CONTRACT DOCUMENTS

TECHNICAL SPECIFICATIONS

FOR

Manatee County
Lena Road Utility Relocation

PROJECT #6107560

August 2023

PROJECT OWNER:

County of Manatee, Florida
c/o Manatee County Procurement Division
1112 Manatee Avenue West
Bradenton, Florida 34205
(941) 748-3014

PREPARED BY:

Kimley-Horn and Associates
200 Central Ave, Suite 600
St. Petersburg, Florida, 33701
(727)547-3999

Jordan W. Walker, P.E.
Jordan.Walker@kimley-horn.com
200 Central Ave, Suite 600
St. Petersburg, Florida, 33701
(727)308-4320

INFRASTRUCTURE ENGINEERING STANDARD SPECIFICATIONS

DIVISION 1	GENERAL REQUIREMENTS	4
SECTION 01005	GENERAL REQUIREMENTS	4
SECTION 01010	SUMMARY OF WORK	15
SECTION 01015	CONTROL OF WORK	17
SECTION 01030	SPECIAL PROJECT PROCEDURES	21
SECTION 01045	CUTTING AND PATCHING	25
SECTION 01050	FIELD ENGINEERING AND SURVEYING	27
SECTION 01090	REFERENCE STANDARDS	29
SECTION 01150	MEASUREMENT AND PAYMENT	32
SECTION 01152	REQUESTS FOR PAYMENT	41
SECTION 01153	CHANGE ORDER PROCEDURES	42
SECTION 01200	PROJECT MEETINGS	45
SECTION 01310	CONSTRUCTION SCHEDULE & PROJECT RESTRAINTS	47
SECTION 01340	SHOP DRAWINGS, PROJECT DATA AND SAMPLES	52
SECTION 01370	SCHEDULE OF VALUES	59
SECTION 01380	CONSTRUCTION PHOTOGRAPHS	60
SECTION 01410	TESTING AND TESTING LABORATORY SERVICES	62
SECTION 01510	TEMPORARY AND PERMANENT UTILITIES	64
SECTION 01570	TRAFFIC REGULATION	66
SECTION 01580	PROJECT IDENTIFICATION AND SIGNS	68
SECTION 01590	COUNTY'S FIELD OFFICE	71
SECTION 01600	MATERIAL AND EQUIPMENT	73
SECTION 01620	STORAGE AND PROTECTION	75
SECTION 01700	CONTRACT CLOSEOUT	77
SECTION 01710	CLEANING	80
SECTION 01720	PROJECT RECORD DOCUMENTS	82
SECTION 01730	OPERATING AND MAINTENANCE DATA	89
SECTION 01740	WARRANTIES AND BONDS	92
DIVISION 2	SITE WORK	94
SECTION 02064	MODIFICATION OF EXISTING STRUCTURES, PIPING AND EQUIPMENT	94
SECTION 02100	SITE PREPARATION	100
SECTION 02220	EXCAVATION, BACKFILL, FILL AND GRADING FOR STRUCTURES	102
SECTION 02221	TRENCHING, BEDDING AND BACKFILL FOR PIPE	107
SECTION 02223	EXCAVATION BELOW GRADE AND CRUSHED STONE OR SHELL REFILL	114
SECTION 02260	FINISH GRADING	115
SECTION 02276	TEMPORARY EROSION AND SEDIMENTATION CONTROL	117
SECTION 02590	WATER SERVICES ON PRIVATE PROPERTY	119
SECTION 02615	DUCTILE IRON PIPE AND FITTINGS	123
SECTION 02616	DISINFECTING POTABLE WATER PIPE LINES	127
SECTION 02617	INSTALLATION, TESTING, AND CLEANING OF PRESSURE PIPE	129
SECTION 02622	POLYVINYL CHLORIDE (PVC) PRESSURIZED PIPE AND FITTINGS	139
SECTION 02640	VALVES AND APPURTENANCES	152
SECTION 02800	TRACER WIRE SYSTEM	176
DIVISION 9	PAINTING	178
SECTION 09865	SURFACE PREPARATION AND SHOP PRIME PAINTING	178
SECTION 09900	PAINTING	184

This specification includes by reference the Manatee County Public Works Standards, Part I Utilities Standards Manual approved February 25, 2020.

All items and/or materials furnished and installed shall conform to the Manatee County Approved Products List. All items listed in the submittal requirements under each section shall be required to be submitted for review and/or acceptance.

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01005 GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE AND INTENT

A. Description

The work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all work included in this Contract.

B. Work Included

The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, shop drawings, working drawings and other means of construction necessary or proper for performing and completing the work. The Contractor shall obtain and pay for all required permits necessary for the work, other than those permits such as the DEP permit and railroad permit, which may have already been obtained. The Contractor shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the County, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all incidental costs. The Contractor shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.

The cost of incidental work described in these General Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made.

The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment.

C. Public Utility Installations and Structures

Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto.

The Contractor shall protect all installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the County. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor, which are shown on the Plans or have been located in the field by the utility, shall be repaired by the Contractor, at his expense, as approved by the County. No separate payment shall be made for such protection or repairs to public utility installations or structures.

Public utility installations or structures owned or controlled by the County or other governmental body, which are required by this contract to be removed, relocated, replaced

or rebuilt by the Contractor not identified in any separate bid item shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various contract items. No separate payment shall be made.

Where public utility installations or structures owned or controlled by the County or other governmental body are encountered during the course of the work, and are not indicated on the Plans or in the Specifications, and when, in the opinion of the County, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the County, for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction, it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be in accordance with the General and Supplemental General Conditions.

The Contractor shall give written notice to County and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight hours in advance of breaking ground in any area or on any unit of the work. This can be accomplished by making the appropriate contact with the "Sunshine State One-Call of Florida, Inc. Call Center ("Call Sunshine") and per all requirements provided for in the Florida Underground Facilities Damage Prevention and Safety Act (Florida Statutes, Title XXXIII, Chapter 556).

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

1.02 PLANS AND SPECIFICATIONS

A. Plans

When obtaining data and information from the Plans, figures shall be used in preference to scaled dimensions, and large-scale drawings in preference to small-scale drawings.

B. Copies Furnished to Contractor

The Contractor shall furnish each of the subcontractors, manufacturers, and suppliers such copies of the Contract Documents as may be required for their work. Additional copies of the Plans and Specifications, when requested, may be furnished to the Contractor at cost of reproduction.

C. Supplementary Drawings

When, in the opinion of the County, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the County and five paper prints thereof will be given to the Contractor.

D. Contractor to Check Plans and Data

The Contractor shall verify all dimensions, quantities and details shown on the Plans, Supplementary Drawings, Schedules, Specifications or other data received from the

County, and shall notify the County of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at his own expense. The Contractor will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the County, should such errors or omissions be discovered. All schedules are given for the convenience of the County and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

E. Specifications

The Technical Specifications consist of three parts: General, Products and Execution. The General Section contains General Requirements which govern the work. Products and Execution modify and supplement these by detailed requirements for the work and shall always govern whenever there appears to be a conflict.

F. Intent

All work called for in the Specifications applicable to this Contract, but not shown on the Plans in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Plans or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.

The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

The inclusion of the Related Requirements (or work specified elsewhere) in the General part of the specifications is only for the convenience of the Contractor, and shall not be interpreted as a complete list of related Specification Sections.

1.03 MATERIALS AND EQUIPMENT

A. Manufacturer

All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the County, that the manufacturer or subcontractor deal directly with the County. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.

Any two or more pieces or material or equipment of the same kind, type or classification, and being used for identical types of services, shall be made by the same manufacturer.

B. Delivery

The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the work to complete the work within the allotted time. The

Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.

C. Tools and Accessories

The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

Spare parts shall be furnished as specified.

Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

D. Installation of Equipment.

The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise by the County during installation. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

The Contractor shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the County and made of ample size and strength for the purpose intended. Substantial templates and working drawings for installation shall be furnished.

The Contractor shall furnish all materials and labor for, and shall properly bed in non-shrink grout, each piece of equipment on its supporting base that rests on masonry foundations.

Grout shall completely fill the space between the equipment base and the foundation. All metal surfaces coming in contact with concrete or grout shall receive a coat of coal tar epoxy per Specifications Section 09900 or provide a 1/32-inch neoprene gasket between the metal surface and the concrete or grout.

E. Service of Manufacturer's Engineer

The Contract prices for equipment shall include the cost of furnishing (as required by equipment specifications sections) a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test and place in operation the equipment in conformity with the Contract Documents. After the equipment is placed in permanent operation by the County, such engineer or superintendent shall make all adjustments and tests required by the County to prove that such equipment is in proper and satisfactory operating condition, and

shall instruct such personnel as may be designated by the County in the proper operation and maintenance of such equipment.

1.04 INSPECTION AND TESTING

A. General

Inspection and testing of materials will be performed by the County unless otherwise specified.

For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Three (3) copies of the reports shall be submitted and authoritative certification thereof must be furnished to the County as a prerequisite for the acceptance of any material or equipment.

If, in the making of any test of any material or equipment, it is ascertained by the County that the material or equipment does not comply with the Contract, the Contractor will be notified thereof and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the County.

Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.

The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the County formally takes over the operation thereof.

B. Costs

All inspection and testing of materials furnished under this Contract will be performed by the County or duly authorized inspection engineers or inspections bureaus without cost to the Contractor, unless otherwise expressly specified.

The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor and such costs shall be deemed to be included in the Contract price.

Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the County for compliance. The Contractor shall reimburse the County for the expenditures incurred in making such tests on materials and equipment which are rejected for non-compliance.

C. Inspections of Materials

The Contractor shall give notice in writing to the County, at least two weeks in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of

completion of the manufacture of preparation of materials. Upon receipt of such notice, the County will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials or he will notify the Contractor that the inspection will be made at a point other than the point of manufacture, or he will notify the Contractor that inspection will be waived. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

D. Certificate of Manufacture

When inspection is waived or when the County so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

E. Shop Tests of Operating Equipment

Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the work until the County notifies the Contractor, in writing, that the results of such tests are acceptable.

The cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

F. Preliminary Field Tests

As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make preliminary field tests of equipment. If the preliminary field tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, prior to the acceptance tests, make all changes, adjustments and replacements required. The furnishing Contractor shall assist in the preliminary field tests as applicable.

G. Final Field Tests

Upon completion of the work and prior to final payment, all equipment and piping installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost to the County. The Supplier shall assist in the final field tests as applicable.

H. Failure of Tests

Any defects in the materials and equipment or their failure to meet the tests, guarantees or requirements of the Contract Documents shall be promptly corrected by the Contractor. The

decision of the County as to whether the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to make these corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees of specified requirements, the County, notwithstanding its partial payment for work, and materials and equipment, may reject the materials and equipment and may order the Contractor to remove them from the site at his own expense.

In case the County rejects any materials and equipment, then the Contractor shall replace the rejected materials and equipment within a reasonable time. If the Contractor fails to do so, the County may, after the expiration of a period of thirty (30) calendar days after giving him notice in writing, proceed to replace such rejected materials and equipment, and the cost thereof shall be deducted from any compensation due or which may become due the Contractor under his Contract.

I. Final Inspection

During such final inspections, the work shall be clean and free from water. In no case will the final pay application be prepared until the Contractor has complied with all requirements set forth and the County has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Document.

1.05 TEMPORARY STRUCTURES

A. Temporary Fences

If, during the course of the work, it is necessary to remove or disturb any fence or part thereof, the Contractor shall, at his own expense, if so ordered by the County, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced. The County shall be solely responsible for the determination of the necessity for providing a temporary fence and the type of temporary fence to be used.

1.06 TEMPORARY SERVICES

A. First Aid

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

1.07 LINES AND GRADES

A. Grade

All work under this Contract shall be constructed in accordance with the lines and grades shown on the Plans, or as given by the County. The full responsibility for keeping alignment and grade shall rest upon the Contractor.

B. Safeguarding Marks

The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed,

and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or removing without authorization such established points, stakes and marks.

The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

C. Datum Plane

All elevations indicated or specified refer to the Mean Sea Level Datum of the NAVD 1988 and/or NGVD 1929.

1.08 ADJACENT STRUCTURES AND LANDSCAPING

A. Responsibility

The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Plans, and the removal, relocation and reconstruction of such items called for on the Plans or specified shall be included in the various Contract Items and no separate payments will be made therefore. Where such public and private property, structures of any kind and appurtenances thereto are not shown on the Plans and when, in the opinion of the County, additional work is deemed necessary to avoid interference with the work, payment therefore will be made as provided for in the General Conditions.

Contractor is expressly advised that the protection of buildings, structures, tunnels, tanks, pipelines, etc. and related work adjacent and in the vicinity of his operations, wherever they may be, is solely his responsibility. Conditional inspection of buildings or structures in the immediate vicinity of the project which may reasonably be expected to be affected by the Work shall be performed by and be the responsibility of the Contractor.

Contractor shall, before starting operations, make an examination of the interior and exterior of the adjacent structures, buildings, facilities, etc., and record by notes, measurements, photographs, etc., conditions which might be aggravated by open excavation and construction. Repairs or replacement of all conditions disturbed by the construction shall be made to the satisfaction of the County. This does not preclude conforming to the requirements of the insurance underwriters. Copies of surveys, photographs, reports, etc., shall be given to the County.

Prior to the beginning of any excavations, the Contractor shall advise the County of all buildings or structures on which he intends to perform work or which performance of the project work will affect.

B. Protection of Trees

1. All trees and shrubs shall be adequately protected by the Contractor with boxes and otherwise and in accordance with ordinances governing the protection of trees. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be

replaced by him with new stock of similar size and age, at the proper season and at the sole expense of the Contractor.

2. Beneath trees or other surface structures, where possible, pipelines may be built in short tunnels, backfilled with excavated materials, except as otherwise specified, or the trees or structures carefully supported and protected from damage.
3. The County may order the Contractor, for the convenience of the County, to remove trees along the line or trench excavation. If so ordered, the County will obtain any permits required for removal of trees. Such tree removal ordered shall be paid for under the appropriate Contract Items.

C. Lawn Areas

Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed, and later replaced, or the area where sod has been removed shall be restored with new sod.

D. Restoration of Fences

Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good a condition as before the starting of the work. The manner in which the fence is repaired or replaced and the materials used in such work shall be subject to the approval of the County. The cost of all labor, materials, equipment, and work for the replacement or repair of any fence shall be deemed included in the appropriate Contract Item or items, or if no specific Item is provided therefore, as part of the overhead cost of the work, and no additional payment will be made therefore.

1.09 PROTECTION OF WORK AND PUBLIC

A. Barriers and Lights

During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers and lights as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public, in accordance with state and local requirements.

B. Smoke Prevention

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

C. Noise

The Contractor shall eliminate noise to as great an extent as practicable at all times. Air compressing plants shall be equipped with silencers and the exhaust of all engines or other power equipment shall be provided with mufflers. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.

D. Access to Public Services

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

E. Dust Prevention

The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the roads and/or construction areas sprinkled with water at all times.

1.10 CUTTING AND PATCHING

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

1.11 CLEANING

A. During Construction

During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the County, such material, debris, or rubbish constitutes a nuisance or is objectionable. The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops.

B. Final Cleaning

At the conclusion of the work, all equipment, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver such materials and equipment undamaged in a bright, clean, polished and new operating condition.

1.12 MISCELLANEOUS

A. Protection Against Siltation and Bank Erosion

1. The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses and drainage ditches.
2. The Contractor, at his own expense, shall remove any siltation deposits and correct any erosion problems as directed by the County which results from his construction operations.

B. Protection of Wetland Areas

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

C. Existing Facilities

The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in the Special Provisions.

D. Use of Chemicals

All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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 the construction of

Utility relocations related to the roadway, drainage, lighting, and signals improvements as part of the Lena Road – South of 44th Avenue East of Landfill Road project. The proposed utility project includes the relocation of 8-inch water main, 16-inch force main, and 30-inch reclaimed water main via open-cut. Also included in this project is removal of existing pipe in conflict with the proposed improvements, water service replacement and connections, reclaimed water service replacement and connections, and fire hydrant assemblies.

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 County.

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

Construct all the Work under a single contract.

1.03 WORK SEQUENCE

A. All work done under this Contract shall be done with a minimum of inconvenience to the users of the system or facility. The Contractor shall coordinate his 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 County's use of the premises during the construction period; coordinate the construction schedule and operations with the County'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.

1.04 CONSTRUCTION AREAS

A. The Contractor shall: Limit his use of the construction areas for work and for storage, to allow for:

1. Work by other Contractors.

2. County's Use.
3. Public Use.

B. Coordinate use of work site under direction of County's Representative.

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

D. Move any stored products under the Contractor's control, which interfere with operations of the County or separate contractor.

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

1.05 COUNTY OCCUPANCY

A. 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 County, 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 County 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 County has the option of not accepting the entire work as a whole until it is completed, tested and approved by the County.

1.06 PARTIAL COUNTY OCCUPANCY

The Contractor shall schedule his operations for completion of portions of the Work, as designated, for the County's occupancy prior to substantial completion of the entire work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01015 CONTROL OF WORK

PART 1 GENERAL

1.01 WORK PROGRESS

The Contractor shall furnish personnel and equipment which will be efficient, appropriate and adequately sized to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time stipulated in the Contract. If at any time such personnel appears to the County to be inefficient, inappropriate, or insufficient for securing the quality of work required for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character, or increase the personnel and equipment and the Contractor shall conform to such order. Failure of the County to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.02 PRIVATE LAND

The Contractor shall not enter or occupy private land outside of easements, except by permission of the affected property owner.

1.03 WORK LOCATIONS

Work shall be located substantially as indicated on the drawings, but the County reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

1.04 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the County may require special construction procedures such as limiting the length of open trench, prohibiting stacking excavated material in the street and requiring that the trench shall not remain open overnight.

B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be barricaded and well lighted at all times when construction is not in progress.

1.05 DISTRIBUTION SYSTEMS AND SERVICES

A. The Contractor shall avoid interruptions to water, telephone, cable TV, sewer, gas, or other related utility services. He shall notify the County and the appropriate agency well in advance of any requirement for dewatering, isolating, or relocating a section of a utility, so that necessary arrangements may be made.

B. If it appears that utility service will be interrupted for an extended period, the County may

order the Contractor to provide temporary service lines at the Contractor's expense. Inconvenience of the users shall be kept to the minimum, consistent with existing conditions. The safety and integrity of the systems are of prime importance in scheduling work.

1.06 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

A. The Contractor shall assume full responsibility for the protection of all buildings, structures and utilities, public or private, including poles, signs, services to building utilities, gas pipes, water pipes, hydrants, sewers, drains and electric and telephone cables and other similar facilities, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operation shall be repaired by the Contractor at his expense.

B. The Contractor shall bear full responsibility for obtaining locations of all underground structures and utilities (including existing water services, drain lines and sewers). Services to buildings shall be maintained and all costs or charges resulting from damage thereto shall be paid by the Contractor.

C. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit prices established in the Bid.

D. If, in the opinion of the County, permanent relocation of a utility owned by the County is required, the County may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for at the Contract unit prices, if applicable, or as extra work as classified in the General Conditions. If relocation of a privately-owned utility is required, the County will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the County and utility and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies in writing at least 48 hours (excluding Saturdays, Sundays and legal holidays) before excavating near their utilities.

1.07 TEST PITS

Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor immediately after the utility location and the surface shall be restored in a manner equal or better than the original condition. No separate payment will be made.

1.08 CARE AND PROTECTION OF PROPERTY

A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition equal or better to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the County.

B. All sidewalks which are disturbed by the Contractor's operations shall be restored to their original or better condition by the use of similar or comparable materials. All curbing shall be restored in a condition equal to the original construction and in accordance with the best modern practice.

C. Along the location of this work, all fences, walks, bushes, trees, shrubbery and other physical features shall be protected and restored in a thoroughly workmanlike manner unless otherwise shown on the drawings. Fences and other features removed by the Contractor shall be replaced in the location indicated by the County as soon as conditions permit. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be regraded and sodded to equal or exceed original conditions.

