify Engineer and Engineer may  
34 require Contractor to pull-back and re-drill from the location along bore path  
35 before the deviation.  
36  
37 G. In the event that a drilling fluid fracture, inadvertent returns or returns loss  
38 occurs during pilot hole drilling operations, Contractor shall cease operations  
39 and shall discuss corrective options with the Engineer, work shall then  
40 proceed accordingly.  
41  
42 H. Upon approval of the pilot hole location by the Engineer, the hole  
43 enlarging or back reaming phase of the installation shall begin. The  
44 borehole diameter shall be increased to accommodate the pullback  
45 operation of the required size of PE pipe. The type of back reamer to be

HORIZONTAL DIRECTIONAL DRILLING  
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utilized in this phase shall be determined by the types of subsurface soil conditions that have been encountered during the pilot hole drilling operation. The reamer type shall be at the Contractor's discretion with the final hole diameter being a maximum of twenty (20) percent larger than the outside diameter of the product pipe being installed in the borehole.

I. The open borehole may be stabilized by means of bentonite drilling slurry pumped through the inside diameter of the drill pipe and through openings in the reamer. The slurry will also serve as an agent to carry the loose cuttings to the surface through the annulus of the borehole. These cuttings and bentonite slurry are to be contained at the exit hole or entry side of the directional bore in pits or holding tanks. The slurry may be recycled at this time for reuse in the hole opening operation or it shall be hauled by the Contractor to an approved dump site and properly disposed. A complete list of all drilling fluid additives and mixtures to be used in the directional operation will be submitted to the Engineer along with their respective material safety data sheets.

J. In the event that pipe becomes stuck, Contractor shall notify Engineer. Engineer, Contractor, and/or the maintaining agency shall discuss options and then work will proceed accordingly.

K. Excess pipe shall be removed and the bore hole associated with this excess pipe shall be filled with flowable fill or grout, unless the area of the excess pipe is excavated and backfilled as part of the tie-in operations.

#### 3.04 PIPE TESTING

A. Following successful pull-back of pipe, Contractor shall test pipe as required in Section 01 45 17, Pipeline Testing Requirements.

#### 3.05 SITE RESTORATION

A. Following drilling operations, Contractor will demobilize equipment and restore the work-site to original condition. Any noticeable surface defects due to the drilling operation shall be repaired by Contractor.

#### 3.06 RECORD KEEPING

A. Contractor shall maintain a daily project log of drilling operations and a guidance system log with a copy given to Engineer at completion of boring. As-built drawings shall be certified as to accuracy by Contractor as required in Section 01 78 39.

END OF SECTION

### HORIZONTAL DIRECTIONAL DRILLING STANDARD SMALL DIAMETER INSTALLATIONS



SECTION 33 05 22

HORIZONTAL DIRECTIONAL DRILLING

SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

PART 1-GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

- A. This specification covers the installation of pipe by horizontal directional drilling (HDD). HDD is a trenchless excavation method that is accomplished in three phases. The first phase consists of drilling a small diameter pilot hole along a designed directional path. The second phase consists of enlarging the pilot hole to a diameter suitable for installation of the pipe. The third phase consists of pulling the product pipe into the enlarged hole. HDD is accomplished using a specialized horizontal drilling rig with ancillary tools, equipment and borehole stabilizing drilling fluids.
- B. The Contractor shall provide all necessary labor, tools, materials and equipment to successfully complete the installation of directionally drilled piping as specified herein and to the lines and grades shown on the Contract Drawings. The Contractor shall be responsible for the final constructed product, and for furnishing the qualified labor and superintendence necessary for this method of construction.
- C. The drilling operations shall use techniques of creating or directing a borehole along a predetermined path to a specified target location. Use of down-hole steering tools to change the boring course and monitoring instrumentation to locate and orient the boring along a predetermined course is required.
- D. The mobile drilling system shall utilize a jetting drill bit and/or drill bit with mud motor to drill and circulate cuttings and spoil from the borehole.
- E. Steering shall be accomplished through the use of an articulated section of drill collar that causes an angular offset resulting in the drill bit being off-center. When steering adjustments are required, as dictated by down hole guidance monitoring equipment, the bit is rotated toward the desired direction of travel and the drill pipe and bit are advanced forward without rotation.

1.02 DEFINITIONS

- A. Contractor's Construction Drawings. Shall be defined as drawings by which the Contractor proposes to construct, operate, build, etc., the

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SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

referenced item. The submission of these drawings shall be required for the sole purpose of providing sufficient details to verify that the Contractor's work progress is in accordance with the intent of the design. When required, such drawings will have been previously reviewed and sealed by a qualified professional engineer registered in the State of Florida.

B. Subaqueous Crossings shall be defined as a HDD that crosses under a body of water greater than 50 feet across.

C. Large Diameter Installation shall be defined as a HDD that the nominal outside diameter of the product pipe is greater than twelve (12) inches.

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

A. American Association of State Highway and Transportation Officials (AASHTO).

B. Occupational Safety and Health Administration (OSHA).

C. API Specifications 13A, 1993. Specification for Drilling Fluid Materials, Fifteenth Edition, Dallas, Texas. American Petroleum Institute.

D. API Recommended Practice 13B-1, 1990. Standard Procedures for Field Testing Water-Based Drilling Fluids, First Edition, Dallas, Texas, American Petroleum Institute.

E. API Bulletin 13D, 1985. Bulletin on the Rheology of Oil-Well Drilling Fluids, Second Edition, Dallas, Texas, American Petroleum Institute.

F. Horizontal Directional Drilling Good Practices Guidelines, HDD Industry Consortium, 300pp, 2<sup>nd</sup> ed., 2004.

G. IADC Drilling Manual, 1992. Eleventh Edition, Houston, Texas, International Association of Drilling Contractors.

H. Installation of Pipelines by Horizontal Directional Drilling, Pipeline Research Committee, American Gas Association, PR-227-9424, April 1995.

I. Installation of Pipelines Beneath Levees Using Horizontal Directional Drilling, US Army Corps of Engineers, Waterways Experiment Station, Final Report, CPAR-GL-98-1, April 1998.

#### HORIZONTAL DIRECTIONAL DRILLING SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

1 J. Pressure Pipeline Design for Water and Wastewater, American Society for  
2 Civil Engineers, 2<sup>nd</sup> ed., 1992

3  
4 K. Tables for Hydraulic Design of Pipes and Sewers, American Society for  
5 Civil Engineers, 5<sup>th</sup> ed., 1990.  
6

7 1.04 SUBMITTALS  
8

9 A. Prior to beginning the Work, the contractor must submit to the Engineer  
10 the following items:  
11

12 1. The Contractor shall provide a completed HDD Work plan with  
13 drawings and written description identifying details of the proposed  
14 method of construction and sequence of operations to be  
15 performed during construction. The Work plan shall address the  
16 following requirements:  
17

18  
19 a. Pre-construction walkover and site inspection.  
20

21 1) Call- One Call for utilities location within the limits of  
22 the HDD project (Ground Penetrating Radar (GPR)  
23 Electronic Locate, Subsurface Location as required).  
24

25 2) The Contractor shall video tape and take photographs  
26 of near by structures which may be affected by  
27 inadvertent fluid returns.  
28

29 3) The Contractor shall review as-built drawing and prior  
30 soil reports of past projects in the area, if available.  
31

32 4) The Contractor shall make an effort to discuss the  
33 scope of the proposed project with City, County and  
34 State Agencies that may have previous project  
35 construction knowledge in the vicinity.  
36

37 b. The Contractor shall establish a drill profile between the  
38 entry and exit point by observing various framework  
39 conditions mentioned below in order to ensure, that the  
40 intended theoretical drilling profile line can also be realized in  
41 practice.  
42

43 1) Entry and exit angle  
44

45 2) Slant tangential sections  
46

3) Radii of curvature

HORIZONTAL DIRECTIONAL DRILLING  
SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

1  
2 4) Cover

3  
4 5) Borehole diameter

5  
6 If the Contractor is planning on deviating from bid document  
7 HDD Profile, then the Contractor is required to submit  
8 additional drawings with the new HDD Profile for the  
9 engineer's approval.

10  
11 The deviation drawings shall include a HDD Profile, plan  
12 view and cross-section. The Contractor is also  
13 recommended to submit deviation drawings for larger bores  
14 for site layout plans (Rig and Product Pipe Layout site) and  
15 pipeline stringing area (rollers).

16  
17 c. The Contractor shall provide anticipated drilling rates for  
18 pilot bore, reaming and pullback procedures. These drilling  
19 rates shall be used to calculate drilling fluid volumes  
20 required for pilot hole, each reaming pass and pullback.  
21 The contractor shall guarantee pump capacity and that the  
22 drilling fluid cleaning system is capable of sustaining the  
23 anticipated drilling rates during the pilot bore, reaming and  
24 pullback.

25  
26 d. The Contractor shall submit qualification documents for the  
27 HDD superintendent and key personnel experience in  
28 accordance with Section 1.06A and 1.06B. Also, the  
29 contractor shall have personnel with a Florida/OSHA  
30 Certification for the site Safety Representative.

31  
32 e. The Contractor shall submit a detailed schedule for the HDD  
33 installation at least fifteen (15) days prior to mobilization.  
34 The detail schedule shall identify all major construction  
35 activities and durations, with beginning and completion  
36 dates shown. The detail schedule shall be updated at least  
37 every two weeks or more frequently, as directed by the  
38 Engineer, and shall include but not limited to the following  
39 items:

40 1) Pre-construction walk over and inspection.

41  
42 2) Regular Mobilization and set-up.

43  
44 3) Pilot bore  
45

- 4) Pre-reaming and reaming.
- 5) Layout and thermal butt fusing of pipe.
- 6) Pressure Testing of pipe prior to pullback when practical or as directed by the Engineer.
- 7) Final reaming and pullback of product pipe.
- 8) Annulus grouting after installation (optional).
- 9) Mandrel/pig test to confirm deformations of product pipe are within allowable tolerances.
- 10) Cleanup, surface restoration, and demobilization.

- B. The Contractor shall make available complete, legible, written daily logs and records as called for in Section 1.06C of this specification and as directed by the Engineer as it is being created or no later than by noon of the following day to which the records correspond.
- C. The Contractor shall document any deviations from the actual plan and profile of the bore path and the location shown on the plans. The Contractor shall notify the Engineer immediately upon discovery of any deviations from the design plans.
- D. The Contractor shall submit measured mud and/or drilling fluid weights used during pilot boring and reaming of the bore measured at a minimum of twice per shift or at least once per two hundred (200) feet of drilled or reamed length, whichever is more frequent.
- E. The Contractor shall submit an as-built profile of the pilot bore within twenty-four (24) hours of completion of the pilot bore.
- F. The Contractor shall submit records of equipment calibrations and certifications for all equipment used for downhole wireline survey and tracking of the drill head. Procedures for operating the downhole wireline survey tools shall be described, including measures to verify the accuracy of the equipment readings. The Contractor shall submit a drawing with the surveyed location of the surface wire grid system for the "TruTracker" or equipment tracking system. The Contractor shall submit methods for surveying the coordinates of the surface wire grid system both on shore and across or under the waterway. During pilot bore, reaming passes, and pipe pullback the Contractor shall electronically record the following information once per drill pipe or every thirty (30) feet, whichever is most frequent. The information shall be provided to the Engineer, as it is being

HORIZONTAL DIRECTIONAL DRILLING  
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created or no later than noon of the day following the shift for which the records were taken.

1. Rate of Penetration
2. Rotation
3. Thrust
4. Pump Rates
5. Measured Depth
6. Annular Pressure
7. Flow Meter (Returns Suction Line)

G. The Contractor shall submit an as-built profile of the pilot bore within 24 hours of completion of the pilot bore.

H. The Contractor shall submit methods and procedures for filling the pipe with fluid during pull back and testing.

I. A Frac-out and Surface Spill Contingency Plan shall be prepared for the installation of pipelines using HDD. This plan shall be submitted to the Engineer prior to construction. The Contractor shall submit a letter of intent signed by an authorized representative of Contractor, confirming that the plan will be followed. The contingency plan for inadvertent returns/hydrofracture shall address all potential pathways for release of drilling fluid, and shall address containment, cleanup, and mitigation measures as well as reporting procedures and points of contact for regulatory and permitting agencies. The Plan shall address releases to the ground surface and to waterways. Stand-by equipment shall be provided by the Contractor to recover fluids from the waterway via truck and via boat. Floating turbidity barriers shall be part of the stand-by equipment to minimize dispersion in the event that drilling fluids reach the waterway.

J. Soil Separation Plant and Plans for Disposal:

1. The Contractor shall submit details on the pump and cleaning plant. Include dimensions, manufacturer's specifications, pump capacity, noise rating, and soundproofing details on the system.
2. Pump capacity should be specified for water at sea level elevation, and adjusted for actual elevation and fluid viscosity.
3. Provide details on the generator, including dimensions, noise ratings at twenty-five (25) feet, and soundproofing. Confirm that the generator and other on-site equipment can be operated without exceeding the maximum allowable noise tolerances specified in permit, or "by Pinellas County Noise Ordinance."

1 4. The Contractor shall submit plans for disposal of waste materials  
2 resulting from the pipeline construction, including drilling fluids,  
3 cuttings, waste oil, fuel, discharge water, etc. The Contractor shall  
4 identify the disposal site and submit a letter indicating willingness  
5 and legal authority to accept the described and anticipated waste  
6 products.  
7

8 K. The Contractor shall provide details on measures to be taken to monitor  
9 and protect adjacent utilities, structures, and roadways, and provide  
10 details on monitoring equipment and provisions, including the layout of all  
11 settlement points, and other monitoring points. Provide two copies of pre-  
12 construction survey of adjacent structures and photographs with captions  
13 to document conditions prior to beginning HDD construction.  
14

15 L. The Contractor shall submit a Safety Plan, including the name of the  
16 Contractor's Site Safety Representative, emergency telephone numbers  
17 for medical facilities, and precautions for handling and disposal of any  
18 hazardous or flammable materials. The Safety Plan shall include a code  
19 of safe practices and an emergency plan in accordance with OSHA and  
20 Florida/OSHA requirements.  
21

22 M. The Contractor shall submit detailed descriptions of all equipment and  
23 materials to be used for the pipeline installation. Equipment and material  
24 submittals shall include directional drill rig, drill rig anchoring system, the  
25 mud system, drill bits, mud motors, reamers or hole openers, pipe rollers  
26 for pullback, drilling fluid and additives, pipe pull head, and pipe pulling  
27 swivel. Descriptions of equipment shall include manufacturers'  
28 specifications, calibrations, appropriate drawings, photographs, and  
29 descriptions of any modifications since manufacture. Descriptions of  
30 drilling fluid additives shall be accompanied by Materials Safety Data  
31 Sheets (MSDS) and manufacturers' descriptions and warranties.  
32

#### 33 1.05 PERFORMANCE REQUIREMENTS 34

35 A. The Contractor shall provide all equipment, materials, and personnel  
36 necessary for completing the installation as shown on the plans and  
37 specified herein. The equipment and materials shall include, but are not  
38 limited to:  
39

40 1. Directional drilling rig with all ancillary equipment, including drill  
41 pipe, drilling fluid, cutting tools, reaming bits, swivels, expanders,  
42 motors, pumps, hoses, mixing equipment, drilling fluid processing  
43 equipment (cuttings separation equipment), downhole survey  
44 equipment, energized surface grid tracking system, fluid pressure  
45 and flow rate monitoring equipment, pull back monitoring  
46 equipment, spare parts, pipe handling equipment, crane, backhoe,

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1 roller, side boom tractors, control cabin, control equipment, and  
2 office equipment.

3  
4 2. Drilling fluids, water, fuel, lubricant, polymers, or other additives.

5  
6 3. Any other expendable or reusable materials, supplies, and  
7 equipment needed for the installation.  
8

9 B. The drilling equipment shall be capable of advancing through the geologic  
10 conditions to be encountered at the site, as described in the geotechnical  
11 reports, and as anticipated by the Contractor.  
12

13 C. The drilling fluid shall be designed for the geologic conditions to be  
14 encountered at the site, as described in the geotechnical reports and as  
15 anticipated by the Contractor.  
16

17 D. The drilling system shall include a fluid pump and separation plant that  
18 can achieve the rates of drilling fluid pumping, spoil separation, and slurry  
19 cleaning required by the Contractor to achieve planned production rates  
20 for the soils described in the geotechnical reports, and as anticipated by  
21 the Contractor. Shaker screens and hydrocyclones may be required for  
22 efficient separation of spoils. The Contractor is advised that the  
23 separation plant must fit within the allowable work areas.  
24

25 E. All spoil and slurry must be contained in trucks, tanks, approved  
26 recirculation pits, or other containers at all times. Dumping of spoil or  
27 slurry on the ground, discharge into sewer, or discharge into the water  
28 bodies will not be permitted. All spoils will be transported and disposed of  
29 off site at an approved disposal facility that meets all State of Florida and  
30 local requirements.  
31

32 F. Perform all work within areas shown on the plans.  
33

34 G. The pipeline shall be installed using the radii of curvatures and entry and  
35 exit angles shown on the drawings, unless deviations are approved in  
36 writing by the Engineer.  
37

38 H. Pipe rollers and lifters will be required to help the transition of the product  
39 pipe into the borehole. The number of pipe rollers and lifters shall be  
40 determined by the Contractor and submitted as part of the work plan.  
41

42 I. Surface settlement or heave of utilities and other features above the HDD  
43 centerlines and within the zone influenced by the HDD construction shall  
44 be limited in values that avoid damage. The Contractor shall repair any  
45 damage resulting from settlement or heave caused by HDD activities at  
46 no additional cost to the Owner.

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- 1  
2 J. It shall be the Contractor's sole responsibility that all work is done in  
3 conformance with all applicable federal, state, and local safety  
4 requirements. Required safety equipment and procedures shall be  
5 employed by the Contractor at all times. All materials and methods of  
6 construction shall meet the applicable requirements of Pinellas County  
7 and the applicable requirements of the State of Florida Administrative  
8 Code.  
9
- 10 K. The pipe will be certified by the Contractor as meeting all requirements of  
11 the specifications. The product pipe will be pressure-tested by the  
12 Contractor prior to pull back when practical or as directed by the Engineer,  
13 and after installation is completed, in accordance with requirements  
14 specified by the Manufacturer.  
15
- 16 L. The Contractor shall allow the Engineer access to and shall furnish  
17 necessary assistance and cooperation to aid the Engineer in observations  
18 and data and sample collection, including, but not limited to the following:  
19
- 20 1. The Owner and Engineer shall have full access to the operator  
21 control container prior to, during, and following all HDD operations.  
22 This shall include, but not be limited to, providing visual access to  
23 real-time operator control screens, gauges, and indicators.  
24
- 25 2. The Owner and Engineer shall have full access to the slurry  
26 separation plant prior to, during and following all HDD operations.  
27 This shall include, but not be limited to, full access to shaker  
28 screens, hydrocyclones, conveyor belts, and slurry and spoil  
29 holding tanks. The Engineer shall be allowed to collect soil  
30 samples from the shaker screens and/or spoil holding tanks on the  
31 slurry separation plant a minimum of once per drill pipe section, and  
32 whenever changes in conditions are observed or suspected.  
33
- 34 3. Sound levels measured by the Engineer or Engineer's consultant  
35 shall not exceed 55 dBA 6 PM to 7 AM, or 60 dBA 7 AM to 6 PM,  
36 within five feet of the nearest occupied building. Contractor shall  
37 comply with all local noise ordinances if the local requirements are  
38 more stringent. Sound levels in excess of these values are  
39 sufficient cause to have the work halted until equipment can be  
40 quieted to these levels. Work stoppage by the County for  
41 excessive noise shall **not** relieve the Contractor of the other  
42 portions of this specification including, but not limited to, completion  
43 of all Work within specified contract time and contract price. The  
44 Contractor shall submit a plan prior to construction identifying all  
45 noise reduction/abatement procedures. The plan will be approved  
46 by the Engineer prior to construction.

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- 1  
2 4. If mufflers cannot achieve the necessary noise reduction, noise  
3 abatement shall be accomplished by the Contractor's installation of  
4 baffles (or other acceptable means) positioned to break line-of-sight  
5 from the noise source to affected residences and/or commercial  
6 structures. Minimum noise abatement measures shall consist of  
7 equipping all engines with hospital grade mufflers or silencers.  
8

9 1.06 QUALITY ASSURANCE

- 10  
11 A. The Contractor shall have at least three years of demonstrated successful  
12 experience installing pipelines using the horizontal directional drilling  
13 process on at least three projects with similar diameters, installation  
14 lengths, and ground and ground water conditions. The Contractor shall  
15 furnish evidence of successful use of wireline and "Tru-Tracker" guidance  
16 and tracking system on at least two projects. The Contractor shall furnish  
17 evidence of successful experience with downhole pressure and load  
18 monitoring devices on at least one project. The Contractor shall furnish  
19 evidence of successful experience by including project owner, project  
20 name, location, diameter, length, depth, ground conditions, any problems  
21 encountered and how resolved, and any claims and how resolved.  
22 Owner's representative with address and telephone number shall be  
23 provided.  
24  
25 B. Qualifications and Experience of Contractor Personnel: The Contractor  
26 shall employ skilled, experienced superintendent(s), drill rig operators, and  
27 key personnel. The superintendent(s) and drill rig operators shall have at  
28 least three years of successful experience using the HDD process, on at  
29 least five projects with similar diameters, pull back length and ground  
30 conditions. The superintendent(s), drill rig operator, and key personnel  
31 shall demonstrate successful completion of at least three projects where  
32 pipe was installed with horizontal directional drilling techniques. The  
33 Contractor shall furnish resumes of the superintendent(s) and operators.  
34 Personnel experience records should include project names, locations,  
35 pull back lengths, ground conditions, pipe materials, project description,  
36 project owner, Engineer, and references with names, addresses and  
37 telephone numbers. The superintendent and operators listed in the  
38 submittal shall be on site during all construction related activities required  
39 for HDD installation.  
40  
41 C. Daily logs and records shall be maintained by the Contractor and shall  
42 include drilling lengths, location of drill head, drilling fluid pressures and  
43 flow rates, drilling fluid losses, inadvertent returns, drilling times required  
44 for each pipe joint, any instances of retraction and re-drilling of the pilot  
45 bore or segments thereof, and any other relevant observations, including  
46 any observed settlement, heave, frac-outs or surface spills. The drilling

HORIZONTAL DIRECTIONAL DRILLING  
SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

fluid pressures shall be measured at the entry point and at the drill head and recorded at least twice per drill pipe length. These records shall be maintained and provided daily to the Engineer. The position of the drill head shall be continuously tracked and recorded by a downhole wireline tracking locator system, and shall be supplemented by a "Tru-Tracker" or equivalent tracking system installed that completely encompasses the area between the entry point and the exit point. The coordinates of the surface wire grid system shall be surveyed and recorded. A plot of actual locations of the bore path shall be maintained and updated daily, or more frequently, as directed by the Engineer.

D. Contractor shall provide at least seventy-two (72) hours advance written notice to the Engineer of the planned inception of major drilling activities, including pilot bore launch, pre-reaming, reaming, and product pipe pullback. The Contractor shall immediately notify the Engineer, in writing, when any significant problems are encountered or if ground conditions are considered by the Contractor to be materially and significantly different than those represented within the Contract Documents. The Contractor shall perform the pilot bore in the presence of the Engineer, unless Engineer grants prior written approval to perform such work in Engineer's absence.

E. All surveying equipment used for downhole wireline surveying and tracking of the bore path and drill head and layout of the surface wire grid system for the "Tru-Tracker" or equivalent tracking system shall be inspected and calibrated by the equipment manufacturer prior to use. Proof of this inspection and calibration shall be provided to the Engineer prior to the commencement of drilling operations.

## PART 2 – PRODUCTS

### 2.01 GENERAL

A. Directional drilling equipment shall consist of a directional drilling rig of sufficient capacity, drilling rods, appropriate drill bit, reamer, product pipe, drilling fluid, and additives, an adequate guidance system to accurately guide the boring operations and trained and competent personnel to operate the drilling system. All equipment shall be properly inspected to assure good and safe operating condition with sufficient back-up equipment in case of a failure.

## 2.02 PRODUCT PIPE, JOINTS AND FITTINGS

### A. PIPE

1. All product pipe to be installed by the HDD operation will be High Density Polyethylene (HDPE), Restrained Joint PVC or Restrained Joint Ductile Iron pipe.
2. Refer to material specifications for material requirements.
3. Refer to piping sections of this specification for pipe handling requirements.

### B. FITTINGS

1. Refer to material specifications for material requirements.

### C. DRILLING FLUID (MUD) SYSTEM

1. Drilling fluid shall be composed of a carrier fluid (water) and drilling fluid additives (bentonite and/or polymers). Bentonite is a naturally occurring clay mineral (montmorillinite) that forms a mud when mixed with water.
2. The composition of the drill fluid is determined by the results of geological investigation executed in line with the framework of the project planned before construction.
3. The principal functions of drilling fluids used in HDD are:
  - a. Transporting drill cuttings to the surface by suspending and carrying them in the fluid stream flowing in the annulus between the borehole wall and the drill pipe/product.
  - b. Cleaning build-up on drill bits or reamer cutters by directing fluid streams at the cutters.
  - c. Cooling the downhole tools and electronic equipment.
  - d. Lubricating to reduce the friction between the drill pipe/product pipe and the borehole wall.
  - e. Stabilizing the borehole, especially in loose or soft soils by building a low permeability filter cake, and exerting a positive hydrostatic pressure against the borehole wall. The filter cake along with positive hydrostatic pressure reduces

collapse of the borehole and prevents formation fluids (i.e. groundwater) from flowing into the borehole or drilling fluids from exiting the borehole into the formation (loss of circulation).

f. The Contractor shall provide hydraulic power to the borehole with a downhole mud motor.

g. The following fluid properties are to be tested and considered to assure compatibility between the drilling fluid mixture and the native soil after proper identification and characterization. These fluid properties are density, viscosity, pH – value, circulation, volume and solid content.

h. The drilling fluid pressures and flow rates shall be continuously monitored and recorded by the Contractor at the pump and within the annular space within thirty (30) feet of the drilling head.

#### D. DRILL PIPE

The Contractor shall use high quality drill pipes. The drill pipe shall be inspected periodically and properly maintained within the manufacturer's prescribed limits.

The Contractor shall adhere to the manufacturer's guidelines for using their pipe, and sound practices must be followed to ensure reduced risk of downhole failure, i.e. the Contractor shall not bend the drill pipe sharper than the minimum bend radius stated by the manufacturer, especially on HDD enter and exit locations.

### PART 3 - EXECUTION

#### 3.01 GENERAL

A. Contractor shall contact Pinellas County Utilities at least forty-eight (48) hours before each of the following activities: 1) the set up of a drill rig pit, 2) the start of the pilot bore, 3) the pull back of the product pipe. Upon completion of the pilot hole phase of the operation, a complete set of as-built records shall be submitted in duplicate to the Engineer. These records shall include copies of the plan and profile drawing, as well as directional readings recorded during the drilling operation.

B. The drawings show existing utilities that are believed to be near the directional drill alignment. There is no guarantee that these utilities are located as shown or that other utilities may not be present. The

### HORIZONTAL DIRECTIONAL DRILLING SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

Contractor is to field locate existing utilities in advance of the work so as not to delay work and avoid conflict or disruption of utility services.

C. The Contractor shall provide adequate control of surface water and drilling fluids drainage and runoff, and provide silt fences and hay bales to prevent surface water or drilling fluids from entering the adjacent environmentally sensitive area.

D. The Contractor shall not initiate HDD until all submittals are received, reviewed, and accepted by the Engineer.

E. The Contractor shall not initiate HDD until all required permits are obtained.

### 3.02 PERSONNEL QUALIFICATIONS

A. Horizontal Directional Drilling is a complex operation and requires a high standard of qualified personnel to execute the Work. The personnel engaged in the execution of the work shall be carefully trained both in the project management and the operation of HDD equipment.

B. The Contractor shall employ skilled, experienced superintendent(s), drilling operators, safety specialist and competent support personnel.

C. The Contractor superintendent and drilling operators shall have at least three years of demonstrated successful experience installing pipelines using HDD process on at least three projects with similar diameters, installation lengths and groundwater conditions.

D. The Contractor shall furnish evidence of successful use of wire line and "Tru-Tracker" guidance and tracking systems on at least two similar projects.

### 3.03 WORK STAGING AREA

A. The Contractor shall limit staging and work operations to the areas shown on the Drawings, or as otherwise accepted in writing by the Engineer, for storage of equipment and materials, parking, product pipe layout, drilling, and other work.

B. The Contractor shall maintain the work area in a manner that shall minimize adverse impacts on other public use activities. The Contractor shall proceed with work in a safe, orderly manner, while maintaining the work site free of debris and unnecessary equipment and materials.

