# TECHNICAL SPECIFICATIONS

# FOR

# BROADWAY AND GULF OF MEXICO DRIVE UTILITY RELOCATION

**Prepared for:**

**TOWN OF LONGBOAT KEY**

**Prepared by:**

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**Project No. 148800011**

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## TECHNICAL SPECIFICATIONS

# SECTION 01010
# SUMMARY OF WORK

## PART 1 GENERAL

### 1.01 WORK COVERED BY CONTRACT DOCUMENTS/REQUIREMENTS INCLUDED

A. The work included in this Contract consists of infrastructure improvements, located on Longboat Key, Florida. Infrastructure improvements consist of relocation of existing water mains, and all incidentals and appurtenances. Relocation of existing force main, manhole, rim adjustment to existing manholes, and lift station improvements consisting of wet well top slab adjustments and valve vault top slab adjustments. Includes removal of existing water mains, and force mains.

B. The Contractor shall furnish all shop drawings, working drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all work required by these Specifications and as shown on the Contract Drawings.

C. The Contractor shall perform the work complete, in place and ready for continuous service and shall include any repairs, replacements, and/or restoration required as a result of damages caused prior to acceptance by the Town.

D. The Contractor shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

### 1.02 CONTRACTS

A. All Work shall be constructed under a single prime contract.

### 1.03 SUMMARY OF WORK

A. Furnish all labor, materials, equipment and incidentals required to construct the Country Club Shores asbestos cement water main replacement project in its entirety as shown on the Drawings and specified herein.

B. The Work includes, but is not necessarily limited to, the following:

1. Connect existing 6-inch PVC water main on the west side of the Gulf of Mexico Drive to existing 16-inch DI water main on the east side of Gulf of Mexico Drive with a perpendicular 6” PVC water main.

2. Connect to existing 6-inch PVC water main parallel to Gulf of Mexico Drive within FDOT right-of way to avoid proposed storm pipe.

3. Remove existing 6” PVC water main perpendicular to Gulf of Mexico Drive.

4. Adjust existing manholes, water meters, valve boxes, and fire hydrant assemblies in the project area to the new finished grade.

5. Connect existing lift station valve vault with 8-inch force main to proposed relocated manhole.

6. Remove 8” DI force main parallel to Gulf of Mexico Drive and segment of existing 12” VCP sanitary sewer parallel to Gulf of Mexico Drive.

7. Adjust existing lift station wet well and valve vault to the new finished grade.

8. Mill and overlay/ full roadway reconstruction shall be conducted in accordance with FPID 453730-1-52-01.

9. Perform all associated testing, miscellaneous work, restoration and cleanup for all Phases.

## 1.04 WORK SEQUENCE

A. All work performed under this Contract shall be done with a minimum of inconvenience to the users of the system or facility. The Contractor shall coordinate their work with private property owners such that existing utility services are maintained to all users to the maximum extent possible.

B. The Contractor shall, if necessary and feasible, construct the work in stages to accommodate the Town's use of the premises during the construction period; coordinate the construction schedule and operations with the Town's Representative.

C. The Contractor shall, where feasible, construct the Work in stages to provide for public convenience and not close off public use of any facility until completion of construction to provide alternative usage.

## 1.05 SUBSTANTIAL COMPLETION

A. The Work, or any separable parts thereof identified herein shall be deemed substantially completed at such time that all incidental requirements necessary to enable the Town to continuously and successfully utilize the Work or separable part thereof, for the purposes of which it is intended are completed.

B. The Contract Times of Substantial Completion of the Work shall be identified in the Agreement.

C. It is assumed that portions of the Work will be completed prior to completion of the entire Work. Upon completion of construction of each individual facility, including testing, if the Town, at its sole discretion, desires to accept the individual facility, the Contractor will be issued a dated certificate of completion and acceptance for each individual facility. The Town will assume ownership and begin operation of the individual facility on that date and the three-year guaranty period shall commence on that date. The Town has the option of not accepting the entire work as a whole until it is completed, tested and approved by the Town.

## 1.06 CONSTRUCTION AREAS

A. The Contractor shall limit their use of the construction areas for work and for storage, to allow for work by other Contractors, the Town's use, and the Public's use.

B. Contractor shall coordinate use of work site under direction of Town's Representative.

C. Contractor shall assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.

D. Contractor shall move any stored products under the Contractor's control which interfere with operations of the Town or separate contractor.

E. Contractor shall obtain and pay for the use of additional storage of work areas needed for Contractor operations.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION (NOT USED)

END OF SECTION

# SECTION 01150
# MEASUREMENT AND PAYMENT

## PART 1 GENERAL

### 1.01 SCOPE

A. The scope of this section of the Contract Documents is to further define the items included in each Bid Item in the Bid Form section of the Contract Documents. Payment will be made based on the specified items included in the description in this section for each bid item.

B. All contract prices included in the Bid Form section will be full compensation for all shop drawings, working drawings, labor, materials, tools, equipment and incidentals necessary to complete the construction as shown on the Drawings and/or as specified in the Contract Documents to be performed under this Contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction in the manner set up for each item in this section of the Specifications. Payment for all items listed in the Bid Form will constitute full compensation for all work shown and/or specified to be performed under this Contract.

### 1.02 ESTIMATED QUANTITIES

A. The quantities shown are approximate and are given only as a basis of calculation upon which the award of the Contract is to be made. The Town does not assume any responsibility for the final quantities, nor shall the Contractor claim misunderstanding because of such estimate of quantities. Final payment will be made only for satisfactorily completed quantity of each item.

### 1.03 WORK OUTSIDE AUTHORIZED LIMITS

A. No payment will be made for work constructed outside the authorized limits of work.

### 1.04 MEASUREMENT STANDARDS

A. Unless otherwise specified for the particular items involved, all measurements of distance shall be taken horizontally or vertically.

### 1.05 AREA MEASUREMENTS

A. In the measurement of items to be paid for on the basis of area of finished work, the lengths and/or widths to be used in the calculations shall be the final dimensions measured along the surface of the completed work within the neat lines shown or designated.

### 1.06 LUMP SUM ITEMS

A. Where payment for items is shown to be paid for on a lump sum basis, no separate payment will be made for any item of work required to complete the lump sum items. Lump sum contracts shall be complete, tested and fully operable prior to request for

final payment. Contractor may be required to provide a break-down of the lump sum totals.

## 1.07 UNIT PRICE ITEM

A. Separate payment will be made for the items of work described herein and listed on the Bid Form. Any related work not specifically listed, but required for satisfactory completion of the work, shall be considered to be included in the scope of the appropriate listed work items.

B. No separate payment will be made for the following items, and the cost of such work shall be included in the applicable pay items of work. Final payments shall not be requested by the Contractor or made by the Town until as-built (record) drawings have been submitted and approved by the Town.

1. Shop Drawings, Working Drawings.
2. Clearing, grubbing and grading except as hereinafter specified.
3. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
4. Dewatering and disposal of surplus water.
5. Structural fill, backfill, and grading.
6. Replacement of unpaved roadways, and shrubbery plots.
7. Cleanup and miscellaneous work.
8. Foundation and borrow materials, except as hereinafter specified.
9. Testing and placing system in operation.
10. Any material and equipment required to be installed and utilized for the tests.
11. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
12. Maintaining the existing quality of service during construction.
13. Appurtenant work as required for a complete and operable system.
14. As-built Record Drawings.

## 1.08 BID ITEMS

### A. BID ITEM 1050-16003 AND 1050-16004 – UTILITY PIPE, REMOVE & DISPOSE, 5-7.9", AND 8-19.9"

1. Measurement for this Bid Item shall be the actual number of linear feet of existing water main removed as shown and specified in the Contract Documents.

2. Payment for all work included in Bid Item shall be made at the applicable Contract unit bid price per linear foot of water main. Abandonment shall include complete grouting and filling of the water mains and services, including capping existing pipe where shown in the Contract Drawings, removal of concrete valve pads and valve covers, blow off assemblies and associated meter boxes, and all incidentals and appurtenances required to completely abandon existing water main as shown and specified in the Contract Documents.

### B. BID ITEMS 1080-23106 AND 1080-23116 – UTILITY FIXTURE-TAPPING SADDLE/SLEEVE, FURNISH & INSTALL, 6" AND 16"

1. Payment for all work included in this Bid Item shall be at the applicable Contract unit price bid for furnishing and installing each listed diameter tapping sleeve and tapping valve, polyethylene wrap, valve box and cover, and concrete pad as shown on the Contract Drawings and listed on the Bid Form. Prior to the tapping operation, the Contractor shall contact the Town as to the date and time of the proposed work. The tapping operation itself up to 12-inches in diameter will be performed by the Town. All tapping operations larger than 12 inches in diameter shall be performed by the Contractor with the Town's Representative present. Payment shall represent full compensation for all labor, material, excavation, including rock as necessary, bedding, backfill, compaction testing, disinfection and equipment required to complete these Bid Items.

### C. BID ITEMS 1055-31312, 1055-31106, 1055-31506, 1055-31510 - UTILITY FITTINGS FOR PVC PIPE, FURNISHING AND INSTALL, REDUCER, 12", ELBOW, 6", AND CAP/PLUG, 6" AND 10"

1. Measurement for this Bid Item shall be each fitting furnished and installed as shown and specified in the Contract Documents.

2. Payment for all work included in this Bid Item will be made at the applicable Contract unit price bid for furnishing and installing each ductile iron fitting (cement-lined) as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including fittings, restrained joints and/or thrust blocks, rock removal, dewatering, sheeting and shoring, bedding, backfill, compaction, testing and disinfection, and all incidentals and appurtenances required for complete installation of PVC Fittings as shown and specified in the Contract Documents.

### D. BID ITEMS 1050-31206 AND 1050-31208 - UTILITY PIPE-POLY VINYL

CHLORIDE, FURNISHING & INSTALL, WATER/SEWER, 6" & 8"

1. Measurement for this Bid Item shall be the actual number of linear feet of the listed diameter pipe furnished, installed, and tested as shown and specified in the Contract Documents. Payment for fully furnished and installed pipe shall maintain a 10% retainage for testing.

2. Payment for all work included in these Bid Items shall be made at the applicable Contract unit price bid per the schedule of prices for furnishing, installing, and testing the listed diameter PVC water main (AWWA C-900 pipe), including restrained joints and thrust blocks, as shown on the Contract Drawings and listed in the Bid Form. Payment shall represent full compensation for all labor, materials, excavation, including removal of rock and existing pipes for proper installation, dewatering, bedding, backfill, sheeting and shoring, compaction, cleaning and flushing, tracer wire, detectable warning tape, testing and disinfection, equipment, incidentals and appurtenances required to complete PVC Water Main installation as shown and specified in the Contract Documents.

3. No additional compensation will be made for excavation below the bottom of the pipe, for rock removal, bedding and backfill materials, or for repair of any trench settlement.

E. BID ITEMS 1080-24106 - UTILITY FIXTURE, VALVE ASSEMBLY, FURNISH AND INSTALL, 6"

1. Measurement for this Bid Item shall be each gate valve furnished and installed as shown and specified in the Contract Documents.

2. Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per each valve for furnishing and installing the listed diameter valve, restrained joints and thrust blocks, box, cover, valve extension (as required), identification tag and concrete pad as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, excavation, including rock removal as necessary, sheeting and shoring, dewatering, bedding, backfill, compaction, testing and disinfection, and all incidentals and appurtenances required for complete Gate Valve installation as shown and specified in the Contract Documents.

F. BID ITEMS 1644700, 1080-21500 - FIRE HYDRANT, ADJUST & MODIFY, AND UTILITY FIXTURE, METER/VALVE BOX, ADJUST

1. Payment for work under this Bid Item shall be made at the Contract unit price bid for each water meter, valve and fire hydrant assembly grade modification to bring the existing appurtenance up to new finished grade.

G. BID ITEM 0425-5 - MANHOLE, ADJUST

1. Payment for work under this Bid Item shall be made at the Contract unit price bid for each manhole modification including frame and cover adjustments,

grade adjustment rings, etc.

H. BID ITEM 0425-5-2 – MANHOLE, REMOVAL

1. Payment for work under this Bid Item shall be made at the Contract unit price bid for each manhole removal, and any earthwork associated.

I. BID ITEM 0425-2-42 – MANHOLES, P-7, >10'

1. Payment for work under this Bid Item shall be made at the Contract unit price bid for each manhole furnished and installed including frame and cover, construction of inverts, drop connections if applicable, sealing of lift holes, rainwater protector, grade adjustment rings, manhole boot connectors, etc.

1. Measurement shall be for each manhole installed complete and accepted. Payment shall be made per unit price for the category of depth as determined by the proposed rim and invert. All stubs and plugs shown or called for on the Contract Drawings shall be included in the unit price bid for manholes. Excavation, including rock as necessary, bedding, backfill, dewatering, sheeting, testing and any and all other items necessary for a completed system in accordance with the Contract Documents shall be included. Payment shall represent full compensation for all labor, materials, equipment and incidental items necessary to complete each concrete manhole structure, ready for approval and service by the Town.

J. BID ITEM 1055-51108 - UTILITY FITTINGS, DUCTILE IRON/CAST IRON, FURNISH & INSTALL ELBOW, 8"

1. Measurement for this Bid Item shall be each fitting furnished and installed as shown and specified in the Contract Documents.

2. Payment for all work included in this Bid Item will be made at the applicable Contract unit price bid for furnishing and installing each ductile iron fitting (cement-lined) as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including fittings, restrained joints and/or thrust blocks, rock removal, dewatering, sheeting and shoring, bedding, backfill, compaction, testing and disinfection, and all incidentals and appurtenances required for complete installation of Ductile Iron Fittings as shown and specified in the Contract Documents.

K. BID ITEM 1501-1 – LIFT STATION, ADJUST & MODIFY

1. Payment for work under this Bid Item shall be made at the Contract unit price bid for lift station improvements including wet surface preparation and relining of the wet well, concrete slab removal, concrete work to raise top slabs to new finished grades, adjustment of pump guide rails, float attachment point and all electrical components currently attached to the existing top slabs including the control panel, disconnect, and meter.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION (NOT USED)

END OF SECTION

# SECTION 01410
# TESTING AND TESTING LABORATORY SERVICES

## PART 1 GENERAL

### 1.01 REQUIREMENTS INCLUDED

A. Town shall employ and pay for the services of an independent testing laboratory to perform testing specifically indicated on the Contract Documents or called out in the Specifications. Town may elect to have materials and equipment tested for conformity with the Contract Documents at any time.

1. Contractor shall cooperate fully with the laboratory to facilitate the execution of its required services.

2. Employment of the laboratory shall in no way relieve the Contractor's obligations to perform the work of the Contract.

### 1.02 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge on requirements of Contract Documents.

2. Approve or accept any portion of the Work.

3. Perform any duties of the Contractor.

### 1.03 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel; provide access to Work and/or to Manufacturer's operations.

B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.

C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes which require control by the testing laboratory.

D. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The Town may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor and no extra charge to the Town shall be allowed on account of such testing and certification.

E. Furnish incidental labor and facilities:

1. To provide access to work to be tested.

2. To obtain and handle samples at the project site or at the source of the product to be tested.

3. To facilitate inspections and tests.

4. For storage and curing of test samples.

F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

1. When tests or inspections cannot be performed due to insufficient notice, Contractor shall reimburse Town for laboratory personnel and travel expenses incurred due to Contractor's negligence.

G. Employ and pay for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required for the Contractor's convenience and as approved by the Town.

H. If the test results indicate the material or equipment complies with the Contract Documents, the Town shall pay for the cost of the testing laboratory. If the tests and any subsequent retests indicate the materials and equipment fail to meet the requirements of the Contract Documents, the contractor shall pay for the laboratory costs directly to the testing firm or the total of such costs shall be deducted from any payments due the Contractor.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION (NOT USED)

END OF SECTION

# SECTION 01510
# TEMPORARY AND PERMANENT UTILITIES

## PART 1 GENERAL

### 1.01 REQUIREMENTS INCLUDED

A. The Contractor shall be responsible for furnishing all requisite temporary utilities, i.e., power, water, sanitation, etc. The Contractor shall obtain and pay for all permits required as well as pay for all temporary usages. The Contractor shall remove all temporary facilities upon completion of work.

### 1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with National Electric Code.

B. Comply with Federal, State and Local codes and regulations and with utility company requirements.

## PART 2 PRODUCTS

### 2.01 MATERIALS, GENERAL

A. Materials for temporary utilities may be "used". Materials for electrical utilities shall be adequate in capacity for the required usage, shall not create unsafe conditions and shall not violate requirements of applicable codes and standards.

### 2.02 TEMPORARY ELECTRICITY AND LIGHTING

A. Arrange with the applicable utility company for temporary power supply. Provide service required for temporary power and lighting and pay all costs for permits, service and for power used.

### 2.03 TEMPORARY WATER

A. The Contractor shall arrange with Longboat Key Public Works to provide water for construction purposes, i.e., meter, pay all costs for installation, maintenance and removal, and service charges for water used.

B. The Contractor shall protect piping and fitting against freezing.

### 2.04 TEMPORARY SANITARY FACILITIES

A. The Contractor shall provide sanitary facilities in compliance with all laws and regulations.

B. The Contractor shall service, clean and maintain facilities and enclosures.

## PART 3 EXECUTION

### 3.01 GENERAL

A. The Contractor shall maintain and operate systems to assure continuous service.

B. The Contractor shall modify and extend systems as work progress requires.

### 3.02 REMOVAL

A. The Contractor shall completely remove temporary materials and equipment when their use is no longer required.

B. The Contractor shall clean and repair damage caused by temporary installations or use of temporary facilities.

END OF SECTION

# SECTION 01720
# PROJECT RECORD DOCUMENTS

## PART 1 STANDARDS

### 1.01 MINIMUM RECORD DRAWING STANDARDS FOR ALL RECORD DRAWINGS SUBMITTED TO TOWN

A. Record drawings shall be submitted to at least the level of detail in the contract documents. It is anticipated that the original Contract Documents shall serve as at least a background for all record information. Original drawings in CAD format may be requested of the Town.

B. Drawings shall meet the criteria of the Contract Documents and the Town.

## PART 2 STANDARDS

### 2.01 REQUIREMENTS INCLUDED

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

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

### 2.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples in Contractor's field office apart from documents used for construction.

1. Provide files and racks for storage of documents.
2. Provide locked cabinet or secure storage space for storage of samples.

B. File documents and samples in accordance with CSI format.

C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.

D. Make documents and samples available at all times for inspection by the Town.

## 2.03 MARKING DEVICES

A. Provide felt tip marking pens for recording information in the color code designated by the Town.

## 2.04 RECORDING DRAWINGS PREPARATION

A. Record information concurrently with construction progress.

B. Do not conceal any work until required information is recorded.

C. Drawings; Legibly mark to record actual construction:

1. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of underground utilities and appurtenances referenced to permanent surface improvements. Actual installed pipe material, class, etc. Locations of drainage ditches, swales, water lines and force mains shall be shown every 200 feet (measured along the centerline) or alternate lot lines, whichever is closer. Dimensions at these locations shall indicate distance from centerline of right-of-way to the facility.

2. Field changes of dimension and detail.

3. Changes made by Field Order or by Change Order.

4. Details not on original Contract Drawings.

5. Equipment and piping relocations.

6. Locations of all valves, fire hydrants, manholes, water and sewer services, water and force main fittings, underdrain cleanouts, catch basins, junction boxes and any other structures located in the right-of-way or easement, shall be located by elevation and by station and offset based on intersection P.I.'s and centerline of right-of-way. For facilities located on private roads, the dimensioning shall be from centerline of paving or another readily visible baseline.

7. Elevations shall be provided for all manhole rim and inverts; junction box rim and inverts; catch basin rim and inverts; and baffle, weir and invert elevations in control structures. Elevations shall also be provided at the PVI's and at every other lot line or 200 feet, whichever is less, of drainage swales and ditches. Benchmarks and elevation datum shall be indicated.

8. Slopes for pipes and ditches shall be recalculated, based on actual field measured distances, elevations, pipe sizes, and type shown. Cross section of drainage ditches and swales shall be verified.

9. Centerline of roads shall be tied to right-of-way lines. Elevation of roadway centerline shall be given at PVI's and at all intersections.

10. Record drawings shall show bearings and distances for all right-of-way and easement lines, and property corners.

11. Sidewalks, fences and walls, if installed at the time of initial record drawing submittal, shall be located every 200 feet or alternate lot lines, whichever is closer. Dimensions shall include distance from the right-of-way line and the back of curb and lot line or easement line.

12. Sanitary sewer mainline wyes shall be located from the downstream manhole. These dimensions shall be provided by on-site inspections or televiewing of the sewer following installation.

13. Elevations shall be provided on the top of operating nuts for all water and force main valves.

14. Allowable tolerance shall be ± 6.0 inches for horizontal dimensions. Vertical dimensions such as the difference in elevations between manhole inverts shall have an allowable tolerance of ± 1/8 inch per 50 feet (or part thereof) of horizontal distance up to a maximum tolerance of ± 2 inch.

15. Properly prepared hard-copy record drawings (11x17) and a digital PDF copy, shall be certified by a design professional (Engineer and/or Surveyor registered in the State of Florida), employed by the Contractor, and submitted to the Town.

D. Specifications and Addenda; Legibly mark each Section to record:

1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment installed.

2. Changes made by field order or by change order.

E. Shop Drawings (after final review and approval):

1. Five sets of record drawings for each process equipment, piping, electrical system and instrumentation system.

## 2.05 SUBMITTAL

A. Prior to substantial completion and prior to starting the bacteria testing of water lines, deliver signed and sealed Record Documents and Record Drawings to the Town. These will be reviewed and verified by the inspector. If there are any required changes or additions, these shall be completed and the entire signed and sealed set resubmitted prior to final pay application.

B. The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare record drawings. Record drawings shall be certified by the professional(s) (Engineer or Surveyor licensed in Florida), and submitted on signed and sealed paper drawings, with an AutoCAD version on a recordable compact disk (CD).

C. The CD shall contain media in AutoCad Version 2018 or later, or in any other CAD

program compatible with AutoCad in DWG or DXF form. All fonts, line types, shape files, external references, or other pertinent information used in the drawing and not normally included in AutoCAD shall be included on the media with a text file or attached noted as to its relevance and use. The CD shall also contain Geographic Information System (GIS) shapefiles in a geodatabase format. GIS shapefiles shall be in the correct geographic/spatially related datum/coordinate system.

D. Accompany submittal with transmittal letter, containing:

1. Date.

2. Project title and number.

3. Contractor's name and address.

4. Title and number of each Record Document.

5. Signature of Contractor or their authorized representative.

Note: The data required to properly prepare these record drawings shall be obtained at the site, at no cost to the Town by the responsible design professional or his/her duly appointed representative. The appointed representative shall be a qualified employee of the responsible design professional or a qualified inspector retained by the responsible design professional on a project-by-project basis.

## PART 3 EXECUTION (NOT USED)

END OF SECTION

# DIVISION 2 SITE WORK

## SECTION 02064
## MODIFICATION OF EXISTING STRUCTURES, PIPING AND EQUIPMENT

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to demolish, modify, alter and/or convert existing structures as shown or specified and as required for the installation of piping, mechanical equipment and appurtenances. Existing piping and equipment shall be removed and dismantled as necessary for the performance of facility alterations in accordance with the requirements herein specified.

## PART 2 PRODUCTS

### A.01 GENERAL

A. Epoxy mortar shall be fiberglass fiber mixed with an epoxy filler.

B. Non-shrink grout shall be a sand-cement, non-metallic formulation, having a minimum 28-day strength of 4,000 psi and 0.0 percent shrinkage per ASTM C1090.

C. Liners to be installed in existing concrete manholes and wet wells shall be spray-applied, monolithic, reinforced urethane resin. Urethane resin-based manhole liner material shall be resistant to hydrogen sulfide gas, and other common contents found in a sanitary sewer environment.

D. Approved spray liners can be found in the Utility Approved Product List approved on Feb 2020.

## PART 3 EXECUTION

### 3.01 GENERAL

A. Cut, repair, reuse, excavate, demolish or otherwise remove parts of the existing structures or appurtenances, as indicated on the construction drawings, or as necessary to complete the work as required. Dispose of surplus materials resulting from the above work in an approved manner. The work shall include all necessary cutting and bending of reinforcing steel, structural steel, or miscellaneous metal work found embedded in the existing structures.