D. Trees close to the work which drawings do not specify to be removed, shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any tree be cut or removed without prior notification to the County. All injuries to bark, trunk, limbs and roots of trees shall be repaired by dressing, cutting and painting according to approved methods, using only approved tools and materials.

E. The protection, removal and replacement of existing physical features along the line of work shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit and/or lump sum prices established under the items in the Bid.

1.09 MAINTENANCE OF TRAFFIC

A. Open pits, trenches, unpaved streets, debris, or other obstructions due to construction that will prevent the normal flow of traffic during an extended construction stoppage, for any reason, shall be minimized. In the event an extended construction stoppage is found to be necessary, Contractor shall, at his own expense, provide normal traffic flow during extended construction stoppage. Extended stoppage will be defined by the County.

B. All excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he shall repair the road surface, provide temporary roadways, erect wheel guards or fences, or take other safety measures which are satisfactory to the County.

C. Any changes to the traffic pattern require a Traffic Control Plan as detailed in Specification Section 01570.

1.10 WATER FOR CONSTRUCTION PURPOSES

A. In locations where public water supply is available, the Contractor may purchase water for all construction purposes.

B. The Contractor shall be responsible for paying for all water tap fees incurred for the purpose of obtaining a potable water service or temporary use meter.

1.11 MAINTENANCE OF FLOW

The Contractor shall at his own cost, provide for the flow of sewers, drains and water courses interrupted during the progress of the work and shall immediately cart away and remove all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the County well in advance of the interruption of any flow.

1.12 CLEANUP

During the course of the work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. The Contractor shall dispose of all residue resulting from the construction work and at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and shall leave the entire site of the work in a neat and orderly condition.

1.13 COOPERATION WITHIN THIS CONTRACT

A. All firms or person authorized to perform any work under this Contract shall cooperate with the General Contractor and his subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the County.

1.14 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be reconstructed by the Contractor at his own expense.

B. All structures shall be protected in a manner approved by the County. Should any of the floors or other parts of the structures become heaved, cracked, or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor, at his own expense and to the satisfaction of the County. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the warranty period described in the Contract.

C. Further, the Contractor shall take all necessary precautions to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the County.

1.15 CONSTRUCTION WITHIN RIGHT-OF-WAY

Where pipe lines are installed within FDOT right-of-way, all excavation backfill and compaction for the purpose of reconstructing roadways and/or adjacent slopes contiguous thereto shall be in accordance with FDOT and/or Manatee County Standards and Specifications, whichever is applicable. Contractor shall satisfy the authorized representative of the FDOT with respect to proper safety procedures, construction methods, required permitting, etc., within the FDOT right-of-way.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01030 SPECIAL PROJECT PROCEDURES

PART 1 GENERAL

1.01 PERMITS

Upon notice of award, the Contractor shall immediately apply for all applicable permits not previously obtained by the County to do the work from the appropriate governmental agency or agencies. No work shall commence until all applicable permits have been obtained and copies delivered to the County. The costs for obtaining all permits shall be borne by the Contractor.

1.02 CONNECTIONS TO EXISTING SYSTEM

The Contractor shall perform all work necessary to locate, excavate and prepare for connections to the existing systems all as shown on the Drawings or where directed by the County. The cost for this work and for the actual connection shall be included in the price bid for the project and shall not result in any additional cost to the County. The termination point for each contract shall be as shown on the Contract Drawings.

1.03 RELOCATIONS

The Contractor shall be responsible for the coordination of the relocation of structures, including but not limited to light poles, power poles, signs, sign poles, fences, piping, conduits and drains that interfere with the positioning of the work as set out on the Drawings. No relocation of the items under this Contract shall be done without approval from the County.

1.04 EXISTING UNDERGROUND PIPING, STRUCTURES AND UTILITIES

A. The attention of the Contractor is drawn to the fact that during excavation, the possibility exists of the Contractor encountering various utility lines not shown on the Drawings. The Contractor shall exercise extreme care before and during excavation to locate and flag these lines as to avoid damage to the existing lines.

B. It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the close proximity of excavation, are temporarily stayed in position while work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice.

C. The existing utility locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping to be encountered. The Contractor shall be responsible for notifying the various utility companies to locate their respective utilities in advance of construction in conformance with all requirements provided for in the Florida Underground Facilities Damage Prevention and Safety Act (Florida Statutes, Title XXXIII, Chapter 556).

D. The existing piping and utilities that interfere with new construction shall be rerouted as shown, specified, or required. Before any piping and utilities not shown on the Drawings are disturbed, the Contractor shall notify the County and shall provide suggestions on how best to resolve the issue.

E. The Contractor shall exercise care in any excavation to locate all existing piping and utilities. All utilities which do not interfere with complete work shall be carefully protected against damage. Any existing utilities damaged in any way by the Contractor shall be restored or replaced by the Contractor at his expense as directed by the County.

F. It is intended that wherever existing utilities such as water, sewer, gas, telephone, electrical, or other service lines must be crossed, deflection of the pipe within recommended limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated in the Drawings. However, when in the opinion of the County this procedure is not feasible, he may direct the use of fittings for a utility crossing as detailed on the Drawings. No deflections will be allowed in gravity sanitary sewer lines or in existing storm sewer lines.

1.05 SUSPENSION OF WORK DUE TO WEATHER

Refer to FDOT Standards and Specifications Book, Section 8.

1.06 HURRICANE PREPAREDNESS PLAN

A. Within 30 days of the date of Notice to Proceed, the Contractor shall submit to the County a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the County in case of a hurricane warning.

B. In the event of inclement weather, or whenever County shall direct, Contractor shall ensure that he and his Subcontractors shall carefully protect work and materials against damage or injury from the weather. If, in the opinion of the County, any portion of work or materials is damaged due to the failure on the part of the Contractor or Subcontractors to protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

1.07 POWER SUPPLY

Electricity as may be required for construction and permanent power supply shall be secured and purchased by the Contractor.

1.08 SALVAGE

Any existing equipment or material, including, but not limited to, valves, pipes, fittings, couplings, etc., which is removed or replaced as a result of construction under this project may be designated as salvage by the County and if so shall be protected for a reasonable time until picked up by the County. Any equipment or material not worthy of salvaging, as directed by the County, shall be disposed of by the Contractor at no additional cost.

1.09 DEWATERING

A. The Contractor shall do all groundwater pumping necessary to prevent flotation of any part of the work during construction operations with his own equipment.

B. The Contractor shall pump out water and wastewater which may seep or leak into the excavations for the duration of the Contract and with his own equipment. He shall dispose of this water in an appropriate manner.

1.10 ADDITIONAL PROVISIONS

A. Before commencing work on any of the existing pipelines, structures or equipment, the Contractor shall notify the County, in writing, at least 10 calendar days in advance of the date he proposes to commence such work.

B. The Contractor shall provide, at his own expense, all necessary temporary facilities for access to and for protection of, all existing facilities. The County's personnel must have ready access at all times to the existing facilities. The Contractor is responsible for all damage to existing structures, equipment and facilities caused by his construction operations and must repair all such damage when and as ordered by the County.

1.11 CONSTRUCTION CONDITIONS

The Contractor shall strictly adhere to the specific requirements of the governmental unit(s) and/or agency(ies) having jurisdiction over the work. Wherever there is a difference in the requirements of a jurisdictional body and these Specifications, the more stringent shall apply.

1.12 PUBLIC NUISANCE

A. The Contractor shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, excessive noise or dust.

B. Sound levels must meet Manatee County Ordinance #87-34, (which amends Ordinance 81-3, The Manatee County Noise Control Ordinance). Sound levels in excess of such ordinance are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the County for excessive noise shall not relieve the Contractor of the other portions of this specification.

C. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.13 WARRANTIES

A. All material supplied under these Specifications shall be warranted by the Contractor and the manufacturers for a period of three (3) years. Warranty period shall commence on the date of County acceptance.

B. The material shall be warranted to be free from defects in workmanship, design and materials. If any part of the system should fail during the warranty period, it shall be replaced at no expense to the County. All material and installation costs shall be 100% borne by the Contractor.

C. The manufacturer's warranty period shall run concurrently with the Contractor's warranty or guarantee period. No exception to this provision shall be allowed. The Contractor shall be responsible for obtaining warranties from each of the respective suppliers or manufacturers for all the material specified under these contract specifications,

D. In the event that the manufacturer is unwilling to provide a three-year warranty commencing at the time of County acceptance, the Contractor shall obtain from the manufacturer a four (4) year warranty starting at the time of equipment delivery to the job site. This four-year

warranty shall not relieve the Contractor of the three-year warranty starting at the time of County acceptance of the equipment.

1.14 FUEL STORAGE & FILLING

A. If the contractor is storing fuel on site, or doing his own fuel filling of portable equipment (other than hand-held equipment), he is responsible for any required response, clean-up or reporting required, at no additional cost to the county.

B. The Contractor shall prepare and submit a fuel storage / spill abatement plan prior to start of construction if required.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01045 CUTTING AND PATCHING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall be responsible for all cutting, fitting and patching, including excavation and backfill, required to complete the work or to:

1. Make its several parts fit together properly.
2. Uncover portions of the work to provide for installation of ill-timed work.
3. Remove and replace defective work.
4. Remove and replace work not conforming to requirements of Contract Documents.
5. Provide penetrations of non-structural surfaces for installation of piping and electrical conduit.

PART 2 PRODUCTS

2.01 MATERIALS

Comply with specifications and standards for each specific product involved.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect existing conditions of project, including elements subject to damage or to movement during cutting and patching.

B. After uncovering work, inspect conditions affecting installation of products, or performance of work.

C. Report unsatisfactory or questionable conditions to County. Do not proceed with work until County has provided further instructions.

3.02 PREPARATION

A. Provide adequate temporary support as necessary to assure structural value to integrity of affected portion of work.

B. Provide devices and methods to protect other portions of project from damage.

C. Provide protection from elements for that portion of the project which may be exposed by cutting and patching work and maintain excavations free from water.

3.03 PERFORMANCE

A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.

B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.