- 1 C. The Contractor shall follow all requirements of the Frac-Out and Surface  
2 Spill Contingency Plan as submitted and approved and shall control  
3 operational pressures, drilling mud weights, drilling speeds, and any other  
4 operational factors required to avoid hydro-fracture, fluid losses to  
5 formations, and drilling fluid spillage. This includes any spillages or  
6 returns at entry and exit locations or at any intermediate point. All  
7 inadvertent returns or spills shall be promptly contained and cleaned up.  
8 The Contractor shall maintain on-site mobile spoil removal equipment  
9 during all drilling, pre-reaming, reaming, and pull back operations and  
10 shall be capable of quickly removing spoils. The Contractor shall  
11 immediately notify Engineer of any inadvertent returns or spills and  
12 immediately contain and clean up the return or spill.  
13  
14 D. Combustible materials (fuel, oil, lubricants, etc.) shall be stored off-site or  
15 in a well-ventilated storage facility removed from the immediate vicinity of  
16 the drilling area by at least twenty (20) feet.  
17  
18 E. The Contractor shall provide maintenance of traffic plans, in accordance  
19 with approved Traffic and Safety Requirements, erect appropriate barriers,  
20 warning lights, and signs, painted with approved colors, warnings, and  
21 graphics to ensure adequate warning to motorist and the public.  
22  
23 F. The Contractor shall install an enclosure fence and/or barrier walls around  
24 the work area. The enclosure fence shall include a lockable gate and  
25 should be adequate to prevent entry of unauthorized persons, when  
26 practical or as directed by Engineer.  
27  
28 G. At the completion of construction, the Contractor shall remove all  
29 temporary facilities installed by the Contractor. Unused soil, aggregate,  
30 and other materials shall be removed and disposed of at approved sites in  
31 accordance with all Federal, State, and Local regulations. Any damage to  
32 streets, lawns, common areas, and sidewalks shall be restored to original  
33 or better conditions. All disturbed areas shall be re-vegetated.  
34

#### 35 3.04 MOBILIZATION

- 36  
37 A. The Contractor shall mobilize all equipment, materials, and personnel  
38 necessary to install pipeline using the HDD process at the locations shown  
39 in the Drawings.  
40  
41 1. The Contractor shall set up temporary workspace within the areas  
42 shown on the Drawings. Appropriate precautions and measures  
43 shall be employed by the Contractor to prevent erosion, surface  
44 drainage, and spillage of drilling fluids or other materials that could  
45 adversely impact the environmental quality of the site. Silt fences,  
46 hay wattles, and hay bales shall be used to line the work area to

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minimize erosion and contain any spillages or runoff. A vacuum truck, shovels, brooms, buckets, and barrels shall be kept on-site to facilitate containment and cleanup. A vacuum truck or trailer unit shall be on standby and capable of responding within one hour to any spill or inadvertent return incident.

2. The exit area shall have a drilling fluid pit for containing drilling fluids and cuttings. Appropriate precautions and measures shall be employed by the Contractor to prevent erosion, surface drainage, and spillage of drilling fluids or other materials that could adversely impact the environmental quality of the site. Hay bales or wattles shall be used to line the exit area to minimize erosion and runoff. Containment and cleanup equipment shall be available to contain and clean up any surface spills and frac-outs.

3. Layout area shall be free of stones, wood, debris and obstructions. A crane to lift pipe over driveways and entrances, etc. and pipe rollers shall be provided by the Contractor to facilitate pipe pull back.

### 3.05 HORIZONTAL DIRECTIONAL DRILLING

A. The capacity of the directional drilling system used by the Contractor shall be adequate to install the specified pipeline.

B. The pump used by the Contractor shall be adequate to supply the required flow rate and pressures at the anticipated drilling fluid viscosity at all times. Drilling speeds shall not exceed pump capacity.

C. At all times during the pilot bore the Contractor shall provide and maintain a bore tracking system that is capable of accurately locating the position of the drill head in the x, y, and z axes. The Contractor shall record these data at least twice per drill pipe length or every fifteen (15) feet, whichever is more frequent.

1. Contractor shall monitor and record x, y, and z coordinates relative to an established surface survey benchmark, from downhole survey data using downhole wireline system. "Tru-Tracker" energized surface grid, or equivalent, shall be installed and used to supplement the wireline system. The "Tru-Tracker" grid shall encompass the entire area of the bore including underwater across the water. Alternatively, the Contractor may propose fixed "Tru-Tracker" grids on land outside the waterway, supplemented by moveable grids on floating templates that can be temporarily anchored and surveyed while drilling the pilot hole. The moveable template should be sufficiently large to encompass the active drilling area for a two hour drilling period, and should be at least as

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1 wide as the maximum depth of the bore. The grids shall be  
2 surveyed to establish horizontal and vertical position to 0.1 feet  
3 accuracy. The data shall be continuously monitored and recorded  
4 at least twice per drill pipe length or every fifteen (15) feet,  
5 whichever is most frequent.  
6

7 2. Deviations between the recorded and design bore path shall be  
8 calculated and reported on the daily log. If the deviations exceed  
9 tolerances specified elsewhere, such occurrences shall be reported  
10 immediately to the Engineer. The Contractor shall undertake all  
11 necessary measures to correct deviations and return to design line  
12 and grade.  
13

14 3. Drilling fluid pressures and flow rates shall be continuously  
15 monitored and recorded by the Contractor. The pressures shall be  
16 monitored at the pump and within the annular space with a  
17 downhole pressure-sensing tool located within thirty (30) feet of the  
18 drilling head.  
19

20 4. Maximum allowable drilling speeds shall be calculated by the  
21 Contractor for pilot boring and each reaming pass and shall not be  
22 exceeded for pilot boring or reaming passes. Measurements shall  
23 be taken every fifteen (15) feet.  
24

25 5. The Contractor shall measure and record drilling fluid viscosity and  
26 density at least three times per shift with at least two hours between  
27 readings, using calibrated Marsh funnel and mud balance. These  
28 measurements shall be included in daily logs submitted to the  
29 Engineer. The Contractor shall document modifications to the  
30 drilling fluids, by noting the types and quantities of drilling fluid  
31 additives and the dates and times when introduced. The reason for  
32 the addition of drilling fluid additives or other modifications shall be  
33 documented and reported.  
34

35 The Contractor shall measure and record the pH on a regular basis  
36 (three times per shift with at least two hours between readings) with  
37 pH strips, paper or a pH meter.  
38

39 The Contractor shall constantly monitor and record the circulating  
40 volume, particularly for the early detection of drilling fluid losses, or  
41 thinning, or the danger of borehole collapse. Ground upheavals  
42 can also be detected early from such differences, and necessary  
43 action can be implemented to prevent further damage.  
44  
45

1  
2 The Contractor shall constantly monitor and record the solid (sand)  
3 content to assure there is no significant increase, which can  
4 diversely impact efficiency of the circulations system.  
5

6 D. Entry and exit points shall be as shown on the drawings, unless otherwise  
7 approved in writing by the Engineer. The Contractor shall employ  
8 licensed, professional land surveyors to locate the entry and exit points,  
9 and to establish horizontal and vertical datum for the bore and the pipe  
10 layout and fabrication areas.  
11

12 E. Drill entrance and exit angles shall be as shown on the Contract Plans and  
13 Drawings, unless otherwise approved in writing by the Engineer.  
14

15 F. The pilot bore shall follow the design path of the bore shown on the  
16 Drawings.  
17

18 1. Horizontal and vertical deviations shall be less than plus or minus  
19 three feet from the design path centerline. The Contractor shall  
20 continuously monitor horizontal and vertical position and record the  
21 position at least twice per drill pipe length, or at fifteen (15) feet  
22 intervals, whichever is most frequent.  
23

24 2. The radius of curvature shall not be less than that shown on the  
25 Drawings. The radius of curvature shall be calculated over the  
26 distance of three drill pipe sections.  
27

28 3. The location of the entry and exit points shall be as shown on the  
29 Drawings. The Contractor shall be solely responsible for all work  
30 necessary to correct excessive deviations from line and grade,  
31 including re-drilling, redesigning connections, and acquiring  
32 additional easement, at no additional cost to the Owner and without  
33 schedule extension.  
34

35 G. The pilot bore shall be pre-reamed and reamed using equipment and  
36 methods submitted by the Contractor. The Contractor shall completely  
37 ream the borehole to the final diameter prior to pull back, when practical or  
38 as directed by the Engineer.  
39

40 H. The Contractor shall perform hydrostatic water pressure test in  
41 accordance with the manufacturer's guidelines prior to product pipe  
42 pullback.  
43  
44  
45  
46

I. Pipe Pullback:

1. The pipe shall be installed by pulling it into the reamed bore path in a continuous operation when practical, behind a final reaming tool selected by the Contractor.
2. The pipe shall be isolated from excessive torsional and axial stresses by a swivel device with a pre-established breakaway tensile capacity that is lower than the allowable tensile strength of the product pipe.
3. All measurements shall be made, recorded, and submitted on the daily logs during final reaming and pipe pull back.
4. The maximum pull (axial tension force) exerted on the pipelines shall be measured continuously and limited to the maximum allowed by the pipe manufacturer with an appropriate factor of safety ( $\geq 2$ ) so that the pipe or joints are not overstressed.
5. The pipelines shall be adequately supported during installation so as to prevent overstressing or buckling. The Contractor shall provide adequate support/rollers along the pipe layout area to support the required length of the pipe for each bore. Such support/rollers shall be spaced at a maximum of sixty (60) feet on centers, and the rollers shall be comprised of a non-abrasive material arranged in a manner to provide support to the bottom and bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback. The pipe layout area shall be cleared of all large stones, construction debris, or other foreign objects that could damage the pipe during pull back.
6. The end of the pipe shall be closed during the pull back operation.
7. Each length of pipe shall be inspected and cleaned as necessary to be free of debris immediately before joining.
8. Tracer wire will be attached to the leading end of the pipe pulling head and shall extend the full length of the installed pipe.
9. The Contractor shall at all times handle the pipe in a manner that does not overstress or otherwise damage the pipe. Vertical and horizontal curves shall be limited so that wall stresses do not exceed fifty (50) of yield stress for flexural bending of the pipe or joint. If the pipe is buckled or otherwise damaged, the damaged section shall be removed and replaced by the Contractor at his expense. The Contractor shall take appropriate steps during pull

back to ensure that the pipe and tracer wires (if required) will be installed without damage.

10. The pipe shall be **filled with water** as it enters the borehole to reduce pull back loads and to ensure that adequate internal pressure is maintained at all points to counter balance collapse pressures.

11. The Contractor shall monitor and inspect pipe rollers and method for suspending product pipe at exit pit during the pull back operation to avoid damage to the pipe.

12. The Contractor shall cease pull back operations if the pipe is damaged and shall remove the product pipe from the bore and repair the pipe using the manufacturer's recommended procedure or replace the damaged pipe before resuming installation.

13. Damage to the product pipe resulting from manufacturer defects, installation, contact grouting, or grouting of the annulus is the responsibility of the Contractor, including costs for replacement and labor and materials. To confirm no damage to the pipe, upon completion of pull back and grouting, the Contractor shall perform the following test on the completed pipeline:

a. A sphere or pig, one inch less in diameter than the internal diameter of the product pipe, which is capable of allowing water to pass through it, complete with a pulling cable on either side of sphere or pig, shall be pulled through the entire length of the pipeline. If the pig or sphere cannot pass through the pipe, it shall be considered collapsed and damaged.

14. After the product pipe is completely pulled through the borehole, a sufficient relaxation period, if recommended by the pipe manufacturer, shall be provided before the final pipe tie-in.

15. The Contractor shall conduct a final hydrostatic test of the installed pipeline. Final test shall be in accordance with the pipe manufacturer's guidelines. The Contractor will repair any defects discovered during this test, and repeat until the pipe passes the test.

J. The Contractor shall notify the Engineer immediately in the event that any obstruction is encountered that prevents further advancement of the drill pipe, or pull back of the pre-reamer, reamer, and/or pipe. The Contractor shall make all diligent and reasonable efforts to advance past the object by drilling slowly through the object, pulling back, and drilling along a new

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bore path that avoids the object, or excavating and exposing and removing the object, and all other reasonable attempts to continue the bore. The Contractor shall notify the Engineer of proposed measures to attempt to advance past the object, prior to initiating the attempt. If the Contractor attempts to pull back and re-drill, the Contractor shall adhere to line and grade tolerances established in this specification section, unless the Engineer approves variance, in writing, prior to the Contractor's attempt to re-drill. The Contractor and Engineer shall investigate the cause and together determine an appropriate response. Appropriate response may include revisions to equipment or methods, retraction and re-drilling of a portion of the borehole, or abandonment of the borehole. If abandonment is deemed necessary, the Contractor shall recover, to the extent practicable, any drill pipe, product pipe, and tools in the borehole, and properly abandon the borehole by contact grouting, unless otherwise directed in writing by the Engineer. If the borehole is abandoned, the Contractor shall be allowed to begin a second attempt to install the pipeline at an alternate location subject to approval, in writing, by the Engineer. The Contractor shall take all reasonable actions to complete the installation with minimal delays.

- K. The Contractor shall remove all equipment, materials, drilling fluids, muck, waste, and debris from the site and restore the site to its original condition upon completion of the installation. Restoration and demobilization shall be completed by the Contractor within seven days of the completion of the pipeline installation.
- L. The Contractor shall monitor for settlement or heave before and during drilling and grouting operations.

END OF SECTION

SECTION 33 11 01

POTABLE WATER MAIN PIPING AND APPURTENANCES

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The work covered by this Section consists in furnishing all plant, labor, equipment and materials, and in performing all operations in connection with construction of water mains and appurtenances, complete and ready for use in accordance with the latest Specifications of the American Water Works Association and the applicable Plans, and subject to the terms and conditions of the contract.

1.02 MAINTAINING WATER SERVICE AND SHUT DOWNS

- A. The Contractor's attention is called to the fact that the existing system must be kept in operation at all times. Where connections are made to existing mains or other shutdowns are necessary, permission must be obtained and arrangements must be made with the Utilities Department for removing from service those mains that will be affected. Shutdowns must be held to a minimum in both number and duration.
- B. No valve or other control device on the existing system shall be operated by the Contractor without first obtaining approval from the Utilities Department. The Contractor shall, at least forty-eight (48) hours in advance, notify citizens subject to interruption of service by means of door hangers or any other approved method of the starting time and duration of such interruption.

1.03 SUBMITTALS

- A. Unless waived by the Engineer, cut sheets for the entire potable water system shall be submitted by the Contractor to the Pinellas County Utilities Engineer for approval at least two days prior to construction. This requirement will not relieve the Contractor of the responsibility to accurately record the "as-built" locations (horizontal and vertical) of piping, valving and appurtenances. Contractor to submit to Engineer the Continuity testing Results per Section 3.04 Item 6.g.

1.04 LAYING PIPE

- A. When new mains are to be constructed outside of pavement, all roads and curbs shall be installed prior to water main installation. On roads where

POTABLE WATER MAIN PIPING AND APPURTENANCES

1 there is no curb, the paving must be completed prior to installing the water  
2 main. Water facilities will not be accepted or tested until curb and/or roads  
3 are complete, thus preventing possible relocation or adjusting and  
4 retesting of newly installed pipes. Mains installed under pavement shall  
5 be pressure tested and chlorinated after the road base is installed but  
6 before paving with asphalt. Any deviation from this must be approved in  
7 writing by Engineer or his designated representative.  
8

9 B. All joints, fittings and other appurtenances shall not be covered until  
10 inspected by the Pinellas County Inspector. Non-compliance will require  
11 excavation of all joints and fittings.  
12

13 C. Pipe and fittings will be located seven feet back of curb and five feet to  
14 nine feet on curves in all subdivisions. At other locations, the pipe and  
15 fittings will be as shown on the approved Plans. All pipe four inches and  
16 larger in diameter may be deflected, but not bent. PVC pipe two inches in  
17 diameter may be bent around cul-de-sacs that have a radius of thirty-  
18 seven (37) feet or larger if the trench is left open until the Pinellas County  
19 Inspector is onsite to document that this guideline is fully complied with.  
20 The use of fittings not shown on the "Contractor Copy" construction Plan  
21 must have the prior concurrence of the Pinellas County Inspector.  
22

#### 23 1.05 ABANDONMENT OF EXISTING MAINS BEING TAKEN OUT OF SERVICE 24

25 A. In general, pipe six inches and smaller abandoned within Pinellas County  
26 rights-of-way shall be capped at both ends and abandoned in place.  
27 Grouting is not required unless specifically required by the Engineer or the  
28 County.  
29

30 B. Abandoned pipes eight inches and larger shall be filled with grout or  
31 flowable fill unless otherwise directed by the County or the Engineer.  
32

33 C. Pipe abandoned in rights-of-way owned by municipalities other than  
34 Pinellas County shall be subject to the requirements of the agency having  
35 jurisdiction.  
36

37 D. All pipes shall be abandoned in a manner which results in the abandoned  
38 pipeline not being pressurized.  
39

#### 40 PART 2 – PRODUCTS 41

##### 42 2.01 GENERAL 43

44 A. Materials and construction pertaining to construction of water distribution  
45 systems shall be in accordance with American Water Works Association  
46 (AWWA) Standards.

#### POTABLE WATER MAIN PIPING AND APPURTENANCES

33 11 01 - 2

- 1
- 2 B. Materials and construction pertaining to restoration and construction of
- 3 roads and structures shall be in accordance with the latest edition of
- 4 Florida Department of Transportation (DOT) Standard Specifications for
- 5 Road and Bridge Construction or as called for on the Plans.
- 6
- 7 C. All ductile iron or cast iron pipe, fittings and valves and that portion of fire
- 8 hydrants that is underground, are to be encased in blue polyethylene
- 9 material, conforming to the requirements of the County's Materials
- 10 Specification Manual. Polyethylene film shall be supplied in tube form
- 11 suitable for use in Installation Method 'A' per AWWA C105.
- 12
- 13 D. All piping and appurtenances used shall be color coded blue with the
- 14 exception of ductile iron pipe. That shall be encased in blue polyethylene
- 15 wrap, or if not available, encased in clear polywrap and shall be marked
- 16 by means of three four-inch wide painted blue lines along the length of the
- 17 pipe at opposite locations around the pipe.
- 18
- 19 E. All PVC piping and ductile iron mains partially constructed of PVC or
- 20 HDPE between valves shall be installed with 14 gauge locator wires as
- 21 specified below.
- 22
- 23 F. Water mains shall be buried with blue metallic locator tape. All locator
- 24 tape shall be placed twelve (12) inches above buried pipe.
- 25
- 26 G. No glued joints will be allowed. Mechanical restrainers are the only
- 27 acceptable method of restraint.
- 28

29 2.02 MATERIALS

30

- 31 A. All pipe and appurtenant materials used in the Pinellas County Utilities
- 32 System shall be as specified in the latest version of the Pinellas County
- 33 Utilities Material Specification Manual at the time of Plan approval.
- 34

35 PART 3 - EXECUTION

36

37 3.01 HANDLING

38

- 39 A. All materials, unless otherwise directed, shall be unloaded as nearby as
- 40 possible to the location of installation by the Contractor. Materials shall be
- 41 handled with care to avoid damage.
- 42
- 43 B. Materials shall be lifted by hoists or slid or rolled on skidways in such
- 44 manner as to avoid shock. Under no circumstances shall materials be
- 45 dropped. Pipe handled on skidways must not be allowed to roll against

POTABLE WATER MAIN PIPING AND APPURTENANCES

33 11 01 - 3



- 1 pipe already on the ground. The Contractor shall be responsible for the  
2 safe handling of all materials. Damaged materials shall not be installed.
- 3 C. All materials found during the progress of work to have flaws, cracks, or  
4 other defects will be rejected by the Engineer regardless of whether or not  
5 it has been installed and shall be replaced by and at the expense of the  
6 Contractor.
- 7
- 8 D. All PVC pressure pipe, upon delivery to the site and until such time as it is  
9 placed in the trench, shall be shielded from the weather and direct sunlight  
10 to prevent pipe deterioration.
- 11
- 12 E. Materials shall not be stacked or placed under materials in such a manner  
13 that damage could result.
- 14
- 15 F. Slings, hooks, or tongs used for lifting shall be padded in such a manner  
16 as to prevent damage to exterior surfaces, interior linings and  
17 components. If any part of the coating, lining or components is damaged,  
18 the repairs or replacement shall be made by the Contractor at his expense  
19 and in a manner satisfactory to the Engineer prior to attempting  
20 installation.
- 21
- 22 G. The Contractor shall ensure that the equipment that will come into contact  
23 with the potable water is clean and sterilized by means of dipping or  
24 washing it in a highly concentrated solution of water and chlorine or as  
25 required by the Engineer.
- 26
- 27 H. In the event that materials supplied by the County are defective, the  
28 Contractor shall notify the Engineer immediately so arrangements can be  
29 made for replacing such devices.
- 30

### 31 3.02 FIELD LAYOUT AND MODIFICATIONS

32

- 33 A. The Contractor, unless directed otherwise, shall be responsible for setting  
34 construction layout stakes and/or offsets required to complete the  
35 designated work. The Contractor shall insure that those stakes and/or  
36 offsets are protected and any re-staking due to work stoppage shall be  
37 included and no additional compensation to the Contractor will be made.
- 38
- 39 B. The Engineer has the right to make any modifications as he deems  
40 necessary due to field conditions, conflicts with other utilities or to protect  
41 other properties.
- 42

### 43 3.03 EXCAVATION, ALIGNMENT AND GRADE

44

- 45 A. Trench excavation and backfill shall be in accordance with Specification  
46 31 23 33, Excavation and Backfill for Pipes.

## POTABLE WATER MAIN PIPING AND APPURTENANCES

33 11 01 - 4

1  
2 B. All water mains shall be laid and maintained at the required lines and  
3 grades with fittings, valves and appurtenances at the described locations.  
4 All pipe shall be laid to the depth as shown on the Plans, or when a depth  
5 is not indicated, with a minimum cover of thirty (30) inches outside of the  
6 roadway, and thirty-six (36) inches under the roadway. Grade lines shall  
7 be set by the Contractor. The tolerance of such grades shall not be more  
8 than that specified on the Drawings. When no tolerance is indicated a  
9 tolerance of 0.5 foot shall be used. All other realignments must be  
10 approved by the Engineer. The Contractor shall have suitable survey  
11 equipment on the site at all times.  
12

13 C. The work shall at all times progress with caution to prevent damage to  
14 underground obstructions both known and unknown. Should an  
15 obstruction not shown on the Plans be encountered the Engineer shall be  
16 immediately notified and he shall be responsible for alteration to the Plan  
17 should realignment be necessary. The Contractor shall notify the  
18 Engineer far enough in advance to allow the realignment to be  
19 accomplished by deflection in the pipe joints.  
20

### 21 3.04 LAYING AND JOINING BURIED WATER MAINS

22

#### 23 A. General

24

- 25 1. Prior to installation, all pipe shall be inspected for defects and all  
26 lump or excess coatings shall be removed. The inside of the bell  
27 and outside of the spigot shall be cleaned prior to joining of all pipe.  
28 Caution shall be taken to prevent damage to the pipe during  
29 lowering into the trench. Caution shall be taken to prevent foreign  
30 matter from entering the pipe during installation. The Engineer may  
31 require covering of the end of the pipe to prevent debris from  
32 entering. No debris, tools, clothing or other material shall be placed  
33 in the pipe.  
34
- 35 2. After placement in the trench the spigot end of the pipe shall be  
36 centered in the bell and the pipe shall be driven home and then  
37 brought to the proper line and grade by tamping approved backfill  
38 material under it, except for the bell. Joint deflection shall not  
39 exceed manufacturer's limit.  
40
- 41 3. During the time that the pipe is in the trench but no work is in  
42 progress, the end shall be closed by a water-tight plug. This shall  
43 include the noon hour, as well as overnight. If there is water in the  
44 trench upon beginning work this plug shall remain in place until the  
45 trench has been pumped dry, unless otherwise approved by the  
46 Engineer.

### POTABLE WATER MAIN PIPING AND APPURTENANCES

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4. Standard plugs shall be inserted into all dead end pipes, tees or crosses; spigot ends shall be capped; flanged ends shall have blind flanges, or sheet metal or plywood caps. Plugs installed for pressure testing shall be fully secured and restrained to withstand the test pressure.
  5. Where plugging is required because of Contract division or phasing for later connection, the ends of such lines shall be equipped with a permanent type cast iron or ductile iron plug/cap or blind flange with or without a blowoff cock, as shown on the Drawings. Installation or removal of such plugging shall be considered incidental to the work and no payment shall be expected for this work by the Contractor.
  6. Tracer Wire For PVC, HDPE and Non-Continuous Ductile Iron Mainlines
    - a. Tracer wire shall be installed on all mainline pipe. Mainline pipe installed by open cut method shall have two (2) 14-gauge minimum solid copper or two (2) 12-gauge copper clad steel tracer wires taped to the top center of the pipe. Mainline pipe installed by horizontal directional drill shall have two (2) 12-gauge copper clad steel tracer wires installed with the pipe. All tracer wire shall be as specified in the Material Specification Manual.
    - b. The locator wires shall have colored insulation matching the type of service provided in the main and be acceptable for direct burial.
    - c. All splices of the wires shall be made with watertight connections per material specification manual.
    - d. The wires shall each be continuous throughout the project.
    - e. The wire is to be tied to all valves, tees and elbows.
    - f. The locator wires shall be brought up into all valve boxes with enough slack provided to extend 10 to 12-inches out of each box and installed as shown in the Standard Details.
    - g. Contractor shall perform a 12-volt DC electrical continuity test on each of the wires. No more than one volt of loss per 1000 feet of mainline pipe will be acceptable. The locator wire system shall pass the 12-volt DC electrical continuity

#### POTABLE WATER MAIN PIPING AND APPURTENANCES

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test for at least one wire prior to final acceptance of the pipeline. Any cuts or breaks in the wire shall be repaired by the Contractor at his expense.

- h. The locator wire shall be tested by the Contractor at the time of pressure testing. If this test fails, the Contractor is responsible for repairing the locator wire and the pressure test will be reschedule when the wire will pass.

#### 7. Tracer Wire for Long Side Services

- a. Each long side service or any service over 40 feet shall have one (1) 14-gauge minimum solid copper locator wire duct taped to top center of pipe.
- b. The locator wire shall have colored insulation matching the type of service provided in the service and be acceptable for direct burial.
- c. All splices of the wire shall be made with watertight connections per material specification manual.
- d. The wire shall be continuous along the service line.
- e. The locator wire shall have one end sealed off and buried within 12-inches of the connection to the main with the other end stubbed off in the service box with enough slack provided to extend 10 to 12-inches out of each service box.

- 8. Contractor shall perform a tone test on each long side service using a wire and cable locator. The locator wire system shall pass the tone test prior to final acceptance of the service line. Any cuts or breaks in the wire shall be repaired by the Contractor at his expense.

#### B. Pigging, Flushing and Cleaning

- 1. All mains shall be pigged, cleaned and flushed to remove all sand and other foreign matter. The Contractor shall be responsible for developing a pigging and flushing plan to be submitted to the Project Representative for approval prior to pigging and flushing. The Contractor shall dispose of all water used for pigging and for flushing without causing a nuisance or property damage, in accordance with state and local requirements. Any permits or fees

### POTABLE WATER MAIN PIPING AND APPURTENANCES

required for the disposal of flushing water shall be the responsibility of the Contractor.

2. Flushing water used by the Contractor shall be taken from an approved potable water metered source. The water utility will provide the meter and designate the source. The Contractor shall be responsible for the cost of potable water used to flush potable mains.
3. The cleaning of the new piping system shall be accomplished by the controlled and pressurized passage of a series of hydraulic or pneumatic polyurethane plugs of varying dimensions coatings, and densities; which shall be selected by the pipe cleaning Contractor. The Contractor shall provide a means to enter the pig into the system, control and regulate flow, monitor flows and pressures, and to remove the pig from the system. The Contractor shall maintain a constant surveillance of the system and immediately report to the proper authority any in-line problems encountered or any malfunctions discovered in the piping system. A record of pig models, sizes, styles, and other pertinent information shall be kept by the Contractor and turned over to the County.
4. The Contractor shall furnish pig launching and retrieval equipment to minimize additional valving, fittings and auxiliary water supplies. Valves and blowoff assemblies, which are installed as part of the project, shall be used as much as possible to minimize the number of temporary ports required for proper flushing and cleaning.
5. All materials used shall be specifically manufactured for flushing and cleaning pressure pipes, bends and valves. The pigs shall be able to go through bends, open valves and fittings, and provide adequate cleaning of the pipe.
6. Cost of Pigging Services- The cost to complete the requirements under this section shall be included in the contract items provided in the proposal sheet. There is no separate pay item for this work.

C. Jointing HDPE Pipe and Fittings

1. HDPE pipe shall be jointed by the butt-fusion process in accordance with pipe manufacturer's directions. Contractor shall provide butt-fusion technicians who are trained and certified by the P.E. pipe manufacturer to complete the project. The date of technician certification shall not exceed 12 months before commencing construction.

