

**PINELLAS COUNTY
UTILITIES DEPARTMENT**



**Standard Technical Specifications for
Utilities and Related Construction
APRIL 2010**

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SECTION 00 75 00

SPECIAL PROVISIONS

These Special Provisions provide additional information and modify the Pinellas County Utilities Standard Technical Specifications (PCU-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 ADDITIONAL INFORMATION AND STUDIES

ARTICLE SP-3 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 PCU's Standard Technical Specifications (STS). All STS will be designated as such in lower right hand corner of document by PCU-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.

PCU - Job #

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

4 1. 01 57 00 Control of Work

5 A. Paragraph 1.13, Not Applicable.
6

7 B. Part 3 – Execution, Add:

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

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 | <input type="checkbox"/> | Special Provisions |
| 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 | <input type="checkbox"/> | 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 Liner System |
| 33 01 36 | <input type="checkbox"/> | Urethane/Epoxy, Polyurea Liner System |
| 33 01 37 | <input type="checkbox"/> | Polyurethane Liner System |
| 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 |
| 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 |

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 a 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

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 PCU Inspector and the Engineer
- 31 FORTY-EIGHT (48) HOURS prior to starting construction
- 32 (Saturday, Sunday and Holidays excluded). Upon notification, a
- 33 meeting will be scheduled between the PCU Inspector and the
- 34 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

- 1 a. F.D.O.T.
2 b. County
3 c. Florida Department of Environmental Protection (FDEP)
4 d. City/Municipality
5
- 6 C. If field conditions require deviation from the approved plans, the
7 Contractor shall notify the Project Engineer of the required change. The
8 Project Engineer will make the necessary changes and submit a revised
9 set of plans to the appropriate agency or agencies for approval.
10
- 11 D. All construction is subject to inspection and certain tasks require that the
12 PCU Inspector be on the site to properly document the procedure, test
13 results and/or material used. On the occasions that the PCU Inspector is
14 required on site to observe these tasks, FORTY-EIGHT (48) hours
15 advance notice will be required (Saturday, Sunday and Holidays
16 excluded).
17
- 18 E. Should the Contractor suspend work on any given project, the Contractor
19 shall provide written notification detailing the reason for the suspension to
20 the PCU Engineering Department within two business days. Additionally,
21 forty-eight (48) hours advance, written notice will be required for a restart
22 of the project.
23
- 24 F. Should any materials be installed or backfilled prior to inspection by the
25 PCU Inspector, the facilities are subject to uncovering, exposing, and/or
26 disassembly for inspection. It is preferred that all material expected to be
27 required for the project be on site for initial material inspection prior to
28 commencing the project. Material thus delivered to the job site will be
29 protected and stored as to insure preservation of quality and fitness.
30
- 31 G. Meters shall not be installed on potable and reclaimed water systems until
32 all cleanup work is completed and a final inspection has been made by the
33 Pinellas County Utilities Inspector.
34
- 35 H. All projects requiring a or Florida Department of Environmental Protection
36 Permit will not receive water service until the Pinellas County Utilities
37 receives a SEALED copy of the Engineer's Certificate of Completion and
38 Compliance (As-built plans, if applicable) and a Release Form from the
39 Florida Department of Environmental Protection (FDEP). The following
40 must also be provided, if applicable:
41
- 42 1. Deed and Agreement to Deed to pipelines and appurtenances as
43 additions to Pinellas County Utilities.
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- 45 2. Deed of Conveyance to pipelines
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3. Release of Lien/Cost Statement

4. Easement

I. Taps

1. All taps on existing, in service, pressurized mains for development projects will normally be made by PCU personnel. All taps for pressure testing and chlorination will be saddle taps, made by the Contractor.

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

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

J. Additional Requirements for Tapping Asbestos Cement Pipe

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

2. Coupons from the tapping procedure shall be placed in a "zip lock" type bag in the wet condition. The bag shall be marked with the 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

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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

1 SECTION 01 42 01

2
3 REFERENCE STANDARDS AND DEFINITIONS

4
5
6 PART 1 - GENERAL

7
8 1.01 REQUIREMENTS INCLUDED

- 9
10 A. Abbreviations and acronyms are used in the Contract Documents to
11 identify reference standards.

12
13 1.02 QUALITY ASSURANCE

- 14
15 A. Application: When a standard is specified by reference, comply with
16 requirements and recommendations stated in that standard, except when
17 requirements are modified by the Contract Documents, or applicable
18 codes establish stricter standards.

- 19
20 B. Publication Date: The publication in effect on the date of issue of
21 Contract Documents, except when a specific publication date is specified.

22
23
24 1.03 ABBREVIATIONS, NAMES, AND ADDRESSES OF ORGANIZATIONS

- 25
26 A. Obtain copies of referenced standards direct from publication source,
27 when needed for proper performance of Work, or when required for
28 submittal by Contract Documents.

29
30 AA Aluminum Association
31 900 19th Street NW
32 Washington, DC 20006

33
34 AASHTO American Association of State Highway
35 and Transportation Officials
36 444 North Capitol Street, NW Suite 249
37 Washington, DC 20001

38
39 ABPA American Backflow Prevention Association
40 PO Box 3051
41 Bryan, Texas 77805-3051

42
43 ACI American Concrete Institute
44 38800 Country Club Drive
45 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 th 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 th Street., 6 th 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 |

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

30 ADMINISTRATION – shall mean the Pinellas County Administration.

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

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

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

46

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 L= Allowable leakage [gph]
 15 S= Length of pipe tested [feet]
 16 D= Nominal diameter of pipe [inches]
 17 P= Average pressure during test [psig]

18 150 psi (per 1000ft.)
 19 (Table 5.4 AWWA C
 20 600-05 & Table 2
 21 C605-5)

| | | |
|----|----|------|
| 22 | 2 | 0.17 |
| 23 | 4 | 0.33 |
| 24 | 6 | 0.50 |
| 25 | 8 | 0.66 |
| 26 | 10 | 0.83 |
| 27 | 12 | 0.99 |
| 28 | 16 | 1.32 |
| 29 | 18 | 1.49 |
| 30 | 20 | 1.66 |
| 31 | 24 | 1.99 |
| 32 | 30 | 2.48 |
| 33 | 36 | 2.98 |
| 34 | 42 | 3.48 |
| 35 | 48 | 3.97 |
| 36 | 54 | 4.47 |

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

- 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.
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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

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

3.04 LOCAL TRAFFIC

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

3.05 PEDESTRIAN TRAFFIC

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

3.06 BUS STOPS

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

END OF SECTION

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

1 defects, damage or unsoundness of the materials. Items accepted by
2 the Contractor shall be signed for by his authorized representative,
3 and the Contractor shall be responsible for such items from the time
4 he picks them up to the time they are installed and accepted by the
5 Utilities Department.
6

- 7 2. Upon acceptance of any material from Pinellas County Utilities, the
8 Contractor shall be responsible for loading the material at the storage
9 yard and unloading the material at the job site and for the safe
10 transportation of the material between those locations
11

12 1.04 INSPECTION AND TESTING
13

- 14 A. The Contractor shall be fully responsible for the proper operation of
15 equipment during tests and instruction periods and shall neither have, nor
16 make any claim for damage, which may occur to equipment prior to the time
17 when the County formally takes over the operation thereof.
18
- 19 B. When requested, the Contractor shall furnish authoritative evidence in the
20 form of Certificates of Manufacture that the materials to be used in the work
21 have been manufactured and tested in conformity with the Contract
22 Documents. These certificates shall be notarized and shall include copies of
23 the results of physical tests and chemical analyses, where necessary, that
24 have been made directly on the product or on similar products of the
25 manufacturer.
26
- 27 C. As soon as conditions permit, the Contractor shall furnish all labor, materials,
28 and instruments and shall make preliminary field tests. If the preliminary field
29 tests reveal that the system does not comply with the requirements of the
30 Contract Documents, the Contractor shall, prior to the acceptance tests,
31 make all changes, adjustments and replacement required.
32
- 33 D. Upon completion of the Work and prior to final payment, all equipment and
34 piping shall be subjected to acceptance tests as specified or required to
35 prove compliance with the Contract Documents.
36
- 37 E. The Contractor shall furnish labor, fuel, energy, and all other materials,
38 equipment and instruments necessary for all acceptance tests, at no
39 additional cost. The Supplier shall assist in the final field tests as applicable.
40
- 41 F. Any defects in the materials and equipment or their failure to meet the tests,
42 guarantee or requirements of the Contract Documents shall be promptly
43 corrected by the Contractor. If the Contractor fails to make these corrections
44 or if the improved materials and equipment, when tested, shall again fail to
45 meet the guarantees or specified requirements, the materials and equipment
46 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

1 tree.

2 1.08 PROTECTION OF WORK AND PUBLIC

3
4 A. Barriers and Lights

- 5
6 1. The Contractor shall provide and maintain proper and adequate
7 barricades, construction signs, torches, flashers, construction tapes,
8 flagmen, guards or other traffic control devices as may be necessary
9 to provide the required safety and protection to the public at and
10 around the perimeter of the construction areas. The Contractor shall
11 provide suitable barricades, red lights, "danger" or "caution" or "street
12 closed" signs and watchmen at all places where the work causes
13 obstructions to the normal traffic or constitutes in any way a hazard to
14 the public. The Contractor shall comply with all City, County or State
15 regulations.

16
17 B. Smoke Prevention

- 18
19 1. A strict compliance with ordinances regulating the production of
20 emission of smoke will be required. No open fires will be permitted.

21
22 C. Noise

- 23
24 1. The Contractor shall eliminate noise to as great an extent as
25 practicable at all times. Air compressing plants shall be equipped with
26 silencers and the exhaust of all gasoline, diesel, motors or other
27 power equipment shall be provided with mufflers. The Contractor
28 shall strictly observe all local regulations and ordinances covering
29 noise control.
30
31 2. If mufflers and silencers cannot achieve the necessary noise
32 reduction, other noise abatement procedures shall be instituted by the
33 Contractor, such as installation of 3/4-inch plywood baffles positioned
34 to break off line-of-sight from the noise source to affected residences
35 and/or commercial structures.

36
37 D. Access to Public Services

- 38
39 1. Neither the materials excavated nor the materials or plant used in the
40 construction of the work shall be placed to prevent free access to all
41 fire hydrants, valves or manholes.

42
43 E. Dust Prevention

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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.

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G. Pollution Control

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

1.09 CUTTING AND PATCHING

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

1.10 CLEANING

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

1.11 EROSION CONTROL, WETLANDS AND STORM SEWERS

- A. Protection Against Siltation and Bank Erosion
 - 1. The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses, drainage ditches, wetlands and other areas of concern.
 - 2. The Contractor, at his own expense, shall remove any siltation deposits and correct any erosion problems, which result from his construction operations.
 - 3. The Contractor shall be solely responsible for any fines resulting from

1 the encroachment of any environmentally protected areas.

2
3
4 B. Protection of Wetland Areas

- 5
6 1. The Contractor shall properly dispose of all surplus material, including
7 soil, in accordance with Local, State and Federal regulations. Under no
8 circumstances shall surplus material be disposed of in wetland areas as
9 defined by the Florida Department of Environmental Protection,
10 Southwest Florida Water Management District, U.S. Army Corps of
11 Engineers, etc.
12

13 C. Sanitary & Storm Sewer Systems

- 14
15 1. The Contractor shall be entirely responsible for the satisfactory
16 replacement of storm sewer and installation of sanitary sewer systems
17 in substantial conformance to the approved Drawings. It is strongly
18 recommended that no roadway base or paving be constructed until the
19 Contractor has performed televising of these lines to his and the
20 County's satisfaction, and all storm sewer and sanitary sewer invert
21 grades are verified in the field. The lamping of lines and verification of
22 elevations in no way absolves the Contractor from any of his
23 contractual obligations.
24

25 1.12 RESTORATION OF PROPERTY

- 26
27 A. Responsibility. All damage as a result of construction work done to existing
28 structures, wetland areas, roadway pavement, driveways, other paved areas,
29 fences, utilities, traffic control devices and any other obstruction not
30 specifically named herein, shall be repaired, restored or replaced by the
31 Contractor unless otherwise specified.
32
33 B. Temporary Repairs. All damage named in Paragraph A above shall be at
34 least temporarily repaired, restored or replaced immediately following
35 construction efforts at that location. Temporary restoration shall mean
36 putting the affected area back into a safe, usable condition. In no case shall
37 trenches remain open over night within a street right-of-way unless specific
38 approval is granted by the County.
39
40 C. Permanent Repairs. All damage named in Paragraph A above shall be
41 permanently repaired, restored, or replaced before final completion.
42 Permanent repairs shall be accomplished in a professional workmanship-like
43 manner.
44
45 D. In all areas disturbed by the work, the Contractor shall grade and restore the
46 site to a condition as good or better than existed before construction.

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

6
7 1.13 MAINTENANCE OF TRAFFIC

8
9 A. Maintenance of Traffic shall be in accordance with Specification 01 55 26,
10 Traffic Control.

11
12 1.14 MATERIALS

13
14 A. All materials installed in the County's easements or rights-of-way shall be
15 approved in the County's Materials Specification Manual regardless of whether
16 these facilities are to be owned by the County or are to be privately owned.

17
18
19
20 PART 2 – PRODUCTS (Not Used)

21
22 PART 3 – EXECUTION (Not Used)

23
24
25 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.

EROSION AND SEDIMENTATION CONTROL

- 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

1 PART 3 - EXECUTION

2
3 3.01 CLEARING

- 4
5 A. Clearing and grubbing shall be scheduled and performed in such a
6 manner that subsequent grading operation and erosion control practices
7 can follow immediately thereafter. Excavation, borrow, and embankment
8 operations will be conducted as a continuous operation. All construction
9 areas not otherwise protected shall be planted with permanent vegetative
10 cover within 30 working days after completion of active construction.

11
12 3.02 STABILIZING

- 13
14 A. The angle for graded slopes and fills shall be no greater than the angle,
15 which can be retained by vegetative cover or other adequate erosion
16 control devices or structures. All disturbed areas outside of embankment
17 left exposed will, within 30 working days of completion of any phase of
18 grading, be planted or otherwise provided with either temporary or
19 permanent ground cover, devices, or structures sufficient to restrain
20 erosion.

21
22 3.03 REGULATORY REQUIREMENTS

- 23
24 A. Whenever land disturbing activity is undertaken on a tract, a ground cover
25 sufficient to restrain erosion must be planted or other wise provided within
26 30 working days on that portion of the tract upon which further active
27 construction is to be undertaken.
28
29 B. If any earthwork is to be suspended for any reason whatsoever for longer
30 than 30 calendar days, the areas involved shall be seeded with vegetative
31 cover or otherwise protected against excessive erosion during the
32 suspension period. Suspension of work in any area of operation does not
33 relieve the Contractor of the responsibility for the control of erosion in that
34 area.

35
36 PART 4 - CONSTRUCTION PHASE

37
38 4.01 PRACTICES

- 39
40 A. Avoid dumping soil or sediment into any stream bed or watercourse.
41
42 B. Maintain an undisturbed vegetative buffer where possible between a
43 natural watercourse and trenching and grading operations.
44
45 C. Avoid equipment crossings of streams, creeks, and ditches where
46 practicable.

1
2 PART 5 - SEDIMENT CONTROL FEATURES

3
4 5.01 GENERAL

- 5
6 A. All devices (silt fences, retention areas, etc.), for sediment control shall be
7 constructed at the locations indicated prior to beginning excavation on the
8 site. All devices shall be properly maintained in place until a structure or
9 paving makes the device unnecessary or until directed to permanently
10 remove the device.

11
12 5.02 DESIGN APPLICATIONS

- 13
14 A. Mulch shall be used for temporary stabilization of areas subject to
15 excessive erosion, and for protection of seed beds after planting where
16 required.
17
18 B. Filter Fabric, drain pipe with sock, or other approved methods shall be
19 placed and secured over the grates of each existing inlet, grating or storm
20 pipe opening near the area of excavation to prevent silt and debris from
21 entering the storm systems.
22 C. Silt fences, hay bales and floating turbidity barriers shall be used as
23 shown on the plans or as directed by the Project Representative to restrict
24 movement of sediment from the site.
25
26 D. Establish vegetative cover on all unpaved areas disturbed by the work.
27
28 1. Preparation of Seedbed. Areas to be seeded shall be scarified a
29 depth of four inches until a firm, well pulverized, uniform seedbed is
30 prepared. Fertilizer shall be applied during the scarification process
31 in accordance with the following rates.
32 a. Fertilizer - 10 to 15 pounds per 1,000 square feet
33 2. Seeding. Disturbed areas along embankments shall be
34 permanently seeded with mix specified in Section 32-92-01.
35
36 3. Mulch all areas immediately after seeding. Mulch shall be applied
37 and anchored as specified herein before.
38

39 5.03 MAINTENANCE

- 40
41 A. Maintain all temporary and permanent erosion control measures in
42 functioning order. Temporary structures shall be maintained until such
43 time as vegetation is firmly established and grassed areas shall be
44 maintained until completion of the project. Areas which fail to show a
45 suitable stand of grass or which are damaged by erosion shall be
46 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'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

1 SECTION 01 58 01

2
3 PROJECT IDENTIFICATION SIGNS

4
5 PART 1 - GENERAL

6
7 1.01 REQUIREMENTS INCLUDED

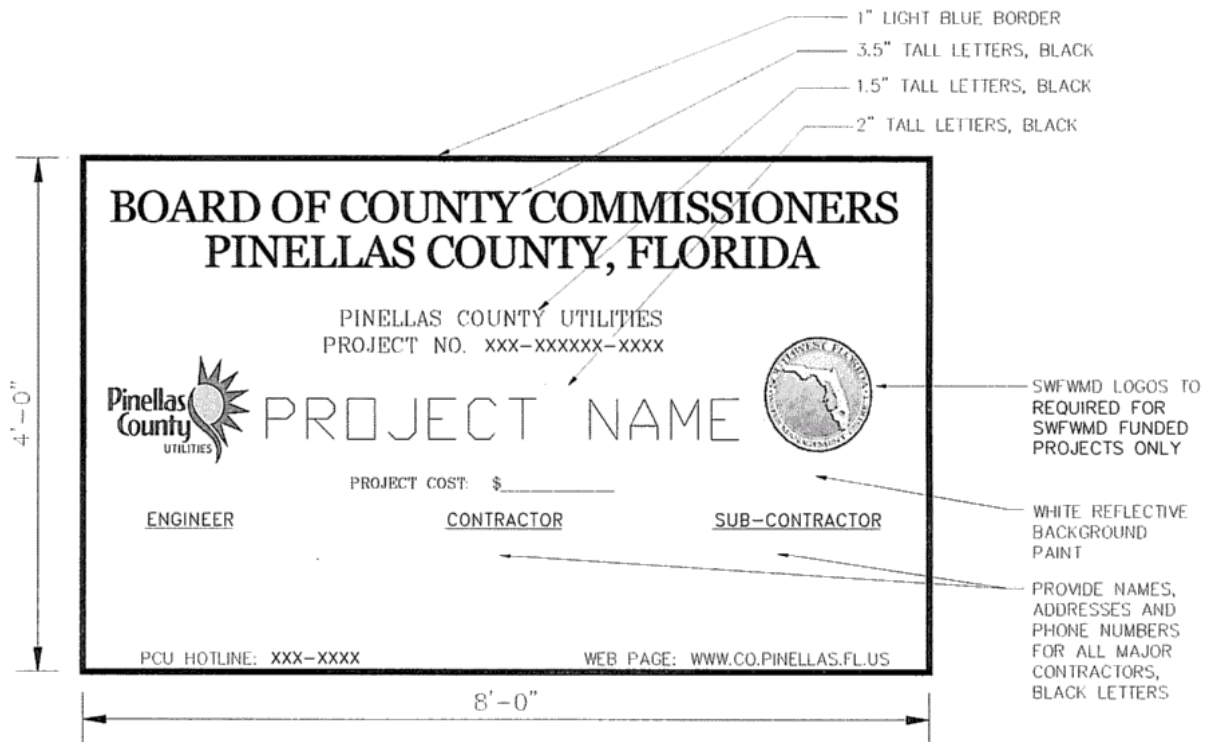
- 8
9 A. Furnish, install and maintain project identification sign on Pinellas County
10 Projects.
11
12 B. Remove sign on completion of construction.

13
14 1.02 PROJECT IDENTIFICATION SIGNS

- 15
16 A. Signs shall be not less than thirty-two (32) square feet in area, with
17 painted graphic content to include the following and as shown on the
18 following page:
19
20 1. Title of Project
21 2. Name of Owner
22 3. Names and titles of authorities as directed by County
23 4. Names and title of:
24 a. Engineer
25 b. Professional Consultants
26 5. Prime Contractor
27 6. Major subcontractors
28 7. Project Cost
29 8. PCU Web Page
30 9. County logo
31 10. Other logos subject to the requirements of the Project.
32
33 B. Graphic design, style of lettering and colors: As approved by the
34 Engineer, subject to the approval of the County.
35
36 C. Erect on the site at a lighted location of high public visibility, as approved
37 by the Engineer and the County.

38
39 1.03 QUALITY ASSURANCE

- 40
41 A. Sign Painter: Professional experience in type of work required.
42
43 B. Finishes, Painting: Adequate to resist weathering and fading for
44 scheduled construction period.



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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).

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- b. Prime: Painted trim and siding - white pigmented non-penetrating alkyd based primer applied at the rate of 3.0 mils dry film thickness.
 - c. Finish: Painted trim and face - apply two coats semi-gloss modified acrylic latex applied at a rate of at least 2.0 mils dry film thickness, per coat.
2. Steel
- a. Surface Preparation: Commercial blast according to the Steel Structures Painting Council Specifications SP-6.
 - b. Prime: One coat of a combination of lead chromate rust inhibitive and synthetic pigmented alkyd resins, minimum 1.5 mils dry film thickness. If shop coat is damaged, reprime base areas in field.
 - c. Finish: Two coats of semi-gloss medium to long oil alkyd resin coating, 1.5 mils dry film thickness per coat.
3. Use Bulletin colors for graphics.

PART 3 - EXECUTION

3.01 PROJECT IDENTIFICATION SIGN

- A. Paint exposed surfaces of supports, framing and surface material; one coat of primer and one coat of exterior paint.
- B. Paint graphics in styles, sizes and colors selected.

3.02 MAINTENANCE

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

3.03 REMOVAL

- A. Remove signs, framings, supports and foundations at completion of Project.

END OF SECTION

1 SECTION 01 78 39

2
3 PROJECT RECORD DOCUMENTS

4
5
6 PART 1 – GENERAL

7
8 1.01 REQUIREMENTS INCLUDED

- 9
10 A. Contractor shall maintain at the site one record copy of:
- 11 1. Drawings.
 - 12 2. Specifications.
 - 13 3. Addenda.
 - 14 4. Change Orders and other modifications to the Contract.
 - 15 5. Engineer's field orders or written instructions.
 - 16 6. Approved shop drawings, working drawings and samples.
 - 17 7. Field test records.
 - 18 8. Construction photographs.
 - 19 9. Detailed Progress Schedule.

20
21
22 1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- 23
24 A. Store documents and samples in Contractor's field office apart from
- 25 documents used for construction.
- 26
27 B. File documents and samples in accordance with CSI format.
- 28
29 C. Maintain documents in a clean, dry, legible, condition and in good order.
- 30 Do not use record documents for construction purposes.
- 31
32 D. Make documents and samples available at all times for review by the
- 33 Engineer and County.
- 34
35 E. As a prerequisite for monthly progress payments, the Contractor is to
- 36 exhibit the currently updated "record documents" for review by the
- 37 Engineer.

38
39 1.03 RECORDING

- 40
41 A. Label each document "PROJECT RECORD" in neat large printed letters.
- 42
43 B. Record information concurrently with construction progress. Do not
- 44 conceal any work until required information is recorded.
- 45
46 C. Drawings; Legibly mark to record actual construction:

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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.

- 1 3. Air release manhole (rim and bottom elevation and horizontal
2 location) i.e. ties to back of curb and nearest property corner or
3 permanent control point.
4 4. Detailed location of valves (horizontal), i.e., ties to back of curb
5 and nearest property corner or permanent control point.
6 5. Service connection locations for each designated meter.
7
8 B. All top of pipe elevations shall be accompanied by a finished grade
9 elevation at the same location.
10
11 C. Horizontal location of the pipe shall be defined using ties to back of curb
12 and nearest property corner, property line or permanent control point.
13
14 D. Should supplemental information be compiled or be available related to
15 the "As-Built" condition of the Project, the Contractor shall provide that
16 information, along with the "As-Built Record Drawing" documentation
17 outlined above, which is required under the terms of the contract. Such
18 supplemental information may include but not be limited to:
19
20 1. Length of pipe between fittings with depth every one hundred (100)
21 feet.
22 2. Elevation of top of pipe at grade changes.
23 3. Manufacturer of pipe.
24 4. Manufacturer, number of turns to open and depth of valves
25 5. Define location of transition point between differing pipe materials
26 6. Flow capacity of fire hydrants if such field information was obtained
27 during construction.
28

29 1.06 SPECIAL REQUIREMENTS FOR GRAVITY SEWER
30

- 31 A. In addition to that specified above, the following information shall be
32 provided on the Record Drawings:
33
34 1. Manhole rim and invert elevations (include pipe inverts).
35 2. Manhole horizontal location (i.e. ties to back of curb and nearest
36 property corner or permanent control point.)
37 3 Service laterals located from nearest down stream manhole
38 (indicate any laterals out of manholes).
39 4. Distance between manholes.
40 5. Size and material of all pipe.
41

42 1.07 SPECIAL REQUIREMENTS FOR WASTEWATER PUMP STATIONS
43

- 44 A. In addition to that specified above, the following information shall be
45 provided on the Record Drawings:
46

1 SECTION 03 10 01

2
3 CONCRETE MATERIALS

4
5
6 PART 1 - GENERAL

7
8 1.01 SCOPE OF WORK

- 9
10 A. The work shall include the furnishing of all materials, equipment and labor
11 required to construct all concrete work shown on the Drawings, or incidental to
12 the proper execution of the work.

13
14 1.02 RELATED SECTIONS

- 15
16 A. Section 32 13 01- Concrete Sidewalks, Driveways, and Gutters

17
18 1.03 DESIGN MIX

- 19
20 A. Prior to placing any concrete, the Contractor shall submit for the Engineer's
21 approval, a design mix, calculated by a recognized testing laboratory, and using
22 the approved aggregates to produce a workable mix of the desired strength,
23 together with certified copies of seven day and twenty-eight (28) day tests of
24 cylinders taken from concrete made according to the design mix. The mixes
25 shall be designed to secure concrete having a minimum compressive strength at
26 age twenty-eight (28) days as shown on the Plans or covered in other sections of
27 these Specifications.

28
29 PART 2 - PRODUCTS

30
31 2.01 CEMENT

- 32
33 A. Portland cement shall conform to the latest revision of Federal and/or ASTM
34 Specifications enumerated below:
35
36 1. For general concrete construction, ASTM designation C-150, Type I or
37 Type II, or Federal Specifications SS-C-192, Type I or II.
38
39 2. For construction of sewage treatment plant and pump station structures
40 Type II cement shall be used.
41
42 3. Slag cement shall conform to ASTM designation C-465.
43
44 4. Slag cement may be used in the maximum ratio of one part of slag
45 cement by weight to six parts of total cement by weight, if approval by the
46 Engineer, is obtained prior to use.

1 B. Concrete Bag Mix

- 2
- 3 1. Quickete 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 |

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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.

1
2 2.05 REINFORCEMENT
3

4 A. Reinforcing bars shall conform to the requirements of the latest revision of
5 Federal Specification QQ-S-632 and shall be as follows unless indicated
6 otherwise on the plans:
7

- 8 1. Bent: Type II (deformed), Class B40
9 2. Straight: Type II (deformed), Class B40
10 3. Column Ties: Type I (plain), Class B40
11

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

15 C. Reinforcing steel shall be detailed, fabricated and placed according to the
16 methods and standards recommended in the "Manual of Standard Practice
17 for Detailing Reinforced Concrete Structures" of the American Concrete
18 Institute.
19

20 2.06 JOINTS
21

22 A. Water Stops
23

- 24 1. Materials for stops shall be 1/8-inch steel plate welded into a
25 continuous strip, or an approved alternate material.
26

27 2.07 GROUTING AND PATCHING
28

29 A. Cement for use in grouting and patching shall be non-shrinking material free
30 of stain-causing agents and matching the adjacent concrete in appearance.
31

32 B. Bonding Agent: To be structural epoxy adhesive conforming to ASTM-C881
33 Type I & II, Grade 2, Class B & C with a minimum bond strength of 1900
34 psi.
35

36 PART 3 - EXECUTION
37

38 3.01 REINFORCING STEEL
39

40 A. The reinforcing fabricated to shapes and dimensions shown, shall be placed
41 where indicated on the Drawings. Before placing, all reinforcements shall be
42 thoroughly cleaned of rust, mill scale or coatings, which would reduce or
43 destroy the bond.
44

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

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

- 3
4 C. The concrete covering over steel reinforcement shall be as shown on the
5 Plans.
6

7
8
9 3.02 PROPORTIONING

- 10
11 A. All materials, except water, shall be proportioned into the mix by weight.
12 Water may be proportioned either by weight or volume.
13

- 14 B. Delivery tickets for transit mix concrete shall show the weight of cement of
15 each type incorporated in the batch.
16

- 17 C. Precise control of the proportions and amounts of all materials will be
18 required. Unauthorized changes in proportions, or addition of water, shall be
19 sufficient cause for rejection of the batch. The proportions of the approved
20 design mix may be changed only upon specific approval of the Engineer.
21 The use of admixture to improve workability will not be approved, unless
22 such admixture is a part of the design mix and the submitted design mix test
23 data. Only admixture of pozzolanic, cementitious or silicious nature will be
24 considered.
25

- 26 D. The amount of water used in the mix shall be kept at the minimum
27 necessary to produce concrete of a workable consistency. Consistency
28 shall be measured at the time of pouring by slump tests, when directed by
29 the Engineer. The slump shall fall within the following tabulated limits:
30

31 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 |

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43 3.03 MIXING AND PLACING

- 44
45 A. General
46

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

11
12 B. Time

13
14 1. The minimum time for mixing each batch after all materials are in the
15 mixer shall be one minute for 1/2 to 1 1/2 cubic yard mixers, and
16 1 1/2 minutes for mixers over 1 1/2 cubic yard capacity. The mixer
17 shall revolve at a uniform speed, a minimum of twelve (12)
18 revolutions after all materials have been placed therein.