C. Fit and adjust products to provide a finished installation to comply with specified products, functions, tolerances and finishes.

D. Restore work which has been cut or removed; install new products to provide completed work in accordance with the requirements of the Contract Documents.

E. Replace surfaces airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

F. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes.

END OF SECTION

SECTION 01050 FIELD ENGINEERING AND SURVEYING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall provide and pay for field surveying service required for the project.

B. The Contractor shall furnish and set all necessary stakes to establish the lines and grades as shown on the Contract Drawings and layout each portion of the Work of the Contract.

1.02 QUALIFICATION OF SURVEYOR AND ENGINEER

All construction staking shall be conducted by or under the supervision of a Florida Registered Professional Surveyor and Mapper. The Contractor shall be responsible for the layout of all such lines and grades, which will be subject to verification by the County.

1.03 SURVEY REFERENCE POINTS

A. Existing basic horizontal and vertical control points for the Project are designated on the Contract Drawings.

B. Locate and protect all survey monumentation, property corners and project control points prior to starting work and preserve all permanent reference points during construction. All costs associated with the replacement of all survey monumentation, property corners and project control points shall be borne by the Contractor.

C. Make no changes or relocations without prior written notice to County.

D. Report to County when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

E. Require surveyor to replace project control points which may be lost or destroyed.

F. Establish replacements based on original survey control.

1.04 PROJECT SURVEY REQUIREMENTS

The Contractor shall establish temporary bench marks as needed, referenced to data established by survey control points.

1.05 RECORDS

The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare record drawings per Specification Section 01720.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01090 REFERENCE STANDARDS

PART 1 GENERAL

1.01 REQUIREMENTS

Abbreviations and acronyms used in Contract Documents to identify reference standards.

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

B. Publication Date: The most recent publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

1.02 ABBREVIATIONS, NAMES AND ADDRESSES OR ORGANIZATIONS

Obtain copies of reference standards direct from publication source, when needed for proper performance of work, or when required for submittal by Contract Documents.

AA Aluminum Association
818 Connecticut Avenue, N.W.
Washington, DC 20006

AASHTO American Association of State Highway and Transportation Officials
444 North Capital Street, N.W.
Washington, DC 20001

ACI American Concrete Institute
Box 19150
Reford Station
Detroit, MI 48219

AI Asphalt Institute
Asphalt Institute Building
College Park, MD 20740

AISC American Institute of Steel Construction
1221 Avenue of the Americas
New York, NY 10020

AISI American Iron and Steel Institute
1000 16th Street NW
Washington, DC 20036

ANSI American National Standards Institute
1430 Broadway
New York, NY 10018

ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers
179l Tullie Circle, N.E.
Atlanta, GA 30329

ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
AWS	American Welding Society 2501 N.W. 7th Street Miami, FL 33125
CRSI	Concrete Reinforcing Steel Institute 180 North LaSalle Street, Suite 2110 Chicago, IL 60601
FDEP	Florida Department of Environmental Protection 3900 Commonwealth Blvd. Tallahassee, Florida 32399
FDOT	Florida Department of Transportation Standards Specifications for Road and Bridge Construction Maps & Publication Sales - Mail Station 12 605 Suwannee St. Tallahassee, FL 32399-0450
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
MCPW UTIL STD	Manatee County Utility Engineering 1022 26th Ave E Bradenton, FL 34208
MLSFA	Metal Lath/Steel Framing Association 221 North LaSalle Street Chicago, IL 60601
MMA	Monorail Manufacturer's Association 1326 Freeport Road Pittsburgh, PA 15238
NAAMM	National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601

NEMA	National Electrical Manufacturer's Assoc. 2101 L Street N.W. Washington, DC 20037
OHSA	Occupational Safety and Health Assoc. 5807 Breckenridge Pkwy., Suite A Tampa, FL 33610-4249
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 20076
PCI	Prestressed Concrete Institute 20 North Wacker Drive Chicago, IL 60606
SDI	Steel Door Institute 712 Lakewood Center North Cleveland, OH 44107
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association 8224 Old Court House Road Vienna, VA 22180
SSPC	Steel Structures Painting Council 402 24th Street, Suite 600 Pittsburgh, PA 15213
SWFWMD	Southwest Florida Water Management District 2379 Broad Street Brooksville, FL 34604-6899
UL	Underwriter's Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062

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

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 County 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

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

1.04 MEASUREMENT STANDARDS

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

1.05 AREA MEASUREMENTS

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

1.06 LUMP SUM ITEMS

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

1.07 UNIT PRICE ITEM

Separate payment will be made for the items of work described herein and listed on the Bid

Form. Any related work not specifically listed, but required for satisfactory completion of the work shall be considered to be included in the scope of the appropriate listed work items.

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

1. Project signs and photographs.
2. Removal, repair, replacement or relocation of all signs, walls, private irrigation systems and related items.
3. Rubbish and spoil removal.
4. Shop Drawings, Working Drawings.
5. Clearing, grubbing and grading except as hereinafter specified.
6. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
7. Dewatering and disposal of surplus water.
8. Structural fill, backfill, and grading.
9. Replacement of unpaved roadways, and shrubbery plots.
10. Cleanup & miscellaneous work.
11. Foundation and borrow materials, except as hereinafter specified.
12. Testing and placing system in operation.
13. Any material and equipment required to be installed and utilized for the tests.
14. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
15. Maintaining the existing quality of service during construction.
16. Appurtenant work as required for a complete and operable system.
17. Seeding and hydromulching.

BID ITEM NO. 1, 16, 24 – MOBILIZATION

Measurement and payment for this Bid Item shall include full compensation for the required 100 percent (100%) Performance Bond, 100 Percent (100%) Payment Bond, all required insurance for the project and the Contractor's mobilization and demobilization costs as shown in the Bid Form. Mobilization includes, but it not limited to: preparation and movement of personnel, equipment, supplies and incidentals such as safety and sanitary supplies/ facilities.

Payment for mobilization shall not exceed 10 percent (10%) of the total Contract cost unless the Contractor can prove to the County that his actual mobilization cost exceeds 10 percent (10%).

Partial payments for this Bid Item will be made in accordance with the following schedule:

Percent of Original Contract Amount:	Percent Allowable Payment of Mobilization/Demobilization Bid Item Price:
5	25
10	35
25	45
50	50
75	75
100	100

These payments will be subject to the standard retainage provided in the Contract. Payment of the retainage will be made after completion of the work and demobilization.

BID ITEM NO. 2, 17, 25 – RECORD DRAWINGS

Payment for all work included, but is not limited to, under this Bid Item shall represent full compensation in accordance with the lump sum price bid for as-built record drawings per specification section 01720 and the latest edition of the Manatee County Public Works Standards Manual. Also included is any other record drawing requirements for certifications to put proposed project into service. All items are subject to approval by the Engineer and the County.

Measurement for periodic payments of this lump sum bid item will be in accordance with the approved Schedule of Values, to be supplied by the Contractor In accordance with the Contract Documents.

WATER IMPROVEMENTS

BID ITEM NO. 3 – DI CLASS 350 PIPE (OPEN CUT)

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per the schedule of prices for furnishing and installing the listed diameter Ductile Iron Pipe (AWWA A21.50 and A21.51, and ANSI C150 and C151) as shown on the Contract Drawings, and listed in the Bid Form. The thickness of pipe shall be pressure Class 350. Measurement and Payment shall be made for the actual length of the listed diameter pipe installed and will represent full compensation for all labor, materials including pipe bell joint restraints, blue fluoropolymer coated high-strength low alloy steel or 316 stainless steel hardware, tracer wire, marking tape, excavation, including rock, dewatering, bedding, backfill, compaction, polyethylene wrapping, and equipment required to complete these Bid Items,

including removal of existing abandoned pipelines and protecting and supporting power/light poles that may be in conflict with the pipeline construction. Payment shall also include locating of existing utilities in the project area. Included in these bid items are the removal and replacement of existing roadway signs, traffic signalization loops, irrigation systems required to construct the pipeline. No additional compensation will be made for excavation below the bottom of the pipe, for rock removal or bedding and backfill materials, or for repair of any trench settlement.

BID ITEM	DESCRIPTION	UNITS
3	8 DIP Class 350 Water Main	LF

BID ITEM - DUCTILE IRON FITTINGS (WATER)

Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid for furnishing and installing each listed (double standard thickness cement-lined) ductile iron fitting as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing and disinfection required to complete these Bid Items. Included under these bid items are mechanical joint restraints, and blue fluoropolymer-coated high-strength low alloy steel conforming to AWWA C111 or uncoated 316 stainless steel hardware as well as polyethylene wrapping all fittings and restraints.

BID ITEM	DESCRIPTION	UNITS
4	8" DI Fitting – 11.25 Deg. Bend MJ	EA
5	8" DI Fitting – 22.5 Deg. Bend MJ	EA
6	8" DI Fitting – 45 Deg. Bend MJ	EA
7	8" DI Fitting – 90 Deg. Bend MJ	EA
8	8" DI Fitting – Tee, MJ	EA

BID ITEM NO. 9 – DI GATE VALVE

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, box, cover, concrete pad, and tracer wire test station box, as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, excavation, including rock as necessary, bedding, backfill, compaction, polyethylene wrapping all valves, testing and disinfection and equipment required to complete these Bid Items.

BID ITEM	DESCRIPTION	UNITS
9	8” DI Gate Valve, MJ	EA

BID ITEM NO. 10 - WATER SERVICE CONECTION

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid for each service type for furnishing and installing the listed blue-coded water service lines, both short and long side, as listed on the Bid Form. Included in these bid items is the removal, relocation, and reconnection of water meter and meter boxes that do not meet the County standards (refer to County details). Included in this bid item is the installation of a new backflow prevention assembly downstream of the meter installed per the County details. If the relocated meter was connected to an existing backflow preventer assembly, the County inspector will determine if the assembly is acceptable to be reused. The meter and backflow prevention assembly proposed locations shall be coordinated with the County

Inspector and property owner in order to meet County standards. All pipe, fittings, meter boxes, valves, connections, concrete pads, sod restoration, and landscaping restoration required to perform the complete removal, relocation, new installations, and reconnections of the water meter, meter box, and backflow preventer assembly and new private property service lines as required are included in this pay item for a fully operational water service.