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2. Butt-fusion means the butt-joining of the pipe by softening the aligned faces of the pipe ends in a suitable apparatus and pressing them together under controlled pressure.
3. The internal and external beads resulting from the butt-fusion process shall be visible and examined for penetration 360 degrees around the pipe diameter.
4. All fittings for HDPE pipe (4" and larger), except for D.I./HDPE Mechanical Joint Adaptors, shall be ductile iron mechanical joint fittings per material specification manual and shall be joined to the pipe using a butt fused restrained mechanical joint adapter.
5. The D.I./HDPE mechanical joint adapter shall be connected to the HDPE pipe by a heat-fused joint on one end, and connected to a ductile iron pipe valve, or fitting with a mechanical joint on the other end.
6. Solvent epoxy cementing and mechanical joining with bolt on wrap around clamps or mechanical joints with out an adapter shall not be used for connections.
7. Short pieces of pipe between valves and fittings shall be DIP with all joints restrained for sizes 3-inches and larger. For 2-inch, the short pieces shall be brass or Sch. 80 with IP threads and DI, HDPE or brass fittings and all joints restrained.

D. Jointing Concrete Pressure Pipe and Fittings

1. Rubber O-rings shall be stored in a cool, dark place away from sun, electric motors, and oil or grease for a short period of time and as specified by manufacturer.
2. Prior to joining two sections of pipe, the surfaces of the joint rings shall be thoroughly cleaned and the rubber gasket shall be liberally lubricated with the vegetable oil soap supplied by the manufacturer and compatible with potable water use. The lubricated gasket will then be seated and a uniform tension along its length shall be required. The spigot end shall then be inserted in the bell and driven home. Prior to being fully seated the position of the gasket shall be checked by means of the feeler gauge supplied by the manufacturer. If in position, full seating shall be completed. However, should the gasket be out of position the pipe shall be separated and the full procedure be repeated.

3. After the pipe has been driven completely home and has been set at grade the diaper should be slipped over the joint and fastened in position by means of the steel strapping stitched into its edges. A mix of 1:2 mortar grout of sufficiently liquid consistency to flow easily is to be poured into the diaper and "rodded" or "puddled" to insure complete filling of the recess. The Contractor shall use and furnish approved equipment for mixing grout and shall use approved equipment and methods to force the pipe home.

E. Jointing Push-On Ductile Iron, Steel and PVC Pipe

1. The inside of the bell and the outside of the spigot end shall be thoroughly cleaned to remove dirt, grit, oil or excess coatings and other foreign matter. The rubber gasket shall be flexed inward and inserted in the gasket recess of the bell socket. A thin film of gasket lubricant shall be applied to either the inside surface of the gasket or the spigot ends, care will be taken to avoid contact with the ground. The joint shall be completed by forcing the plain end to the bottom of the socket with a forked tool or jacking device or other approved method. All pipe shall have depth mark prior to insertion. Pipe cut in the field shall be filed to resemble the spigot end of manufactured pipe.
2. When deflection is required the joint shall be completed prior to setting the deflection. The deflection shall conform to applicable AWWA Standards or manufacturer's recommendation with prior Engineer's approval.

F. Jointing Mechanical Joint Pipe and Fittings

1. The inside of the socket, the outside of the spigot end and the gland shall be thoroughly cleaned and or washed with an approved solution to remove dirt, grit, oil or excess coatings and foreign matter to improve gasket seating. The gland shall then be placed on the plain end of the pipe with the lip extension toward the plain end, followed by the gasket with the narrow edge of the gasket toward the plain end of the pipe. The pipe shall be inserted into the socket and the gasket pressed firmly and evenly into the gasket recess. The joint shall be kept straight during the assembly and any deflection required shall be done after the joint has been assembled but prior to tightening the bolts.

G. Jointing Flanged Ductile Iron and Flanged Steel Pipe and Fittings

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1. Flanged joints are intended mostly for above ground use and the underground use of this joint is generally not desirable because of the rigidity of the joint.
2. The flanges shall be thoroughly cleaned to remove grit, oil or foreign matter. The flanged joints shall be fitted so that the contact faces bear uniformly on the gasket and then are tightened in a crisscross order with a relatively uniform bolt stress.
3. The gaskets shall be installed in a manner that water tightness is achieved without over torquing the bolts and as recommended by the manufacturer. If, after tightening the bolts to the specified torque, water continues to leak, the joint shall be disassembled and properly reassembled.
4. The Contractor shall be very careful to prevent bending or torsional strains from being applied to flanges, flanged fittings or flanged appurtenances. Flanged pipe shall be properly anchored, supported or restrained to prevent breakage of fittings and flanges.
5. Bolt requirements are as follows:

Pipe Size (inches)	Number Per Joint	Bolt Size (inches)	Threads per inch	Torque Ft -lbs
4	8	5/8 x 3	11	60
6	8	3/4 x 3 1/2	10	100
8	8	3/4 x 3 1/2	10	100
10	12	7/8 x 4	9	160
12	12	7/8 x 4	9	160
16	16	1 x 4 1/2	8	245
20	20	1 1/8 x 3	7	390
24	20	1 1/4 x 5 1/2	7	545
30	28	1 1/4 x 6 1/2	7	545
36	32	1 1/2 x 7	6	875
42	36	1 1/2 x 7 1/2	6	875
48	44	1 1/2 x 8	6	875
54	44	1 3/4 x 8 1/2	5	1550

#### H. Jointing Special Joint Ductile Iron Pipe

1. Other special joint pipe shall be assembled or installed per manufacturer's recommendations or directed by the Engineer. The Contractor shall insure that the joint is thoroughly cleaned by

## POTABLE WATER MAIN PIPING AND APPURTENANCES

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removing all dirt, oil, grit, excess coatings and foreign matter to insure a tight joint.

### 3.05 REMOVAL OF OUT OF SERVICE PIPE

- A. Due to certain permit requirements, pipe that is to be removed from service will have to be physically taken out of the ground. The limits of pipe to be removed shall be specifically called for in the Plans or shall be approved in writing by the Engineer. Any other removal not specifically called for, shall be considered incidental to construction of other items in the Contract and the Contractor will not receive compensation for such work.
- B. When removing pipe the Contractor shall excavate a trench wide enough to dislodge the pipe from the surrounding soil, and long enough to be able to handle the pipe without causing any damage to nearby utilities, structures or adjacent property.
- C. The removed pipe, fitting and appurtenances will become the Contractor's property and he shall be responsible for proper disposal and any required permits thereof.
- D. Refer to Specification 01 35 00, Special Project Procedures for removal of asbestos cement (AC) pipe.

### 3.06 INSTALLATION OF PIPE UNDER DRIVEWAYS

- A. At the Engineer's discretion the Contractor will be required to auger pipes under driveways, structures or trees to avoid removal or expensive restoration of those structures. The Contractor will be allowed to utilize an auger machine and to push or pull the carrier pipe into the bore without the need of a casing.
- B. The Contractor shall install the water pipe within the bore hole on a line and grade to allow connection to open cut piping adjacent to the bore hole within pipe jointing alignment limits defined for the pipe in question. The completed installation shall not result in settlement of soil under the driveway.

### 3.07 INSTALLATION OF PIPE UNDER HIGHWAYS AND RAILROADS

- A. The General Contractor shall furnish and install protective steel pipe casings and/or carrier pipe under highways/railroads in the pipe size, thickness, length, location and details as shown on the drawings and

#### POTABLE WATER MAIN PIPING AND APPURTENANCES

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specified herein. The Contractor's attention is particularly directed to the requirements of the particular municipal or private owner or Department of Public Works having jurisdiction over the highways/railroads whether through permit, verbal or other directions.

B. The construction shall not be started until the necessary permits have been obtained, a copy is at the job site, and proper notice and approval for construction has been obtained from the owner of the highway/railroad and the Engineer.

C. All necessary materials, equipment, labor and traffic protection devices shall be on the job site before requesting permission to start the work.

D. Steel casings and the installation thereof required for highway/railroad crossings shall be in accordance with the standards and requirements of the Florida Department of Transportation (FDOT) or railroads or AASHTO Standards and the Specifications outlined herein. All work of this nature shall be performed by qualified Contractors regularly engaged in that type or work and shall be subject to approval by the Engineer.

E. All work shall be in accordance with Specification 35 05 20, Jacking and Boring.

### 3.08 FITTINGS

A. All fittings shall be restrained by means of restraining devices such as restainer glands, restraining gaskets, etc.

B. Fittings shall be set and joined to the pipe and each type of joint as specified for pipe.

C. Trenching and backfilling for all fittings shall also be in accordance with Section 31 23 33, Excavation and Backfill for Pipes.

D. The use of thrust blocks in new lines is prohibited and shall be limited to areas in which a new fitting has been installed in an existing line and is not feasible to restrain joints or when directed by the Engineer.

E. The use of "reverse dead-man" shall be as described under Standard Details for dead-end valves or in circumstances that the Engineer deems it necessary and shall be performed under his direction.

### 3.09 VALVES

A. Valves shall be set and joined to the pipe and each type of joint as specified for pipe.

## POTABLE WATER MAIN PIPING AND APPURTENANCES

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- 1 B. Trenching and backfilling for all valves shall also be in accordance with  
2 31 23 33, Excavation and Backfill for Pipes.  
3
- 4 C. Cast iron valve boxes shall be firmly supported, maintained centered and  
5 plumb over the operating nut of the valve. Outside of paved areas, valve  
6 boxes shall be set in a 2' x 2' x 6" thick concrete collar, along with a brass  
7 ID tag, as shown in the Standard Details. The box cover shall be flush  
8 with the surface of the finished pavement. All box lids shall be painted  
9 OSHA safety blue and shall have the word "WATER" cast in the lid.  
10
- 11 D. All reasonable effort must be made to locate valves/valve boxes behind  
12 the back of curb, in grass areas and at street corners, whenever possible.  
13 Valves should be kept in clusters within two feet of the tee, when  
14 possible.  
15
- 16 E. Valve boxes in areas that will require sod at a later date must be left 1"-2"  
17 above existing grade (to allow for sod thickness).  
18
- 19 F. All valves/boxes shall be located by means of a perpendicular 6" x 2' blue  
20 stripe across the curb. The distance from the back of the curb to the valve  
21 shall be stenciled on the curb with numbers four inches high, painted blue,  
22 by the Contractor. This information will be referenced on the pavement if  
23 no curbs are to be installed. The fire hydrant valves shall be stenciled (in  
24 the same manner) with the letters H.V. All valve box tops shall be painted  
25 blue. All valves must be centered over the operating nut/wheel and all  
26 valves after being fully opened, will be backed off one-quarter of a turn to  
27 prevent them from being jammed open.  
28
- 29 G. All dead end valves shall be restrained with a reverse deadman, per the  
30 Standard Details.  
31
- 32 H. Should the operating nut be more than three feet below the final grade, an  
33 extension shall be supplied and installed by the Contractor. The extension  
34 shall bring the nut to within twelve inches of final grade.  
35
- 36 I. Installation of Valves on Existing Mains  
37
- 38 1. When installing valves in existing mains (cutting-in) the Contractor  
39 shall insure that the pipe is kept clean at all times and no debris,  
40 ground water, mud, oil, etc. will make their way into the pipe.  
41
- 42 2. The Contractor shall notify customers of water service shut-down  
43 and shall insure that such is held to a minimum.  
44
- 45 3. The lid shall fit flush in the top of the box without forcing and shall  
46 not rock, tip or rattle. Roadway boxes for bypass valves shall be  
marked "BYPASS". Valve box lids shall be painted blue and  
referenced to the closest curb by stenciling the distance and by

#### POTABLE WATER MAIN PIPING AND APPURTENANCES

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1 painting a 6" wide by 2' long stripe perpendicular to the curb of the  
2 roadway.

3  
4 J. Removal and Disposal of Existing Valves

- 5  
6 1. Any valve, unless otherwise specified, that is removed from the  
7 System shall become the property of the Contractor and he shall  
8 ensure proper disposal.  
9

10 3.10 HYDRANTS

- 11  
12 A. Hydrants shall be placed at a location in which they are completely  
13 accessible and the possibility of damage from vehicles is minimal. Unless  
14 otherwise directed, the hydrants shall be installed in accordance with the  
15 Standard Details..  
16  
17 B. All hydrants shall be installed plumb and shall have their pumper nozzle  
18 perpendicular to the curb. They shall conform to the established grade  
19 with steamer nozzle between eighteen inches (18) to twenty four (24)-  
20 inches above the ground.  
21  
22 C. All hydrants shall be connected to the water main with a six inch branch  
23 controlled by an independent 6-inch resilient wedge gate valve that  
24 functions as a hydrant shut-off valve. In the event that the hydrant is more  
25 than ten (10) feet away from the main line, a second valve shall be  
26 installed.  
27  
28 D. Hydrants shall be restrained as shown in the Standard Details. Thrust  
29 blocks shall not be allowed unless specifically approved by the Engineer.  
30 All underground pipe and fittings shall be polyethylene encased as  
31 described in these Specifications.  
32  
33 E. All hydrant legs shall be restrained per in accordance with the Standard  
34 Details. No threaded rod will be accepted.  
35  
36 F. All fire hydrant legs greater than ten (10) feet in length shall have two  
37 valves, one at the main and one within two feet of the hydrant.  
38  
39 G. Hydrants in subdivision shall be installed within the space between the  
40 sidewalk and the lot line (when said space is available) and on the dividing  
41 line between lots or at the PC or PT of the curve along the curb.  
42  
43 H. In shopping centers and commercial areas, all reasonable effort shall be  
44 made to install hydrants in grass areas where there is no traffic. Deviation  
45 from this requires prior approval and the installation of protective hydrant  
46 guards, per Pinellas County Specifications and the Standard Details.

POTABLE WATER MAIN PIPING AND APPURTENANCES

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- 1  
2 I. Any hydrant located within ten (10) feet of a vehicular use area in an off-  
3 street location shall be provided with guard posts in accordance with the  
4 Standard Details, unless otherwise approved by the Director of Pinellas  
5 County Utilities Engineering or his authorized representative.  
6  
7 J. All fire hydrants shall be flowed during final inspection to ensure proper  
8 working condition.  
9  
10 K. All fire hydrants shall be bagged by the Contractor until put in service  
11 following a successful chlorination.  
12  
13 L. All chains shall be removed from the hydrants, and the hydrants shall be  
14 painted in accordance with the Standard Details.  
15  
16 M. Relocation of Hydrants  
17  
18 1. When called for on the Plans, the Contractor shall remove and  
19 relocate hydrants. The hydrants shall be thoroughly cleaned, bolts  
20 and gaskets replaced and a new line valve installed.  
21  
22 2. The existing shut-off valve shall be plugged and buried.  
23  
24 N. Removal and Disposal of Hydrants  
25  
26 1. Any hydrant, unless otherwise specified, that is removed from the  
27 System shall become the property of the Contractor and he shall  
28 insure proper disposal.  
29

### 30 3.11 FIRE LINES

- 31  
32 A. Fire lines shall have two valves with each valve having a box with lid. One  
33 valve shall be located at the water main and the second valve shall be  
34 located at the property line. The only deviation shall be at the Engineer's  
35 discretion. The property line valve shall have a leak meter wrapped  
36 around it.  
37  
38 B. All private fire lines shall be constructed in accordance with Pinellas  
39 County Specifications. This includes pressure testing and chlorination as  
40 required.  
41  
42 C. All fire lines that do not serve a fire sprinkler system shall have a leak  
43 detection meter installed around the valve at the property line (installed by  
44 the County).  
45

## POTABLE WATER MAIN PIPING AND APPURTENANCES

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- 1 D. Fire sprinkler lines shall have a double check valve assembly. A leak  
2 detection meter shall be installed on the completed assembly by Pinellas  
3 County personnel. Chlorination shall be done as required up to the first  
4 O.S. & Y. valve. Additional chlorination may be required behind the  
5 device which is under jurisdiction of the Plumbing/Building Code.  
6
- 7 E. If the Siamese connection is on the DCVA or any portion of the line  
8 running into the building, Class 50 ductile iron pipe shall be required  
9 behind the double check valve assembly to the riser inside the building.  
10 DR14 PVC may be substituted up to within five feet of the building, at  
11 which point DIP shall then be used as required. Siamese connections  
12 shall have an eight inch minimum clearance above finished grade.  
13
- 14 F. All backflow devices on fire lines are to be installed in ten (10) foot wide  
15 grass area or protected with a series of modified fire hydrant guards, the  
16 quantity and location of such shall be determined by the Engineer or his /  
17 her approved or appointed representative.  
18

### 19 3.12 TAPPING OF MAINS 20

- 21 A. The Contractor, after installing the sleeve and prior to making the tap,  
22 shall insure that the sleeve is providing a watertight joint by means of  
23 pressure testing with pressures in accordance with 01 45 17, Pipeline  
24 Testing Requirements. If leaks are present, the Contractor will be  
25 required to repair them to the satisfaction of the Engineer.  
26

### 27 3.13 SERVICE METERS AND ACCESSORIES 28

- 29 A. Unless specified to be furnished by the Contractor under a separate pay  
30 item, all meters, reduced pressure devices, double check valves, etc. will  
31 be supplied by the Utilities Department. The Contractor shall pick-up such  
32 devices where directed and shall inspect them thoroughly and shall insure  
33 that they are in proper working order.  
34
- 35 B. The Contractor shall install meters, backflow devices, double check  
36 valves, etc. at locations called for in the Plans, as sketched out or as  
37 directed by the Engineer. No meter or accessory is to be installed outside  
38 of the right-of-way unless easements have been secured or as specifically  
39 directed by the Engineer.
- 40 C. When relocating meters, the Contractor shall insure that the meter is  
41 operational. If the meter or accessories are damaged he shall bring this to  
42 the attention of the Engineer. Meter boxes shall be replaced, as well as  
43 brass fittings and pipe inserts and shall be considered incidental to the  
44 cost of relocating meters.  
45

## POTABLE WATER MAIN PIPING AND APPURTENANCES

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- 1 D. All meter, backflow, reduced pressure device, etc. installations shall be  
2 made in accordance with Pinellas County Utilities Department Standard  
3 Construction Details as shown on these Specifications.  
4

5 3.14 SERVICE LINES AND SERVICE CASINGS  
6

- 7 A. Service line casings shall be installed on all long side services. Casings  
8 may be installed using the pneumatic bullet method, subject to the  
9 requirements of the entity having jurisdiction for the roadway.  
10

- 11 B. Service line casings for one-inch services shall be Schedule 80 PVC or  
12 SDR-9 HDPE two inches in diameter for single services, three inches in  
13 diameter for double services.  
14

- 15 1. All service lines over (40) forty-feet in length shall have a minimum  
16 size of one-inch.  
17

- 18 C. All casings shall be marked on both sides of the road with a six inch wide  
19 blue stripe running across the curb in the direction of the casing. A single  
20 strand of blue 14 gauge copper wire shall be installed with the casing and  
21 extend up the 2 x 4 that is required at the end of the casing. The 2 x 4 will  
22 be six feet in length and painted blue.  
23

- 24 D. The depth to the top of the casings shall be thirty (30) inches to thirty-six  
25 (36) inches. Casings that are installed deeper than thirty-six (36) inches  
26 shall be removed and installed at the correct depth. Casings shall extend  
27 a minimum of five feet beyond the existing back-of-curb or edge of  
28 roadway. Exceptions to this requirement due to physical constraints shall  
29 require prior approval by the Engineer.  
30

31 3.15 INSTALLATION OF BOLTS ON MECHANICAL JOINTS  
32

- 33 A. Align bolt holes and insert bolts, with bolt heads behind the bell flange,  
34 and tighten opposite nuts to keep the gland square with the socket.  
35  
36  
37  
38  
39  
40

41 Tighten the nuts in accordance with the following table:  
42

Bolt Diameter (inches)	Torque (ft-lb)
5/8	45-60

POTABLE WATER MAIN PIPING AND APPURTENANCES

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3/4	75-90
1	85-100
1 1/4	105-120

### 3.16 PAINTING

- A. All above ground installations, except for fire hydrants and guard post, shall be painted OSHA safety precaution blue. Paint application shall be in accordance with the paint manufacturer's recommendation.
- B. Paint used on all fire line backflow prevention devices shall be as specified in the County Materials Specification Manual.
- C. Fire hydrants shall be painted yellow with white bonnet per Material Specification Manual.
- D. Guard posts shall be painted OSHA safety yellow.
- E. All painting shall be in accordance with Section 09 91 00, Painting.

### 3.17 TESTING AND DISINFECTION

- A. All potable water mains shall be tested and disinfected in accordance with Specifications 01 45 17, Pipeline Pressure and Leakage Testing Requirements and 33 13 01, Disinfection of Potable Water Mains.

END OF SECTION



SECTION 33 13 01

DISINFECTION OF POTABLE WATER MAINS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This Specification provides written description and direction of required practices to those involved in the process of disinfecting potable water mains and appurtenances prior to their placement for service.
- B. Chlorination shall not take place until:
  - 1. The main is constructed in accordance with the Contract Documents as modified by the Engineer during construction and all construction permit requirements are met.
  - 2. All blow offs, injection and sample points are constructed and ready for use.
  - 3. The main has been pigged and thoroughly flushed with scouring velocities as needed.
  - 4. The main has been successfully pressure and leakage tested in accordance with Specification 01 45 17, Pipeline Testing Requirements.
  - 5. Chlorine neutralization chemicals, and methods for application and disposal of chlorinated water, have been established by the Contractor. The Contractor shall dispose of the water without causing a nuisance, property damage and in compliance with the National Pollution Discharge Elimination System (NPDES) and all applicable jurisdictions.

1.02 APPLICABILITY

- A. All new water mains shall be flushed and disinfected in accordance with ANSI/AWWA C651 and bacteriological samples shall be collected and analyzed on two consecutive days.
- B. Special County Projects (i.e. County Parks, Utility Facilities, etc.) with water lines after back flow prevention and meter assemblies.
- C. New additions or alterations/relocations of water mains less than or equal to 50' in length shall be disinfected by either the Tablet method,

Continuous-feed method or swabbing or spraying with a hypochlorite solution and flushed as prescribed in ANSI/AWWA C651. Bacteriological samples shall be collected and analyzed on two consecutive days.

D. New additions or alterations/relocations of water mains that are over fifty (50) feet in length shall be disinfected and flushed as agreed by the County using the Continuous-feed method as described in ANSI/AWWA C651. Bacteriological samples shall be collected and analyzed on two consecutive days.

E. All newly disinfected water mains shall maintain, after samples have been collected, a minimum pressure of 20 psi until a Letter of Clearance has been obtained from the (FDEP).

F. Bacteriological test results for all new and altered public drinking water facilities other than wells will be considered invalid if the results are for samples collected more than sixty (60) days before the results are received by the (FDEP).

G. Emergency and Special Conditions

1. In the event of an emergency where time is of the essence and a delay in putting the water main(s) back into service may lead to a detrimental interruption of customer service or adversely affect the integrity of the water distribution system then the following options should be considered. Based upon the circumstances and as directed by the County, disinfection, flushing, and sampling may be completed as using guidance in ANSI/AWWA C651 including Slug method or standard chlorination procedures for disinfection may be implemented.

### 1.03 SCHEDULING AND NOTIFICATION

A. All disinfection of water mains shall be completed by the Contractor under the direct supervision of the Pinellas County Utilities Inspector. The Contractor shall be responsible to provide all the necessary equipment and materials to perform the disinfection in accordance with ANSI/AWWA C651.

B. Scheduling of the disinfection and flushing of newly constructed or altered water mains require a minimum of 48 business hours notice. The Pinellas County Utilities Inspector shall coordinate disinfection, flushing and bacteriological sampling of newly constructed or altered water mains to be completed within the normal business week and hours. Disinfection and flushing shall be done Monday thru Thursday.

- 1 C. The disinfection and sample collection for water lines down stream of a  
2 property's water meter or backflow prevention device is under the jurisdiction  
3 of the Plumbing/Building Code. Sample analysis shall be coordinated with  
4 State certified labs and results provided to the Building Department having  
5 jurisdiction.  
6

## 7 PART 2 – PRODUCTS

### 8 9 2.01 CHLORINATION CHEMICALS

- 10  
11 A. Forms of chlorine to be used for disinfection shall be as listed in AWWA  
12 C651.  
13  
14 1. Liquid chlorine per ANSI/AWWA B301.  
15 2. Sodium hypochlorite liquid per ANSI/AWWA B300.  
16 3. Calcium hypochlorite tablets or granules per ANSI/AWWA B300.  
17 (Calcium hypochlorite intended for swimming pool disinfection shall  
18 not be used.)  
19  
20 B. All products shall be NSF approved for use with potable water.  
21

### 22 2.02 DECHLORINATION CHEMICALS

- 23  
24 A. Chemicals to be used to dechlorinate flushing water shall be as listed in  
25 Appendix C, of AWWA C651. These include:  
26  
27 1. Sodium Thiosulfate ( $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ )  
28 2. Sodium Bisulfite ( $\text{NaHSO}_3$ )  
29 3. Sodium Sulfite ( $\text{Na}_2\text{SO}_3$ )  
30 4. Sulfur Dioxide ( $\text{SO}_2$ ).  
31

## 32 PART 3 - EXECUTION

### 33 34 3.01 GENERAL

- 35  
36 A. The Contractor shall locate blow-off valves at low points and dead ends in  
37 the grid to permit the removal of sediment.  
38  
39 B. The corporation stop to be used for pressure testing and chlorination shall  
40 be installed at the tap valve by the Contractor.  
41  
42 C. Samples shall be taken only through a PCU approved standpipe  
43 assembly. No samples shall be taken through a fire hydrant. Refer to the  
44 Standard Details.  
45

- 1 D. Disinfection and pressure testing shall be completed on all the new  
2 sections of water mains, including the fittings and valves. This shall be  
3 determined as being up to the first O.S. & Y, the valve upstream of the  
4 back-flow device/water meter or the end(s) of the newly installed water  
5 main(s) as applicable.  
6
- 7 E. All blow-off standpipes and injection points shall be removed upon  
8 satisfactory completion of sampling and testing. Corporation stop shall  
9 remain in the line. Water mains smaller than six inches, or mains without  
10 fire hydrants or permanent blowoffs, the temporary blowoff and sample  
11 points shall remain installed until such time as the main is cleared and has  
12 been flushed before being placed into service.  
13
- 14 F. Teflon tape will be required on all threaded joints to avoid contamination  
15 (No pipe dope will be allowed).  
16
- 17 G. It is the Contractor's responsibility to place blow-off and sample points  
18 where designated by the approved plan as agreed upon by the Engineer,  
19 County and review & permit authorities.  
20
- 21 H. The County at their discretion shall have the authority to modify this policy  
22 according to field conditions in coordination with the Contractor.  
23

### 24 3.02 FLUSHING

- 25
- 26 A. All pipelines shall be flushed to remove the lighter solids in the line.  
27 Because flushing cannot be relied on to remove heavy material allowed to  
28 get into pipeline during installation, every precaution shall be made to  
29 protect the pipeline against entrance of foreign material during the  
30 installation process.  
31
- 32 B. Every new pipeline shall be flushed at a minimum velocity of 2.5 feet per  
33 second (fps) to ensure that the lighter solids are removed from the pipe  
34 interior. (Note that it may be difficult to obtain scouring velocities in a pipe  
35 over two hundred (200) feet in length.) Discharge velocity can be  
36 determined by a simple field procedure involving the "trajectory" method.  
37 For any size pipe discharging horizontally three feet above the ground, a  
38 stream of water traveling at twelve (12) feet per second will strike the  
39 ground six feet away. Similarly, a stream of water traveling at five feet per  
40 second will strike the ground more than two feet from the end of the pipe.  
41 This test must be made thru an open-ended pipe; it must not end with a  
42 valve or fitting, which would be smaller than the inside diameter of the  
43 pipe.  
44
- 45 C. All pipelines eight inches in diameter or greater, or pipelines suspected of  
46 having heavy foreign material in them, shall be subjected to open end

flushing to remove any foreign material from the pipeline. Pigging is required in addition to open-end flushing.

- D. A velocity of 5.0 fps is desirable and a velocity of 12 fps may be needed to remove sand from river undercrossings and other subsurface inverts.
- E. Table 1, provided at the end of this Specification, outlines the number and size of flushing assemblies required.
- F. During the flushing process, a clean white cup shall be used at all sampling points to visually check for water clarity. When all the sample points are clear, meaning there is no background sediment, and the system chloramines residual is present, the line is ready to schedule for chlorination.
- G. In the case of mains twenty-four (24) inch and larger, preliminary flushing may be replaced by stringent measures for removal of dirt and sediment from the pipe and the thorough cleaning of its interior prior to filling with the high chlorine solution. Swabbing with a chlorine solution may be required at the discretion of the Engineer.