B. Dismantle and remove all existing equipment, piping, and other appurtenances required for the completion of the work. Where called for or required, cut existing pipelines for the purpose of making connections thereto.

C. Anchor bolts for equipment and structural steel to be removed shall be cut off one inch below the concrete surface. Surfaces shall then be refinished using non-

shrink grout or epoxy mortar or as indicated on the construction drawings. Repairs to the interior surfaces of existing concrete structures in sanitary sewers shall be made with epoxy mortar. Repairs to be made on other existing concrete surfaces using non-shrink grout shall be made using a bonding agent such as Acrylbond by Concrete Producers Solutions or an equal approved by the Town. Remove all dirt, curing compounds, sealers, paint, rust or other foreign material, and etch with a muriatic acid solution. Flush with clean water and while still damp, apply a coating of the bonding agent. Place the new grout patch onto the treated area immediately.

D. At the time that a new connection is made to an existing pipeline, additional new piping, extending to a new or existing valve shall be installed. Pipe restraint devices shall also be installed as required. At the time when a new potable or reclaimed water service is installed, a pipe locator tracer wire shall be installed and connected to the tracer wire at the main.

E. No existing structure, equipment, or appurtenance shall be shifted, cut, removed, or otherwise altered except with the expressed approval of and only to the extent approved by the Town. All existing valve boxes, fire hydrants, air release valve cabinets, and manholes shall be relocated to meet the new finished grade elevations after construction.

F. When removing materials or portions of existing utility pipelines or structures or when making openings in walls and partitions, take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new work, and not to damage the structures or contents by falling or flying debris. Unless otherwise approved by the Town, saw-cutting, rotary core-boring, or line drilling will be required in removing material from existing concrete structures or pipes.

G. Materials and equipment removed while making alterations and additions shall remain the property of the Town, except that items not salvageable, as determined by the Town, shall be disposed of off the work site.

H. All alterations to existing utility pipes and structures shall be done at such time and in such a manner as to comply with the approved time schedule. Before any part of the work is started, all tools, equipment, and materials shall be assembled and made ready so that the work can be completed without delays.

I. All cutting of existing concrete or other material to provide suitable bonding to new work shall be done in a manner to meet the requirements of the respective section of these Standards covering the new work. When not covered, the work shall be carried on in the manner and to the extent directed by the Town or per the construction drawings.

J. Surfaces of seals visible in the completed work shall be made to match as nearly as possible the adjacent surfaces.

K. Non-shrink cementitious grout shall be used for setting wall castings, sleeves, leveling pump bases, doweling anchors into existing concrete and elsewhere as shown on the construction drawings. The surface to which grout is to be applied shall be wetted to facilitate good bonding.

L. Where necessary or required for the purpose of making connections; cut existing pipelines in a manner to provide an approved joint. Where required, use flanges, couplings, or adapters, all as required.

M. Provide flumes, hoses, piping, pumps and well points, and other related items to divert or provide suitable plugs, bulkheads, or other means to hold back the flow of water or other liquids, all as required in the performance of the work.

N. Care shall be taken not to damage any part of existing buildings or foundations or outside structures.

O. Prior to entering confined spaces in sanitary sewer structures, conduct an evaluation of the atmosphere within, in accordance with local, state, and federal regulations. Provide ventilation equipment and other equipment as required to assure safe working conditions.

## 3.02 CONNECTING TO EXISTING PIPING AND EQUIPMENT

A. The Contractor shall verify exact location, material, alignment, joint, etc. of existing piping and equipment prior to making the connections called out in the Drawings. The verifications shall be performed with adequate time to correct any potential alignment or other problems prior to the actual time of connection. A Town Inspector must be present for all tie-ins for a visual inspection.

## 3.04 IN-PLACE GROUTING OF EXISTING PIPE

A. Where water and wastewater utility pipes are to be abandoned in place, they shall be filled with a non-shrinking sand-cement grout or cement slurry. When such pipes are made of asbestos-cement materials, the abandonment activities shall be performed by a licensed asbestos Contractor. It is completely the Contractor's responsibility to obtain all regulatory clearances and provide documentation in cases where they have determined that an asbestos-cement pipe abandonment activity by in-place grouting does not require a licensed asbestos Contractor.

B. The ends of the pipe sections to be grout or slurry filled shall be capped or plugged with suitable pipe fittings. The pumping material shall be of suitable properties and the pumping pressure shall be such that the pipe sections are filled completely. All above ground features shall be removed: hydrants, meters, valve & meter boxes, pads, vaults, etc. Existing tees, crosses, and valves left in service shall be plugged and restrained.

C. The Town shall be given timely notice so that the Town's representative may be present to monitor all pipe filling operations. Provide standpipes and/or additional means of visual inspection as required to determine if adequate grout/slurry material has filled the entire pipe sections.

D. All tees, crosses, and valves left in service shall be plugged and restrained.

E. Existing pipelines that are being grouted and abandoned must be cut and capped at a maximum distance of 2,000 linear foot segments. The caps must have offset grout port on the top side of the cap. The Town preferred grout mix in the contract specifications must be used.

F. Approved Grout Mix is shown below:

| Materials Per Cubic Yard | | | | |
|---|---|---|---|---|
| **Material** | **Description** | **Amount Qty** | **Specific Gravity** | **Absolute Volume** |
| Cement | Cement Type I/II ASTM C150 | 400 lbs | 3.15 | 2.04 |
| Fly Ash | Fly Ash Class F ASTM C618 | 1350 lbs | 2.45 | 8.83 |
| Total Water | Potable | 118 gal. | | |
| Total Water | (includes any admixture water present) | 982.9 lbs | | 15.75 |
| TOTAL CEMENTITIOUS MATERIAL PER ASTM C595 | | 1750 lbs | | |
| Design Percent Air (Entrapped and Entrained) | | 1.5% | | |
| Slump Range (From Mixer Discharge) | | N/A | | Absolute Volume<br><br>27 CF |
| Air Content (From Mixer Discharge) | | 2.0% (±1.5%) | | |
| Plastic Density ("Unit Weight") | | 101.2 lb/sf | | |
| W/CM Ratio | | 0.56 | | |
| Total Mix Weight | | 2733 lb/cy | | |

Note: Grout mix strength shall be 340 psi @ 28 days

## 3.05 SPRAY-APPLIED LINERS

A. Use a high-pressure water spray to remove all foreign material from the walls and bench of the structure. Loose or protruding masonry materials shall be removed using a hammer and chisel. Fill any voids, holes or cracks using a hand trowel with epoxy mortar to form a uniform surface. Place covers over all pipe openings to prevent extraneous material from entering the pipes. Block or divert sewer flow from entering the structure. Any infiltration leaks shall be stopped by using such methods as approved by the Town.

B. The liner material shall be sprayed onto the invert, bench and wall areas. The sprayed-on material shall be applied such that the entire structure is lined with a structurally enhanced monolithic liner. The thickness of the wall liner material shall be such that it will withstand the hydraulic load generated by the surrounding groundwater table, using a factor of safety of two, and using the assumption that the groundwater table is at the level of the top of the structure. The invert and bench liner material shall be the same thickness as that required for the base of the wall.

C. Special care shall be used to provide a smooth transition between the intersecting pipelines and the manhole inverts such that flow is not impaired. Remove concrete material from the existing manhole base channel in depth to the required thickness of the new liner material.

D. No active sewer flow shall be allowed in the newly lined structure, nor shall any vacuum tests be performed, until the liner material has had adequate time to cure, as recommended by the liner material manufacturer.

E. Install the coating systems per manufacturer's recommendation and completely protect the structure from corrosion. The liner or coating systems must extend and seal onto manhole ring, onto and around pipe openings and any other protrusions, and completely cover the bench and flow invert. Provide a five (5)-year unlimited warranty on all workmanship and products. The work includes the surface preparation and application of the coating or liner system, and shall protect the structure for at least five (5) years from all leaks and from failure due to corrosion from exposure to corrosive gases such as hydrogen sulfide.

## 3.06 CONNECTION TO EXISTING LIFT STATION

A. Where required or as indicated on the construction drawings, make connection of new pipelines to existing wet well structures. If pipe stub-outs of the correct size and position are not available, make connections by removing a portion of the wet well wall by mechanical rotary core boring. The connection between pipe and concrete wet well shall be completed with resilient seals meeting the requirements of ASTM C923 and according to the latest edition of the Town's Approved Products List.

B. Repair internal coating of existing wet well cored during connection of new force main by sandblasting the interior of the existing wet well and applying approved coating material as listed in the Town's Approved Products List in accordance with the manufacturer's recommendations.

END OF SECTION

# SECTION 02100
# SITE PREPARATION

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. This Section covers clearing, grubbing and stripping of the project site and/or along the pipeline route.

B. The Contractor shall clear and grub all the area within the limits of construction or as required, which includes, but is not limited to utility easements. The width of the area to be cleared shall be reviewed by the Town prior to the beginning of any clearing.

C. The Contractor's attention is directed to any Soil Erosion and Sediment Control Ordinances in force in the Town of Longboat Key. The Contractor shall comply with all applicable sections of these ordinances.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION

### 3.01 CLEARING

A. The surface of the ground for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, trees shall be preserved as hereinafter specified unless otherwise designated by the Town. Clearing operations shall be conducted to prevent damage to existing structures and installations and to those under construction, to provide for the safety of employees and others. Soil erosion control devices such as hay bales and silt fences shall be installed to satisfy all Federal, State and Town requirements.

### 3.02 GRUBBING

A. Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

### 3.03 STRIPPING

A. In areas so designated, topsoil shall be stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. The Town shall have the option to receive all excess topsoil materials. The Contractor shall pay all equipment and labor cost

to deliver excess topsoil material to a remote site chosen by the Town within a five-mile radius of the construction site. Should the Town not choose to receive any or all excess topsoil materials, the Contractor shall dispose of said material at no additional cost to the Town.

## 3.04 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

A. The Contractor shall dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris off site. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be considered a subsidiary obligation of the Contractor; the cost of which shall be included in the prices bid for the various classes of work.

## 3.05 PRESERVATION OF TREES

A. Those trees which are not designated for removal by the Town shall be carefully protected from damage. The Contractor shall erect such barricades, guards and enclosures as may be considered necessary by him for the protection of the trees during all construction operation.

## 3.06 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

A. The Contractor shall exercise extreme care to avoid unnecessary disturbance of developed private property adjacent to proposed project site. Trees, shrubbery, gardens, lawns and other landscaping, which are not designated by the Town to be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.

B. All soil preservation procedures and replanting operations shall be under the supervision of a nursery representative experienced in such operations.

C. Improvements to the land such as fences, walls, outbuildings and other structures which of necessity must be removed, shall be replaced with equal quality materials and workmanship.

D. The Contractor shall clean up the construction site across developed private property directly after construction is completed upon approval of the Town.

## 3.07 PRESERVATION OF PUBLIC PROPERTY

A. The appropriate paragraphs of these Specifications shall apply to the preservation and restoration of public lands, parks, rights-of-way, easements and all other damaged areas. This includes but is not limited to the trimming of trees damaged by Contractor's equipment.

END OF SECTION

# SECTION 02220
# EXCAVATION, BACKFILL, FILL AND GRADING FOR STRUCTURES

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. Structural excavation shall consist of the removal of material for the construction of foundations for structures and other excavation designated on the drawings or in these specifications.

B. Structural excavation and backfill shall consist of furnishing material, if necessary and placing and compacting backfill material around structures to the lines and grades designated on the drawings, as specified or directed by the Town.

C. Structural excavation and backfill shall include the furnishing of all materials, equipment and other facilities which may be necessary to perform the excavations, place and compact the backfill, install sheeting and bracing, and carry out any necessary dewatering. It shall also include the wasting or disposal of surplus excavated material in a manner and in locations approved by the Town.

D. The Contractor is responsible for the protection of every tree which is scheduled to remain in the project area. This includes trees which may or may not be shown on the plans. Every tree shall be adequately protected in place at no additional cost to the Town. This includes, but is not limited to, protecting the root systems and adjusting grades as necessary for tree/root protection.

### 1.02 QUALITY ASSURANCE

A. Testing Agency:

1. In place soil compaction tests shall be performed by a qualified testing laboratory.

2. Compaction tests shall be taken every 500 feet, except in the road crossings or road shoulders. Tests are to be taken according to current FDOT Standards.

B. Reference Standards:

1. American Society for Testing and Materials (ASTM):

a. ASTM D1557, Moisture-Density Relations of Soils Using 10-lb. (4.5-kg) Rammer and 18-in. (457-mm) Drop.

### 1.03 JOB CONDITIONS

A. The Contractor shall provide, operate and maintain all necessary pumps, discharge lines, well points, etc., in sufficient number and capacity to keep all excavation, bases, pits, etc., free from seepage, standing or running water at all times throughout the period of construction.

B. The Contractor shall assume all responsibility for the security of the excavation required, employing bracing, lining or other accepted means necessary to accomplish same.

C. Excavated areas shall be cleared of all debris, water, slush, muck, clay and soft or loose earth and shall be conditioned to the entire satisfaction of the Town.

D. All excavated material unsuitable for use or which will not be used shall be disposed of in a manner consistent with State and Town regulation.

E. All unsuitable organic materials, roots, logs, etc., found during excavation shall be removed by the Contractor and the trench shall be refilled with suitable material.

## PART 2 PRODUCTS

### 2.01 MATERIAL FOR CONTROLLED FILL

A. Composition: Only approved material free from organic matter and lumps of clay, shall be used for backfilling. Excavated earth free from debris or organic material may be used for backfilling foundations or fill.

B. Crushed stone and shell shall meet or exceed current FDOT Standards.

### 2.02 MATERIAL FOR SHORING AND SHEETING

A. Wood for shoring and sheeting shall be green, rough cut hardwood planking.

### 2.03 UNSUITABLE MATERIAL

A. Unsuitable material shall be defined as highly organic soil per ASTM D2487 Group PT. This includes, but is not limited to, such items as topsoil, roots, vegetable matter, trash, debris, and clays that cannot be dried sufficiently to obtain specified compaction.

## PART 3 EXECUTION

### 3.01 INSPECTION

A. The Contractor shall verify that work preceding the affected work of this Section has been satisfactorily completed.

B. Conditions adversely affecting the work of this Section shall be corrected to the satisfaction of the Town.

### 3.02 REMOVAL OF UNSUITABLE MATERIALS

A. The Contractor shall remove unsuitable material from within the limits of the Work.

B. Materials meeting requirements for controlled fill shall be stockpiled as necessary and in such a manner satisfactory to the Town.

C. All material excavated shall be placed to minimize interference with public travel and to permit proper access for inspection of the work.

### 3.03 EXCAVATION

A. When concrete or shell subbase footing is to rest on an excavated surface, care shall be taken not to disturb the natural soil. Final removal and replacement of the foundation material and subbase compaction to grade shall not be made until just before the concrete or masonry is placed.

B. When any structural excavation is completed, the Contractor shall notify the Town who will inspect the excavation. No concrete or masonry shall be placed until the excavation has been approved by the Town.

C. The elevations of the footing bottom and the base slab as shown on the Drawings shall be considered as approximate and the Town may order in writing, such changes in dimensions or elevations of the footings and slab base as necessary to secure satisfactory foundations.

D. All excavation shall be made within an area bounded by lines five feet outside and parallel to the exterior walls of the structure to allow for correct forming, shoring and inspection of foundation work. Pouring of concrete against earth side walls shall not be permitted.

E. If the ground is excavated below the grade called for by the Drawings or becomes unstable due to the Contractor's carelessness or operations, the ground shall be excavated to undisturbed native soil before continuing concreting operations.

F. If in the opinion of the Town, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the Town and if so directed, replaced by crushed stone or washed shell.

## 3.04 INSTALLATION OF SHORING AND SHEETING

A. The Contractor shall furnish, install and maintain sheeting and bracing required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below which is necessary for proper construction and to protect adjacent structures from undermining or other damage. If the Town determines that insufficient or improper supports have been provided, additional supports shall be installed at the expense of the Contractor. Compliance with such orders shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting. Should voids form, they shall be immediately filled and rammed.

B. The Contractor shall embed and leave in place all sheeting, bracing and other related items as shown on the Contract Drawings. The Town may direct that sheeting and bracing timber be cut off at a specified elevation. No additional payment or compensation shall be made for this work.

C. Sheeting and bracing not left in place shall be removed carefully in such manner as not to endanger other structures, utilities, property, or proposed construction.

D. The Town may order sheeting and bracing to be left in place; however, this shall not relieve the Contractor from liability for damages to persons or property due to negligence or the failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

E. The Contractor shall receive no payment other than that included in the pipe bid item price for any timber used for sheeting, bracing, or other related items.

## 3.05 STRUCTURAL BACKFILL

A. Structural backfill shall not be placed until the footings or other portions of the structure or facility have been inspected by the Town and approved for backfilling.

B. A minimum of 1-1/2" layer of lean concrete shall be placed as a working mat for the concrete base slabs and footings if required by the Town.

C. Fill shall be placed in uniform layers not more than 12" thick and compacted to a minimum of 98 percent of the maximum density determined by ASTM D1557, Method A or C, or as directed by the Town. The Contractor shall securely tamp the backfill with pneumatic rammer around all wall foundations. The method of compaction shall be satisfactory to the Town.

D. Compaction of structural backfill by ponding and jetting may be permitted when, as determined by the Town: the backfill material is of such character that it will be self-draining when compacted; foundation materials will not soften or be otherwise damaged by the applied water; no damage from hydrostatic pressure will result to the structure. Ponding and jetting within two feet below finished subgrade shall not be permitted in roadway areas. At the discretion of the Town, ponding and jetting may be permitted with compaction layers not to exceed four feet.

E. Surplus material not used on-site shall be removed and disposed of off-site by the Contractor. In no case shall surplus material be deposited on adjacent lands. Fill used for grading shall be placed in layers not to exceed 12 inches in thickness and shall be compacted to a density equal or greater to that of the surrounding natural ground.

## 3.06 BACKFILLING AROUND STRUCTURES

A. Common fill and structural fill are specified for use as backfill against the exterior walls of the structures. Fill shall be placed in layers having a maximum thickness of eight (8) inches in loose state and shall be compacted sufficiently to prevent settlement. If compaction is by rolling or ramming, material shall be wetted down as required. Where material can be suitably compacted by jetting or puddling, the Contractor may use one of these methods. No boulders shall be allowed to roll down the slopes and hit the walls.

B. Backfilling shall be carried up evenly on all walls of an individual structure simultaneously. A variation of two (2) feet in elevation will be the maximum allowable. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength. Backfilling shall be subjected to approval by the Town.

C. In locations where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the refill up to an elevation of at least one foot above the bottom of the pipes:

1. Place structural fill in such areas for a distance of not less than three feet either

side of the center line of the pipe in level layers not exceeding 6-inches in depth.

2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the Town.

3. Structural fill shall be of the quality specified under Part 2 of this Section.

D. The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the grading plan. No soft spots or uncompacted areas shall be allowed in the work.

E. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

## 3.07 FIELD QUALITY CONTROL

A. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM D1557, Method A or C.

END OF SECTION

# SECTION 02221
# TRENCHING, BEDDING AND BACKFILL FOR PIPE

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all dewatering, excavation, backfill, fill, grading, trench protection or other related work required to complete the piping work shown on the Drawings and specified herein. The work shall include but not be limited to vaults; duct conduit; pipe; roadways and paving; backfilling; required fill or borrow operations; grading; disposal of surplus and unsuitable materials; and all related work such as sheeting, bracing and dewatering.

B. Prior to commencing work, the Contractor shall examine the site and review test borings if available or undertake their own subsurface investigations and take into consideration all conditions that may affect their work.

C. The Contractor is responsible for the protection of every tree which is scheduled to remain in the project area. This includes trees which may or may not be shown on the Plans. Every tree shall be adequately protected in place at no additional cost to the Town. This includes but is not limited to protecting the root systems and adjusting grades as necessary for tree/root protection.

### 1.02 PROTECTION

A. Sheeting and Bracing in Excavations:

1. In connection with construction of underground structures, the Contractor shall properly construct and maintain cofferdams. These shall consist of: sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction and to protect adjacent structures, existing yard pipe and/or foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

2. Trench sheeting for pipes: no sheeting is to be withdrawn if driven below, mid-diameter of any pipe and no wood sheeting shall be cut off at a level lower than one foot above the top of any pipe unless otherwise directed by the Town. During the progress of the work, the Town may direct the Contractor in writing to leave additional wood sheeting in place. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given for an alternate method of removal.

3. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities,

existing piping, or property. Unless otherwise approved or indicated on the Drawings or in the Specification, all sheeting and bracing shall be removed after completion of the piping or structure, care being taken not to disturb or otherwise injure the pipeline or finished masonry. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools specifically made for that purpose, by watering, or as may otherwise be directed.

4. The Contractor shall construct, to the extent they deem it desirable for their method of operation, the cofferdams and sheeting outside the neat lines of the pipeline trench or foundation unless otherwise indicated on the Drawings or directed by the Town. Sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing and cofferdams shall be adequate to withstand all pressures to which the pipeline or structure will be subjected. Pumping, bracing and other work within the cofferdam shall be done in a manner to avoid disturbing any construction of the pipeline or the enclosed masonry. Any movement or bulging which may occur shall be corrected by the Contractor at their own expense so as to provide the necessary clearances and dimensions.

5. Drawings of the cofferdams and design computations shall be submitted to the Town and approved prior to any construction. However, approval of these drawings shall not relieve the Contractor of the responsibility for the cofferdams. The drawings and computations shall be prepared and stamped by a Registered Professional Engineer in the State of Florida and shall be in sufficient detail to disclose the method of operation for each of the various stages of construction, if required, for the completion of the pipeline and substructures.

B. Dewatering, Drainage and Flotation

1. The Contractor shall construct and place all pipelines, concrete work, structural fill, bedding rock and limerock base course, in-the-dry. In addition, the Contractor shall make the final 24" of excavation for this work in-the-dry and not until the water level is a minimum of 18 inches below proposed bottom of excavation.

2. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavation and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations. At all times during the construction operations, the groundwater levels shall be maintained at an elevation 18 inches below the lowest level where structures are being installed.

3. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

4. Wellpoints may be required for dewatering the soil prior to final excavation for deeper in-ground structures or piping and for maintaining the lowered groundwater level until construction has been completed to avoid the structure, pipeline, or fill from becoming floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from wellpoints shall be continuous and standby pumps shall be provided.

5. The Contractor shall furnish all materials and equipment to perform all work required to install and maintain the proposed drainage systems for handling groundwater and surface water encountered during construction of structures, pipelines and compacted fills.

6. Prior to excavation, the Contractor shall submit their proposed method of dewatering and maintaining dry conditions to the Town for approval. Such approval shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The Contractor shall be responsible for correcting any disturbance of natural bearing soils for damage to pipeline or structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.

7. As part of their request for approval of a dewatering system, the Contractor shall demonstrate the adequacy of the proposed system and wellpoint filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one-quart sample. Discharge water shall not flow directly into wetlands or Waters of the State as defined by FDEP and SWFWMD.

8. During backfilling and construction, water levels shall be measured in observation wells located as directed by the Town.

9. Continuous pumping will be required as long as water levels are required to be below natural levels.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. General

1. Materials for use such as fill and backfill shall be described below and shall be from an FDOT certified pit. For each material, the Contractor shall notify the Town of the source of the material and shall furnish the Town, for approval, a representative sample weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of such material.

2. Additional materials shall be furnished as required from off-site sources and hauled to the site.

B. Bedding - shall conform to FDOT Standard Specifications for Road and Bridge Construction, Section 901 Coarse Aggregate, and shall be either coarse aggregate

of Size No. 57 or coarse sand of Size No. 9. Washed shell size No.57 may be used as an alternate bedding material.

C. Structural Fill

1. Structural fill in trenches shall be used below spread footing foundations, slab-on-grade floors and other structures as backfill within three feet of the below grade portions of structures.