19
20 2. Neither the speed, nor the volume capacity of the mixer, shall exceed
21 those recommended by the manufacturer. Excessive over-mixing,
22 requiring addition of water to preserve the consistency, will not be
23 permitted.

24
25 C. Placing

26
27 1. Concrete shall be placed before the initial set has occurred and in no
28 event after it has contained its water content for more than sixty (60)
29 minutes, unless documented by the testing laboratory justifying a
30 longer truck residence time without deleterious effect.

31
32 2. The concrete shall be compacted and worked in an approved manner
33 into all corners and angles of the forms and around reinforcement
34 and embedded fixtures in such a manner as to prevent segregation of
35 the coarse aggregate.

36
37 3. All concrete shall be placed with the aid of mechanical vibrating
38 equipment supplemented by hand forking or spading. Vibration shall
39 be transmitted directly to the concrete and not through the forms.
40 The duration of vibration at any location in the forms shall be held to
41 the minimum necessary to produce thorough consolidation.

42
43 4. The concrete shall be placed by suitable equipment as nearly as
44 possible to its final location and without any segregation of the
45 aggregate. Any free vertical drop shall not exceed three feet.

46

- 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.

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- 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

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- A. Should the concrete fail to conform to all the requirements of this Section, the Engineer may require the Contractor to remove the defective concrete and reconstruct the Work as directed.

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.

PAINTING AND PROTECTIVE COATINGS

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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.

PAINING AND PROTECTIVE COATINGS

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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

1 Contractor shall be certified in writing by the painting and
2 coating material manufacturers as qualified applicators of
3 their products with copies of the certification submitted to the
4 Engineer.
5

6 3. Product Data Sheets. Contractor shall submit paint and coatings
7 material manufacturers' printed technical data sheets for products
8 intended for use in each paint and coating system. Data sheets
9 shall fully describe material as to its intended use, makeup,
10 recommended surface preparation and application conditions,
11 primers, material mixing and application (including recommended
12 dry mil thickness recoat time), precautions, safety and maintenance
13 cleaning directions.
14

15 4. Material Safety Data Sheets. Material Safety Data Sheets (MSDS)
16 shall accompany all paint submittals and shall be prominently
17 displayed at the job site during all painting activities.
18

19 1.05 PROTECTION OF WORK
20

21 A. The Contractor shall be responsible for any and all damage to his work or
22 the work of others during the time his work is in progress.
23

24 1.06 EXTRA STOCK
25

26 A. One (1) gallon of each type and color of finish paint and coating used on
27 the project shall be provided as extra stock. Extra stock paint shall be
28 supplied in appropriate sealed containers and be clearly labeled as to
29 paint type, formula, and color.
30

31 1.07 RIGHT OF REJECTION
32

33 A. The Engineer shall have the right to reject all material or work that is
34 unsatisfactory, and require the replacement of either or both at the
35 expense of the Contractor.
36

37 1.08 ONE MANUFACTURER
38

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

PAINING AND PROTECTIVE COATINGS

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

Finish Coats - Series 104

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

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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

1 oil, curing compounds, and other deleterious compounds. In
2 general, the concrete shall be reasonably smooth and free of
3 pockets and cavities.
4

5 2. Allow new concrete to cure for 28 days. All surfaces shall be
6 cleaned by brush blasting (NACE #6 or SSPC-SP13). All surfaces
7 shall be completely dry before application of the coating.
8

9 3. For painting of existing structures, in addition to above, patch
10 concrete with non-shrink grout, repair cracks in concrete wall
11 surfaces by epoxy injection.
12

13 B. Application. Application shall be in strict conformance with the
14 manufacturer's printed recommendations. All coats shall be applied within
15 24 hours of the previous coat.
16

17 C. A prime coat is not required on concrete. Coating can be applied in one
18 or two coats. When applied in two coats each coat shall have a minimum
19 dry film thickness of 8 to 10 mils. The total system shall have a minimum
20 dry film thickness of 15 to 20 mils.
21

22 TNEMEC System: Primer – Not required
23 Intermediate Coat - Series 46H-413
24 Finish Coat I – Series 46H-413
25

26 2.09 ARCHITECTURAL PAINT FINISHES 27

28 A. Manufacture. Unless otherwise noted, products listed below are the
29 products of TNEMEC coatings. Approved equivalent products will be
30 acceptable.
31

32 B. Interior Finishes:
33

34 1. Interior Wet Concrete Surfaces (Non-Aggressive Areas)
35 Surface Preparation: Prefer SSPC-SP7: Brush off Blast Cleaning.
36 If brush off Blast Cleaning is not possible, a double acid etching is
37 recommended. Properly prepared surface should have a profile
38 similar to 100 grit sandpaper. A test patch is recommended when
39 applying epoxy coatings over old, existing coatings.
40

41 Materials:

42 Primer: TNEMEC Series 66 @ 3.0 - 5.0 mils
43 DFT 2nd Coat: TNEMEC Series 66 @ 4.0 - 6.0 mils DFT (optional)
44 Finish: TNEMEC Series 66 @ 4.0 - 6.0 mils DFT 11.0 - 17.0 mils
45 DFT
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2. Concrete Block Walls (Non-aggressive Environment)
Surface Preparation: Cure 14 days. Remove mortar spatter.
Surfaces must be clean and dry.

Materials:
Filler: TNEMEC Series 130 or 54-562 @ 80 SF/Gal
Finish Ct.: TNEMEC Series 113 or 114 @ 4.0 - 6.0 mils DFT
 3. Poured Concrete Walls (Non-aggressive Environment)
Surface Preparation: Cure for 28 days. All surfaces must be clean
and dry.

Materials:
Primer: TNEMEC Series 113 or 114 @ 4.0 - 6.0 mils DFT.
Finish: TNEMEC Series 113 or 114 @ 4.0 - 6.0 mils DFT.
- C. Concrete in aggressive areas (CBW)
1. Surface Preparation. Surfaces shall be cured for 28 days, clean,
dry and free from curing compounds, oil, grease, dirt or chalk.
 2. Filler. TNEMEC Series 54-660 (block walls only).
 3. Prime Coat. One coat of TNEMEC Series 66 applied at 5 mils
DFT.
 4. Finish Coats. Two coats of TNEMEC Series 66 applied at 5 mils
DFT per coat.
- D. Concrete Sealed (ECB). Huls Chem-Trete PB at a rate of between 50
and 100 sf/gal. Application shall be sufficient to guarantee complete
water repelling for five (5) years.
- E. Concrete Waterproof (CWP). One coat, minimum 2lbs. per square yard
of ThoroSeal by Thoro System Products or approved equal.
- 2.10 PATCH COAT FOR GALVANIZED SURFACES
- A. All galvanized surfaces which are scratched, marred, or otherwise
damaged shall be patched with TNEMEC Series 90-97 @ 2.5 - 3.5 mils
DFT.
- 2.11 PRIMER OVER BITUMINOUS COATING
- A. Two coats, TNEMEC Series 66, at 4 mils DFT each. Allow bituminous
coating to bleed through on first coat. Apply second coat, third coat shall
be per service condition schedule.

PAINTING AND PROTECTIVE COATINGS

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2.12 UNIVERSAL PRIMER

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

PART 3 - EXECUTION

3.01 MANUFACTURER'S RECOMMENDATIONS

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

3.02 DELIVERY AND STORAGE

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

3.03 SAFETY REQUIREMENTS

- A. In accordance with the requirements of applicable OSHA Regulations for Construction, the Contractor shall provide and require the use of personal protective equipment for all persons working in or about the project site.
- B. Respirators shall be worn by all persons engaged in, and assisting in, spray painting. In addition, workers engaged in or near the work during sandblasting shall wear eye and face protection devices meeting the requirements of A7NSI Z87.1 latest revisions, and approved OSHA Regulations for sand blasting operations and equipment including approved air-purifying, half-mask or mouthpiece respirator with appropriate filter.

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

1 delivered to the job site with any other shop coat shall either have this
2 coating removed or shall be recoated with "universal-primer", and the
3 specified coating applied in the field. Manufactured equipment with
4 approved corrosion resistant factory finishes and galvanized finishes shall
5 be exempt from this requirement.
6

7 B. Application of Field Coatings.
8

9 1. Except where in conflict with the manufacturer's printed
10 instructions, or where otherwise specified herein, the Contractor
11 may use brush, roller, air spray, or so-called airless spray
12 application; however, any spray painting must first have the
13 approval of the Engineer. Rollers for applying enamel shall have a
14 short nap. Areas inaccessible to spray coating or rolling shall be
15 coated by brushing or other suitable means.
16

17 2. The Contractor shall give special attention to the work to ensure
18 that edges, corners, crevices, welds, bolts, and other areas, as
19 determined by the Engineer, receive a film thickness at least
20 equivalent to that of adjacent coated surfaces.
21

22 3. All protective coating materials shall be applied in strict accordance
23 with the manufacturer's printed instructions.
24

25 4. Prime coat shall be applied to all clean surfaces within a four hour
26 period of the cleaning, and prior to deterioration or oxidation of the
27 surface, and in accordance with the manufacturer's
28 recommendations. Drift from sand-blasting procedures shall not be
29 allowed to settle on freshly painted surfaces.
30

31 5. All coatings shall be applied in dry and dust-free environment. No
32 coating or paint shall be applied when the surrounding air
33 temperature, measured in the shade, is below 40 degrees F. No
34 coating or paint shall be applied to wet or damp surfaces and shall
35 not be applied in rain, fog or mist, or when the relative humidity
36 exceeds 90 percent. No coating or paint shall be applied when it is
37 expected that the relative humidity will exceed 90 percent or that
38 the air temperature will drop below 40 degrees F within 8 hours
39 after the application of the coating or paint. Dew or moisture
40 condensation should be anticipated and if such conditions are
41 prevalent, coating or painting shall be delayed until mid-morning to
42 be certain that the surfaces are dry. The day's coating or painting
43 shall be completed well in advance of the probable time of day
44 when condensation will occur, in order to permit the film sufficient
45 drying time prior to the formation of moisture.
46

- 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

PAINTING AND PROTECTIVE COATINGS

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- A. Inspection Devices. The Contractor shall furnish, until final acceptance of coating and painting, inspection devices in good working condition for detection of holidays and measurement of dry-film thickness of coatings and paints. The Contractor shall also furnish U.S. department of Commerce, National Bureau of Standards certified thickness calibration plates to test accuracy of dry-film thickness gauge and certified instrumentation to test accuracy. Dry-film thickness gauges shall be made available for the Engineer's use at all times until final acceptance of application.

- B. The Contractor shall conduct film thickness measurements and electrical inspection of the coated surfaces with equipment furnished by him and shall recoat and repair as necessary for compliance with the Specifications.

- C. After repaired and recoated ferrous metals areas have cured, final inspection tests will be conducted by the Engineer with equipment provide by the Contractor. Coating thickness specified in mils on ferrous substrates will be measured with a nondestructive magnetic type dry-film thickness gage such as the Elecometer, manufactured by Gardner Laboratories, Inc. Discontinuities, voids, and pinholes in the coatings will be determined with a nondestructive type electrical holiday detector. Epoxy coatings and other thin film coatings will be checked for discontinuities and voids with a low voltage detector of the wet-sponge type, such as Model M1 as manufactured by Tinker and Razor. Use a non-sudsing type wetting agent, such as Kodak Photo-Flo, which shall be added to the water prior to wetting the sponge. A high voltage, low current, spark type detector such as Model EP, manufactured by Tinker and Razor, will be used for electrical inspection of only coal tar enamel. Tape type coatings will be inspected for holidays using a device designed for use in detecting such flaws. All pinholes shall be marked, repaired in accordance with the manufacture's printed recommendations and retested. No pinholes or other irregularities will be permitted. Film thickness discrepancies shall be measured and verified with a micrometer or other approved measuring instrument with 5 readings taken every 100 ft² of painted surface. Coatings not in compliance with the Specifications will not be acceptable and shall be replaced, and reinspected at Contractor's expense until the Specifications are met.

- D. On non-ferrous surfaces, dry film thickness readings shall be taken at random locations with a Tooke Gauge at the rate of approximately five readings per 100 square feet of surface. Grooves cut into coatings shall be repaired by application of all coats of paint or coating film being tested. The average of all readings for a given area or surface shall be within required dry film thickness range and no individual reading shall be more

PAINTING AND PROTECTIVE COATINGS

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.

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TABLE I

COATING SYSTEM SCHEDULE

Item

Service Condition

| | |
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| 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 2.01 MATERIALS
25
26 A. General
27
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

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

- 3
4 2. Material falling within the above Specification, encountered during
5 the excavation, may be stored in segregated stockpiles for reuse.
6 All material, which in the opinion of the Engineer, is not suitable for
7 reuse shall be spoiled as specified herein for disposal of unsuitable
8 materials.

9
10 C. Crushed Stone

- 11
12 1. Crushed stone for pipe bedding shall be FDOT No. 57 in
13 accordance with Section 901-2 of the FDOT Standard
14 Specifications for Road and Bridge Construction.

15
16 D. Select Fill

- 17
18 1. Select fill shall be noncohesive, non-plastic material free of all
19 debris, lumps or clods. Fill material shall be clean earth fill
20 composed of sand or an approved mixture of clay and sand.
21 Backfill material placed within one foot of piping and appurtenances
22 shall not contain any stones or rocks larger than two inches in
23 diameter, or three-quarter inch in diameter for PVC pipe.

24
25 PART 3 - EXECUTION

26
27 3.01 SAFETY PRECAUTIONS AND TEMPORARY WORKS

- 28
29 A. The Contractor shall provide and maintain adequate barricades, construction
30 signs, torches, flashers and guards as required in pedestrian and vehicular
31 traffic areas. All safety rules and regulations of local authorities shall be
32 observed. Local fire officials shall be kept advised of roads closed and roads
33 re-opened.
34
35 B. Where required, the Contractor shall provide suitable crossings at street
36 intersections and driveways, and supply such aid, as may be required for
37 pedestrians and motorists, including delivery vehicles, to safely negotiate the
38 construction area. "Street Closed to Through Traffic" signs and "Detour"
39 routes shall be indicated and maintained by the Contractor when the job is
40 located in a public or private street or way. In the case of dead end streets,
41 the Contractor shall advise all concerned residents and make all
42 arrangements to maintain reasonable ingress and egress for the residents.
43 Particular attention shall be given to residents in bad health, emergencies
44 and emergency vehicles. The Contractor shall be responsible for building
45 and maintaining all by-pass roadway areas and restoring those areas to their
46 original condition.
47 C. The Contractor shall furnish temporary or permanent support, adequate
48 protection and maintenance of all underground facilities and utilities

EXCAVATION AND BACKFILL FOR PIPES

1 encountered. Support, protection, maintenance and restoration are the
2 Contractor's responsibility at no additional cost to the County.
3

4 3.02 CLEARING AND GRUBBING
5

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

10 3.03 EXCAVATION
11

12 A. General
13

- 14 1. The Contractor shall perform all excavation of every description, and
15 of whatever substances encountered, to the depth indicated on the
16 Drawings, or as otherwise specified.
17
18 2. Trench excavation shall be such that the pipe can be laid to the
19 alignment and grade required. Trenches shall be shored and drained
20 in such a manner that work may proceed safely and efficiently.
21
22 3. Trench dewatering pumps shall discharge to natural drainage
23 channels, drains or sewers and shall be adequate to remove
24 accumulated storm and/or subsurface water. The Contractor shall
25 take necessary action to prevent surface water from flowing into the
26 trenches. It is the responsibility of the Contractor to assure that all
27 trench walls and trench bottoms are dry and remain dry during
28 pipeline construction.
29
30 4. The Contractor shall separate, remove and dispose of excavated
31 material not suitable for backfill, as directed by the Engineer.
32
33 5. All excavated material retained for backfill shall be piled in such a
34 manner as not to endanger the work or obstruct the sidewalks,
35 driveways or drainage. Fire hydrants, valve pit covers and hoses,
36 curb stop boxes, fire and police call boxes and other utility controls
37 shall be unobstructed and accessible at all times during construction.
38

39 B. Unclassified Excavation
40

- 41 1. Unclassified excavation shall include soil, clay, silt, sand, muck,
42 gravel, hardpan, loose shale, loose stones in masses and boulders
43 measuring less than one-half cubic yard in volume.
44

45 C. Classified Excavation
46
47

- 1 1. Classified excavation shall be rock further defined as follows:
2 boulders, measuring one-half cubic yard or more in volume, rock
3 material in ledges, bedded deposits and unstratified masses,
4 conglomerate deposits firmly cemented and concrete or masonry
5 structures, except sidewalks and paving, that in the opinion of the
6 Engineer required for its removal drilling and blasting, wedging,
7 sledging, barring or breaking up with a power operated hand tool.
8
9 2. No soft or disintegrated rock that can be removed with a hand pick or
10 power operated excavator or shovel, no loose, shaken, or previously
11 blasted rock or broken stone in rock fillings or elsewhere, and no rock
12 exterior to the minimum limits of measurement allowed, which may
13 fall into the excavation, will be considered as rock.
14

15 3.04 TRENCH PREPARATION

- 16
17 A. Unsupported trench width shall be limited to the minimum practicable width
18 allowing working space to place and compact the haunching material. The
19 maximum width shall be the pipe diameter plus one foot on each side of the
20 pipe at springline for pipe in unsupported trenches. In sheeted trenches the
21 width of trench between faces of the sheeting shall be adequate to allow the
22 pipe bedding and haunching to be placed and completed, and the sheeting
23 removed without disturbing the bedding and haunching material within two
24 pipe diameters on each side of the pipe. Trench boxes and moveable
25 sheeting shall be wide enough to allow moving without disturbing the
26 bedding and haunching within two pipe diameters on each side of the pipe.
27 Trench boxes and moveable sheeting shall be constructed and used in the
28 trench to avoid disturbing the piping, bedding and haunching when being
29 moved forward in the trench.
30
31 B. Dewatering of the trench bottom shall be accomplished using adequate
32 means to allow preparation of bedding, placement of haunching and pipe in
33 a trench environment without standing water. Dewatering shall continue
34 until sufficient backfill is placed above the pipe to prevent flotation.
35
36 C. The trench shall be dug so that the pipe can be laid to the alignment and
37 depth required, and it shall be excavated only so far in advance of the pipe
38 laying as allowed by the Engineer. The trench shall be so braced and
39 drained that the workmen may work in it safely and efficiently. All trench
40 preparation shall comply with all the latest applicable Local, State (Florida
41 Trench Safety Act) and Federal Regulations (OSHA: Safe Trench Act). It
42 is essential that the discharge of the trench dewatering pumps be
43 conducted to natural drainage channels, drains or storm sewers.
44
45 D. Bell holes shall be provided at each joint to permit the joint to be made
46 properly. Ledge rock, boulders and large stones shall be removed to

1 provide a clearance of six inches on all pipe twenty-four (24) inches and
2 smaller and nine inches on pipe larger than twenty-four (24) inches. If
3 such removal is required, backfilling will be done with selected material
4 approved by the Engineer and tamped to establish the proper grade.
5

6 E. Trench Bottom
7

8 1. Where the bottom of the trench at subgrade is found to be unstable
9 or to include ashes, cinders, refuse, vegetable or other organic
10 matter, or large pieces or fragments of inorganic material that, in
11 the judgment of the Engineer, should be removed, the Contractor
12 shall excavate and remove such unsuitable material to the width
13 and depth as directed by the Engineer. Before the pipe is laid, the
14 subgrade shall be made by backfilling with an approved material in
15 three inch uncompacted layers. The layers shall be thoroughly
16 tamped as specified by the Engineer to provide the uniform and
17 continuous bearing support as heretofore described.
18

19 2. The trench shall be dry when the bottom is prepared. The trench
20 bottom shall be excavated, or filled and compacted, as required to
21 bring it to grade and shaped to receive and support the pipe barrel. In
22 addition, bell holes shall be excavated so that after placement only
23 the barrel of the pipe receives bearing pressure from and is uniformly
24 supported by, the bottom of the trench. Preparation of the trench
25 bottom and placement of the pipe shall be such that the final position
26 of the pipe is true to line and grade, and uniformly supported
27 throughout the barrel of each length. When pipe is placed in refill
28 material, additional refill of the same material shall be tamped on
29 each side of the barrel to the springline, thus forming a trough of firm
30 bedding.
31

32 F. All materials that, in the opinion of the Engineer, are suitable for reuse in
33 restoring the disturbed surface shall be kept separated from the general
34 excavation material and can only be used as directed by the Engineer.
35

36 G. All excavated material shall be piled in a manner that will not endanger the
37 work and that will avoid obstructing sidewalks and driveways. Hydrants,
38 valve pit covers, valve boxes, curb stop boxes, fire and police call boxes,
39 or other utility controls shall be left unobstructed and accessible until the
40 work is completed. Gutters, drainage inlets, natural water courses and
41 miscellaneous drainage structures shall be kept clear or other satisfactory
42 provisions made for their proper operation.
43

44 H. Hand methods for excavation shall be employed when damage to existing
45 facilities is likely if heavy equipment is utilized or as directed by the
46 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

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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

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

- 3
4 3. Backfill testing shall be performed in accordance with Pinellas County
5 Minimum Testing Frequency Requirements, latest edition, unless
6 called out differently by the Engineer on the plan documents.
7

8 D. Testing of Backfill
9

- 10 1. Trenching within, or across roadways, or other areas to be paved, or
11 stabilized shall be backfilled and compacted to their full depth.
12 Compaction shall be as specified in the Special Provisions or on the
13 Plans.
14

- 15 2. Density tests for backfilled trenches within, or across roadways, shall
16 be performed as specified or as directed by the Engineer, with at
17 least one test taken at different locations for each vertical foot
18 beginning from two feet over pipe to ground level.
19

- 20 3. Backfill testing shall be performed in accordance with Pinellas County
21 Minimum Testing Frequency Requirements, latest edition, unless
22 called out differently by the Engineer on the plan documents.
23

- 24 4. Where unsatisfactory compaction is revealed by the test, the
25 Contractor shall re-excavate, backfill, re-compact and/or rework the
26 backfill as required, to obtain the required degree of compaction over
27 the entire depth of the trench.
28

- 29 5. Satisfactory backfill compaction is an integral part of pipe laying,
30 paving, and stabilizing. Satisfactory density reports shall be on file
31 before each Contractor's statement is submitted for payment.
32

33 E. Disturbance of Sewer Mains
34

- 35 1. Sewer mains shall be checked by the Contractor to determine
36 whether any displacement of the pipe has occurred after the trench
37 has been backfilled to two feet above the pipe. If such inspection
38 shows poor alignment, displaced pipe or any defects, these defects
39 shall be remedied to the satisfaction of the Engineer by the
40 Contractor at his expense.
41

42
43 3.07 DISPOSAL OF SURPLUS MATERIAL
44

- 45 A. All excavated material not required or not suitable for fill, or backfill, shall be
46 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

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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

EXCAVATION AND BACKFILL FOR STRUCTURES

- 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 |

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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

EXCAVATION AND BACKFILL FOR STRUCTURES

1 shall not contain stones larger than ten (10) inches in any
2 dimension, broken concrete, masonry, rubble or other such
3 materials. It shall have physical properties such that it can be
4 readily spread and compacted during filling.
5

- 6 2. Material falling within the above Specification, encountered during
7 the excavation, may be stored in segregated stockpiles for reuse.
8 All material which, in the opinion of the Engineer, is not suitable for
9 reuse shall be spoiled as specified herein for disposal of unsuitable
10 materials.
11

12 D. Crushed Stone

- 13
14 1. Crushed stone shall be used for a drainage layer below structures
15 with underdrains and at other locations indicated on the Drawings.
16
17 2. Crushed stone shall be size No. 57 with gradation as noted in Table
18 1, Section 901 of Department of Transportation, Construction of
19 Roads and Bridges.
20

21 2.02 UNSUITABLE MATERIAL

- 22
23 A. Highly organic soil ASTM D 2487 Group PT, topsoil, roots, vegetable
24 matter, trash and debris.
25

26 PART 3 – EXECUTION

27
28 3.01 SAFETY PRECAUTIONS AND TEMPORARY WORKS

- 29
30 A. The Contractor shall provide and maintain adequate barricades, construction
31 signs, torches, flashers and guards as required in pedestrian and vehicular
32 traffic areas. All safety rules and regulations of local authorities shall be
33 observed. Local fire officials shall be kept advised of roads closed and roads
34 re-opened.
35
36 B. Where required, the Contractor shall provide suitable crossings at street
37 intersections and driveways, and supply such aid, as may be required for
38 pedestrians and motorists, including delivery vehicles, to safely negotiate the
39 construction area. "Street Closed to Through Traffic" signs and "Detour"
40 routes shall be indicated and maintained by the Contractor when the job is
41 located in a public or private street or way. In the case of dead end streets,
42 the Contractor shall advise all concerned residents and make all
43 arrangements to maintain reasonable ingress and egress for the residents.
44 Particular attention shall be given to residents in bad health, emergencies
45 and emergency vehicles. The Contractor shall be responsible for building
46 and maintaining all by-pass roadway areas and restoring those areas to their
47 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

1 standby pumping units to serve the system in case of failure of the
2 normal pumping units.
3

- 4 4. Piping and boiling, or any form of uncontrolled seepage, in the
5 bottom or sides of the excavation shall be prevented at all times. If
6 for any reason the dewatering system is found to be inadequate to
7 meet the requirements set forth herein, the Contractor shall, at his
8 own expense, make such additions, changes and/or replacements
9 as necessary to provide a satisfactory dewatering system.
10

11 C. Control of Groundwater Level
12

- 13 1. Maintain the groundwater level at or below subgrade of the
14 structure until the concrete structures are up high enough to: (1)
15 prevent flooding the structure, (2) support both bottom and top
16 levels of walls, and (3) prevent flotation.
17
18 2. After the structure has been completed in its entirety, backfill as
19 described hereinafter.
20
21 3. Flotation shall be prevented by maintaining a positive and
22 continuous operation of the dewatering system. The Contractor
23 shall be fully responsible and liable for all damages which may
24 result from failure of this system.
25
26 4. Disposal of drainage water shall be in an area approved by the
27 Engineer. Precautions shall be taken to prevent the flow or
28 seepage of drainage back into the drainage area. Particular care
29 shall be taken to prevent the discharge of unsuitable drainage to a
30 water supply or surface water body.
31
32 5. Removal of the dewatering system shall be accomplished after the
33 dewatering system is no longer required.
34

35 3.04 EXCAVATION
36

37 A. General
38

- 39 1. The Contractor shall perform all excavation of every description, and
40 of whatever substances encountered, to the depth indicated on the
41 Drawings, or as otherwise specified.
42
43 2. Excavation shall be such that the structures can be installed at the
44 grades required. Excavations shall be shored and drained in such a
45 manner that work may proceed safely and efficiently.
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- 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

EXCAVATION AND BACKFILL FOR STRUCTURES

- 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 B. Material suitable for backfill is to be stockpiled on, or near site, until released
41 by the Engineer for disposal.
42

43 3.09 GRADING
44

- 45 A. Grading in preparation for placing of topsoil, planting areas, paved walks
46 and drives, and appurtenances shall be performed at all places that are
47 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

1 SECTION 32 12 01

2
3 STABILIZED AND ASPHALT ROADWAY RESTORATION

4
5 PART 1 – GENERAL

6
7 1.01 SCOPE OF WORK

- 8
9 A. Contractor shall furnish all labor and materials required to restore
10 stabilized roadways and asphalt paving as specified herein.
11
12 B. Workmanship and materials shall be in accordance with Department of
13 Transportation requirements for new pavement for roads under their
14 jurisdiction. Any local or County Road shall be restored in accordance
15 with permits or ordinances of the municipality having jurisdiction over such
16 road or street. Restoration of flexible pavement shall conform to the
17 approved permit or utility license for each road crossing.
18
19 C. Where applicable, all work shall conform to the Technical Specifications of
20 Florida Department of Transportation "Standard Specifications for Road
21 and Bridge Construction", latest edition (Divisions II and III) and "Roadway
22 and Traffic Design Standards", latest edition, including any amendments
23 thereto. The Contractor shall acquire his own copies of the Department of
24 Transportation Standards. In the event of conflict between the
25 Department of Transportation Standards and the Specifications listed in
26 these documents, the Engineer shall determine which shall govern.
27

28 1.02 SUBMITTALS

- 29
30 A. Shop drawings for the proposed materials of construction, including an
31 asphalt job mix formula, shall be submitted to the Engineer for approval at
32 least two weeks prior to the application of stabilized or paved surfaces.
33

34 PART 2 – PRODUCTS

35
36 2.01 SUBBASE

- 37
38 A. Materials used should be high bearing value soil, sand-clay, ground
39 limestone, crushed limerock, coquina, or any other material suitable for
40 stabilization. Muck shall not be used.
41

42 2.02 BASE

- 43
44 A. Limerock for use as base material shall meet the requirements of Florida
45 Department of Transportation Standard Specifications for Road and
46 Bridge Construction, Section 911. The limerock producer shall address

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- 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

1 processed. After thoroughly mixing to a uniform texture, the surface shall
2 be compacted by rolling with any type of equipment that will produce the
3 density required. Compaction shall continue until the entire depth to be
4 stabilized has a value determined from tests made on the 6-inch
5 compacted thickness, of not less than the requirements set forth by the
6 agency having jurisdiction over the road.
7

8 3.05 RESURFACING

- 9
- 10 A. When pavement replacement is complete, certain streets as directed by
11 the County, shall be resurfaced for the full width of the existing paved
12 section. Resurfacing shall be consistent with the requirements set forth by
13 the governmental agency that has jurisdiction over the road.
14
- 15 B. Materials for resurfacing shall be as specified on the Drawings.
16

17 3.06 SUBBASE PREPARATION

- 18
- 19 A. Prior to installation of base material, the area shall be graded to within
20 0.2± feet, and soft, spongy or mucky material removed. Sufficient
21 stabilizing material shall be cut in to achieve a Florida Bearing Value
22 (FBV) in excess of 75 psi or limerock bearing ratio (LBR) greater than forty
23 (40) pounds at a minimum density of ninety-eight (98) percent of a
24 maximum density as defined and measured in ASSTHO T-180 (Modified
25 Proctor), to a six inch minimum depth.
26
- 27 B. Density tests for subbase materials shall be taken at three hundred (300)
28 foot intervals in a staggered pattern and around structures as required. If
29 compaction procedures allow, testing requirements may be reduced or
30 increased at the Engineer's discretion.
31

32 3.07 BASE COURSE CONSTRUCTION

- 33
- 34 A. General
- 35
- 36 1. The base course shall be constructed on the prepared subgrade, in
37 accordance with the Specifications and Plans. All base material
38 shall be placed in accordance with the lines, grades, notes, and
39 typical cross sections shown on the Plans. Any deviation from the
40 Plans is subject to the approval of the Engineer. Any deviations not
41 approved by the Engineer shall be repaired to the satisfaction of the
42 Engineer at no expense to the County.
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B. Limerock, Reclaimed Asphalt or Crushed Concrete Base Course

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

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

6 C. Asphalt Base Course.

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

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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)

| | Arterial | Collector (Major/Minor) Commercial / Industrial | Residential Medium Traffic | Residential Light Traffic |
|---|--|--|---|---|
| Structural Coefficient | 4.17 | 3.28 | 3.06 | 2.46 |
| Asphalt Superpave Surface | 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) |
| Base (Compacted 98% of AASHTO T-180) | 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) |
| Sub-Base (Compacted 98% of AASHTO T-180) | 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) |
| Two Lane Roadway Pavement Width | 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

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END OF SECTION

1 SECTION 32 13 01

2
3 CONCRETE SIDEWALKS, DRIVEWAYS AND GUTTERS

4
5
6 PART 1 - GENERAL

7
8 1.01 SCOPE OF WORK

- 9
10 A. Contractor shall furnish all labor and materials required to restore and
11 construct concrete sidewalks, driveways and gutters as specified herein.