### 3.03 CHLORINATION

- A. Upon satisfactory completion of all testing and flushing, the Contractor shall furnish all materials and labor necessary to disinfect all water mains in accordance with the applicable sections of AWWA C-601.
- B. Prior to chlorine injection the following shall be ensured:
  - 1. That the source water tap valve for the water mains to be chlorinated has been shut off.
  - 2. That all blow offs and sample points involved in the Project are open.
  - 3. That there are no open valves to activate water mains tied into the water mains to be chlorinated.
  - 4. That there is a uninterrupted supply of potable water or adequate number of barrels to assure there is no interruption once the injection process begins.
- C. Disinfection of water mains shall be completed in accordance with ANSI/AWWA C651 standards and shall include the following; preflushing or cleaning of the water mains before the application of chlorine, disinfecting the mains with the prescribed chlorine dose for the disinfection

method being utilized, allow for the proper amount of chlorine holding or contact time, ensuring that the applicable chlorine residual was maintained for the duration of the disinfection period, and final flushing and clearing of the heavily chlorinated water with the disposal and treatment of the heavily chlorinated water in accordance with applicable dechlorination methods. All sampling points shall be at sites as designated by the approved plan or (500) feet intervals or as agreed upon by the County as conditions dictate. Satisfactory bacteriological analysis shall be determined by the results of samples collected by the County Water Quality Management and analyzed by the Pinellas County state certified lab in accordance with Pinellas County Operating Procedures.

D. The County shall furnish the Contractor with sufficient water to perform the disinfection required. As the chlorine solution is being injected the chlorine residual at the closest sample point to the injection point shall be tested with a high  $\text{Cl}_2$  test kit or OTO reagent as applicable. Pinellas County Utilities has set 50 mg/l as the targeted free chlorine residual for new water main clearances as measured at the end of pipeline discharge. The water flow or solution strength shall be adjusted as necessary to achieve the recommended minimum chlorine strength.

E. As the high chlorine solution reaches each successive sample point, the valve at the sample point shall be closed. Prior to closing the valve at the last sample point, the following water main shut down process shall take place in sequence:

1. The source water control valve shall be closed.
2. The injection pump should be shut off and its valve closed.
3. The last blow off/ sample point valve should be closed.

ALL BLOW-OFF VALVES SHALL NEVER BE CLOSED BEFORE THE SOURCE WATER VALVE IS CLOSED.

F. The initial chlorine solution shall be no less than 50 ppm and not more than 1000 ppm in concentration and shall be left standing in the main for a period of not less than twenty-four (24) hours and not more than forty-eight (48) hours. There must be a chlorine residual of 10 ppm at the standpipe hose bib after twenty-four (24) hours. After this period, the high chlorine water shall be drained and/or flushed from the system.

### 3.04 DRAINING, FLUSHING AND NEUTRALIZATION

A. Draining and/or flushing the solution from the main shall be the responsibility of the Contractor and shall be performed so as not to cause damage to the environment or create a nuisance to the owners of adjacent property. The Contractor shall inform the Engineer of the proposed

1 methods of disposal of the high chlorine solution and shall secure any  
2 permits that may be necessary to dispose of such material.

- 3  
4 B. Where applicable flushed water shall be treated to remove the chlorine  
5 residual from the water being discharged that has the potential to impact  
6 storm sewer, retention pond, lake, bay, gulf, or any other body of water,  
7 chemicals for dechlorinating the water shall be as specified above. See  
8 AWWA Standard C651, Disposal of Heavily Chlorinated Water, Appendix  
9 C for additional details. This process shall be followed each time water is  
10 discharged.

11  
12 3.05 SAMPLING

- 13  
14 A. The Contractor shall schedule bacteriological sampling through the  
15 Pinellas County Inspector. A representative from the County Water  
16 Quality Management shall meet with the Pinellas County Inspector and/or  
17 the Contractor as applicable.  
18  
19 B. Before the water samples are collected, the Contractor shall ensure that  
20 all the blow off(s) and sample point(s) are opened and that the source  
21 water control valve is open.  
22  
23 C. Bacteriological sampling shall be conducted in accordance with Florida  
24 Administrative Code (F.A.C.) 62-555.340. Samples may be collected after  
25 first reducing the disinfection residual to no more than 4 mg/L or the  
26 representative disinfection residual of the source water. Disinfection  
27 residuals shall be measured and recorded. Bacteriological samples shall  
28 be collected and analyzed on two or more consecutive business days  
29 each taken at least six (6) hours apart. Samples shall be analyzed for the  
30 presence of total coliform by the Pinellas County state certified lab.  
31  
32 D. Prior to initiating sampling, the WQM specialist will check for the Total  
33 Chlorine Residual at the last sample point and confirm that the residual is  
34 representative of the incoming source water.  
35  
36 E. If the Total Chlorine Residuals are satisfactory, the specialist will begin  
37 water sample collection.  
38  
39 F. After the sampling is completed, the Contractor shall initiate the shut down  
40 process using the following sequence:  
41  
42 1. Turn off blow off(s) and sample point(s).  
43 2. Shut off the control valve.  
44  
45 G. Main Clearance Sampling is completed when each sample site has two  
46 consecutive day satisfactory (Total Coliform Absent) results.

- 1
- 2 H. Bacteriological test results for new and altered public drinking water mains
- 3 will be considered invalid if the pressure in the mains is not maintained at
- 4 20 psi or greater after the samples are collected.
- 5
- 6 I. Flushing and sampling shall be repeated, as required, if total coliform is
- 7 detected in a water sample. If necessary, the main shall be re-chlorinated.
- 8
- 9

10 3.06 ACTIVATION OF NEW WATER MAINS

11

- 12 A. No section of any main shall be put into service without the written
- 13 permission of the County and after the (FDEP) has cleared such main for
- 14 use.
- 15
- 16 B. After the Final or Partial "Letter of Clearance" has been issued by the
- 17 (FDEP) for a newly constructed water main and Pinellas County Utilities
- 18 Engineering is ready to authorize its activation, the water main(s) needs to
- 19 be thoroughly flushed before it is actually placed into service.
- 20
- 21 C. To achieve this flushing, fire hydrants may be utilized on 6-inch and larger
- 22 water mains. On water mains less than 6-inches, a permanent blow-off
- 23 may be used if provided. Otherwise the temporary blow-offs setup for the
- 24 flushing, chlorination and main clearance sampling procedures must be
- 25 utilized.
- 26
- 27 D. Before activation, new water mains should be flushed until the water runs
- 28 clean and clear. In addition, after the water main has been flushed, field
- 29 tests for Total Chlorine should be taken to ensure disinfection residuals
- 30 are similar to and representative of the source water. If the flushing has
- 31 been thoroughly completed, and a Total Chlorine residual greater than 1.5
- 32 to 1.8 is not detected, Pinellas County Utilities Water Quality Management
- 33 should be notified for additional follow up.
- 34
- 35 E. If a water main tie-in is involved or if the pressure in the main was not
- 36 maintained at 20 psi or greater, Pinellas County Utilities Water Quality
- 37 Management should be notified and water samples for bacteriological
- 38 analysis should be collected.
- 39
- 40
- 41
- 42
- 43
- 44
- 45
- 46
- 47

TABLE 1



REQUIRED OPENINGS TO FLUSH PIPELINES (40 PSI RESIDUAL PRESSURE)  
(For information purposes only)

Pipe Size	Flow (gpm Required to Produce 2.5 fps Velocity	Orifice Size (in.)	Number of Hydrant Outlet Nozzles	Size (in.) of Hydrant Outlet Nozzles
2	25	2	1	2-1/2
4	100	2	1	2-1/2
6	220	2	1	2-1/2
8	390	2	1	2-1/2
10	610	2-5/16	1	2-1/2
12	880	2-13/16	1	2-1/2
14	1200	3-1/4	2	2-1/2
16	1565	3-5/8	2	2-1/2
18	1980	4-3/16	2	2-1/2

**Note:** A 2 1/2-inch hydrant outlet nozzle will discharge approximately 1,000 gpm and a 4 1/2-inch hydrant outlet nozzle will discharge approximately 2,500 gpm with 40 psi residual pressure.

END OF SECTION

SECTION 33 32 00

SUBMERSIBLE WASTEWATER PUMPING STATIONS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials and equipment to construct and install a complete, automatic, underground pumping station with all factory-built equipment installed in a reinforced concrete pump wet well and shall furnish and install a reinforced concrete valve chamber complete with all pipe, valves, and fittings.
- B. The Contractor shall furnish all labor, materials and equipment to setup, maintain and operate a sewage bypass system as necessary during the proposed construction. It is required that the bypass system include a backup pump to prevent spills during a primary bypass pump failure. The contractor shall be responsible for any wastewater spills during the bypass operation and pay any and all fines, fees, property damage, environmental damage and cleanup costs that are associated with wastewater spills. The Contractor is responsible for providing by-pass pumps which shall not create a nuisance. The contractor will be required to use electric by-pass pumps when not in compliance with the local code noise requirement.
- C. Principal items of equipment included in the pump station: one set of pumps, one spare pump (unless noted otherwise by Pinellas County Utilities), valves, piping, automatic pump level sensor controller, GreyLine or Engineer of Record approved equal sonic-type of level sensor controller) will be the primary choice for pump level sensor controller (with Digital Controls bubbler system as a secondary choice), level sensor float backup system (Flygt or Engineer of Record approved equal), central control panel with circuit breakers and motor starters, all wiring and wetwell level sensors connected to SCADA system and mounted in the SCADA panel.
- D. Each pump station site shall have Metal Halide area lighting. Lighting to be controlled by a switch located as designated by the Engineer and Pinellas County. All area lighting shall be installed a minimum of ten (10) feet above ground on a concrete pole as designated by Pinellas County. Area aesthetics will be the primary consideration for area lighting detail.
- E. Each pump station site shall be provided with an appropriate driveway (Concrete, asphalt or millings), appropriate vinyl fencing and site landscaping as requested by Pinellas County.

1  
2 F. Each pump station shall be evaluated to determine if an odor control  
3 system is required.  
4

5 G. Each pump station shall have a potable "safety and sanitation" water  
6 supply connection for wet well cleaning. A potable water connection,  
7 installed with appropriate back flow prevention device, shall be provided.  
8 Where potable water is unavailable, a reclaimed water connection shall be  
9 provided, if available.  
10

## 11 1.02 WARRANTY

12

13 A. The Contractor shall guarantee the entire installation, labor and materials  
14 for eighteen (18) months. The Contractor shall repair or furnish without  
15 charge similar part or parts, which within eighteen (18) months after date  
16 of acceptance, prove to be defective.  
17

## 18 PART 2 –PRODUCTS

19

### 20 2.01 STRUCTURES

21

22 A. Reinforced concrete pipe installed vertically for use as a pumping station,  
23 shall have steel reinforcement equal to or exceeding ASTM designation  
24 C478, latest revision, and shall conform or exceed the wall thickness of  
25 Table 2, Wall B, ASTM designation C-76, latest revision. Concrete shall  
26 be 4000 psi/28 day and shall be made using Type II Portland Cement.  
27 Valve vaults may be precast or poured in place concrete. Top slabs to be  
28 per the plan drawings for both structures.  
29

30 B. Concrete ingredients shall conform to as follows:  
31

- 32 1. Portland Cement: Type II per ASTM Specifications C-150
- 33 2. Aggregate: 1" to #4 per ASTM Specification C-33
- 34 3. Sand: 2.35 fineness modulus, free from organic matter
- 35 4. Water: Clean and suitable for domestic use
- 36 5. Air: Maximum 5 percent entrained  
37

38 C. Ballast concrete shall be 2500 psi/28 day and emplaced as shown on  
39 plans.  
40

41 D. Slab shall be 3500 psi/28 day concrete and shall be placed on two layers  
42 of waterproof membrane.  
43

44 E. Fiberglass Liners shall be as specified in the Materials Specification  
45 Manual and shall be specifically manufactured for sewer use. These  
46 products shall meet all requirements of latest ASTM designation C-582  
47 (plastic laminates) and ASTM designation C-581 (chemical resistance).

## SUBMERSIBLE WASTEWATER PUMPING STATIONS

1 The properly installed liners shall not fail under H-20 dynamic wheel load  
2 applied vertically. Liner shall be installed in accordance with  
3 manufacturer's requirements. The liner shall be tested in accordance with  
4 ASTM-3753.

- 5  
6 F. All exposed interior wet well top surfaces shall be covered with 1/8-inch  
7 minimum thickness continuous fiberglass sheet adequately anchored to  
8 the concrete.  
9

## 10 2.02 EQUIPMENT

### 11 A. Pumps

- 12  
13  
14 1. The pumps shall be capable of handling raw, unscreened sewage.  
15 The design shall be such that the pumps will be automatically  
16 connected to the discharge piping when lowered into place. The  
17 pumps shall be easily removable for inspection or service, requiring  
18 no bolts, nuts or other fastenings to be removed for this purpose.  
19  
20 2. Each pump shall be fitted with a lifting lug, bracket, etc. of adequate  
21 strength and length to permit raising the pump for inspection and  
22 removal.  
23  
24 3. The starter casing, oil/air casing and impeller shall be of grey iron  
25 construction, with all parts coming into contact with sewage,  
26 protected by a coat of rubber-asphalt paint. All external bolts and  
27 nuts shall be of 304 stainless steel. The impeller shall be protected  
28 by a rotating stainless steel or bronze wear ring and stationary  
29 neoprene "O" ring at the inlet of the pump. The impeller shall be of  
30 a single vane, nonclog design, capable of passing solids, fibrous  
31 material, and heavy sludge, and constructed with long throughway  
32 with no acute turns.  
33  
34 4. Each pump shall be provided with a tandem double mechanical  
35 seal running in an oil reservoir, composed of two separate lapped  
36 face seals, each consisting of one stationary and one rotating  
37 tungsten-carbide ring with each pair held in contact by a separate  
38 spring, so that the outside pressure assists spring compression in  
39 preventing the seal faces from opening. The compression spring  
40 shall be protected against exposure to the pumped liquid. The  
41 pumped liquid shall be sealed from the oil reservoir by one face  
42 seal and the oil reservoir from the motor chamber by the other, as  
43 required. The seals shall require neither maintenance nor  
44 adjustment, and shall be easily replaced.  
45  
46 5. A sliding guide bracket shall be an integral part of the pumping unit  
47 and the pump casing shall have a machined angle connection with

1 yoke to connect with the cast iron discharge connection, which shall  
2 be bolted to the floor of the sump and so designed as to receive the  
3 pump angle connection without the need of any bolts or nuts. The  
4 anchoring of the pump to the wet well floor shall include any pad or  
5 pedestal to allow unimpeded flow to the impeller per the  
6 recommendation and detail of the pump manufacturer.  
7

8 6. Sealing of the pumping unit to the discharge connection shall be  
9 accomplished by a simple linear downward motion of the pump with  
10 the entire weight of the pumping unit guided to and wedging tightly  
11 against the angled discharge connection; no portion of the pump  
12 shall bear directly on the floor of the sump and no rotary motion of  
13 the pump shall be required for sealing.  
14

15 7. The pump motor shall be housed in watertight casing and shall  
16 have Class F insulated windings which shall be moisture resistant.  
17 Pump motors shall have cooling characteristics suitable to permit  
18 continuous operation in a totally, partially or non-submerged  
19 condition. The pump shall be capable of running dry in a totally dry  
20 condition for extended periods under full load without damage.  
21

22 B. Sewage Pumps and Motors  
23

24 1. All sewage pumps shall be Flygt N-Series, or Engineer of Record  
25 approved equal, with 230/460 volt, 3 phase, 60 cycle motors.  
26 Impellers shall be capable of passing a three inch sphere and  
27 delivering the GPM and TDH as shown on the plans.  
28

29 C. Access Frame and Guide Bars  
30

31 1. An aluminum access frame complete with checkered aluminum  
32 doors rated at three hundred (300) pounds per square foot, as  
33 manufactured by Bilco or Halliday, shall be furnished unless  
34 conditions, i.e. vehicle loading, etc, require a higher load rating  
35 door. Stainless steel door hinges will be recessed and vandal-  
36 proof; hasp will be fabricated of round bar stock mounted vertically  
37 and drilled to accept a padlock. A fall prevention system shall be  
38 incorporated into the access frame.  
39

40 2. Doors over fifty (50) pounds in pull-weight shall be torsion bar  
41 loaded, all will have a locking safety handle to hold them in the  
42 open position. Valve pit and wet well doors, in the open position,  
43 shall provide a clear opening to allow for service and removal of  
44 equipment (including pumps with mix flush valves). The upper  
45 guide and cable holder shall be furnished and securely mounted to  
46 the opening using 3/8" x 2 1/4" long stainless steel wedge anchors.  
47 Two stainless steel pump guide bars (SAE 304, schedule 40) of a

size shown on the drawings, shall be furnished for each pump and shall be of adequate length to extend from the lower guide holders on the pump discharge connection to the upper guide holder mounted on the access frame using 3/8" X 2 1/4" long stainless steel wedge anchors. Intermediate guide bar brackets shall be installed where depth of station is greater than eighteen (18) feet.

#### D. Valves and Piping

1. Gate valves, four inch through sixteen (16) inch diameter, shall be AWWA standard for resilient seated gate valves, NRS open left and rated at 250 psi minimum. Valves in vaults shall have flanged connections with a hand wheel operator. Buried valves shall have mechanical joint connections with a two-inch operating nut, supplied with a valve box, bronze identification disk and concrete valve box collar as shown in the Standard Details.
2. Piping shall be flanged ductile iron (no flange adapters will be accepted). Duplex pump discharge lines shall be flanged ductile iron (no flange adapters will be accepted) jointed by a double branch ninety (90) degree ductile iron elbow to the common outlet. Triplex pump discharge lines shall be flanged ductile iron (no flange adapters will be accepted) jointed by a ductile iron cross to the common outlet. A flanged wall pipe shall connect the riser pipe. MJ wall sleeves shall be utilized to make the horizontal connection to the riser. Pipe sizing shall be in accordance to plans. A line valve shall be installed within five feet of the valve pit with an external bypass system.
3. Discharge piping shall have two 1/2-inch stainless steel ball valves installed to permit pump performance testing. The ball valves shall be installed upstream of the pump discharge check valves
4. A by-pass draw tube shall be installed on stations that have two hour retention time or less, and six inch draw tubes.. Bypass valves should be 6" or greater when head condition exceeds 40'.
5. All hardware (bolts/nuts) on flange by flange piping shall be 304 stainless steel.

#### E. Pump Station Control Panel Specifications

1. The control panel enclosure shall be stainless steel, NEMA 4X (sized per the Appendix Schedule 1). There shall be polished aluminum dead front inner door. The dead front shall be mounted on a stainless steel continuous hinge (piano) mounted with pop rivets, with a positive mechanical quarter-turn handle catch and shall open at least ninety (90) degrees F. A method of holding the

1 dead front door in the open position shall be provided. A method of  
2 securing a standard padlock, thereby locking the cabinet outer  
3 door, shall be provided. All panels shall be equipped with stainless  
4 steel wire terminals.  
5

6 2. The dead front door shall contain the following labeling: Access to  
7 circuit breakers, HAND-OFF-AUTO-RTU pump selector switches  
8 with green light for auto, yellow level indicator pilot lights, red pump  
9 run pilot lights, red alarm pilot light, maintenance switch with yellow  
10 pilot light, phase monitor test switch, green watchdog activated pilot  
11 light, and a 20 amp GFI receptacle. All indicator lights shall be  
12 lamp trade number (1819).  
13

14 3. A MELTRIC #37-27-043 generator receptacle shall be mounted on  
15 the side of the control cabinet in the down position. Main circuit  
16 breaker and Emergency generator circuit breaker shall be inter-  
17 locked to prevent back feed. All circuit breakers shall be Square D  
18 FAL series or larger as required, and sized for the available power  
19 company fault current. Where a "high" leg service exists, it shall be  
20 connected to the "B" phase of the main breaker. Most applications  
21 will be duplex pumps unless otherwise specified.  
22

23 4. The motor starter sub panel shall contain Square D Model #8536  
24 (Type P starters are not acceptable) across-the-line NEMA-rated  
25 magnetic starters with individual over-load on each leg and one  
26 hundred 120 volt coil control. Across the line motor starters with  
27 thermal overload protection shall be used when pump horsepower  
28 is less than 20 hp on a 240 volt or less voltage feed or 20  
29 horsepower on 480 volt or less voltage feed. Additionally, a VFD  
30 shall be installed for all applications. All control wiring shall be  
31 surface mounted, void of splices, have appropriate color coded or  
32 numbered terminal ends, sized 14 minimum, type THHN or  
33 equivalent, rated for six hundred (600) volts, stranded tinned  
34 copper conductor colors are as follows:  
35

- 36 a. 120V-A/C  
37 Blue-Hot  
38 White – Neutral  
39
- 40 b. 24V-A/C  
41 Orange – Hot  
42 Grey – Neutral  
43
- 44 c. 12V D/C  
45 Red – Positive  
46 Black – Negative  
47

d. Green – Ground

e. Diversified Electronics - Pump Alternator Only  
Brown – 1 Input  
Yellow – Common Input

f. RTU colors are per Pinellas County Utilities standard.

5. Control relays shall be 8 pin plug-in type and a LED pilot light to indicate when energized. Relay sockets shall be surface mounted. 120V to 24 volt step down transformers shall be minimum, .075KVA rated and primary and secondary fused. Alternators shall be Diversified Electronics solid state 8 pin plug-in type with indicator LED's, a switch to select automatic or lead pump operation, and a test switch. A battery alarm system (STA-CON B.O.A.C.) shall be provided in the panel. A red-flashing light and an audible alarm (wheel-lock model #EH-EL2) compatible with the Sta-con alarm system. Alarm horn and light shall be mounted on site for optimum placement. An outside horn cancel button, that shall work on power failure, shall be installed.

6. All three-phase panels shall have an electronic solid state phase monitor and use pin wiring configuration compatible with current stations as follows: 240 volt systems shall use the Diversified Electronics 8 pin plug-in type; 480 volt systems shall use hard-wired surface mounted unit. The loss of any phase shall actuate the battery alarm and open the 120 volt neutral. This phase loss shall disconnect the 120 volt neutral from the 120 volt control section.

7. Control circuitry shall be designed as per Pinellas County Utilities standards. A solid state lightning surge protector with a clamping time of ten (10) nanoseconds shall be Innovative Technologies XT40 (230v., 1ph), XT40 (230v, 3ph) or XT40 (480v, 3ph) or EQX80 and be weatherproof for external mounting. The surge protector shall be mounted on the outside of the disconnect control panel on the load side. A NEMA 4 stainless steel, fusible, horsepower rated disconnect switch shall be provided and drilled for padlock security in the "OFF" position. The disconnect shall isolate the non-fusible utility power from the control panel. A second similar disconnect is required before the meter in 480 volt applications by the power company. An 11" x 17" schematic and pump data sheet shall be permanently affixed to the interior of the enclosed door. Lamination shall be provided to protect the data sheet. A stainless steel NEMA 4x junction box (minimum 14" x 12" x 6" and a minimum 24" x 24" x



8" for 20 H.P. and larger) with bottom or side hinged cover shall be installed between the control panel and the wet well. It shall house the terminal strip, which shall be stainless steel, mounted on an aluminum din rail, for pump, float, RTU and sensor connections (24). There shall be twelve (12) inches minimum clearance between the bottom of the junction box and slab top elevation.

8. The control panel and the junction box shall be connected by means of a 1-1/2-inch (minimum size) conduit with appropriately sized in-line gas seal-off. Myers Hub or other similar, reusable, water-proof fitting shall be installed where any conduit enters the top or side of any box. The junction box shall have one 2-inch PVC (minimum size) conduit for each pump, and two 2-inch PVC (minimum size) conduits for the floats. All conduits between the junction box and the wet well shall be sealed with duct seal or approved equal. Re-usable butterfly clamps shall be used in the junction box to secure motor, float and level controller leads. The control panel and disconnect switch shall be mounted plumb on two 6" x 6" x 10' (minimum) pre-cast concrete posts buried three feet in the ground. The overall length of the post shall be determined by the size of the panel and the three feet minimum distance required between the bottom of the panel and slab top elevation. All mounting hardware shall be 304 stainless steel. If UNI-STRUT is used, it shall be of 304 stainless steel. Larger than 20 H.P. applications shall have conduit for pump cable sized so that the cable does not occupy more than twenty-five (25) percent of the conduit.

9. All stand alone (pedestal mounted) panels shall have 304 stainless steel Uni-strut welded to the rear of the panel to support meter can, fusible disconnect and junction box. In addition the pedestal mounted panel shall be securely anchored to a six inch thick, reinforced with #4 bars at eight inches o.c. both ways, 3500 psi concrete slab.

10. All grounding grids (delta) shall consist of a minimum of three each 5/8-inch, copper-clad steel sectional ground rods, which are compression-coupled. The depth of all ground rods will be determined by a using IEEE "Fall of Potential Method" and shall be so noted on a Certified Ground Test Document, which shall be provided by the installer. Ground resistance shall test at or below 10 OHMS, un-bonded. All conductors shall consist of copper rope-lay cable composed of a minimum of twenty-eight (28) strands of 14 gauge wire weighing not less than 375 pounds per 1,000 feet.

11. All ground grid system connections shall be made using the exothermic process, CADWELD, or other approved equal manufacturer. All underground connections shall be via exothermic

welding. All structures shall be bonded to the closest electric service ground via the main size conductor and/or a water service pipe. The bonding shall be accomplished to achieve equal potential of all grounds. Delta grids shall be tested without the service and water main connection, and documented as such, and then connection to service and water main can be made. The ground resistance of the completed system shall be measured, and listed on the Certified Ground Test Document.

12. All conductors, other than those supplied from the power company, shall be 600 volt rated stranded copper THHN insulation or equivalent and be run in PVC conduit or as per code requirements. The service conductors shall have ampacity ratings that meet or exceed the main breaker ampacity. All utility services, not supplied by the power company, shall be supplied by the contractor and shall be underground in conduit.
13. The Contractor shall be responsible to verify power company requirements prior to ordering equipment and beginning any work. All workmanship shall be done in a professional manner and will meet all NEC and NEMA codes. The enclosure and components shall be UL approved.
14. Twenty four (24) din rail mounted RTU terminals shall be supplied and mounted vertically as close to bottom center of cabinet as possible. Above the terminals shall be seven RTU relays mounted and wired as per the supplied prints.
15. SCADA and RTU requirements shall be as specified in Section 40 95 01, Wastewater Pump Station SCADA Remote Telemetry Unit (RTU).

F. Mixing/Flushing

1. All pump stations shall have a mixing and/or flushing capability so that at minimum the fluid in the wet well is mixed once per alternation cycle (i.e. one mixer/flusher per duplex setup, two per triplex setup). Location of mixing and/or flushing valve shall be determined in the field by the Engineer and Pinellas County Engineering.

G. Wiring

1. The pump station shall be factory wired for the electric service to the central control panel and either a 100 amp or 200 amp (sized as required) fusible disconnect switch in a stainless steel rain tight enclosure to be located between the electric meter and the control panel of all 230 volt electrical services and a stainless steel rain tight enclosure to be located on each side of the electric meter of all

460 volt electrical services. A stainless steel junction box with stainless steel terminal strip shall be furnished and installed between the control panel and wetwell. All wiring shall be copper. All conductors shall be color coded 4 AWG or larger 600 volt type THW and shall be run in PVC conduit.

#### H. Painting

1. Surfaces to be painted shall be free from grease, excess moisture and rust. All metal surfaces except stainless steel and all exposed interior concrete surfaces and exterior pump station concrete wall surfaces shall receive two coats (15 mils total) of a self-curing material consisting of two components. The material used shall meet all requirements of the US Army Corps of Engineers Formula C-200, and/or Steel Structures Painting Council Specification SSPC-Paint No. 16, Coal Tar Epoxy – polyamide black paint. Wet well and valve vault top slab surfaces shall have a broom finish.

#### I. Factory Tests

1. The completed pump station shall be given a two hour running test. A written report of the actual test shall be provided showing pump capacities, control settings, motor amperage and voltage, accessory operation and thorough visual inspection noted herein.

### PART 3 – EXECUTION

#### 3.01 CONSTRUCTION

- A. Fiberglass manhole liners shall be constructed on the base slab as specified and shall be seamless vertically and horizontally and sized according to plans. The top slab underside and walls of the opening(s) of the wet well shall have one-eighth inch minimum thickness sheet of fiberglass adequately anchored into the concrete slab.
- B. Any pipe entering through the wetwell walls will be sealed all around to the interior walls by use of fiberglass patching kit. There shall be no mortar exposed above bench level, except the stack.
- C. Station and Wetwell Installation
  1. The Contractor shall furnish all labor, materials and equipment necessary or incidental to the installation of the pump station and wet well, including:
    - a. Clearing, topsoil removal, disposal of excess excavation, supplying of any borrow replacement of topsoil and sod.