2. Shall be either soil classification A-1, A-2 or A-3, per AASHTO M-145, and shall be free of organic matter, lumps of clay or marl, muck, compressible materials, and rock exceeding 2.5 inches in diameter. Broken concrete, masonry, rubble or other similar materials shall not be used as backfill. Minimum acceptable density shall be 98 percent of the maximum density as determined by AASHTO T-180.

D. Selected Common Fill - shall have the same material classification and requirements as Structural Fill, as described above.

E. Common Fill

1. Shall be either soil classification A-1, A-2, A-3, A-4, A-5 or A-6, per AASHTO M-145, and shall be free of organic matter, lumps of clay or marl, muck, compressible materials and rock exceeding 2.5 inches in diameter. Broken concrete, masonry, rubble or other similar materials shall not be used as backfill.

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

E. Unsuitable Material - soil classification A-7 and A-8, per AASHTO M-145, shall not be used as backfill material.

## PART 3 EXECUTION

## 3.01 EXCAVATION

A. Excavate trenches and pits for structures to the elevations indicated on the construction drawings. Take special care to avoid over-excavating or disturbing the bottom of the trench or pit, so that the soil at the bottom of the hole remains in a naturally compacted condition. Excavate to widths sufficient to provide adequate working room to install the required structures. Do not excavate the final layer of soil to the designed grade until just before placing the bedding, foundation, pipe, structure, or masonry work required. Remove boulders, rocks, logs or any unforeseen obstacles encountered.

B. In case the foundation soil found at the bottom of the trench or pit is soft, plastic or mucky, or does not conform to the soil's classification specified as suitable foundation material, over-excavation to a greater depth will be required. Soils not

meeting the classification required for foundation material shall be removed to a depth at least four inches below the bottom of the pipe, bedding or structure bottom elevation. Rock, boulders or other hard or lumpy material shall be removed to a depth 12 inches below the bottom of the pipe, bedding or structure bottom elevation. Remove muck, clay or other soft material to a depth as needed to establish a firm foundation.

C. Where possible, the sides of trenches should be vertical up to at least the spring line of the installed pipe.

D. Trench excavation shall be performed in accordance with Florida Statute Title XXXIII, Chapter 553, Part III, Trench Safety Act.

## 3.02 BACKFILLING

A. Backfill materials shall be placed on solid, firm, naturally compacted or compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180, dry or dewatered in place soil foundations.

B. Where over-excavation is required due to nonconforming soil classification or rocky, unstable, or otherwise undesirable soil conditions, place Structural Fill or Selected Common Fill in the over-excavated zone up to the base of the bedding material layer. Compact the over-excavated zone to 98 percent of the maximum dry density of the material as determined by AASHTO T-180.

C. When backfilling in an over-excavated zone where moist or watery conditions exist, backfill shall be coarse No. 9 sand or a mixture of No. 57 coarse aggregate with either No. 9 coarse sand, A-1, or A-3 material.

D. After compaction, backfill material in the over-excavation zone shall form a solid and firm foundation on which to build up successive layers of backfill and structures.

E. Bedding materials shall be placed on solid, firm soil foundations and shall be compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180.

F. Concrete and masonry structures shall be backfilled using Structural Fill. Backfilling and compaction shall be underneath the structure and carried up evenly on all walls of an individual structure simultaneously. The maximum allowable difference in backfill elevations shall be two feet. No backfilling shall be allowed against concrete or masonry walls until the walls and their supporting slabs have been in place at least seven days or until the specified 28-day strength has been attained. Compaction of Structural Fill underneath the base and along the walls shall be 98 percent of the maximum dry density of the material as determined by AASHTO T-180. The Structural Fill shall be either dried or shall have water added so that the moisture content of the material is within a range that will allow the required density to be achieved.

G. Trenching backfill for pipe installation shall be Selected Common Fill for the pipe bedding zone. The pipe bedding envelope shall begin at the level four inches, six inches, or nine inches, depending on pipe diameter, below the bottom of the pipe,

and shall extend vertically up to a level 12 inches above the top of the pipe. Where the in-place soil material within the four-inch, six-inch, or nine-inch pipe bedding zone beneath the bottom of the pipe meets the soil classification for Selected Common Fill, undercutting of the trench below the bottom of the pipe will not be required. In this case, loosen the soil at the bottom of the trench immediately below the middle third of the pipe diameter, and place the pipe upon it.

1. Where the in-place soil material within the pipe bedding zone does not meet the soil classification for Selected Common Fill, undercutting shall be required, and the bedding zone shall be backfilled with Selected Common Fill. In this case, place the pipe bedding material and leave it in a moderately firm uncompacted condition under the middle third of the pipe diameter, and compact the outer portions of the trench bottom to 98 percent of the maximum dry density.

2. Soils that were over-excavated due to rocky, soft or otherwise unsuitable soil foundation conditions shall also be replaced with Selected Common Fill.

3. Compaction of Selected Common Fill shall be 98 percent of the maximum dry density as determined by AASHTO T-180. Such backfill material shall have an optimized moisture content that will allow the required density to be achieved.

H. Excavate for pipe bells before laying pipe. Lay pipe true to the lines and grades indicated on the construction plans. Place backfill material on both sides of the pipe and compact to 98 percent of the maximum dry density of the material as determined by AASHTO T-180. Take special care to effectively fill and compact the material in the haunch areas under the sides of the pipe.

I. For pipes that are not installed under roadways or driveways, trenching backfill for pipe installation shall be Common Fill above the pipe envelope zone, and shall be compacted to 95 percent of the maximum dry density of the material as determined by AASHTO T-180, and shall have moisture content optimized to allow the required density.

J. For pipes that are installed under roadways or driveways, trenching backfill for pipe installation shall be Selected Common Fill above the pipe envelope zone, and shall be compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180, and shall have moisture content optimized to allow the required density.

K. Selected Common Backfill shall be placed in layers not to exceed 6 inches. Common Backfill shall be placed in layers not to exceed 12 inches.

L. Backfill compaction tests shall be performed every 500 feet in pipeline trenches and for every utility structure. Test reports shall be presented to the Town Inspector.

## 3.03 GRADING AND CLEAN UP

A. Surplus and unsuitable soil materials not used on-site shall be removed and disposed of off-site in a manner that is consistent with state and local regulations. In no case shall surplus or unsuitable material be deposited on-site or on adjacent lands.

B. The surface of backfilled areas shall be graded smooth and true to the lines and grades indicated on the construction plans. No soft spots or uncompacted areas shall be allowed in the work.

C. Upon completion of the work, leave the work areas and all adjacent areas in a neat and presentable condition, clear of all temporary structures, rubbish and surplus materials. Pile any salvageable materials that have been removed in neat piles for pickup by the Town's crews, unless otherwise directed.

END OF SECTION

# SECTION 02223
# EXCAVATION BELOW GRADE AND CRUSHED STONE OR SHELL REFILL

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. If in the opinion of the Town, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the Town and replaced by crushed stone or washed shell.

## PART 2 PRODUCTS (NOT USED)

## PART 3 MATERIALS

### 3.01 EXCAVATION AND DRAINAGE

A. Whatever the nature of unstable material encountered or the groundwater conditions, trench stabilization shall be complete and effective.

B. Should the Contractor excavate below the grade shown on the Contract drawings, because of negligence or for their own convenience, and due to failure in properly dewatering the trench disturbs the subgrade before dewatering is sufficiently complete, they shall be directed by the Town to excavate below the grade shown. The work of excavating below grade and furnishing and placing the approved refill material shall be performed at the Contractor's expense.

### 3.02 REFILL

A. Soils not meeting the classification required for foundation material shall be removed to a depth at least four inches below the bottom of the pipe, bedding or structure bottom elevation. Rock, boulders or other hard or lumpy material shall be removed to a depth 12 inches below the bottom of the pipe, bedding or structure bottom elevation. Remove muck, clay or other soft material to a depth as needed to establish a firm foundation.

END OF SECTION

# SECTION 02325
# ROAD AND RAILROAD CROSSINGS

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, equipment, materials and incidentals required to install road or railroad crossings as shown on the Drawings and as specified herein.

### 1.02 OPERATIONS ON TOWN OF LONGBOAT KEY OR STATE OF FLORIDA PROPERTY

A. All work affecting the Town of Longboat Key, Florida Department of Transportation, any other governmental agency's right-of-way or facilities, or railroad right-of-way shall be carried out to the full satisfaction of the applicable Department's authorized representative. The Contractor shall be responsible to meet any and all requirements of the Department of Transportation, railroad, or other agency pertaining to the specific project and shall conduct all their work accordingly.

B. Prior to the start of the jacking operation, a detailed jacking plan shall be submitted to the Town for review and approval. No work shall be permitted until the submittals are accepted. A Bore Path Report shall be submitted within three (3) days of completion of the bore.

C. Prior to construction, a minimum of three (3) working days written notice prior to the start of the actual work shall be given to the Town and to the Florida Department of Transportation or other applicable agency.

D. The Contractor shall install, maintain and leave in place any sheeting, underpinning, cribbing and other related items (other than that required for the jacking pits) to support any structures or facility on the right-of-way owned by either the Town, Florida Dept. of Transportation or other governmental agency or railroad entity. The Contractor, at their expense, may be directed by the Department of Transportation, other applicable agency, or the Town, to leave sheeting in place.

E. The Contractor shall perform all necessary soil test borings to determine actual soil conditions and shall utilize the results of said borings to determine the procedures required for each jack and bore operation, including, but not limited to, the presence of rock and necessary dewatering requirements.

F. No wires, equipment, or other appurtenances shall be permitted to be placed across or pass across State property without the express written permission of the Department of Transportation’s authorized representative.

G. All equipment used by the Contractor on State property may be inspected by the State and shall not be used if it is deemed unsatisfactory by an authorized State representative. State highways shall be kept free of obstructions at all times.

H. No blasting shall be permitted under or adjacent to any State highways.

I. The Contractor shall be responsible for all damages arising from their negligence or failure to comply with any State or Town regulations or requirements or deviations from the Contract Documents.

J. All State highway crossings shall be performed and completed in a manner fully satisfactory to the Department of Transportation and the Town.

## 1.03 SHOP DRAWINGS

The Contractor shall furnish working drawings showing all fabrication and construction details for the jacked crossings.

## 1.04 SUBMITTALS

A. Contractor shall submit a Jacking Plan that includes the following:

1. Site layout plan for entry and exit pit locations, drawn to scale, depicting the position of all required equipment, access points, existing facilities to remain in place, existing traffic lanes to be maintained in operation, office trailers and storage sites.

2. Qualification information on jack/bore contractor.

3. Manufacturer's information on equipment to be used.

4. Methods and materials for retaining walls for jacking and receiving pits.

B. Bore Report that details final alignment, dimensions, and record documentation.

# PART 2 PRODUCTS

## 2.01 MATERIALS

A. Sleeve, carrier pipe, skids, insulation, bulkheads, etc. shall be per contract plans.

# PART 3 EXECUTION

## 3.01 JACKING SLEEVE

A. The Contractor shall provide all labor, material, equipment and appurtenances required for jacking the sleeves beneath the roadway or railroad tracks. The steel sleeve shall be welded steel pipe and jacked in one continuous operation at the locations shown on the drawings. Once the operation starts, jacking shall not be discontinued. Proper alignment and elevation of the sleeves shall be consistently maintained throughout the jacking operation.

B. The Contractor shall shore the jacking pits with sheeting, or such other materials as required. Sheeting shall be driven to a sufficient depth below the invert of the steel sleeve to resist any pressure developed by the soil outside the jacking pit. Sheeting shall terminate not less than 3-feet, 6-inches above existing grade.

C. The sections of steel sleeve shall be field welded in accordance with the applicable portions of AWWA C-206 for field welded water pipe joints. Steel sleeve shall receive one coat of Tnemec 46H-413 Hi-Build Tnemec-tar applied in accordance with manufacturer's recommendation.

D. At the completion of the jacking operations, the Contractor shall be required to leave all sheeting in place. The top of the sheeting shall be cut off 36-inches below finished grade.

E. The Contractor shall be responsible for preventing voids outside the steel sleeves. Should they occur, the Contractor may be directed to fill them with grout in a method approved by the Town. The Contractor shall exercise care in the sleeve removal to prevent voids.

F. The Contractor shall be responsible for furnishing, installing and removing the thrust block or restraint which was employed in driving the sleeve forward. No additional payment for the jacking restraint shall be made other than the unit price for this item. The entire jacking operation shall be discussed and accepted by the Town prior to commencing jack and bore operation. After completion, the backup structures shall be removed in part or whole to permit construction of the pipeline in the sleeve.

## 3.02 INSTALLING PIPE IN SLEEVE

A. The Contractor shall install the pipe in full conformity with the Contract Documents. The pipe shall be installed to the lines and grades required within the sleeve and placed to the approval of the Town. The pipe shall be braced to the side and the top of the sleeve to prevent flotation or motion.

B. A bulkhead shall be placed at the ends of the sleeve to keep the surrounding soil and material from migrating into the voids in the sleeve.

## 3.03 TESTING

A. The pipe shall be tested as provided in the Contract Document.

END OF SECTION

# SECTION 02616
# DISINFECTING POTABLE WATER PIPE LINES

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and incidentals required to clean and disinfect potable water pipe lines. This work is required to place all types of pipe into service as potable water lines.

### 1.02 CLEANING WATER MAINS

At the conclusion of the work, the Contractor shall thoroughly clean all of the new pipes to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period per Section 02618.

### 1.03 DISINFECTING & BACTERIOLOGICAL TESTING OF POTABLE WATER PIPE LINES

A. All record drawing requirements must be submitted to the Town prior to starting the bacteriological testing of the water lines.

B. After the new potable water pipelines have been hydrostatically tested, or after existing potable water pipelines have been modified or repaired, they shall be cleaned, disinfected and sampled and tested for the presence of coliform organisms in accordance with AWWA C651.

C. The Town Inspector shall have been notified and shall be present at the time of the introduction of the chlorine disinfectant and water from the supply system into the main.

D. At the end of the chlorine contact period, the chlorine residual shall be determined by sampling and testing, and the results shall be reported to the regulatory agencies with the Town and State. The Town Inspector and/or Engineer of Record shall have been notified and shall be present at the time of the sampling and testing. The pipelines shall then be flushed thoroughly with clean potable water until chlorine measurements show that the concentration is no higher than the chlorine concentration that is acceptable for domestic use.

E. Discharge flows from cleaning or flushing operations, and heavily chlorinated water from disinfecting operations, shall be disposed of in a manner consistent with US EPA, FDEP and SWFWMD regulations. Chapter 62-302 F.A.C. water quality standard for residual chlorine in Class III waters is <0.01 mg/L (ppm).

F. After final flushing and before the new main is connected to the distribution system, sampling and analysis of the replacement water shall be performed by an approved laboratory or by the Department of Health. Sampling locations shall be as required by AWWA C651 or as determined by the FDEP representative. Pipelines that are tested and return an unsatisfactory test result shall be reflushed and resampled, or

redisinfected, or otherwise reconditioned, until a satisfactory result is attained. Additionally flushing, testing and sampling shall be performed at no additional cost to the Town.

G. No potable water main shall be placed into service until the results of the bacteriological tests are satisfactory and the FDEP has provided the Town with a written letter of acceptance. Potable water services, fire service, and fire hydrant leads that are exempt from a permit from the FDEP but still require bacteriological sampling in accordance with Chapter 62-555, Florida Administrative Code, shall not be placed into service until the results of the bacteriological tests are satisfactory and the Town of Longboat Key Public Works Department has provided written acceptance.

H. Special disinfecting procedures, when approved by the Town, may be used where the method outlined above is not practical.

END OF SECTION

# SECTION 02617
# INSTALLATION AND TESTING OF PRESSURE PIPE

## PART 1 GENERAL

A. Reference Section 1.9, Installation of Pipelines in the Manatee County Public Works Utility Standards Part 1-Utility Standards Manual.

## 1.01 GENERAL

A. Furnish and install pipe, fittings, valves, fire hydrants, services, and all other appurtenances and incidentals complete and in-place as required by the construction drawings.

B. All pipe crossing state or federal roads or local arterials & thoroughfares shall be installed in a casing pipe.

C. Trees shall not be planted or located within 10 feet of any potable water main, reclaimed water main, sanitary force main or gravity sanitary sewer main that is owned and maintained by Town. With prior approval, an approved root barrier may be used with 5 feet of clearance.

D. All distribution waterlines that enter private property become private lines and have a back-flow preventer (BFP) installed at the right-of-way. BFP can be part of a meter assembly or a BFP / detector check assembly.

## 1.02 HANDLING AND STORAGE

A. Prior to installation, all pipe and fittings shall be inspected. Cracked, broken, or otherwise defective materials not in compliance with these standards shall not be used and shall be removed from the project site.

B. The pipeline installer shall take care in the handling, storage and installation of the pipe and fittings to prevent injury to the materials or coatings. Use proper implements, tools and facilities for the safe and proper protection of the work. Lower the pipe and fittings from the truck to the ground and from the ground into the trench in a manner to avoid any physical damage. Under no circumstances shall the pipe or fittings be dropped onto the ground or into the trenches.

C. The pipeline installer shall not distribute material on the job site faster than it can be used to good advantage. Unless otherwise approved by the Town, the installer shall not distribute more than one week's supply of material in advance of laying. Any materials not to be installed within two weeks of delivery shall be protected from the sunlight, atmosphere and weather by suitable enclosures or protective wrapping until ready for installation. Stored PVC pipe shall be placed on suitable racks with bottom tiers raised above the ground to avoid damage. Storage of pipe on the job site shall be done in accordance with the pipe manufacturer's written instructions.

## PART 2 PRODUCTS

2.01 Pipe, fittings, valves, accessories, and appurtenances shall be furnished in accordance with the Contract Documents.

## PART 3 EXECUTION

### 3.01 PREPARATION

A. All excavation and backfill shall be as shown on the Drawings and specified in Section 02221, Trenching, Bedding and Backfill for Pipe.

### 3.02 SURVEY MARKINGS

A. As a marker for the Surveyor, a PVC pipe marker or 2" x 4" marker shall be inserted by the Contractor on the top of pipe for potable water mains, reclaimed water mains and sanitary force mains at intervals no greater than 200 feet apart and at locations where there is a substantial grade change. The pipe markers shall indicate the pipe diameter and shall be labeled PWM in "safety" blue, RWM in purple, and FM in green, for potable water mains, reclaimed water mains and sanitary force mains, respectively. The Contractor is responsible for making the aforementioned markers available to the Surveyor. The Contractor shall field locate the mains and fittings when markers are not made available to the Surveyor.

B. As a marker for the Surveyor, a PVC pipe marker or 2" x 4" marker shall be inserted by the Contractor on the top of all pipe fittings (other than sanitary sewer service wyes, potable water saddles and reclaimed water saddles). The markers for fittings shall indicate the type of fitting and shall be labeled PWF in "safety" blue, RWF in purple, and FMF in green, for potable water fittings, reclaimed water fittings, and sanitary force main fittings, respectively. The Contractor is responsible for making the aforementioned markers available to the Surveyor. The Contractor shall field locate the mains and fittings when markers are not made available to the Surveyor.

### 3.03 PROCEDURE FOR TESTING WATER LINES, FORCE MAINS AND RECLAIMED WATER LINES

A. A 48-hour notice (2 full business days) is needed prior to testing. A letter stating the reasons testing should be scheduled ahead of other jobs must accompany all emergency testing requests.

B. Hydrostatic Testing

1. After the water mains, reclaimed water mains or sewer force mains are installed complete, and the fire hydrants, valves, fittings, blow-offs and restraining devices are permanently installed, and the trenches are backfilled, the new pipelines shall be tested hydrostatically for leakage.

2. Contractor shall submit detailed test procedures and method for Engineer's review. In general, testing shall be conducted in accordance with AWWA C605. The method and procedures for performing the hydrostatic pressure test shall be approved by the Engineer. Submit the plan for testing to the Engineer at least 10 (ten) days before starting a test.

3. The Town Inspector shall have been notified and shall be present during hydrostatic testing procedures. The Contractor and an Engineer of Record representative shall also be present during the tests.

4. All excavations for any utility pipes or cables within the rights-of-way or easements must be complete before a hydrostatic test is performed. Any subsequent digging or boring across the water, sewer or reclaimed pipelines after they have been tested shall result in a requirement for the pipelines to be retested.

5. All mains to be tested shall be cleaned as specified to remove all dirt, stones, pieces of wood or any other material which may have entered the lines during construction. Any obstructions remaining shall be removed.

6. Pipelines to be tested shall have been allowed to remain in place undisturbed for at least 24 hours to allow time for all joints to develop a complete seal. All potable water services and reclaimed water services are to be installed complete with curb stops and meter boxes prior to beginning the test. Gate valves on fire hydrant laterals shall be opened so that the test pressure bears against the closed hydrant valve.

7. Discharged flows from cleaning or flushing operations shall be disposed of in a manner consistent with US EPA, FDEP, and SWFWMD regulations.

8. Only one connection to the existing water supply system shall be allowed prior to acceptance of the main. Connection shall be made through a Town approved backflow prevention assembly. Air shall be expelled completely from the section of pipeline to be tested. If air cannot be fully expelled, ARV's shall be required at the high points to ensure proper function of the mains. After the hydrostatic test has been successfully completed, the corporation stops, located at the temporary jumper connection, are to be closed and plugged with brass or PVC stops.

9. The hydrostatic test duration shall be at least two hours. The test pressure at the beginning of the test shall be 180 psi for water mains and reclaimed water mains and shall be 150 psi for sewer force mains. The water supply, and the water supply pump, shall be disconnected during the test. The test pressure shall not vary by more than plus or minus 5 psi during the test. If the pressure drops 5 psi, makeup water shall be pumped into the test pipeline section during the test duration to maintain the pressure to within 5 psi of the test pressure and the amount of leakage measured. The total amount of makeup water added shall be measured and shall be compared to the allowable leakage.

10. The allowable leakage measured during the test duration for DI and PVC pipe shall be as determined by the following formula:

$$L = \frac{SD\sqrt{P}}{148{,}000}$$

where,

L = testing allowance (makeup water), gallons per hour
S = length of pipe tested, feet
D = nominal pipe diameter, inches
P = test pressure, psi (gage)
or, as determined by Table 5A of the Hydrostatic Testing section of AWWA C600.

11. The maximum length of pipe to be hydrostatically tested shall be 2,600 feet. If an exception to this rule is granted by the Town's authorized representative, and a length of pipeline greater than 2,600 feet is tested, the allowable leakage will still be figured for a 2,600-foot length of pipeline.

12. Any exposed pipe sections, valves, fittings, hydrants, services and pipe joints shall be carefully observed during the test duration. All visible leaks shall be repaired, regardless of the amount of leakage.

13. Any damaged or defective pipeline components that are discovered after the hydrostatic testing shall be repaired or replaced with standard materials, and the test shall be repeated until a satisfactory test result is achieved. Any modifications to the new pipeline made after a successful hydrostatic test has been performed shall be cause for a new hydrostatic test of the same pipeline to be performed again.

14. No pipeline installation shall be accepted if the amount of make-up water is greater than the allowable leakage. In the event of a failed test result, locate all leaks and make repairs or replacements as required, and retest the pipeline until the leakage is within the allowable limit.

15. When the test has been completed successfully, blow off the pressure from the opposite end of the line from the water supply connection, to demonstrate the limits of the length of pipeline subjected to testing. Also, flush water from all hydrants, services and blow-offs, to demonstrate that they were on-line during the test.

## 3.04 INSPECTION/TESTING PROCEDURE COVERING BORED PIPELINES OR CASING AND CONDUITS INSTALLED ACROSS PREVIOUSLY TESTED AND/OR TOWN ACCEPTED WATER AND SEWER PIPE WITHIN DEVELOPMENT PROJECTS UNDER ACTIVE CONSTRUCTION

A. Prior to testing water and sewer lines, every effort will be made to install sleeves for underground utilities that will cross these water and sewer lines or services.

B. Where it has not been possible to pre-install sleeves prior to testing and bores or conduits are required, it is the responsibility of the utility company and/or their Contractor performing the work to provide the Town of Longboat Key Public Works Department or the Engineer of Record with accurate horizontal and vertical as-built

information of the sleeves, bores and conduits installed by said utility company. This applies to all bores and conduits crossing water and sewer lines.