12
13 PART 2 – PRODUCTS

14
15 2.01 MATERIALS

- 16
17 A. Sidewalk shall be 3000 psi concrete, at least four feet wide, five feet wide
18 on arterial and collector streets, and four inches thick, except at
19 driveways. Driveway sidewalks shall be six inches thick with six inches by
20 six inches #10 wire mesh reinforcing.
21
22 B. Replacement of concrete driveways shall be in accordance with County
23 Standards (six inches, 3000 psi/28 day with 6 x 6 # 10 mesh from back of
24 curb to property line).
25
26 C. Curb and curb and gutter shall consist of 3000 psi/28 day concrete.
27
28 D. Expansion joints shall be installed between the back-of-curb and concrete
29 driveways, and between concrete driveways and sidewalks, where new
30 concrete abuts old concrete.

31
32 PART 3 – EXECUTION

33
34 3.01 CURB AND GUTTER

- 35
36 A. Curb or curb and gutter removal, where required in the construction of this
37 work, shall be held to a minimum. Curb and gutter material to be removed
38 shall be carefully separated from the trench excavation material and shall
39 be disposed of as directed. The Contractor shall replace all curb or curb
40 and gutter which has been removed. Curb and gutter shall be removed up
41 to the nearest regular joint on each side of the trench.
42
43 B. Curb or curb and gutter shall be replaced as soon as possible after the
44 backfill is placed and compacted and shall duplicate in all respects the
45 original construction. Workmanship shall be in accordance with the best
46 standard practices for this type of work. Curb and curb and gutter shall

CONCRETE SIDEWALKS, DRIVEWAYS AND GUTTERS

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

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

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

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

3.05 CAUSE FOR REJECTION

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

END OF SECTION

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.
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

45
46 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.
- 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 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

SANITARY SEWER CURED IN PLACE PIPELINING

- 1
2 A. Products and Installers seeking approval must meet all of the following
3 criteria to be deemed acceptable:
4
5 B. Acceptable products shall have a minimum of 500,000 linear feet (LF) of
6 documented acceptable wastewater installations in the United States.
7
8 C. The Contractor must have a minimum of three years experience with the
9 specific product and have installed a minimum of 150,000 L.F. of
10 documented acceptable wastewater installations in the State of Florida.
11
12 D. A client/reference list shall be supplied with the Bid, which shall include
13 the product utilized for the referenced installations along with the dates of
14 installation and the lineal footage of the individual installations.
15
16 E. Liner materials shall be as manufactured by Insituform of North America,
17 Inc., Superliner, National Liner or Engineer approved equal.
18

19 1.03 SUBMITTALS

- 20
21 A. The Contractor shall submit the following information:
22
23 1. Manufacturer's certification that the materials to be used meet the
24 referenced standards and these specifications.
25 2. License or certificate verifying Manufacture's/ Licensor's approval
26 of the installer.
27 3. Proposed equipment and procedures for accomplishing the work.
28 4. Lining Manufacturer's product data and instructions for resin and
29 catalyst system.
30 5. Design Calculations, in accordance with the Appendix of ASTM F-
31 1216, for each length of liner to be installed including the thickness
32 of each proposed CIPP. It will be acceptable for the Contractor to
33 submit a design for the most severe line condition and apply that
34 design to all of the line sections. To be completed and certified by
35 a Professional Engineer proficient in the design of pipeline systems.
36 All calculations shall include data that conforms to the requirements
37 of these specifications.
38 6. A detailed installation plan describing all preparation work, cleaning
39 operation, pre-closed circuit television (CCTV) inspections, bypass
40 pumping, traffic control, installation procedure, method of curing,
41 service reconnection, quality control, testing to be performed, final
42 CCTV inspection, and all else necessary and appropriate for a
43 complete CIPP liner installation.
44 7. Tube wet-out and cure method including: a complete description of
45 the proposed wet-out procedure, manufacturer's recommended
46 cure method- for each diameter and thickness of CIPP liner to be

1 installed, and detailed curing procedure detailing the curing medium
2 and the method of application.

3 8. A detailed installation schedule.

4 9. All MSDS sheets for all materials to be furnished for the project.

5
6 1.04 SUBSTITUTIONS

7
8 A. Only after execution of the contract will Engineer consider requests from
9 Contractor for substitutions. Substitutions will be considered only when a
10 product becomes unavailable due to no fault of Contractor.

11
12 B. Items identified as "equal" shall be accompanied by product literature and
13 a written itemized comparison of the published specifications (feature by
14 feature from the manufacturer's literature) for the item specified and for
15 the item proposed. The burden of proof of "equality" shall be on the
16 supplier.

17
18 C. Request constitutes a representation that Contractor:
19 1. Has investigated proposed product and determined that it meets or
20 exceeds, in all respects, specified product.
21 2. Will provide the same warranty for substitution as for specified
22 product.
23 3. Will coordinate installation and make other changes which may be
24 required for Work to be complete in all respects.
25 4. Waives claims for additional costs which may subsequently
26 become apparent.

27
28 D. Substitutions will not be considered when they are indicated or implied on
29 shop drawing or product data submittals without separate written request,
30 or when acceptance will require substantial revision of Contract
31 Documents.

32
33 E. Engineer will determine acceptability of proposed substitution, and will
34 notify Contractor of acceptance or rejection in writing within a reasonable
35 time.

36
37 PART 2 – PRODUCTS

38
39 2.01 CURED-IN-PLACE PIPE (CIPP) LINING

40
41 A. The liner material shall be an epoxy vinyl ester or polyester fiber felt resin-
42 impregnated tubing or Engineer approved equal, sized to tightly fit the
43 internal circumference and length of the designated gravity sewer. The
44 cured liner shall meet the minimum initial structural properties as listed in
45 ASTM F-1216. The liner shall be designed in accordance with the
46 Appendices in ASTM F-1216. It shall be assumed that a fully deteriorated

1 gravity sewer pipeline having no structural strength will be rehabilitated
 2 with H-20 traffic loading, the water table's at the ground surface and the
 3 product installed will have a minimum expected lifetime of fifty (50) years.
 4 In no case shall the liner thickness be less than 0.236 inches (6 mm) for
 5 pipe sizes eight inches through twelve (12) inches in diameter. Minimum
 6 liner thickness for pipes greater than eight inches shall be as specified by
 7 the Engineer. Liner shall be sized by Contractor to provide a tight fit to the
 8 inside circumference of the host pipe and shall be a continuous joint – less
 9 lining from manhole to manhole.

10
 11 B. Unless otherwise specified, the Contractor shall use an epoxy vinyl ester
 12 or polyester resin and catalyst system and a fiber felt tube compatible with
 13 the inversion or other approved alternate installation process and having
 14 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 |

15
 16
 17
 18
 19
 20
 21
 22
 23
 24
 25 C. The epoxy vinyl ester or polyester resin and fiber felt tubing system shall
 26 be in accordance with the requirements of ASTM F-1216 and be
 27 fabricated to a size that, when installed, will neatly fit the interior of the
 28 host pipe. Allowance shall be made for circumferential stretching during a
 29 direct (non-inversion) pull in. The CIPP product shall fit tightly to the host
 30 sewer pipe (with minimal shrinkage) in such a way as to minimize water
 31 migration (tracking) between the liner and the host pipe. A vacuum
 32 impregnation process shall be used in conjunction with a roller system to
 33 achieve a uniform distribution of the resin throughout the tube under
 34 controlled conditions. The volume shall be adjusted by adding five to ten
 35 (10) percent excess resin for the change in resin volume due to
 36 polymerization and to allow for any migration of resin into cracks or joints
 37 in the host pipe.

38
 39 D. The outside of the fabric tube shall be marked every 5 feet with the name
 40 of the manufacturer or CIPP system, manufacturing lot and production
 41 footage.

42
 43 2.02 CHEMICAL JOINT, CRACK AND ANNULAR SPACE SEALING MATERIALS
 44 FOR ACTIVE LEAKS AND SERVICE LATERAL CONNECTIONS
 45

- 1 A. Chemical joint and crack sealing materials used on this Project shall have
2 the following properties:
3
4 1. react quickly to form a permanent watertight seal;
5 2. resultant seal shall be flexible and immune to the effects of wet/dry
6 cycles;
7 3. non-biodegradable and immune to the effects of acids, alkalis, and
8 organics in sewage;
9 4. component packaging and mixing compatible with field conditions
10 and worker safety;
11 5. extraneous sealant left inside pipe shall be readily removable; and
12 shall be compatible with the repair resin utilized.
13
14 B. Chemical joint sealing material shall be acrylic resin type and shall be
15 furnished with activators, initiators, inhibitors and any other materials
16 recommended by the manufacturer for a complete grout system.
17
18 C. Sealing grout shall be furnished in liquid form in standard manufacturer's
19 containers. Sealing grout shall be as specified in the PCU Material
20 Specification Manual or Engineer approved equal.
21

22 PART 3 - EXECUTION

23 3.01 PUBLIC NOTIFICATION

- 24 A. All residences and businesses that may be affected by work performed in
25 the installation of CIPP liners shall be notified by delivery of a notification.
26 Notifications are to be delivered at least 72 hours before any work
27 commences at a site.
28
29
30
31 B. Notifications shall include the following: and explanation of the work to be
32 performed; when the work is anticipated to commence; where the work is
33 to be performed in reference to local streets; the name and office
34 telephone numbers of Contractor representatives; the nature of the
35 inconvenience(s) anticipated to be experienced by the resident/ business
36 owner; the anticipated duration of the work; that the work is being
37 performed on behalf of Pinellas County Utilities; and a PCU contact and
38 telephone number as provided by the County.
39
40 C. Information included in the notifications regarding Contractor
41 representatives shall include both the name and twenty-four (24) hour
42 telephone number of the Contractor's supervisor at the work site(s) and
43 the name and business telephone number of a Contractor representative
44 who is responsible for the administration of the project from the location of
45 the offices of the Contractor.
46

- 1 D. The proposed format of all correspondence from the Contractor, to the
2 public, shall be reviewed, and approved, by the Engineer or a Designee.
3
4 E. Complete public notification is to be the exclusive responsibility of the
5 Contractor.
6
7 F. Cost associated with public notifications shall be included in the contract
8 price of CIPP installation.
9

10 3.02 WASTEWATER FLOW CONTROL

- 11
12 A. The Contractor shall bypass sewage around the section of pipe being
13 lined by plugging the upstream manhole and discharging to a downstream
14 manhole. Bypass shall be set up to cause minimum disruption to
15 residents, commercial establishments and traffic. Pumps shall be of
16 sufficient capacity to accommodate daily peak flows and wet weather
17 flows.
18
19 B. Where lines to be rehabilitated are determined by the Engineer to be of a
20 critical nature and cannot be bypassed during normal work hours, lining
21 may have to be scheduled at low flow during nighttime hours.
22
23 C. If wastewater flow is minimal and lining can be installed in a timely
24 manner, bypass may not be required.
25
26 D. The Contractor shall make every effort possible to notify each customer
27 whose service is affected by the lining operation.
28
29 E. The Contractor shall be responsible for any back-up or any damage
30 caused by the lining process.
31

32 3.03 PRE-CLEANING AND TELEVISION INSPECTION

- 33
34 A. The Contractor shall clean and televise the assigned gravity sewer to be
35 rehabilitated prior to construction in accordance with specification
36 33 01 32 - Sanitary Sewer Cleaning and Televising. Only National
37 Association of Sewer Companies (NASSCO) Pipeline Assessment and
38 Certification Program (PACP) certified personnel trained in locating
39 breaks, obstacles and service connections by closed circuit television
40 using PACP certified software shall perform the inspection. The interior
41 surface of the pipeline shall be cleaned with high pressure water jet
42 equipment prior to receiving the new liner. All service locations and
43 obstructions, such as dropped joints and protruding services, shall be
44 noted on the inspection.
45

- 1 B. The Contractor shall notify the Engineer if any severe problems are
2 discovered during televising that would prohibit the installation of the liner.
3 If conditions such as broken pipe or major blockages are found that will
4 prevent proper cleaning, or where additional damage would occur if
5 cleaning is attempted or continued, the Contractor shall advise the
6 Engineer.
7
- 8 C. Any damage done by the Contractor to any existing sewer pipe or
9 structure by the Contractor will be immediately repaired to a condition
10 equal to or better than its original condition at the Contractor's expense.
11
- 12 D. Cost associated with pre-televising and cleaning shall be included in the
13 contract price of CIPP installation.
14

15 3.04 PROTRUDING SERVICE CONNECTIONS
16

- 17 A. Existing service connections that protrude into the main line shall be
18 removed to within one-quarter inch of the inside wall of the main line pipe
19 by means of robotic equipment. The protrusion shall be ground using
20 grinding tools specifically designed for that purpose. The finished product
21 shall be uniform and smooth to accept main line lining product and provide
22 a proper seal.
23

24 3.05 LINER INSERTION
25

- 26 A. Installation of CIPP shall proceed only after all necessary preparation has
27 been completed, including the following: all affected residences and
28 businesses have been notified in accordance with these specifications;
29 pre-installation cleaning and television inspection; implementation of
30 adequate flow control; and the placement of traffic control measures in
31 accordance with these specifications.
32
- 33 B. The Contractor shall obtain all field measurements required to properly
34 size the liner for installation. The proposed liner shall be sized to provide
35 for a tight fit to the inside circumference of the host pipe and extend
36 sufficiently from manhole to manhole. Liner shall be installed in strict
37 accordance with methods and requirements of ASTM F-1216 and of the
38 liner manufacturer. Liner shall be free of irregularities, pinholes, tears,
39 cracks, excessive wrinkling and sealed so as to eliminate any possibility of
40 infiltration at the manhole wall.
41
- 42 C. The Contractor shall notify the Engineer in a timely fashion if the lining
43 process is delayed and would continue to cause continued service
44 interruption to customers affected by the lining operation. In this situation,
45 the Contractor shall be responsible for taking steps necessary to

1 reconnect services or provide a bypass operation, satisfactory to the
2 Engineer, for the affected services.
3

4 D. Pressure requirements: Before the curing begins, the pressure required to
5 hold the flexible tube tight against the existing conduit, and the maximum
6 allowable pressure so as not to damage the tube, shall be specified by the
7 tube manufacture and provided to the County for each line segment.
8

9 E. Once the cure has started and dimpling for laterals is completed, the
10 required pressure shall be maintained until the cure has been completed.
11 Should the pressure deviate more than 2.3 ft. of water (1psi.) from the
12 required pressure, the installed tube shall be removed from the existing
13 conduit. A continuous log of pressure during cure shall be maintained and
14 submitted to the County for each lined segment.
15

16 F. Prior to installation and as recommended by the manufacturer remote
17 temperature gauges or sensors shall be placed inside the host pipe to
18 monitor the temperature during the cure cycle. Liner and/or host pipe
19 interface temperature shall be monitored and logged during curing of the
20 liner.
21

22 G. Curing shall be accomplished by utilizing the appropriate medium (water
23 or steam) in accordance with the manufacturer's recommended cure
24 schedule. The curing source or in and output temperatures shall be
25 monitored and logged during the cure cycles. The manufacturer's
26 recommended cure schedule shall be used for each line segment
27 installed.
28

29 H. The Contractor shall cool the CIPP in accordance with the approved
30 manufacturer's recommendations.
31

32 I. Temperatures and curing data shall be monitored and recorded, by the
33 Contractor, throughout the installation process to ensure that each phase
34 in achieved as approved in accordance with the CIPP System
35 manufacturer's recommendations.
36

37 J. The installed CIPP shall be continuous over the entire length of sewer line
38 section and be free from visual defects such as foreign inclusions, dry
39 spots, pinholes, major wrinkles and de-lamination.
40

41 K. Contractor shall submit an inversion and cure record report for each liner.
42 This record shall include location, from & to manhole numbers, direction of
43 inversion, date, time, pressure and temperature throughout the entire
44 inversion and curing process for each liner.
45

46 3.06 MANHOLE CONNECTIONS
47

- 1 A. A seal, consisting of a resin mixture or hydrophilic seal compatible with the
2 installed CIPP shall be applied at manhole walls in accordance with the
3 CIPP System manufacturer's recommendation.
4
- 5 B. Cost associated with manhole seals shall be included in the contract price
6 of CIPP installation.
7
8

9 3.07 SERVICE RECONNECTIONS
10

- 11 A. Service reconnections shall be completed as soon as possible upon
12 completion of the main line rehabilitation and with the approval of the
13 Engineer.
14
- 15 B. Re-connection shall be accomplished without excavation using a robotic
16 cutter. Cuts shall be neat and smooth with the service line opened to
17 ninety-five (95) percent of the inside diameter in order to prevent
18 blockages, and the bottom of both openings must match. The edges of
19 the opening shall not have pipe fragments or liner fragments, which may
20 obstruct flow or snag debris. All over-cut service connections will be
21 properly repaired to meet the requirements of these specifications.
22
- 23 C. In the event that service reinstatements result in openings that are greater
24 than 100 percent of the service connection opening, the Contractor shall
25 install a CIPP type repair, sufficiently in size to completely cover the over-
26 cut service connection. No additional compensation will be paid for the
27 repair of over-cut service connections.
28
- 29 D. All cuttings and coupons of pipe material resulting from service tap cutting
30 shall be recovered at the downstream manhole of the pipe rehabilitation
31 operation prior to leaving the site and putting the main line back in service.
32 Coupons may not be allowed to pass through the system.
33
- 34 E. The Contractor shall stop all visible service line leaks and seal each
35 service lateral connection to the new liner with a chemical sealant
36 compatible with liner material. The chemical sealant shall be injected by
37 the use of standard packer device and equipment to create a water tight
38 seal at each connection.
39
- 40 F. In the event reconnection within the pipe cannot be accomplished or
41 failure occurs during the reconnection process, the Contractor may be
42 permitted to excavate, at the Contractor's expense, and reconnect to the
43 existing main using an approved sewer saddle.
44
- 45 G. Due to the critical nature of service reconnection, the Contractor shall
46 keep backup robotic equipment on site to eliminate any delay to the

1 reactivation of service to customers. This specification shall also apply to
2 the Pay Item to grinding and sealing existing service openings on
3 previously lined pipe.
4

5 3.08 TRAFFIC CONTROL AND MAINTENANCE OF TRAFFIC
6

- 7 A. The Contractor shall implement a Maintenance of Traffic Plan in
8 accordance with specification 01 55 26- Traffic Regulation.
9

10 3.09 CIPP REPAIR/ REPLACEMENT
11

- 12 A. Occasionally installation will result in the need to repair or replace a
13 defective CIPP. The Contractor shall outline specific repair or
14 replacement procedures for potential defects that may occur in the
15 installed CIPP. Repair/replacement procedures shall be as recommended
16 by the CIPP system manufacturer and shall be submitted to the County.
17

- 18 B. Defects in the installed CIPP that will not affect the operation and long
19 term life of the product shall be identified and defined.
20

- 21 C. Repairable defects that may occur in the installed CIPP shall be
22 specifically defined by the Contractor based on manufacturer's
23 recommendations, including a detailed step-by-step repair procedure,
24 resulting in a finished product meeting the requirements of these contract
25 specifications.
26

- 27 D. Un-repairable defects that may occur to the CIPP shall be clearly defined
28 by the Contractor based on manufacturer's recommendations, including a
29 recommended procedure for the removal and replacement of the CIPP.
30

31 3.10 POST CLEANING AND TELEVISION INSPECTION/ FINAL ACCEPTANCE
32

- 33 A. Post cleaning and television inspection shall proceed only after all
34 necessary work and preparation has been completed, including the
35 following: installation on CIPP liner in accordance with specifications, all
36 services re-instated including grout sealing in accordance with these
37 specifications; pre-installation cleaning and television inspection;
38 implementation of adequate flow control; and the placement of traffic
39 control measures in accordance with these specifications.
40

- 41 B. The Contractor shall clean and televise the assigned gravity sewer after
42 rehabilitation in accordance with specification 33 01 32- Sanitary Sewer
43 Cleaning and Televising. Only NASSCO PACP certified personnel trained
44 in locating breaks, obstacles and service connections by closed circuit
45 television using PACP certified software shall perform the inspection. The
46 interior surface of the pipeline shall be cleaned with high pressure water

1 jet equipment immediately prior to conducting the post television
2 inspection. All service locations, gouges, cracks, bumps, bulges and
3 obstructions, such as dropped joints, shall be noted on the inspection.
4

5 C. In the case of bellies in the line, the pipe shall be cleared of any standing
6 water to provide continuous visibility during the post inspection.
7

8 D. The Contractor shall provide all inspections in digital PACP format
9 including printed inspection logs.
10

11 E. Cost associated with post-televising and cleaning shall be included in the
12 contract price of CIPP installation.
13

14 F. The finished liner shall be free of significant visual defects, damage,
15 deflection, holes, leaks and other defects.
16

17 G. 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
19 reviewed and accepted prior to the County accepting and processing
20 payment for that individual project. No partial payments will be made on
21 individual projects.
22

23 3.11 CLEANUP

24
25 A. Cleanup is an essential part of the Work. As the work progresses and is
26 completed, the Contractor shall clean the various sites of all operations
27 and completely restore all work areas to the satisfaction of the Engineer
28 and the County. This cleanup shall be done as promptly as practicable
29 and shall not be left until the end of the construction period. No part of the
30 Work shall be considered complete and no payment will be made until
31 cleanup is completed.
32

33 END OF SECTION
34

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 Utilities' (PCU) 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 ± 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

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

3
4 B. All necessary precautions are to be taken to protect the sewer lines from
5 damage resulting from the cleaning and inspection process.
6 Reimbursement for damage to the sewer infrastructure or damage or
7 flooding of private or public property, as a direct or indirect result of the
8 cleaning and inspection operation shall be the responsibility of the
9 Contractor.

10
11 C. Contractor shall be responsible for all permits required to perform
12 assigned Work.

13
14
15 D. Contractor shall obtain permission from the property owner whenever
16 access to manholes in easements and right-of-way is required for
17 equipment.

18
19
20 E. Cleaning and inspection work required includes, but not limited to the
21 following:

- 22
23
24 a. Field locating all manholes along the sewer pipes to be cleaned.
25 b. Maintaining and protecting both vehicular and pedestrian traffic, and
26 meeting all requirements of the County and all other government
27 agencies having jurisdiction.
28 c. Cleaning and inspecting existing sanitary sewer pipes and manholes,
29 as herein specified, and to record the inspection information in the
30 format identified by the County.
31 d. Disposal of waste, sediment and debris as specified herein.
32 e. Removal of roots, scale, and protrusions as specified herein.
33 f. Cleaning and restoring the work area as the work progresses and after
34 the completion of all work activities.
35 g. All other work required for the complete and satisfactory cleaning and
36 inspection of the pipeline and adjacent manholes.

37
38 3.04 CLEANING PROCEDURE

39
40 A. After determining and performing all preliminary requirements, Contractor
41 shall thoroughly clean assigned pipelines sufficiently to permit an
42 unrestricted inspection by closed circuit television. The Contractor shall
43 remove accumulated grease, roots, sand, rock, bricks, sludge and all
44 other debris that obstructs video inspection such that all portions of the
45 pipe being inspected will be clearly visible.
46

- 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

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- J. Contractor shall conform to the following requirements:
 - a. Cleaning of upstream reached of sewers shall be completed before the downstream reached are cleaned.
 - b. Hydraulic cleaning equipment shall be inserted in the downstream manhole of the reach and the work shall proceed upstream unless otherwise approved by the County.
- K. Any blockages of lateral building connections resulting from the cleaning or other items of work shall be removed by cleaning of the building connection by Contractor, at its own expense. Any damage caused by flooding of lateral building connections shall be corrected by Contractor, at its own expense.