Water service casing (horizontal directional drill) is required on all roadway crossings and shall extend outside pavement edge per County standard details. These bid items include, but are not limited to, service saddle, corporation stop, piping, casings (if required), and ancillary fittings. Contractor shall employ a licensed plumber for any work within private property and shall pay for any applicable permit fees to complete the work. Contractor to coordinate and be granted access to work on private property with property owner and County inspector prior to plumber starting work on private property. Payment shall represent full compensation for all labor, material, excavation, including rock, bedding, backfill, compaction, testing and disinfection and equipment required to complete these Bid Items.

BID ITEM NO. 11 – CUT AND CONNECT TO EXISTING WATER MAIN

Payment for all work included, but is not limited to, under these Bid Items shall represent full compensation in accordance with the unit bid price per each proposed connection to existing water mains. Prior to the connections, the Contractor will contact the County as to the date and time of the proposed work to coordinate water main isolations. Payment for all work included, but is not limited to, under this Bid Item shall represent full compensation in accordance with the bid price for all labor, additional necessary ductile iron fittings (double cement lined) not shown in the Contract Drawings, polyethylene wrapping fittings and restraints, thrust blocks, dead mans, excavation, dewatering, bedding, backfill, compaction, testing, temporary shutdown, and equipment required to complete this Bid Item.

BID ITEM NO. 12 – REMOVE EXISTING 8" WATER MAIN

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per linear foot of pipe that is inactivated including removal of the pipe, appurtenances, fittings, meters, services, hydrants, valves, and concrete pads, as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing and disinfection required to complete this Bid Item.

BID ITEM NO. 13 – BLOW OFF ASSEMBLY

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per each for furnishing and installing each blowoff assembly as shown on the Contract Drawings and listed on the Bid Form. This Bid Item includes, but is not limited to, 2" gate valve, valve box and lid, meter box and lid, tracer wire, solid tapped cap, 2" coupling, and 2" HDPE tubing required to provide water service to properties located within a Cul-De-Sac per County standard details. Payment shall represent full compensation for all labor, material, excavation, including rock, bedding, backfill, compaction, testing and disinfection and equipment required to complete these Bid Items.

BID ITEM NO. 14 – FIRE HYDRANT ASSEMBLY

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per each hydrant assembly, including 6" hydrant lead including hydrant elbow, ductile

iron fittings, tee connection to existing or proposed water main, ductile iron 90 deg locked bend (if applicable), gate valve, box cover, concrete pads, restraining rods and/or thrust blocks, as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, polyethylene wrapping all buried pipe, fittings, and valves, testing and disinfection required to complete this Bid Item.

BID ITEM NO. 15, 23, 24 – CONTRACT CONTINGENCY

Payment for all work under this Bid Item shall be made only at the County's discretion. This Bid Item shall not exceed 10% of the Bidders Total Base Bid. The Bidder shall calculate and enter a dollar amount for this Bid Item.

WASTEWATER IMPROVEMENTS

BID ITEM NO. 18 – PVC C900 DR18 PIPE (OPEN CUT)

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per the schedule of prices for furnishing and installing the listed diameter PVC water main (AWWA C900-16 DR 18) pipe as shown on the Contract Drawings and listed on the Bid Form. Measurement and Payment shall be made for the actual length of the listed diameter pipe and installed and will represent full compensation for all labor, materials including pipe bell joint restraints, blue fluoropolymer coated high-strength low alloy steel or 316 stainless steel hardware, tracer wire, marking tape, excavation, including rock, dewatering, bedding, backfill, compaction, and equipment required to complete these Bid Items, including removal of existing abandoned pipelines and protecting and supporting power/light poles that may be in conflict with the pipeline construction. Payment shall also include locating of existing utilities in the project area. Included in these bid items are the removal and replacement of existing roadway signs, traffic signalization loops, and irrigation systems required to construct the pipeline. No additional compensation shall be made for excavation below the bottom of the pipe, for rock removal or bedding and backfill material, or for repair of any trench settlement.

BID ITEM	DESCRIPTION	UNITS
18	16” C900 DR-18 PVC Force Main	LF

BID ITEM - DUCTILE IRON FITTINGS

Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid for furnishing and installing each listed (double standard thickness cement-lined) ductile iron fitting as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing and disinfection required to complete these Bid Items. Included under these bid items are mechanical joint restraints, and blue fluoropolymer-coated high-strength low alloy steel conforming to AWWA C111 or uncoated 316 stainless steel hardware as well as polyethylene wrapping all fittings and restraints.

BID ITEM	DESCRIPTION	UNITS
19	16" DI Fitting – 11.25 Deg. Bend MJ	EA
20	16" DI Fitting – 45 Deg. Bend MJ	EA

BID ITEM NO. 21 – CUT AND CONNECT TO EXISTING FORCE MAIN

Payment for all work included, but is not limited to, under these Bid Items shall represent full compensation in accordance with the unit bid price per each proposed connection to existing force mains. Prior to the connections, the Contractor will contact the County as to the date and time of the proposed work to coordinate water main isolations. Payment for all work included, but is not limited to, under this Bid Item shall represent full compensation in accordance with the bid price for all labor, additional necessary ductile iron fittings not shown in the Contract Drawings, polyethylene wrapping fittings and restraints, thrust blocks, dead mans, excavation, dewatering, bedding, backfill, compaction, testing, bypassing pumping equipment, isolation appurtenances such as line stops, and any other equipment required to complete this Bid Item.

BID ITEM NO. 22 – REMOVE EXISTING 16" FORCE MAIN

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per linear foot of pipe that is inactivated including removal of the pipe, appurtenances, fittings, services, valves, and concrete pads, as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing and disinfection required to complete this Bid Item.

RECLAIM WATER IMPROVEMENTS

BID ITEM – DI CLASS 350 PIPE (OPEN CUT)

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per the schedule of prices for furnishing and installing the listed diameter Ductile Iron Pipe (AWWA A21.50 and A21.51, and ANSI C150 and C151) as shown on the Contract Drawings, and listed in the Bid Form. The thickness of pipe shall be pressure Class 350. Measurement and Payment shall be made for the actual length of the listed diameter pipe installed and will represent full compensation for all labor, materials including pipe bell joint restraints, blue fluoropolymer coated high-strength low alloy steel or 316 stainless steel hardware, tracer wire, marking tape, excavation, including rock, dewatering, bedding, backfill, compaction, polyethylene wrapping, and equipment required to complete these Bid Items, including removal of existing abandoned pipelines and protecting and supporting power/light poles that may be in conflict with the pipeline construction. Payment shall also include locating of existing utilities in the project area. Included in these bid items are the removal and replacement of existing roadway signs, traffic signalization loops, irrigation systems required to construct the pipeline. No additional compensation will be made for excavation below the bottom of the pipe, for rock removal or bedding and backfill materials, or for repair of any trench settlement.

BID ITEM	DESCRIPTION	UNITS
26	6" DIP Class 350 Reclaim Water Main	LF
27	30" DIP Class 350 Reclaim Water Main	LF

BID ITEM - DUCTILE IRON FITTINGS (RECLAIM)

Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid for furnishing and installing each listed (double standard thickness cement-lined) ductile iron fitting as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing and disinfection required to complete these Bid Items.

Included under these bid items are mechanical joint restraints, and blue fluoropolymer-coated high-strength low alloy steel conforming to AWWA C111 or uncoated 316 stainless steel hardware as well as polyethylene wrapping all fittings and restraints.

BID ITEM	DESCRIPTION	UNITS
28	6" DI Fitting – Tee, MJ	EA
29	30" DI Fitting – 45 Deg. Bend MJ	EA
30	30" DI Fitting – 90 Deg. Bend, MJ	EA

BID ITEM NO. 31 – RECLAIM WATER SERVICE CONECTION

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid for each service type for furnishing and installing the listed reclaim water service lines, both short and long side, as listed on the Bid Form. Included in these bid items is the removal, relocation, and reconnection of reclaim water meter and meter boxes that do not meet the County standards (refer to County details). Included in this bid item is the installation of a new backflow prevention assembly downstream of the meter installed per the County details. If the relocated meter was connected to an existing backflow preventer assembly, the County inspector will determine if the assembly is acceptable to be reused. The meter and backflow prevention assembly proposed locations shall be coordinated with the County Inspector and property owner in order to meet County standards. All pipe, fittings, meter boxes, valves, connections, concrete pads, sod restoration, and landscaping restoration required to perform the complete removal, relocation, new installations, and reconnections of the water meter, meter box, and backflow preventer assembly and new private property service lines as required are included in this pay item for a fully operational water service.

Water service casing (horizontal directional drill) is required on all roadway crossings and shall extend outside pavement edge per County standard details. These bid items include, but are not limited to, service saddle, corporation stop, piping, casings (if required), and ancillary fittings. Contractor shall employ a licensed plumber for any work within private property and shall pay for any applicable permit fees to complete the work. Contractor to coordinate and be granted access to work on private property with property owner and County inspector prior to plumber starting work on private property. Payment shall represent full compensation for all labor, material, excavation, including rock, bedding, backfill, compaction, testing and disinfection and equipment required to complete these Bid Items.

BID ITEM NO. 32 – CUT AND CONNECT TO EXISTING RECLAIM WATER MAIN

Payment for all work included, but is not limited to, under these Bid Items shall represent full compensation in accordance with the unit bid price per each proposed connection to existing reclaim water mains. Prior to the connections, the Contractor will contact the County as to the date and time of the proposed work to coordinate water main isolations. Payment for all work included, but is not limited to, under this Bid Item shall represent full compensation in accordance with the bid price for all labor, additional necessary ductile iron fittings (double cement lined) not shown in the Contract Drawings, polyethylene wrapping fittings and restraints, thrust blocks, dead mans, excavation, dewatering, bedding, backfill, compaction, testing, temporary shutdown, and equipment required to complete this Bid Item.