- b. Shoring and bracing where necessary.
- d. Keeping the excavation dry at all times.
- e. Providing any ballast concrete that may be required.
- f. Backfilling by compacting twelve inch layers of approved materials simultaneously on all sides of the structures.
- g. Providing electrical service feeders with NEMA 4X fused main disconnect located per code requirements.
- h. Grading, sodding and landscaping shall be required for the entire pump station easement. The contractor shall water and maintain the new sod and landscaping. All plants and bushes shall be submitted as a landscape plan to allow for proper clearance around the valve vault and wet well.
- i. A driveway shall be installed in accordance with the plans.
- j. Installation of all equipment and materials shall be in accordance with manufacturer's requirements.
- k. All gravity inflow pipes shall be installed with a PVC Bowl Drop facing downward with a drop pipe to a depth specified during the plan review process.

### 3.02 INITIAL START-UP AND OPERATOR INSTRUCTION

- A. The Contractor shall provide the services of a factory-trained service man for one day of initial start-up and operator instruction.

## **APPENDIX**

SCHEDULE 1  
PINELLAS COUNTY ENCLOSURE SIZES

VOLTAGE	HORSEPOWER	ENCLOSURE SIZE	DUPLEX	VFD'S
230V/3PH	3HP	48" X 36" X 10"	X	
230V/3PH	5HP	48" X 36" X 10"	X	
230V/3PH	7.5HP	48" X 36" X 10"	X	
230V/3PH	10HP	48" X 36" X 10"	X	
230V/3PH	15HP	60" X 60" X 12"	X	
230V/3PH	20HP	60" X 48" X 14"	X	X
230V/3PH	25HP	60" X 60" X 16"	X	X
230V/3PH	30HP	72" X 60" X 16"	X	X
230V/3PH	40HP	72" X 60" X 18"	X	X
230V/3PH	47HP	72" X 60" X 18"	X	X
480V/3PH	3HP	60" X 36" X 12"	X	
480V/3PH	5HP	60" X 36" X 12"	X	
480V/3PH	7.5HP	60" X 36" X 12"	X	
480V/3PH	10HP	60" X 36" X 12"	X	
480V/3PH	15HP	60" X 36" X 12"	X	
480V/3PH	20HP	60" X 48" X 12"	X	X
480V/3PH	30HP	60" X 60" X 16"	X	X
480V/3PH	47HP	72" X 60" X 16"	X	X
480V/3PH	60HP	72" X 60" X 16"	X	X
480V/3PH	77HP	72" X 84" X 18"	X	X
480V/3PH	88HP	72" X 84" X 18"	X	X
230V/1PH	2.4HP	60" X 36" X 12"	X	
230V/1PH	4.0HP	60" X 36" X 12"	X	

1  
2

END OF SECTION

SECTION 33 33 01

GRAVITY SEWERS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Work includes furnishing all plant, labor, tools, equipment, materials, and performing all operations in connection with construction of sanitary sewers and appurtenant structures, including excavation, trenching, backfilling and appurtenant work as required, or as directed.

1.02 Material Depth Limitations

- A. Pipe materials used for gravity sewers shall be subject to the depth limitations indicated in accordance with the Standard Details.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All gravity sewer pipe and appurtenant materials used in the Pinellas County Sewer System shall be as specified in the latest version of the Pinellas County Utilities Material Specification Manual at the time of plan approval.

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Order of Work

1. The Engineer reserves the right to specify which sewer lines will receive priority in construction. In general, however, the work will be from the lower end of the sewer towards the upper end of the sewer.

B. Maintenance of Existing Sewerage Facilities

1. It is the responsibility of the Contractor to maintain operation of the existing sewerage facilities during construction and repair work. The Contractor shall be responsible for providing any equipment required to maintain operation of service during construction. Any damage done to any existing sewer pipe or structure is to be immediately repaired to a condition equal to, or better than, its original condition.

1 C. Location and Grade of Sewers

- 2
- 3 1. The line and the grade of the sewer, as well as the location of manholes,  
4 and all other appurtenances, shall be as shown on the Plans or, as  
5 directed by the Engineer. The grade line as given on the Plans indicates  
6 the grade of the invert of the sewer pipe.  
7

8 D. Cutting Gravity Sewer Pipe

- 9
- 10 1. Cutting ductile iron pipe shall be field cut with a power saw. No impact  
11 cutting is permitted. The spigot end of pipe thus cut shall be filed or  
12 ground to form a bevel.  
13
- 14 2. Cutting PVC sewer pipe may be field cut using hand or power saws in  
15 accordance with the manufacturer's recommendations. The raw spigot  
16 end thus formed shall be filed to remove gasket damaging burrs and to  
17 form a standard bevel.  
18

19 E. Laying Gravity Sewers

- 20
- 21 1. Cut sheets for complete sections of the gravity sewers, as designated by  
22 the Engineer, shall be submitted by the Contractor to the Engineer for  
23 approval at least two days prior to construction. Each run of gravity  
24 sewer shall be represented on a separated cut sheet.  
25
- 26 2. Installation of ductile iron pipe shall conform to the procedures outlined  
27 in "A Guide for the Installation of Ductile Iron Pipe" which is available  
28 from the Ductile Iron Pipe Research Association. All ductile iron pipe is  
29 to be encased in green polyethylene material, conforming to the  
30 requirements of the County's Materials Specification Manual.  
31 Polyethylene film shall be supplied in tube form suitable for use in  
32 Installation Method 'A' per AWWA C105.  
33
- 34 3. Installation of PVC pipe shall be per ASTM D-2321 and UNI-B-5.  
35
- 36 4. Trench excavation shall be as specified in Section 31 23 33, Excavation  
37 and Backfill for Pipes.  
38
- 39 5. Each pipe shall be laid true to line and grade so as to form a close  
40 concentric joint with the adjoining pipe, preventing offsets in the flow line.  
41 The trench bottom shall form a solid base for the entire length of pipe  
42 and shall be capable of supporting the full weight of the pipe and backfill  
43 material. The pipe bells shall not bear against the solid bottom of the  
44 ditch. Sewers will be inspected with mirrors at intervals during  
45 construction and corrected, if necessary, before backfill.  
46



1 6. All wye units, stubs, or other fittings placed in lines for future  
2 connections, or services, shall have the open bell tightly plugged using  
3 pipe manufacturer=s recommended watertight plug. All plugs shall be  
4 capable of withstanding 4 psi internal air test pressure, yet permit easy  
5 removal for future use.

6  
7 7. The open ends of all pipelines shall be kept securely plugged at the end  
8 of each day's work and at any other time when any operation is being  
9 carried out which might permit foreign materials, rock, dirt, etc. to enter  
10 the pipe. Pipelines shall be thoroughly flushed out upon their completion  
11 and when directed by the Engineer.

12  
13 F. Joining Gravity Sewer Pipe

14  
15 1. Gravity sewer pipe having factory fabricated joints shall be joined  
16 together in strict accordance with the manufacturer's specifications. The  
17 surface shall be wiped free of dust, dirt, gravel, or other foreign materials  
18 before joining. The spigot end shall be centered on grade into the bell  
19 end of the last downstream length of pipe, and properly seated.

20  
21 2. When seating pipe with a pry, lever, or other approved device, care shall  
22 be taken to protect the pipe end from damage. Ends damaged in any  
23 manner shall be cause for rejection of the pipe.

24  
25 G. Repair and Replacement Construction

26  
27 1. All repair and replacement work shall conform to standards specified for  
28 new construction wherever applicable, or as specified in the Repair  
29 Specifications.

30  
31 H. Removal of Existing Pipe

32  
33 1. Existing pipe no longer in service that is removed from the system shall  
34 be disposed of properly by the Contractor. Openings in manholes,  
35 sewer lines, or wye branches remaining in place shall be properly  
36 plugged and sealed so as to eliminate any possibility of infiltration at the  
37 point of separation. All pieces of broken pipe shall be removed from the  
38 trench before backfill operations commence. Backfill of the trench shall  
39 be as specified in Section 31 23 33 - Excavation and Backfill for Pipes.  
40 Inspection of structures remaining in place shall be made before backfill.

41  
42 3.02 INSPECTIONS OF LINES AND MANHOLES

43  
44 A. Inspection of completed lines and manholes shall be scheduled within a  
45 reasonable time after construction or when required by the Engineer. Before

scheduling an inspection, the Contractor shall prepare the lines by cleaning and flushing. Manholes shall be clean, finished and free of leaks.

B. Manholes shall be on a true and uniform grade. The inverts shall have a smooth steel troweled finish. All benches shall be uniformly sloping. The frames shall be tight and properly set in mortar on solid masonry. The invert, benches and adjacent pipe shall be free of splattered mortar. All required interior lining or paint shall be kept intact. Manhole frames shall be adjusted to grade with the covers and frames cleaned and free of mortar and asphaltic mixtures. All precast manhole seams shall be filled with an approved asphaltic compound.

C. Pipe between manholes shall be true to line and grade. Dips and sags with one inch or more of trapped water shall be cause for rejection. Inspection shall be by mirror and sunlight and shall be followed by television inspection at the Contractor's/Developer's expense. Air testing may be required also at the Contractor's/Developer's expense. Contractor shall provide personnel to assist with inspections.

D. The Contractor shall provide Pinellas County Utilities with a Television Inspection of the completed gravity sewers in accordance with the following:

1. Shall be performed by a NASSCO PACP Certified Operator who will use software that is compatible with Granite XP latest version software to NASSCO PACP Standards.
2. Shall be submitted as digital media that includes video and data base file in PACP format and include a printed copy of the PACP television inspection log.
3. Shall perform a manhole inspection and provide a completed NASSCO Manhole Inspection form latest version for each manhole that is connected to the sewer being inspected.
4. All pertinent data recorded in audio on the media to include:
  - a. Subdivision name and phase number.
  - b. Manhole numbers (these numbers must match manhole numbers on "as built" drawings).
  - c. Date
  - d. Size and material of pipe
  - e. Service connection locations, right or left
  - f. All distances between manholes
  - g. Locations of suspected and obvious pipe deficiencies (i.e., bad joints, breaks or leaks etc)

5. PVC pipe shall have a deflection test using a seven and one-half percent (go-no-go) test mandrel of appropriate size, which shall be visible on video at all times.
  6. The printed NASSCO PACP television report (indicating manhole numbers) which will accompany the media. This written report must include:
    - a. Manhole numbers (these numbers must match manhole numbers on "as-built" drawings).
    - b. Service connection locations, right or left.
    - c. Reference to service connection locations out of manholes.
    - d. Locations of suspected and obvious pipe deficiencies (i.e., bad joints, breaks or leaks, etc.).
    - e. Depth of each manhole.
    - f. Actual measured distance (on ground) between manholes.
  7. All visual and television inspections shall be completed and approved by Pinellas County Utilities after the road base has been constructed but prior to the placing of any asphalt.
  8. Television Inspection Media must clearly show details of structural defects, misalignments and infiltration.
  9. For detailed requirements for Television Inspection see Section 33 01 32 Sanitary Sewer Cleaning and Televising.
- E. All known or indicated breaks shall be repaired by the Contractor regardless of the test allowances. Faulty sections of sewer lines or manholes rejected by the Engineer shall be removed and re-laid by the Contractor. Sunken manholes will not be accepted.
- 3.03 SERVICE CONNECTIONS - WYE UNITS AND SERVICE PIPE
- A. In new sewer construction, D.I.P. and PVC service connections shall be made by means of a wye or tee. All joints connected to the wye unit shall remain flexible. Service connections on existing mains shall be made using a sewer saddle approved in the County's Materials Specification Manual.
  - B. All new sewer service connections shall have a continuous looped trace wire consisting of one (1) 14-gauge minimum solid copper or one (1) 12-gauge copper clad steel tracer wires taped to the top center of the pipe from the cleanout to the main line and back to the cleanout in accordance with the Pinellas County Standard Details. Tracer wire shall be in accordance with the County's Materials Specifications Manual.

1 C. Service pipe for all properties shall be laid to the property line and plugged, as  
2 shown on the Standard Details. All ends of service lines shall be marked by a  
3 permanent stake and where sidewalks or curbs are located nearby, by a  
4 chiseled mark cut in the sidewalk or curb. Service pipe shall have a protective  
5 cover of not less forty-two (42) inches under all roads and thirty-six (36) inches  
6 at all property lines. Inspection of service pipe shall be made before backfill.  
7 Service pipe shall have a visibly good line and grade. Shallow service shall be  
8 laid by using a four foot hand level with proper shim attached to one end.  
9

10  
11 D. In cases of extra depth where service pipe cannot be laid on a continuous  
12 grade to the property line, the Contractor shall then furnish all materials and  
13 construct risers as shown on the Plans. When pipe cannot be adequately  
14 supported on undisturbed earth, it shall be supported on a concrete cradle. No  
15 payment will be made for concrete required to correct conditions resulting from  
16 faulty construction methods or negligence.  
17  
18  
19

#### 20 3.04 SERVICE RECONNECTIONS 21

22 A. Service reconnections require adapters for all joints that will not connect  
23 properly with ordinary factory joints. Approved pipe cutting methods shall be  
24 used to cut any pipe required for the connection. All cut pipe will be ground and  
25 smoothed to remove snags and sharp edges. No mortar or collars shall be  
26 used on reconnections unless specifically approved by the Engineer.  
27

#### 28 3.05 JOINING NEW PIPE TO OLD PIPE 29

30 A. Joining polyvinyl chloride pipe to existing vitrified clay pipe requires an adapter  
31 approved in the County's Materials Specification Manual for all joints that will  
32 not connect properly with ordinary factory joints. Approved pipe cutting  
33 methods must be used to cut any pipe required for the connection. All cut pipe  
34 shall be ground and smoothed to remove snags and sharp edges. No mortar  
35 or collars shall be used for such connections unless approved by the Engineer.  
36

#### 37 3.06 CLEAN-OUTS 38

39 A. Clean-outs shall be constructed in accordance with the Standard Details at  
40 locations as shown on the Plans.  
41

#### 42 3.07 JOINING PIPE TO MANHOLES OR OTHER STRUCTURES 43

44 A. All manhole connection holes shall be core drilled with a maximum hole  
45 diameter not to exceed one and a half times the pipe diameter.  
46

- 1 B. Approved standard groutable PVC-to-manhole fitting approved in the County's  
2 Materials Specification Manual, or a flexible rubber boot may also be used at  
3 the manhole connection. The boot shall be manufactured of neoprene or  
4 isoprene compounds formulated and tested to resist deterioration due to  
5 sewage, hydrogen sulfide, oils, fats, greases, petroleum products and  
6 by-products. The connection at the manhole wall shall be flexible and  
7 water-tight. Any annular space inside the manhole at the connection shall be  
8 filled with approved caulking material or joint filler.  
9
- 10 C. Stubouts for future mains shall be constructed at the locations and to the  
11 elevations shown on the Plans. The manhole benches shall be constructed to  
12 direct flows from all shown manhole inlets smoothly to the outlet. Stubouts  
13 shall be plugged with bricks and mortar per the detail shown on the Plans.  
14
- 15 D. Pipe connections to existing manholes shall be made so that finished work will  
16 conform, as nearly as possible, to the essential requirements for new manhole  
17 construction, as specified above. Drop connections on existing manholes shall  
18 be strengthened by use of eight #6 pins, placed around the drop elbow and tee,  
19 or inside PVC drops may be used.  
20

21 3.08 WATER MAIN STORM DRAIN CROSSINGS  
22

- 23 A. In all cases where sanitary sewer mains cross water mains, or storm sewers with  
24 a minimum clear distance between the sanitary sewer and the water main or  
25 storm sewer of less than twelve (12) inches, the sanitary sewer shall be ductile  
26 iron pipe for a distance of ten feet on either side of the point of crossing. No pipe  
27 joint shall occur within ten (10) feet of the crossed water main.  
28  
29  
30

END OF SECTION

SECTION 33 34 00

SANITARY SEWAGE FORCE MAINS AND APPURTENANCES

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all plant, labor, materials, equipment and tools and perform all operations in connection with the construction of the sanitary sewage mains and appurtenances, including excavation, trenching, backfilling, testing, clearing and clean-up.

1.02 MAINTAINING SERVICE AND SHUT DOWNS

- A. The Contractor's attention is called to the fact that the existing system must be kept in operation at all times. Where connections are made to existing mains or other shutdowns are necessary, permission must be obtained and arrangements must be made with the Utilities Department for removing from service those mains that will be affected. Shutdowns must be held to a minimum in both number and duration. Bypass pumping and hauling operations may be required to interrupt service.
- B. No valve or other control device on the existing system shall be operated by the Contractor without first obtaining approval from the Utilities Department. The Contractor shall, at least forty-eight (48) hours in advance, notify citizens subject to interruption of service by means of door hangers or any other approved method of the starting time and duration of such interruption.

1.03 SUBMITTALS

- A. Unless waived by the Engineer, cut sheets for the entire force main shall be submitted by the Contractor to the Engineer for approval at least two days prior to construction. This requirement will not relieve the Contractor of the responsibility to accurately record the "as-built" locations (horizontal and vertical) of piping, valving and appurtenances. Contractor shall submit to the County the Continuity Testing Results per Section 3.04 Item 6.g.

1.04 LAYING PIPE

- A. All roads and curbs shall be installed prior to force main installation. On a road where there is no curb, the paving must be done prior to installing the force main. Any deviation from this must be approved in writing by the

Pinellas County Engineer or his designated representative. In any case, force mains will not be accepted or tested until curb and/or roads are compete, thus preventing possible relocation or adjusting and retesting of newly installed pipes.

B. All joints, fittings and other appurtenances shall not be covered until inspected by the Pinellas County Inspector. Non-compliance will require excavation of all joints and fittings.

C. The pipe and fittings shall be constructed as shown on the approved Plans. All pipe four inches and larger in diameter may be deflected, but not bent. PVC pipe two inches in diameter may be bent around cul-de-sacs that have a radius of thirty-seven (37) feet or larger if the trench is left open until the Pinellas County Inspector is onsite to document that this guideline is fully complied with. The use of fittings not shown on the "Contractor Copy" construction Plan must have the prior concurrence of the Pinellas County Inspector.

#### 1.05 ABANDONMENT OF EXISTING MAINS BEING TAKEN OUT OF SERVICE

A. In general, pipe six inches and smaller abandoned within Pinellas County rights-of-way shall be capped at both ends and abandoned in place. Grouting is not required unless specifically required by the Engineer or the County.

B. Abandoned pipes eight inches and larger shall be filled with grout or flowable fill unless otherwise directed by the County or the Engineer.

C. Pipe abandoned in rights-of-way owned by municipalities other than Pinellas County shall be subject to the requirements of the agency having jurisdiction.

D. All pipes shall be abandoned in a manner which results in the abandoned pipeline not being pressurized.

#### PART 2 – PRODUCTS

##### 2.01 GENERAL

A. Materials, equipment and supplies furnished and permanently incorporated into the Project shall be of first quality in every respect, shall be constructed and finished to high standards of workmanship, and shall be the product of an approved reputable manufacturer. Material shall be suitable for the service intended, shall reflect modern design and engineering and shall be fabricated in a first-class workmanlike manner. All materials, equipment and supplies shall be new and shall have not

1           been in service at any time previous to installation, except as required in  
2           tests or incident to installation.

3  
4           B.     Materials and construction pertaining to restoration and construction of  
5           roads and structures shall be in accordance with the latest edition of  
6           Florida Department of Transportation (DOT) Standard Specifications for  
7           Road and Bridge Construction or as called for on the Plans.

8  
9           C.     All ductile iron or cast iron pipe, fittings and valves are to be encased in  
10          green polyethylene material, conforming to ASTM specification D-1248,  
11          with a minimum 8 mil thickness, taped and free of dirt in accordance with  
12          the latest edition of AWWA C105. Polyethylene film shall be supplied in  
13          tube form suitable for use in Installation Method 'A' as defined in AWWA  
14          C105.

15  
16          D.     All piping and appurtenances shall be color coded green with the  
17          exception of ductile iron pipe. That shall be encased in green  
18          polyethylene wrap, or if not available, encased in clear polywrap and shall  
19          be marked by means of three four-inch wide painted green lines along the  
20          length of the pipe at opposite locations around the pipe.

21  
22          E.     All PVC piping and ductile iron mains partially constructed of PVC or  
23          HDPE between valves shall be installed with locator wires, as specified  
24          below.

25  
26          F.     Force mains shall be buried with green metallic locator tape. All locator  
27          tape shall be placed twelve (12) inches above buried pipe.

28  
29          G.     No glued joints will be allowed. Mechanical restrainers are the only  
30          acceptable method of restraint.

31  
32   2.02   MATERIALS

33  
34          A.     All pipe and appurtenant materials used in the Pinellas County Sewer  
35          System shall be as specified in the latest version of the Pinellas County  
36          Utilities, Material Specification Manual at the time of plan approval.

37  
38   PART 3 - EXECUTION

39  
40   3.01   HANDLING

41  
42          A.     All materials, unless otherwise directed, shall be unloaded as nearby as  
43          possible to the location of installation by the Contractor. Materials shall be  
44          handled with care to avoid damage.



- 1 B. Materials shall be lifted by hoists or slid or rolled on skidways in such  
2 manner as to avoid shock. Under no circumstances shall materials be  
3 dropped. Pipe handled on skidways must not be allowed to roll against  
4 pipe already on the ground. The Contractor shall be responsible for the  
5 safe handling of all materials. Damaged materials shall not be installed.  
6
- 7 C. All materials found during the progress of work to have flaws, cracks, or  
8 other defects will be rejected by the Engineer regardless of whether or not  
9 it has been installed and shall be replaced by and at the expense of the  
10 Contractor.  
11
- 12 D. All PVC pressure pipe, upon delivery to the site and until such time as it is  
13 placed in the trench, shall be shielded from the weather and direct sunlight  
14 to prevent pipe deterioration.  
15
- 16 E. Materials shall not be stacked or placed under materials in such a manner  
17 that damage could result.  
18
- 19 F. Slings, hooks, or tongs used for lifting shall be padded in such a manner  
20 as to prevent damage to exterior surfaces, interior linings and  
21 components. If any part of the coating, lining or components is damaged,  
22 the repairs or replacement shall be made by the Contractor at his expense  
23 and in a manner satisfactory to the Engineer prior to attempting  
24 installation.  
25
- 26 G. In the event that materials supplied by the County are defective, the  
27 Contractor shall notify the Engineer immediately so arrangements can be  
28 made for replacing such devices.  
29

### 30 3.02 FIELD LAYOUT AND MODIFICATIONS 31

- 32 A. The Contractor, unless directed otherwise, shall be responsible for setting  
33 construction layout stakes and/or offsets required to complete the  
34 designated work. The Contractor shall insure that those stakes and/or  
35 offsets are protected and any re-staking due to work stoppage shall be  
36 included and no additional compensation to the Contractor will be made.  
37
- 38 B. The Engineer has the right to make any modifications as he deems  
39 necessary due to field conditions, conflicts with other utilities or to protect  
40 other properties.  
41

### 42 3.03 EXCAVATION, ALIGNMENT AND GRADE 43

- 44 A. Trench excavation and backfill shall be in accordance with Specification  
45 31 23 33, Excavation and Backfill for Pipes.  
46

1 B. All mains shall be laid and maintained at the required lines and grades  
2 with fittings, valves and appurtenances at the described locations. All pipe  
3 shall be laid to the depth as shown on the Plans, or when a depth is not  
4 indicated, with a minimum cover of thirty (30) inches outside of the  
5 roadway, and thirty-six (36) inches under the roadway. Grade lines shall  
6 be set by the Contractor. The tolerance of such grades shall not be more  
7 than that specified on the drawings. When no tolerance is indicated a  
8 tolerance of 0.5 foot shall be used. All other realignments must be  
9 approved by the Engineer. The Contractor shall have suitable survey  
10 equipment on the site at all times.

11  
12 C. The Work shall at all times progress with caution so as to prevent damage  
13 to underground obstructions both known and unknown. Should an  
14 obstruction not shown on the Plans be encountered, the Engineer shall be  
15 immediately notified and he shall be responsible for alteration to the plan  
16 should realignment be necessary. The Contractor shall notify the  
17 Engineer far enough in advance to allow the realignment to be  
18 accomplished by deflection in the pipe joints.

#### 19 20 3.04 LAYING AND JOINING BURIED FORCE MAINS

##### 21 22 A. General

- 23  
24 1. Prior to installation, all pipe shall be inspected for defects and all  
25 lump or excess coatings shall be removed. The inside of the bell  
26 and outside of the spigot shall be cleaned prior to joining of all pipe.  
27 Caution shall be taken to prevent damage to the pipe during  
28 lowering into the trench. Caution shall be taken to prevent foreign  
29 matter from entering the pipe during installation. The Engineer may  
30 require covering of the end of the pipe to prevent debris from  
31 entering. No debris, tools, clothing or other material shall be placed  
32 in the pipe.  
33  
34 2. After placement in the trench the spigot end of the pipe shall be  
35 centered in the bell and the pipe shall be driven home and then  
36 brought to the proper line and grade by tamping approved backfill  
37 material under it, except for the bell. Joint deflection shall not  
38 exceed manufacturer's limit.  
39  
40 3. During the time that the pipe is in the trench but no work is in  
41 progress, the end shall be closed by a water-tight plug. This shall  
42 include the noon hour, as well as overnight. If there is water in the  
43 trench upon beginning work, this plug shall remain in place until the  
44 trench has been pumped dry, unless otherwise approved by the  
45 Engineer.  
46

4. Standard plugs shall be inserted into all dead end pipes, tees or crosses; spigot ends shall be capped; flanged ends shall have blind flanges, or sheet metal or plywood caps. Plugs installed for pressure testing shall be fully secured and restrained to withstand the test pressure.
5. Where plugging is required because of Contract division or phasing for later connection, the ends of such lines shall be equipped with a permanent type cast iron or ductile iron plug/cap or blind flange with or without a blowoff cock, as shown on the Drawings. Installation or removal of such plugging shall be considered incidental to the work and no payment shall be expected for this work by the Contractor.
6. Tracer Wire For PVC, HDPE and Non-Continuous Ductile Iron Force Mains.
  - a. Tracer wire shall be installed on all mainline pipe. Mainline pipe installed by open cut method shall have two (2) 14-gauge minimum solid copper or two (2) 12-gauge copper-clad steel tracer wires taped to the top center of the pipe. Mainline pipe installed by horizontal directional drill shall have two (2) 12-gauge copper-clad steel tracer wires installed with the pipe. All tracer wire shall be as specified in the material specification manual.
  - b. The locator wires shall have colored insulation matching the type of service provided in the main and be acceptable for direct burial.
  - c. All splices of the wires shall be made with watertight connections per material specification manual.
  - d. The wires shall each be continuous throughout the project.
  - e. The wire is to be tied to all valves, tees and elbows
  - f. The locator wires shall be brought up into all valve boxes with enough slack provided to extend 10 to 12-inches out of each box and installed as shown in the Standard Details.
  - g. Contractor shall perform a 12-volt DC electrical continuity test on each of the wires. No more than one volt of loss per 1000 feet of mainline pipe will be acceptable. The locator wire system shall pass the 12-volt DC electrical continuity test for at least one wire prior to final acceptance of the

1 pipeline. Any cuts or breaks in the wire shall be repaired by  
2 the Contractor at his expense.

- 3  
4 h. The locator wire shall be tested by the Contractor at the time  
5 of pressure testing. If this test fails, the Contractor is  
6 responsible for repairing the locator wire and the pressure  
7 test will be reschedule when the wire will pass.  
8

9 B. Pigging, Flushing and Cleaning

- 10  
11 1. All mains shall be pigged, cleaned and flushed to remove all sand  
12 and other foreign matter. The Contractor shall be responsible for  
13 developing a pigging and flushing plan to be submitted to the  
14 Project Representative for approval prior to pigging and flushing.  
15 The Contractor shall dispose of all water used pigging and for  
16 flushing without causing a nuisance or property damage, in  
17 accordance with state and local requirements. Any permits or fees  
18 required for the disposal of flushing water shall be the responsibility  
19 of the Contractor.  
20  
21 2. Flushing water used by the Contractor shall be taken from an  
22 approved metered source. The water utility will provide the meter  
23 and designate the source. Potable and reclaimed flushing water  
24 shall be at the Contractor's expense.  
25  
26 a. Reclaimed water should be used for sanitary force mains.  
27  
28 b. Potable water can be used for all service types.  
29  
30 3. The cleaning of the new piping system shall be accomplished by  
31 the controlled and pressurized passage of a series of hydraulic or  
32 pneumatic polyurethane plugs of varying dimensions coatings, and  
33 densities; which shall be selected by the pipe cleaning Contractor.  
34 The Contractor shall provide a means to enter the pig into the  
35 system, control and regulate flow, monitor flows and pressures, and  
36 to remove the pig from the system. The Contractor shall maintain a  
37 constant surveillance of the system and immediately report to the  
38 proper authority any in-line problems encountered or any  
39 malfunctions discovered in the piping system. A record of pig  
40 models, sizes, styles, and other pertinent information shall be kept  
41 by the Contractor and turned over to the County.  
42  
43 4. The Contractor shall furnish pig launching and retrieval equipment  
44 to minimize additional valving, fittings and auxiliary water supplies.  
45 Valves and blowoff assemblies, which are installed as part of the  
project, shall be used as much as possible to minimize the number  
of temporary ports required for proper flushing and cleaning.