3.05 WASTE DISPOSAL

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

3.06 CLOSE CURICUIT TELEVISION INSPECTION PROCEDURE

- A. The Contractor shall provide PCU with digital media that includes video and data base file that is compatible with Granite XP in NASSCO PACP format. Compatibility issues with software other than Granite XP latest version are the Contractor's responsibility.
- B. CCTV inspection shall be performed by NASSCO PACP certified operators who use NASSCO certified software that is compatible with 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 PCU inspector.
9 Measurement meters shall be accurate to one-tenth of a foot over the
10 entire length of the sewer line section being inspected. Otherwise, the
11 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

1 SECTION 33 01 33

2
3 MANHOLE REHABILITATION

4
5 PART 1 - GENERAL

6
7 1.01 SCOPE OF WORK

- 8
9 A. The intent of manhole repair is to provide a structurally sound and watertight
10 manhole in place of an existing deteriorated manhole.
11
12 B. Several types of manhole repair may be ordered: rebuilding, lining and
13 replacement. The Engineer may change the type of repair for a particular
14 manhole after visually inspecting the manhole.
15
16 C. Costs for traffic control shall be included in the work item in right-of-ways
17 with a County Functional Classification of Collector or less and locations not
18 requiring more than Standard Index 612.
19
20 D. Minor infiltration shall be considered as a part of manhole work effort. Very
21 active infiltration as determined by the Engineer shall be paid in a separate
22 Pay Item, if it is specifically included as a pay item in the Contract.
23

24 1.02 SUBMITTALS

- 25
26 A: All materials and procedures required to establish compliance with the
27 Specifications shall be submitted to the County/Engineer for
28 review/approval.
29
30 B. Submittals shall include at least the following:
31
32 1. Descriptive literature, bulletins and/or catalogs of materials.
33
34 2. Work procedures including flow diversion plan, method of repair,
35 etc.
36
37 3. Materials and method for repair of leaks or cracks in concrete
38 structure.
39
40 4. Final installation report on completed structures.
41

42 1.03 WARRANTY

- 43
44 A. Manufacturer shall warrant all calcium aluminate products against failure for a
45 period of ten (10) years, performing repairs to the damage and restore the
46 coating at no cost to the County within sixty (60) days after written notification

1 of the failure. For warranty requirements for other lining material refer to
2 specific liner system specification sections.
3

4 1.04 SUBSTITUTIONS 5

- 6 A. Only after execution of the contract will Engineer consider requests from
7 Contractor for substitutions. Substitutions will be considered only when a
8 product becomes unavailable due to no fault of Contractor.
9
- 10 B. Items identified as "equal" shall be accompanied by product literature and
11 a written itemized comparison of the published specifications (feature by
12 feature from the manufacturer's literature) for the item specified and for
13 the item proposed. The burden of proof of "equality" shall be on the
14 supplier.
15
- 16 C. Request constitutes a representation that Contractor:
17 1. Has investigated proposed product and determined that it meets or
18 exceeds, in all respects, specified product.
19 2. Will provide the same warranty for substitution as for specified
20 product.
21 3. Will coordinate installation and make other changes which may be
22 required for Work to be complete in all respects.
23 4. Waives claims for additional costs which may subsequently
24 become apparent.
25
- 26 D. Substitutions will not be considered when they are indicated or implied on
27 shop drawing or product data submittals without separate written request,
28 or when acceptance will require substantial revision of Contract
29 Documents.
30
- 31 E. Engineer will determine acceptability of proposed substitution, and will
32 notify Contractor of acceptance or rejection in writing within a reasonable
33 time.
34

35 PART 2 – PRODUCTS 36

37 2.01 PATCHING MATERIAL FOR MANHOLES 38

- 39 A. Manhole patching material shall be Strong-Seal, SewperCoat or Engineer
40 approved equal.
41
- 42 B. Active leaks shall be stopped using a rapid setting cementitious grout.
43 Some leaks may require weep holes to localize the infiltration during the
44 application after which the weep holes shall be plugged with rapid setting
45 mix prior to the final liner application. When severe infiltration is present,
46 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 or Engineer approved equal.
6

7 2.03 SPRAYED ON MANHOLE LINER
8

9 A. The coating to be applied shall be pure fused calcium aluminate mortar
10 with pure fused calcium aluminate aggregate equal to SewperCoat PG as
11 manufactured by Kerneos Aluminates Technologies, or Engineer
12 approved equal.
13

14 B. MINIMUM PHYSICAL/ MATERIAL PROPERTIES
15

| | 24 HRS | 7 DAYS | 28 DAYS |
|---|---------------|------------------------|----------------|
| 17 ASTM C 109 Compressive Strength, psi | >5,500 | >7,000 | >8,000 |
| 18 ASTM C 293 Flexural Strength, psi | >1,300 | >1,400 | >1,600 |
| 19 ASTM C 596 Shrinkage at 90% Humidity, % | < 0.04 | < 0.06 | < 0.08 |
| 20 ASTM C 666 Freeze-Thaw After 300 Cycles | | No Damage | |
| 21 ASTM C 496 Splitting Tensile Strength | | > 900 psi | |
| 22 ASTM C 882 Bond Strength by Slant Shear | | > 2,300 psi at 28 days | |
| 23 ASTM C 457 Air Void Content (7 Days) | | 2-4% | |
| 24 ASTM C 642 Specific Gravity/Absorption Test (7 Days) | | 3-5% | |
| 25 Static Modulus of Elasticity (24 hrs) | | 7.1 x 106 psi | |

26
27 2.04 FIBERGLASS LINER
28

29 A. Fiberglass Liners shall be specifically manufactured for sewer use as
30 specified in Material Specification Manual or Engineer approved equal.
31 These products shall meet all requirements of latest ASTM designation C-
32 582 (plastic laminates) and ASTM designation C-581 (chemical
33 resistance). The properly installed liners shall not fail under H-20 dynamic
34 wheel load applied vertically. Liner shall be installed in accordance with
35 manufacturer's requirements.
36

37 2.05 MULTI-COMPONENT STRESS PANEL LINER SYSTEM
38

39 A. Multi-component stress panel liner system shall be a SpectraShield liner
40 system as manufactured by CCI Spectrum, Inc. as specified in Section
41 33 01 35.
42

43 2.06 URETHANE/ EPOXY, POLYUREA LINER SYSTEM
44

45 A. Urethane/epoxy, polyurea liner system shall be a Green Monster liner
46 system as manufactured by GML Coatings as specified in Section 33 01
47 36.
48

1 2.07 POLYURETHANE LINER SYSTEM

- 2
3 A. Polyurethane liner system shall be a Spraywall liner system as
4 manufactured by Sprayroq as specified in Section 33 01 37.
5

6 PART 3 – EXECUTION

7
8 3.01 FIELD LAYOUT

- 9
10 A. The County supplied Atlas sheet, street address and other pertinent
11 information will identify the general location of the manhole. If there is any
12 question as to the general location described by the County, the Contractor
13 shall approach the Engineer and address the questions before beginning
14 with the excavation.
15

16 3.02 MANHOLE ADJUSTMENT

- 17
18 A. Manhole ring and covers found to be above or below grade shall be adjusted
19 by adding or removing rows of brick and mortar to meet the following
20 specifications:
21

22 1. The top of the cone shall be set between two and one-half inches and
23 fourteen and one-half (14 1/2) inches below the bottom of the
24 manhole cover frame. It is the intent of the specifications to provide a
25 minimum of two and one-half inches to accommodate future grade
26 changes without disturbing the manhole.
27

28 2. Where the distance between the bottom of the manhole cover frame
29 and the top of the cone is greater than fourteen and one-half (14 1/2)
30 inches, 12-inch riser units shall be used to bring the top of the cone to
31 within the limits specified.
32

33 3.03 MANHOLE REBUILDING

- 34
35 A. Manholes that have cracked rings, leaky risers or covers below grade may
36 be designated to be rebuilt. The rebuilding shall include all labor,
37 equipment, materials, including excavation and dewatering to accomplish
38 the following:
39

40 1. Removing existing manhole down to required elevation and rebuild
41 using brick or precast sections as directed by the Engineer.
42

43 2. The Contractor shall then install a new manhole ring and cover as
44 directed by the Engineer.
45
46

1 3.04 MANHOLE LINING

2
3 A. Manholes may be designated to receive a new fiberglass liner and reducer
4 cone. This lining will only be specified for forty-eight (48) inches in diameter
5 or larger manholes. Installation of fiberglass liners and reducer cones shall
6 include:

- 7
8 1. Excavation of an area sufficiently wide and deep for removal of the
9 old castings, mortar and brick riser and the existing manhole top
10 section.
11
12 2. The bottom of the manhole liner shall be cut to fit the existing
13 manhole base as closely as possible. Cutouts in manhole liner shall
14 be made to accommodate existing inlets, drops, and clean-outs.
15 Cuts should be precisely made with a power saw fitted with masonry-
16 type blade or with a special jigsaw. Fresh cut fiberglass shall receive
17 two coats of polyester resin to resist wicking.
18
19 3. The manhole liner shall be lowered into the existing brick or concrete
20 manhole and set into a quick-setting grout mixture. Good bottom seal
21 shall be obtained in order to prevent loss of grout from the annular
22 space between the outside of the manhole liner and the interior of the
23 old manhole. A six inch height of a quick-setting grout shall be
24 placed above the initial bottom seal in the annular space between the
25 manhole liner and the existing brick or concrete manhole to insure
26 adequacy of the bottom seal. The gap from drops, clean-outs
27 materials, and existing piping between the existing manhole wall and
28 the new manhole liner wall shall be bridged with short lengths of PVC
29 or other corrosion-resistant pipe approved by the County. Quick-
30 setting mortar shall be used to seal around all pipes.
31
32 4. The annular space between the manhole liner and existing brick or
33 concrete manhole shall be filled with a Portland cement and sand
34 grout. The grout shall be made with six bags of cement per cubic
35 yard of grout.
36
37 5. As directed by the Engineer, the new ring and cover shall be replaced
38 and finished to grade by constructing a chimney on the flat shoulder
39 of the manhole liner using brick and mortar or precast concrete rings.
40 In no case, shall the cast iron ring be placed directly on the manhole
41 liner. All new rings and covers will be furnished by the Contractor.
42

43 3.05 MANHOLE PATCHING AND LINING

44
45 A. This Section shall govern all work, materials and equipment required for
46 manhole rehabilitation for the purpose of eliminating infiltration, providing

1 corrosion protection, repair of voids and restoration of structural integrity of
2 the manhole, as a result of spray applying a monolithic fiber-reinforced
3 cementitious liner to the wall and bench surfaces of brick, concrete or any
4 other construction material.

5
6 B. The Applicator must be approved, trained and certified as having
7 successfully completed factory training. The Applicator/Contractor shall
8 furnish all labor, equipment and materials for applying the coating directly
9 to the contour of the manhole to form a structural cementitious liner of a
10 minimum of one-half inch thickness using a machine specially designed
11 for the application. All aspects of the installation shall be in accordance
12 with manufacturer's recommendations and shall include the elimination of
13 active infiltration prior to applying lining, the repair and sealing of inverts
14 and benches, the removal of any loose or unsound material and patching.

15
16 C. The manhole shall be prepared for coating by placing boards over inverts
17 to prevent extraneous material from entering the sewer lines and to
18 prevent up stream line from flooding the manhole. All foreign material
19 shall be removed from the manhole wall and bench using a high pressure
20 water spray (minimum 1,200 psi). Loose and protruding brick, mortar and
21 concrete shall be removed using a mason's hammer and chisel or
22 scraper.

23
24 D. Active leaks shall be stopped using a rapid setting cementitious grout
25 according to the manufacturer's recommendations. Some leaks may
26 require weep holes to localize the infiltration during the application after
27 which the weep holes shall be plugged with rapid setting mix prior to the
28 final liner application. When severe infiltration is present, drilling may be
29 required in order to pressure grout. Manufacturer's recommendations
30 shall be followed when pressure grouting is required.

31
32 E. Any bench, invert or service line repairs shall be made at this time using a
33 quick-setting mix and following the manufacturer's recommendations.

34
35 F. The surface, prior to spraying on the lining system, shall be damp without
36 noticeable free water droplets, or running water. Materials shall be
37 sprayed, applied to a minimum uniform thickness to insure that all cracks,
38 crevices and voids are filled and a somewhat smooth surface remains
39 after light troweling. The light troweling is performed to compact the
40 material into voids and to set the bond.

41
42 G. Not before the first application has begun to take an initial set
43 (disappearance of surface sheen which could be fifteen (15) minutes to
44 one hour depending upon ambient conditions) the second application
45 should be made to assure a minimum total finished thickness of one-half
46 inch. The surface shall then be troweled to a smooth finish being careful

1 not to over trowel, so as to bring additional water to the surface to weaken
2 it. A brush finish may be applied to the finished coat to remove trowel
3 marks. Manufacturer's recommendation shall be followed whenever more
4 than twenty-four (24) hours have elapsed between applications.
5

6 H. The wooden bench covers shall be removed and when the bench is
7 sprayed such that a gradual slope is produced from the walls to the invert
8 with the thickness at the edge of the invert being no less than one-half
9 inch. The wall-bench intersection shall be rounded to a uniform radius,
10 the circumference of the intersection.
11

12 I. For calcium aluminate mortar systems, curing should be implemented as
13 soon as the surface begins to harden and dry (as early as one hour after
14 application). Several layers of ASTM C-309 liquid membrane curing
15 compound or a 100%-humid moisture cure may be used.
16

17 3.06 TESTS

18 A. Procedure

19
20
21 1. Compressive strength tests shall be made by breaking 2-inch cube test
22 specimens prepared, cured and broken in accordance with the
23 American Society for Testing Materials Standard Method C-109, latest
24 version. Four specimen test cubes shall be taken from every fifty (50)
25 bags of product used or eight (8) manholes. One cube shall be broken
26 at seven days, the remainder at twenty-eight (28) days. Additional test
27 cubes may be ordered for changes in equipment or method, and under
28 adverse weather, or curing conditions.
29

30 B. Responsibility for Tests and Reports

31
32 1. The Contractor shall supply all cube molds, tools and labor for
33 preparing specimens.
34
35 2. The test cubes shall be tested in a recognized commercial testing
36 laboratory.
37

38 3.07 FINAL ACCEPTANCE

39
40 A. All completed manhole work will be inspected by the County. Any leaks or
41 cracks or defective workmanship shall be repaired to the satisfaction of
42 the Engineer at no cost to the County. Final acceptance will be granted
43 after surface restoration, if required, is complete.
44

45 END OF SECTION

1 SECTION 33 01 34

2
3 SANITARY SEWER PIPE REPAIRS

4
5 PART 1 - GENERAL

6
7 1.01 SCOPE OF WORK

- 8
9 A. The Contractor shall furnish all labor and materials to repair sanitary sewer
10 pipelines as specified herein.

11
12 PART 2 – PRODUCTS (NOT USED)

13
14 PART 3 – EXECUTION

15
16 3.01 GENERAL

- 17
18 A. The Contractor shall excavate and expose suspected damaged pipeline at
19 general locations described by the County. The pipeline shall be exposed
20 for visual inspection four feet on each side of the damaged area or as
21 directed by the County. The County may authorize replacing bad joint
22 materials (vitrified clay or concrete pipe) or removing and replacing the pipe.

- 23
24 B. Crushed stone shall be used in pipe bedding and to help stabilize trench
25 bottoms. Special attention shall be given to compacting the bedding
26 underneath the pipeline and its haunches.

- 27
28 C. Backfilling of repaired pipe shall proceed only in the presence of the
29 Inspector.

30
31 3.02 VITRIFIED CLAY PIPE REPAIRS

- 32
33 A. Repairs to VCP including cracked or crushed pipe, cracked bells, offset
34 joints, holes, etc. shall be accomplished by replacing a section of damaged
35 pipe with a piece of new C-900 PVC pipe. Such replacement shall be
36 performed in accordance with the clay pipe manufacturer's
37 recommendations. PVC repair sleeves shall be supplied by Contractor.

38
39 3.03 IRON PIPE REPAIRS

- 40
41 A. Repairs to iron pipe shall be accomplished using one of two methods

- 42
43 1. One method will consist of the application of an appropriate repair
44 sleeve. Refer to Material Specification Manual.

45

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
14 the Engineer, the Contractor will, at no cost to the County, re-
15 excavate, 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

1 SECTION 33 01 35

2
3 MULTI-COMPONENT STRESS PANEL LINER SYSTEM

4
5 PART 1 - GENERAL

6
7 1.01 SCOPE OF WORK

- 8
9 A. The Work described within details a complete program for application of multi-
10 component liner system coating to manholes, wet wells, junction chamber, or
11 other concrete structures. The completed system will provide a corrosion
12 resistant liner to prevent deterioration from hydrogen sulfide and other
13 corrosive gases/acids within the wastewater stream.

14
15 1.02 SUBMITTALS

16
17 A: All materials and procedures required to establish compliance with the
18 Specifications shall be submitted to the County/Engineer for
19 review/approval.

20
21 B. Submittals shall include at least the following:

- 22
23 1. Descriptive literature, bulletins and/or catalogs of materials.
24
25 2. Work procedures including flow diversion plan, method of repair,
26 etc.
27
28 3. Materials and method for repair of leaks or cracks in concrete
29 structure.
30
31 4. Final installation report on completed structures.

32
33 1.03 WARRANTY

34
35 A. Manufacturer shall warrant all coatings against failure for a period of ten (10)
36 years, performing repairs to the damage and restore the coating at no cost to
37 the County within sixty (60) days after written notification of the failure.

38
39 1.04 QUALITY ASSURANCE

40
41 A. The manufacturer and/or installer of the total liner system of concrete
42 structures shall be a company that specializes in the design, manufacture or
43 installation of corrosion protection systems for concrete structures including
44 manholes, wet wells, junction chambers, etc. Installer shall be completely
45 trained in leak repair, surface preparation and corrosion material application
46 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 B. Shall be a SpectraShield liner system as manufactured by CCI Spectrum,
9 Inc. or approved equal.
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

- 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

TYPICAL CHEMICAL ANALYSIS

"A" Component

Viscosity, 77 degrees F, cps., ASTM D-1638 -- 400
Physical State -- Liquid
Color -- Clear
Hygroscopicity -- Reacts with water

"B" Component

Viscosity, 160 degrees F, cps., ASTM D-1638 -- 400
Physical State -- Liquid
Color -- Flamingo Pink
Hygroscopicity -- 100%

Reaction Profile –

MULTI-COMPONENT STRESS PANEL LINER SYSTEM

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:

- 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

1 SECTION 33 01 36

2
3 URETHANE/ EPOXY, POLYUREA LINER SYSTEM

4
5 PART 1 - GENERAL

6
7 1.01 SCOPE OF WORK

- 8
9 A. The Work described within details a complete program for application of
10 urethane/epoxy, polyurea liner system coating to manholes, wet wells,
11 junction chamber, or other concrete structures. The completed system will
12 provide a corrosion resistant liner to prevent deterioration from hydrogen
13 sulfide and other corrosive gases/acids within the wastewater stream.

14
15 1.02 SUBMITTALS

16
17 A: All materials and procedures required to establish compliance with the
18 Specifications shall be submitted to the County/Engineer for
19 review/approval.

20
21 B. Submittals shall include at least the following:

- 22
23 1. Descriptive literature, bulletins and/or catalogs of materials.
24
25 2. Work procedures including flow diversion plan, method of repair,
26 etc.
27
28 3. Materials and method for repair of leaks or cracks in concrete
29 structure.
30
31 4. Final installation report on completed structures.

32
33 1.03 WARRANTY

34
35 A. Manufacturer shall warrant all coatings against failure for a period of ten (10)
36 years, performing repairs to the damage and restore the coating at no cost to
37 the County within sixty (60) days after written notification of the failure.

38
39 1.04 QUALITY ASSURANCE

40
41 A. The manufacturer and/or installer of the total liner system of concrete
42 structures shall be a company that specializes in the design, manufacture or
43 installation of corrosion protection systems for concrete structures including
44 manholes, wet wells, junction chambers, etc. Installer shall be completely
45 trained in leak repair, surface preparation and corrosion material application
46 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 B. Shall be a Green Monster liner system as manufactured by GML
9 Coatings, LLC or Engineer approved equal.
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

- 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. Shall use a system tested approved high early strength, non-corrosive,
16 cementitious concrete to rebuild the substrate profile and create a surface for
17 coating in concrete and masonry structures.
18
19 E. The lining system to be utilized for rehabilitate and protect concrete, steel,
20 fiberglass, or masonry structures shall be a multi-component, urethane/epoxy,
21 polyurea liner system as described below.
22
23 1. Liner system
24
25 a. Primer- Urethane/ epoxy polymer
26 b. Final corrosion barrier – Pure Polyurea
27
28 2. Primer shall be one hundred (100) percent solids.
29
30

31 **PRIMER TYPICAL PROPERTIES (1:1 BY VOL.)**

32

| | | |
|-------------------------------|------------|--------|
| 33 Tensile strength, PSI- | ASTM D638 | 4500 |
| 34 Elongation, %- | ASTM D638 | 6 |
| 35 Compressive Strength, neat | ASTM D695 | 3800 |
| 36 Compressive Strength, sand | ASTM D695 | 4450 |
| 37 Shrinkage | | none |
| 38 Exudation | | none |
| 39 Bond strength, psi | ASTM D4541 | 1200 |
| 40 Hardness, shore D | ASTM D2240 | 71 |
| 41 Solids content, % | | 89 |
| 42 Color | | amber |
| 43 Viscosity, cps, neat | | 25 |
| 44 VOC, g/l | | 2.3 |
| 45 Pot life @ 72° F | | 3 min |
| 46 Tack free @ 72° F | | 10 min |
| 47 Final cure @ 72° F | | 20 min |

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46

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

1 ordinances. Submit plan for bypass and maintenance of traffic to the
2 Engineer for approval prior to conducting the Work.
3
4

5 3.02 SURFACE PREPARATION
6

- 7 A. Abrasive blasting equipment shall remove all deteriorated concrete, hard
8 contaminants, localized micro-organisms, and gas contaminants, from the
9 walls, ceiling, benches, floors, pipes or other structures. Final product shall be
10 a cleaned, exposed and virgin concrete aggregate ready for rehabilitation
11 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 90 mils to an unlimited build thickness.
43
- 44 C. Provide final written report to County/Engineer detailing the location, date of
45 report, and description of repair.
46

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

1 SECTION 33 01 37

2
3 POLYURETHANE LINER SYSTEM

4
5 PART 1 - GENERAL

6
7 1.01 SCOPE OF WORK

- 8
9 A. The Work described within details a complete program for application of
10 polyurethane liner system coating to manholes, wet wells, junction chamber,
11 or other concrete structures. The completed system will provide a waterproof,
12 corrosion resistant liner to prevent deterioration from hydrogen sulfide and
13 other corrosive gases/acids within the wastewater stream. This liner system
14 shall restore structural integrity (over 500,000 psi flexural modulus) of brick/
15 concrete structures

16
17 1.02 SUBMITTALS

- 18
19 A: All materials and procedures required to establish compliance with the
20 Specifications shall be submitted to the County/Engineer for
21 review/approval.

- 22
23 B. Submittals shall include at least the following:

- 24
25 1. Descriptive literature, bulletins and/or catalogs of materials.
26
27 2. Work procedures including flow diversion plan, method of repair,
28 etc.
29
30 3. Materials and method for repair of leaks or cracks in concrete
31 structure.
32
33 4. Final installation report on completed structures.

34
35 1.03 WARRANTY

- 36
37 A. Manufacturer shall warrant all coatings against failure for a minimum period of
38 ten (10) years, performing repairs to the damage and restore the coating at
39 no cost to the County within sixty (60) days after written notification of the
40 failure.

41
42 1.04 QUALITY ASSURANCE

- 43
44 A. The manufacturer and/or installer of the total liner system of concrete
45 structures shall be a company that specializes in the design, manufacture or
46 installation of corrosion protection systems for concrete structures including

1 manholes, wet wells, junction chambers, etc. Installer shall be completely
2 trained in leak repair, surface preparation and corrosion material application
3 on concrete structures. Corrosion materials/products shall be suitable for
4 installation in a severe hydrogen sulfide environment without any deterioration
5 to the liner and shall completely prevent the breakdown of concrete surfaces.
6

7 B. To ensure total unit responsibility, all materials and installation thereof shall
8 be furnished and coordinated with/by one supplier/installer who turnkeys the
9 Work and assumes full responsibility for entire operation.
10

11 C. Shall be a Spay Wall liner system as manufactured by Sprayroq Protective
12 Lining Systems or Engineer approved equal.
13

14 1.05 SUBSTITUTIONS

15
16 A. Only after execution of the contract will Engineer consider requests from
17 Contractor for substitutions. Substitutions will be considered only when a
18 product becomes unavailable due to no fault of Contractor.
19

20 B. Items identified as "equal" shall be accompanied by product literature and
21 a written itemized comparison of the published specifications (feature by
22 feature from the manufacturer's literature) for the item specified and for
23 the item proposed. The burden of proof of "equality" shall be on the
24 supplier.
25

26 C. Request constitutes a representation that Contractor:
27 1. Has investigated proposed product and determined that it meets or
28 exceeds, in all respects, specified product.
29 2. Will provide the same warranty for substitution as for specified
30 product.
31 3. Will coordinate installation and make other changes which may be
32 required for Work to be complete in all respects.
33 4. Waives claims for additional costs which may subsequently
34 become apparent.
35

36 D. Substitutions will not be considered when they are indicated or implied on
37 shop drawing or product data submittals without separate written request,
38 or when acceptance will require substantial revision of Contract
39 Documents.
40

41 E. Engineer will determine acceptability of proposed substitution, and will
42 notify Contractor of acceptance or rejection in writing within a reasonable
43 time.
44

45 PART II – PRODUCTS

46

1 2.01 MATERIALS AND EQUIPMENT

2
3 A. The materials to be utilized in the lining of concrete structures shall be
4 designed and manufactured to withstand the severe effects of hydrogen
5 sulfide in a wastewater environment. Manufacturer of corrosion protection
6 products shall have long proven experience in the production of the coating
7 products utilized and shall have satisfactory installation record.

8
9 B. Abrasive blasting equipment shall be suited to completely remove
10 deteriorated concrete and hard contaminants from the existing concrete
11 surfaces. Containment unit to capture spent abrasive material shall be
12 provided unless otherwise approved by the County/Engineer.

13
14 C. Equipment for installation of lining materials shall be high quality grade and be
15 as recommended by the manufacturer.

16
17 D. The lining system to be utilized for rehabilitation of brick/ concrete structures
18 shall be a polyurethane liner system as described below.

19
20 1. Liner (Installation -- Liner)

21
22 a. Self-priming polyurethane

23
24 **MINIMUM PHYSICAL/ MATERIAL PROPERTIES**

| | | | |
|----|--|------------|--------------|
| 25 | | | |
| 26 | Flexural Modulus | ASTM D790 | 735,000 psi |
| 27 | Long Term Flexural Modulus of Elasticity | | |
| 28 | | ASTM D2990 | 529,000 psi |
| 29 | | | |
| 30 | Compressive Strength | ASTM D695 | 18,000 psi |
| 31 | Tensile strength | ASTM D638 | 7,450 psi |
| 32 | Tensile modulus | ASTM D638 | 425,000 psi |
| 33 | Elongation | ASTM D638 | 4% at break |
| 34 | Taber abrasion, | ASTM D4060 | 17.7 mg loss |
| 35 | CS 17 wheels | | |
| 36 | Hardness, shore D | ASTM D2240 | 90 |
| 37 | Density | | 87 lbs. /cf |

38
39 **ADHESION RESULTS:**

40 ASTM D-4541

41 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

1 SECTION 33 05 20

2
3 JACKING AND BORING

4
5 PART 1 - GENERAL

- 6
7 A. Special crossings shall be constructed in accordance with the details shown
8 on the plans, or as directed. All materials and workmanship shall be as
9 specified, herein.
10
11 B. The Contractor is responsible for verifying the location of all utilities in the
12 ground before commencing the jack and bore operation. No
13 compensation will be allowed for labor or materials for unused casing.
14 The Contractor will be responsible for all damage incurred to roadways or
15 utilities by his operation.
16

17 PART 2 - PRODUCTS

18
19 2.01 CASINGS

- 20
21 A. All casings shall be installed accurately to line and grade and shall meet all
22 requirements of the prevailing rights-of-way holder. Casings shall be new
23 and of domestic material and manufacture.
24
25 B. Pipe casing shall be welded steel. The pipe casing shall be steel and
26 conform to the requirements of AWWA Standard C-200 and ASTM A-139,
27 Grade B. The pipe shall be coated internally and externally with coal-tar
28 primer followed by a hot coal-tar enamel in accordance with AWWA
29 Standard C-203.
30
31 C. Joints shall be full penetration butt welded in accordance with the
32 requirements of AWWA Standard C-206. The joints shall be double groove
33 welded with continuous circumferential welds and field lined and coated in
34 accordance with AWWA C-203.
35
36 D. All casings shall be in conformance with the specifications as shown on the
37 plans and detail sheets.
38

39 2.02 CARRIER PIPE

- 40
41 A. All carrier pipe shall be Class 50 ductile iron pipe with joint restraints or fully
42 restrained PVC pipe.
43

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

1 SECTION 33 05 21

2 HORIZONTAL DIRECTIONAL DRILLING

3 STANDARD SMALL DIAMETER INSTALLATIONS

4
5
6
7 PART 1 - GENERAL

8
9
10
11 1.01 SCOPE OF WORK

- 12
13 A. The Work specified in this section consists of furnishing and installing
14 underground utilities using the horizontal directional drilling (HDD) method of
15 installation, also commonly referred to as directional boring or guided
16 horizontal boring. This Work shall include all services, equipment, materials,
17 and labor for the complete and proper installation, testing, restoration of
18 underground utilities and environmental protection and restoration.
19
20 B. Small Diameter Installation shall be defined as a HDD that the nominal
21 outside diameter of the product pipe is twelve (12) inches or less.