C. Procedures to be followed for installation of conduits, pipelines and bores that will cross, or be closer than 5'-0" horizontally and 18 inches vertically to, previously tested water and sewer lines that are still under the ownership of the developer/contractor.

1. Notify the Town and obtain the best as-built information available. Allow sufficient time for the Town to field locate the existing pipelines.

2. Submit drawings of proposed location to the Town for review.

3. Perform installation in the presence of a Town representative. Notify the Public Works Department at least 48 hours (2 business days) prior to installation.

4. Submit two (2) copies of as-built information to the Town for record drawings.

5. Failure to follow steps 2) thru 5) will result in additional charges for retesting the previously tested water and sewer lines.

D. Procedures to be followed for installation of conduits, pipelines and bores crossing or closer than 5'-0" horizontally and 18 inches vertically to previously tested water and sewer lines that have been previously accepted by the Town:

1. Obtain record drawing information from the Town.

2. Follow procedures in "Sunshine State One-Call", paying special attention to the requirements of Section VII.

E. Should water or sewer lines be damaged during the bore pipeline or casing installation, the cost of any repairs and retesting will be paid for by the utility company that installed the bore. The actual clearance between a bored casing crossing a water or sewer pipe should not be less than 18 inches.

## 3.05 DETECTION

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

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

END OF SECTION

# SECTION 02618
# PIPELINE CLEANING

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to clean all new lines 4" and larger, and existing pipelines as specified in this specification and as indicated on the Drawings.

### 1.02 RELATED WORK

A. The Contractor is responsible for all necessary supply water.

B. The Contractor is responsible for all necessary bypass pumping.

C. The Contractor is responsible for the proper disposal of any materials removed from the pipe lines as a result of the cleaning procedure.

### 1.03 SUBMITTALS

A. The Contractor shall submit, prior to construction, a cleaning plan, Shop Drawings, and layout diagram for approval to the Town.

B. The Contractor shall submit to the Town a list of materials to be furnished, and the names of suppliers.

### 1.04 QUALIFICATIONS

A. The Contractor performing this work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner.

B. The Contractor shall also be capable of providing crews as needed to complete this work without undue delay.

C. The Town reserves the right to approve or disapprove the Contractor, based on the submitted qualifications.

## PART 2 PRODUCTS

### 2.01 GENERAL

A. The Contractor shall be responsible for furnishing pigs in sufficient numbers and sizes, of appropriate densities, coatings and configurations to properly clean the piping systems.

B. All pigs used for the cleaning of sewer or reclaimed water lines shall not be used in the cleaning of potable water lines.

## 2.02 MATERIALS

A. The pig launching and retrieval equipment shall be of the latest design and construction and shall include the means to maintain constant monitoring of the in-line flows and pressures of the system being cleaned and the constant location of the cleaning pigs in the system. Launching and retrieval systems shall be fabricated, designed and manufactured according to ANSI standards and capable of withstanding working pressures of 150 psi. Launching and receiving devices shall be sized one diameter larger than the system to which it will be attached with a minimum length of 2.5 times the diameter.

B. The Contractor shall have available for immediate use an electronic pig detector for use in the system being cleaned to provide a means of tracking the passage of the pig in the system to locate areas of potential or suspected blockage and other disparities in the system.

C. The pig shall be constructed of elastomer polyurethane with an open cell construction and a density equal to or suitable for use in the piping system being cleaned. Pig configuration shall consist of a parabolic nose with a concave base and coated with a resilient surface material that will maintain a peripheral seal and will effectively clean the piping system without over abrading the interior pipe wall. Pig characteristics shall include the ability to navigate through 90-degree bends, 180 degree turns, bi-directional fittings, full port valves, reduce its cross-sectional area and return to its original design configuration and be propelled by hydraulic pressure.

# PART 3 EXECUTION

## 3.01 PIPELINE CLEANING

A. The cleaning of the pipe line shall be done by the controlled and pressurized passage of a polyurethane pig of varying dimensions, coatings and densities as determined by the Town through the piping system.

B. A series of pigs shall be entered into the system at a point as near to the beginning as is logistically and mechanically feasible.

C. A launching assembly shall be used as the entrance point for the pig. This assembly shall allow for the following:

1. The entering of pigs into the system by providing the means to induce flow from an external source, independent of the flows and pressures immediately available from the system, on the back of the pig to develop sufficient pressure to force the pig through the system.

2. A means to control and regulate the flow.

3. A means to monitor the flows and pressures.

4. A means to connect and disconnect from the system without any disruption to the operation of the system.

D. The pig shall be removed or discharged from the system at a point as near to the end as is logistically and mechanically feasible.

E. The Contractor shall be responsible for the retrieval of the pig at the discharge point. This may include setting a trap that will not disrupt normal flow and operations but will capture the pig and any debris. A retrieval assembly may also be used but said assembly shall be able to connect and disconnect from the system without any disruption to the operation of the system.

F. Alternative launching and retrieval methods shall be done with the prior approval of the Town.

G. Any pig that cannot progress through the piping system shall be located by the Contractor and removed by excavation of the pipe in order to remove the blockage. All pipe repairs shall be the responsibility of the Contractor and shall be performed with as little disruption to the system as possible.

H. Any increase in pressure that cannot be accounted for, i.e. fittings or valves or additional cleaning runs, shall be investigated, per the Engineers' approval, by locating the pig at the beginning of the increased pressure and excavating to determine the cause of the pressure increase. All pipe repairs shall be the responsibility of the Contractor and shall be performed with as little disruption to the system as possible.

I. Final flushing of the cleansed lines shall be performed after the last successful run of the pig as determined by the Town. The Contractor shall be responsible for all applicable flushing and disinfection requirements for potable water lines.

## 3.02 ACCEPTANCE

A. The Contractor shall maintain and provide a report at the end of the cleaning procedure containing the following:

1. The pressures in the pipe during the pigging procedure.

2. Any inline problems encountered during the procedure including all excavations with detailed locations, reason for the excavation and any corrective measures taken to the pipeline.

3. A record of the pigs used, their sizes, styles and other pertinent information regarding what materials were used during the cleaning.

4. An analysis of the condition of the pipeline before and after the cleaning procedure.

END OF SECTION

# SECTION 02622
# POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS
# (AWWA SPECIFICATIONS C-900)

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to install the PVC piping, ductile iron fittings, and appurtenances complete and ready for use as indicated on the Drawings.

B. Provide and install complete all fittings and appurtenances not noted specifically on the Drawings as required to complete the utility system in accordance with these Standards.

### 1.02 DESCRIPTION OF SYSTEM

A. The Contractor shall install the piping in the locations as shown on the Drawings.

### 1.03 QUALIFICATIONS

A. All plastic pipe, fittings, and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, qualified, and specializes in the manufacture of the items to be furnished. The pipe and fittings shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications.

### 1.04 SUBMITTALS

A. The Contractor shall submit shop drawings to the Town including, but not limited to, dimensions and technical specifications for all piping.

B. The Contractor shall submit to the Town, samples of all materials specified herein.

C. The Contractor shall submit and shall comply with pipe manufacturer's recommendation for handling, storing and installing pipe and fittings.

D. The Contractor shall submit pipe manufacturer's certification of compliance with these Specifications.

### 1.05 TOOLS

A. The Contractor shall supply special tools, solvents, lubricants, and caulking compounds required for proper installation.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Polyvinyl chloride (PVC) pressure pipe shall be C900-16, meeting the requirements of AWWA C900 used for potable and reclaimed water. Mains shall be cast-iron-pipe-equivalent outside diameters (also known as ductile iron pipe size (DIPS)). Each length of pipe shall be hydrostatically tested to four times its pressure class of the pipe by the manufacturer in accordance with AWWA C900.

B. For pressure sewer, Polyvinyl chloride (PVC) pressure pipe, 4-36 inches in diameter, shall be ductile iron pipe size (DIPS), Class 235, DR 18, meeting the requirements of AWWA C900-16. 14" Diameter pipe shall only be used with the written approval by Town of Longboat Key. Each length of pipe shall be hydrostatically tested at twice its pressure class in accordance with AWWA C900-16. Pipe shall be furnished in standard lengths of approximately 20 feet.

C. Standard PVC pressure pipe joints shall be bell and spigot push-on type with elastomeric ring seals. Ring seal gaskets used at push-on joints shall conform to ASTM F 477 and shall be EPDM rubber for potable and reclaimed water pipes.

E. Lubricant furnished for lubricating the push-on joints in potable water pipes shall be nontoxic, water soluble, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material, and shall not impart color, taste, or odor to the water, and shall be an approved substance per NSF 61.

F. Thrust restraint devices shall be provided at all horizontal and vertical bends and fittings, in casings under roads and railroads and at other locations as indicated on the Drawings. Thrust restraint devices for PVC pipe and fittings shall be either concrete thrust blocks or restraining glands as manufactured by Star Pipe Products, PVC Stargrip 4000 and 4100, or as manufactured by EBAA Iron Sales, Megaflange, 2000PV or other approved equal restraining gland products. Restrained joints, where used, shall be installed at bend and fitting locations and at pipe joint locations both upstream and downstream from bends or fittings at distances as required by these Standards.

G. All fittings for PVC pipe shall be ductile iron or gray iron with mechanical joints and shall conform to AWWA C110 or AWWA C153 and to the applicable sections of these Standards for ductile iron and gray iron fittings.

H. All pipe materials used in potable water systems shall comply with NSF Standards 61 and 372.

## PART 3 EXECUTION

### 3.01 INSTALLATION

A. The Contractor shall install the plastic pipe in strict accordance with the manufacturer's technical data and printed instructions.

B. Pipe shall be installed in accordance with the Drawings and Section 02617, Installation and Testing of Pressure Pipe.

### 3.02 DETECTION

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

B. PVC pipe shall have a No. 10 gauge solid, insulated wire of proper color installed along the pipe alignment as detailed in these Standards.

## 3.03 IDENTIFICATION

A. PVC pipe shall bear identification markings in accordance with AWWA C900 or ASTM D2241.

B. PVC pipe shall be color coded blue for water, purple (Pantone purple 522C) for reclaimed water or green for pressure sewer using a solid pipe color pigment.

## 3.04 INSPECTION AND TESTING

A. All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipelines shall be subjected to a hydrostatic pressure and leak testing. Prior to testing, the pipelines shall be supported in a manner approved by the Town to prevent movement during tests.

END OF SECTION

# SECTION 02625
# PRECAST POLYMER CONCRETE STRUCTURES

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. The Contractor shall furnish all materials, labor and equipment necessary to construct polymer concrete manholes and/or wet wells as shown on the Drawings and as specified herein.

B. Precast polymer concrete structures shall be manufactured from chemical-resistant polymer concrete with fiber-reinforced polymer (FRP) or steel reinforcement bars. Structures shall be manufactured by an established national manufacturer exclusively producing polymer concrete sanitary sewer manholes and wet wells. Polymer concrete structures shall be furnished per the latest edition of the Town's Approved Products List.

C. Drop manholes, manholes with opposing turbulent flows as defined in the Town of Longboat Key Utility Standards US-3, manholes immediately upstream of a lift station as defined in Town of Longboat Key Utility Standards US-17A, manholes with gravity sewers greater than 12-inch diameter, manholes receiving a force main and the first two gravity manholes downstream of manholes receiving a force main, and all lift station wet well shall be manufactured from polymer concrete as specified herein. Traditional lined Portland concrete wet wells may be accepted, when the required diameter exceeds the diameters available by the authorized manufacturers of the polymer concrete wet well.

D. The manufacturer, dimensions, material and construction methods shall be available for inspection and approved by the Town in advance of construction. The Town reserves the right to inspect the facilities of the supplier and the manufacturer if they are different.

E. These Specifications are intended to give a general description of what is required, but do not intend to cover all the structural design details which will vary in accordance with the requirements of the plans. It is, however, intended to cover the furnishing, shop testing, delivery and complete installation of all precast structures whether specifically mentioned in these Specifications or not.

F. The supplier of the precast items shall coordinate his work with that of the Contractor to ensure that the units will be delivered and installed in the excavation provided by the Contractor, in accordance with the Contractor's construction schedule.

G. The Contractor will ensure coordination of the precast structures fabrication with the supplier to achieve the proper structural top slab openings, spacings and related dimensions for the selected equipment frames and covers. The top slabs, frames, covers, and subsurface structures outside of roadways shall be capable of live load of 300 pounds per square foot unless noted otherwise.

## 1.02 SUBMITTALS

A. The contractor shall submit the following items to the Town for review and approval:

1. Shop drawings of structure sections, top and bottom slabs, construction details, reinforcement methods, jointing methods, materials, dimensions, rim and invert elevations, and component parts.

2. Summary of criteria used in design including, as minimum, material properties, loadings, load combinations and dimensions assumed.

3. Include certification from manufacturer that polymer concrete structure design meets or exceeds the load and strength requirements of ASTM C478 and ASTM C857, reinforced in accordance with ACI 440.1R if applicable.

4. Frames, grates, rings, and covers.

5. Materials to be used in fabricating pipe drop connections.

6. Materials to be used for pipe connections.

7. Materials to be used for stubs and stub plugs, if required.

8. Proof of independent Chemical Resistance testing conducted in accordance with the Standard Specifications for Public Works Construction (California Greenbook) Section 211-2 or ASTM C267 Standard Test Methods for Chemical Resistance of Mortars, Grouts, Monolithic Surfacing and Polymer Concretes.

9. Signed and sealed calculations and drawings by a Florida registered Professional Engineer showing structure meets designated strengths per ASTM standards referenced below.

10. Signed and sealed buoyancy calculations by a Florida registered Professional Engineer with a Factor of Safety of 1.25 without incorporating soil friction.

## 1.03 INSPECTION

A. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection and approval by the Town or authorized representative of the Town. Such inspection may be made at the place of manufacture, on site, or both locations. The polymer concrete section may be inspected prior to unloading from the delivery truck and marked by the inspector showing acceptance or rejection. However, discovery of failure at any time to meet the requirements of these Specifications is cause for rejection.

B. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All sections which are damaged after delivery as determined by the Town, shall be rejected. Sections already installed,

shall be removed and replaced entirely at the Contractor's expense.

C. At the time of inspection, the sections shall be examined for compliance with the standards referenced below, latest revision, these Specifications and with the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimension, blisters, cracks, roughness, soundness, etc. The surface shall be free of defect.

D. Imperfections may be repaired subject to the approval of the Town and after demonstration by the manufacturer that strong and permanent repairs result.

## 1.04 REFERENCES

A. ASTM C33 (most current) Standard Specification for Concrete Aggregates

B. ASTM C267 (most current) Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes

C. ASTM C443 (most current) Standard Specification for Joints for Concrete Pipe and Manholes Using Rubber Gaskets

D. ASTM C478 (most current) Standard Specification for Precast Reinforced Concrete Manhole Sections

E. ASTM C497 (most current) Test Methods for Concrete Pipe, Manhole Sections, or Tile

F. ASTM C579 (most current) Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic, Surfacing, and Polymer Concrete

G. ASTM C580 (most current) Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes

H. ASTM C857 (most current) Standard Practice for Minimum Structural Design Loading for Underground Utility Structures

I. ASTM C923 (most current) Standard Specifications for Resilient Connectors between Concrete Manholes Structures and Pipe

J. ASTM C990 (most current) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections using Preformed Flexible Joint Sealants

K. ASTM D648 (most current) Test Method for Deflection Temperature of Plastics Under Flexural Load in Edgewise Position, if applicable

L. ASTM D2584 (most current) Test Method for Ignition Loss of Cured Reinforced Resins

M. ASTM D6783 (most current) Standard Specification for Polymer Concrete Pipe

N. ACI 350 (most current) Code Requirements for Environmental Engineering Concrete Structures & Commentary

O. ACI 440.1R (most current) Guide for the Design and Construction of Structural Concrete Reinforced with Fiber-Reinforced Polymer (FRP) Bars, if applicable

P. ACI 548.6R (most current) Polymer Concrete: Guidelines for Structural Applications

Q. California Greenbook Standard Specifications for Public Works Construction Section 211-2

## PART 2 PRODUCTS

### 2.01 MANHOLE AND/OR WETWELL MATERIALS

A. Design shall be of sufficient strength to safely support HS-20 loading in accordance with AASHTO.

B. Provide polymer concrete sections, monolithic top and bottom base sections, and related components referencing to ASTM C478 and ASTM C857. ASTM C478 and ASTM C857 material and manufacturing is allowed compositional and dimensional differences required by a polymer concrete product. Manholes shall be designed based upon live and dead load criteria in ASTM C857.

C. Provide base riser section with monolithic floors, unless shown otherwise.

D. Provide riser sections joined with bell and spigot, or tongue and groove smooth wall design seamed with butyl mastic and joint lubricated rubber gaskets conforming to ASTM C990 so that on assembly, base, riser and top section make a continuous and uniform structure.

E. Construct riser sections for polymer concrete structures from standard polymer concrete sections of the diameter indicated on drawings. Use various lengths of polymer concrete manhole or wet well sections in combination to provide correct height with the fewest practical joints.

F. Design wall sections for depth and loading conditions with wall thickness as designed by polymer concrete manufacturer. Wall thicknesses shall be as stated by manufacturer based upon loading conditions and material properties. For manholes, riser walls shall have a minimum thickness of 2” and the cone walls shall have a minimum thickness of 5”. For wet wells, the section walls shall have a minimum thickness of 4”.

G. Provide tops to support AASHTO HS-20 or vehicle loading or loads as required and receiving frame, covers, or hatches, as indicated on drawings.

H. Minimum clear distance between two wall penetrations shall be a minimum of 6” on 48” to 72” diameter structures and a minimum of 8” on larger diameter structures. A clearance of 6” is required between wall penetration and joint.

1. Wall thickness shall be designed to resist hydrostatic pressures with a

minimum safety factor of 2.0 for full depth conditions from grade to invert.

2. The wall thickness of risers and conical tops shall be not less than that prescribed by the manufacturer's design by more than 5%. A wall greater than the prescribed design shall not be cause for rejection.

3. Wall thickness shall be as required by structural design performed by manufacturer. Wall thickness design calculations shall be provided, signed and sealed by a licensed Florida Professional Engineer.

I. Polymer concrete shall have a minimum unconfined compressive strength 28-day strength of 9,000 psi when measured in accordance with ASTM C497.

J. Structures shall have engineered and rated lifting devices that shall not penetrate completely through the wall. All openings shall be patched with non-shrink polymer grout as recommended by manufacturer.

## 2.02 MANHOLE FRAMES AND LIDS

A. Frames and lids shall be heavy duty composite with minimum three (3) 316 stainless steel locking bolts. All frames and lids shall be designed to withstand an AASHTO HS-20-wheel loading with an added 30% impact factor and shall be Class Heavy Duty traffic bearing. Refer to the latest edition of the Town's Approved Products List for approved products.

## 2.03 MANHOLE INSERTS

A. All sanitary sewer manholes installed shall require watertight rainwater protection inserts made of minimum 18-gauge, 304 stainless steel. Neoprene gaskets shall be installed under the insert lip to ensure a leakproof seal. Refer to the latest edition of the Town's Approved Products List for approved products.

## 2.04 MANHOLE INVERTS

A. Benched inverts shall be factory-built polymer concrete and shall be monolithically cast per ASTM C478.

B. The width of the invert channel shall be the same as the inside diameter of the connected sewer pipes and shall have a "U" - shaped cross-section with the bottom of the channel shaped to correspond with the lower half of the pipe. The depth of the channel shall be a minimum of half the inside diameter of the connected pipes.

C. The channel shall be formed smooth and streamlined, and, where the flow changes directions, shall have true curves of the largest radius possible within the manhole base. The maximum change of direction of flow within a manhole shall be 90 degrees.

D. The channel invert slope shall be uniform through the manhole and shall have a minimum vertical drop of 1 inch from the inlet(s) to the outlet.

## 2.05 DESIGN CRITERIA:

A. Polymer concrete risers, cones, flat lids, grade rings and base sections shall be designed by manufacturer to meet loading requirements of ASTM C478, ASTM C857 and ACI 350 as modified for polymer concrete manhole and wet well design as follows:

1. Polymer Concrete Mix Design shall consist of thermosetting resin, sand, and aggregate. No Portland cement shall be allowed as part of the mix design matrix all sand and aggregate shall be inert in an acidic environment.

2. Reinforcement – Shall use acid resistant reinforcement (FRP Bar) in accordance with ACI 440.1R or steel in accordance with ASTM C478 as applicable for polymer concrete design.

3. The wall thickness of polymer concrete structures shall not be less than that prescribed by the manufacturer's design by less than 95% of stated design thickness.

4. Thermosetting Resin - The resin shall have a minimum deflection temperature of 158° F when tested at 264 psi following Test Method ASTM D648. The resin content shall not be less than 7% of the weight of the sample as determined by Test Method ASTM D2584. Resin selection shall be suitable for applications in the corrosive conditions to which the polymer concrete structures will be exposed.

5. AASHTO HS-20 design or as required loading applied to manhole cover and transition and base slabs.

6. Polymer concrete structured shall be designed based upon live and dead load criteria in ASTM C857 and ACI 350.

7. Unit soil weight of 130 pcf located above portions of manhole or wet well, including base slab projections.

8. Internal liquid pressure based on unit weight of 63 pcf.

9. Dead load of manhole or wet well sections fully supported by transition and base slab.

## PART 3 EXECUTION

A. Each polymer concrete manhole or wet well component shall be free of all defects, including indentations, cracks, foreign inclusions and resin starved areas that, due to their nature and degree or extent, detrimentally affect the strength and serviceability of the component part. The nominal internal diameter of manhole or wet well components shall not vary more than 1%. Variations in height of two opposite sides of risers and cones shall not be more than 5/8 inch. The under run in height of a riser or cone shall not be more than ¼ in/ft of height with a maximum of ½ inch in any one section.

B. Marking and Identification - Each manhole or wet well shall be marked with the following information – Manufacturer's name or trademark, Manufacturer's location

and Production Date.

C. Manhole or wet well joints of a bell and spigot or smooth wall tongue and groove design shall be assembled with a butyl rubber sealant, an elastomeric sealing gasket, and external joint wrap so that on assembly the manhole or wet well base, riser, and top sections make a continuous and uniform structure meeting the requirements of ASTM C443. Joint sealing surfaces shall be free of dents, gouges and other surface irregularities that would affect joint integrity.

D. Construct invert channels to provide smooth flow transition with minimal disruption of flow at pipe connections. Invert slope through manhole or wet well as indicated on drawings. All precast base slabs to be cast monolithically. Polymer concrete bench and channel are to be factory constructed with all resin aggregate material. Extended ballast slab requirements for buoyancy concerns can be addressed with cementitious concrete material. Any modifications required in the bench or channel during construction shall be used with non-shrink polymer grout per the latest revision of the Town's Approved Products List.

E. Provide cast-in resilient connectors conforming to requirements of ASTM C923 installed at the factory. All connectors are to be watertight. Install resilient connectors at each pipe entering and exiting the structure in accordance with manufacturer's instructions. The external take down clamp and its hardware shall be 316 stainless steel. Cold joint pipe stub grouting shall not be allowed. Cast-in resilient connectors shall be furnished per the latest edition of the Town's Approved Products List.

F. All pipe penetrations shall be made in the factory unless otherwise specified in the plans.

G. If the Contractor is required to connect a new line to an existing manhole, jack-in resilient connectors conforming to requirements of ASTM C923. All connectors are to be watertight. Install resilient connectors at each pipe entering and exiting the structure in accordance with manufacturer's instructions. The internal expansion band and hardware shall be minimum 304 stainless steel. The external take down clamp and its hardware shall be 316 stainless steel. Jack-in resilient connectors shall be furnished per the latest edition of the Town's Approved Products List.

## 3.01 QUALITY CONTROL

Manufacturer of manholes or wet wells shall employ manufacturing methods and material formulation in use for a minimum of five (5) years. Manufacturer shall provide at least two (2) references of projects of similar size and scope.

## 3.02 GROUTING

All materials needed for grouting and patching shall be non-shrink polymer grout per the latest edition of the Town's Approved Products List. All holes in sections used for handling and annular spaces, around influent and effluent pipes, shall be filled using the materials listed above. Non-shrink polymer grout shall be placed in the gap between the boot or seal and the manhole invert channel, to make a smooth transition, unless otherwise directed by the manufacturer's instructions.