BID ITEM NO. 33 – REMOVE EXISTING 30" RECLAIM WATER MAIN

Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per linear foot of pipe that is inactivated including removal of the pipe, appurtenances,

fittings, meters, services, valves, and concrete pads, as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, equipment, excavation, including rock, bedding, backfill, compaction, testing and disinfection required to complete this Bid Item.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01152 REQUESTS FOR PAYMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Submit Applications for Payment to the Project Manager or as directed at the preconstruction meeting, in accordance with the schedule established by Conditions of the Contract and Agreement between County and Contractor.

1.02 FORMAT AND DATA REQUIRED

A. Submit payment requests in the form provided by the County with itemized data typed in accordance with the Bid Form.

B. Provide construction photographs in accordance with Contract Documents.

1.03 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the County requires substantiating data, Contractor shall submit suitable information with a cover letter.

B. Submit one copy of data and cover letter for each copy of application.

1.04 PREPARATION OF APPLICATION FOR FINAL PAYMENT

Fill in application form as specified for progress payments.

1.05 SUBMITTAL PROCEDURE

A. Submit applications for payment at the times stipulated in the Agreement.

B. Number: Three (3) copies of each application; all signed and certified by the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01153 CHANGE ORDER PROCEDURES

PART 1 GENERAL

1.01 DEFINITION

A. Change Order: A written order signed by the Owner, the Architect/Engineer and the Contractor authorizing a change in the Project Plans and/or Specifications and, if necessary, a corresponding adjustment in the Contract Sum and/or Contract Time, pursuant to Article V of the General Conditions of the Construction Agreement.

B. Administrative Change Adjustment: Minor change order under 10% of project cost or 20% time, does not have to be Board approved.

C. Field Directive: A written order issued by Owner which orders minor changes in the Work not involving a change in Contract Time, to be paid from the Owner's contingency funds.

D. Field Order: Minor change to contract work that does not require adjustment of contract sum or expected date of completion.

1.02 REQUIREMENTS INCLUDED

A. The Contractor shall promptly implement change order procedures:

1. Provide full written data required to evaluate changes.
2. Maintain detailed records of work done on a time-and-material/force account basis.
3. Provide full documentation to County on request.

B. The Contractor shall designate a member of the Contractor's organization who:

1. Is authorized to accept changes to the Work.
2. Is responsible for informing others in the Contractor's employ of the authorized changes into the Work.

1.03 PRELIMINARY PROCEDURES

A. Project Manager may initiate changes by submitting a Request to Contractor. Request will include:

1. Detailed description of the change, products, costs and location of the change in the Project.
2. Supplementary or revised Drawings and Specifications.
3. The projected time extension for making the change.
4. A specified period of time during which the requested price will be considered valid.
5. Such request is for information only and is not an instruction to execute the changes, nor to stop work in progress.

B. Contractor may initiate changes by submitting a written notice to the Project Manager, containing:

1. Description of the proposed changes.
2. Statement of the reason for making the changes.

3. Statement of the effect on the Contract Sum and the Contract Time.
4. Statement of the effect on the work of separate contractors.
5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.04 FIELD ORDER CHANGE

A. In lieu of a Change Order, the Project Manager may issue a Field Order for the Contractor to proceed with additional work within the original intent of the Project.

B. Field Order will describe changes in the work, with attachments of backup information to define details of the change.

C. Contractor must sign and date the Field Order to indicate agreement with the terms therein.

1.05 DOCUMENTATION OF PROPOSALS AND CLAIMS

A. Support each quotation for a lump sum proposal and for each unit price which has not previously been established, with sufficient substantiating data to allow the County to evaluate the quotation.

B. On request, provide additional data to support time and cost computations:

1. Labor required.
2. Equipment required.
3. Products required.
    a. Recommended source of purchase and unit cost.
    b. Quantities required.
4. Taxes, insurance and bonds.
5. Credit for work deleted from Contract, similarly documented.
6. Overhead and profit.
7. Justification for any change in Contract Time.

C. Support each claim for additional costs and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal.

1. Name of the County's authorized agent who ordered the work and date of the order.
2. Date and time work was performed and by whom.
3. Time record, summary of hours work and hourly rates paid.
4. Receipts and invoices for:
    a. Equipment used, listing dates and time of use.
    b. Products used, listing of quantities.
    c. Subcontracts.

1.06 PREPARATION OF CHANGE ORDERS

A. Project Manager will prepare each Change Order.

B. Change Order will describe changes in the Work, both additions and deletions, with attachments as necessary to define details of the change.

C. Change Order will provide an accounting of the adjustment in the Contract Sum and in the

Contract Time.

1.07 LUMP SUM/FIXED PRICE CHANGE ORDER

A. Project Manager initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by the Contractor, or requests from the County, or both.

B. Once the form has been completed, all copies should be sent to Contractor for approval. After approval by Contractor, all copies should be sent to County for approval. The County will distribute executed copies after approval by the Board of County Commissioners.

1.08 UNIT PRICE CHANGE ORDER

A. Contents of Change Orders will be based on, either:

1. County's definition of the scope of the required changes.
2. Contractor's Proposal for a change, as approved by the County.
3. Survey of completed work.

B. The amounts of the unit prices to be:

1. Those stated in the Agreement.
2. Those mutually agreed upon between County and Contractor.

1.09 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/CONSTRUCTION CHANGE AUTHORIZATION

A. Refer to Article V.5.6 of the General Conditions of the Construction Agreement.

1.10 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Periodically revise Schedule of Values and Application for Payment forms to record each change as a separate item of work, and to record the adjusted Contract Sum.

B. Periodically revise the Construction Schedule to reflect each change in Contract Time. Revise sub schedules to show changes for other items of work affected by the changes.

C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01200 PROJECT MEETINGS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The County shall schedule the pre-construction meeting, periodic progress meetings and special meetings, if required, throughout progress of work.

B. Representatives of contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

C. The Contractor shall attend meetings to ascertain that work is expedited consistent with Contract Documents and construction schedules.

1.02 PRE-CONSTRUCTION MEETING

A. Attendance:

1. County's Engineer
2. County's Project Manager
3. Contractor
4. Resident Project Representative
5. Related Labor Contractor's Superintendent
6. Major Subcontractors
7. Major Suppliers
8. Others as appropriate

B. Suggested Agenda:

1. Distribution and discussion of:
    a. List of major subcontractors.
    b. Projected Construction Schedules.
    c. Coordination of Utilities
2. Critical work sequencing
3. Project Coordination:
    a. Designation of responsible personnel.
    b. Emergency contact persons with phone numbers.
4. Procedures and processing of:
    a. Field decisions.
    b. Submittals.
    c. Change Orders.
    d. Applications for Payment.
5. Procedures for maintaining Record Documents
6. Use of premises:
    a. Office, work and storage areas.
    b. County's REQUIREMENTS.
7. Temporary utilities
8. Housekeeping procedures
9. Liquidated damages
10. Equal Opportunity Requirements
11. Laboratory testing

12. Project / Job meetings: Progress meeting, other special topics as needed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01310 CONSTRUCTION SCHEDULE & PROJECT RESTRAINTS

PART 1 GENERAL

1.01 GENERAL

A. Construction under this contract must be coordinated with the County and accomplished in a logical order to maintain utilization and flow through existing facilities and public properties and rights-of-way and to allow construction to be completed within the time allowed by Contract Documents and in the manner set forth in the Contract.

1.02 CONSTRUCTION SCHEDULING GENERAL PROVISIONS

A. No work shall be done between 7:00 p.m. and 7:00 a.m. nor on weekends or legal holidays without written permission of the County. However, emergency work may be done without prior permission.

B. Night work may be established by the Contractor as regular procedure with the written permission of the County. Such permission, however, may be revoked at any time by the County if the Contractor fails to maintain adequate equipment and supervision for the proper execution and control of the work at night.

C. Due to potential health hazards and requirements of the State of Florida and the U.S. Environmental Protection Agency, existing facilities must be maintained in operation.

D. The Contractor shall be fully responsible for providing all temporary piping, plumbing, electrical hook-ups, lighting, temporary structure, or other materials, equipment and systems required to maintain the existing facility's operations. All details of temporary piping and temporary construction are not necessarily shown on the Drawings or covered in the Specifications. However, this does not relieve the Contractor of the responsibility to ensure that construction will not interrupt proper facility operations.

E. The Contractor shall designate an authorized representative of his firm who shall be responsible for development and maintenance of the schedule and of progress and payment reports. This representative of the Contractor shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the commitments of the Contractor's schedule.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. The Contractor shall submit a critical path schedule as described herein.

B. The planning, scheduling, management and execution of the work is the sole responsibility of the Contractor. The progress schedule requirement is established to allow County to review Contractor's planning, scheduling, management and execution of the work; to assist County in evaluating work progress and make progress payments and to allow other contractors to cooperate and coordinate their activities with those of the Contractor.

2.02 FORM OF SCHEDULES

A. Prepare schedules using the latest version of Microsoft Project, or other County approved software, in the form of a horizontal bar chart diagram. The diagram shall be time-scaled and sequenced by work areas. Horizontal time scale shall identify the first work day of each week.

B. Activities shall be at least as detailed as the Schedule of Values. Activity durations shall be in whole working days. In addition, man-days shall be shown for each activity or tabulated in an accompanying report.

C. Diagrams shall be neat and legible and submitted on sheets at least 8-1/2 inches by 11 inches suitable for reproduction. Scale and spacing shall allow space for notations and future revisions.

2.03 CONTENT OF SCHEDULES

A. Each monthly schedule shall be based on data as of the last day of the current pay period.

B. Description for each activity shall be brief, but convey the scope of work described.

C. Activities shall identify all items of work that must be accomplished to achieve substantial completion, such as items pertaining to Contractor's installation and testing activities; items pertaining to the approval of regulatory agencies; contractor's time required for submittals, fabrication and deliveries; the time required by County to review all submittals as set forth in the Contract Documents; items of work required of County to support pre-operational, startup and final testing; time required for the relocation of utilities. Activities shall also identify interface milestones with the work of other contractors performing work under separate contracts with County.

D. Schedules shall show the complete sequence of construction by activities. Dates for beginning and completion of each activity shall be indicated as well as projected percentage of completion for each activity as of the first day of each month.