22
23 1.02 SUBMITTALS

- 24
25 A. Prior to beginning work, the Contractor must submit to the Engineer a Work
26 plan detailing the procedure and schedule to be used to execute the Project.
27 The Work plan should include a description of all equipment to be used,
28 down-hole tools, a list of personnel and their qualifications and experience
29 (including back-up personnel in the event that an individual is unavailable),
30 list of subcontractors, a schedule of work activity, a safety plan (including
31 MSDS of any potentially hazardous substances to be used), traffic control
32 plan (if applicable), an environmental protection plan and contingency plans
33 for possible problems. Work plan should be comprehensive, realistic and
34 based on actual working conditions for this particular Project. Plan should
35 document the thoughtful planning required to successfully complete the
36 Project.
37
38 B. The Contractor shall submit documentation that the proposed electrofusion
39 personnel have been certified by the pipe or electrofusion accessory
40 manufacturer.
41
42 C. All drilling fluids and loose cuttings shall be contained, no fluids shall be
43 allowed to enter any unapproved areas or natural waterways. Upon
44 completion of the directional drill project, all excess drilling fluid and material
45 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

1 outlined in this Specification. Adherence to the Specifications contained
2 herein, or the Engineer's approval of any aspect of any directional bore
3 operation covered by this Specification, shall in no way relieve the Contractor
4 of their ultimate responsibility for the satisfactory completion of the Work
5 authorized under the Contract.
6

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

10
11 **PART 2 - PRODUCTS**

12
13 **2.01 GENERAL**

- 14
15 A. Directional drilling equipment shall consist of a directional drilling rig of
16 sufficient capacity to perform the bore and pullback the pipe, a drilling fluid
17 mixing, delivery system of sufficient capacity to successfully complete the
18 crossing, a guidance system to accurately guide boring operations and
19 trained and competent personnel to operate the system. All equipment shall
20 be in good, safe operating condition with sufficient supplies, materials and
21 spare parts on hand to maintain the system in good working order for the
22 duration of this Project.

23
24 **2.02 PRODUCT PIPE, JOINTS AND FITTINGS**

25
26 **A. PIPE**

- 27
28 1. All product pipe to be installed by the HDD operation will be High
29 Density Polyethylene (HDPE), Restrained Joint PVC or Restrained
30 Joint Ductile Iron pipe.
- 31 2. Refer to material specifications for material requirements.
- 32 3. Refer to piping sections of this specification for pipe handling
33 requirements.

34
35 **B. FITTINGS**

- 36
37 1. Refer to material specifications for material requirements.

38
39 **C. DRILLING FLUID (MUD) SYSTEM**

- 40
41 1. Drilling fluid shall be composed of a carrier fluid (water) and drilling
42 fluid additives (bentonite and/or polymers). Bentonite is a naturally
43 occurring clay mineral (montmorillinite) that forms a mud when mixed
44 with water.

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41
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.

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

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

3
4 Rock, Clay - 60 sec.
5 Hard Clay - 40 sec.
6 Soft Clay - 45 sec.
7 Sandy Clay - 90 sec.

8
9 Stable Sand - 80 sec.
10 Loose Sand - 110 sec.
11 Wet Sand - 110 sec.

12
13 These viscosities may be varied to best fit the soil conditions encountered,
14 as approved by the Engineer.

15
16 C. Additives to drilling fluid such as drill soap, polymers, etc. shall be
17 "environmentally safe" and be approved for such usage. No diesel fuel will
18 be used.

19
20 D. The mud pumping system shall have a minimum capacity of 50 GPM and be
21 capable of delivering the drilling fluid at a constant minimum pressure of
22 1000 psi. The delivery system shall have filters in-line to prevent solids from
23 being pumped into the drill pipe. Connections between the pump and drill
24 pipe shall be leak-free. Used drilling fluid and drilling fluid spilled during
25 drilling operations shall be contained and properly disposed of. A berm, or
26 equivalent, shall be maintained around drill rigs, drilling fluid mixing system,
27 entry and exit pits and drilling fluid recycling system to prevent spills into the
28 surrounding environment. Pumps and or vacuum truck(s) of sufficient size
29 shall be in place to convey excess drilling fluid from containment areas to
30 storage and facilities.

31
32 2.06 OTHER EQUIPMENT

33
34 A. Pipe rollers shall be of sufficient size to fully support the weight of the pipe
35 while being hydro-tested and during pull-back operations. Sufficient number
36 of rollers shall be used to prevent excess sagging of pipe. Rollers shall be
37 used as necessary to assist in pull back operations and in layout/fusing of
38 material.

39
40 B. Hydraulic or pneumatic pipe rammers may only be used if necessary and
41 with the authorization of Engineer.

42
43 C. Other devices or utility placement systems for providing horizontal thrust
44 other than those previously defined in the preceding sections shall not be
45 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
STANDARD SMALL DIAMETER INSTALLATIONS

1 utilized in this phase shall be determined by the types of subsurface soil
2 conditions that have been encountered during the pilot hole drilling operation.
3 The reamer type shall be at the Contractor's discretion with the final hole
4 diameter being a maximum of twenty (20) percent larger than the outside
5 diameter of the product pipe being installed in the borehole.
6

7 I. The open borehole may be stabilized by means of bentonite drilling slurry
8 pumped through the inside diameter of the drill pipe and through openings in
9 the reamer. The slurry will also serve as an agent to carry the loose cuttings
10 to the surface through the annulus of the borehole. These cuttings and
11 bentonite slurry are to be contained at the exit hole or entry side of the
12 directional bore in pits or holding tanks. The slurry may be recycled at this
13 time for reuse in the hole opening operation or it shall be hauled by the
14 Contractor to an approved dump site and properly disposed. A complete list
15 of all drilling fluid additives and mixtures to be used in the directional
16 operation will be submitted to the Engineer along with their respective
17 material safety data sheets.
18

19 J. In the event that pipe becomes stuck, Contractor shall notify Engineer.
20 Engineer, Contractor, and/or the maintaining agency shall discuss options
21 and then work will proceed accordingly.
22

23 K. Excess pipe shall be removed and the bore hole associated with this excess
24 pipe shall be filled with flowable fill or grout, unless the area of the excess
25 pipe is excavated and backfilled as part of the tie-in operations.
26

27 3.04 PIPE TESTING
28

29 A. Following successful pull-back of pipe, Contractor shall test pipe as required
30 in Section 01 45 17, Pipeline Testing Requirements.
31

32 3.05 SITE RESTORATION
33

34 A. Following drilling operations, Contractor will demobilize equipment and
35 restore the work-site to original condition. Any noticeable surface defects
36 due to the drilling operation shall be repaired by Contractor.
37

38 3.06 RECORD KEEPING
39

40 A. Contractor shall maintain a daily project log of drilling operations and a
41 guidance system log with a copy given to Engineer at completion of boring.
42 As-built drawings shall be certified as to accuracy by Contractor as required
43 in Section 01 78 39.
44

45 END OF SECTION

1 SECTION 33 05 22

2
3 HORIZONTAL DIRECTIONAL DRILLING

4
5 SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

6
7 PART 1-GENERAL

8
9 1.01 DESCRIPTION OF REQUIREMENTS

- 10
11 A. This specification covers the installation of pipe by horizontal directional
12 drilling (HDD). HDD is a trenchless excavation method that is
13 accomplished in three phases. The first phase consists of drilling a small
14 diameter pilot hole along a designed directional path. The second phase
15 consists of enlarging the pilot hole to a diameter suitable for installation of
16 the pipe. The third phase consists of pulling the product pipe into the
17 enlarged hole. HDD is accomplished using a specialized horizontal drilling
18 rig with ancillary tools, equipment and borehole stabilizing drilling fluids.
19
20 B. The Contractor shall provide all necessary labor, tools, materials and
21 equipment to successfully complete the installation of directionally drilled
22 piping as specified herein and to the lines and grades shown on the
23 Contract Drawings. The Contractor shall be responsible for the final
24 constructed product, and for furnishing the qualified labor and
25 superintendence necessary for this method of construction.
26
27 C. The drilling operations shall use techniques of creating or directing a
28 borehole along a predetermined path to a specified target location. Use
29 of down-hole steering tools to change the boring course and monitoring
30 instrumentation to locate and orient the boring along a predetermined
31 course is required.
32
33 D. The mobile drilling system shall utilize a jetting drill bit and/or drill bit with
34 mud motor to drill and circulate cuttings and spoil from the borehole.
35
36 E. Steering shall be accomplished through the use of an articulated section
37 of drill collar that causes an angular offset resulting in the drill bit being off-
38 center. When steering adjustments are required, as dictated by down hole
39 guidance monitoring equipment, the bit is rotated toward the desired
40 direction of travel and the drill pipe and bit are advanced forward without
41 rotation.
42

43 1.02 DEFINITIONS

- 44
45 A. Contractor's Construction Drawings. Shall be defined as drawings by
46 which the Contractor proposes to construct, operate, build, etc., the

HORIZONTAL DIRECTIONAL DRILLING

SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

1 referenced item. The submission of these drawings shall be required for
2 the sole purpose of providing sufficient details to verify that the
3 Contractor's work progress is in accordance with the intent of the design.
4 When required, such drawings will have been previously reviewed and
5 sealed by a qualified professional engineer registered in the State of
6 Florida.
7

8 B. Subaqueous Crossings shall be defined as a HDD that crosses under a
9 body of water greater than 50 feet across.
10

11 C. Large Diameter Installation shall be defined as a HDD that the nominal
12 outside diameter of the product pipe is greater than twelve (12) inches.
13

14 1.03 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

15
16 A. American Association of State Highway and Transportation Officials
17 (AASHTO).
18

19 B. Occupational Safety and Health Administration (OSHA).
20
21

22 C. API Specifications 13A, 1993. Specification for Drilling Fluid Materials,
23 Fifteenth Edition, Dallas, Texas. American Petroleum Institute.
24

25 D. API Recommended Practice 13B-1, 1990. Standard Procedures for Field
26 Testing Water-Based Drilling Fluids, First Edition, Dallas, Texas, American
27 Petroleum Institute.
28

29 E. API Bulletin 13D, 1985. Bulletin on the Rheology of Oil-Well Drilling
30 Fluids, Second Edition, Dallas, Texas, American Petroleum Institute.
31

32 F. Horizontal Directional Drilling Good Practices Guidelines, HDD Industry
33 Consortium, 300pp, 2nd ed., 2004.
34

35 G. IADC Drilling Manual, 1992. Eleventh Edition, Houston, Texas,
36 International Association of Drilling Contractors.
37

38 H. Installation of Pipelines by Horizontal Directional Drilling, Pipeline
39 Research Committee, American Gas Association, PR-227-9424, April
40 1995.
41

42 I. Installation of Pipelines Beneath Levees Using Horizontal Directional
43 Drilling, US Army Corps of Engineers, Waterways Experiment Station,
44 Final Report, CPAR-GL-98-1, April 1998.
45

1 J. Pressure Pipeline Design for Water and Wastewater, American Society for
2 Civil Engineers, 2nd ed., 1992

3
4 K. Tables for Hydraulic Design of Pipes and Sewers, American Society for
5 Civil Engineers, 5th 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 1) Entry and exit angle

43 2) Slant tangential sections

44 3) Radii of curvature
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HORIZONTAL DIRECTIONAL DRILLING
SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

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- 4) Cover
- 5) Borehole diameter

If the Contractor is planning on deviating from bid document HDD Profile, then the Contractor is required to submit additional drawings with the new HDD Profile for the engineer's approval.

The deviation drawings shall include a HDD Profile, plan view and cross-section. The Contractor is also recommended to submit deviation drawings for larger bores for site layout plans (Rig and Product Pipe Layout site) and pipeline stringing area (rollers).

- c. The Contractor shall provide anticipated drilling rates for pilot bore, reaming and pullback procedures. These drilling rates shall be used to calculate drilling fluid volumes required for pilot hole, each reaming pass and pullback. The contractor shall guarantee pump capacity and that the drilling fluid cleaning system is capable of sustaining the anticipated drilling rates during the pilot bore, reaming and pullback.
- d. The Contractor shall submit qualification documents for the HDD superintendent and key personnel experience in accordance with Section 1.06A and 1.06B. Also, the contractor shall have personnel with a Florida/OSHA Certification for the site Safety Representative.
- e. The Contractor shall submit a detailed schedule for the HDD installation at least fifteen (15) days prior to mobilization. The detail schedule shall identify all major construction activities and durations, with beginning and completion dates shown. The detail schedule shall be updated at least every two weeks or more frequently, as directed by the Engineer, and shall include but not limited to the following items:
 - 1) Pre-construction walk over and inspection.
 - 2) Regular Mobilization and set-up.
 - 3) Pilot bore

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- 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

1 created or no later than noon of the day following the shift for which the
2 records were taken.

- 3
- 4 1. Rate of Penetration
- 5 2. Rotation
- 6 3. Thrust
- 7 4. Pump Rates
- 8 5. Measured Depth
- 9 6. Annular Pressure
- 10 7. Flow Meter (Returns Suction Line)

11

12 G. The Contractor shall submit an as-built profile of the pilot bore within 24
13 hours of completion of the pilot bore.

14

15 H. The Contractor shall submit methods and procedures for filling the pipe
16 with fluid during pull back and testing.

17

18 I. A Frac-out and Surface Spill Contingency Plan shall be prepared for the
19 installation of pipelines using HDD. This plan shall be submitted to the
20 Engineer prior to construction. The Contractor shall submit a letter of
21 intent signed by an authorized representative of Contractor, confirming
22 that the plan will be followed. The contingency plan for inadvertent
23 returns/hydrofracture shall address all potential pathways for release of
24 drilling fluid, and shall address containment, cleanup, and mitigation
25 measures as well as reporting procedures and points of contact for
26 regulatory and permitting agencies. The Plan shall address releases to
27 the ground surface and to waterways. Stand-by equipment shall be
28 provided by the Contractor to recover fluids from the waterway via truck
29 and via boat. Floating turbidity barriers shall be part of the stand-by
30 equipment to minimize dispersion in the event that drilling fluids reach the
31 waterway.

32

33 J. Soil Separation Plant and Plans for Disposal:

- 34
- 35 1. The Contractor shall submit details on the pump and cleaning plant.
36 Include dimensions, manufacturer's specifications, pump capacity,
37 noise rating, and soundproofing details on the system.
- 38
- 39 2. Pump capacity should be specified for water at sea level elevation,
40 and adjusted for actual elevation and fluid viscosity.
- 41
- 42 3. Provide details on the generator, including dimensions, noise
43 ratings at twenty-five (25) feet, and soundproofing. Confirm that the
44 generator and other on-site equipment can be operated without
45 exceeding the maximum allowable noise tolerances specified in
46 permit, or "by Pinellas County Noise Ordinance."
- 47

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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SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

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- J. It shall be the Contractor's sole responsibility that all work is done in conformance with all applicable federal, state, and local safety requirements. Required safety equipment and procedures shall be employed by the Contractor at all times. All materials and methods of construction shall meet the applicable requirements of Pinellas County and the applicable requirements of the State of Florida Administrative Code.

- K. The pipe will be certified by the Contractor as meeting all requirements of the specifications. The product pipe will be pressure-tested by the Contractor prior to pull back when practical or as directed by the Engineer, and after installation is completed, in accordance with requirements specified by the Manufacturer.

- L. The Contractor shall allow the Engineer access to and shall furnish necessary assistance and cooperation to aid the Engineer in observations and data and sample collection, including, but not limited to the following:
 - 1. The Owner and Engineer shall have full access to the operator control container prior to, during, and following all HDD operations. This shall include, but not be limited to, providing visual access to real-time operator control screens, gauges, and indicators.

 - 2. The Owner and Engineer shall have full access to the slurry separation plant prior to, during and following all HDD operations. This shall include, but not be limited to, full access to shaker screens, hydrocyclones, conveyor belts, and slurry and spoil holding tanks. The Engineer shall be allowed to collect soil samples from the shaker screens and/or spoil holding tanks on the slurry separation plant a minimum of once per drill pipe section, and whenever changes in conditions are observed or suspected.

 - 3. Sound levels measured by the Engineer or Engineer's consultant shall not exceed 55 dBA 6 PM to 7 AM, or 60 dBA 7 AM to 6 PM, within five feet of the nearest occupied building. Contractor shall comply with all local noise ordinances if the local requirements are more stringent. Sound levels in excess of these values are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the County for excessive noise shall **not** relieve the Contractor of the other portions of this specification including, but not limited to, completion of all Work within specified contract time and contract price. The Contractor shall submit a plan prior to construction identifying all noise reduction/abatement procedures. The plan will be approved by the Engineer prior to construction.

- 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

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1 fluid pressures shall be measured at the entry point and at the drill head
2 and recorded at least twice per drill pipe length. These records shall be
3 maintained and provided daily to the Engineer. The position of the drill
4 head shall be continuously tracked and recorded by a downhole wireline
5 tracking locator system, and shall be supplemented by a "Tru-Tracker" or
6 equivalent tracking system installed that completely encompasses the
7 area between the entry point and the exit point. The coordinates of the
8 surface wire grid system shall be surveyed and recorded. A plot of actual
9 locations of the bore path shall be maintained and updated daily, or more
10 frequently, as directed by the Engineer.
11

12 D. Contractor shall provide at least seventy-two (72) hours advance written
13 notice to the Engineer of the planned inception of major drilling activities,
14 including pilot bore launch, pre-reaming, reaming, and product pipe
15 pullback. The Contractor shall immediately notify the Engineer, in writing,
16 when any significant problems are encountered or if ground conditions are
17 considered by the Contractor to be materially and significantly different
18 than those represented within the Contract Documents. The Contractor
19 shall perform the pilot bore in the presence of the Engineer, unless
20 Engineer grants prior written approval to perform such work in Engineer's
21 absence.
22

23 E. All surveying equipment used for downhole wireline surveying and
24 tracking of the bore path and drill head and layout of the surface wire grid
25 system for the "Tru-Tracker" or equivalent tracking system shall be
26 inspected and calibrated by the equipment manufacturer prior to use.
27 Proof of this inspection and calibration shall
28 be provided to the Engineer prior to the commencement of drilling
29 operations.
30

31 PART 2 – PRODUCTS

32 2.01 GENERAL

33
34 A. Directional drilling equipment shall consist of a directional drilling rig of
35 sufficient capacity, drilling rods, appropriate drill bit, reamer, product pipe,
36 drilling fluid, and additives, an adequate guidance system to accurately
37 guide the boring operations and trained and competent personnel to
38 operate the drilling system. All equipment shall be properly inspected to
39 assure good and safe operating condition with sufficient back-up
40 equipment in case of a failure.
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1
2 2.02 PRODUCT PIPE, JOINTS AND FITTINGS
3

4 A. PIPE
5

- 6 1. All product pipe to be installed by the HDD operation will be High
7 Density Polyethylene (HDPE), Restrained Joint PVC or Restrained
8 Joint Ductile Iron pipe.
9
10 2. Refer to material specifications for material requirements.
11
12 3. Refer to piping sections of this specification for pipe handling
13 requirements.
14

15 B. FITTINGS
16

- 17 1. Refer to material specifications for material requirements.
18

19 C. DRILLING FLUID (MUD) SYSTEM
20

- 21 1. Drilling fluid shall be composed of a carrier fluid (water) and drilling
22 fluid additives (bentonite and/or polymers). Bentonite is a naturally
23 occurring clay mineral (montmorillinite) that forms a mud when
24 mixed with water.
25
26 2. The composition of the drill fluid is determined by the results of
27 geological investigation executed in line with the framework of the
28 project planned before construction.
29
30 3. The principal functions of drilling fluids used in HDD are:
31
32 a. Transporting drill cuttings to the surface by suspending and
33 carrying them in the fluid stream flowing in the annulus
34 between the borehole wall and the drill
35 pipe/product.
36
37 b. Cleaning build-up on drill bits or reamer cutters by directing
38 fluid streams at the cutters.
39
40 c. Cooling the downhole tools and electronic equipment.
41
42 d. Lubricating to reduce the friction between the drill
43 pipe/product pipe and the borehole wall.
44
45 e. Stabilizing the borehole, especially in loose or soft soils by
46 building a low permeability filter cake, and exerting a positive
47 hydrostatic pressure against the borehole wall. The filter
48 cake along with positive hydrostatic pressure reduces

HORIZONTAL DIRECTIONAL DRILLING

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1 collapse of the borehole and prevents formation fluids (i.e.
2 groundwater) from flowing into the borehole or drilling fluids
3 from exiting the borehole into the formation (loss of
4 circulation).

5
6 f. The Contractor shall provide hydraulic power to the borehole
7 with a downhole mud motor.

8
9 g. The following fluid properties are to be tested and
10 considered to assure compatibility between the drilling fluid
11 mixture and the native soil after proper identification and
12 characterization. These fluid properties are density,
13 viscosity, pH – value, circulation, volume and solid content.

14
15 h. The drilling fluid pressures and flow rates shall be
16 continuously monitored and recorded by the Contractor at
17 the pump and within the annular space within thirty (30) feet
18 of the drilling head.

19
20 D. DRILL PIPE

21
22 The Contractor shall use high quality drill pipes. The drill pipe shall be
23 inspected periodically and properly maintained within the manufacturer's
24 prescribed limits.

25
26 The Contractor shall adhere to the manufacturer's guidelines for using
27 their pipe, and sound practices must be followed to ensure reduced risk of
28 downhole failure, i.e. the Contractor shall not bend the drill pipe sharper
29 than the minimum bend radius stated by the manufacturer, especially on
30 HDD enter and exit locations.

31
32 PART 3 - EXECUTION

33
34 3.01 GENERAL

35
36 A. Contractor shall contact Pinellas County Utilities at least forty-eight (48)
37 hours before each of the following activities: 1) the set up of a drill rig pit,
38 2) the start of the pilot bore, 3) the pull back of the product pipe. Upon
39 completion of the pilot hole phase of the operation, a complete set of as-
40 built records shall be submitted in duplicate to the Engineer. These
41 records shall include copies of the plan and profile drawing, as well as
42 directional readings recorded during the drilling operation.

43
44 B. The drawings show existing utilities that are believed to be near the
45 directional drill alignment. There is no guarantee that these utilities are
46 located as shown or that other utilities may not be present. The

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1 Contractor is to field locate existing utilities in advance of the work so as
2 not to delay work and avoid conflict or disruption of utility services.
3

4 C. The Contractor shall provide adequate control of surface water and drilling
5 fluids drainage and runoff, and provide silt fences and hay bales to
6 prevent surface water or drilling fluids from entering the adjacent
7 environmentally sensitive area.
8

9 D. The Contractor shall not initiate HDD until all submittals are received,
10 reviewed, and accepted by the Engineer.
11

12 E. The Contractor shall not initiate HDD until all required permits are
13 obtained.
14

15 3.02 PERSONNEL QUALIFICATIONS

16
17 A. Horizontal Directional Drilling is a complex operation and requires a high
18 standard of qualified personnel to execute the Work. The personnel
19 engaged in the execution of the work shall be carefully trained both in the
20 project management and the operation of HDD equipment.
21

22 B. The Contractor shall employ skilled, experienced superintendent(s),
23 drilling operators, safety specialist and competent support personnel.
24

25 C. The Contractor superintendent and drilling operators shall have at least
26 three years of demonstrated successful experience installing pipelines
27 using HDD process on at least three projects with similar diameters,
28 installation lengths and groundwater conditions.
29

30
31 D. The Contractor shall furnish evidence of successful use of wire line and
32 "Tru-Tracker" guidance and tracking systems on at least two similar
33 projects.
34

35 3.03 WORK STAGING AREA

36
37 A. The Contractor shall limit staging and work operations to the areas shown
38 on the Drawings, or as otherwise accepted in writing by the Engineer, for
39 storage of equipment and materials, parking, product pipe layout, drilling,
40 and other work.
41

42 B. The Contractor shall maintain the work area in a manner that shall
43 minimize adverse impacts on other public use activities. The Contractor
44 shall proceed with work in a safe, orderly manner, while maintaining the
45 work site free of debris and unnecessary equipment and materials.
46

- 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

HORIZONTAL DIRECTIONAL DRILLING SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

1 minimize erosion and contain any spillages or runoff. A vacuum
2 truck, shovels, brooms, buckets, and barrels shall be kept on-site to
3 facilitate containment and cleanup. A vacuum truck or trailer unit
4 shall be on standby and capable of responding within one hour to
5 any spill or inadvertent return incident.
6

7 2. The exit area shall have a drilling fluid pit for containing drilling
8 fluids and cuttings. Appropriate precautions and measures shall be
9 employed by the Contractor to prevent erosion, surface drainage,
10 and spillage of drilling fluids or other materials that could adversely
11 impact the environmental quality of the site. Hay bales or wattles
12 shall be used to line the exit area to minimize erosion and runoff.
13 Containment and cleanup equipment shall be available to contain
14 and clean up any surface spills and frac-outs.
15

16 3. Layout area shall be free of stones, wood, debris and obstructions.
17 A crane to lift pipe over driveways and entrances, etc. and pipe
18 rollers shall be provided by the Contractor to facilitate pipe pull
19 back.
20

21 3.05 HORIZONTAL DIRECTIONAL DRILLING

22

23 A. The capacity of the directional drilling system used by the Contractor shall
24 be adequate to install the specified pipeline.
25

26 B. The pump used by the Contractor shall be adequate to supply the required
27 flow rate and pressures at the anticipated drilling fluid viscosity at all times.
28 Drilling speeds shall not exceed pump capacity.
29

30 C. At all times during the pilot bore the Contractor shall provide and maintain
31 a bore tracking system that is capable of accurately locating the position of
32 the drill head in the x, y, and z axes. The Contractor shall record these
33 data at least twice per drill pipe length or every fifteen (15) feet, whichever
34 is more frequent.

35 1. Contractor shall monitor and record x, y, and z coordinates relative
36 to an established surface survey benchmark, from downhole survey
37 data using downhole wireline system. "Tru-Tracker" energized
38 surface grid, or equivalent, shall be installed and used to
39 supplement the wireline system. The "Tru-Tracker" grid shall
40 encompass the entire area of the bore including underwater across
41 the water. Alternatively, the Contractor may propose fixed "Tru-
42 Tracker" grids on land outside the waterway, supplemented by
43 moveable grids on floating templates that can be temporarily
44 anchored and surveyed while drilling the pilot hole. The moveable
45 template should be sufficiently large to encompass the active
46 drilling area for a two hour drilling period, and should be at least as

HORIZONTAL DIRECTIONAL DRILLING SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

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

HORIZONTAL DIRECTIONAL DRILLING
SUBAQUEOUS CROSSINGS AND LARGE DIAMETER INSTALLATIONS

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.
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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 (≥ 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

- 1 back to ensure that the pipe and tracer wires (if required) will be
2 installed without damage.
3
- 4 10. The pipe shall be **filled with water** as it enters the borehole to
5 reduce pull back loads and to ensure that adequate internal
6 pressure is maintained at all points to counter balance collapse
7 pressures.
8
- 9 11. The Contractor shall monitor and inspect pipe rollers and method
10 for suspending product pipe at exit pit during the pull back
11 operation to avoid damage to the pipe.
12
- 13 12. The Contractor shall cease pull back operations if the pipe is
14 damaged and shall remove the product pipe from the bore and
15 repair the pipe using the manufacturer's recommended procedure
16 or replace the damaged pipe before resuming installation.
17
- 18 13. Damage to the product pipe resulting from manufacturer defects,
19 installation, contact grouting, or grouting of the annulus is the
20 responsibility of the Contractor, including costs for replacement and
21 labor and materials. To confirm no damage to the pipe, upon
22 completion of pull back and grouting, the Contractor shall perform
23 the following test on the completed pipeline:
24
- 25 a. A sphere or pig, one inch less in diameter than the internal
26 diameter of the product pipe, which is capable of allowing
27 water to pass through it, complete with a pulling cable on
28 either side of sphere or pig, shall be pulled through the entire
29 length of the pipeline. If the pig or sphere cannot pass
30 through the pipe, it shall be considered collapsed and
31 damaged.
32
- 33 14. After the product pipe is completely pulled through the borehole, a
34 sufficient relaxation period, if recommended by the pipe
35 manufacturer, shall be provided before the final pipe tie-in.
36
- 37 15. The Contractor shall conduct a final hydrostatic test of the installed
38 pipeline. Final test shall be in accordance with the pipe
39 manufacturer's guidelines. The Contractor will repair any defects
40 discovered during this test, and repeat until the pipe passes the
41 test.
42
- 43 J. The Contractor shall notify the Engineer immediately in the event that any
44 obstruction is encountered that prevents further advancement of the drill
45 pipe, or pull back of the pre-reamer, reamer, and/or pipe. The Contractor
46 shall make all diligent and reasonable efforts to advance past the object by
47 drilling slowly through the object, pulling back, and drilling along a new

1 bore path that avoids the object, or excavating and exposing and removing
2 the object, and all other reasonable attempts to continue the bore. The
3 Contractor shall notify the Engineer of proposed measures to attempt to
4 advance past the object, prior to initiating the attempt. If the Contractor
5 attempts to pull back and re-drill, the Contractor shall adhere to line and
6 grade tolerances established in this specification section, unless the
7 Engineer approves variance, in writing, prior to the Contractor's attempt to
8 re-drill. The Contractor and Engineer shall investigate the cause and
9 together determine an appropriate response. Appropriate response may
10 include revisions to equipment or methods, retraction and re-drilling of a
11 portion of the borehole, or abandonment of the borehole. If abandonment
12 is deemed necessary, the Contractor shall recover, to the extent
13 practicable, any drill pipe, product pipe, and tools in the borehole, and
14 properly abandon the borehole by contact grouting, unless otherwise
15 directed in writing by the Engineer. If the borehole is abandoned, the
16 Contractor shall be allowed to begin a second attempt to install the
17 pipeline at an alternate location subject to approval, in writing, by the
18 Engineer. The Contractor shall take all reasonable actions to complete the
19 installation with minimal delays.