## 3.03 INTERNAL JOINT SEALANTS

A butyl rubber sealant shall be applied to the interior of manhole and wet well bell and spigot or tongue and groove smooth wall joints per manufacturer's recommendations and shall be furnished per the latest edition of the Town's Approved Products List.

## 3.04 EXTERNAL JOINT WRAP

Gasketed bell and spigot joint: If the joint design has the risers' outer walls offset from each other, an 18-inch-wide heat shrinkable joint wrap shall be centered over all these joints including the chimney to cone section per manufacturer's recommendations and shall be furnished per the latest edition of the Town's Approved Products List.

Gasketed tongue and groove smooth wall joint: If the joint design has the risers' outer walls flush with each other, a 12-inch non-shrink elastomeric plastic joint wrap shall be centered over all these joints including chimney to cone section per manufacturer's recommendations and shall be furnished per the latest edition of the Town's Approved Products List.

## 3.05 CERTIFICATION

As a basis of acceptance, the manufacturer shall provide an independent certification consisting of a copy of the manufacturer's test reports along with a copy of the test results certifying that representative manhole or wet well samples have been tested, and inspected in accordance with the provisions of this Specification and meet all requirements of same, to include but not limited to the load and strength requirements of ASTM C478 and ASTM C857.

## 3.06 MANHOLE AND/OR WETWELL CONSTRUCTION

A. POLYMER CONCRETE MANHOLE AND/OR WET WELL INSTALLATION: The Contractor shall set section vertical and in true alignment. All structures shall meet the following installation tolerances: The finished structure shall not be out of plumb by more than 3/8" per 10 feet of height.

B. GRADE ADJUSTMENT: The Contractor shall set polymer concrete corrosion proof grade rings on top of manhole slabs and polymer concrete manhole cones to provide grade adjustment in setting manhole frames. Contractor shall use butyl rubber strip sealant between rings, minimum 3" wide by ½" thick. Contractor shall ensure a watertight seal by removing debris, stones, and dirt between rings.

C. BACKFILL: Unless otherwise shown on the Drawings, a minimum distance of one (1) foot from the outside surface and extending from the bottom of the excavation to the top of the reducer section shall be backfilled using select material as specified in the Contract Documents. The material chosen shall be free of large lumps or clods, which will not readily break down under compaction. This material will be subject to approval by Town.

D. BACKFILL PROCEDURE: The Contractor shall place backfill in maximum layers of 12 inches loose measure and mechanically tamp to 98% Standard Proctor

Density, unless otherwise approved by Town. Flooding shall not be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the structure.

E. A minimum of an 8-inch shell base compacted layer of washed shell or crushed stone shall be placed as a foundation for the structure's base slabs.

F. Allow joints to set for 24 hours before backfilling. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. The Contractor shall install the precast sections in a manner that will result in a watertight joint. Leaking joints are not acceptable.

G. MARKING AND IDENTIFICATION: Each structure shall be marked on the inside and outside with the following information:

1. Manufacturer's name or trademark.

2. Manufacturer's factory location.

3. Manufacturer's serial number.

4. Total length.

H. Holes or penetrations in the polymer concrete sections required for handling or other purposes shall be plugged with a non-shrink polymer grout approved by the manufacturer. Holes or penetrations shall not penetrate through the wall.

I. Where holes must be cut in the precast sections to accommodate pipes, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may loosen the joints.

J. Frames and hatches specified and furnished shall be cast in the cover slab prior to setting. Normal installation shall include 6" to 12" of polymer concrete grade rings between the top of the cone section and the cover plate ring slab.

K. TESTING

1. After each manhole and/or wetwell is constructed to grade and prior to being backfilling, each structure shall be tested for water tightness.

a. Plug pipe lines and perform vacuum test. Observing all recommended safety measures, induce a backpressure of 5.0 psi equivalent to 10" Hg (mercury). The assembly is considered satisfactory if the vacuum loss is less than 1" Hg for the length of time listed in the following table:

| Time of Test (Seconds) | | | |
|---|---|---|---|
| Depth (Feet) | Structure Diameter (Feet) | | |
| | 4 | 5 | 6 or Larger |
| 4<br>8<br>12<br>16<br>20<br>24 | 10<br>20<br>30<br>40<br>50<br>60 | 13<br>26<br>39<br>52<br>65<br>78 | 16<br>32<br>48<br>64<br>80<br>96 |
| T (Seconds) | 5 | 6.5 | 8 |

Note: Add "T" seconds for each additional 2'-0" of depth.

2. Failure to pass one of these tests requires the Contractor to correct the problems and retest. The Contractor shall replace leaking gaskets and/or polymer concrete sections and retest the completed manhole/or wet well. No structure will be accepted without successfully passing this test.

L. STUB LINES: The Contractor shall provide stub lines where shown on the Drawings or as directed by the Town for the connection of future sewer lines to manholes and/or wet well. Provide bell end enclosed with an approved plug at the end of each stub line. Bell of stub line shall be as close to structure exterior surface as practical. The Contractor shall accurately reference each stub line for direction and record along with the actual invert elevation. He shall furnish the Town two copies of the above specified data on stub lines.

M. CONNECTION TO EXISTING STRUCTURES: All piping entering existing manholes and/or wet well shall have a jack-in resilient pipe to manhole seals per ASTM C923. The external take down clamp and its hardware shall be 316 stainless steel. The internal expansion band and its hardware shall be minimum 304 stainless steel. Connectors shall be installed in strict accordance with the written installation instructions of the manufacturer. Non-shrink grout shall be placed in the gap between the boot or seal and the manhole invert channel, to make a smooth transition, unless otherwise directed by the manufacturer's instructions. Jack-in resilient connectors shall be furnished per the latest edition of the Town's Approved Products List.

N: WARRANTY: Manufacturer shall provide a fifty-year (50) warranty that the polymer concrete structure will not fail due to corrosion.

## PART 5 WARRANTY

A. Manufacturer shall provide a fifty (50) year warranty that the polymer concrete structure will not fail due to corrosion.

## END OF SECTION

# SECTION 02627
# SANITARY SEWER MANHOLE REHABILITATION

## PART 1 GENERAL

### 1.01 DESCRIPTION

A. This specification consists of all work, materials, labor and equipment required for manhole rehabilitation for the purpose of eliminating infiltration and exfiltration, providing corrosion protection, adjusting final grade of manhole top, repair of voids and restoration of the structural integrity of the manhole. All such work shall comply with these Specifications and the specific product manufacturer's recommendations. Any conflict between the product manufacturer's recommendations and any portion of the Contract Documents shall be resolved prior to beginning the work.

### 1.02 PRODUCT AND MANUFACTURER QUALIFICATION REQUIREMENTS

A. Since sewer products are intended to have a 50-year design life, and in order to minimize the Town's risk, only proven products with substantial successful long term track records will be allowed. At a minimum, products and installers must meet all of the following criteria to be deemed commercially acceptable:

1. For a Product to be considered commercially acceptable, the product must have a minimum of two (2) million square feet and ten (10) year history of successful wastewater collection system installations in the United States. In addition, products must provide Third Party Test Results supporting the long-term performance and structural strength of the product and such data shall be satisfactory to the Owner. No product will be allowed without Independent Third-Party Testing verification.

2. For an installing Contractor to be considered commercially acceptable, the installer must have a certification from the manufacturer as a licensed and fully trained installer of the product. The installer must also have a minimum of one (1) million square feet of successful wastewater collection system installations on underground concrete/masonry structures and ten (10) years of rehabilitation experience.

### 1.03 SUBMITTALS:

A. Product

1. Technical data sheets showing the physical and chemical properties.

2. Material Safety Data Sheets (MSDS).

3. Third Party Testing results.

4. Verification of minimum installation requirements set forth in section 1.02.A.1 above.

B. Installer

1. Verification of “certified applicator” status.

2. Verification of minimum installation requirements set forth in section 1.02.A.2 above.

C. Written certification from the product manufacturer that each of the proposed rehabilitation products is compatible with each other.

D. Submit with Each Project:

1. Description, layout, and application sequencing plan.

2. Rehabilitation system application requirements including material handling and storage requirements, mixing and proportioning requirements (as applicable), maximum pot life, film/coating thickness, curing, testing and certification requirements of all rehabilitation materials. Product Material Safety Data Sheets.

3. Detailed instructions and methodology for finishing all pipe and manhole connections to rehabilitated manholes to prevent infiltration and exfiltration.

4. Wastewater Flow Control/Bypassing Plan.

5. Confined Space Entry Plan/Permit.

6. Plan for capturing extraneous debris during rehabilitation processes and debris disposal.

## PART 2 PRODUCTS

### 2.01 MATERIAL

A. Refer to the latest edition of the Town’s Approved Product List for acceptable products.

### 2.02 CEMENTITIOUS MORTAR

A. Mortar shall be made of one part Portland cement and two parts clean sharp sand. Cement shall be Type 1 and shall conform to ASTM C150. Sand shall meet the requirements of ASTM C144.

### 2.03 PATCHING MATERIAL

A. A quick setting fiber reinforced cementitious material shall be used as a patching material and is to be mixed and applied according to manufacturer’s recommendations.

### 2.04 HYDRAULIC CEMENT

A. A rapid setting, high-early-strength, cementitious product specifically formulated for leak control shall be used to stop water infiltration. The material shall be mixed and applied according to the manufacturer's recommendations.

## 2.05 CHEMICAL GROUT

A. A chemical grout shall be used for stopping very active infiltration and filling voids.

## 2.06 LINER MATERIAL

A. CEMENTITIOUS MATERIAL

1. Cementitious liner products shall be used to form a structural monolithic liner covering all interior manhole surfaces and shall have the following minimum requirements:

   a. Compressive Strength (ASTM C109): 7,000 psi, 28days

   b. Tensile Strength (ASTM C496): 700 psi, 28 days

   c. Flexural Strength (ASTM C293): 1,300 psi, 28 days

   d. Shrinkage (ASTM C596): 0.02% at 28 days

   e. Minimum Bond (ASTM C952): 200 psi, 28 days

2. Refer to Section 09920 Sewpercoat Surface System of the specifications. When used as the final rehabilitation liner material (no epoxy liner), product shall be made with calcium aluminate cement. Calcium aluminate is not required when the cementitious liner is used as the underlayment for a protective coating liner application.

B. PROTECTIVE COATING LINER MATERIAL

1. The protective coating liner is to be applied where corrosion is anticipated. The protective coating liner material shall be applied over the complete cementitious liner material (without the calcium aluminate). The liner shall be spray applied or spin cast. The manufacturer of the selected protective coating liner material shall approve in writing that their protective coating liner is compatible with cementitious repair and liner material.

2. The protective coating liner material shall conform to Section 09970 Surface Protection Spray Systems of the specifications.

C. WATER

1. Water shall be clean and potable.

## 2.07 INTERNAL MANHOLE CHIMNEY SEAL MATERIAL

A. Butyl rubber strips used to prevent leakage of water into the manhole through the frame joint area and the area above the manhole cone and shall have the following minimum requirements:

1. Elongation (ASTM D412): 600%

2. Tensile Strength (ASTM D412): 1,150 psi

3. Adhesive Strength (ASTM D903): 175 lb. l/in.

4. Tear Resistance (ASTM D1004): 155 lb. l/in.

B. The seal shall extend from the inside of the manhole frame down to the cone or corbel of the manhole. Seal shall be minimum 3" wide x ½" thick so that all joints are watertight.

## 2.08 EXTERNAL MANHOLE SEAL WRAP

A. External Manhole Seal Wrap: When work consists of adjusting manholes or cone replacements, an external seal wrap shall be installed to the outside of concrete risers and joints of the precast manhole in order to eliminate infiltration. The external seal wrap shall be installed in accordance with the details of the Contract Documents and the manufacturer's recommendations.

# PART 3 EXECUTION

## 3.01 PREPARATION

A. Perform traffic control in accordance with the approved traffic control submittal.

B. Store materials in accordance with manufacturer's recommendations.

C. Schedule and perform the work in a manner that does not cause or contribute to overflows or spills of sewage from the sewer system.

D. Install devices to prevent extraneous material from entering the sewer system and to prevent upstream line from flooding the manhole. If extraneous material or debris falls into a "live" manhole during adjustment operations, the Contractor shall remove debris at no cost to the Owner.

E. Dispose of waste in accordance with applicable regulations.

F. Schedule and perform any bypass pumping that will be necessary to properly rehabilitate the manhole.

G. If present in the manhole, Contractor shall remove all access steps. Removal shall consist of neatly cutting steps flush with the wall prior to any lining installation. Contractor shall be responsible for proper disposal of steps.

H. For manholes that are located within pavement areas and require resetting or replacement of concrete riser rings, cones, and /or frames, the Contractor shall sawcut, remove, and replace a 6 ft. x 6 ft. square or round section of pavement

and base for rehabilitation operations. Costs for removal and replacement of pavement and base beyond these limits shall be borne by the Contractor.

## 3.02 INSTALLATION

A. Prior to any lining all other miscellaneous work must be complete.

B. Prior to man entry into any structure to be rehabilitated, proper ventilation and strict confined space OSHA regulations shall be followed. Failure to do so shall be grounds for removal from the project.

## 3.03 CONE REPLACEMENT

A. The Contractor shall replace existing deteriorated manhole cone section with new precast concrete cone section. A preformed rubber gasket shall be placed in all keyways between existing manhole riser section and cone joints. Prior to backfilling, rubber external seal wraps shall be applied to the cone and manhole section joint, riser rings and frame in accordance with Town of Longboat Key Public Works Department Utility Standards. If the existing manhole is of brick construction, the cone shall be set in a full bed of mortar on the top course of bricks.

## 3.04 GRADE ADJUSTMENT RINGS

A. The Contractor shall replace existing, deteriorated grade adjustment rings with new precast concrete riser rings. All manholes designated to receive casting adjustment and/or alignment shall be adjusted to meet existing finished grade unless an alternative elevation is specified. A minimum 3-inch wide by ½-inch thick butyl rubber sealant strip adhesive shall be placed in between individual precast concrete grade adjustment rings, and precast concrete rings and cone joints. If the manhole is corrosion-prone as defined by Specification Section 02625, then the grade adjustment rings shall be made of polymer concrete. The butyl rubber sealant strips shall be per the latest edition of the Town's Approved Products List. Prior to backfilling, rubber external seal wraps shall be applied to the cone and manhole section joint, grade adjustment rings and frame in accordance with Town of Longboat Key Public Works Department Utility Standards.

## 3.05 MANHOLE FRAME AND COVER

A. Existing frames and covers which must be removed to facilitate manhole rehabilitation, riser reconstruction, and/or casting alignment or grade adjustments shall be salvaged, cleaned and given two coats of an approved bituminous coating by the Contractor for replacement unless determined to be defective by Town. If manhole frame and/or cover are determined to be defective, Contractor shall replace with new standard frame and/or cover per the latest edition of the Town's Approved Products List. If the manhole is corrosion-prone as defined by Specification Section 02625, then the frame and cover shall be heavy duty composite per the latest edition of the Town's Approved Products List. A minimum 3-inch wide by ½-inch thick butyl rubber sealant strip adhesive shall be placed between manhole frame and grade adjustment rings or manhole cone.

B. Existing manhole covers, which must be adjusted to existing or new pavement surfaces, shall be adjusted by modifying the existing precast concrete adjustment

rings to bring the entire existing ring and cover to grade.

C. No manhole cover adjustment rings shall be allowed.

## 3.06 CEMENTITIOUS LINER

A. Active leaks shall be stopped using hydraulic cement or chemical grout as necessary. Installation shall be in accordance with the manufacturer's recommendations.

B. All manholes to be lined shall be cleaned and scarified with a minimum of 5,000 psi water jet at a minimum water temperature of 180 degrees F. The water jet shall hit the manhole wall surface at as near perpendicular angle as possible. Cleaning the manhole walls from the ground surface without the appropriate angled nozzles will not be accepted. Manhole surface build-up of debris and loose manhole construction materials shall be removed during the cleaning process.

C. The intent of the surface preparation and cleaning work is to remove debris, films (oil, greases, etc.) or unsound, deteriorated concrete and to provide a structurally sound, clean surface that will enable lining materials to bond to the original substrate at adhesion strengths of that specified herein. A substrate pH of 8.3 is the minimum pH that will be considered acceptable to demonstrate that the surface preparation and cleaning have been properly performed.

D. Additional aggressive surface preparation and cleaning methods may be necessary to remove carbonated cementitious lining concrete or contaminants that remain after the cleaning performed as described above. The Contractor shall test the pH of the cleaned manhole interior surface at various locations of the manhole and when the results indicate a pH less than 8.3, then additional surface preparations and cleaning will be required. As a minimum level of effort, the Contractor shall either dry sand blast or pneumatic jackhammer with a bushing bit followed by a minimum 5,000 psi water blast.

E. Any bench, invert or service line repairs shall be made at this time using quick setting grout or repair mortar per the manufacturer's recommendations.

F. Invert repair shall be performed on all inverts with visible damage or where infiltration is present. After blocking flow through the manhole and thoroughly cleaning the invert, quick setting patch material shall be applied to the invert in an expeditious manner. The finished invert surfaces shall have a smooth surface and form a continuous monolithic conduit with the sewer pipe entering and leaving the manhole. The bench and invert shall form a watertight seal with the manhole walls, base. and pipe seal.

G. Wastewater flow shall be controlled by methods which prevent contact with the new bench and invert for 6-8 hours after mortar placement. If 6-8 hours set time is not possible, a fast setting, high early strength mortar shall be used with provisions for flow control until concrete has set.

H. Fill all cracks, holes, and joints that have voids using non-shrink grouts in accordance with the manufacturer's recommendations.

I. Apply Cementitious Liner Material per the Manufacturer's recommendations. Apply Cementitious Liner material so that the final thickness is 0.5-inch minimum or per the thickness required by the manufacturer's minimum specification, whichever is greater. The material shall start at the bottom of the manhole frame and extend to the water level of the invert.

J. Finishing: Trowel the surface of the liner to create a uniform smooth finish. Caution shall be taken to prevent over working the material. Once the initial cure has taken place, the exposed surface area should be given a broom finish. Thickness may be verified at any point with a wet gage.

K. If the cementitious lining material is not immediately coated with a protective coating liner, apply a seal coat compatible with the repair material to aid in curing and minimize recontamination of the substrate prior to application of the protective coating liner material.

## 3.07 PROTECTIVE COATING LINER

A. Prior to any protective coating lining, perform all work shown in Section 3.06 above.

B. Remove any curing compounds, sealers or contaminates prior to protective coating lining.

C. Apply protective coating lining material in accordance with the manufacturer's recommendations over the waterproofing/structural repair material shown in Section 3.06.

D. Apply protective coating lining material to all internal surface area of the structure.

## 3.08 EXTERNAL MANHOLE JOINT WRAP

A. When Work consists of adjusting sewer manholes or cone replacement, an external seal wrap shall be installed on the outside joints of concrete risers, concrete cones, grade adjustment rings, and manhole frames in order to eliminate infiltration. Frame and cover shall be completely coated prior to installation of the external seal wrap. The external seal wrap shall be installed using min. twelve-inch-wide elastomeric plastic joint wrap centered over all exposed manhole joints in accordance with the manufacturer's recommendations. External manhole joint wrap shall be per the latest edition of the Town's Approved Products List.

## 3.09 INTERNAL MANHOLE JOINT SEALANT

A. When Work consists of adjusting sewer manholes or cone replacement, an internal manhole joint sealant shall be applied just before the manhole riser section reassembly in order to eliminate infiltration. The sealant shall be a minimum of ½-inch x ¾ inch bead of urethane paste per the latest edition of the Town's Approved Products List.

## 3.10 MANHOLE INSERT

A. If existing manhole is not equipped with a watertight manhole rainwater insert, Contractor shall furnish and install a new manhole insert per Town of Longboat

Key Public Works Utility Standards Section 12 and in accordance with the manufacturer's recommendations. The rainwater insert shall be minimum 18-gauge 304 stainless steel or 1/8" thick thermoplastic polyolefin per the latest edition of the Town's Approved Products List.

B. If existing manhole is equipped with a watertight manhole insert to prevent intrusion of storm water, the insert shall be cleaned and reinstalled by the Contractor, unless determined to be defective by the Town. If insert is determined to be defective, Contractor shall furnish a new watertight manhole insert and install in accordance with manufacturer's recommendations at the completion of manhole rehabilitation operations.

## 3.11 TESTING

A. After completion of any rehabilitation operation and prior to backfilling (if required), the Contractor shall conduct the following tests on the manholes:

1. Visual Inspection: The Town and Contractor shall make a final visual inspection. Any deficiencies in the finished system shall be marked and repaired.

B. If a protective coating liner is applied, the following additional tests will be required:

1. Wet Film Thickness Gage: During application a wet film thickness gage, meeting ASTM D4414 – Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application.

## 3.12 WARRANTY

A. The Contractor shall guarantee the work to be free of defects in materials and workmanship for five-year period, unless otherwise stated, after completion and acceptance of the work. The Contractor shall repair defects in materials or workmanship, which may develop during the warranty period; and any damage to other work caused by such defects or discovered within the same period at no additional cost to the Town.

## 3.13 WARRANTY INSPECTIONS

A. Conduct visual inspection prior to expiration of warranty to determine integrity of rehabilitation materials and water-tightness.

1. Complete post inspection during first high groundwater period (spring or fall) following acceptance of work.

2. Contractor should accompany Town on inspections.

3. Inspect a minimum of 25 percent of the manholes rehabilitated at locations selected by Town.

a. Infiltration and Inflow: None

b. Structural Repair: Sound

c. If more than one manhole fails warranty inspection, inspect all manholes with similar characteristics.

d. Repair defects in accordance with Warranty.

END OF SECTION

# SECTION 02640
# VALVES AND APPURTENANCES

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.

B. All of the types of valves and appurtenances shall be products of well-established reputable firms who are fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these standards as applicable. Valves used in waterworks applications shall comply with Section 8 of NSF Standard 61 for mechanical devices and NSF 372.

C. All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of potable water, reclaimed water, wastewater, etc., depending on the applications.

D. All valves and appurtenances shall be of the size shown on the drawings and, to the extent possible, all equipment of the same type on the project shall be from a single manufacturer.

E. All valves and appurtenances shall have the name of the manufacturer, year of the valve and the working pressure for which they are designed cast in raised letters upon some visible part of the body.

F. Special tools, if required for the normal operation or maintenance, shall be supplied with the equipment.

G. All hand actuated buried valves shall have three-piece adjustable valve boxes and 2-inch square AWWA operating nuts. Provide stainless steel extension stems and alignment rings where needed to bring the operating nut to within 4 feet below the box lid.

H. Water and reclaimed water system isolation valves shall be gate valves for sizes 2-inch through 12-inch and shall be butterfly valves for sizes 16-inch and larger.

I. Isolation valves for sewer force main pipelines shall be gate valves, unless otherwise noted on the plans. Tapping valves shall be used for tapping force mains. Plug valves shall be full port, have a 100% circular cross section, and must have prior written authorization from the Town for use.

J. Valves shall open when turning the operating nut or wheel counterclockwise and shall close when turning clockwise.

K. All bonnet bolts, gland bolts, flange connection bolts, nuts, washers, and other trim hardware exposed to the outside environment shall be stainless steel. Thrust collar tie-rod bolts shall be stainless steel. All MJ-type underground bolts, nuts, and washers shall be COR-TEN or stainless steel.

L. All valves shall have a factory applied, holiday free, fusion bonded epoxy coating on the interior and exterior unless otherwise noted in the plans or the following specification. All other painted items exposed to sunlight, including field painted box lids, etc., shall be painted the appropriate color with an epoxy type paint.

M. No valves with a break-way stem shall be allowed.

N. The equipment shall include, but not be limited to, the following:

1. Gate valves (Sec. 2.01)
2. Ball Valves (Sec. 2.03)
3. Valve Actuators (Sec. 2.06)
4. Air Release Valves (Sec. 2.07)
5. Valves Boxes (Sec. 2.08)
6. Corporation Stops and Saddles (Sec. 2.09)
7. Flange Adapters and Plain End Couplings (Sec. 2.10)
8. Hydrants (Sec. 2.13)
9. Restrained Joints (Sec. 2.14)
10. Tapping Sleeves and Tapping Valves (Sec. 2.15)
11. Tracer Wire Boxes (Sec. 2.16)

## 1.02 SUBMITTALS

A. Submit to the Town within 30 days after execution of the contract a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.