E. Submittal schedule for shop drawing review, product data, and samples shall show the date of Contractor submittal and the date approved submittals will be required by the County, consistent with the time frames established in the Specifications.

F. For Contract change orders granting time extensions, the impact on the Contract date(s) shall equal the calendar-day total time extension specified for the applicable work in the Contract change orders.

G. For actual delays, add activities prior to each delayed activity on the appropriate critical path(s). Data on the added activities of this type shall portray all steps leading to the delay and shall further include the following: separate activity identification, activity description indicating cause of the delay, activity duration consistent with whichever set of dates below applies, the actual start and finish dates of the delay or, if the delay is not finished, the actual start date and estimated completion date.

H. For potential delays, add an activity prior to each potentially delayed activity on the appropriate critical path(s). Data for added activities of this type shall include alternatives available to mitigate the delay including acceleration alternatives and further show the following: separate activity identification, activity description indicating cause of the potential delay and activity duration equal to zero work days.

2.04 SUPPORTING NARRATIVE

A. Status and scheduling reports identified below shall contain a narrative to document the project status, to explain the basis of Contractor's determination of durations, describe the Contract conditions and restraints incorporated into the schedule and provide an analysis pertaining to potential problems and practical steps to mitigate them.

B. The narrative shall specifically include:

1. Actual completion dates for activities completed during the monthly report period and actual start
   dates for activities commenced during the monthly report period.
2. Anticipated start dates for activities scheduled to commence during the following monthly report period.
3. Changes in the duration of any activity and minor logic changes.
4. The progress along the critical path in terms of days ahead or behind the Contract date.
5. If the Monthly Status Report indicates an avoidable delay to the Contract completion date or interim completion dates as specified in the Agreement, Contractor shall identify the problem, cause and the activities affected and provide an explanation of the proposed corrective action to meet the milestone dates involved or to mitigate further delays.
6. If the delay is thought to be unavoidable, the Contractor shall identify the problem, cause, duration, specific activities affected and restraints of each activity.
7. The narrative shall also discuss all change order activities whether included or not in the revised/current schedule of legal status. Newly introduced change order work activities and the CPM path(s) that they affect, must be specifically identified. All change order work activities added to the schedule shall conform with the sequencing and Contract Time requirements of the applicable Change Order.
8. Original Contract date(s) shall not be changed except by Contract change order. A revision need not be submitted when the foregoing situations arise unless required by County. Review of a report containing added activities will not be construed to be concurrence with the duration or restraints for such added activities; instead the corresponding data as ultimately incorporated into the applicable Contract change order shall govern.
9. Should County require additional data, this information shall be supplied by Contractor within 10 calendar days.

2.05 SUBMITTALS

A. Contractor shall submit estimated and preliminary progress schedules (as identified in the Terms and Conditions of the Contract and the General Conditions), monthly status reports, a start-up schedule and an as-built schedule report all as specified herein.

B. All schedules, including estimated and preliminary schedules, shall be in conformance with the Contract Documents.

C. The finalized progress schedule discussed in the Contract Documents shall be the first monthly status report and as such shall be in conformance with all applicable specifications contained herein.

D. Monthly Status Report submittals shall include a time-scaled (days after notice to proceed) diagram showing all contract activities and supporting narrative. The initial detailed schedule shall use the notice to proceed as the start date. The finalized schedule, if concurred with by County, shall be the work plan to be used by the contractor for planning, scheduling, managing and executing the work.

E. The schedule diagram shall be formatted as above. The diagram shall include (1) all detailed activities included in the preliminary and estimated schedule submittals, (2) calendar days prior to substantial completion, (3) summary activities for the remaining days. The critical path activities shall be identified, including critical paths for interim dates, if possible.

F. The Contractor shall submit progress schedules with each application for payment.

2.06 MONTHLY STATUS REPORTS

A. Contractor shall submit detailed schedule status reports on a monthly basis with the Application for Payment. The first such status report shall be submitted with the first Application for Payment and include data as of the last day of the pay period. The Monthly Report shall include a "marked-up" copy of the latest detailed schedule of legal status and a supporting narrative including updated information as described above. The Monthly Report will be reviewed by County and Contractor at a monthly schedule meeting and Contractor will address County's comments on the subsequent monthly report. Monthly status reports shall be the basis for evaluating Contractor's progress.

B. The "marked-up" diagram shall show, for the latest detailed schedule of legal status, percentages of completion for all activities, actual start and finish dates and remaining durations, as appropriate. Activities not previously included in the latest detailed schedule of legal status shall be added, except that contractual dates will not be changed except by change order. Review of a marked-up diagram by County will not be construed to constitute concurrence with the time frames, duration, or sequencing for such added activities; instead the corresponding data as ultimately incorporated into an appropriate change order shall govern.

2.07 STARTUP SCHEDULE

A. At least 60 calendar days prior to the date of substantial completion, Contractor shall submit a time-scaled (days after notice to proceed) diagram detailing the work to take place in the period between 60 days prior to substantial completion, together with a supporting narrative. County shall have 10 calendar days after receipt of the submittal to respond. Upon receipt of County's comments, Contractor shall make the necessary revisions and submit the revised schedule within 10 calendar days. The resubmittal, if concurred with by County, shall be the Work Plan to be used by Contractor for planning, managing, scheduling and executing the remaining work leading to substantial completion.

B. The time-scaled diagram shall use the latest schedule of legal status for those activities completed ahead of the last 60 calendar days prior to substantial completion and detailed activities for the remaining 60-day period within the time frames outlined in the latest schedule of legal status.

C. Contractor will be required to continue the requirement for monthly reports, as outlined above. In preparing this report, Contractor must assure that the schedule is consistent with

the progress noted in the startup schedule.

2.08 REVISIONS

A. All revised Schedule Submittals shall be made in the same form and detail as the initial submittal and shall be accompanied by an explanation of the reasons for such revisions, all of which shall be subject to review and concurrence by County. The revision shall incorporate all previously made changes to reflect current as-built conditions. Minor changes to the approved submittal may be approved at monthly meetings; a minor change is not considered a revision in the context of this paragraph.

B. A revised schedule submittal shall be submitted for review when required by County.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01340 SHOP DRAWINGS, PROJECT DATA AND SAMPLES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall submit to the County for review and approval: working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this section called data) that have been produced within the last three (3) years, and material samples (hereinafter in this section called samples) as are required for the proper control of work, including, but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings. Submittals may be done electronically via PDF documents.

B. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the County. The County will provide the initial submittal log in electronic format. The electronic log (excel file) shall be passed back and forth between the Contractor and the County for each submittal package. This log shall include the following items:

1. Submittal description and number assigned.
2. Date to County.
3. Date returned to Contractor (from County).
4. Status of Submittal (No exceptions taken, returned for confirmation or resubmittal, rejected).
5. Date of Resubmittal and Return (as applicable).
6. Date material released (for fabrication).
7. Projected date of fabrication.
8. Projected date of delivery to site.
9. Projected date and required lead time so that product installation does not delay contact.
10. Status of O&M manuals submitted.

1.03 CONTRACTOR'S RESPONSIBILITY

A. It is the duty of the Contractor to check all drawings, data and samples prepared by or for him before submitting them to the County for review. Each and every copy of the Drawings and data shall bear Contractor's stamp showing that they have been so checked. Shop drawings submitted to the County without the Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the contract Documents.

B. The Contractor shall ensure that all submitted cut sheets, product sheets, product documentation, etc. are current versions of the product information and are not older than three (3) years. Product certification(s) shall be no older than three (3) years. Any submitted documents found to be beyond the acceptable date ranges shall be rejected.

C. Determine and verify:

1. Field measurements.
2. Field construction criteria.
3. Catalog numbers and similar data.

4. Conformance with Specifications and indicate all variances from the Specifications.

D. The Contractor shall furnish the County a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall indicate those that are critical to the progress schedule.

E. The Contractor shall not begin any of the work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the County, with No Exceptions Taken or Approved as Noted.

F. The Contractor shall submit to the County all drawings and schedules sufficiently in advance of construction requirements to provide no less than twenty-one (21) calendar days for checking and appropriate action from the time the County receives them. Submittals are to be scheduled, submitted, reviewed, and approved prior to the acquisition of the material or equipment. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow time for potential resubmittal.

G. No delay costs or time extensions will be allowed for time lost in late submittals or resubmittals.

H. All material & product submittals, other than samples, may be transmitted electronically as a pdf file. All returns to the contractor will be as a pdf file only unless specifically requested otherwise.

I. The Contractor shall be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by County of the necessary Shop Drawings.

1.04 COUNTY'S REVIEW OF SHOP DRAWINGS AND WORKING DRAWINGS

A. The County's review of drawings, data and samples submitted by the Contractor shall cover only general conformity to the Specifications, external connections and dimensions which affect the installation.

B. The review of drawings and schedules shall be general and shall not be construed:

1. As permitting any departure from the Contract requirements.
2. As relieving the Contractor of responsibility for any errors, including details, dimensions and materials.
3. As approving departures from details furnished by the County, except as otherwise provided herein.

C. If the drawings or schedules as submitted describe variations and show a departure from the Contract requirements which the County finds to be in the interest of the County and to be so minor as not to involve a change in Contract Price or time for performance, the County may return the reviewed drawings without noting any exception.

D. When reviewed by the County, each of the Shop and Working Drawings shall be identified as having received such review being so stamped and dated. Shop Drawings stamped

"REJECTED" and with required corrections shown shall be returned to the Contractor for correction and resubmittal.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals, the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by the County on previous submissions. The Contractor shall make any corrections required by the County.

F. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the County.

G. The County shall review a submittal/resubmittal a maximum of three (3) times after which cost of review shall be borne by the Contractor. The cost of engineering shall be equal to the County's actual payroll cost.

H. When the Shop and Working Drawings have been completed to the satisfaction of the County, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the County.

I. No partial submittals shall be reviewed. Incomplete submittals shall be returned to the Contractor and shall be considered not approved until resubmitted.