20
21 K. The Contractor shall remove all equipment, materials, drilling fluids, muck,
22 waste, and debris from the site and restore the site to its original condition
23 upon completion of the installation. Restoration and demobilization shall
24 be completed by the Contractor within seven days of the completion of the
25 pipeline installation.

26
27 L. The Contractor shall monitor for settlement or heave before and during
28 drilling and grouting operations.

29
30
31
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 PCU Inspector. Non-compliance will require excavation
11 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 PCU Inspector is
19 onsite to document that this guideline is fully complied with. The use of
20 fittings not shown on the "Contractor Copy" construction Plan must have
21 the prior concurrence of the PCU 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

- 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 locater
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

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- B. All water mains shall be laid and maintained at the required lines and grades with fittings, valves and appurtenances at the described locations. All pipe shall be laid to the depth as shown on the Plans, or when a depth is not 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 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.

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

1 test for at least one wire prior to final acceptance of the
2 pipeline. Any cuts or breaks in the wire shall be repaired by
3 the Contractor at his expense.
4

5 h. The locator wire shall be tested by the Contractor at the time
6 of pressure testing. If this test fails, the Contractor is
7 responsible for repairing the locator wire and the pressure
8 test will be reschedule when the wire will pass.
9

10 7. Tracer Wire for Long Side Services
11

12 a. Each long side service or any service over 40 feet shall have
13 one (1) 14-gauge minimum solid copper locator wire duct
14 taped to top center of pipe.
15

16 b. The locator wire shall have colored insulation matching the type
17 of service provided in the service and be acceptable for direct
18 burial.
19

20 c. All splices of the wire shall be made with watertight connections
21 per material specification manual.
22

23 d. The wire shall be continuous along the service line.
24

25 e. The locator wire shall have one end sealed off and buried within
26 12-inches of the connection to the main with the other end
27 stubbed off in the service box with enough slack provided to
28 extend 10 to 12-inches out of each service box.
29

30 8. Contractor shall perform a tone test on each long side service using
31 a wire and cable locator. The locator wire system shall pass the
32 tone test prior to final acceptance of the service line. Any cuts or
33 breaks in the wire shall be repaired by the Contractor at his
34 expense.
35

36
37
38 B. Pigging, Flushing and Cleaning
39

40 1. All mains shall be pigged, cleaned and flushed to remove all sand
41 and other foreign matter. The Contractor shall be responsible for
42 developing a pigging and flushing plan to be submitted to the
43 Project Representative for approval prior to pigging and flushing.
44 The Contractor shall dispose of all water used for pigging and for
45 flushing without causing a nuisance or property damage, in
46 accordance with state and local requirements. Any permits or fees

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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.

POTABLE WATER MAIN PIPING AND APPURTENANCES

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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.

1 3. After the pipe has been driven completely home and has been set
2 at grade the diaper should be slipped over the joint and fastened in
3 position by means of the steel strapping stitched into its edges. A
4 mix of 1:2 mortar grout of sufficiently liquid consistency to flow
5 easily is to be poured into the diaper and "rodded" or "puddled" to
6 insure complete filling of the recess. The Contractor shall use and
7 furnish approved equipment for mixing grout and shall use
8 approved equipment and methods to force the pipe home.
9

10 E. Jointing Push-On Ductile Iron, Steel and PVC Pipe
11

12 1. The inside of the bell and the outside of the spigot end shall be
13 thoroughly cleaned to remove dirt, grit, oil or excess coatings and
14 other foreign matter. The rubber gasket shall be flexed inward and
15 inserted in the gasket recess of the bell socket. A thin film of
16 gasket lubricant shall be applied to either the inside surface of the
17 gasket or the spigot ends, care will be taken to avoid contact with
18 the ground. The joint shall be completed by forcing the plain end to
19 the bottom of the socket with a forked tool or jacking device or other
20 approved method. All pipe shall have depth mark prior to insertion.
21 Pipe cut in the field shall be filed to resemble the spigot end of
22 manufactured pipe.
23

24 2. When deflection is required the joint shall be completed prior to
25 setting the deflection. The deflection shall conform to applicable
26 AWWA Standards or manufacturer's recommendation with prior
27 Engineer's approval.
28

29 F. Jointing Mechanical Joint Pipe and Fittings
30

31 1. The inside of the socket, the outside of the spigot end and the
32 gland shall be thoroughly cleaned and or washed with an approved
33 solution to remove dirt, grit, oil or excess coatings and foreign
34 matter to improve gasket seating. The gland shall then be placed
35 on the plain end of the pipe with the lip extension toward the plain
36 end, followed by the gasket with the narrow edge of the gasket
37 toward the plain end of the pipe. The pipe shall be inserted into the
38 socket and the gasket pressed firmly and evenly into the gasket
39 recess. The joint shall be kept straight during the assembly and
40 any deflection required shall be done after the joint has been
41 assembled but prior to tightening the bolts.
42

43 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 |

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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

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1 removing all dirt, oil, grit, excess coatings and foreign matter to
2 insure a tight joint.

3
4 3.05 REMOVAL OF OUT OF SERVICE PIPE

- 5
6 A. Due to certain permit requirements, pipe that is to be removed from
7 service will have to be physically taken out of the ground. The limits of
8 pipe to be removed shall be specifically called for in the Plans or shall be
9 approved in writing by the Engineer. Any other removal not specifically
10 called for, shall be considered incidental to construction of other items in
11 the Contract and the Contractor will not receive compensation for such
12 work.
13
14 B. When removing pipe the Contractor shall excavate a trench wide enough
15 to dislodge the pipe from the surrounding soil, and long enough to be able
16 to handle the pipe without causing any damage to nearby utilities,
17 structures or adjacent property.
18
19 C. The removed pipe, fitting and appurtenances will become the Contractor's
20 property and he shall be responsible for proper disposal and any required
21 permits thereof.
22
23 D. Refer to Specification 01 35 00, Special Project Procedures for removal of
24 asbestos cement (AC) pipe.
25

26 3.06 INSTALLATION OF PIPE UNDER DRIVEWAYS

- 27
28 A. At the Engineer's discretion the Contractor will be required to auger pipes
29 under driveways, structures or trees to avoid removal or expensive
30 restoration of those structures. The Contractor will be allowed to utilize an
31 auger machine and to push or pull the carrier pipe into the bore without
32 the need of a casing.
33
34 B. The Contractor shall install the water pipe within the bore hole on a line
35 and grade to allow connection to open cut piping adjacent to the bore hole
36 within pipe jointing alignment limits defined for the pipe in question. The
37 completed installation shall not result in settlement of soil under the
38 driveway.
39
40
41

42 3.07 INSTALLATION OF PIPE UNDER HIGHWAYS AND RAILROADS

- 43
44 A. The General Contractor shall furnish and install protective steel pipe
45 casings and/or carrier pipe under highways/railroads in the pipe size,
46 thickness, length, location and details as shown on the drawings and

POTABLE WATER MAIN PIPING AND APPURTENANCES

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1 specified herein. The Contractor's attention is particularly directed to the
2 requirements of the particular municipal or private owner or Department of
3 Public Works having jurisdiction over the highways/railroads whether
4 through permit, verbal or other directions.
5

6 B. The construction shall not be started until the necessary permits have
7 been obtained, a copy is at the job site, and proper notice and approval for
8 construction has been obtained from the owner of the highway/railroad
9 and the Engineer.

10
11 C. All necessary materials, equipment, labor and traffic protection devices
12 shall be on the job site before requesting permission to start the work.
13

14 D. Steel casings and the installation thereof required for highway/railroad
15 crossings shall be in accordance with the standards and requirements of
16 the Florida Department of Transportation (FDOT) or railroads or AASHTO
17 Standards and the Specifications outlined herein. All work of this nature
18 shall be performed by qualified Contractors regularly engaged in that type
19 or work and shall be subject to approval by the Engineer.
20

21 E. All work shall be in accordance with Specification 35 05 20, Jacking and
22 Boring.
23

24 3.08 FITTINGS

25
26 A. All fittings shall be restrained by means of restraining devices such as
27 restainer glands, restraining gaskets, etc.
28

29 B. Fittings shall be set and joined to the pipe and each type of joint as
30 specified for pipe.
31

32 C. Trenching and backfilling for all fittings shall also be in accordance with
33 Section 31 23 33, Excavation and Backfill for Pipes.
34

35 D. The use of thrust blocks in new lines is prohibited and shall be limited to
36 areas in which a new fitting has been installed in an existing line and is not
37 feasible to restrain joints or when directed by the Engineer.
38

39 E. The use of "reverse dead-man" shall be as described under Standard
40 Details for dead-end valves or in circumstances that the Engineer deems it
41 necessary and shall be performed under his direction.

42 3.09 VALVES

43
44 A. Valves shall be set and joined to the pipe and each type of joint as
45 specified for pipe.
46

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 E. Valve boxes in areas that will require sod at a later date must be left 1"-2"
16 above existing grade (to allow for sod thickness).
17
- 18 F. All valves/boxes shall be located by means of a perpendicular 6" x 2' blue
19 stripe across the curb. The distance from the back of the curb to the valve
20 shall be stenciled on the curb with numbers four inches high, painted blue,
21 by the Contractor. This information will be referenced on the pavement if
22 no curbs are to be installed. The fire hydrant valves shall be stenciled (in
23 the same manner) with the letters H.V. All valve box tops shall be painted
24 blue. All valves must be centered over the operating nut/wheel and all
25 valves after being fully opened, will be backed off one-quarter of a turn to
26 prevent them from being jammed open.
27
- 28 G. All dead end valves shall be restrained with a reverse deadman, per the
29 Standard Details.
30
- 31 H. Should the operating nut be more than three feet below the final grade, an
32 extension shall be supplied and installed by the Contractor. The extension
33 shall bring the nut to within twelve inches of final grade.
34
- 35 I. Installation of Valves on Existing Mains
36
- 37 1. When installing valves in existing mains (cutting-in) the Contractor
38 shall insure that the pipe is kept clean at all times and no debris,
39 ground water, mud, oil, etc. will make their way into the pipe.
- 40 2. The Contractor shall notify customers of water service shut-down
41 and shall insure that such is held to a minimum.
42
- 43 3. The lid shall fit flush in the top of the box without forcing and shall
44 not rock, tip or rattle. Roadway boxes for bypass valves shall be
45 marked "BYPASS". Valve box lids shall be painted blue and
46 referenced to the closest curb by stenciling the distance and by

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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.

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- I. Any hydrant located within ten (10) feet of a vehicular use area in an off-street location shall be provided with guard posts in accordance with the Standard Details, unless otherwise approved by the Director of Pinellas County Utilities Engineering or his authorized representative.
- J. All fire hydrants shall be flowed during final inspection to ensure proper working condition.
- K. All fire hydrants shall be bagged by the Contractor until put in service following a successful chlorination.
- L. All chains shall be removed from the hydrants, and the hydrants shall be painted in accordance with the Standard Details.
- M. Relocation of Hydrants
 - 1. When called for on the Plans, the Contractor shall remove and relocate hydrants. The hydrants shall be thoroughly cleaned, bolts and gaskets replaced and a new line valve installed.
 - 2. The existing shut-off valve shall be plugged and buried.
- N. Removal and Disposal of Hydrants
 - 1. Any hydrant, unless otherwise specified, that is removed from the System shall become the property of the Contractor and he shall insure proper disposal.

3.11 FIRE LINES

- A. Fire lines shall have two valves with each valve having a box with lid. One valve shall be located at the water main and the second valve shall be located at the property line. The only deviation shall be at the Engineer's discretion. The property line valve shall have a leak meter wrapped around it.
- B. All private fire lines shall be constructed in accordance with PCU Specifications. This includes pressure testing and chlorination as required.
- C. All fire lines that do not serve a fire sprinkler system shall have a leak detection meter installed around the valve at the property line (installed by the County).
- D. Fire sprinkler lines shall have a double check valve assembly. A leak detection meter shall be installed on the completed assembly by PCU

POTABLE WATER MAIN PIPING AND APPURTENANCES

1 personnel. Chlorination shall be done as required up to the first O.S. & Y.
2 valve. Additional chlorination may be required behind the device which is
3 under jurisdiction of the Plumbing/Building Code.
4

5 E. If the Siamese connection is on the DCVA or any portion of the line
6 running into the building, Class 50 ductile iron pipe shall be required
7 behind the double check valve assembly to the riser inside the building.
8 DR14 PVC may be substituted up to within five feet of the building, at
9 which point DIP shall then be used as required. Siamese connections
10 shall have an eight inch minimum clearance above finished grade.
11

12 F. All backflow devices on fire lines are to be installed in ten (10) foot wide
13 grass area or protected with a series of modified fire hydrant guards, the
14 quantity and location of such shall be determined by the Engineer or his /
15 her approved or appointed representative.
16

17 3.12 TAPPING OF MAINS 18

19 A. The Contractor, after installing the sleeve and prior to making the tap,
20 shall insure that the sleeve is providing a watertight joint by means of
21 pressure testing with pressures in accordance with 01 45 17, Pipeline
22 Testing Requirements. If leaks are present, the Contractor will be
23 required to repair them to the satisfaction of the Engineer.
24

25 3.13 SERVICE METERS AND ACCESSORIES 26

27 A. Unless specified to be furnished by the Contractor under a separate pay
28 item, all meters, reduced pressure devices, double check valves, etc. will
29 be supplied by the Utilities Department. The Contractor shall pick-up such
30 devices where directed and shall inspect them thoroughly and shall insure
31 that they are in proper working order.
32

33 B. The Contractor shall install meters, backflow devices, double check
34 valves, etc. at locations called for in the Plans, as sketched out or as
35 directed by the Engineer. No meter or accessory is to be installed outside
36 of the right-of-way unless easements have been secured or as specifically
37 directed by the Engineer.

38 C. When relocating meters, the Contractor shall insure that the meter is
39 operational. If the meter or accessories are damaged he shall bring this to
40 the attention of the Engineer. Meter boxes shall be replaced, as well as
41 brass fittings and pipe inserts and shall be considered incidental to the
42 cost of relocating meters.
43

44 D. All meter, backflow, reduced pressure device, etc. installations shall be
45 made in accordance with Pinellas County Utilities Department Standard
46 Construction Details as shown on these Specifications.

POTABLE WATER MAIN PIPING AND APPURTENANCES

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2 3.14 SERVICE LINES AND SERVICE CASINGS
3

- 4 A. Service line casings shall be installed on all long side services. Casings
5 may be installed using the pneumatic bullet method, subject to the
6 requirements of the entity having jurisdiction for the roadway.
7
- 8 B. Service line casings for one-inch services shall be Schedule 80 PVC or
9 SDR-9 HDPE two inches in diameter for single services, three inches in
10 diameter for double services.
11
- 12 1. All service lines over (40) forty-feet in length shall have a minimum
13 size of one-inch.
14
- 15 C. All casings shall be marked on both sides of the road with a six inch wide
16 blue stripe running across the curb in the direction of the casing. A single
17 strand of blue 14 gauge copper wire shall be installed with the casing and
18 extend up the 2 x 4 that is required at the end of the casing. The 2 x 4 will
19 be six feet in length and painted blue.
20
- 21 D. The depth to the top of the casings shall be thirty (30) inches to thirty-six
22 (36) inches. Casings that are installed deeper than thirty-six (36) inches
23 shall be removed and installed at the correct depth. Casings shall extend
24 a minimum of five feet beyond the existing back-of-curb or edge of
25 roadway. Exceptions to this requirement due to physical constraints shall
26 require prior approval by the Engineer.
27

28 3.15 INSTALLATION OF BOLTS ON MECHANICAL JOINTS
29

- 30 A. Align bolt holes and insert bolts, with bolt heads behind the bell flange,
31 and tighten opposite nuts to keep the gland square with the socket.
32
33
34
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36
37

38 Tighten the nuts in accordance with the following table:
39

| Bolt Diameter (inches) | Torque (ft-lb) |
|------------------------------|-------------------|
| 5/8 | 45-60 |
| 3/4 | 75-90 |
| 1 | 85-100 |
| 1 1/4 | 105-120 |

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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,

1 Continuous-feed method or swabbing or spraying with a hypochlorite
2 solution and flushed as prescribed in ANSI/AWWA C651. Bacteriological
3 samples shall be collected and analyzed on two consecutive days.
4

5 D. New additions or alterations/relocations of water mains that are over fifty
6 (50) feet in length shall be disinfected and flushed as agreed by the
7 County using the Continuous-feed method as described in ANSI/AWWA
8 C651. Bacteriological samples shall be collected and analyzed on two
9 consecutive days.
10

11 E. All newly disinfected water mains shall maintain, after samples have been
12 collected, a minimum pressure of 20 psi until a Letter of Clearance has
13 been obtained from the (FDEP).
14

15 F. Bacteriological test results for all new and altered public drinking water
16 facilities other than wells will be considered invalid if the results are for
17 samples collected more than sixty (60) days before the results are
18 received by the (FDEP).
19

20 G. Emergency and Special Conditions
21

22 1. In the event of an emergency where time is of the essence and a
23 delay in putting the water main(s) back into service may lead to a
24 detrimental interruption of customer service or adversely affect the
25 integrity of the water distribution system then the following options
26 should be considered. Based upon the circumstances and as
27 directed by the County, disinfection, flushing, and sampling may be
28 completed as using guidance in ANSI/AWWA C651 including Slug
29 method or standard chlorination procedures for disinfection may be
30 implemented.
31

32 1.03 SCHEDULING AND NOTIFICATION
33

34 A. All disinfection of water mains shall be completed by the Contractor under
35 the direct supervision of the Pinellas County Utilities Inspector. The
36 Contractor shall be responsible to provide all the necessary equipment
37 and materials to perform the disinfection in accordance with ANSI/AWWA
38 C651.
39

40 B. Scheduling of the disinfection and flushing of newly constructed or altered
41 water mains require a minimum of 48 business hours notice. The Pinellas
42 County Utilities Inspector shall coordinate disinfection, flushing and
43 bacteriological sampling of newly constructed or altered water mains to be
44 completed within the normal business week and hours. Disinfection and
45 flushing shall be done Monday thru Thursday.
46

- 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 (NaHSO_3)
29 3. Sodium Sulfite (Na_2SO_3)
30 4. Sulfur Dioxide (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

1 flushing to remove any foreign material from the pipeline. Pigging is
2 required in addition to open-end flushing.

3
4 D. A velocity of 5.0 fps is desirable and a velocity of 12 fps may be needed to
5 remove sand from river undercrossings and other subsurface inverts.

6
7 E. Table 1, provided at the end of this Specification, outlines the number and
8 size of flushing assemblies required.

9
10 F. During the flushing process, a clean white cup shall be used at all
11 sampling points to visually check for water clarity. When all the sample
12 points are clear, meaning there is no background sediment, and the
13 system chloramines residual is present, the line is ready to schedule for
14 chlorination.

15
16 G. In the case of mains twenty-four (24) inch and larger, preliminary flushing
17 may be replaced by stringent measures for removal of dirt and sediment
18 from the pipe and the thorough cleaning of its interior prior to filling with
19 the high chlorine solution. Swabbing with a chlorine solution may be
20 required at the discretion of the Engineer.

21
22 3.03 CHLORINATION

23
24 A. Upon satisfactory completion of all testing and flushing, the Contractor
25 shall furnish all materials and labor necessary to disinfect all water mains
26 in accordance with the applicable sections of AWWA C-601.

27
28 B. Prior to chlorine injection the following shall be ensured:

29
30 1. That the source water tap valve for the water mains to be
31 chlorinated has been shut off.

32
33 2. That all blow offs and sample points involved in the Project are
34 open.

35
36 3. That there are no open valves to activate water mains tied into the
37 water mains to be chlorinated.

38
39 4. That there is a uninterrupted supply of potable water or adequate
40 number of barrels to assure there is no interruption once the
41 injection process begins.

42
43 C. Disinfection of water mains shall be completed in accordance with
44 ANSI/AWWA C651 standards and shall include the following; preflushing
45 or cleaning of the water mains before the application of chlorine,
46 disinfecting the mains with the prescribed chlorine dose for the disinfection

1 method being utilized, allow for the proper amount of chlorine holding or
2 contact time, ensuring that the applicable chlorine residual was maintained
3 for the duration of the disinfection period, and final flushing and clearing of
4 the heavily chlorinated water with the disposal and treatment of the heavily
5 chlorinated water in accordance with applicable dechlorination methods.
6 All sampling points shall be at sites as designated by the approved plan or
7 (500) feet intervals or as agreed upon by the County as conditions dictate.
8 Satisfactory bacteriological analysis shall be determined by the results of
9 samples collected by the County Water Quality Management and
10 analyzed by the Pinellas County Utilities (PCU) State certified lab in
11 accordance with PCU Standard Operating Procedures.
12

13 D. The County shall furnish the Contractor with sufficient water to perform the
14 disinfection required. As the chlorine solution is being injected the
15 chlorine residual at the closest sample point to the injection point shall be
16 tested with a high Cl₂ test kit or OTO reagent as applicable. Pinellas
17 County Utilities has set 50 mg/l as the targeted free chlorine residual for
18 new water main clearances as measured at the end of pipeline discharge.
19 The water flow or solution strength shall be adjusted as necessary to
20 achieve the recommended minimum chlorine strength.
21

22 E. As the high chlorine solution reaches each successive sample point, the
23 valve at the sample point shall be closed. Prior to closing the valve at the
24 last sample point, the following water main shut down process shall take
25 place in sequence:
26 1. The source water control valve shall be closed.
27 2. The injection pump should be shut off and its valve closed.
28 3. The last blow off/ sample point valve should be closed.
29

30 ALL BLOW-OFF VALVES SHALL NEVER BE CLOSED BEFORE THE
31 SOURCE WATER VALVE IS CLOSED.
32

33 F. The initial chlorine solution shall be no less than 50 ppm and not more
34 than 1000 ppm in concentration and shall be left standing in the main for a
35 period of not less than twenty-four (24) hours and not more than forty-
36 eight (48) hours. There must be a chlorine residual of 10 ppm at the
37 standpipe hose bib after twenty-four (24) hours. After this period, the high
38 chlorine water shall be drained and/or flushed from the system.
39

40 3.04 DRAINING, FLUSHING AND NEUTRALIZATION
41

42 A. Draining and/or flushing the solution from the main shall be the
43 responsibility of the Contractor and shall be performed so as not to cause
44 damage to the environment or create a nuisance to the owners of adjacent
45 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 Utilities (PCU) State
31 certified lab.
32
33 D. Prior to initiating sampling, the WQM specialist will check for the Total
34 Chlorine Residual at the last sample point and confirm that the residual is
35 representative of the incoming source water.
36
37 E. If the Total Chlorine Residuals are satisfactory, the specialist will begin
38 water sample collection.
39
40 F. After the sampling is completed, the Contractor shall initiate the shut down
41 process using the following sequence:
42
43 1. Turn off blow off(s) and sample point(s).
44 2. Shut off the control valve.
45

- 1 G. Main Clearance Sampling is completed when each sample site has two
2 consecutive day satisfactory (Total Coliform Absent) results.
3
- 4 H. Bacteriological test results for new and altered public drinking water mains
5 will be considered invalid if the pressure in the mains is not maintained at
6 20 psi or greater after the samples are collected.
7
- 8 I. Flushing and sampling shall be repeated, as required, if total coliform is
9 detected in a water sample. If necessary, the main shall be re-chlorinated.
10

11
12 3.06 ACTIVATION OF NEW WATER MAINS
13

- 14 A. No section of any main shall be put into service without the written
15 permission of the County and after the (FDEP) has cleared such main for
16 use.
17
- 18 B. After the Final or Partial "Letter of Clearance" has been issued by the
19 (FDEP) for a newly constructed water main and Pinellas County Utilities
20 Engineering is ready to authorize its activation, the water main(s) needs to
21 be thoroughly flushed before it is actually placed into service.
22
- 23 C. To achieve this flushing, fire hydrants may be utilized on 6-inch and larger
24 water mains. On water mains less than 6-inches, a permanent blow-off
25 may be used if provided. Otherwise the temporary blow-offs setup for the
26 flushing, chlorination and main clearance sampling procedures must be
27 utilized.
28
- 29 D. Before activation, new water mains should be flushed until the water runs
30 clean and clear. In addition, after the water main has been flushed, field
31 tests for Total Chlorine should be taken to ensure disinfection residuals
32 are similar to and representative of the source water. If the flushing has
33 been thoroughly completed, and a Total Chlorine residual greater than 1.5
34 to 1.8 is not detected, Pinellas County Utilities Water Quality Management
35 should be notified for additional follow up.
36
- 37 E. If a water main tie-in is involved or if the pressure in the main was not
38 maintained at 20 psi or greater, Pinellas County Utilities Water Quality
39 Management should be notified and water samples for bacteriological
40 analysis should be collected.
41
42
43
44
45
46
47

1
2
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4
5

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 |

6
7
8
9
10
11
12
13

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 Utilities Engineering (PCU). All area lighting shall be installed a minimum of ten (10) feet above ground on a concrete pole as designated by PCU. 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

1 landscaping as requested by PCU.
2

3 F. Each pump station shall be evaluated to determine if an odor control
4 system is required.
5

6 G. Each pump station shall have a potable "safety and sanitation" water
7 supply connection for wet well cleaning. A potable water connection,
8 installed with appropriate back flow prevention device, shall be provided.
9 Where potable water is unavailable, a reclaimed water connection shall be
10 provided, if available.
11

12 1.02 WARRANTY

13

14 A. The Contractor shall guarantee the entire installation, labor and materials
15 for eighteen (18) months. The Contractor shall repair or furnish without
16 charge similar part or parts, which within eighteen (18) months after date
17 of acceptance, prove to be defective.
18

19 PART 2 –PRODUCTS

20

21 2.01 STRUCTURES

22

23 A. Reinforced concrete pipe installed vertically for use as a pumping station,
24 shall have steel reinforcement equal to or exceeding ASTM designation
25 C478, latest revision, and shall conform or exceed the wall thickness of
26 Table 2, Wall B, ASTM designation C-76, latest revision. Concrete shall
27 be 4000 psi/28 day and shall be made using Type II Portland Cement.
28 Valve vaults may be precast or poured in place concrete. Top slabs to be
29 per the plan drawings for both structures.
30

31 B. Concrete ingredients shall conform to as follows:
32

- 33 1. Portland Cement: Type II per ASTM Specifications C-150
- 34 2. Aggregate: 1" to #4 per ASTM Specification C-33
- 35 3. Sand: 2.35 fineness modulus, free from organic matter
- 36 4. Water: Clean and suitable for domestic use
- 37 5. Air: Maximum 5 percent entrained
38

39 C. Ballast concrete shall be 2500 psi/28 day and emplaced as shown on
40 plans.
41

42 D. Slab shall be 3500 psi/28 day concrete and shall be placed on two layers
43 of waterproof membrane.
44

45 E. Fiberglass Liners shall be as specified in the Materials Specification
46 Manual and shall be specifically manufactured for sewer use. These
47 products shall meet all requirements of latest ASTM designation C-582

SUBMERSIBLE WASTEWATER PUMPING STATIONS

1 (plastic laminates) and ASTM designation C-581 (chemical resistance).
2 The properly installed liners shall not fail under H-20 dynamic wheel load
3 applied vertically. Liner shall be installed in accordance with
4 manufacturer's requirements. The liner shall be tested in accordance with
5 ASTM-3753.
6

7 F. All exposed interior wet well top surfaces shall be covered with 1/8-inch
8 minimum thickness continuous fiberglass sheet adequately anchored to
9 the concrete.
10

11 2.02 EQUIPMENT
12

13 A. Pumps
14

15 1. The pumps shall be capable of handling raw, unscreened sewage.
16 The design shall be such that the pumps will be automatically
17 connected to the discharge piping when lowered into place. The
18 pumps shall be easily removable for inspection or service, requiring
19 no bolts, nuts or other fastenings to be removed for this purpose.
20

21 2. Each pump shall be fitted with a lifting lug, bracket, etc. of adequate
22 strength and length to permit raising the pump for inspection and
23 removal.
24

25 3. The starter casing, oil/air casing and impeller shall be of grey iron
26 construction, with all parts coming into contact with sewage,
27 protected by a coat of rubber-asphalt paint. All external bolts and
28 nuts shall be of 304 stainless steel. The impeller shall be protected
29 by a rotating stainless steel or bronze wear ring and stationary
30 neoprene "O" ring at the inlet of the pump. The impeller shall be of
31 a single vane, nonclog design, capable of passing solids, fibrous
32 material, and heavy sludge, and constructed with long throughway
33 with no acute turns.
34

35 4. Each pump shall be provided with a tandem double mechanical
36 seal running in an oil reservoir, composed of two separate lapped
37 face seals, each consisting of one stationary and one rotating
38 tungsten-carbide ring with each pair held in contact by a separate
39 spring, so that the outside pressure assists spring compression in
40 preventing the seal faces from opening. The compression spring
41 shall be protected against exposure to the pumped liquid. The
42 pumped liquid shall be sealed from the oil reservoir by one face
43 seal and the oil reservoir from the motor chamber by the other, as
44 required. The seals shall require neither maintenance nor
45 adjustment, and shall be easily replaced.
46

47 5. A sliding guide bracket shall be an integral part of the pumping unit

SUBMERSIBLE WASTEWATER PUMPING STATIONS

1 and the pump casing shall have a machined angle connection with
2 yoke to connect with the cast iron discharge connection, which shall
3 be bolted to the floor of the sump and so designed as to receive the
4 pump angle connection without the need of any bolts or nuts. The
5 anchoring of the pump to the wet well floor shall include any pad or
6 pedestal to allow unimpeded flow to the impeller per the
7 recommendation and detail of the pump manufacturer.
8

9 6. Sealing of the pumping unit to the discharge connection shall be
10 accomplished by a simple linear downward motion of the pump with
11 the entire weight of the pumping unit guided to and wedging tightly
12 against the angled discharge connection; no portion of the pump
13 shall bear directly on the floor of the sump and no rotary motion of
14 the pump shall be required for sealing.
15

16 7. The pump motor shall be housed in watertight casing and shall
17 have Class F insulated windings which shall be moisture resistant.
18 Pump motors shall have cooling characteristics suitable to permit
19 continuous operation in a totally, partially or non-submerged
20 condition. The pump shall be capable of running dry in a totally dry
21 condition for extended periods under full load without damage.
22

23 B. Sewage Pumps and Motors
24

25 1. All sewage pumps shall be Flygt N-Series, or Engineer of Record
26 approved equal, with 230/460 volt, 3 phase, 60 cycle motors.
27 Impellers shall be capable of passing a three inch sphere and
28 delivering the GPM and TDH as shown on the plans.
29

30 C. Access Frame and Guide Bars
31

32 1. An aluminum access frame complete with checkered aluminum
33 doors rated at three hundred (300) pounds per square foot, as
34 manufactured by Bilco or Halliday, shall be furnished unless
35 conditions, i.e. vehicle loading, etc, require a higher load rating
36 door. Stainless steel door hinges will be recessed and vandal-
37 proof; hasp will be fabricated of round bar stock mounted vertically
38 and drilled to accept a padlock. A fall prevention system shall be
39 incorporated into the access frame.
40

41 2. Doors over fifty (50) pounds in pull-weight shall be torsion bar
42 loaded, all will have a locking safety handle to hold them in the
43 open position. Valve pit and wet well doors, in the open position,
44 shall provide a clear opening to allow for service and removal of
45 equipment (including pumps with mix flush valves). The upper
46 guide and cable holder shall be furnished and securely mounted to
47 the opening using 3/8" x 2 1/4" long stainless steel wedge anchors.