5. All materials used shall be specifically manufactured for flushing and cleaning pressure pipes, bends and valves. The pigs shall be able to go through bends, open valves and fittings, and provide adequate cleaning of the pipe.
6. Cost of Pigging Services- The cost to complete the requirements under this section shall be included in the contract items provided in the proposal sheet. There is no separate pay item for this work.

C. Jointing HDPE Pipe and Fittings

1. HDPE pipe shall be jointed by the butt-fusion process in accordance with pipe manufacturer's directions. Contractor shall provide butt-fusion technicians who are trained and certified by the P.E. pipe manufacturer to complete the project. The date of technician certification shall not exceed 12 months before commencing construction.
2. Butt-fusion means the butt-joining of the pipe by softening the aligned faces of the pipe ends in a suitable apparatus and pressing them together under controlled pressure.
3. The internal and external beads resulting from the butt-fusion process shall be visible and examined for penetration 360 degrees around the pipe diameter.
4. All fittings for HDPE pipe (4" and larger), except for D.I./HDPE Mechanical Joint Adaptors, shall be ductile iron mechanical joint fittings per material specification manual and shall be joined to the pipe using a butt fused restrained mechanical joint adapter.
5. The D.I./HDPE mechanical joint adapter shall be connected to the HDPE pipe by a heat-fused joint on one end, and connected to a ductile iron pipe valve, or fitting with a mechanical joint on the other end.
6. Solvent epoxy cementing, electro-fusion couplings and mechanical joining with bolt on wrap around clamps or mechanical joints with out an adapter shall not be used for connections.
7. The D.I./HDPE mechanical joint adaptor shall be connected to the HDPE pipe by a heat-fused joint on one end, and connected to a ductile iron pipe valve, or fitting with a mechanical joint on the other end.
8. Short pieces of pipe between valves and fittings shall be DIP with all joints restrained for sizes 3-inches and larger. For 2-inch, the

1 short pieces shall be brass or Sch. 80 with IP threads and DI,  
2 HDPE or brass fittings and all joints restrained.

3  
4 D. Jointing Push-On Ductile Iron and PVC Pipe and Fittings

- 5  
6 1. The inside of the bell and the outside of the spigot end shall be  
7 thoroughly cleaned to remove dirt, grit, oil or excess coatings and  
8 other foreign matter. The rubber gasket shall be flexed inward and  
9 inserted in the gasket recess of the bell socket. A thin film of  
10 gasket lubricant shall be applied to either the inside surface of the  
11 gasket or the spigot ends, care will be taken to avoid contact with  
12 the ground. The joint shall be completed by forcing the plain end to  
13 the bottom of the socket with a forked tool or jacking device or other  
14 approved method. All pipe shall have depth mark prior to insertion.  
15 Pipe cut in the field shall be filed to resemble the spigot end of  
16 manufactured pipe.  
17  
18 2. When deflection is required the joint shall be completed prior to  
19 setting the deflection. The deflection shall conform to applicable  
20 AWWA Standards or manufacturer's recommendation with prior  
21 Engineer's approval.  
22

23 E. Jointing Mechanical Joint Pipe and Fittings

- 24  
25 1. The inside of the socket, the outside of the spigot end and the  
26 gland shall be thoroughly cleaned and or washed with an approved  
27 solution to remove dirt, grit, oil or excess coatings and foreign  
28 matter to improve gasket seating. The gland shall then be placed  
29 on the plain end of the pipe with the lip extension toward the plain  
30 end, followed by the gasket with the narrow edge of the gasket  
31 toward the plain end of the pipe. The pipe shall be inserted into the  
32 socket and the gasket pressed firmly and evenly into the gasket  
33 recess. The joint shall be kept straight during the assembly and  
34 any deflection required shall be done after the joint has been  
35 assembled but prior to tightening the bolts.  
36

37 F. Jointing Special Joint Ductile Iron Pipe and Fittings

- 38  
39 1. Other special joint pipe shall be assembled or installed, per  
40 manufacturer's recommendations, or directed by the Engineer. The  
41 Contractor shall insure that the joint is thoroughly cleaned by  
42 removing all dirt, oil, grit, excess coatings and foreign matter to  
43 insure a tight joint.  
44

45 3.05 TEMPORARY AND PERMANENT PLUGGING

- 1 A. Temporary plugging of pipes shall be performed at the time of construction  
2 when the work is interrupted due to lunch breaks, end of shift or any other  
3 reason that require work to stop for more than half an hour.  
4  
5 B. Permanent plugs shall be inserted into the bells of all dead-ends of pipe,  
6 tees, or crosses and plain ends shall be capped. All plugs and caps shall  
7 be properly restrained as called for on the Plans or Standard Details.  
8

9 3.06 REMOVAL OF OUT OF SERVICE PIPE

- 10  
11 A. Due to certain permit requirements, pipe that is to be removed from  
12 service will have to be physically taken out of the ground. The limits of  
13 pipe to be removed shall be specifically called for in the Plans or shall be  
14 approved in writing by the Engineer. Any other removal not specifically  
15 called for, shall be considered incidental to construction of other items in  
16 the Contract and the Contractor will not receive compensation for such  
17 work.  
18  
19 B. When removing pipe, the Contractor shall excavate a trench wide enough  
20 to dislodge the pipe from the surrounding soil, and long enough to be able  
21 to handle the pipe without causing any damage to nearby utilities,  
22 structures or adjacent property.  
23  
24 C. The removed pipe, fitting and appurtenances will become the Contractor's  
25 property and he shall be responsible for proper disposal and any required  
26 permits thereof.  
27  
28 D. Refer to Specification 01 35 00, Special Project Procedures for removal of  
29 asbestos cement (AC) pipe.  
30

31 3.07 INSTALLATION OF PIPE UNDER DRIVEWAYS

- 32  
33 A. At the Engineer's discretion, the Contractor will be required to auger pipes  
34 under driveways, structures or trees to avoid removal or expensive  
35 restoration of those structures. The Contractor will be allowed to utilize an  
36 auger machine and to push or pull the carrier pipe into the bore without  
37 the need of a casing.  
38  
39 B. The Contractor shall install the sewer water pipe within the bore hole on a  
40 line and grade to allow connection to open cut piping adjacent to the bore  
41 hole within pipe jointing alignment limits defined for the pipe in question.  
42 The completed installation shall not result in settlement of soil under the  
43 driveway.  
44

45 3.08 INSTALLATION OF PIPE UNDER HIGHWAYS AND RAILROADS

- 1 A. The Contractor shall furnish and install protective steel pipe casings  
2 and/or carrier pipe under highways/railroads in the pipe size, thickness,  
3 length, location and details as shown on the Drawings and specified  
4 herein. The Contractor's attention is particularly directed to the  
5 requirements of the particular municipal or private owner or Department of  
6 Public Works having jurisdiction over the highways/railroads whether  
7 through permit, verbal or other directions.  
8
- 9 B. The construction shall not be started until the necessary permits have  
10 been obtained, a copy is at the job site, and proper notice and approval for  
11 construction has been obtained from the owner of the highway/railroad  
12 and the Engineer.  
13
- 14 C. All necessary materials, equipment, labor and traffic protection devices  
15 shall be on the job site before requesting permission to start the Work.  
16
- 17 D. Steel casings and the installation thereof required for highway/railroad  
18 crossings shall be in accordance with the standards and requirements of  
19 the Florida Department of Transportation (FDOT) or railroads or AASHTO  
20 Standards and the Specifications outlined herein. All work of this nature  
21 shall be performed by qualified Subcontractors regularly engaged in that  
22 type or work and shall be subject to approval by the Engineer.  
23
- 24 E. All work shall be in accordance with Specification 33 05 20, Jacking and  
25 Boring.  
26

### 27 3.09 FITTINGS

28

- 29 A. All fittings shall be restrained by means of restraining devices such as  
30 restrainer glands, restraining gaskets, etc.  
31
- 32 B. Fittings shall be set and joined to the pipe and each type of joint as  
33 specified for pipe.  
34
- 35 C. Trenching and backfilling for all fittings shall also be in accordance with  
36 Section 31 23 33, Excavation and Backfill for Pipes.  
37
- 38 D. The use of thrust blocks in new lines is prohibited and shall only be limited  
39 to areas in which a new fitting has been installed in an existing line and is  
40 not feasible to restrain joints or when directed by the Engineer.  
41
- 42 E. The use of "reverse dead-man" shall be as described under Standard  
43 Details for dead-end valves or in circumstances that the Engineer deems it  
44 necessary and shall be performed under his direction.  
45

### 46 3.10 VALVES



- 1  
2 A. Valves shall be set and joined to the pipe and each type of joint as  
3 specified for pipe.  
4  
5 B. Trenching and backfilling for all valves shall also be in accordance with  
6 31 23 33, Excavation and Backfill for Pipes.  
7  
8 C. Cast iron valve boxes shall be firmly supported, maintained centered and  
9 plumb over the operating nut of the valve. Outside of paved areas, valve  
10 boxes shall be set in a 2' x 2' x 6" thick concrete collar, along with a brass  
11 ID tag, as shown on Standard Details. The box cover shall be flush with  
12 the surface of the finished pavement. All force main valve box lids shall  
13 be painted green and shall have the word "SEWER" cast in the lid.  
14  
15 D. All reasonable effort must be made to locate valves/valve boxes, back of  
16 curb, in grass areas and at street corners, whenever possible.  
17  
18 E. Valve boxes in areas that will require sod at a later date must be left one  
19 to two inches above existing grade (to allow for sod thickness).  
20  
21 F. All valves/boxes shall be located by means of a perpendicular 6" x 2'  
22 green stripe across the curb. The distance from the back of the curb to  
23 the valve will be stenciled on the curb with numbers four inches high,  
24 painted green, by the Contractor. This information will be referenced on  
25 the pavement, if no curbs are to be installed. All valve box tops shall be  
26 painted green. All valves must be centered over the operating nut/wheel  
27 and all valves, after being fully opened, will be backed off one-quarter turn  
28 to prevent them from being jammed open. This procedure should take  
29 place only after the main has passed pressure testing and has been  
30 accepted by the County.  
31  
32 G. All dead end valves shall be restrained with a reverse deadman, per the  
33 Standard Details.  
34  
35 H. Should the operating nut be more than three feet below the final grade, an  
36 extension shall be supplied and installed by the Contractor. The extension  
37 shall bring the nut to within twelve (12) inches of final grade.  
38  
39  
40  
41  
42 I. Installation of Valves on Existing Force Mains  
43  
44 1. When installing valves in existing mains (cutting-in), the Contractor  
45 shall insure that the pipe is kept clean at all times and no debris,  
46 ground water, mud, oil, etc., will make their way into the pipe.

- 1  
2 2. The lid shall fit flush in the top of the box without forcing and shall  
3 not rock, tip or rattle. Valve box lids shall be painted green and  
4 referenced to the closest curb by stenciling the distance, and by  
5 painting a six inches wide by two feet long stripe perpendicular to  
6 the curb of the roadway.  
7

8 J. Removal and Disposal of Existing Valves  
9

- 10 1. Any valve, unless otherwise specified, that is removed from the  
11 system shall become the property of the Contractor and he shall  
12 insure proper disposal.  
13

14 3.11 TAPPING OF MAINS  
15

- 16 A. The Contractor, after installing the sleeve and prior to making the tap,  
17 shall ensure that the sleeve is providing a watertight joint by means of  
18 pressure testing with pressures in accordance with 01 45 17, Pipeline  
19 Testing Requirements. If leaks are present, the Contractor will be  
20 required to repair them to the satisfaction of the Engineer.  
21

22 3.12 INSTALLATION OF BOLTS ON MECHANICAL JOINTS  
23

- 24 A. Align bolt holes and insert bolts, with bolt heads behind the bell flange,  
25 and tighten opposite nuts to keep the gland square with the socket.  
26 Tighten the nuts in accordance with following table:  
27

Bolt Diameter (inches)	Torque (ft-lb)
5/8	45-60
3/4	75-90
1	85-100
1 1/4	105-120

28  
29 3.13 PAINTING  
30

- 31 A. All above ground installations shall be painted OSHA safety precaution  
32 green. Paint application shall be in accordance with the paint  
33 manufacturer's recommendation.  
34  
35 B. Paint shall be as specified in the County Materials Specification Manual.  
36  
37 C. Guard post shall be painted OSHA safety yellow.  
38  
39 D. All painting shall be in accordance with Section 09 91 00, Painting.

1  
2 3.14 PRESSURE TESTING  
3

- 4 A. All sewage force mains shall be tested in accordance with Specification  
5 01 45 17, Pipeline Pressure and Leakage Testing Requirements.  
6

7 END OF SECTION

SECTION 33 35 01

RECLAIMED WATER MAIN PIPING AND APPURTENANCES

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all plant, labor, materials, equipment and tools and perform all operations in connection with the construction of the effluent or reclaimed water mains and appurtenances, including excavation, trenching, backfilling, testing, clearing and clean-up.

1.02 MAINTAINING SERVICE AND SHUT DOWNS

- A. The Contractor's attention is called to the fact that the existing system must be kept in operation at all times. Where connections are made to existing mains or other shutdowns are necessary, permission must be obtained and arrangements must be made with the Utilities Department before removing from service those mains that will be affected. Shutdowns must be held to a minimum in number and duration.

- B. No valve or other control device on the existing system shall be operated by the Contractor without first obtaining approval from the Utilities Department. The Contractor shall, at least forty-eight (48) hours in advance, notify citizens subject to interruption of service by means of door hangers or any other approved method of the starting time and duration of such interruption.

1.03 SUBMITTALS

- A. Unless waived by the Engineer, cut sheets for the entire reclaimed water main shall be submitted by the Contractor to the Engineer for approval at least two days prior to construction. This requirement will not relieve the Contractor of the responsibility to accurately record the "as-built" locations (horizontal and vertical) of piping, valving and appurtenances. Contractor shall submit to the County the Continuity Testing Results per Section 3.04 Item 6.g.

1.04 LAYING PIPE

- A. All roads and curbs shall be installed prior to reclaimed water main installation. On a road where there is no curb, the paving must be done prior to installing the reclaimed water main. Any deviation from this must be approved in writing by the Engineer or his designated representative.

1 In any case, reclaimed water facilities will not be accepted or tested until  
2 curb and/or roads are complete, thus preventing possible relocation or  
3 adjusting and retesting of newly installed pipes.  
4

5 B. All joints, fittings and other appurtenances shall not be covered until  
6 inspected by the County Inspector. Non-compliance will require  
7 excavation of all joints and fittings.  
8

9 C. The pipe and fittings shall be constructed as shown on the approved  
10 Plans. All pipe four inches and larger in diameter may be deflected, but  
11 not bent. PVC pipe two inches in diameter may be bent around cul-de-  
12 sacs that have a radius of thirty-seven (37) feet or larger, if the trench is  
13 left open until the County Inspector is onsite to document that this  
14 guideline is fully complied with. The use of fittings not shown on the  
15 "Contractor Copy" construction Plan must have the prior concurrence of  
16 the County Inspector.  
17

#### 18 1.05 ABANDONMENT OF EXISTING MAINS BEING TAKEN OUT OF SERVICE 19

20 A. In general, pipe six inches and smaller abandoned within Pinellas County  
21 rights-of-way shall be capped at both ends and abandoned in place.  
22 Grouting is not required unless specifically required by the Engineer or the  
23 County.  
24

25 B. Abandoned pipes eight inches and larger shall be filled with grout or  
26 flowable fill unless otherwise directed by the County or the Engineer.  
27

28 C. Pipe abandoned in rights-of-way owned by municipalities other than  
29 Pinellas County shall be subject to the requirements of the agency having  
30 jurisdiction.  
31

32 D. All pipes shall be abandoned in a manner which results in the abandoned  
33 pipeline not being pressurized.  
34

### 35 PART 2 – PRODUCTS 36

#### 37 2.01 GENERAL 38

39 A. Materials, equipment and supplies furnished and permanently  
40 incorporated into the Project shall be of first quality in every respect, shall  
41 be constructed and finished to high standards of workmanship, and shall  
42 be the product of an approved reputable manufacturer. Material shall be  
43 suitable for the service intended, shall reflect modern design and  
44 engineering and shall be fabricated in a first-class workmanlike manner.  
45 All materials, equipment and supplies shall be new and not have been in

- 1 service at any time previous to installation, except as required in tests or  
2 incident to installation.
- 3 B. Materials and construction pertaining to restoration and construction of  
4 roads and structures shall be in accordance with the latest edition of  
5 Florida Department of Transportation (DOT) Standard Specifications for  
6 Road and Bridge Construction or as called for on the Plans.
- 7
- 8 C. All ductile iron or cast iron pipe, fittings and valves and that portion of fire  
9 hydrants that is underground, are to be encased in lavender polyethylene  
10 material, conforming to the requirements of the County's Materials  
11 Specification Manual. Polyethylene film shall be supplied in tube form  
12 suitable for use in Installation Method 'A' per AWWA C105.
- 13
- 14 D. All piping and appurtenances used shall be color coded lavender with the  
15 exception of ductile iron pipe. That shall be encased in lavender  
16 polyethylene wrap, or if not available, encased in clear polywrap and shall  
17 be marked by means of three four-inch wide painted lavender lines along  
18 the length of the pipe at opposite locations around the pipe.
- 19
- 20 E. All PVC piping and ductile iron mains partially constructed of PVC or  
21 HDPE between valves shall be installed with locator wires as specified  
22 below.
- 23
- 24 F. Reclaimed water mains shall be buried with purple metallic locator tape.  
25 All locator tape shall be placed twelve (12) inches above buried pipe.
- 26
- 27 G. No glued joints will be allowed. Mechanical restrainers are the only  
28 acceptable method of restraint.
- 29

## 30 2.02 MATERIALS

- 31
- 32 A. All pipe and appurtenant materials used in the Pinellas County Reclaimed  
33 Water System shall be as specified in the latest version of the Pinellas  
34 County Utilities Material Specification Manual at the time of Plan approval.
- 35

## 36 PART 3 - EXECUTION

### 37 3.01 HANDLING

- 38
- 39
- 40 A. All materials, unless otherwise directed, shall be unloaded as nearby as  
41 possible to the location of installation by the Contractor. Materials shall be  
42 handled with care to avoid damage.
- 43
- 44 B. Materials shall be lifted by hoists or slid or rolled on skidways in such  
45 manner as to avoid shock. Under no circumstances shall materials be  
46 dropped. Pipe handled on skidways must not be allowed to roll against

- 1 pipe already on the ground. The Contractor shall be responsible for the  
2 safe handling of all materials. Damaged materials shall not be installed.
- 3 C. All materials found during the progress of work to have flaws, cracks, or  
4 other defects will be rejected by the Engineer regardless of whether or not  
5 it has been installed and shall be replaced by and at the expense of the  
6 Contractor.
- 7
- 8 D. All PVC pressure pipe, upon delivery to the site and until such time as it is  
9 placed in the trench, shall be shielded from the weather and direct sunlight  
10 to prevent pipe deterioration.
- 11
- 12 E. Materials shall not be stacked or placed under materials in such a manner  
13 that damage could result.
- 14
- 15 F. Slings, hooks, or tongs used for lifting shall be padded in such a manner  
16 as to prevent damage to exterior surfaces, interior linings and  
17 components. If any part of the coating, lining or components is damaged,  
18 the repairs or replacement shall be made by the Contractor at his expense  
19 and in a manner satisfactory to the Engineer prior to attempting  
20 installation.
- 21
- 22 G. In the event that materials supplied by the County are defective, the  
23 Contractor shall notify the Engineer immediately so arrangements can be  
24 made for replacing such devices.

### 25 26 3.02 FIELD LAYOUT AND MODIFICATIONS

- 27
- 28 A. The Contractor, unless directed otherwise, shall be responsible for setting  
29 construction layout stakes and/or offsets required to complete the  
30 designated Work. The Contractor shall insure that those stakes and/or  
31 offsets are protected and any re-staking, due to work stoppage, shall be  
32 included and no additional compensation to the Contractor will be made.
- 33
- 34 B. The Engineer has the right to make any modifications as he deems  
35 necessary due to field conditions, conflicts with other utilities or to protect  
36 other properties.
- 37

### 38 3.03 EXCAVATION, ALIGNMENT AND GRADE

- 39
- 40 A. Trench excavation and backfill shall be in accordance with Specification  
41 31 23 33, Excavation and Backfill for Pipes.
- 42
- 43 B. All mains shall be laid and maintained at the required lines and grades  
44 with fittings, valves and appurtenances at the described locations. All pipe  
45 shall be laid to the depth as shown on the Plans, or when a depth is not  
46 indicated, with a minimum cover of thirty (30) inches outside of the

roadway, and thirty-six (36) inches under the roadway. Grade lines shall be set by the Contractor. The tolerance of such grades shall not be more than that specified on the drawings. When no tolerance is indicated a tolerance of 0.5 foot shall be used. All other realignments must be approved by the Engineer. The Contractor shall have suitable survey equipment on the site at all times.

- C. The Work shall at all times progress with caution to prevent damage to underground obstructions, both known and unknown. Should an obstruction not shown on the Plans be encountered, the Engineer shall be immediately notified and he shall be responsible for alteration to the Plan, should realignment be necessary. The Contractor shall notify the Engineer far enough in advance to allow the realignment to be accomplished by deflection in the pipe joints.

### 3.04 LAYING AND JOINING BURIED RECLAIMED WATER MAINS

#### A. General

1. Prior to installation, all pipe shall be inspected for defects and all lump or excess coatings shall be removed. The inside of the bell and outside of the spigot shall be cleaned prior to joining of all pipe. Caution shall be taken to prevent damage to the pipe during lowering into the trench. Caution shall be taken to prevent foreign matter from entering the pipe during installation. The Engineer may require covering of the end of the pipe to prevent debris from entering. No debris, tools, clothing or other material shall be placed in the pipe.
2. After placement in the trench, the spigot end of the pipe shall be centered in the bell and the pipe shall be driven home and then brought to the proper line and grade by tamping approved backfill material under it, except for the bell. Joint deflection shall not exceed manufacturer's limit.
3. During the time that the pipe is in the trench, but no work is in progress, the end shall be closed by a water-tight plug. This shall include the noon hour, as well as overnight. If there is water in the trench upon beginning work, this plug shall remain in place until the trench has been pumped dry, unless otherwise approved by the Engineer.
4. Standard plugs shall be inserted into all dead end pipes, tees or crosses; spigot ends shall be capped; flanged ends shall have blind flanges, or sheet metal or plywood caps. Plugs installed for



1 pressure testing shall be fully secured and blocked to withstand the  
2 test pressure.

- 3  
4 5. Where plugging is required, because of Contract division or  
5 phasing for later connection, the ends of such lines shall be  
6 equipped with a permanent type cast iron or ductile iron plug/cap or  
7 blind flange with or without a blowoff cock, as shown on the  
8 Drawings. Installation or removal of such plugging shall be  
9 considered incidental to the Work and no payment shall be  
10 expected for this work by the Contractor.

11  
12 6. Tracer Wire For PVC, HDPE and Non-Continuous Ductile Iron  
13 Mainlines

- 14  
15 a. Tracer wire shall be installed on all mainline pipe. Mainline  
16 pipe installed by open cut method shall have two (2) 14-  
17 gauge minimum solid copper or two (2) 12-gauge copper-  
18 clad steel tracer wires taped to the top center of the pipe.  
19 Mainline pipe installed by horizontal directional drill shall  
20 have two (2) 12-gauge copper-clad steel tracer wires  
21 installed with the pipe. All tracer wire shall be as specified in  
22 the material specification manual.  
23  
24 b. The locator wires shall have colored insulation matching the  
25 type of service provided in the main and be acceptable for  
26 direct burial.  
27  
28 c. All splices of the wires shall be made with watertight  
29 connections per material specification manual.  
30  
31 d. The wires shall each be continuous throughout the project.  
32  
33 e. The wire is to be tied to all valves, tees and elbows  
34  
35 f. The locator wires shall be brought up into all valve boxes  
36 with enough slack provided to extend 10 to 12-inches out of  
37 each box and installed as shown in the Standard Details.  
38  
39 g. Contractor shall perform a 12-volt DC electrical continuity  
40 test on each of the wires. No more than one volt of loss per  
41 1000 feet of mainline pipe will be acceptable. The locator  
42 wire system shall pass the 12-volt DC electrical continuity  
43 test for at least one wire prior to final acceptance of the  
44 pipeline. Any cuts or breaks in the wire shall be repaired by  
45 the Contractor at his expense.  
46

- 1 h. The locator wire shall be tested by the Contractor at the time  
2 of pressure testing. If this test fails, the Contractor is  
3 responsible for repairing the locator wire and the pressure  
4 test will be reschedule when the wire will pass.  
5

6 7. Tracer Wire for Long Side Services  
7

- 8 d. Each long side service or any service over 40 feet shall have  
9 one (1) locator wire duct taped to top center of pipe.  
10  
11 e. The locator wire shall have colored insulation matching the  
12 type of service provided in the service and be acceptable for  
13 direct burial.  
14  
15 f. All splices of the wire shall be made with watertight  
16 connections per material specification manual.  
17  
18 g. The wire shall be continuous along the service line.  
19  
20 h. The locator wire shall have one end sealed off and buried  
21 within 12-inches of the connection to the main with the other  
22 end stubbed off in the service box with enough slack  
23 provided to extend 10 to 12-inches out of each service box.  
24

- 25 8.. Contractor shall perform a tone test on each long side service using  
26 a wire and cable locator. The locator wire system shall pass the  
27 tone test prior to final acceptance of the service line. Any cuts or  
28 breaks in the wire shall be repaired by the Contractor at his  
29 expense.  
30

31 B. Pigging, Flushing and Cleaning  
32

- 33 1. All mains shall be pigged, cleaned and flushed to remove all sand  
34 and other foreign matter. The Contractor shall be responsible for  
35 developing a pigging and flushing plan to be submitted to the  
36 Project Representative for approval prior to pigging and flushing.  
37 The Contractor shall dispose of all water used pigging and for  
38 flushing without causing a nuisance or property damage, in  
39 accordance with state and local requirements. Any permits or fees  
40 required for the disposal of flushing water shall be the responsibility  
41 of the Contractor.  
42  
43 2. Flushing water used by the Contractor shall be taken from an  
44 approved metered source. The water utility will provide the meter  
45 and designate the source. Potable and reclaimed flushing water  
46 shall be at the Contractor's expense.

1  
2 a. Reclaimed water should be used for reclaimed water mains.

3  
4 b. Potable water can be used for all service types.

5 3. The cleaning of the new piping system shall be accomplished by  
6 the controlled and pressurized passage of a series of hydraulic or  
7 pneumatic polyurethane plugs of varying dimensions coatings, and  
8 densities; which shall be selected by the pipe cleaning Contractor.  
9 The Contractor shall provide a means to enter the pig into the  
10 system, control and regulate flow, monitor flows and pressures, and  
11 to remove the pig from the system. The Contractor shall maintain a  
12 constant surveillance of the system and immediately report to the  
13 proper authority any in-line problems encountered or any  
14 malfunctions discovered in the piping system. A record of pig  
15 models, sizes, styles, and other pertinent information shall be kept  
16 by the Contractor and turned over to the County.

17  
18 4. The Contractor shall furnish pig launching and retrieval equipment  
19 to minimize additional valving, fittings and auxiliary water supplies.  
20 Valves and blowoff assemblies, which are installed as part of the  
21 project, shall be used as much as possible to minimize the number  
22 of temporary ports required for proper flushing and cleaning.

23  
24 5. All materials used shall be specifically manufactured for flushing  
25 and cleaning pressure pipes, bends and valves. The pigs shall be  
26 able to go through bends, open valves and fittings, and provide  
27 adequate cleaning of the pipe.

28  
29 6. Cost of Pigging Services- The cost to complete the requirements  
30 under this section shall be included in the contract items provided in  
31 the proposal sheet. There is no separate pay item for this work.

32  
33 C. Jointing HDPE Pipe and Fittings

34  
35 1. HDPE pipe shall be jointed by the butt-fusion process in  
36 accordance with pipe manufacturer's directions. Contractor shall  
37 provide butt-fusion technicians who are trained and certified by the  
38 P.E. pipe manufacturer to complete the project. The date of  
39 technician certification shall not exceed 12 months before  
40 commencing construction.