B. Complete shop drawings of all valves and appurtenances shall be submitted to the Town for approval in accordance with the Specifications.

# PART 2 PRODUCTS

## 2.01 GATE VALVES

A. Where indicated on the drawings or necessary due to locations, size, or inaccessibility, chain wheel operators shall be furnished with the valves. Such

operators shall be designed with adequate strength for the valves with which they are supplied and provide for easy operation of the valve. Chains for valve operators shall be galvanized.

B. Gate valves installed underground shall be provided with a box cast in a concrete pad and a box cover. Stainless steel or equivalent valve extension stems shall be provided to place the valve operating nut no more than 4 feet deep. One valve wrench, 6 feet in length, shall be provided for every 15 valves installed.

C. Gate valves 2 inches to 14 inches in diameter shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 or AWWA C515 and shall be UL listed, and FM approved where applicable. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.

D. The valves shall have a non-rising stainless-steel stem to eliminate lead content. All bolts, nuts and washers shall be stainless steel to eliminate exterior corrosion and maintain fastener strength. Manufacturer shall use Never-Seez or equivalent during assembly of bolt and nut sets to prevent galling of similar metals. Stem seals shall be provided and shall be of the O-ring type, two above and one below the thrust collar. Valves that are located above grade and located in valve vaults shall be OS&Y with flanged joints.

E. The wedge shall be ductile iron fully encapsulated with an EPDM rubber. The Elastomer type shall be permanently indicated on the disc or body of the valve. The resilient sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.

F. The valve body, bonnet, and bonnet cover shall meet or exceed all the requirements of AWWA C515.

G. Valves meeting AWWA C515 requirements shall be rated for an operating pressure of 250 psi and shall be tested in accordance with AWWA C515.

H. The valves are to have 2-inch cast or ductile iron AWWA operating nuts and shall open left or counterclockwise.

I. The valves shall be covered by a Manufacturer's 10-year warranty on manufacturer's defects and reasonable labor costs for replacement. Warranty shall become effective from the date of purchase by the end user and delivered within 30 days from the receipt of the purchase order. For publicly owned and maintained utilities, the end user is Town of Longboat Key Government.

J. Gate valves shall be assembled and tested in a certified ISO 9001:2000 manufacturing facility within the United States and provide their certification of meeting internationally recognized quality control procedures.

## 2.02 COMBINATION PRESSURE REDUCING & PRESSURE SUSTAINING WITH CHECK VALVE OPTION

A. Pressure sustaining and check valve shall be pilot operated diaphragm actuated valve with cast iron body, bronze trim, and 125-pound flanged ends. The valve

shall be hydraulically operated, diaphragm type globe valve. The main valve shall have a single removable seat and a resilient disc, of rectangular cross section, surrounded on three and a half sides. No external packing glands are permitted and there shall be no pistons operating the main valve or any controls. The valve shall be equipped with isolation valves to service the pilot system while permitting flow if necessary. Main valve and all pilot controls shall be manufactured in the United States of America. Valve shall be single chamber type, with stainless steel stem.

B. Valve shall automatically reduce pressure for the downstream distribution network and sustain a minimum pressure in the high pressure main regardless of distribution demand, and as an option, shall also close when a pressure reversal occurs for check valve operations. The pilot system shall consist of two direct acting, adjustable, spring loaded diaphragm valves.

C. Valve shall be cast iron or ductile iron with main valve trim of brass and bronze. The pilot control valves shall be cast brass with 303 stainless steel trim. Valve shall be similar in all respects to Cla-Val Company, Model 92-01 or a similar control valve such as Bermad Model 723, GA Industries Model 4700 or an approved equal.

## 2.03 BALL VALVES

A. Brass Ball Valves: sizes 3/4-inch through 2-inch shall be brass body, stem and ball per ASTM B 62, alloy 85-5-5-5, full port, full flow, 1/4-turn check, ball curb valves, rated for 300 psi, Mueller 300 (as specified in the table below), Ford, or approved equal, with compression, pack joint, flare, threaded or flanged ends as required.

Curb Stops for Water and Reclaimed Water

| Pipe Material | Type of Connection | Model |
|---|---|---|
| HDPE | Compression x FIP | B-25170 * |
| HDPE | Pack Joint x FIP | P-25170 * |
| Copper | Compression x FIP | B-25170 |
| Copper | Flare x FIP | B-25166 |
| Stainless Steel | FIP x FIP Thread | B-20200 |
| * Insert required, part number per manufacturer product information | | |

B. PVC Ball Valves: sizes 1/2-inch through 2-inch shall be double true union type, CPVC, or PVC (same material as pipe) fitted for intended service. Valves shall be solvent welded to piping system unless otherwise noted. Valves shall be Spears or approved equal.

C. All valves shall be mounted in such a position that valve position indicators are plainly visible. Above grade ball valves shall have a vinyl coated lever handle. Lever handle, handle nut, and lever packing gland shall be 304 or 316 stainless steel.

D. Potable plastic service pipe material and compression and pack joint connectors shall not be used in soil that is contaminated with low molecular-weight petroleum products, aromatic hydrocarbons, chlorinated hydrocarbons or organic solvents. Appropriate service tubing shall apply.

## 2.04 BUTTERFLY VALVES

A. Butterfly valves shall conform to AWWA C504, Class 250 B, Mueller Lineseal XPII, DeZurik AWWA, Pratt HP-250II, or an approved equal.

B. Valve seats shall be an EPDM elastomer. Valve seats 24 inches and larger shall be field adjustable and replaceable without dismounting operator dise or shaft and without removing the valve from the line. Valves 20 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C504.

C. All valves shall be subject to hydrostatic and leakage tests at the point of manufacture. The hydrostatic test for Class 250 valves shall be performed with an internal hydrostatic pressure equal to 500 psi applied to the inside of the valve body of each valve. During the hydrostatic test, there shall be no leakage through the metal, the end joints or the valve shaft seal. The leakage test for the Class 250 valves shall be performed at a differential pressure of 250 psi and against both sides of the valve. No adjustment of the valve disc shall be necessary after pressure test for normal operation of valve. All valves shall be leak-tight in both directions.

D. Butterfly valve actuators shall conform to AWWA C504. Gearing for the actuators shall be totally enclosed in a gear case. Actuators shall be capable of seating and unseating the disc against the full design pressure and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.

E. The valve shaft shall be constructed of 18-8, ASTM A-276, Type 304 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one piece unit extending full size through the valve disc and valve bearing or it may be of a stub shaft design. Shaft bearings shall be Teflon or nylon, self-lubricated type.

F. Gearing for the operators shall be totally enclosed in a gear case in accordance with paragraph 3.8.3 of the above mentioned AWWA Standard Specification.

G. Operators shall be capable of seating and unseating the disc against the full design pressure of velocity, as specified for each class, into a dry system downstream and shall transmit a minimum torque to the valve. Operators shall be rigidly attached to the valve body.

H. The manufacturer shall certify that the required tests on the various materials and on the completed valves have been satisfactory and that the valves conform with all requirements of this Specification and the AWWA standard.

I. Where indicated on the Drawings, extension stems, floor stands, couplings, stem guides, and floor boxes as required shall be furnished and installed.

## 2.05 PLUG VALVES

A. Plug valves shall be eccentric, non-lubricating type with integral plug and shafts and shall be furnished with end connections and with actuating mechanisms as

called for on the construction plans or as otherwise required. Valves shall seal bubble-tight or water drop-tight in both directions when tested according to the Leakage Test method of AWWA C504 with a hydrostatic pressure of 150 psi.

B. Plug valves shall also be subjected to the internal, full body Hydrostatic Test of AWWA C504 at a pressure two times the rated pressure or a minimum pressure of 300 psi, whichever is greater. During the test, there shall be no leakage through the metal, or through the end joints or shaft seal, nor shall any part of the valve be deformed.

C. Flanged valve ends shall be faced and drilled according to ANSI B 16.1, Class 125. Mechanical joint valve ends shall conform to AWWA C111. Threaded ends shall conform to the NPT requirements of ANSI B1.20.1.

D. The plug valve body, bonnet and gland shall be ductile iron per ASTM A 126, Class B. The integral plug and shafts shall be cast iron ASTM A 126, Class B, or 316 stainless steel. The entire plug, except for the shafts, shall be covered with nitrile (Buna N) rubber. The rubber compound shall have been vulcanized to the metal plug and shall have a peel strength of not less than 75 pounds per inch when tested according to ASTM D 429, method B. The valve seat shall be at least 90 percent pure nickel, welded-in overlay into the cast iron body. The top and bottom bearings shall be 316 stainless steel.

E. Plug valves shall have a full port area of 100 percent of the nominal pipe size area.

F. Valves shall have worm gear type actuators with 2-inch square operating nuts.

G. Plug valves shall be coated inside with Protecto 401 or amine-cured novolac ceramic epoxy or another two-part epoxy suitable for sanitary sewer service which has been approved by the Town.

## 2.06 VALVE ACTUATORS

A. Butterfly valve and plug valve actuators.

Butterfly valve and plug valve actuators shall conform to the requirements for actuators presented in AWWA C 504 and shall be either manual or motor operated. Actuators shall be capable of seating and unseating the disc against the full design pressure and velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.

B. Manual Actuators.

Manual actuators shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized based on actual line pressure and velocities. Actuators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. They shall turn counterclockwise to open valves. Manual actuators shall be of the traveling nut, self-locking type or of the worm gear type and shall be designed to hold the valve in any intermediate position between fully

open and fully closed without creeping or fluttering. Valves located above grade shall have handwheel and position indicator, and valves located below grade shall be equipped with a 2-inch square AWWA operating nut located at ground level and cast-iron extension type valve box.

C. Motor Actuators (Modulating)

1. The motor actuated valve controller shall include the motor, actuator unit gearing, limit switch gearing, limit switches, position transmitter which shall transmit a 4-20 mA DC signal, control power transformer, electronic controller which will position the valve based on a remote 4-20 milliamp signal, torque switches, bored and key-wayed drive sleeve for non-rising stem valves, declutch lever and auxiliary handwheel as a self-contained unit.

2. The motor shall be specifically designed for valve actuator service using 480 volt, 60 Hertz, three phase power as shown, on the electrical drawings. The motor shall be sized to provide an output torque and shall be the totally enclosed, non-ventilated type. The power gearing shall consist of helical gears fabricated from heat treated alloy steel forming the first stage of reduction. The second reduction stage shall be a single stage worm gear. The worm shall be of alloy steel with carburized threads hardened and ground for high efficiency. The worm gear shall be of high tensile strength bronze with hobbed teeth. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout. Preference will be given to units having a minimum number of gears and moving parts. Spur gear reduction shall be provided as required.

3. Limit switches and gearing shall be an integral part of the valve control. The limit switch gearing shall be made of bronze and shall be grease lubricated, intermittent type and totally enclosed to prevent dirt and foreign matter from entering the gear train. Limit switches shall be of the adjustable type capable of being adjusted to trip at any point between fully opened valve and fully closed valve.

4. The speed of the actuator shall be the responsibility of the system supplier with regard to hydraulic requirements and response compatibility with other components within the control loop. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing. The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Gear limit switches must be geared to the driving mechanism and in step at all times whether in motor or manual operation. Provision shall be made for two additional rotors as described above, each to have two normally open and two normally closed contacts. Each valve controller shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve, should excessive load be met by obstructions in either direction of travel. The torque switch shall be provided with double-pole contacts.

5. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operations, but must be

responsive to manual operation at all times except when being electrically operated. The motor shall not rotate during hand operation nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running. The gear limit switches and torque switches shall be housed in a single easily accessible compartment integral with the power compartment of the valve control. All wiring shall be accessible through this compartment. Stepping motor drives will not be acceptable.

6. The motor with its control module must be capable of continuously modulating over its entire range without interruption by heat protection devices. The system, including the operator and control module must be able to function, without override protection of any kind, down to zero dead zone.

7. All units shall have strip heaters in both the motor and limit switch compartments.

8. The actuator shall be equipped with open-stop-close push buttons, an auto-manual selector switch, and indicating lights, all mounted on the actuator or on a separate locally mounted power control station.

9. The electronics for the electric operator shall be protected against temporary submergence.

10. Actuators shall be Limitorque L120 with Modutronic Control System containing a position transmitter with a 4-20MA output signal or equal.

D. Motor Actuators (Open-Close)

1. The electronic motor-driven valve actuator shall include the motor, actuator gearing, limit switch gearing, limit switches, torque switches, fully machined drive sleeve, declutch lever, and auxiliary handwheel as a self-contained unit.

2. The motor shall be specifically designed for valve actuator service and shall be of high torque totally enclosed, nonventilated construction, with motor leads brought into the limit switch compartment without having external piping or conduit box.

3. The motor shall be of sufficient size to open or close the valve against maximum differential pressure when voltage to motor terminals is 10% above or below nominal voltage.

4. The motor shall be pre-lubricated and all bearings shall be of the anti-friction type.

5. The power gearing shall consist of helical gears fabricated from heat treated steel and worm gearing. The worm shall be carburized and hardened alloy steel with the threads ground after heat treating. The worm gear shall be of alloy bronze accurately cut with a hobbing machine. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout.

6. Limit switches and gearing shall be an integral part of the valve actuator. The switches shall be of the adjustable rotor type capable of being adjusted to trip at any point between fully opened valve and fully closed valve. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing (influent valves require additional contacts to allow stopping at an intermediate position). The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Additional switches shall be provided if shown on the control and/or instrumentation diagrams. Limit switches shall be geared to the driving mechanism and in step at all times whether in motor or manual operation. Each valve actuator shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve should excessive load be met by obstructions in either direction of travel. Travel and thrusts shall be independent of wear in valve disc or seat rings.

7. A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operation except when being electrically operated. The motor shall not rotate during hand operation, nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve actuator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. Movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running.

8. Valve actuators shall be equipped with an integral reversing controller and three phase overload relays, Open-Stop-Close push buttons, local-remote-manual selector switch, control circuit transformer, three-phase thermal overload relays and two pilot lights in a NEMA 4X enclosure. In addition to the above, a close coupled air circuit breaker or disconnect switch shall be mounted and wired to the valve input power terminals for the purpose of disconnecting all underground phase conductors.

9. The valve actuator shall be capable of being controlled locally or remotely via a selector switch integral with the actuator. In addition, an auxiliary dry contact shall be provided for remote position feedback.

10. Valve A.C. motors shall be designed for operation on a 480 volt, 3-phase service. Valve control circuit shall operate from a fuse protected 120 volt power supply.

11. Motor operators shall be as manufactured by Limitorque Corporation, Type L120 or approved equal.

## 2.07 AIR RELEASE VALVES

A. Air release valves shall be automatic float operated, GA Industries Fig-929 for sewer applications, Fig-920 for water and reclaimed water application, or an approved equal, with inlet size and working pressure ratings as required and NPT connections.

B. Valve bodies shall be ductile iron per ASTM A 126, Class B. The orifice, float and linkage shall be stainless steel. The seat shall be (Buna N) nitrile elastomer.

## 2.08 VALVE BOXES

A. Buried valves shall have adjustable cast iron or HDPE valve boxes. Lids shall be cast iron drop type, and shall have “WATER”, “SEWER”, or “RECLAIM”, as applicable, cast into the top. Lids will be painted “safety” blue for potable, purple for reclaimed, and green for sanitary sewer.

B. Cast iron boxes shall be two-piece, or three-piece, as required, screw type, Tyler Pipe, 6850 Series, Box 461-S through 668-S, with extensions, as required to make the desired box length, or an approved equal. Bottom barrel shall be 5-1/4 inches inside diameter, with a flanged bottom with sufficient bearing area to prevent settling.

C. HDPE boxes shall be two-piece, adjustable, 1/4-inch-thick minimum heavy wall, high density polyethylene, with cast iron top and stainless-steel adjustable stem, Trench Adapter, as manufactured by American Flow Control, or an approved equal. Bottom barrel shall have flanged bottom to prevent settling. All bolts, screws and pins shall be stainless steel.

D. Reclaimed valve boxes shall be square 9-inch x 9-inch load bearing marked “Reclaimed Water” and painted Pantone 522C purple.

E. All valves shall either have operating nuts within 4 feet below the top of the lid or shall have extension stems with centering guides to provide an extended operating nut within 4 feet below the lid. Extension stems shall be fixed to the valve operating nut with a stainless-steel fastener.

F. All potable water, sewer, and reclaimed water grade-adjustment risers shall be cast iron material just like the valve box. No plastic or steel risers shall be allowed.

G. A centering device BoxLok or equal shall be installed in the valve box.

H. Stand pipe shall match color code of the system being installed, (blue for potable, Pantone purple 522 C for reclaimed, and green for sanitary sewer).

## 2.09 CORPORATION STOPS AND SADDLES

A. Corporation stops for connections to ductile iron and PVC water and reclaimed water mains shall be all red brass, alloy 85-5-5-5, per ASTM B 62, and shall

conform to AWWA C800. 1-inch through 2-inch corporation stops shall be ball type, 300 psi working pressure rated, with AWWA MIP threaded inlets and compression, pack joint, flare, or FIP threaded joint outlets, Mueller as shown in the table below, or an approved equal. All joints made to CTS size HDPE tubing shall use stainless steel insert stiffeners.

Corporation Stops

| Pipe Material | Type of Connection | Mueller 300 Model |
|---|---|---|
| HDPE | Compression x AWWA IP Thread | B-25028 (Saddle) * |
| HDPE | Compression x AWWA Taper Thread | B-25008 (Direct Tap) * |
| HDPE | Pack Joint x AWWA IP Thread | P-25028 (Saddle) * |
| HDPE | Pack Joint x AWWA Taper Thread | P-25008 (Direct Tap) * |
| Copper | Compression x AWWA IP Thread | B-25028 (Saddle) |
| Copper | Pack Joint x AWWA Taper Thread | B-25008 (Direct Tap) |
| Copper | Pack Joint x AWWA IP Thread | P-25028 (Saddle) |
| Copper | Pack Joint x AWWA Taper Thread | P-25008 (Direct Tap) |
| Copper | Flare x AWWA IP Thread | B-25028 (Saddle) |
| Copper | Flare x AWWA Taper Thread | B-25008 (Direct Tap) |
| Stainless Steel | FIP Thread x AWWA IP Thread | B-20046 (Saddle) |
| Stainless Steel | FIP Thread x AWWA Taper Thread | B-20045 (Direct Tap) |
| * Insert required, part number per manufacturer product information | | |

B. Potable plastic service pipe material and compression and pack joint connectors shall not be used in soil that is contaminated with low molecular-weight petroleum products, aromatic hydrocarbons, chlorinated hydrocarbons or organic solvents. Appropriate service tubing shall apply.

C. Water and reclaimed water service connections to PVC and DIP mains shall be made using red brass saddles, alloy 85-5-5-5, per ASTM B 62. Straps, washers and nuts shall be brass or stainless steel. No ductile iron, cast iron or steel saddles will be allowed. Saddles shall be Smith Blair 325 Bronze saddles with Stainless Steel or brass extra wide strap or equivalent.

D. Service and air release valve (ARV) connections to HDPE water, reclaimed water and sewer mains may be made using Romac Style 306H saddle or approved equal. All saddles shall be properly sized per the manufacturer product information and be installed according to the manufacturer's written instructions. Connections to HDPE mains shall not be made using narrower saddles similar to the Smith-Blair 325.

## 2.10 FLANGED ADAPTERS AND PLAIN END COUPLINGS

A. Plain end couplings and adapters shall be fusion-bonded epoxy coated carbon steel with Ethylene Propylene Diene Monomer (EPDM) rubber gaskets and stainless steel nuts, bolts and spacers. Acrylonitrile butadiene (NBR) gaskets shall be used for potable water mains that are located in soil that is contaminated with low molecular-weight petroleum products or non- chlorinated organic solvents or non-aromatic organic solvents. Fluorocarbon (FKM) gaskets shall be used for potable water mains that are located in soil that is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons. Fluorocarbon (FKM) gaskets shall be

used for potable water mains if the soil is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons, and is also contaminated with low molecular-weight petroleum products or organic solvents. Couplings shall be Dresser Style 38, or another approved equal. Flange adapters shall have a plain end compression seal similar to the style 38, with an ANSI 125 Class flange on the opposite end, and shall be Dresser Style 128W or an approved equal. Stainless steel backup rings shall be used for force mains that are located in corrosive environments including wetwells and valve vaults.

## 2.11 HOSE BIBS

A. Hose bibs shall be 3/4" or 1" brass, polished chromium plated brass, with vacuum breaker as noted on the drawings.

## 2.12 SWING CHECK VALVES

A. Check valves shall be swing type, weighted lever, conforming to AWWA C508. Valves shall be iron-body, bronze-mounted, single disk, 175 psi working pressure for 2- through 12-inch, 150 psi for 14- through 30-inch, with ANSI B16.1 Class 125 flanged ends, by Mueller; No. A-2600-6-01 (sewer), No. A-2602-6-01 (water), or AVK Series 41, or an approved equal.

B. When there is no flow through the line, the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.

C. Check valves shall have bronze seat and body rings, extended bronze or stainless steel hinge pins and stainless steel nuts and bolts on bolted covers.

D. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight.

## 2.13 HYDRANTS

A. Hydrants shall be dry barrel, nostalgic style, and shall be Mueller Super Centurion 250 with 5” Storz adaptor, or approved equal and shall conform to AWWA C502 and UL/FM certified, and shall, in addition, meet the specific requirements and exceptions which follow:

1. Hydrants shall be according to manufacturer's standard pattern or nostalgic style and of standard size and shall have one 5-inch Storz connection or equivalent with two 2½- inch hose nozzles.

2. Hydrant inlet connections shall have mechanical joints for 6-inch pipe.

3. Hydrant valve opening shall have an area at least equal to that area of a 5 1/4-inch minimum diameter circle and be obstructed only by the valve rod. Each hydrant shall be able to deliver 500 gpm minimum through its two 2 1/2 -inch hose nozzles when opened together with a loss of not more than 2 psi in the hydrant per AWWA C502.

4. The upper and lower stem rod shall be stainless steel and shall have a breakable stem-rod coupling of stainless steel or cast iron or ductile iron with a fusion bonded epoxy coating, with stainless steel pins and clips.

5. Hydrants shall be hydrostatically tested as specified in AWWA C502 and shall be rated at 250 psi minimum.

6. The operating nut shall be 1½ -inch pentagon shaped with a protective weather cover, and open counter clockwise.

7. All nozzle threads shall be American National Standard.

8. Each nozzle cap shall be provided with a Buna N rubber washer.

9. All hydrants shall be traffic break away type and allow for 360-degree rotation to position the Storz connection/nozzle in the desired direction after installation.

10. Hydrants must be capable of being extended without removing any operating parts.

11. Hydrant extensions shall be fusion bonded epoxy coated inside and outside with a stainless-steel stem. The breakaway coupling can be fusion bonded epoxy coated or stainless steel. Only one hydrant extension is allowed per hydrant.

12. Weepholes shall be excluded from fire hydrants.

13. Hydrant main valve closure shall be of the compression type opening against the pressure and closing with the pressure. The main valve shall be faced or covered with EPDM elastomer, which shall seat on a bronze ring.

14. Hydrant bonnets, weather cover, nozzle section, caps and shoe shall be cast iron or ductile iron and shall be holiday free fusion-bonded epoxy coated at the factory, per AWWA C550, inside and outside. Lower barrel shall be fusion bonded epoxy coated inside and outside. Aboveground parts shall also have a top coat of Sherwin-Williams Acrolon 218 HS acrylic polyurethane or approved equal; color Safety Yellow for fire hydrants that are connected to the potable water system or Pantone 522C purple for fire hydrants that are connected to the reclaimed water system.

15. Exterior nuts, bolts and washers shall be stainless steel. Bronze nuts may be used below grade.

16. All internal operating parts shall be removable without requiring excavation.

## 2.14 RESTRAINED JOINTS

A. Pipe joints shall be restrained by poured-in-place concrete thrust blocks or by other mechanical methods, including tie rods, Stargrip and Allgrip, as manufactured by Star Pipe Products or Megaflange and 2000 PV, as

manufactured by EBAA Iron Sales. Flanged joints may be used above ground.