SUBMERSIBLE WASTEWATER PUMPING STATIONS

1 Two stainless steel pump guide bars (SAE 304, schedule 40) of a
2 size shown on the drawings, shall be furnished for each pump and
3 shall be of adequate length to extend from the lower guide holders
4 on the pump discharge connection to the upper guide holder
5 mounted on the access frame using 3/8" X 2 1/4" long stainless
6 steel wedge anchors. Intermediate guide bar brackets shall be
7 installed where depth of station is greater than eighteen (18) feet.
8

9 D. Valves and Piping

- 10
- 11 1. Gate valves, four inch through sixteen (16) inch diameter, shall be
12 AWWA standard for resilient seated gate valves, NRS open left and
13 rated at 250 psi minimum. Valves in vaults shall have flanged
14 connections with a hand wheel operator. Buried valves shall have
15 mechanical joint connections with a two-inch operating nut,
16 supplied with a valve box, bronze identification disk and concrete
17 valve box collar as shown in the Standard Details.
18
- 19 2. Piping shall be flanged ductile iron (no flange adapters will be
20 accepted). Duplex pump discharge lines shall be flanged ductile
21 iron (no flange adapters will be accepted) jointed by a double
22 branch ninety (90) degree ductile iron elbow to the common outlet.
23 Triplex pump discharge lines shall be flanged ductile iron (no flange
24 adapters will be accepted) jointed by a ductile iron cross to the
25 common outlet. A flanged wall pipe shall connect the riser pipe.
26 MJ wall sleeves shall be utilized to make the horizontal connection
27 to the riser. Pipe sizing shall be in accordance to plans. A line
28 valve shall be installed within five feet of the valve pit with an
29 external bypass system.
30
- 31 3. Discharge piping shall have two 1/2-inch stainless steel ball valves
32 installed to permit pump performance testing. The ball valves shall
33 be installed upstream of the pump discharge check valves
34
- 35 4. A by-pass draw tube shall be installed on stations that have two
36 hour retention time or less, and six inch draw tubes.. Bypass valves
37 should be 6" or greater when head condition exceeds 40'.
38
- 39 5. All hardware (bolts/nuts) on flange by flange piping shall be 304
40 stainless steel.
41

42 E. Pump Station Control Panel Specifications

- 43
- 44 1. The control panel enclosure shall be stainless steel, NEMA 4X
45 (sized per the Appendix Schedule 1). There shall be polished
46 aluminum dead front inner door. The dead front shall be mounted
47 on a stainless steel continuous hinge (piano) mounted with pop
48 rivets, with a positive mechanical quarter-turn handle catch and

1 shall open at least ninety (90) degrees F. A method of holding the
2 dead front door in the open position shall be provided. A method of
3 securing a standard padlock, thereby locking the cabinet outer
4 door, shall be provided. All panels shall be equipped with stainless
5 steel wire terminals.
6

7 2. The dead front door shall contain the following labeling: Access to
8 circuit breakers, HAND-OFF-AUTO-RTU pump selector switches
9 with green light for auto, yellow level indicator pilot lights, red pump
10 run pilot lights, red alarm pilot light, maintenance switch with yellow
11 pilot light, phase monitor test switch, green watchdog activated pilot
12 light, and a 20 amp GFI receptacle. All indicator lights shall be
13 lamp trade number (1819).
14

15 3. A MELTRIC #37-27-043 generator receptacle shall be mounted on
16 the side of the control cabinet in the down position. Main circuit
17 breaker and Emergency generator circuit breaker shall be inter-
18 locked to prevent back feed. All circuit breakers shall be Square D
19 FAL series or larger as required, and sized for the available power
20 company fault current. Where a "high" leg service exists, it shall be
21 connected to the "B" phase of the main breaker. Most applications
22 will be duplex pumps unless otherwise specified.
23

24 4. The motor starter sub panel shall contain Square D Model #8536
25 (Type P starters are not acceptable) across-the-line NEMA-rated
26 magnetic starters with individual over-load on each leg and one
27 hundred 120 volt coil control. Across the line motor starters with
28 thermal overload protection shall be used when pump horsepower
29 is less than 20 hp on a 240 volt or less voltage feed or 20
30 horsepower on 480 volt or less voltage feed. Additionally, a VFD
31 shall be installed for all applications. All control wiring shall be
32 surface mounted, void of splices, have appropriate color coded or
33 numbered terminal ends, sized 14 minimum, type THHN or
34 equivalent, rated for six hundred (600) volts, stranded tinned
35 copper conductor colors are as follows:
36

- 37 a. 120V-A/C
38 Blue-Hot
39 White – Neutral
40
- 41 b. 24V-A/C
42 Orange – Hot
43 Grey – Neutral
44
- 45 c. 12V D/C
46 Red – Positive
47 Black – Negative

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48

- 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-fusable 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

SUBMERSIBLE WASTEWATER PUMPING STATIONS

1 4x junction box (minimum 14" x 12" x 6" and a minimum 24" x 24" x
2 8" for 20 H.P. and larger) with bottom or side hinged cover shall be
3 installed between the control panel and the wet well. It shall house
4 the terminal strip, which shall be stainless steel, mounted on an
5 aluminum din rail, for pump, float, RTU and sensor connections
6 (24). There shall be twelve (12) inches minimum clearance
7 between the bottom of the junction box and slab top elevation.

8 8. The control panel and the junction box shall be connected by
9 means of a 1-1/2-inch (minimum size) conduit with appropriately
10 sized in-line gas seal-off. Myers Hub or other similar, reusable,
11 water-proof fitting shall be installed where any conduit enters the
12 top or side of any box. The junction box shall have one 2-inch PVC
13 (minimum size) conduit for each pump, and two 2-inch PVC
14 (minimum size) conduits for the floats. All conduits between the
15 junction box and the wet well shall be sealed with duct seal or
16 approved equal. Re-usable butterfly clamps shall be used in the
17 junction box to secure motor, float and level controller leads. The
18 control panel and disconnect switch shall be mounted plumb on two
19 6" x 6" x 10' (minimum) pre-cast concrete posts buried three feet in
20 the ground. The overall length of the post shall be determined by
21 the size of the panel and the three feet minimum distance required
22 between the bottom of the panel and slab top elevation. All
23 mounting hardware shall be 304 stainless steel. If UNI-STRUT is
24 used, it shall be of 304 stainless steel. Larger than 20 H.P.
25 applications shall have conduit for pump cable sized so that the
26 cable does not occupy more than twenty-five (25) percent of the
27 conduit.

28
29 9. All stand alone (pedestal mounted) panels shall have 304 stainless
30 steel Uni-strut welded to the rear of the panel to support meter can,
31 fusible disconnect and junction box. In addition the pedestal
32 mounted panel shall be securely anchored to a six inch thick,
33 reinforced with #4 bars at eight inches o.c. both ways, 3500 psi
34 concrete slab.

35
36 10. All grounding grids (delta) shall consist of a minimum of three each
37 5/8-inch, copper-clad steel sectional ground rods, which are
38 compression-coupled. The depth of all ground rods will be
39 determined by a using IEEE "Fall of Potential Method" and shall be
40 so noted on a Certified Ground Test Document, which shall be
41 provided by the installer. Ground resistance shall test at or below
42 10 OHMS, un-bonded. All conductors shall consist of copper rope-
43 lay cable composed of a minimum of twenty-eight (28) strands of
44 14 gauge wire weighing not less than 375 pounds per 1,000 feet.

45
46 11. All ground grid system connections shall be made using the
47 exothermic process, CADWELD, or other approved equal

SUBMERSIBLE WASTEWATER PUMPING STATIONS

1 manufacturer. All underground connections shall be via exothermic
2 welding. All structures shall be bonded to the closest electric
3 service ground via the main size conductor and/or a water service
4 pipe. The bonding shall be accomplished to achieve equal
5 potential of all grounds. Delta grids shall be tested without the
6 service and water main connection, and documented as such, and
7 then connection to service and water main can be made. The
8 ground resistance of the completed system shall be measured, and
9 listed on the Certified Ground Test Document.

- 10
11 12. All conductors, other than those supplied from the power company,
12 shall be 600 volt rated stranded copper THHN insulation or
13 equivalent and be run in PVC conduit or as per code requirements.
14 The service conductors shall have ampacity ratings that meet or
15 exceed the main breaker ampacity. All utility services, not supplied
16 by the power company, shall be supplied by the contractor and
17 shall be underground in conduit.
18
19 13. The Contractor shall be responsible to verify power company
20 requirements prior to ordering equipment and beginning any work.
21 All workmanship shall be done in a professional manner and will
22 meet all NEC and NEMA codes. The enclosure and components
23 shall be UL approved.
24
25 14. Twenty four (24) din rail mounted RTU terminals shall be supplied
26 and mounted vertically as close to bottom center of cabinet as
27 possible. Above the terminals shall be seven RTU relays mounted
28 and wired as per the supplied prints.
29
30 15. SCADA and RTU requirements shall be as specified in Section
31 40 95 01, Wastewater Pump Station SCADA Remote Telemetry
32 Unit (RTU).
33

34 F. Mixing/Flushing
35

- 36 1. All pump stations shall have a mixing and/or flushing capability so
37 that at minimum the fluid in the wet well is mixed once per
38 alternation cycle (i.e. one mixer/flusher per duplex setup, two per
39 triplex setup). Location of mixing and/or flushing valve shall be
40 determined in the field by the Engineer and PCU Engineering.
41

42 G. Wiring
43

- 44 1. The pump station shall be factory wired for the electric service to
45 the central control panel and either a 100 amp or 200 amp (sized
46 as required) fusible disconnect switch in a stainless steel rain tight
47 enclosure to be located between the electric meter and the control
48 panel of all 230 volt electrical services and a stainless steel rain
49 tight enclosure to be located on each side of the electric meter of all

1 460 volt electrical services. A stainless steel junction box with
2 stainless steel terminal strip shall be furnished and installed
3 between the control panel and wetwell. All wiring shall be copper.
4 All conductors shall be color coded 4 AWG or larger 600 volt type
5 THW and shall be run in PVC conduit.
6
7

8 H. Painting
9

- 10 1. Surfaces to be painted shall be free from grease, excess moisture
11 and rust. All metal surfaces except stainless steel and all exposed
12 interior concrete surfaces and exterior pump station concrete wall
13 surfaces shall receive two coats (15 mils total) of a self-curing
14 material consisting of two components. The material used shall
15 meet all requirements of the US Army Corps of Engineers Formula
16 C-200, and/or Steel Structures Painting Council Specification
17 SSPC-Paint No. 16, Coal Tar Epoxy – polyamide black paint. Wet
18 well and valve vault top slab surfaces shall have a broom finish.
19

20 I. Factory Tests
21

- 22 1. The completed pump station shall be given a two hour running test.
23 A written report of the actual test shall be provided showing pump
24 capacities, control settings, motor amperage and voltage,
25 accessory operation and thorough visual inspection noted herein.
26

27 PART 3 – EXECUTION
28

29 3.01 CONSTRUCTION
30

- 31 A. Fiberglass manhole liners shall be constructed on the base slab as
32 specified and shall be seamless vertically and horizontally and sized
33 according to plans. The top slab underside and walls of the opening(s) of
34 the wet well shall have one-eighth inch minimum thickness sheet of
35 fiberglass adequately anchored into the concrete slab.
36
37 B. Any pipe entering through the wetwell walls will be sealed all around to the
38 interior walls by use of fiberglass patching kit. There shall be no mortar
39 exposed above bench level, except the stack.
40
41 C. Station and Wetwell Installation
42
43 1. The Contractor shall furnish all labor, materials and equipment
44 necessary or incidental to the installation of the pump station and
45 wet well, including:
46
47 a. Clearing, topsoil removal, disposal of excess excavation,
48 supplying of any borrow replacement of topsoil and sod.

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

1 SECTION 33 33 01

2
3 GRAVITY SEWERS

4
5
6 PART 1 - GENERAL

7
8 1.01 SCOPE OF WORK

- 9
10 A. The Work includes furnishing all plant, labor, tools, equipment, materials, and
11 performing all operations in connection with construction of sanitary sewers and
12 appurtenant structures, including excavation, trenching, backfilling and
13 appurtenant work as required, or as directed.
14

15 1.02 Material Depth Limitations

- 16
17 A. Pipe materials used for gravity sewers shall be subject to the depth limitations
18 indicated in accordance with the Standard Details.
19

20 PART 2 - PRODUCTS

21
22 2.01 MATERIALS

- 23
24 A. All gravity sewer pipe and appurtenant materials used in the Pinellas County
25 Sewer System shall be as specified in the latest version of the Pinellas
26 County Utilities Material Specification Manual at the time of plan approval.
27

28 PART 3 - EXECUTION

29
30 3.01 CONSTRUCTION

31
32 A. Order of Work

- 33
34 1. The Engineer reserves the right to specify which sewer lines will receive
35 priority in construction. In general, however, the work will be from the
36 lower end of the sewer towards the upper end of the sewer.
37

38 B. Maintenance of Existing Sewerage Facilities

- 39
40 1. It is the responsibility of the Contractor to maintain operation of the
41 existing sewerage facilities during construction and repair work. The
42 Contractor shall be responsible for providing any equipment required to
43 maintain operation of service during construction. Any damage done to
44 any existing sewer pipe or structure is to be immediately repaired to a
45 condition equal to, or better than, its original condition.
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C. Location and Grade of Sewers

1. The line and the grade of the sewer, as well as the location of manholes, and all other appurtenances, shall be as shown on the Plans or, as directed by the Engineer. The grade line as given on the Plans indicates the grade of the invert of the sewer pipe.

D. Cutting Gravity Sewer Pipe

1. Cutting ductile iron pipe shall be field cut with a power saw. No impact cutting is permitted. The spigot end of pipe thus cut shall be filed or ground to form a bevel.
2. Cutting PVC sewer pipe may be field cut using hand or power saws in accordance with the manufacturer's recommendations. The raw spigot end thus formed shall be filed to remove gasket damaging burrs and to form a standard bevel.

E. Laying Gravity Sewers

1. Cut sheets for complete sections of the gravity sewers, as designated by the Engineer, shall be submitted by the Contractor to the Engineer for approval at least two days prior to construction. Each run of gravity sewer shall be represented on a separated cut sheet.
2. Installation of ductile iron pipe shall conform to the procedures outlined in "A Guide for the Installation of Ductile Iron Pipe" which is available from the Ductile Iron Pipe Research Association. All ductile iron pipe is to be encased in green polyethylene material, conforming to the requirements of the County's Materials Specification Manual. Polyethylene film shall be supplied in tube form suitable for use in Installation Method 'A' per AWWA C105.
3. Installation of PVC pipe shall be per ASTM D-2321 and UNI-B-5.
4. Trench excavation shall be as specified in Section 31 23 33, Excavation and Backfill for Pipes.
5. Each pipe shall be laid true to line and grade so as to form a close concentric joint with the adjoining pipe, preventing offsets in the flow line. The trench bottom shall form a solid base for the entire length of pipe and shall be capable of supporting the full weight of the pipe and backfill material. The pipe bells shall not bear against the solid bottom of the ditch. Sewers will be inspected with mirrors at intervals during construction and corrected, if necessary, before backfill.

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

1 scheduling an inspection, the Contractor shall prepare the lines by cleaning and
2 flushing. Manholes shall be clean, finished and free of leaks.
3

4 B. Manholes shall be on a true and uniform grade. The inverts shall have a
5 smooth steel troweled finish. All benches shall be uniformly sloping. The
6 frames shall be tight and properly set in mortar on solid masonry. The invert,
7 benches and adjacent pipe shall be free of splattered mortar. All required
8 interior lining or paint shall be kept intact. Manhole frames shall be adjusted to
9 grade with the covers and frames cleaned and free of mortar and asphaltic
10 mixtures. All precast manhole seams shall be filled with an approved asphaltic
11 compound.
12

13 C. Pipe between manholes shall be true to line and grade. Dips and sags with
14 one inch or more of trapped water shall be cause for rejection. Inspection shall
15 be by mirror and sunlight and shall be followed by television inspection at the
16 Contractor's/Developer's expense. Air testing may be required also at the
17 Contractor's/Developer's expense. Contractor shall provide personnel to assist
18 with inspections.
19

20 D. The Contractor shall provide Pinellas County Utilities with a Television
21 Inspection of the completed gravity sewers in accordance with the following:
22

23 1. Shall be performed by a NASSCO PACP Certified Operator who will use
24 software that is compatible with Granite XP latest version software to
25 NASSCO PACP Standards.
26

27 2. Shall be submitted as digital media that includes video and data base file
28 in PACP format and include a printed copy of the PACP television
29 inspection log.
30

31 3. Shall perform a manhole inspection and provide a completed NASSCO
32 Manhole Inspection form latest version for each manhole that is
33 connected to the sewer being inspected.
34

35 4. All pertinent data recorded in audio on the media to include:
36

37 a. Subdivision name and phase number.

38 b. Manhole numbers (these numbers must match manhole numbers on
39 "as built" drawings).

40 c. Date

41 d. Size and material of pipe

42 e. Service connection locations, right or left

43 f. All distances between manholes

44 g. Locations of suspected and obvious pipe deficiencies (i.e., bad joints,
45 breaks or leaks etc)
46

- 1 5. PVC pipe shall have a deflection test using a seven and one-half percent
- 2 (go-no-go) test mandrel of appropriate size, which shall be visible on
- 3 video at all times.
- 4
- 5 6. The printed NASSCO PACP television report (indicating manhole
- 6 numbers) which will accompany the media. This written report must
- 7 include:
- 8
- 9 a. Manhole numbers (these numbers must match manhole numbers
- 10 on "as-built" drawings).
- 11 b. Service connection locations, right or left.
- 12 c. Reference to service connection locations out of manholes.
- 13 d. Locations of suspected and obvious pipe deficiencies (i.e., bad
- 14 joints, breaks or leaks, etc.).
- 15 e. Depth of each manhole.
- 16 f. Actual measured distance (on ground) between manholes.
- 17
- 18 7. All visual and television inspections shall be completed and approved by
- 19 Pinellas County Utilities after the road base has been constructed but
- 20 prior to the placing of any asphalt.
- 21
- 22 8. Television Inspection Media must clearly show details of structural
- 23 defects, misalignments and infiltration.
- 24
- 25 9. For detailed requirements for Television Inspection see Section 33 01 32
- 26 Sanitary Sewer Cleaning and Televising.
- 27
- 28 E. All known or indicated breaks shall be repaired by the Contractor regardless of
- 29 the test allowances. Faulty sections of sewer lines or manholes rejected by the
- 30 Engineer shall be removed and re-laid by the Contractor. Sunken manholes
- 31 will not be accepted.

32

33 3.03 SERVICE CONNECTIONS - WYE UNITS AND SERVICE PIPE

34

- 35 A. In new sewer construction, D.I.P. and PVC service connections shall be made
- 36 by means of a wye or tee. All joints connected to the wye unit shall remain
- 37 flexible. Service connections on existing mains shall be made using a sewer
- 38 saddle approved in the County's Materials Specification Manual.
- 39
- 40 B. All new sewer service connections shall have a continuous looped trace wire
- 41 consisting of one (1) 14-gauge minimum solid copper or one (1) 12- gauge
- 42 copper clad steel tracer wires taped to the top center of the pipe from the
- 43 cleanout to the main line and back to the cleanout in accordance with the
- 44 Pinellas County Standard Details. Tracer wire shall be in accordance with the
- 45 County's Materials Specifications Manual.
- 46

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
19 tee, or inside PVC drops may be used.

20 3.08 WATER MAIN STORM DRAIN CROSSINGS
21

- 22 A. In all cases where sanitary sewer mains cross water mains, or storm sewers with
23 a minimum clear distance between the sanitary sewer and the water main or
24 storm sewer of less than twelve (12) inches, the sanitary sewer shall be ductile
25 iron pipe for a distance of ten feet on either side of the point of crossing. No pipe
26 joint shall occur within ten (10) feet of the crossed water main.
27
28
29

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 to submit to 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 PCU Engineer or his designated representative. In any case, force mains

SANITARY SEWAGE FORCE MAINS AND APPURTENANCES

1 will not be accepted or tested until curb and/or roads are complete, thus
2 preventing possible relocation or adjusting and retesting of newly installed
3 pipes.
4

5 B. All joints, fittings and other appurtenances shall not be covered until
6 inspected by the PCU Inspector. Non-compliance will require excavation
7 of all joints and fittings.
8

9 C. The pipe and fittings will 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 left
13 open until the PCU Inspector is onsite to document that this guideline is
14 fully complied with. The use of fittings not shown on the "Contractor Copy"
15 construction Plan must have the prior concurrence of the PCU Inspector.
16

17 1.05 ABANDONMENT OF EXISTING MAINS BEING TAKEN OUT OF SERVICE

18

19 A. In general, pipe six inches and smaller abandoned within Pinellas County
20 rights-of-way shall be capped at both ends and abandoned in place.
21 Grouting is not required unless specifically required by the Engineer or the
22 County.
23

24 B. Abandoned pipes eight inches and larger shall be filled with grout or
25 flowable fill unless otherwise directed by the County or the Engineer.
26

27 C. Pipe abandoned in rights-of-way owned by municipalities other than
28 Pinellas County shall be subject to the requirements of the agency having
29 jurisdiction.
30

31 D. All pipes shall be abandoned in a manner which results in the abandoned
32 pipeline not being pressurized.
33

34 PART 2 – PRODUCTS

35

36 2.01 GENERAL

37

38 A. Materials, equipment and supplies furnished and permanently
39 incorporated into the Project shall be of first quality in every respect, shall
40 be constructed and finished to high standards of workmanship, and shall
41 be the product of an approved reputable manufacturer. Material shall be
42 suitable for the service intended, shall reflect modern design and
43 engineering and shall be fabricated in a first-class workmanlike manner.
44 All materials, equipment and supplies shall be new and shall have not
45 been in service at any time previous to installation, except as required in
46 tests or incident to installation.

- 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 are to be encased in
8 green polyethylene material, conforming to ASTM specification D-1248,
9 with a minimum 8 mil thickness, taped and free of dirt in accordance with
10 the latest edition of AWWA C105. Polyethylene film shall be supplied in
11 tube form suitable for use in Installation Method 'A' as defined in AWWA
12 C105.
13
14 D. All piping and appurtenances shall be color coded green with the
15 exception of ductile iron pipe. That shall be encased in green
16 polyethylene wrap, or if not available, encased in clear polywrap and shall
17 be marked by means of three four-inch wide painted green lines along the
18 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. Force mains shall be buried with green metallic locator tape. All locator
25 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 Sewer
33 System shall be as specified in the latest version of the Pinellas County
34 Utilities, Material Specification Manual at the time of plan approval.
35

36 PART 3 - EXECUTION

37
38 3.01 HANDLING

- 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

4 C. All materials found during the progress of work to have flaws, cracks, or
5 other defects will be rejected by the Engineer regardless of whether or not
6 it has been installed and shall be replaced by and at the expense of the
7 Contractor.
8

9 D. All PVC pressure pipe, upon delivery to the site and until such time as it is
10 placed in the trench, shall be shielded from the weather and direct sunlight
11 to prevent pipe deterioration.
12

13 E. Materials shall not be stacked or placed under materials in such a manner
14 that damage could result.
15

16 F. Slings, hooks, or tongs used for lifting shall be padded in such a manner
17 as to prevent damage to exterior surfaces, interior linings and
18 components. If any part of the coating, lining or components is damaged,
19 the repairs or replacement shall be made by the Contractor at his expense
20 and in a manner satisfactory to the Engineer prior to attempting
21 installation.
22

23 G. In the event that materials supplied by the County are defective, the
24 Contractor shall notify the Engineer immediately so arrangements can be
25 made for replacing such devices.
26

27 3.02 FIELD LAYOUT AND MODIFICATIONS 28

29 A. The Contractor, unless directed otherwise, shall be responsible for setting
30 construction layout stakes and/or offsets required to complete the
31 designated work. The Contractor shall insure that those stakes and/or
32 offsets are protected and any re-staking due to work stoppage shall be
33 included and no additional compensation to the Contractor will be made.
34

35 B. The Engineer has the right to make any modifications as he deems
36 necessary due to field conditions, conflicts with other utilities or to protect
37 other properties.
38

39 3.03 EXCAVATION, ALIGNMENT AND GRADE 40

41 A. Trench excavation and backfill shall be in accordance with Specification
42 31 23 33, Excavation and Backfill for Pipes.
43

44 B. All mains shall be laid and maintained at the required lines and grades
45 with fittings, valves and appurtenances at the described locations. All pipe
46 shall be laid to the depth as shown on the Plans, or when a depth is not

1 indicated, with a minimum cover of thirty (30) inches outside of the
2 roadway, and thirty-six (36) inches under the roadway. Grade lines shall
3 be set by the Contractor. The tolerance of such grades shall not be more
4 than that specified on the drawings. When no tolerance is indicated a
5 tolerance of 0.5 foot shall be used. All other realignments must be
6 approved by the Engineer. The Contractor shall have suitable survey
7 equipment on the site at all times.
8

- 9 C. The Work shall at all times progress with caution so as to prevent damage
10 to underground obstructions both known and unknown. Should an
11 obstruction not shown on the Plans be encountered the Engineer shall be
12 immediately notified and he shall be responsible for alteration to the plan
13 should realignment be necessary. The Contractor shall notify the
14 Engineer far enough in advance to allow the realignment to be
15 accomplished by deflection in the pipe joints.
16

17 3.04 LAYING AND JOINING BURIED FORCE MAINS

18 A. General

- 19
20
21 1. Prior to installation, all pipe shall be inspected for defects and all
22 lump or excess coatings shall be removed. The inside of the bell
23 and outside of the spigot shall be cleaned prior to joining of all pipe.
24 Caution shall be taken to prevent damage to the pipe during
25 lowering into the trench. Caution shall be taken to prevent foreign
26 matter from entering the pipe during installation. The Engineer may
27 require covering of the end of the pipe to prevent debris from
28 entering. No debris, tools, clothing or other material shall be placed
29 in the pipe.
30
31 2. After placement in the trench the spigot end of the pipe shall be
32 centered in the bell and the pipe shall be driven home and then
33 brought to the proper line and grade by tamping approved backfill
34 material under it, except for the bell. Joint deflection shall not
35 exceed manufacturer's limit.
36
37 3. During the time that the pipe is in the trench but no work is in
38 progress, the end shall be closed by a water-tight plug. This shall
39 include the noon hour, as well as overnight. If there is water in the
40 trench upon beginning work, this plug shall remain in place until the
41 trench has been pumped dry, unless otherwise approved by the
42 Engineer.
43
44 4. Standard plugs shall be inserted into all dead end pipes, tees or
45 crosses; spigot ends shall be capped; flanged ends shall have blind
46 flanges, or sheet metal or plywood caps. Plugs installed for

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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 pipeline. Any cuts or breaks in the wire shall be repaired by the Contractor at his expense.