41  
42 2. Butt-fusion means the butt-joining of the pipe by softening the  
43 aligned faces of the pipe ends in a suitable apparatus and pressing  
44 them together under controlled pressure.  
45

3. The internal and external beads resulting from the butt-fusion process shall be visible and examined for penetration 360 degrees around the pipe diameter.
4. All fittings for HDPE pipe (4" and larger), except for D.I./HDPE Mechanical Joint Adaptors, shall be ductile iron mechanical joint fittings per material specification manual and shall be joined to the pipe using a butt fused restrained mechanical joint adapter.
5. The D.I./HDPE mechanical joint adapter shall be connected to the HDPE pipe by a heat-fused joint on one end, and connected to a ductile iron pipe valve, or fitting with a mechanical joint on the other end.
6. Solvent epoxy cementing, electro-fusion couplings and mechanical joining with bolt on wrap around clamps or mechanical joints with out an adapter shall not be used for connections.
7. Short pieces of pipe between valves and fittings shall be DIP with all joints restrained for sizes 3-inches and larger. For 2-inch, the short pieces shall be brass or Sch. 80 with IP threads and DI, HDPE or brass fittings and all joints restrained.

D. Jointing Push-On Ductile Iron, Steel and PVC Pipe

1. The inside of the bell and the outside of the spigot end shall be thoroughly cleaned to remove dirt, grit, oil or excess coatings and other foreign matter. The rubber gasket shall be flexed inward and inserted in the gasket recess of the bell socket. A thin film of gasket lubricant shall be applied to either the inside surface of the gasket or the spigot ends, care will be taken to avoid contact with the ground. The joint shall be completed by forcing the plain end to the bottom of the socket with a forked tool or jacking device or other approved method. All pipe shall have depth mark prior to insertion. Pipe cut in the field shall be filed to resemble the spigot end of manufactured pipe.
2. When deflection is required, the joint shall be completed prior to setting the deflection. The deflection shall conform to applicable AWWA Standards or manufacturer's recommendation, with prior Engineer's approval.

E. Jointing Mechanical Joint Pipe and Fittings

1. The inside of the socket, the outside of the spigot end and the gland shall be thoroughly cleaned and or washed with an approved

solution to remove dirt, grit, oil or excess coatings and foreign matter to improve gasket seating. The gland shall then be placed on the plain end of the pipe with the lip extension toward the plain end, followed by the gasket with the narrow edge of the gasket toward the plain end of the pipe. The pipe shall be inserted into the socket and the gasket pressed firmly and evenly into the gasket recess. The joint shall be kept straight during the assembly and any deflection required shall be done after the joint has been assembled, but prior to tightening the bolts.

F. Jointing Flanged Ductile Iron and Flanged Steel Pipe

1. Flanged joints are intended mostly for above ground use and the underground use of this joint is generally not desirable because of the rigidity of the joint.
2. The flanges shall be thoroughly cleaned to remove grit, oil or foreign matter. The flanged joints shall be fitted so that the contact faces bear uniformly on the gasket and are tightened in a crisscross order with a relatively uniform bolt stress.
3. The gaskets shall be installed in a manner that water tightness is achieved without over torquing the bolts and as recommended by the manufacturer. If, after tightening the bolts to the specified torque, water continues to leak, the joint shall be disassembled and properly reassembled.
4. The Contractor shall be very careful to prevent bending or torsional strains from being applied to flanges, flanged fittings or flanged appurtenances. Flanged pipe shall be properly anchored, supported or restrained to prevent breakage of fittings and flanges.
5. Bolt requirements are as follows:

Pipe Size (inches)	Number Per Joint	Bolt Size (inches)	Threads per inch	Torque Ft -lbs
4	8	5/8 x 3	11	60
6	8	3/4 x 3 1/2	10	100
8	8	3/4 x 3 1/2	10	100
10	12	7/8 x 4	9	160
12	12	7/8 x 4	9	160
16	16	1 x 4 1/2	8	245
20	20	1 1/8 x 3	7	390
24	20	1 1/4 x 5 1/2	7	545
30	28	1 1/4 x 6 1/2	7	545
36	32	1 1/2 x 7	6	875

42	36	1 1/2 x 7 1/2	6	875
48	44	1 1/2 x 8	6	875
54	44	1 3/4 x 8 1/2	5	1550

G. Jointing Special Joint Ductile Iron Pipe

1. Other special joint pipe shall be assembled or installed per manufacturer's recommendations or directed by the Engineer. The Contractor shall insure that the joint is thoroughly cleaned by removing all dirt, oil, grit, excess coatings and foreign matter to insure a tight joint.

3.05 TEMPORARY AND PERMANENT PLUGGING

- A. Temporary plugging of pipes shall be performed at the time of construction when the work is interrupted due to lunch breaks, end of shift or any other reason that require work to stop for more than half an hour.
- B. Permanent plugs shall be inserted into the bells of all dead-ends of pipe, tees, or crosses and plain ends shall be capped. All plugs and caps shall be properly restrained as called for on the Plans or Standard Details.

3.06 REMOVAL OF OUT OF SERVICE PIPE

- A. Due to certain permit requirements, pipe that is to be removed from service will have to be physically taken out of the ground. The limits of pipe to be removed shall be specifically called for in the Plans or shall be approved in writing by the Engineer. Any other removal not specifically called for, shall be considered incidental to construction of other items in the Contract and the Contractor will not receive compensation for such work.
- B. When removing pipe, the Contractor shall excavate a trench wide enough to dislodge the pipe from the surrounding soil, and long enough to be able to handle the pipe without causing any damage to nearby utilities, structures or adjacent property.
- C. The removed pipe, fitting and appurtenances will become the Contractor's property and he shall be responsible for proper disposal and any required permits thereof.
- D. Refer to Specification 01 35 00, Special Project Procedures, for removal of asbestos cement (AC) pipe.

1  
2 3.07 INSTALLATION OF PIPE UNDER DRIVEWAYS  
3

- 4 A. At the Engineer's discretion, the Contractor will be required to auger pipes  
5 under driveways, structures or trees to avoid removal or expensive  
6 restoration of those structures. The Contractor will be allowed to utilize an  
7 auger machine and to push or pull the carrier pipe into the bore without  
8 the need of a casing.  
9
- 10 B. The Contractor shall install the water pipe within the bore hole on a line  
11 and grade to allow connection to open cut piping adjacent to the bore hole  
12 within pipe jointing alignment limits defined for the pipe in question. The  
13 completed installation shall not result in settlement of soil under the  
14 driveway.  
15

16 3.08 INSTALLATION OF PIPE UNDER HIGHWAYS AND RAILROADS  
17

- 18 A. The Contractor shall furnish and install protective steel pipe casings  
19 and/or carrier pipe under highways/railroads in the pipe size, thickness,  
20 length, location and details as shown on the Drawings and as specified  
21 herein. The Contractor's attention is particularly directed to the  
22 requirements of the particular municipal or private owner or Department of  
23 Public Works having jurisdiction over the highways/railroads, whether  
24 through permit, verbal or other directions.  
25
- 26 B. The construction shall not be started until the necessary permits have  
27 been obtained, a copy is at the job site, and proper notice and approval for  
28 construction has been obtained from the owner of the highway/railroad  
29 and the Engineer.  
30
- 31 C. All necessary materials, equipment, labor and traffic protection devices  
32 shall be on the job site before requesting permission to start the Work.  
33
- 34 D. Steel casings and the installation thereof required for highway/railroad  
35 crossings shall be in accordance with the standards and requirements of  
36 the Florida Department of Transportation (FDOT) or railroads or AASHTO  
37 Standards and the Specifications outlined herein. All work of this nature  
38 shall be performed by qualified Contractors regularly engaged in that type  
39 or work and shall be subject to approval by the Engineer.  
40
- 41 E. All work shall be in accordance with Specification 33 05 20, Jacking and  
42 Boring.  
43  
44  
45  
46

1 3.09 FITTINGS

- 2
- 3 A. All fittings shall be restrained by means of restraining devices such as
- 4 restainer glands, restraining gaskets, etc.
- 5
- 6 B. Fittings shall be set and joined to the pipe and each type of joint as
- 7 specified for pipe.
- 8
- 9 C. Trenching and backfilling for all fittings shall also be in accordance with
- 10 Section 31 23 33, Excavation and Backfill for Pipes.
- 11
- 12 D. The use of thrust blocks in new lines is prohibited and shall only be limited
- 13 to areas in which a new fitting has been installed in an existing line and is
- 14 not feasible to restrain joints or when directed by the Engineer.
- 15
- 16 E. The use of "reverse dead-man" shall be as described under Standard
- 17 Details for dead-end valves or in circumstances that the Engineer deems it
- 18 necessary and shall be performed under his direction.
- 19

20 3.10 VALVES

- 21
- 22 A. Valves shall be set and joined to the pipe and each type of joint as
- 23 specified for pipe.
- 24
- 25 B. Trenching and backfilling for all valves shall also be in accordance with
- 26 Specification 31 23 33, Excavation and Backfill for Pipes.
- 27
- 28 C. Cast iron valve boxes shall be firmly supported, maintained centered and
- 29 plumb over the operating nut of the valve Outside of paved areas, valve
- 30 boxes shall be set in a 2' x 2' x 6" thick concrete collar, along with a brass
- 31 ID tag, as shown in Standard Details. The box cover shall be flush with
- 32 the surface of the finished pavement. All box lids shall be painted
- 33 lavender and shall have the word "RECLAIMED WATER" OR
- 34 "RECLAIMED" cast in the lid.
- 35
- 36 D. All reasonable effort must be made to locate valves/valve boxes, back of
- 37 curb, in grass areas and at street corners, whenever possible. Valves
- 38 should be kept in clusters within two feet of the tee, when possible.
- 39 E. Valve boxes in areas that will require sod at a later date, must be left one
- 40 to two inches above existing grade (to allow for sod thickness).
- 41
- 42 F. All valves/boxes shall be located by means of a perpendicular 6" x 2'
- 43 lavender stripe across the curb. The distance from the back of the curb to
- 44 the valve will be stenciled on the curb with numbers four inches high,
- 45 painted lavender, by the Contractor. This information will be referenced
- 46 on the pavement if no curbs are to be installed. All valve box tops shall be



1 painted lavender. All valves must be centered over the operating  
2 nut/wheel and all valves, after being fully opened, will be backed off one-  
3 quarter turn to prevent them from being jammed open. This procedure  
4 should take place only after the main has passed pressure testing and has  
5 been accepted by the County.  
6

7 G. All dead end valves shall be restrained with a reverse deadman, per the  
8 Standard Details.  
9

10 H. Should the operating nut be more than three feet below the final grade, an  
11 extension shall be supplied and installed by the Contractor. The extension  
12 shall bring the nut to within twelve (12) inches of final grade.  
13

14 I. Installation of Valves on Existing Mains  
15

16 1. When installing valves in existing mains (cutting-in), the Contractor  
17 shall insure that the pipe is kept clean at all times and no debris,  
18 ground water, mud, oil, etc. will make their way into the pipe.  
19

20 2. The Contractor shall notify customers of reclaimed water service  
21 shut-down and shall insure that such is held to a minimum.  
22

23 3. The lid shall fit flush in the top of the box without forcing and shall  
24 not rock, tip or rattle. Roadway boxes for bypass valves shall be  
25 marked "BYPASS". Valve box lids shall be painted lavender and  
26 referenced to the closest curb by stenciling the distance and by  
27 painting a six inch wide by two feet long stripe perpendicular to the  
28 curb of the roadway.  
29

30 J. Removal and Disposal of Existing Valves  
31

32 1. Any valve, unless otherwise specified, that is removed from the  
33 System shall become the property of the Contractor and he shall  
34 ensure proper disposal.  
35

### 36 37 3.11 TAPPING OF MAINS 38

39 A. The Contractor, after installing the sleeve and prior to making the tap,  
40 shall insure that the sleeve is providing a watertight joint by means of  
41 pressure testing with pressures in accordance with Specification 01 45 17,  
42 Pipeline Testing Requirements. If leaks are present, the Contractor will be  
43 required to repair them to the satisfaction of the Engineer.  
44  
45  
46

1 3.12 SERVICE METERS AND ACCESSORIES

- 2
- 3 A. Unless specified to be furnished by the Contractor under a separate pay
- 4 item, all meters, reduced pressure devices, double check valves, etc., will
- 5 be supplied by the Utilities Department. The Contractor shall pick-up such
- 6 devices, where directed, and shall inspect them thoroughly and shall
- 7 insure that they are in proper working order.
- 8
- 9 B. The Contractor shall install meters, backflow devices, double check
- 10 valves, etc. at locations called for in the Plans, as sketched out or as
- 11 directed by the Engineer. No meter or accessory is to be installed outside
- 12 of the right-of-way unless easements have been secured or as specifically
- 13 directed by the Engineer.
- 14
- 15 C. When relocating meters, the Contractor shall insure that the meter is
- 16 operational. If the meter or accessories are damaged, he shall bring this
- 17 to the attention of the Engineer. Meter boxes shall be replaced, as well as
- 18 brass fittings and pipe inserts, and shall be considered incidental to the
- 19 cost of relocating meters.
- 20
- 21 D. All meter, backflow, reduced pressure device, etc., installations shall be
- 22 made in accordance with Pinellas County Utilities Department Standard
- 23 Construction Details.
- 24

25 3.13 SERVICE LINES AND SERVICE CASINGS

- 26
- 27 A. Service line casings shall be installed on all long side services. Casings
- 28 may be installed using the pneumatic bullet method, subject to the
- 29 requirements of the entity having jurisdiction for the roadway.
- 30
- 31 B. Service casings for one-inch services casings shall be Schedule 80 PVC
- 32 or SDR-9 HDPE two inches in diameter for single services three inches in
- 33 diameter for double services.
- 34
- 35 C. All casings shall be marked on both sides of the road with a six inch wide
- 36 lavender stripe running across the curb in the direction of the casing. A
- 37 single strand of lavender tracer wire shall be installed with the casing and
- 38 extend up the 2 x 4 that is required at the end of the casing. The 2 x 4 will
- 39 be six feet in length and painted lavender.
- 40
- 41 D. The depth to the top of the casings shall be thirty (30) inches to thirty-six
- 42 (36) inches. Casings that are installed deeper than thirty-six (36) inches
- 43 shall be removed and installed at the correct depth. Casings shall extend
- 44 a minimum of five feet beyond the existing back-of-curb or edge of
- 45 roadway. Exceptions to this requirement due to physical constraints shall
- 46 require prior approval by the Engineer.

1  
2 E. Reclaimed water service line shall be (1") one-inch minimum size.  
3

4 3.14 INSTALLATION OF BOLTS ON MECHANICAL JOINTS  
5

6 A. Align bolt holes and insert bolts, with bolt heads behind the bell flange,  
7 and tighten opposite nuts to keep the gland square with the socket.  
8 Tighten the nuts in accordance with following table:  
9

Bolt Diameter (inches)	Torque (ft-lb)
5/8	45-60
3/4	75-90
1	85-100
1 1/4	105-120

10  
11 3.15 PAINTING  
12

13 A. All above ground installations shall be painted OSHA safety precaution  
14 lavender. Paint application shall be in accordance with the paint  
15 manufacturer's recommendation.  
16

17 B. Paint shall be as specified in the County Materials Specification Manual.  
18

19 C. Guard post shall be painted OSHA safety yellow.  
20

21 D. All painting shall be in accordance with Section 09 91 00, Painting.  
22

23 3.16 PRESSURE TESTING  
24

25 A. All reclaimed water mains shall be tested in accordance with Specification  
26 01 45 17, Pipeline Pressure and Leakage Testing Requirements.  
27  
28  
29  
30

END OF SECTION

SECTION 33 39 00

SANITARY SEWER STRUCTURES

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Work includes furnishing all plant, labor, tools, equipment, materials, end performing all operations in connection with construction of sanitary sewers and appurtenant structures, including excavation, trenching, backfilling and appurtenant work as required, or as directed.

1.02 RELATED DOCUMENTS

- A. Specification 33 33 01, Gravity Sewers
- B. Specification 31 23 34, Excavation and Backfill for Structures

PART 2 – PRODUCTS

2.01 MATERIALS

A. General

- 1. All manholes shall be precast concrete unless prior approval for an alterative material is given by the County.

B. Concrete

- 1. Concrete for cradles shall conform to Specification 03 10 01, Concrete and Concrete Materials of these Specifications and shall develop a minimum 2,500 psi compressive strength at twenty-eight (28) days.

C. Brick

- 1. Where brick manholes are specifically called for, brick shall be hard, solid common clay brick meeting the requirements for latest ASTM C-32 (sewer brick), Grade MA.

D. Mortar

- 1. Mortar for manholes shall consist of one part Portland Type II cement, two to three parts fine sand mixed with water for proper

consistency. Lime shall not be used in mortar for manholes. Commercially prepared mortar mixes, or expanding grout, shall not be used. Admixtures to mortar or commercial fast-setting cements shall not be used without approval of the Engineer.

## 2.02 MANHOLES

### A. Slabs for Brick Manholes

1. Slabs shall be 3,750 psi/28 day concrete with a wood float finish. Reinforcement shall consist of #4 bars on eight inch centers, both ways, with one and one-half-inches of cover over the bar mat and three inches between earth and re-bar.
2. Brick manholes less than twelve (12) feet deep shall have a slab depth of eight inches. Manholes twelve (12) feet or deeper shall have a slab depth of twelve (12) inches. Slabs for standard manholes, shall be no less than six feet square. Slabs for Type A manholes, shall be a minimum of five feet square. Slabs for drop manholes shall be of sufficient size to support the manhole and the entire drop structure.
3. Slabs shall be located accurately so that manhole or manhole and drop assembly will be centered on slab. All slabs shall be installed at a grade that will allow clearance under the bells of the pipe. All slabs shall be solidly installed on 3/4-inch bedding stone which has been compacted against firm undisturbed ditch bottom. Depth of bedding stone shall be a minimum of six inches, or as directed by the Engineer.
4. The Contractor shall request an inspection of reinforcing steel for all slabs poured on the job.
5. The Contractor shall submit a copy of all concrete truck delivery receipts to the Engineer.
6. If slabs for manholes are to be supplied by a commercial precast firm, the Contractor shall advise the Engineer sufficiently in advance so that inspection may be initiated at the precast yard.

### B. Precast Manholes

1. Precast, reinforced concrete manholes shall have tongue and groove interlocking joints. Inverts shall be formed as specified herein. Shop drawings shall be submitted and approved by the Engineer prior to placing order with supplier.

- 1 a. Precast reinforced concrete manhole risers, grade rings and  
2 tops shall conform as to materials, design, and fabrication with  
3 the requirements of ASTM, C-478. The concrete shall consist  
4 of 4,000 psi/28 day, Type II Portland Cement. The walls for  
5 standard manholes shall be no less than six inches thick. All  
6 precast manhole parts are to be free of fractures, honeycomb,  
7 and other defects of concrete. Cones shall be concentric.  
8  
9 b. Precast manholes shall consist of a base unit with openings  
10 for the sewer pipe, riser units of various lengths to build the  
11 manhole up to the required depth and concentric cones. The  
12 minimum height of the shortest riser shall be twelve (12)  
13 inches.  
14

15 C. Fiberglass Manholes

- 16  
17 1. Fiberglass manholes shall be as specified in the County's Materials  
18 Specification Manual.  
19

20 D. Manhole Frames and Covers

- 21  
22 1. All frames and covers are to be U.S. Foundry and Manufacturing  
23 Corporation #195W, with a one hundred sixty-five (165) pound cover,  
24 or approved equal. All mating surfaces shall be machined for proper  
25 fit. All covers are to be stamped "Pinellas County Sanitary Sewer"  
26 with the year of construction. All manhole covers shall have two  
27 watertight pick holes.  
28

29 PART 3 - EXECUTION

30  
31 3.01 EXCAVATION AND BACKFILL

- 32  
33 A. Excavation and backfill for manholes shall be per Specification 31 23 34,  
34 Excavation and Backfilling for Structures.  
35

36 3.02 MANHOLE CONSTRUCTION

37  
38 A. Brick Manholes

- 39  
40 1. Where required, manholes shall be constructed of brick masonry with  
41 cast iron frames and covers. Mortar shall be properly proportioned,  
42 thoroughly mixed, and used immediately. Any mortar entering the  
43 initial set, requiring additional water or heating, shall be discarded.  
44 Bricks will be laid radially and pressed into the mortar spread on the  
45 previous course. Each brick will be pressed against the adjoining  
46 brick so that inside vertical corners touch. The mortar shall totally fill

all space between bricks. The inside wall of the manhole shall be kept wiped clean of excess mortar. Excess mortar on the outside of the manhole wall shall be kept troweled smooth or cut off. Corbels are to be concentric, and built in twelve (12) courses, unless otherwise specified. The exterior of the manhole shall be plastered to a 5/8-inch thickness, and shrinkage cracks shall be sealed by brushing before the final set. Risers between corbels and cast iron frames shall be limited to twelve (12) inches. The exterior plastered surface of the manholes shall be coated with an approved asphaltic waterproofing material. When outside drops are constructed on manholes, the drop shall be entirely supported by the slab. The drop stack may be formed by brick and poured with concrete, or built up with brick and mortar. Memphis Tees shall be used in the drop structures. All drop manholes shall have the inside surfaces coated as specified for precast manholes.

**B. Precast Manholes**

1. Any modifications necessary to adapt the units to conform to the locations and grades shown, or required, shall be made without additional compensation. It shall be the responsibility of the Contractor to assure that all manhole inlets are provided at the proper locations and elevations to accommodate the actual field requirements without additional compensation.
2. All requirements for manhole and drop manhole construction as previously specified which are applicable to precast manhole construction shall be considered as being contained herein.
3. Slabs for precast manholes shall extend a minimum of six inches beyond the outside face of the manhole wall.
4. All slabs for precast drop manholes shall be of sufficient size to entirely support the drop structure. Slabs shall have the minimum thickness shown in the Standard Details.
5. Manhole Units
  - a. All exposed interior surfaces and the tongue and groove ends of each unit shall be sand blasted and brushed clean, and immediately thereafter, completely coated with a protective coating of not less than 15 mils of manhole coating per Material Specification Manual. The coating shall be applied in strict accordance with the manufacturer's recommendations.

- 1 b. All exterior surfaces shall be brushed clean and, immediately  
2 thereafter, completely coated with a protective coating of not  
3 less than 15 mils of approved coating. The coating shall be  
4 applied in strict accordance with manufacturer's  
5 recommendations.  
6  
7 c. The interior and exterior paint shall be intact and continuous.  
8 Any chips or holidays shall be patched using two coats of  
9 approved coatings and used according to manufacturer  
10 instructions.  
11  
12 d. Top and bottom ends of riser or sections shall be perfectly  
13 formed so that continuous and uniform contact is possible  
14 around the entire joint. Malformed joints shall be rejected.  
15

16 6. Installation  
17

- 18 a. All slabs or bottom sections shall be installed at a grade that  
19 will allow clearance under the bells of the pipe. All slabs or  
20 bottom sections shall be solidly installed on 3/4-inch bedding  
21 stone which has been compacted against firm undisturbed  
22 ditch bottom. Depth of bedding stone will be as directed by  
23 the Engineer.  
24  
25 b. The tongue and groove ends of each unit shall be primed with  
26 Ram-nek primer and allowed to dry. Immediately before  
27 placing the next unit, the joints shall receive a coating of Ram-  
28 nek. Enough plastic material shall be placed in the joint to  
29 squeeze a bead of excess material out of the joint insuring a  
30 completely sealed joint.  
31  
32 c. The top of the cone shall be set between two and one-half  
33 inches and fourteen and one-half (14 1/2) inches below the  
34 bottom of the manhole cover frame. It is the intent of the  
35 Specifications to provide a minimum of two and one-half  
36 inches to accommodate future grade changes without  
37 disturbing the manhole. Where the distance between the  
38 bottom of the manhole cover frame and the top of the cone is  
39 greater than fourteen and one-half (14 1/2) inches, 12-inch  
40 riser units shall be used to bring the top of the cone to within  
41 the limits specified.  
42  
43 d. The annular space between the sewer pipe and the opening in  
44 the manhole shall be grouted with Portland cement mortar and  
45 wiped or collared to insure a watertight joint. Invert channels  
46 shall be formed after the manhole is set by one of the following



1 methods: Build up with brick and mortar, or lay a full section of  
2 sewer pipe through manhole and cut out the top half. The  
3 manhole floor outside of the channels shall be made smooth  
4 and sloped toward the channels on a slope of two inches, per  
5 foot.  
6

7 C. Inverts  
8

- 9 1. Invert channels shall be constructed smooth and semicircular,  
10 conforming to the inside of adjacent sewer section. The mortared  
11 invert channel shall have a steel trowel finish. Changes in direction of  
12 flow shall be made in a smooth curve of as large a radius as possible.  
13 Changes in size and grade shall be made gradually and smoothly.  
14 Whenever possible, inverts shall be formed with a full section of pipe  
15 laid through the manhole with the top half of the pipe cut out.  
16 Benches shall be built up solidly with concrete or brick and mortar  
17 and shall be sloping to the invert. All inside drops shall have a flume  
18 constructed to channel flow into the invert. Standard drop manholes  
19 shall be built whenever the inside drop exceeds twenty-four (24)  
20 inches. All pipe entering the manhole must be trimmed flush with the  
21 walls. All exposed sharp edges of pipe shall be wiped smooth with  
22 mortar.  
23

24 D. Type A Manholes  
25

- 26 1. Manholes four feet or less in depth shall be constructed in accordance  
27 with the details shown on the Plans.  
28

29 E. Standard Manholes  
30

- 31 1. Standard manholes shall be constructed in accordance with the  
32 details shown on the Plans.  
33

34 F. Drop Manholes  
35

- 36 1. Drop manholes shall be constructed in accordance with details  
37 shown on the Plans.  
38 2. Special drop manholes may be required at points where force mains  
39 connect to gravity sewers above the flow line of the manhole. The  
40 special bowl drop shall be constructed in accordance with the  
41 Standard Details.  
42

43 G. Concrete Cradles  
44

- 45 1. Concrete cradles shall be constructed at the location shown on the  
46 Plans or as directed. They shall conform to the details shown on the

Plans, or may, under special conditions, be modified as directed by the Engineer.

#### H. Fiberglass Lined Manholes

1. The properly installed liners shall not fail under H-20 dynamic wheel load applied vertically. All fiberglass products shall be subject to OCFC Visual Inspection Standards, prior to installation. Fiberglass manhole liners shall be constructed on the base slab, as specified, and shall be encased by brick masonry, or pre-cast as previously specified.
2. Any pipe entering through the manhole walls with an invert equal to, or higher than the benches will be sealed all around to the interior walls by use of fiberglass patching kit. There shall be no mortar exposed above bench level, except the stack.

#### I. Epoxy Impregnated Membrane Lined Manhole

1. Where specifically required by the Plans, manhole lining shall be installed using an epoxy impregnated membrane. Specific membrane thickness and epoxy density, and attributes, shall be as shown on the Plans or Standard Details, or as specified by the Engineer.

#### J. Removal of Existing Manholes

1. The Contractor shall remove, as indicated on the Plans, the entire manhole structure including all walls, base slab, frame and cover. The Contractor shall install a new manhole immediately after removal of the existing manhole or immediately backfill and compact the excavation with sand to a one hundred (100) percent maximum density, as determined by the methods contained in the State of Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition.
2. Should the Contractor elect to backfill the excavation prior to the installation of the new manhole, the road surface shall be patched with asphalt in accordance with Section 32 12 01 – Stabilized Roadway and Asphalt Paving, and shall be maintained in satisfactory condition until such time as the new manhole is installed.

#### K. Adjustment of Manhole Frames and Covers

1. Manhole frames and covers shall be adjusted to pavement grade during road resurfacing by addition or removal of successive courses of brick

1 masonry. Where required by the Engineer, height adjustment inserts of  
2 continuous rings of a type, as directed by the Engineer, shall be installed  
3 in the frame/cover assembly.  
4

- 5 2. Manhole frame and covers shall be adjusted to finished ground elevation  
6 in non-pavement areas by addition or removal of successive courses of  
7 brick masonry. Where required by the Engineer, height adjustment  
8 inserts of continuous rings of a type, as directed by Engineer, shall be  
9 installed in the frame/cover assembly.  
10

11 3.03 INSPECTION OF MANHOLES  
12

- 13 A. Inspection of completed lines and manholes shall be as specified in Section  
14 33 33 01, Gravity Sewers.  
15  
16

17 END OF SECTION

SECTION 40 95 01

WASTEWATER PUMP STATION SCADA  
REMOTE TELEMETRY UNIT (RTU)

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall provide, program, and install SCADA Remote Terminal Units (RTU's) as described within this Specification.
- B. The RTU unit shall be interfaced with the pump station Pump Control Panel and be configured to monitor the pump station status, and provide control as noted within this Specification.
- C. The RTU shall be programmed and configured by an authorized agent of Motorola.
- D. The RTU shall be configured to interface with the County's existing SCADA system in place, via Field Interface Units (FIU's).
- E. The Contractor shall provide programming, required by the WonderWare HMI software, to interface with the RTU/FIU at the central SCADA system.
- F. The County will provide existing sample screens for each SCADA panel type.