B. All T-bolts, bolts, nuts, washers, and all thread rods shall meet ASTM A-588 requirements (Cor-ten or equivalent) or be stainless steel. The use of rebar with welded thread is prohibited.

A certification from the supplier shall be provided to the Town during the shop drawing review process ensuring all T-bolts, bolts, nuts, washers, and all thread rods meet the A-588 requirements and shall state the project name and contractor in the certification letter. If stainless steel is to be used, no certification letter is required.

C. Restrained joints may also be Lok-Ring, as manufactured by American Cast Iron Pipe Company, or an approved equal.

D. Restrained joint designs, which require wedges and/or shims to be driven into the joints in order to disassemble the pipe shall not be allowed.

## 2.15 TAPPING SLEEVES AND VALVES

A. Tapping valves shall meet the requirements of AWWA C509/C515 with ductile iron body and shall be rated for a pressure of 250 psi. The valves shall be flanged with an alignment ring by mechanical joint with a nonrising stainless steel stem. All bolts, nuts and washers shall be stainless steel. Manufacturer shall use Never-Seez or equivalent during assembly of bolt and nut sets to prevent galling of similar metals. Stem seals shall be provided and shall be of the O-ring type, two above and one below the valve's thrust collar. Valve shall be designed for vertical burial and shall open counterclockwise. Operating nut shall be AWWA standard 2-inch square for valves 2 inches and up. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve to accommodate full size shell cutter. Gaskets shall cover the entire area of the flange surface and be 1/8-inch minimal thickness of red rubber. The wedge shall be ductile iron fully encapsulated with EPDM rubber. All bolts, nuts and washers between the sleeve and valve shall be stainless steel.

B. Tapping sleeves and saddles shall be sealed to the pipe using a confined "O" ring gasket and shall be able to withstand a pressure test of 180 psi for water lines or 150 psi for sewer force mains for one hour with no leakage in accordance with AWWA C110. A stainless steel 3/4-inch NPT test plug shall be provided for pressure testing. All bolts joining the two halves shall be stainless steel and shall be included with the sleeve or saddle. Sleeves and saddles shall be fusion applied epoxy coated or be made of 18-8 Type 304 stainless steel. Saddle straps shall be 18-8 Type 304 stainless steel.

## 2.16 TRACER WIRE TEST STATION BOXES

A. Tracer wire test station boxes shall be provided at plug valves, butterfly valves, blowoff valves, gate valves, fire hydrants and backflow preventers as indicated in these Standards. Tracer wire test station boxes for yard service shall be 2 ½ inch

diameter, 15-inch length, ABS plastic with a cast iron rim and lid, P200NFGT as manufactured by Bingham & Taylor, or equal approved by Town. Where test boxes will be in streets or subject to vehicular traffic, use B&T Model P525RD, 5 ¼ -inch diameter or equal, centered in a separate concrete pad similar to a valve box pad.

## PART 3 EXECUTION

### 3.01 INSTALLATION

A. All valves and appurtenances shall be installed in the location shown in the Drawings, true to alignment and rigidly supported. Any damage occurring to the above items before they are installed shall be repaired to the satisfaction of the Town.

B. After installation, all valves and appurtenances shall be tested at least two hours at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the Town.

C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures which have a direct bearing on their location, and they shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.

D. Pipe for use with flexible couplings shall have plain ends as specified in the respective pipe sections.

E. Flanged joints and mechanical joints shall be made with high strength, low alloy Corten or 316 stainless steel bolts, nuts and washers.

F. Prior to the assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.

G. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8". Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6" from the end.

H. Valve boxes with concrete bases shall be installed as shown on the Drawings. Mechanical joints shall be made in the standard manner. Valve stems shall be vertical in all cases. Place cast iron box over each stem with base bearing on compacted fill and the top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on cover shall be parallel to pipe.

Remove any sand or undesirable fill from valve box.

## 3.02 HYDRANTS

A. Hydrants shall be set at the locations designated by the Town and/or as shown on the Drawings and shall be bedded on a firm foundation. A drainage pit on crushed stone as shown on the Drawings shall be filled with gravel or crushed stone and satisfactorily compacted. During backfilling, additional gravel or crushed stone shall be brought up around and 6" over the drain port. Each hydrant shall be set in true vertical alignment and shall be properly braced. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the plans. Felt paper shall be placed around the hydrant elbow prior to placing concrete. CARE MUST BE TAKEN TO ENSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS. Concrete used for backing shall be as specified herein.

B. When installations are made under pressure, the flow of water through the existing main shall be maintained at all times. The diameter of the tap shall be a minimum of 2" less than the inside diameter of the branch line.

C. The entire operation shall be conducted by workmen thoroughly experienced in the installation of tapping sleeves and valves, and under the supervision of qualified personnel furnished by the manufacturer. The tapping machine shall be furnished by the Contractor if tap is larger than 12" in diameter.

D. The Contractor shall determine the locations of the existing main to be tapped to confirm the fact that the proposed position for the tapping sleeve will be satisfactory and no interference will be encountered such as the occurrence of existing utilities or of a joint or fitting at the location proposed for the connection. No tap will be made closer than 30" from a pipe joint.

E. Tapping valves shall be set in vertical position and be supplied with a 2" square operating nut for valves 2" and larger. The valve shall be provided with an oversized seat to permit the use of full-sized cutters.

F. Tapping sleeves and valves with boxes shall be set vertically or horizontally as indicated on the Drawings and shall be centered squarely on the main to be tapped. Adequate support shall be provided under the sleeve and valve during the tapping operation. Sleeves shall be no closer than 30" from water main joints. Thrust blocks shall be provided behind all tapping sleeves. Proper tamping of supporting earth around and under the valve and sleeve is mandatory. After completing the tap, the valve shall be flushed to ensure that the valve seat is clean.

## 3.03 SHOP PAINTING

A. Ferrous surfaces of valves and appurtenances shall receive a coating of rust-inhibitive primer. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

## 3.04 FIELD PAINTING

A. All metal valves and appurtenances specified herein and exposed to view shall

be painted safety blue.

## 3.05 INSPECTION AND TESTING

A. All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipelines shall be subjected to a hydrostatic pressure and leak testing as required by the Town and Engineer of Record. Prior to testing, the pipe lines shall be supported in a manner approved by the Town to prevent movement during tests.

B. All leaks shall be repaired and lines retested as approved by the Town.

END OF SECTION

# SECTION 02800
# TRACER WIRE SYSTEM

## PART 1 GENERAL

### 1.01 SCOPE

The Contractor shall furnish all labor, materials, equipment and incidentals required to install a complete tracer wire system as specified in this section.

## PART 2 PRODUCTS

### 2.01 TRACER WIRE

A. Open trench pipeline construction shall require the installation of minimum #10 AWG Copper Clad, High Strength Steel tracer wire with minimum 448 psi break load, with a minimum 30 mil HDPE insulation thickness.

B. Directional Drilling/Boring pipeline construction shall require the installation of minimum #10 AWG Copper Clad, Extra High Strength Steel tracer wire with minimum 1,940 psi break load, with a minimum 45 mil HDPE insulation thickness.

C. Tracer wire products shall be per the latest edition of the Town's Approved Products List

### 2.02 CONNECTORS

A. All mainline tracer wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At crosses, the four wires shall be joined using a 4-way connector. Use of two 3-way connectors with a short jumper wire between them is an acceptable alternative.

B. Direct bury wire connectors shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion and shall be installed in a manner so as to prevent any uninsulated wire exposure.

C. Non-locking friction fit, twist on, or taped connectors are prohibited.

D. Connector products shall be per the latest edition of the Town's Approved Products List

### 2.03 TRACER WIRE BOXES

A. All tracer wire termination points must utilize an approved trace wire access box per the latest edition of the Town's Approved Products List.

B. All grade level/access boxes shall be appropriately identified with "sewer", "reclaimed" or "water" cast into the cap and be color coded.

C. A minimum of 2 ft. of excess/slack wire is required in all trace wire access boxes after meeting final elevation.

## PART 3 EXECUTION

### 3.01 GENERAL

A. Tracer wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed, except as specified in Section 02617.

B. Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.

C. Tracer wire shall be installed at the top of the pipe and secured (taped/tied) at 5-foot intervals.

D. Tracer wire on all stubs must terminate at an approved tracer wire access box located directly above the utility, at the edge of the road right-of-way, but out of the roadway.

E. All water services tracer wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire. If service lateral is a conductive pipe, tracer wire shall be installed 6” above the pipe to avoid contact.

F. In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new tracer wire and existing tracer wire shall be connected using approved splice connectors and shall be properly grounded at the splice location.

G. Lay mainline tracer wire continuously, by-passing around the outside of appurtenances or valves.

END OF SECTION

# DIVISION 3 CONCRETE

## SECTION 03200
## CONCRETE REINFORCEMENT

## PART 1 GENERAL

### 1.01 WORK INCLUDED

A. Reinforcing steel bars and welded steel wire fabric for cast-in-place concrete, complete with tie wire.

B. Support chairs, bolsters, bar supports and spacers, for reinforcing.

### 1.02 QUALITY ASSURANCE

A. Perform concrete reinforcing work in accordance with ACI 318 unless specified otherwise in this Section.

### 1.03 REFERENCES

A. ACI 318 - Building Code Requirements for Reinforced Concrete.

B. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

C. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

D CRSI 63 - Recommended practice for placing reinforcing bars.

E. CRSI 65 - Recommended practice for placing bar supports, specifications and nomenclature.

F. ACI 315 - American Concrete Institute - Manual of Standard Practice.

### 1.04 SHOP DRAWINGS

A. Submit shop drawings in accordance with Contract Documents.

B. Indicate bar sizes, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules and supporting and spacing devices.

C. Manufacturer's Literature: Manufacturer’s specifications and installation instructions for splice devices.

## PART 2 PRODUCTS

### 2.01 REINFORCING

A. Reinforcing steel: Grade 60, Minimum Yield Strength 60,000 psi, deformed billet steel bars, ASTM A615; plain finish.

B. Welded steel wire fabric: Deformed wire, ASTM A497; smooth wire ASTM A185 in flat sheets; plain finish.

## 2.02 ACCESSORY MATERIALS

A. Tie wire: Minimum 16-gauge annealed type, or patented system accepted by Town.

B. Chairs, bolsters, bar supports, spacers: Sized and shaped for strength and support of reinforcing during construction conditions.

C. Special chairs, bolsters, bar supports, spacers (where adjacent to architectural concrete surfaces): Stainless steel type sized and shaped as required.

## 2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with ACI 315.

B. Locate reinforcing splices, not indicated on Drawings, at points of minimum stress. Location of splices shall be reviewed by the Town.

C. Where indicated, weld reinforcing bars in accordance with AWS D12.1.

# PART 3 EXECUTION

## 3.01 PLACEMENT

A. Reinforcing shall be supported and secured against displacement. Do not deviate from true alignment.

B. Before placing concrete, ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings which would reduce bond to concrete.

## 3.02 QUALITY ASSURANCE

A. Acceptable Manufacturers: Regularly engaged in manufacture of steel bar and welded wire fabric reinforcing.

B. Installer Qualifications: Three years of experience in installation of steel bar and welded wire fabric reinforcing.

C. Allowable Tolerances:

1. Fabrication:

   a. Sheared length: +I in.

   b. Depth of truss bars: +0, -1/2 in.

   c. Stirrups, ties and spirals: $\pm$1/4 in.

d. All other bends: ±1 in.

2. Placement:

a. Concrete cover to form surfaces: ±1/4 in.

b. Minimum spacing between bars: 1 in.

c. Top bars in slabs and beams:

(1) Members 8 in. deep or less: ±1/4 in.

(2) Members more than 8 in.: ±1/2 in.

d. Crosswise of members: Spaced evenly within 2 in. of stated separation.

e. Lengthwise of members: Plus, or minus 2 in.

3. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 1 bar diameter.

## 3.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.

B. Handle and store materials to prevent contamination.

## 3.05 INSTALLATION

A. Placement:

1. Bar Supports: CRSI 65.

2. Reinforcing Bars: CRSI 63.

B. Steel Adjustment:

1. Move within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items.

2. Do not move bars beyond allowable tolerance without concurrence of Town.

3. Do not heat, bend, or cut bars without concurrence of Town.

C. Splices:

1. Lap splices: Tie securely with wire to prevent displacement of splices during placement of concrete.

2. Splice devices: Install in accordance with manufacturer's written instructions.

3. Do not splice bars without concurrency of Town, except at locations shown on Drawings.

D. Wire Fabric:

1. Install in longest practicable length.

2. Lap adjoining pieces one full mesh minimum, and lay splices with 16-gauge wire.

3. Do not make end laps midway between supporting beams, or directly over beams of continuous structures.

4. Offset end laps in adjacent widths to prevent continuous laps.

E. Cleaning: Remove dirt, grease, oil, loose mill scale, excessive rust, and foreign matter that will reduce bond with concrete.

F. Protection During Concreting: Keep reinforcing steel in proper position during concrete placement.

END OF SECTION

# SECTION 03300
# CAST-IN-PLACE CONCRETE

## PART 1 GENERAL

### 1.01 WORK INCLUDED

A. Poured-in-place concrete slabs, thrust blocks, pile caps and pipe support cradles.

### 1.02 QUALITY ASSURANCE

A. Perform cast-in-place concrete work in accordance with ACI 318, unless specified otherwise in this Section.

### 1.03 TESTING LABORATORY SERVICES

A. Inspection and testing will be performed by the testing laboratory currently under contract or provided by the Town in accordance with the Contract Documents.

B. Provide free access to work and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of work.

D. Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.

E. Three concrete test cylinders will be taken for every 100 cu. yds. or part thereof of each class of concrete placed each day. Smaller pours shall have cylinders taken as directed by the Town.

F. One slump test will be taken for each set of test cylinders taken.

### 1.04 REFERENCES

A. ASTM C33 - Concrete Aggregates

B. ASTM C150 - Portland Cement

C. ACI 318 - Building Code Requirements for Reinforced Concrete

D. ASTM C260 - Air Entraining Admixtures for Concrete

E. ASTM C94 - Ready-Mixed Concrete

F. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete

G. ACI 305 - Recommended Practice for Hot Weather Concreting

## PART 2 PRODUCTS

### 2.01 CONCRETE MATERIALS

A. Cement: Moderate-Type II, High early strength-Type III, Portland type, ASTM C150.

B. Fine and Coarse Aggregates: ASTM C33.

C. Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material.

### 2.02 ADMIXTURES

A. Air Entrainment: ASTM C260.

B. Chemical: ASTM C494 Type A - water reducing admixture.

### 2.03 ACCEPTABLE MANUFACTURERS

A. Acceptable Products include Pozzolith, WRDA, or Engineer approved equal.

### 2.04 ACCESSORIES

A. Non-shrink grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 2 days and 7000 psi in 28 days.

### 2.05 CONCRETE MIXES

A. Mix concrete in accordance with ASTM C94.

B. Provide concrete of the following strength:

1. Required concrete strengths as determined by 28-day cylinders shall not be less than 3000 psi unless otherwise specified.

2. Select proportions for normal weight concrete in accordance with ACI 301 3.8 Method 1, Method 2, or Method 3. Add air entraining agent to concrete to entrain air as indicated in ACI 301 Table 3.4.1.

3. All mixes shall be in accordance with FDOT Specifications.

C. Use set-retarding admixtures during hot weather only when accepted by Town.

D. Add air entraining agent to concrete mix for concrete work exposed to exterior.

### 2.06 FORMS

A. Forms shall be used for all concrete masonry, including footings. The form shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, appearance and to the elevations indicated on the Drawings.

B. Forms shall be made of wood, metal, or other approved material. Wood forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots; where used for expose surfaces, boards shall be dressed and matched. Plywood shall be sanded smooth and fitted with tight joints between panels. Metal forms shall be of an approved type for the class of work involved and of the thickness and design required for rigid construction.

C. Edges of all form panels in contact with concrete shall be flush within 1/32-inch and forms for plane surfaces shall be such that the concrete will be plane within 1/16-inch in four feet. Forms shall be tight to prevent the passage of mortar and water and grout.

D. Forms for walls shall have removable panels at the bottom for cleaning, inspection and scrubbing-in of bonding paste. Forms for walls of considerable height shall be arranged with tremies and hoppers for placing concrete in a manner that will prevent segregation and accumulation of hardened concrete on the forms or reinforcement above the fresh concrete.

E. Molding or bevels shall be placed to produce a 3/4-inch chamfer on all exposed projecting corners, unless otherwise shown on the Drawings. Similar chamfer strips shall be provided at horizontal and vertical extremities of all wall placements to produce "clean" separation between successive placements as called for on the Plans.

F. Forms shall be sufficiently rigid to withstand vibration; to prevent displacement or sagging between supports and constructed so the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.

G. Forms, including new pre-oiled forms, shall be oiled before reinforcement is placed, with an approved nonstaining oil or liquid form coating having a non-paraffin base.

H. Before form material is reused, all surfaces in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn, all protrusions smoothed and in the case of wood forms pre-oiled.

I. Form ties encased in concrete shall be designed so that after removal of the projecting part, no metal shall be within 1-inch of the face of the concrete. That part of the tie to be removed shall be at least 1/2-inch diameter or be provided with a wood or metal cone at least 1/2-inch in diameter and 1-inch long. Form ties in concrete exposed to view shall be the cone-washer type equal to the Richmond "Tyscru". Throughbolts or common wire shall not be used for form ties.

## PART 3 EXECUTION

### 3.01 PLACING CONCRETE

A. Place concrete in accordance with ACI 304.

B. Notify the Town a minimum of 24 hours prior to commencement of concreting operations.

C. Verify anchors, seats, plates and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete. Rectify the same and proceed with work.

D. Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature and test samples taken.

E. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.

F. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.

G. Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.

H. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solidly with non-shrink grout.

I. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Town upon discovery.

J. Conform to ACI 305 when concreting during hot weather.

## 3.02 SCREEDING

A. Screed surfaces level, maintaining flatness within a maximum deviation of 1/8" in 10 feet.

## 3.03 PATCHING

A. Allow Town to inspect concrete surfaces immediately upon removal of forms. Patch imperfections as directed. All patching procedures shall be submitted to and approved by the Town prior to use.

## 3.04 DEFECTIVE CONCRETE

A. Modify or replace concrete not conforming to required lines, details and elevations.

B. Repair or replace concrete not properly placed resulting in excessive honeycomb and other defects. Do not patch, fill, touch-up, repair, or replace exposed architectural concrete except upon express direction of the Town for each individual area.

## 3.05 CONCRETE FINISHING

A. Provide concrete surfaces to be left exposed, columns, beams and joists with smooth rubbed finish.

## 3.06 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for a period of 7 days or until concrete strengths reaches 75% of the 28-day design strength.

B. Protection against moisture loss may be obtained with spray on curing compounds or plastic sheets. Protection against heat or cold may be obtained with insulated curing blankets or forms.

## 3.07 CONCRETE DRIVEWAY RESTORATION

A. Concrete driveways shall be restored with 6 inches of 3,000 psi concrete with W2.5 X W2.5, 6"X6" #10 wire mesh. Place ½ inch expansion joint between back of curb and new concrete. Area beneath restoration shall be mechanically tamped prior to placing concrete.

## 3.08 CONCRETE SIDEWALK RESTORATION

A. Concrete sidewalks across driveways shall be restored with 6 inches of 3,000 psi concrete with W2.5 X W2.5, 6X6 wire mesh. Place ½ inch expansion joint between back of curb and new concrete. Area beneath restoration shall be mechanically tamped prior to placing concrete.

B. Concrete sidewalks outside of driveways shall be restored with 4 inches of 3,000 psi concrete per FDOT Design Standards, Sections 522, 310, and 304.

END OF SECTION

# SECTION 03350
# CONCRETE FINISHES

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required to finish cast-in-place concrete surfaces as specified herein.

### 1.02 SUBMITTALS

Submit to the Town as provided in the Contract Documents, the proposed chemical hardener manufacturer's surface preparation and application procedures.

### 1.03 SCHEDULE OF FINISHES

A. Concrete for the Project shall be finished in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material under another Section.

B. The base concrete for the following conditions shall be finished as noted and as further specified herein:

1. Exterior, exposed concrete slabs and stairs - broomed finish.

2. Interior, exposed concrete slabs - steel trowel finish.

3. Concrete on which process liquids flow or in contact with sludge - steel trowel finish.

4. Concrete where not exposed in the finished work and not scheduled to receive an additional applied finish or material - off-form finish.

5. Provide concrete surfaces to be left exposed such as walls, columns, beams and joists with smooth rubbed finish.

### 1.04 RESPONSIBILITY FOR CHANGING FINISHES

A. The surface finishes specified for concrete to receive additional applied finishes or materials are the finishes required for the proper application of the actual products specified under other Sections. Where different products are approved for use, it shall be the Contractor's responsibility to determine if changes in finishes are required and to provide the proper finishes to receive these products.

B. Changes in finishes made to accommodate product different from those specified shall be performed at no additional cost to the Town. Submit the proposed new finishes and their construction methods to the Town for approval.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Portland cement and component materials required for finishing the concrete surfaces shall be as specified in the Contract Documents.

B. Hardener shall be Lapidolith as manufactured by Sonneborn Building Products or approved equal. Hardener shall be used on all floors, stair treads and platforms.

## PART 3 EXECUTION

### 3.01 FORMED SURFACES

A. Forms shall not be stripped before the concrete has attained a strength of at least 50 percent of the ultimate design strength. This is equivalent to approximately five "100 day-degrees" of moist curing.

B. Care shall be exercised to prevent damaging edges or obliterating the lines of chamfers, rustications, or corners when removing the forms or doing any work adjacent thereto.

C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the Town.

D. Off-form finish. Fins and other projections shall be removed as approved. Tie cone holes and other minor defects shall be filled with non-shrink grout specified under the Contract Documents.

### 3.02 FLOORS AND SLABS

A. Floors and slabs shall be screeded to the established grades and shall be level with a tolerance of 1/8-inch when checked with a 10 foot straight edge, except where drains occur, in which case floors shall be pitched to drains as indicated. Failure to meet either of above shall be cause for removal, grinding, or other correction as approved by the Town.

B. Following screeding as specified above, power steel trowel as follows:

1. Immediately after final screeding, a dry cement/sand shake in the proportion of 2-sacks of portland cement to 350-pounds of coarse natural concrete sand shall be sprinkled evenly over the surface at the rate of approximately 500 pounds per 1,000 square feet of floor. Neat, dry cement shall not be sprinkled on the surface. This shake shall be thoroughly floated into the surface with an approved disc type power compacting machine weighing at least 200 pounds if a 20-inch disc is used or 300 pounds if a 24-inch disc is used (such as a "Kelly Float" as manufactured by the Weisner-Rapp Corporation of Buffalo, New York). A mechanical blade-type float or trowel is not acceptable for this work.

NOTE: This operation (application of the cement/sand shake) may be eliminated at the discretion of the Town if the base slab concrete exhibits adequate fattiness and homogeneity.

2. In lieu of power steel troweling, small areas as defined by the Town shall be compacted by hand steel troweling with the dry cement/sand shake as ordered.

3. The floor or slab shall be compacted to a smooth surface and the floating operation continued until sufficient mortar is brought to the surface to fill all voids. The surfaces shall be tested with a straight edge to detect high and low spots which shall be eliminated.

4. Compaction shall be continued only until thorough densification is achieved and a small amount of mortar is brought to the surface. Excessive floating shall be avoided.

C. After Paragraph 3.02 A and B procedures are accomplished, floors and slabs for particular conditions shall be completed as scheduled in one of the following finishes:

1. Wood float finish. Hand wood float, maintaining the surface tolerance to provide a grained, nonslip finish as approved.

2. Broomed finish. Hand wood float maintaining the surface tolerance and then broom with a stiff bristle broom in the direction of drainage to provide a nonslip finish as approved.

3. Steel trowel finish. Hand steel trowel to a perfectly smooth, hard even finish free from high or low spots or other defects as approved.

D. Floors, stair treads and platforms shall be given a floor hardener. Application shall be according to manufacturer's instructions.