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 B. Pigging, Flushing and Cleaning
7

8 1. All mains shall be pigged, cleaned and flushed to remove all sand
9 and other foreign matter. The Contractor shall be responsible for
10 developing a pigging and flushing plan to be submitted to the
11 Project Representative for approval prior to pigging and flushing.
12 The Contractor shall dispose of all water used pigging and for
13 flushing without causing a nuisance or property damage, in
14 accordance with state and local requirements. Any permits or fees
15 required for the disposal of flushing water shall be the responsibility
16 of the Contractor.
17

18 2. Flushing water used by the Contractor shall be taken from an
19 approved metered source. The water utility will provide the meter
20 and designate the source. Potable and reclaimed flushing water
21 shall be at the Contractor's expense.
22

23 a. Reclaimed water should be used for sanitary force mains.
24

25 b. Potable water can be used for all service types.
26

27 3. The cleaning of the new piping system shall be accomplished by
28 the controlled and pressurized passage of a series of hydraulic or
29 pneumatic polyurethane plugs of varying dimensions coatings, and
30 densities; which shall be selected by the pipe cleaning Contractor.
31 The Contractor shall provide a means to enter the pig into the
32 system, control and regulate flow, monitor flows and pressures, and
33 to remove the pig from the system. The Contractor shall maintain a
34 constant surveillance of the system and immediately report to the
35 proper authority any in-line problems encountered or any
36 malfunctions discovered in the piping system. A record of pig
37 models, sizes, styles, and other pertinent information shall be kept
38 by the Contractor and turned over to the County.

39 4. The Contractor shall furnish pig launching and retrieval equipment
40 to minimize additional valving, fittings and auxiliary water supplies.
41 Valves and blowoff assemblies, which are installed as part of the
42 project, shall be used as much as possible to minimize the number
43 of temporary ports required for proper flushing and cleaning.

44 5. All materials used shall be specifically manufactured for flushing
and cleaning pressure pipes, bends and valves. The pigs shall be

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D. Jointing Push-On Ductile Iron and PVC Pipe and Fittings

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 Special Joint Ductile Iron Pipe and Fittings

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

- 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
46

- 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

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- A. Valves shall be set and joined to the pipe and each type of joint as specified for pipe.
- B. Trenching and backfilling for all valves shall also be in accordance with 31 23 33, Excavation and Backfill for Pipes.
- C. Cast iron valve boxes shall be firmly supported, maintained centered and plumb over the operating nut of the valve. Outside of paved areas, valve boxes shall be set in a 2' x 2' x 6" thick concrete collar, along with a brass ID tag, as shown on Standard Details. The box cover shall be flush with the surface of the finished pavement. All force main valve box lids shall be painted green and shall have the word "SEWER" cast in the lid.
- D. All reasonable effort must be made to locate valves/valve boxes, back of curb, in grass areas and at street corners, whenever possible.
- E. Valve boxes in areas that will require sod at a later date must be left one to two inches above existing grade (to allow for sod thickness).
- F. All valves/boxes shall be located by means of a perpendicular 6" x 2' green stripe across the curb. The distance from the back of the curb to the valve will be stenciled on the curb with numbers four inches high, painted green, by the Contractor. This information will be referenced on the pavement, if no curbs are to be installed. All valve box tops shall be painted green. All valves must be centered over the operating nut/wheel and all valves, after being fully opened, will be backed off one-quarter turn to prevent them from being jammed open. This procedure should take place only after the main has passed pressure testing and has been accepted by the County.
- G. All dead end valves shall be restrained with a reverse deadman, per the Standard Details.
- H. Should the operating nut be more than three feet below the final grade, an extension shall be supplied and installed by the Contractor. The extension shall bring the nut to within twelve (12) inches of final grade.
- I. Installation of Valves on Existing Force Mains
 - 1. When installing valves in existing mains (cutting-in), the Contractor shall insure that the pipe is kept clean at all times and no debris, ground water, mud, oil, etc., will make their way into the pipe.

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2. The lid shall fit flush in the top of the box without forcing and shall not rock, tip or rattle. Valve box lids shall be painted green and referenced to the closest curb by stenciling the distance, and by painting a six inches wide by two feet long stripe perpendicular to the curb of the roadway.

J. Removal and Disposal of Existing Valves

1. Any valve, unless otherwise specified, that is removed from the system shall become the property of the Contractor and he shall insure proper disposal.

3.11 TAPPING OF MAINS

A. The Contractor, after installing the sleeve and prior to making the tap, shall ensure that the sleeve is providing a watertight joint by means of pressure testing with pressures in accordance with 01 45 17, Pipeline Testing Requirements. If leaks are present, the Contractor will be required to repair them to the satisfaction of the Engineer.

3.12 INSTALLATION OF BOLTS ON MECHANICAL JOINTS

A. Align bolt holes and insert bolts, with bolt heads behind the bell flange, and tighten opposite nuts to keep the gland square with the socket. Tighten the nuts in accordance with following table:

| Bolt Diameter (inches) | Torque (ft-lb) |
|------------------------|----------------|
| 5/8 | 45-60 |
| 3/4 | 75-90 |
| 1 | 85-100 |
| 1 1/4 | 105-120 |

3.13 PAINTING

- A. All above ground installations shall be painted OSHA safety precaution green. Paint application shall be in accordance with the paint manufacturer's recommendation.
- B. Paint shall be as specified in the County Materials Specification Manual.
- C. Guard post shall be painted OSHA safety yellow.
- D. All painting shall be in accordance with Section 09 91 00, Painting.

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3.14 PRESSURE TESTING

- A. All sewage force mains shall be tested in accordance with Specification 01 45 17, Pipeline Pressure and Leakage Testing Requirements.

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 to submit to 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.

RECLAIMED WATER MAIN PIPING AND APPURTENANCES

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 will 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
38 3.01 HANDLING

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

RECLAIMED WATER MAIN PIPING AND APPURTENANCES

1 roadway, and thirty-six (36) inches under the roadway. Grade lines shall
2 be set by the Contractor. The tolerance of such grades shall not be more
3 than that specified on the drawings. When no tolerance is indicated a
4 tolerance of 0.5 foot shall be used. All other realignments must be
5 approved by the Engineer. The Contractor shall have suitable survey
6 equipment on the site at all times.
7

- 8 C. The Work shall at all times progress with caution to prevent damage to
9 underground obstructions, both known and unknown. Should an
10 obstruction not shown on the Plans be encountered, the Engineer shall be
11 immediately notified and he shall be responsible for alteration to the Plan,
12 should realignment be necessary. The Contractor shall notify the
13 Engineer far enough in advance to allow the realignment to be
14 accomplished by deflection in the pipe joints.
15

16 3.04 LAYING AND JOINING BURIED RECLAIMED WATER MAINS

17

18 A. General

19

- 20 1. Prior to installation, all pipe shall be inspected for defects and all
21 lump or excess coatings shall be removed. The inside of the bell
22 and outside of the spigot shall be cleaned prior to joining of all pipe.
23 Caution shall be taken to prevent damage to the pipe during
24 lowering into the trench. Caution shall be taken to prevent foreign
25 matter from entering the pipe during installation. The Engineer may
26 require covering of the end of the pipe to prevent debris from
27 entering. No debris, tools, clothing or other material shall be placed
28 in the pipe.
29
- 30 2. After placement in the trench, the spigot end of the pipe shall be
31 centered in the bell and the pipe shall be driven home and then
32 brought to the proper line and grade by tamping approved backfill
33 material under it, except for the bell. Joint deflection shall not
34 exceed manufacturer's limit.
35
- 36 3. During the time that the pipe is in the trench, but no work is in
37 progress, the end shall be closed by a water-tight plug. This shall
38 include the noon hour, as well as overnight. If there is water in the
39 trench upon beginning work, this plug shall remain in place until the
40 trench has been pumped dry, unless otherwise approved by the
41 Engineer.
42
- 43 4. Standard plugs shall be inserted into all dead end pipes, tees or
44 crosses; spigot ends shall be capped; flanged ends shall have blind
45 flanges, or sheet metal or plywood caps. Plugs installed for

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pressure testing shall be fully secured and blocked 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 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.

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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

- d. Each long side service or any service over 40 feet shall have one (1) locator wire duct taped to top center of pipe.
- e. The locator wire shall have colored insulation matching the type of service provided in the service and be acceptable for direct burial.
- f. All splices of the wire shall be made with watertight connections per material specification manual.
- g. The wire shall be continuous along the service line.
- h. 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 pigging and for flushing without causing a nuisance or property damage, in accordance with state and local requirements. Any permits or fees 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 metered source. The water utility will provide the meter and designate the source. Potable and reclaimed flushing water shall be at the Contractor's expense.

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- a. Reclaimed water should be used for reclaimed water mains.
 - b. Potable water can be used for all service types.
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.
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.

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- 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 |

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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.

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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.

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END OF SECTION

1 SECTION 33 39 00

2
3 SANITARY UTILITY SEWERAGE STRUCTURES
4
5

6 PART 1 - GENERAL
7

8 1.01 SCOPE OF WORK
9

- 10 A. The Work includes furnishing all plant, labor, tools, equipment, materials,
11 end performing all operations in connection with construction of sanitary
12 sewers and appurtenant structures, including excavation, trenching,
13 backfilling and appurtenant work as required, or as directed.
14

15 1.02 RELATED DOCUMENTS
16

- 17 A. Specification 33 33 01, Gravity Sewers
18
19 B. Specification 31 23 34, Excavation and Backfill for Structures
20

21 PART 2 – PRODUCTS
22

23 2.01 MATERIALS
24

25 A. General
26

- 27 1. All manholes shall be precast concrete unless prior approval for an
28 alternative material is given by the County.
29

30 B. Concrete
31

- 32 1. Concrete for cradles shall conform to Specification 03 10 01,
33 Concrete and Concrete Materials of these Specifications and shall
34 develop a minimum 2,500 psi compressive strength at twenty-eight
35 (28) days.
36

37 C. Brick
38

- 39 1. Where brick manholes are specifically called for, brick shall be hard,
40 solid common clay brick meeting the requirements for latest ASTM
41 C-32 (sewer brick), Grade MA.
42

43 D. Mortar
44

- 45 1. Mortar for manholes shall consist of one part Portland Type II
46 cement, two to three parts fine sand mixed with water for proper

1 consistency. Lime shall not be used in mortar for manholes.
2 Commercially prepared mortar mixes, or expanding grout, shall not
3 be used. Admixtures to mortar or commercial fast-setting cements
4 shall not be used without approval of the Engineer.
5

6 2.02 MANHOLES

7 A. Slabs for Brick Manholes

- 8 1. Slabs shall be 3,750 psi/28 day concrete with a wood float finish.
9 Reinforcement shall consist of #4 bars on eight inch centers, both
10 ways, with one and one-half-inches of cover over the bar mat and
11 three inches between earth and re-bar.
12
- 13 2. Brick manholes less than twelve (12) feet deep shall have a slab
14 depth of eight inches. Manholes twelve (12) feet or deeper shall have
15 a slab depth of twelve (12) inches. Slabs for standard manholes,
16 shall be no less than six feet square. Slabs for Type A manholes,
17 shall be a minimum of five feet square. Slabs for drop manholes shall
18 be of sufficient size to support the manhole and the entire drop
19 structure.
20
- 21 3. Slabs shall be located accurately so that manhole or manhole and
22 drop assembly will be centered on slab. All slabs shall be installed at
23 a grade that will allow clearance under the bells of the pipe. All
24 slabs shall be solidly installed on 3/4-inch bedding stone which has
25 been compacted against firm undisturbed ditch bottom. Depth of
26 bedding stone shall be a minimum of six inches, or as directed by the
27 Engineer.
28
- 29 4. The Contractor shall request an inspection of reinforcing steel for all
30 slabs poured on the job.
31
- 32 5. The Contractor shall submit a copy of all concrete truck delivery
33 receipts to the Engineer.
34
- 35 6. If slabs for manholes are to be supplied by a commercial precast firm,
36 the Contractor shall advise the Engineer sufficiently in advance so
37 that inspection may be initiated at the precast yard.
38

39 B. Precast Manholes

- 40 1. Precast, reinforced concrete manholes shall have tongue and groove
41 interlocking joints. Inverts shall be formed as specified herein. Shop
42 drawings shall be submitted and approved by the Engineer prior to
43 placing order with supplier.
44
45
46

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

1 all space between bricks. The inside wall of the manhole shall be
2 kept wiped clean of excess mortar. Excess mortar on the outside of
3 the manhole wall shall be kept troweled smooth or cut off. Corbels
4 are to be concentric, and built in twelve (12) courses, unless
5 otherwise specified. The exterior of the manhole shall be plastered to
6 a 5/8-inch thickness, and shrinkage cracks shall be sealed by
7 brushing before the final set. Risers between corbels and cast iron
8 frames shall be limited to twelve (12) inches. The exterior plastered
9 surface of the manholes shall be coated with an approved asphaltic
10 waterproofing material. When outside drops are constructed on
11 manholes, the drop shall be entirely supported by the slab. The drop
12 stack may be formed by brick and poured with concrete, or built up
13 with brick and mortar. Memphis Tees shall be used in the drop
14 structures. All drop manholes shall have the inside surfaces coated
15 as specified for precast manholes.

16
17 B. Precast Manholes

- 18
19 1. Any modifications necessary to adapt the units to conform to the
20 locations and grades shown, or required, shall be made without
21 additional compensation. It shall be the responsibility of the
22 Contractor to assure that all manhole inlets are provided at the proper
23 locations and elevations to accommodate the actual field
24 requirements without additional compensation.
25
26 2. All requirements for manhole and drop manhole construction as
27 previously specified which are applicable to precast manhole
28 construction shall be considered as being contained herein.
29
30 3. Slabs for precast manholes shall extend a minimum of six inches
31 beyond the outside face of the manhole wall.
32
33 4. All slabs for precast drop manholes shall be of sufficient size to
34 entirely support the drop structure. Slabs shall have the minimum
35 thickness shown in the Standard Details.
36
37 5. Manhole Units
38
39 a. All exposed interior surfaces and the tongue and groove ends
40 of each unit shall be sand blasted and brushed clean, and
41 immediately thereafter, completely coated with a protective
42 coating of not less than 15 mils of manhole coating per
43 Material Specification Manual. The coating shall be applied in
44 strict accordance with the manufacturer's recommendations.
45

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

1 Plans, or may, under special conditions, be modified as directed by
2 the Engineer.

3
4 H. Fiberglass Lined Manholes

- 5
6 1. The properly installed liners shall not fail under H-20 dynamic wheel
7 load applied vertically. All fiberglass products shall be subject to
8 OCFC Visual Inspection Standards, prior to installation. Fiberglass
9 manhole liners shall be constructed on the base slab, as specified,
10 and shall be encased by brick masonry, or pre-cast as previously
11 specified.
12
13 2. Any pipe entering through the manhole walls with an invert equal to,
14 or higher than the benches will be sealed all around to the interior
15 walls by use of fiberglass patching kit. There shall be no mortar
16 exposed above bench level, except the stack.
17

18 I. Epoxy Impregnated Membrane Lined Manhole

- 19
20 1. Where specifically required by the Plans, manhole lining shall be
21 installed using an epoxy impregnated membrane. Specific
22 membrane thickness and epoxy density, and attributes, shall be as
23 shown on the Plans or Standard Details, or as specified by the
24 Engineer.
25

26 J. Removal of Existing Manholes

- 27
28 1. The Contractor shall remove, as indicated on the Plans, the entire
29 manhole structure including all walls, base slab, frame and cover.
30 The Contractor shall install a new manhole immediately after removal
31 of the existing manhole or immediately backfill and compact the
32 excavation with sand to a one hundred (100) percent maximum
33 density, as determined by the methods contained in the State of
34 Florida Department of Transportation Standard Specifications for
35 Road and Bridge Construction, latest edition.
36
37 2. Should the Contractor elect to backfill the excavation prior to the
38 installation of the new manhole, the road surface shall be patched
39 with asphalt in accordance with Section 32 12 01 – Stabilized
40 Roadway and Asphalt Paving, and shall be maintained in satisfactory
41 condition until such time as the new manhole is installed.
42

43 K. Adjustment of Manhole Frames and Covers

- 44
45 1. Existing manhole frames and covers shall be adjusted to pavement
46 grade during road resurfacing by addition or removal of successive

1 courses of brick masonry. Where required by the Engineer, height
2 adjustment inserts of continuous rings of a type, as directed by the
3 Engineer, shall be installed in the existing frame/cover assembly.
4

5 3.03 INSPECTION OF MANHOLES
6

- 7 A. Inspection of completed lines and manholes shall be as specified in Section
8 33 33 01, Gravity Sewers.
9

10
11 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.

WASTEWATER PUMP STATION SCADA
REMOTE TELEMETRY UNIT (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 or OFF
26 positions. HOAR switches shall be reported back to the Central HMIs
27 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 may be
33 silenced either locally from the pump control panel or remotely from
34 Central HMIs via the RTU. When silenced, the alarm light shall remain
35 constantly on. If the alarm condition clears, the alarm silence control shall
36 be restored.
37

- 38 D. The RTU shall be configured to control two to four pumps.
39

- 40 E. The RTU shall report elapsed runtime and number of starts for each pump
41 to the Central HMIs. These values shall be stored in the RTU. In the case
42 of failure of the RTU, these values shall be restored without user
43 intervention. The Central HMIs shall have the ability to individually reset
44 each pump's starts and/or runtimes without loss of data. On demand
45 reports shall be made available for detailed and average starts and
46 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. The RTU shall average individual motor
26 amperage and report both instantaneous and average amperage to the
27 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 generator/transfer
36 switch failure, shall be provided and reported to the Central HMIs. Battery
37 backup power shall be provided for these inputs.
38
- 39 L. The RTU shall have the capability of locally verifying communication
40 status with a FIU/FEP. Pressing the SILENCE button five times in
41 succession shall blink the alarm light five times in succession if
42 communications is successful, in both directions, with a FIU/FEP.
43
44
45
46

1 2.03 CONSTRUCTION

- 2
- 3 A. The RTU shall be housed in a dust-proof and waterproof NEMA 4X, Type
4 304, 14 Gauge stainless steel enclosure powder coated white, with a 304
5 stainless steel, lockable three-point handle-type latching mechanism. All
6 exterior hardware and hinges shall be stainless steel.
7
- 8 B. A 14 gauge aluminum back-panel will be provided to mount all electrical
9 control devices. All interior electrical control components mounted on the
10 back-panel will be secured using stainless steel machine screws 8-32
11 minimum size. Heavier items including the RTU, control power
12 transformer and items in excess of ten (10) pounds will be secured with
13 1/4"-20 stainless steel machine screws. Screw anchor nuts will be
14 permanently installed in the sub-panel using cadmium plated steel knurled
15 threaded inserts AKV Model AKS7 or equal. No self-tapping or sub-panel
16 tapped screws will be used.
17
- 18 C. All wiring to the control devices within the RTU panel will be harnessed
19 and permanently attached to the panel using welded 8-32 studs and stud
20 mounted cable ties. Stick on tie wrap fasteners are not acceptable.
21 Wiring will be supported every eight inches minimum. This panel will be
22 grounded via a 10-32 stud located in the bottom hinged side and bonded
23 to the enclosure and ground buss.
24
- 25 D. There shall be a permanently affixed document pocket the interior side of
26 the exterior enclosure door to include a laminated wiring diagram, and bill
27 of materials.
28
- 29 E. No devices or equipment shall be mounted to the top of the control panel
30 enclosure, exclusive of radio antenna.
31

32 2.04 PAINT

- 33
- 34 A. The enclosure, sub-panel, and dead front operator panel will all be painted
35 with heat fused polyester powder, electro statically applied paint on a
36 phosphatized base. The enclosure will be white, inside and outside. The
37 interior panels will be silver-tek bronze.
38

39 2.05 ENVIRONMENTAL RATINGS

- 40
- 41 A. All components will be able to operate at -22 F or lower to 140 F and
42 higher at ninety-five (95) percent humidity.
43
44
45
46

1 2.06 RTU

2
3 A. To match the County's existing hardware configuration, all RTUs will be
4 Motorola MOSCAD Ace, or MOSCAD, as required, with 4-watt 800MHZ
5 trunked radio, three mixed I/O (as required), battery backup, and 120V AC
6 eight-amp power supply. The unit will have a 120V AC surge suppressor
7 installed directly on the AC-main terminals. All relay outputs will have
8 interposing 120V, 10A relays installed for output protection. Two-120V
9 AC, 5 amp circuit breakers will be installed, one for the RTU, the second
10 for auxiliary power. All internal wiring will be point-to-point labeled using
11 permanent wire markers.

12
13 2.07 RTU SOFTWARE APPLICATION

14
15 A. Each RTU will have the latest RTU SCADA application license compatible
16 with the existing central configuration. Software functionality and
17 algorithms will perform all of the functions listed in the Functionality portion
18 of the specification. Proven debugged software will be provided to
19 perform the below listed functions

20
21 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 |
| Phase Sequence | Phase Monitor |

22
WASTEWATER PUMP STATION SCADA
REMOTE TELEMETRY UNIT (RTU)

| | |
|----------------------------|--------------------------|
| 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 |

1
2

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
4

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 |
| | Reset Pump 3 Max Runtime |

WASTEWATER PUMP STATION SCADA
REMOTE TELEMETRY UNIT (RTU)

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 nd Lag Pump Select |
| Lead Pump Stop Set point | 3 rd Lag Pump Select |
| Lag Pump Stop Set point | |

2 2.08 RADIO

3

4 A. The radio shall be a Motorola model MTS2000 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

29

1 2.11 SHOP TESTING

- 2
- 3 A. After fabrication in the RTU panel manufacturer's plant, an operational test
- 4 shall be performed to check out the entire panel before delivery.
- 5
- 6 B. The RTU will have all software loaded and all I/O will be proven to the
- 7 RTU with inputs simulated. A signed dated detailed test report will be
- 8 shipped with the unit.
- 9

10 PART 3 -EXECUTION

11

12 3.01 INSTALLATION OF RTU PANEL

- 13
- 14 A. The Contractor shall provide and install all required hardware and
- 15 software components necessary for a complete functional RTU. A Florida
- 16 Certified Electrical Contractor will perform installation in accordance with
- 17 the current edition of the NFPA, NEC, UL and local County electrical
- 18 codes.

19

20 1. Electrical Power

21

22 The Contractor will be responsible to run 20 amp, 120V AC circuits

23 to the RTUs. All enclosures, ground busses, antenna masts, surge

24 arrestors will be grounded and bonded to the existing service main

25 ground.

- 26
- 27 2. All trunked radios will be programmed and 'code plugged' by the
- 28 County's Radio Administrator. It will be the supplier's responsibility
- 29 to provide the proper 'code plug' to the Radio Administrator, deliver
- 30 the radios for programming, reinstall the radios, and verify
- 31 operation. The County will not be responsible for invalid or
- 32 improper 'code plugs'.

- 33
- 34 3. All hardware and brackets used to mount the RTU panel shall be
- 35 stainless steel.

- 36
- 37 4. All interface wiring shall be tagged with heat shrink pre-printed wire
- 38 labels. Hand written labels are not acceptable.

- 39
- 40 5. All RTUs will be quality accepted by having the supplier
- 41 demonstrate to the County representative that all features and
- 42 functions of the RTU perform.
- 43
- 44
- 45
- 46

1 3.02 STARTUP AND ACCEPTANCE

2

3 A. The County has established specific procedures for integration and
4 acceptance of a RTU into the County's SCADA system. This procedure
5 shall be followed. Before acceptance, a complete documented checkout
6 of the RTU, Central HMIs interface, and RF communications, shall be
7 completed and witnessed by the County and the system supplier.

END OF SECTION

1 SECTION 48 11 30

2
3 STANDBY DIESEL GENERATORS

4
5 PART 1 – GENERAL

6
7 1.01 SCOPE OF WORK

- 8
9
10 A. This Specification is applicable to standby diesel generators 400 kW and
11 larger for use and wastewater pump stations within the Pinellas County
12 sewer system. Generators smaller than 400 kW are leased or purchased by
13 the County through a separate Master Contract.
14
15 B. The equipment supplied and installed shall meet the requirements of the
16 National Electric Code and all applicable local codes and regulations.
17
18 C. All equipment shall be new, of current production by a U.S. firm, which
19 manufactures the generator, controls, transfer switch, and assembles the
20 standby generator sets as a matched unit so that there is one-source
21 responsibility for warranty, parts, and service through a local representative
22 with factory-trained service personnel.
23
24 D. All standby generators shall be continuous standby (defined as continuous
25 for duration of any power outage).
26

27 1.02 TERMS AND CONDITIONS

- 28
29 A. The installation shall include all labor, material and equipment to install a
30 complete stand-by generator
31
32 B. The electrical Contractor shall secure any permits and inspections
33 required to install the generator and complete the work. All electrical work
34 shall comply with the provisions of the NEC and all state and local codes.
35 Wire and conduit size shall be based on the kW value of the unit as
36 defined in the Schedule provided in the Standard Details.
37
38 C. The Contractor shall furnish all plant, labor, materials, equipment and tools
39 required to rough-in and connect the standby generator. The rough-in
40 dimensions for the unit shall be based on the kW value of the unit and as
41 defined in the Schedule provided in the Standard Details.
42
43
44
45
46

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 cycler 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)

46

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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)

- 1 8. Oil pressure gauge (analog)
- 2
- 3 9. Running time meter (digital)
- 4
- 5 10. Fuel gauge (analog)
- 6
- 7 11. Voltage adjust rheostat (plus or minus five percent range)-(analog
- 8 output)
- 9

10 2.06 ACCESSORIES

11 A. The following accessories shall be provided:

- 12 1. Over voltage protection will shut down the unit after one second of
- 13 fifteen (15) percent or more over voltage.
- 14
- 15 2. Gas proof, seamless, stainless steel, flexible exhaust connector(s)
- 16 ending in pipe thread or SAE flange.
- 17
- 18 3. Flexible fuel line(s) rated three hundred (300) degrees F and 100
- 19 psi ending in pipe thread.
- 20
- 21 4. Residential critical exhaust silencer, coated to be temperature and
- 22 rust resistant. Full load exhaust noise shall be limited to 65 dba as
- 23 measured at twenty-three (23) feet in a free-field environment.
- 24
- 25 5. Watlo block heater (liquid cooled models) of proper wattage and
- 26 engine heater 120 VAC, thermostatically controlled to maintain
- 27 engine coolant at proper temperature to meet the start-up
- 28 requirement of NFPA-99 or NFPA-110 Regulations.
- 29
- 30 6. Charger with plus or minimum one percent constant voltage
- 31 regulation from no load to full load over plus or minus ten percent AC
- 32 input line variation, current limited during engine cranking and short
- 33 circuit conditions, temperature compensated ambient from minimum
- 34 negative forty (-40) degrees C to a positive sixty (+60) degrees C, five
- 35 percent accurate voltmeter and ammeter, fused, reverse polarity and
- 36 transient protected. Option alarm circuit board to meet the
- 37 requirements of NFPA-110 for low battery voltage, high battery
- 38 voltage, and battery charger malfunction.
- 39
- 40
- 41

42 2.07 AUTOMATIC TRANSFER SWITCH

43 A. A transfer switch with microprocessor logic shall be included, which offers

44 a standard feature package, for basic standby applications on 30 - 1000

45

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

- 1 B. Air flow intake and exhaust ports to be louvered and screened against
2 rodent infiltration.
- 3
- 4 C. Heavy duty, keyed alike, lockable handles on all doors to allow inspection
5 and maintenance. All hardware shall be stainless steel.
- 6
- 7 D. A critical silencer is mounted inside the enclosure.
- 8
- 9 E. Stainless steel flex hose between engine and silencer muffler.
- 10
- 11 F. Oil and coolant drain plumbed thru-outside wall with positive shut-offs
12 located inside the enclosure.
- 13
- 14 G. Large access cover for radiator fill.
- 15
- 16 H. Bulb-type rubber seals on all door openings.
- 17

18 2.09 CONCRETE SLAB

- 19
- 20 A. The Contractor shall furnish all plant, labor, materials, equipment and tools
21 to construct the reinforced concrete slab. The dimensions of the slab shall
22 be based on the kW value of the unit and as defined in the schedule listed
23 in the Standard Details.
- 24
- 25 B. All concrete work and materials shall conform to the requirements of
26 Specification 03 10 01.
- 27

28 PART 3 – EXECUTION

29 3.01 SITE TESTS

- 30
- 31
- 32 A. After unit is delivered and after notification by County personnel, the
33 manufacturer's local representative shall have seven calendar days to
34 perform an on-site check, start-up, and building load test. The engineer,
35 regular operators, and the maintenance staff shall be notified of the time
36 and date of the site test.
- 37
- 38 B. Fuel, lubricating oil, and antifreeze shall be checked for conformity to the
39 manufacturer's recommendations under the environmental conditions
40 present and expected. Accessories that normally function while the set is
41 standing by shall be checked prior to cranking the engine. This shall
42 include: engine heaters, battery charger, etc.
- 43
- 44 C. Vendor shall perform start up of new system, check phase rotation, and
45 test run with load on site.
- 46

END OF SECTION

STANDBY DIESEL GENERATORS

06/01/09

48 11 30 - 7

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