1.02 QUALITY CONTROL

- A. It is essential that only qualified personnel be allowed to work on the RTU/SCADA system. To maintain system warranties and system security it is imperative that only qualified SCADA contractors provide new equipment and integration services. At a minimum, the RTU/SCADA contractor must have the following qualifications:
  - 1. State of Florida Electrical Contractor license to insure proper electrical installation of the RTU.
  - 2. Motorola Certified MOSCAD Solutions Provider indicating that the contractor was Motorola trained on MOSCAD to insure proper software configuration, application, and functionality of the RTU.

1  
2 1.03 WARRANTY  
3

- 4 A. The manufacturer shall furnish a minimum eighteen (18) month warranty  
5 against defects in materials and workmanship covering parts and labor on  
6 all electrical control components to include breakers, starters, selector  
7 switches, pilot lights (excluding lamps), and transformers. The RTU/PC  
8 will have a two-year warranty to include lightning damage. The  
9 manufacturer will supply all material and labor to repair or replace failed  
10 components at no cost to the County.  
11

12 1.04 OPERATION AND MAINTENANCE MATERIALS  
13

- 14 A. The Contractor shall deliver to the County the following documentation  
15 with the Final Pay Request:  
16  
17 1. A complete RTU schematic and wiring diagram, with bill of  
18 materials, on CD, AutoCAD, latest version.  
19  
20 2. Four maintenance manuals with the above drawings and  
21 manufacturer's maintenance literature bound in three ring binders.  
22  
23 3. A laminated copy of the schematic and wiring diagram will be  
24 permanently affixed to the interior side of the exterior enclosure  
25 door using RTV silicone.  
26

27 PART 2 - PRODUCTS  
28

29 2.01 REMOTE TERMINAL UNIT (RTU)  
30

- 31 A. The County's SCADA consists of remote terminal units, Field Interface  
32 Units/Front End Processors (FIUs/FEP's) and multiple redundant SCADA  
33 computers operating with WonderWare Human Machine Interface (HMI)  
34 software. Lift station remote monitoring and control communications are  
35 provided through the County's 800MHZ trunked radio system.  
36  
37 B. A complete RTU shall be installed and integrated with the station Pump  
38 Control Panel, and HMIs. All RTU components will be provided in a single  
39 enclosure. The RTU shall be compatible with and provide all the  
40 functionality and features of the County's existing wireless SCADA  
41 System. The RTU will be Motorola MOSCAD Ace with Motorola SCADA  
42 RTU software. It is the responsibility of the RTU/SCADA supplier to  
43 provide all of the specified RTU hardware, software, functionality,  
44 installation, and startup services as detailed below.  
45

- 1 C. The pump control panel shall also operate independently of the  
2 SCADA/telemetry system in the event of failure of the remote  
3 communications link.  
4

5 2.02 FUNCTIONALITY  
6

- 7 A. The RTU shall provide local automatic monitoring from float switches,  
8 bubbler systems, transducers, ultrasonic level sensor inputs, and dry  
9 contacts. Inputs shall be provided for both digital inputs and analog (4-  
10 20ma DC) transducers. Simultaneous monitoring of analog and digital  
11 level sensing devices shall be supported where the analog level sensing  
12 device shall be primary. The RTU shall contain routines for detecting  
13 sensor failures and utilize the alternate level sensing device(s). Analog  
14 sensors and specific float alarms shall be reported to the Central HMIs if  
15 floats operate out of sequence. In all cases, the RTU shall be supplied  
16 with an input for an emergency "High Level Float". Battery backup power  
17 shall be provided so that monitoring is maintained during Utility power  
18 failures. Specific functions may vary based upon the Pump Station Type  
19 as noted within this specification.  
20

- 21 B. Local manual pump control is provided by "Hand-Off-Auto-Remote"  
22 (HOAR) switches located in the Pump Control Panel. In the absence of  
23 RTU power or in the case of RTU failure, the pump motor starters shall  
24 remain operational in the HAND position. In no case shall the RTU have  
25 the capability to operate or override the pumps in the HAND, OFF or  
26 AUTO positions. HOAR switches shall be reported back to the Central  
27 HMIs when a switch has been set in the HAND, OFF, or AUTO positions.  
28

- 29 C. The capability to control a local alarm system consisting of an alarm horn  
30 and light shall be provided. Inputs and outputs shall be provided for this  
31 functionality. Under a "High Level", or other specified alarm condition, the  
32 alarm shall be reported to the Central HMIs. The alarm horn and light may  
33 be silenced either locally from the pump control panel or remotely from  
34 Central HMIs via the RTU. If the alarm condition clears, the alarm silence  
35 control shall be restored.  
36

- 37 D. The RTU shall be configured to control two to four pumps.  
38

- 39 E. The RTU shall report elapsed runtime and number of starts for each pump  
40 to the Central HMIs. These values shall be stored in the RTU. In the case  
41 of failure of the RTU, these values shall be restored without user  
42 intervention. The Central HMIs shall have the ability to individually reset  
43 each pump's starts and/or runtimes without loss of data. On demand  
44 reports shall be made available for detailed and average starts and  
45 runtimes of each pump and station.

- 1 F. The RTU shall be provided with routines to detect individual pump fault  
2 alarms and shall report these alarms to the Central HMIs. Alarms shall  
3 report when a pump is called to run but fails to start, or when a pump is  
4 called to turn off but continues to run, and when a pump is running and  
5 shuts off before it is called to turn off. An additional spare input point shall  
6 be provided for each pump for use with an external pump fault indicator  
7 such as seal fail or thermal. These alarms shall be individually reported  
8 back to the redundant Central HMIs.  
9
- 10 G. RTU configuration parameters shall be adjustable locally and remotely  
11 from the Central HMIs. These functions shall be logged with a time stamp  
12 at the Central HMIs.  
13
- 14 H. The capability to interface with a phase monitor and associated inputs and  
15 outputs shall be provided with the RTU. The phase monitor shall detect  
16 loss of phase, phase reversal, and phase-to-phase voltages. Utility line  
17 voltages shall not be wired directly to the RTU. Upon loss of phase, phase  
18 reversal, low or high line voltages; the RTU shall send an alarm to the  
19 Central HMIs. Phase voltages from phase A to phase B, from phase C to  
20 phase B and from Phase A to phase C on three-phase systems and  
21 voltages from L1 to neutral, from L2 to neutral and from L1 to L2 on single-  
22 phase 240VAC systems shall be reported to the Central HMIs.  
23
- 24 I. A 4-20ma DC analog input for each pump shall be provided with the RTU  
25 for monitoring motor amps or VFD output speed. The RTU shall average  
26 individual motor amperage and report both instantaneous and average  
27 amperage to the Central HMIs.  
28
- 29 J. A fail-safe input shall be provided indicating intrusion. Upon loss of this  
30 signal, or a series of devices providing this signal, the RTU shall report an  
31 alarm to the Central HMIs. Battery backup power shall be provided for this  
32 input.  
33
- 34 K. If the lift station has generator power backup, two inputs, one indicating  
35 generator power is online and the second indicating a commercial power  
36 phase loss detection thru a user installed phase monitor on the line side of  
37 the power feed from the utility, shall be provided and reported to the  
38 Central HMIs. Battery backup power shall be provided for these inputs.  
39
- 40 L. The RTU shall have the capability of locally verifying communication  
41 status with a FIU/FEP. Pressing the SILENCE button five times in  
42 succession shall blink the alarm light five times in succession if  
43 communications is successful, in both directions, with a FIU/FEP.  
44  
45  
46

## 2.03 CONSTRUCTION

- A. The RTU shall be housed in a dust-proof and waterproof NEMA 4X, Type 304, 14 Gauge stainless steel enclosure powder coated white, with a 304 stainless steel, lockable three-point handle-type latching mechanism. All exterior hardware and hinges shall be stainless steel.
- B. A 14 gauge aluminum back-panel will be provided to mount all electrical control devices. All interior electrical control components mounted on the back-panel will be secured using stainless steel machine screws 8-32 minimum size. Heavier items including the RTU, control power transformer and items in excess of ten (10) pounds will be secured with 1/4"-20 stainless steel machine screws. Screw anchor nuts will be permanently installed in the sub-panel using cadmium plated steel knurled threaded inserts AKV Model AKS7 or equal. No self-tapping or sub-panel tapped screws will be used.
- C. All wiring to the control devices within the RTU panel will be harnessed and permanently attached to the panel using welded 8-32 studs and stud mounted cable ties. Stick on tie wrap fasteners are not acceptable. Wiring will be supported every eight inches minimum. This panel will be grounded via a 10-32 stud located in the bottom hinged side and bonded to the enclosure and ground buss.
- D. There shall be a permanently affixed document pocket the interior side of the exterior enclosure door to include a laminated wiring diagram, and bill of materials.
- E. No devices or equipment shall be mounted to the top of the RTU panel enclosure, exclusive of radio antenna.

## 2.04 PAINT

- A. The enclosure, sub-panel, and dead front operator panel will all be painted with heat fused polyester powder, electro statically applied paint on a phosphatized base. The enclosure will be white, inside and outside. The interior panels will be silver-tek bronze.

## 2.05 ENVIRONMENTAL RATINGS

- A. All components will be able to operate at -22 F or lower to 140 F and higher at ninety-five (95) percent humidity.



## 2.06 RTU

- A. To match the County's existing hardware configuration, all RTUs will be Motorola MOSCAD Ace 3600, with 4-watt 800MHZ trunked radio, three mixed I/O (as required), battery backup, and 120V AC eight-amp power supply. The unit will have a 120V AC surge suppressor installed directly on the AC-main terminals. All relay outputs will have interposing 120V, 10A relays installed for output protection. Two-120V AC, 5 amp circuit breakers will be installed, one for the RTU, the second for auxiliary power. All internal wiring will be point-to-point labeled using permanent wire markers.

## 2.07 RTU SOFTWARE APPLICATION

- A. Each RTU will have the latest RTU SCADA application license compatible with the existing central configuration. Software functionality and algorithms will perform all of the functions listed in the Functionality portion of the specification. Proven debugged software will be provided to perform the below listed functions

### 1. Inputs and Discrete Alarm Capabilities will be:

Wet Well High Level	Pump 2 Interlock(s)
Wet Well Lag-Lag Level	Pump 2 Start Fault
Wet Well Lag Level	Pump 2 Run Fault
Wet Well Lead Level	Pump 2 Stop Fault
Wet Well Off Level	Pump 3 SS in Hand Position
Wet Well Low Level	Pump 3 SS in Auto Position
Generator Running	Pump 3 Running
Alarm Horn Silenced	Pump 3 Interlock(s)
Alarm Light On	Pump 3 Start Fault
Alarm Horn On	Pump 3 Run Fault
Float Voltage Low Alarm	Pump 3 Stop Fault
Odor Detector Alarm	Pump 4 SS in Hand Position
Memory/Init Alarm (RTU Fail)	Pump 4 SS in Auto Position
AC Power Alarm	Pump 4 Running
Battery Fail	Pump 4 Interlock(s)
Module 1 Fail	Pump 4 Start Fault
Module 2 Fail	Pump 4 Run Fault
Module 3 Fail	Pump 4 Stop Fault
Primary OK	Pump 1 Max Runtime Alarm
Secondary OK	Pump 2 Max Runtime Alarm
Phase A Loss	Pump 3 Max Runtime Alarm
Phase B Loss	Pump 4 Max Runtime Alarm
Phase C Loss	Wet Well Level

## WASTEWATER PUMP STATION SCADA REMOTE TELEMETRY UNIT (RTU)

Phase Sequence	Phase Monitor
Pump 1 SS in Hand Position	Pump 1 Amps
Pump 1 SS in Auto Position	Pump 2 Amps
Pump 1 Running	Pump 3 Amps
Pump 1 Interlock(s)	Pump 4 Amps
Pump 1 Start Fault	Station Intrusion
Pump 1 Run Fault	Pump Control Panel
Pump 1 Stop Fault	Intrusion
Pump 2 SS in Hand Position	RTU Panel Intrusion
Pump 2 SS in Auto Position	Wet Well Vault Intrusion
Pump 2 Running	Valve Vault Intrusion

2. Analog Input and/or Alarm Capabilities will be:

Wet Well Level Sensor	Pump 1 Avg Amps
Phase AB Voltage	Pump 2 Starts
Phase BC Voltage	Pump 2 Runtime
Phase CA Voltage	Pump 2 Avg Amps
Pump 1 Amps	Pump 3 Starts
Pump 2 Amps	Pump 3 Runtime
Pump 3 Amps	Pump 3 Avg Amps
Pump 4 Amps	Pump 4 Starts
Float Voltage	Pump 4 Runtime
Station Flow	Pump 4 Avg Amps
Float Sequence	Reuse Total Flow
Pump 1 Starts	Force Main Pressure
Pump 1 Runtime	

3. Controlled Discrete Output Capabilities will be:

Disable Station	Reset Pump 3 Starts
Disable Alarm Light	Reset Pump 3 Runtime
Disable Alarm Horn	Reset Pump 4 Starts
Silence Horn	Reset Pump 4 Runtime
Pump 1 Override	Reset Pump 1 Average
Pump 1 Disable	Amps
Pump 2 Override	Reset Pump 2 Average
Pump 2 Disable	Amps
Pump 3 Override	Reset Pump 3 Average
Pump 3 Disable	Amps
Pump 4 Override	Reset Pump 4 Average
Pump 4 Disable	Amps
Reset Pump 1 Starts	Reset Pump 1 Max Runtime
Reset Pump 1 Runtime	Alarm
Reset Pump 2 Starts	Reset Pump 2 Max Runtime
Reset Pump 2 Runtime	Alarm

WASTEWATER PUMP STATION SCADA  
REMOTE TELEMETRY UNIT (RTU)

Reset Pump 3 Max Runtime  
Alarm  
Reset Pump 4 Max Runtime  
Alarm  
Reset Total Flow

1 4. Additional Controllable Internal Points capabilities will be:

Low Level Alarm Set point	2nd Lag Pump Stop Set point
Lead Pump Start Set point	3rd Lag Pump Stop Set point
Lag Pump Start Set point	Lead/Lag/2nd/3rd Start Order
2nd Lag Pump Start Set point	Max Run Set point P1
3rd Lag Pump Start Set point	Max Run Set point P2
Lead Pump Select	Max Run Set point P3
Lag Pump Select	Max Run Set point P4
High Level Alarm Set point	2 <sup>nd</sup> Lag Pump Select
Lead Pump Stop Set point	3 <sup>rd</sup> Lag Pump Select
Lag Pump Stop Set point	

2 2.08 RADIO

3  
4 A. The radio shall be a Motorola model XTL 2500 4 watt 800MHZ trunked  
5 radio or the latest model from Motorola that is designed for this purpose.  
6 No RTU or radio shall be integrated into the County's SCADA System  
7 without County authorization. Before the RTU or radio is placed into  
8 service, GPS coordinates of the lift station control panel must be provided  
9 to the County.

10  
11 2.09 UNINTERRUPTIBLE POWER SUPPLY/BATTERY BACK-UP

12  
13 A. The RTU shall be supplied with an integrated power supply/uninterruptible  
14 power supply (UPS) with battery back-up capability for operating the RTU  
15 for minimum of four hours in the event of a commercial power failure. The  
16 power supply shall keep batteries at a float charge. The RTU shall contain  
17 a low battery cutout circuit and the batteries shall not be damaged by deep  
18 discharges. The power supply shall supply power to the processor/PLC  
19 and I/O and/or function modules. The power supply shall also provide a  
20 24-volt DC voltage source for field devices.

21  
22 2.10 INSTRUMENT SURGE PROTECTION

23  
24 A. All instrumentation will be protected by plug-in surge suppression with  
25 bases mounted in the RTU. Surge Suppression shall be as manufactured  
26 by Phoenix, or County approved equal.

27  
28

1  
2 2.11 SHOP TESTING  
3

- 4 A. After fabrication in the RTU panel manufacturer's plant, an operational test  
5 shall be performed to check out the entire panel before delivery.  
6  
7 B. The RTU will have all software loaded and all I/O will be proven to the  
8 RTU with inputs simulated. A signed dated detailed test report will be  
9 shipped with the unit.  
10

11 PART 3 -EXECUTION  
12

13 3.01 INSTALLATION OF RTU PANEL  
14

- 15 A. The Contractor shall provide and install all required hardware and  
16 software components necessary for a complete functional RTU. A Florida  
17 Certified Electrical Contractor will perform installation in accordance with  
18 the current edition of the NFPA, NEC, UL and local County electrical  
19 codes.  
20

21 1. Electrical Power  
22

23 The Contractor will be responsible to run 20 amp, 120V AC circuits  
24 to the RTUs. All enclosures, ground busses, antenna masts, surge  
25 arrestors will be grounded and bonded to the existing service main  
26 ground.  
27

- 28 2. All trunked radios will be programmed and 'code plugged' by the  
29 County's Radio Administrator. It will be the supplier's responsibility  
30 to provide the proper 'code plug' to the Radio Administrator, deliver  
31 the radios for programming, reinstall the radios, and verify  
32 operation. The County will not be responsible for invalid or  
33 improper 'code plugs'.  
34

- 35 3. All hardware and brackets used to mount the RTU panel shall be  
36 stainless steel.  
37

- 38 4. All interface wiring shall be tagged with heat shrink pre-printed wire  
39 labels. Hand written labels are not acceptable.  
40

- 41 5. All RTUs will be quality accepted by having the supplier  
42 demonstrate to the County representative that all features and  
43 functions of the RTU perform.  
44  
45  
46

1  
2 3.02 STARTUP AND ACCEPTANCE  
3

- 4 A. The County has established specific procedures for integration and  
5 acceptance of a RTU into the County's SCADA system. This procedure  
6 shall be followed. Before acceptance, a complete documented checkout  
7 of the RTU, Central HMIs interface, and RF communications, shall be  
8 completed and witnessed by the County and the system supplier.

END OF SECTION

SECTION 48 11 30

STANDBY DIESEL GENERATORS

PART 1 – GENERAL

1.01 SCOPE OF WORK

- A. This Specification is applicable to standby diesel generators 400 kW and larger for use and wastewater pump stations within the Pinellas County sewer system. Generators smaller than 400 kW are leased or purchased by the County through a separate Master Contract.
- B. The equipment supplied and installed shall meet the requirements of the National Electric Code and all applicable local codes and regulations.
- C. All equipment shall be new, of current production by a U.S. firm, which manufactures the generator, controls, transfer switch, and assembles the standby generator sets as a matched unit so that there is one-source responsibility for warranty, parts, and service through a local representative with factory-trained service personnel.
- D. All standby generators shall be continuous standby (defined as continuous for duration of any power outage).

1.02 TERMS AND CONDITIONS

- A. The installation shall include all labor, material and equipment to install a complete stand-by generator
- B. The electrical Contractor shall secure any permits and inspections required to install the generator and complete the work. All electrical work shall comply with the provisions of the NEC and all state and local codes. Wire and conduit size shall be based on the kW value of the unit as defined in the Schedule provided in the Standard Details.
- C. The Contractor shall furnish all plant, labor, materials, equipment and tools required to rough-in and connect the standby generator. The rough-in dimensions for the unit shall be based on the kW value of the unit and as defined in the Schedule provided in the Standard Details.

1 1.03 WARRANTY

- 2  
3 A. A local single source factory trained service personnel shall maintain  
4 complete warranty, parts availability and service for the engine and  
5 generator unit. Warranty shall be maintained for a minimum of two years.  
6

7 1.04 MANUALS

- 8  
9 A. Four sets of operator, parts, and service manuals and one CD including  
10 wire schematics shall be supplied.  
11  
12 B. Parts manual shall include suggested parts re-order list.  
13

14 PART 2 – PRODUCTS

15  
16 2.01 STANDARD FEATURES

- 17  
18 A. The generator shall be provided with the following standard features:  
19  
20 1. Electronic Governor  
21  
22 2. 12-volt positive engagement solenoid shift-starting motor.  
23  
24 3. 35-ampere minimum automatic battery charging alternator with  
25 solid-state voltage regulation.  
26  
27 4. Positive displacement, full pressure lubrication oil pump, cartridge  
28 oil filters, dipstick, and oil drain.  
29  
30 5. Dry-type replaceable air cleaner elements.  
31

32 2.02 GENERATOR

- 33  
34 A. The alternator shall be salient-pole, reconnectable, voltage as specified.  
35 Any control or internal wiring to accomplish voltage changes will not be  
36 acceptable. The alternator shall be 12-lead through t300 KW,  
37 self-ventilated of drip-proof construction with amortiser rotor windings and  
38 skewed for smooth voltage waveform. The insulation material shall meet  
39 the NEMA Standard (MGI-2.40 and 16.40) for Class H and be vacuum  
40 impregnated with epoxy varnish to be fungus resistant per MIL I-24092.  
41  
42 B. Temperature rise of the rotor and stator shall be limited to NEMA class F.  
43 The excitation system shall be of brushless construction controlled by a  
44 solid-state voltage regulator with adjustable Volts-per-Hertz operation  
45 capable of maintaining voltage within plus or minus two percent at any  
46 constant load from zero to one hundred (100) percent of rating. The

1 regulator must be sealed from the environment and isolated from the load  
2 to prevent tracking when connected to SCR loads.

3  
4 C. On application of any load up to the rated load, the instantaneous voltage  
5 within one second.

6  
7 D. A re-settable line current sensing circuit breaker with inverse time versus  
8 current response shall be furnished and shall not automatically reset  
9 preventing restoration of voltage if maintenance is performed. This  
10 breaker shall protect the generator from damage due to its own high  
11 current capability, minimum 350 amps.

12  
13 E. Terminal strip connection for remote panel harness.

#### 14 15 2.03 FUEL TANK

16  
17 A. Included with generator will be a double wall, skid base, diesel fuel tank  
18 with leak detection. It will have the capacity to operate the generator for a  
19 minimum of three days operating at full load, but not exceed four hundred  
20 ninety-nine (499) gallon capacity.

#### 21 22 2.04 MOTOR CONTROLLER

23  
24 A. The following items shall have digital signaling for remote monitoring,  
25 starting and shut down.

26  
27 1. Fused DC circuits.

28  
29 2. The starting system shall be designed for restarting in the event of  
30 a false engine start, by permitting the engine to completely stop and  
31 then reengage the starter.

32  
33 3. Cranking cyler with fifteen (15) second On and Off cranking  
34 periods.

35  
36 4. Over crank protection designed to open the cranking circuit after  
37 seventy-five (75) seconds if the engine fails to start.

38  
39 5. Circuitry to shut down the engine when signal for high coolant  
40 temperature, low oil pressure, low-water level, or over speed are  
41 received

42  
43 6. Indicating lights to signal

44  
45 7. Not-in-auto (flashing red)



8. Emergency stop (red)
9. High energy temperature/low coolant level (red)
10. Over speed (red)
11. Low oil pressure (red)
12. Battery charger malfunction (red)
13. Low battery voltage (red)
14. Low fuel (red) with automatic engine shutdown
15. System ready (green)
16. Pre-alarm high engine temperature (yellow)
17. Pre-alarm low oil pressure (yellow)
18. Low coolant temperature (red)
19. Test button for indicating lights
20. Low water level (yellow)

## 2.05 INSTRUMENT PANEL

- A. The following items shall have either digital or 4-20 ma analog signaling for remote monitoring.
1. Voltmeter, plus or minus two percent accuracy (analog)
  2. Ammeter, plus or minus two percent accuracy (analog)
  3. Voltmeter-ammeter phase selector switch (digital)
  4. Direct rating pointer-type frequency meter, plus or minus five percent accuracy, 45 to 65 Hz scale. (analog)
  5. Panel illuminating lights (digital)
  6. Battery charging meter (analog)
  7. Coolant temperature gauge (analog)

8. Oil pressure gauge (analog)
9. Running time meter (digital)
10. Fuel gauge (analog)
11. Voltage adjust rheostat (plus or minus five percent range)-(analog output)

## 2.06 ACCESSORIES

### A. The following accessories shall be provided:

1. Over voltage protection will shut down the unit after one second of fifteen (15) percent or more over voltage.
2. Gas proof, seamless, stainless steel, flexible exhaust connector(s) ending in pipe thread or SAE flange.
3. Flexible fuel line(s) rated three hundred (300) degrees F and 100 psi ending in pipe thread.
4. Residential critical exhaust silencer, coated to be temperature and rust resistant. Full load exhaust noise shall be limited to 65 dba as measured at twenty-three (23) feet in a free-field environment.
5. Watlo block heater (liquid cooled models) of proper wattage and engine heater 120 VAC, thermostatically controlled to maintain engine coolant at proper temperature to meet the start-up requirement of NFPA-99 or NFPA-110 Regulations.
6. Charger with plus or minimum one percent constant voltage regulation from no load to full load over plus or minus ten percent AC input line variation, current limited during engine cranking and short circuit conditions, temperature compensated ambient from minimum negative forty (-40) degrees C to a positive sixty (+60) degrees C, five percent accurate voltmeter and ammeter, fused, reverse polarity and transient protected. Optional alarm circuit board to meet the requirements of NFPA-110 for low battery voltage, high battery voltage, and battery charger malfunction.

## 2.07 AUTOMATIC TRANSFER SWITCH

- ### A. A transfer switch with microprocessor logic shall be included, which offers a standard feature package, for basic standby applications on 30 - 1000

1           ampere systems up to 600 volts, 2, 3 or 4 pole. The NFPA-110, Type  
2           110, Type 10 (ten-second) transfer requirement must be met.

3  
4       B.     Standard Features

- 5  
6           1.     UL 1008 Listed  
7           2.     Microprocessor Based Logic  
8           3.     Vertical In-Line Mechanism  
9           4.     Multi-Tap Voltage Selector  
10          5.     Normal/Standby Source Monitoring  
11          6.     Plant Exerciser with Fail Safe (Programmable)  
12          7.     High Withstand, Closing, and Interrupting Ratings  
13          8.     Manual Transfer Under Load  
14          9.     Engine Start Contacts

15  
16       C.     Required Features

- 17  
18          1.     Time Delay Normal to Emergency  
19          2.     Time Delay Engine Start  
20          3.     Time Delay Emergency to Normal  
21          4.     Time Delay Engine Cool down  
22          5.     Emergency Source Sensing  
23          6.     Pilot Light – Normal  
24          7.     Pilot Light – Emergency  
25          9.     Auxiliary Contacts (4NO/4NC) – Normal  
26          10.    Auxiliary Contacts (4NO/4NC) – Emergency  
27          11.    Time Delay Neutral  
28          12.    Pre-transfer Signal Contacts (2NO/2NC)  
29          13.    Go To Emergency Contact (Area Protection)  
30          14.    2 Year Factory Warranty  
31          15.    Selectable 7,14,21,28 day exerciser  
32          16.    U.L. Listed  
33          17.    Dimensions (L x W x H): 48.74 X 20.81 X 18.4  
34          18.    50 or 60 HZ  
35          19.    3 Pole  
36          20.    Amps: 150  
37          21.    NEMA 4X Enclosure  
38          22.    3 Phase  
39          23.    Reconnectable

40  
41   2.08   WEATHER PROTECTIVE ENCLOSURE

- 42  
43       A.     Weatherproof/sound attenuated enclosure. Rigid one piece top cover of  
44       sheet metal construction to include drip-edge for water run-off, epoxy  
45       based primer painted to color specification as needed per location.  
46

- B. Air flow intake and exhaust ports to be louvered and screened against rodent infiltration.
- C. Heavy duty, keyed alike, lockable handles on all doors to allow inspection and maintenance. All hardware shall be stainless steel.
- D. A critical silencer is mounted inside the enclosure.
- E. Stainless steel flex hose between engine and silencer muffler.
- F. Oil and coolant drain plumbed thru-outside wall with positive shut-offs located inside the enclosure.
- G. Large access cover for radiator fill.
- H. Bulb-type rubber seals on all door openings.

#### 2.09 CONCRETE SLAB

- A. The Contractor shall furnish all plant, labor, materials, equipment and tools to construct the reinforced concrete slab. The dimensions of the slab shall be based on the kW value of the unit and as defined in the schedule listed in the Standard Details.
- B. All concrete work and materials shall conform to the requirements of Specification 03 10 01.

### PART 3 – EXECUTION

#### 3.01 SITE TESTS

- A. After unit is delivered and after notification by County personnel, the manufacturer's local representative shall have seven calendar days to perform an on-site check, start-up, and building load test. The engineer, regular operators, and the maintenance staff shall be notified of the time and date of the site test.
- B. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the manufacturer's recommendations under the environmental conditions present and expected. Accessories that normally function while the set is standing by shall be checked prior to cranking the engine. This shall include: engine heaters, battery charger, etc.
- C. Vendor shall perform start up of new system, check phase rotation, and test run with load on site.

END OF SECTION