## 3.03 APPROVAL OF FINISHES

A. All concrete surfaces will be inspected during the finishing process by the Town.

B. Surfaces which, in the opinion of the Town, are unsatisfactory shall be refinished or reworked until approved by the Town.

END OF SECTION

# SECTION 03410
# PRECAST PORTLAND CONCRETE STRUCTURES

## PART 1 GENERAL

### 1.01 SCOPE OF WORK

A. The Contractor shall furnish all materials, labor and equipment and construct valve vaults, meter vaults, concrete pipe and accessory items, consisting of precast sections as shown on the Drawings and as specified herein.

B. The forms, dimensions, concrete and construction methods shall be approved by the Town in advance of construction.

C. These Specifications are intended to give a general description of what is required, but do not purport to cover all of the structural design details which will vary in accordance with the requirements of the plans. It is, however, intended to cover the furnishing, shop testing, delivery and complete installation of all precast structures whether specifically mentioned in these Specifications or not.

D. The supplier of the precast items shall coordinate his work with that of the Contractor to ensure that the units will be delivered and installed in the excavation provided by the Contractor, in accordance with the Contractor's construction schedule.

E. The Contractor will ensure coordination of the precast structures fabrication with the supplier to achieve the proper structural top slab openings, spacings and related dimensions for the selected equipment frames and covers. The top slabs, frames, covers, and subsurface structures outside of roadways shall be capable of live load of 300 pounds per square foot unless noted otherwise.

### 1.02 SUBMITTALS

A. Submit to the Town in accordance with the Contract Documents, shop drawings showing details of construction, reinforcing, and joints.

B. Shop Drawings

1. Content
    a. Dimensions and finishes.
    b. Estimated camber.
    c. Reinforcing and connection details.
    d. Lifting and erection inserts.
    e. Other items cast into members.
2. Show location of unit by same identification mark placed on member.
3. Include design calculations.

C. Manufacturer's Literature: Manufacturer's recommended installation instructions.

D. Manufacturer's certificates of material conformance with Specifications.

E. Test Reports: Reports of tests on concrete. A minimum of three compression test cylinders will be required for each pour.

## 1.03 INSPECTION

A. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection and approval by the Town, or other representatives of the Town. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places and the sections shall be subject to rejection at any time due to failure to meet any of the Specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the project site shall be marked for identification and shall be removed from the project site at once. All sections, which have been damaged after delivery will be rejected and if already installed, shall be acceptably repaired, if permitted, or removed and replaced entirely at the Contractor's expense.

B. At the time of inspection, the sections will be carefully examined for compliance with the applicable ASTM designation and these Specifications and with the approved manufacturer's drawings.

1. All sections shall be inspected for general appearance, dimension, "scratch-strength", blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.

2. All sections shall meet the manufacturing tolerance requirements of ASTM C478 or the following casting tolerances, whichever are more severe:

| | |
|---|---|
| Wall Thickness | ± 3/8" |
| Inside Diameter | ± 3/8" |
| Outside Diameter | ± 1/2" |
| Height or Length | ± 3/8" |

C. Imperfections may be repaired, subject to the approval of the Town, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of 7 days and 5,000 psi at the end of 28 days, when tested in 3-inch by 6-inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the Town.

# PART 2 PRODUCTS

## 2.01 PRECAST CONCRETE SECTIONS

A. Precast concrete manhole grade rings, flat slab tops, conical tops, risers and base sections shall be fabricated in accordance with the material and design standards of ASTM C478, except as modified herein.

B. Portland cement shall conform to ASTM C150, Type II, and concrete shall have a minimum compressive 28-day strength of 4,000 psi.

C. The manufacturer shall make a minimum of four standard test cylinders for each 100 cubic yards of concrete (or part thereof) that is cast each day. These test cylinders, along with sections cast that day, shall be marked in such a way that the test results can be matched with the appropriate castings. Two cylinders shall be cured with the product until the forms are stripped. At this time, one cylinder shall be broken to ascertain that a minimum strength of 2,000 psi has been reached prior to moving the product from the forming location. The remaining two cylinders shall be cured and tested in accordance with ASTM C192 and C39. The average compressive strength for each day's production shall be greater than 4,000 psi with no more than 10% of the tested cylinders falling below 4,000 psi. In no case shall any cylinder strength fall below 3,500 psi. All cylinder strengths shall be certified by a Florida Licensed Professional Engineer. Failure to meet these requirements for any day's production is cause for rejection of all sections cast that day.

D. Minimum wall thickness for manholes shall be 8 inches or 1/12 the inside diameter of the manhole, whichever is greater. The minimum thickness for the bottom of the base section shall be 8 inches.

E. Reinforcing steel shall be as specified in ASTM C478.

F. Precast manhole structures shall be free of cracks, holes, voids, blisters or rough surfaces. Manholes shall be water-tight and shall be generally sound and free of defects of any sort. Lift holes shall not penetrate through the wall of any manhole tops, risers or base sections. Holes passing part-way through the manhole section walls for lifting devices shall be filled with cement or epoxy grout after the manhole has been set in place.

G. Pipe openings shall meet the recommended tolerances of the individual manufactured pipe to manhole connectors; however, the horizontal location shall be within +/- 2 degrees of arc of that detailed on the shop drawings.

## 2.02 MANHOLE INVERTS

A. Benched inverts shall be provided and shall be monolithically cast or shall be a secondary casting in a cured base section as per ASTM C478.

B. The width of the invert channel shall be the same as the inside diameter of the connected sewer pipes and shall have a “U” - shaped cross-section with the bottom of the channel shaped to correspond with the lower half of the pipe. The depth of the channel shall be a minimum of half the inside diameter of the connected pipes.

C. The channel shall be formed smooth and streamlined, and, where the flow changes directions, shall have true curves of the largest radius possible within the manhole base. The maximum change of direction of flow within a manhole shall be 90 degrees.

D. The channel invert slope shall be uniform through the manhole and shall have a minimum vertical drop of 1 inch from the inlet(s) to the outlet.

E. For all manholes with pipes 16 inches in diameter and larger, the base section and invert channels shall have a pre-molded plastic liner as described in subsection 1.12.6, “Concrete Manholes and Wet wells with Protective Liners.”

## 2.03 RESILIENT PIPE CONNECTORS

A. Provide cast-in resilient connectors conforming to requirements of ASTM C923 installed at the factory. All connectors are to be water tight. Install resilient connectors at each pipe entering and exiting the structure in accordance with manufacturer's instructions. The external take down clamp and its hardware shall be 316 stainless steel. Cold joint pipe stub grouting shall not be allowed. Cast-in resilient connectors shall be furnished per the latest edition of the Town's Approved Products List.

B. All pipe penetrations shall be made in the factory unless otherwise specified in the plans.

C. If the Contractor is required to connect a new line to an existing manhole, jack-in resilient connectors conforming to requirements of ASTM C923. All connectors are to be watertight. Install resilient connectors at each pipe entering and exiting the structure in accordance with manufacturer's instructions. The internal expansion band and hardware shall be minimum 304 stainless steel. The external take down clamp and its hardware shall be 316 stainless steel. Jack-in resilient connectors shall be furnished per the latest edition of the Town's Approved Products List.

D. Connectors shall be installed in strict accordance with the written installation instructions of the manufacturer. Non-shrink grout shall be placed in the gap between the boot or seal and the manhole invert channel, to make a smooth transition, unless otherwise directed by the manufacturer's instructions.

## 2.04 MANHOLE AND WET WELL JOINTS

A. Joints between manhole and wet well sections shall be tongue and groove smooth wall, or bell and spigot, with a continuous elastomeric ring gasket (O-ring) joint conforming to the requirements of ASTM C443. In addition to the ring gasket, additional sealing device shall be provided as follows:

**For Tongue and Groove Smooth Wall Manholes:**

(1) A minimum of twelve-inches wide of elastomeric based plastic joint wrap shall be centered over the joints, on the outside of the manhole, including the chimney to manhole frame

(2) A minimum of ½-inch x ¾-inch bead of hydrophilic urethane paste applied to the interior of the joint just before manhole section assembly.

**For Bell and Spigot Manholes:**

(1) A minimum of eighteen (18) inches wide of heat shrinkable joint wrap shall be centered over the joints, on the outside of the manhole, including the chimney to manhole frame

(2) A minimum 3-inch-wide x ½-inch thick bead of sealant strips shall be applied to the interior of the joint just before manhole section assembly

B. For standard manholes without liners, fill the joint at the inside face with non-shrink grout and strike the joint smooth and uniform with the manhole interior walls.

D. For manholes with and without plastic liners and with concrete grade-adjustment rings, joints between the top section and the grade adjustment ring, and between grade rings, and between the grade adjustment ring and the frame shall be made with non-shrink cement mortar.

E. Refer to the latest edition of the Town's Approved Products List for acceptable manufacturers.

## 2.05 PROTECTIVE INSERT LINERS

A. All manholes that are immediately upstream of a lift station wet well as defined in Town of Longboat Key Utility Standards, force main termination manholes and the two downstream manholes in the flow direction, manholes with turbulent opposing flows as defined in the Town of Longboat Key Utility Standards, manholes with 12-inch diameter pipes or larger , drop manholes, and all lift station wet wells shall be manufactured from polymer concrete. However, under the written approval of the Town, a structure at the locations referenced above shall be installed with a protective insert liner in lieu of polymer concrete. The liners shall be integrally cast into the concrete tops, risers and base sections, which shall be in all other respects manufactured in accordance with ASTM C478 using Type II Portland Cement per ASTM C150. The plastic liner shall be generally chemically resistant to the wastewater environment and shall be mechanically affixed to the precast concrete manhole sections so that there can be no separation of the liner from the manhole sections during the service lifetime.

B. The plastic liner shall have no surface degradation when exposed to nitric acid, hydrochloric acid, ammonia, sodium hydroxide, sulfuric acid, acetone, unleaded gasoline and turpentine in accordance with test method ASTM D1308 and shall not be attacked when immersed in acetone according to test method ASTM D2152.

C. The base liner for manholes shall have performed flow channels with water-tight gasketed pipe bell connections or boot holes that extend to the outside profile of the precast concrete structure.

D. The wall thickness for manholes and wet wells with liners, including the liner thickness, shall be 8 inches minimum or 1/12 of the inside diameter, whichever is greater. The minimum thickness of the bottom of the base section shall be 8 inches under the bottom of the flow channel.

E. Manhole frames shall be adjusted to grade with concrete grade rings same as for un-lined manholes. Lined manholes shall be equipped with a convertible collar. The collar shall form a water-tight seal to the manhole top with a lip seal rubber gasket. The collar shall be sealed water-tight against the base of the cast iron frame using a butyl rubber sealant.

F. Refer to the latest edition of the Town's Approved Products List for acceptable manufacturers.

## 2.06 MANHOLE FRAMES AND COVERS

A. Frame and cover castings shall be dense and even grained, and shall be free of blowholes, warping, or any other defects not true to pattern. Seating surfaces of covers and frames shall be machined true to prevent rocking.

B. Castings shall be designed and tested to bear an AASHTO H-20-wheel loading with and added 30 percent impact factor and shall be Class Heavy Duty traffic bearing.

C. Castings shall have the words “TOWN OF LONGBOAT KEY”, “SANITARY SEWER”, and “(YEAR)” cast into them.

D. Refer to the latest edition of the Town’s Approved Products List for acceptable manufacturers.

Standard Frame and Cover:

E. Standard frame and covers shall be gray iron castings, conforming to ASTM A48, Class 30B.

Frame and Cover where Rim Elevation is Below Floodplain Requirements:

F. Manhole rims and clean-out tops shall be elevated 4 inches above the 100-year flood level, or 8 inches above the 25-year flood level, or 4 inches above the surrounding unpaved ground surface within a 20-foot radius, whichever is highest. Manholes with rims less than the above required elevations shall have watertight, tamper proof gasketed covers with minimum three (3) 316 stainless steel locking bolts.

Frame and Cover for ARV Manholes:

G. Manholes used to enclose air release valves with less than 44” from top of the pipe to the cover shall use a hinged cover. In Roadways, the lid shall open in the direction opposite of incoming traffic so that in the case that a vehicle travels over the lid, the lid is shut closed.

Frame and Cover for High Corrosion-Prone Manhole:

H. All manholes that are directly upstream of a lift station wet well as defined in the Town of Longboat Key Utility Standards, force main termination manholes and the two downstream manholes in the flow direction, manholes with turbulent opposing flows as defined in the Town of Longboat Key Utility Standards, manholes with 12-inch diameter pipe or larger, drop manholes, and all lift station wet wells shall use a heavy duty composite ring and cover.

I. Shall have minimum three (3) 316 stainless steel locking bolts.

J. When Work consists of rehabilitating a manhole with an existing liner, the Contractor shall replace the frame and cover, if ferrous, with a composite frame and cover. Concrete grade adjustment rings shall be replaced with polymer concrete grade adjustment rings as well.

## 2.07 MANHOLE INSERTS

A. Manholes supplied with watertight inserts with neoprene gaskets shall be installed under the insert lip to insure a leak proof seal. Inserts shall be minimum 18 gauge 304 stainless steel.

B. Refer to the latest edition of the Town's Approved Products List for acceptable manufacturers.

## 2.08 PRECAST CONCRETE MANHOLE INSTALLATION

A. Manholes shall be installed at the end of each line; at all change in grade, size, or alignment; at all intersections; and at distances not greater than 400 feet for sewers 15 inches or less and 500 feet for sewers 18 inches or larger. Cleanouts may be used only for special conditions with approval by the Town and shall not be substituted for manholes.

B. Drop manholes shall be provided for sewers entering a manhole at an elevation 24 inches or more above the manhole lowest invert. Where the drop is less than 24 inches, the invert shall have an elevated U-channel to prevent solids deposition. Drop manholes shall be constructed with an outside drop connection and the entire outside drop connection shall be encased in concrete.

C. Precast concrete sections shall be set vertically and in true alignment as indicated by the construction plans. Excavation, bedding foundation and backfill shall be done in accordance with the Trenching and Excavation section of these Standards. All manholes shall meet the following installation tolerances:

1. The finished manholes shall not be out of plumb by more than 3/8 inch per 10 feet of height.

2. Any jog or offset of the inside wall surface at a joint shall not exceed 1/2 inch.

3. Variation in the joint width around the circumference of the manhole shall not exceed 1/4 inch.

## 2.09 SETTING MANHOLE FRAME AND COVERS

A. Manhole rings and covers shall be set to conform accurately to the finished ground or pavement grade as indicated on the construction drawings or as directed by the Town. Rings on manholes shall be set concentric with the adjusting rings and sealed so that the space between the top of the adjustment rings and the bottom flanges of the rings will be made watertight. A ring of butyl rubber sealant strip shall be placed around the outside of the bottom flange at least 3-inch wide and ½-inch thick. Mortar shall be extended to the outer edge of the masonry and finished smooth and flush with the top of the flange.

## 2.10 SPRAY-APPLIED MANHOLE LINERS

A. Existing concrete or brick and mortar structures that are to be modified or rehabilitated by adding a manhole liner shall have a spray-applied liner installed according to the material and procedural requirements of the "Modifications to Existing Structures, Piping and Equipment," Section 1.2 of the Town of Longboat Key Public Works Standards. All recommendations of the product's manufacturer shall be followed.

B. Refer to the latest edition of the Town's Approved Products List for acceptable manufacturers.

## 2.11 PROTECTION FROM FLOODWATER INFLOW

A. Wastewater sewer systems shall be designed to prevent flood or surface water from entering the collection system. Manhole rims and clean-out tops shall be elevated 4 inches above the 100-year flood level, or 8 inches above the 25-year flood level, or 4 inches above the surrounding unpaved ground surface within a 20-foot radius, whichever is highest, or the manhole covers, and clean-out lids shall be designed and installed with factory-made watertight, tamper proof, sealing devices.

B. Cleanouts not at or above the required elevations shall have the clean-out adapter solvent welded watertight to the clean-out riser. Plugs are to be recessed square key with Teflon plumber's tape wrapped on threads to make a watertight seal.

# PART 3 EXECUTION

## 3.01 INSTALLATION

A. The Contractor shall be responsible for handling groundwater to provide firm, dry subgrade for the structure, shall prevent water rising on new poured-in-place concrete or grouted joint sections within 24 hours after placing and shall guard against flotation or other damage resulting from ground water or flooding.

B. A minimum of an 8-inch shell base compacted layer of washed shell or crushed stone shall be placed as a foundation for the structure's base slabs and valve and/or meter vault pits.

C. Backfill materials around the structures and above the pipe bedding shall be select material as specified in the Contract Documents.

D. Precast bases, conforming to all requirements of ASTM C478 and above listed requirements for precast sections, may be used.

E. The structure shall not be set into the excavation until the installation procedure and excavation have been approved by the Town.

F. The base may be cast-in-place concrete placed on a thoroughly compacted crushed rock subbase, (98 percent of the maximum density as determined by AASHTO T-180.) The tops of the cast-in-place bases shall be shaped to mate with the precast barrel section and shall be adjusted in grade so that the top slab section is at the approximately correct elevation.

G. Precast concrete structure sections shall be set to be vertical and with sections in true alignment with a 1/4-inch maximum tolerance to be allowed. The joints shall be prepared as in 2.04 above and finished flush with the adjoining surfaces. Allow joints to set for 24 hours before backfilling. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. The Contractor shall install the precast sections in a manner that will result in a watertight joint. Leaking joints are not acceptable.

H. Holes in the concrete sections required for handling or other purposes shall be plugged with a non-shrink grout or by grout in combination with concrete plugs.

I. Where holes must be cut in the precast sections to accommodate pipes, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may loosen the mortar joints.

J. Frames and hatches specified and furnished shall be cast in the cover slab prior to setting. Normal installation shall include 6" to 12" of concrete grade rings between the top of the cone section and the cover plate ring slab.

K. Penetrations and connections into precast or existing structures shall be accomplished by rotary core boring.

L. Cast-in-place liners shall be repaired, fitted around penetrations, sealed at joints, etc. in accordance with the manufacturer's recommendations for that liner. As a general rule, repairs, sleeves and patches shall be welded in place, glues and sealants shall not be used unless approved by the manufacturer.

## 3.04 TESTING

A. After constructed to its finished height and before being backfilled, each manhole must be visually inspected and shall meet the satisfaction of the Town.

B. If the visual inspection reveals defects, poor workmanship, or suspect installation, it shall be at the sole discretion of the Town to have the structure vacuum tested for water tightness.

1. Plug pipelines and perform vacuum test. Observing all recommended safety measures induce a backpressure of 5.0 psi equivalent to 10" Hg (mercury). The structure assembly is considered satisfactory if the vacuum loss is less than 1" Hg for the length of time listed in the following table:

| Time of Test in Seconds | | | |
|---|---|---|---|
| Depth Feet | Structure Diameter in Feet | | |
| | 4 | 5 | 6 or Larger |
| 4<br>8<br>12<br>16<br>20<br>24 | 10<br>20<br>30<br>40<br>50<br>60 | 13<br>26<br>39<br>52<br>65<br>78 | 16<br>32<br>48<br>64<br>80<br>96 |
| T | 5 | 6.5 | 8 |

Note: Add "T" seconds for each additional 2'- of depth.

C. Failure to pass this test requires the Contractor to correct the problems and retest. The Contractor will replace leaking gaskets and/or concrete sections and retest the completed structure. No structure will be accepted without successfully passing this test.

END OF SECTION

# SECTION 13350
# LIFT STATION REHABILITATION

## PART 1 GENERAL

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to remove / replace and modify the existing lift station as shown in the design drawings. This includes removal and replacement of existing exterior components as well as the internal equipment for a complete automatic, underground lift station and adjacent above-ground valve assembly. Keep components includes adjustments to the wet well and valve vault to raise components to proposed grade, adjustments to the guiderails, floats and electrical equipment as shown on the drawings. All materials shall be new, without defects and of the best quality. All materials furnished and all work done shall be in strict accordance with all local requirements and codes.

## 1.01 EQUIPMENT

A. Valve/Meter Vault: Precast concrete vault shall be modified as shown on the drawings and in accordance with Section 03410. The vault shall be adequate size to allow a minimum 12" clearance between all flange fittings and any concrete surfaces.

B. Entrance Hatches: The lift station wet well, and vault(s) shall be equipped with new aluminum access covers sized as shown on the drawings. The wet well access cover and vault access cover shall be constructed of aluminum with a minimum load rating of 300 lbs./sq. ft. and equipped with 316 stainless steel hinges, hasp, and a device to lock the doors in an open position when the lid is raised. The dimensions of the hatch will vary depending on the modifications required . Actual required dimensions of the hatch shall be confirmed with the pump manufacturer prior to ordering.

C. Sewage Pumps and Electrical by the Town, unless noted otherwise on the plans.

D. Piping and Fittings

1. Lift Station wet well shall be as called out on the plans. All flanged fittings in the wet well and aboveground shall be connected using 316 stainless steel hardware (nuts, bolts and washers). All underground external thrust restraints and mechanical joint adapters t-bolts, bolts, tie rods, nuts, and washers shall be high strength, low alloy steel conforming to AWWA C111/ANSI A21.11-17 or ASTM A242 Standards and shall be coated with a factory applied blue fluoropolymer coating with min. 1 mil DFT per the latest edition of the Town's Approved Products List. The coating shall pass a 2000 hour salt spray test with less than 15% red rust per ASTM B117. Alternatively, all hardware shall be 316 stainless steel. Riser pipes shall be HDPE, class 200, DR11 with shop fused butt joints and flanges. All aboveground piping in the valve assembly shall be ductile iron. Buried piping connecting to the existing force main shall be PVC C900-16, class 235, DR-18. See latest edition of Town of Longboat Key's Utility Standards for details.

E. Pump Hardware

1. Lifting chains shall be 3/8" stainless steel type 316 attached to the pump lifting bail using 316 stainless steel shackles. All pump mounting systems shall be of the front-loading slide rail type BPIU per the latest edition of the Town's Approved Products List. All rails and mounting hardware shall be 316 stainless steel.

2. A hanger shall be installed in each wet well for supporting float ball and pump cables. The hanger shall be constructed of 1/4" x 2" type 316 stainless steel flat stock with individual hooks for each float ball and pump cable constructed of 1/4" type 316 stainless steel rod stock. All nuts, bolts, washer, fasteners, brackets, and other hardware installed in the wet well and vault shall be type 316 stainless steel.

3.

F. Painting

1. All paint and other coatings shall be applied in accordance with the project manufacturer's specifications for the surfaces being coated. The exterior of the vaults and wet well top below grade shall be coated with at least two (2) coats of a coal tar epoxy coating containing 78% volume of solids. The minimum thickness of each coat when dry shall be 8 mils. The interior surfaces of the vault shall be coated with two coats of Tnemec Series 69 Hi-Build epoxy coating or equal. The exterior surfaces of the vault and wet well top exposed above grade shall be coated with at least two (2) coats of H & C Silicone acrylic concrete stain, Patio Green, Manufactured by FLR Paints, Inc. The interior and exterior of all ductile iron fittings shall be coated per Sections 02615 and valves per Section 02640 of these specifications.

G. Gate Valves:

1. All gate valves shall be resilient seated type, with 316 stainless steel non rising stem, bonnet cover bolts, nuts, and washers. All valves inside the vault shall be equipped with handwheel.

H. Pipe Penetration Seals:

1. All piping penetrations of the wet well and vault shall be through a grouted-in PVC sleeve or a jack-in rubber seal boot per the Town's Approved Product List.

## 1.02 ELECTRICAL

1. Contractor or subcontractor shall be responsible for any permits, fees, inspections, materials, equipment and labor required for any electrical modifications as indicated on the contract documents.

## 1.03 PERMITS

1. The Contractor shall be responsible for and shall pay for any permits and/or

inspections required.

## 1.04 SHOP DRAWINGS AND INSPECTIONS

1. Shop drawings shall be submitted for approval in accordance with these Specifications prior to construction. When calling for inspection, the contractor should have these approved drawings available for review by the inspectors prior to acceptance by the Town for maintenance. All inspections shall be arranged by contacting the Project Manager.

## 1.05 LINER REPAIRS

1. The contractor shall repair all existing liners in accordance with the manufacturer's recommendations. All HDPE and PVC liner repairs shall be performed by a contractor certified by the liner manufacturer to install and repair the liner.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION (NOT USED)

END OF SECTION