1.05 SHOP DRAWINGS

A. When used in the Contract Documents, the term "Shop Drawings" shall be considered to mean Contractor's plans for material and equipment which become an integral part of the Project. These drawings shall be complete and detailed. Shop Drawings shall consist of fabrication, drawings, setting drawings, schedule drawings, manufacturer's scale drawings and wiring and control diagrams. Cuts, catalogs, pamphlets, descriptive literature and performance and test data, shall be considered only as supportive to required Shop Drawings as defined above.

B. Drawings and schedules shall be checked and coordinated with the work of all trades involved, before they are submitted for review by the County and shall bear the Contractor's stamp of approval and original signature as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval and original signature shall be returned to the Contractor for resubmission.

C. Each Shop Drawing shall have a blank area 3-1/2 inches by 3-1/2 inches, located adjacent to the title block. The title block shall display the following:

1. Number and title of the drawing.
2. Date of Drawing or revision.
3. Name of project building or facility.
4. Name of contractor and subcontractor submitting drawing.
5. Clear identification of contents and location of the work.
6. Specification title and number.

D. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility

of executing the work in accordance with the Contract, even though such drawings have been reviewed.

E. Data on materials and equipment shall include, without limitation, materials and equipment lists, catalog sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.

F. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name and address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained.

G. All manufacturers or equipment suppliers who proposed to furnish equipment or products shall submit an installation list to the County along with the required shop drawings. The installation list shall include at least five installations where identical equipment has been installed and have been in operation for a period of at least one (1) year.

H. Only the County will utilize the color "red" in marking shop drawing submittals.

1.06 SUBMITTAL PREPARATION

A. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

B. Collect required data for each specific material, product, unit of work, or system into a single submittal. Prominently mark choices, options, and portions applicable to the submittal. Partial submittals will not be accepted for expedition of construction effort. Submittal will be returned without review if incomplete.

C. If available product data is incomplete, provide Contractor-prepared documentation to supplement product data and satisfy submittal requirements.

D. All irrelevant or unnecessary data shall be removed from the submittal to facilitate accuracy and timely processing. Submittals that contain the excessive amount of irrelevant or unnecessary data will be returned with review.

E. Provide a transmittal form for each submittal with the following information:
   1. Project title, location and number.
   2. Construction contract number.
   3. Date of the drawings and revisions.
   4. Name, address, and telephone number of subcontractor, supplier, manufacturer, and any other subcontractor associated with the submittal.
   5. List paragraph number of the specification section and page number; and sheet number of the contract drawings by which the submittal is required.
   6. When a resubmission, the resubmittal document name shall remain the same, but shall add an alphabetic suffix on submittal description. For example, submittal 18 would become 18A, to indicate resubmission.
   7. Product identification and location in project.

F. The Contractor is responsible for reviewing and certifying that all submittals are in compliance with contract requirements before submitting to the County for review.

G. Stamp, sign, and date each submittal transmittal form indicating action taken.

H. Stamp used by the Contractor on the submittal transmittal form to certify that the submittal meets contract requirements is to be similar to the following:

CONTRACTOR
(Firm Name)

____ Approved

____ Approved with corrections as noted on submittal data and/or attached sheet(s).

I certify that the following document and information has been verified to be is not more than three (3) years old.

SIGNATURE:_____

TITLE:_____

DATE:_____

1.07 WORKING DRAWINGS

A. When used in the Contract Documents, the term "working drawings" shall be considered to mean the Contractor's fabrication and erection drawings for structures such as roof trusses, steelwork, precast concrete elements, bulkheads, support of open cut excavation, support of utilities, groundwater control systems, forming and false work; underpinning; and for such other work as may be required for construction of the project.

B. Copies of working drawings as noted above, shall be submitted to the County where required by the Contract Documents or requested by the County and shall be submitted at least thirty (30) days (unless otherwise specified by the County) in advance of their being required for work.

C. Working drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Florida and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the County, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error are assumed by the Contractor; the County and Engineer shall not have responsibility therefor.

1.08 SAMPLES

A. The Contractor shall furnish, for the review of the County, samples required by the Contract Documents or requested by the County. Samples shall be delivered to the County as specified or directed. The Contractor shall prepay all shipping charges on samples.

Materials or equipment for which samples are required shall not be used in work until reviewed by the County.

B. Samples shall be of sufficient size and quantity to clearly illustrate:

1. Functional characteristics of the product, with integrally related parts and attachment devices.
2. Full range of color, texture and pattern.
3. A minimum of two samples of each item shall be submitted.

C. Each sample shall have a label indicating:

1. Name of product.
2. Name of Contractor and Subcontractor.
3. Material or equipment represented.
4. Place of origin.
5. Name of Producer and Brand (if any).
6. Location in project.
   (Samples of finished materials shall have additional markings that will identify them under the finished schedules.)
7. Reference specification paragraph.

D. The Contractor shall prepare a transmittal letter in triplicate for each shipment of samples containing the information required above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the County. Review of a sample shall be only for the characteristics or use named in such and shall not be construed to change or modify any Contract requirements.

E. Reviewed samples not destroyed in testing shall be sent to the County or stored at the site of the work. Reviewed samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment incorporated in work shall match the reviewed samples. If requested at the time of submission, samples which failed testing or were rejected shall be returned to the Contractor at his expense.

1.09 APPROVED SUBMITTALS

A. County approval of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory.

B. County approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor's expense.

C. After submittals have been approved, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

D. Retain a copy of all approved submittals at project site, including approved samples.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01370 SCHEDULE OF VALUES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall submit to the County a Schedule of Values allocated to the various portions of the work, within 10 days after date of Notice to Proceed.

B. Upon request of the County, the Contractor shall support the values with data which will substantiate their correctness.

C. The Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment.

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Schedule of Values will be considered for approval by County upon Contractor's request. Identify schedule with:

1. Title of Project and location.
2. Project number.
3. Name and address of Contractor.
4. Contract designation.
5. Date of submission.

B. Schedule of Values shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction.

C. Follow the table of contents for the Contract Document as the format for listing component items for structures:

1. Identify each line item with the number and title of the respective major section of the specification.
2. For each line item, list sub values of major products or operations under item.

D. Follow the bid sheets included in this Contract Documents as the format for listing component items for pipe lines.

E. The sum of all values listed in the schedule shall equal the total Contract sum.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01380 CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall employ a competent photographer to take construction record photographs or perform video, recording including furnishing all labor, materials, equipment and incidentals necessary to obtain photographs and/or video recordings of all construction areas.

B. Preconstruction record information shall consist of video recordings on digital video disks (DVD).

C. Construction progress information shall consist of photographs and digital photographs on a recordable compact disc (CD-R).

1.02 QUALIFICATIONS

A. All photography shall be done by a competent camera operator who is fully experienced and qualified with the specified equipment.

B. For the video recording, the audio portion should be done by a person qualified and knowledgeable in the specifics of the Contract, who shall speak with clarity and diction so as to be easily understood.

1.03 PROJECT PHOTOGRAPHS

A. Provide one print of each photograph with each pay application.

B. Provide one recordable compact disc with digital photographs with each pay application.

C. Negatives:

1. All negatives shall remain the property of photographer.
2. The Contractor shall require that photographer maintain negatives or protected digital files for a period of two years from date of substantial completion of the project.
3. Photographer shall agree to furnish additional prints to County at commercial rates applicable at time of purchase. Photographer shall also agree to participate as required in any litigation requiring the photographer as an expert witness.

D. The Contractor shall pay all costs associated with the required photography and prints. Any parties requiring additional photography or prints shall pay the photographer directly.

E. All project photographs shall be a single weight, color image. All finishes shall be smooth surface and glossy and all prints shall be 8 inches x 10 inches.

F. Each print shall have clearly marked on the back, the name of the project, the orientation of view, the date and time of exposure, name and address of the photographer and the photographers numbered identification of exposure.

G. All project photographs shall be taken from locations to adequately illustrate conditions prior to construction, or conditions of construction and state of progress. The Contractor shall consult with the County at each period of photography for instructions concerning views required.

1.04 VIDEO RECORDINGS

A. Video recording shall be done along all routes that are scheduled for construction. Video recording shall include full recording of both sides of all streets and the entire width of easements plus 10 feet on each side on which construction is to be performed. All video recording shall be in full color.

B. A complete view, in sufficient detail with audio description of the exact location shall be provided.

C. The engineering plans shall be used as a reference for stationing in the audio portion of the recordings for easy location identification.

D. Two complete sets of video recordings shall be delivered to the County on digital video disks (DVD) for the permanent and exclusive use of the County prior to the start of any construction on the project. Included in this delivery shall be a printed video log which includes time stamps and project stationing.

E. All video recordings shall contain the name of the project, the date and time of the video, recording, the name and address of the photographer and any other identifying information required.

F. Construction shall not start until preconstruction video recordings are completed, submitted and accepted by the County. In addition, no progress payments shall be made until the preconstruction video recordings are accepted by the County.

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. County 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. County 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 County 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 County 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 County 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 County.

H. If the test results indicate the material or equipment complies with the Contract Documents, the County 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

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.

C. Comply with County Health Department regulations.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

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

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 Manatee County Utilities Customer Service office 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 01570 TRAFFIC REGULATION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall be responsible for providing safe and expeditious movement of traffic through construction zones. A construction zone is defined as the immediate areas of actual construction and all abutting areas which are used by the Contractor and which interfere with the driving or walking public.

B. The Contractor shall remove temporary equipment and facilities when no longer required, restore grounds to original or to specified conditions.

1.02 TRAFFIC CONTROL

A. The necessary traffic control shall include, but not be limited to, such items as proper construction warning signs, signals, lighting devices, markings, barricades, channelization and hand signaling devices. The Contractor shall be responsible for installation and maintenance of all devices and detour routes and signage for the duration of the construction period. The Contractor shall utilize the appropriate traffic plan from the FDOT Maintenance of Traffic Standards, Series 600 of the FDOT Roadway & Traffic Design Standards, Latest Edition.

B. Should there be the necessity to close any portion of a roadway carrying vehicles or pedestrians the Contractor shall submit a Traffic Control Plan (TCP) at least 5 days before a partial or full day closure, and at least 8 days before a multi-day closure. TCP shall be submitted, along with a copy of their accreditation, by a certified IMSA or ATSA Traffic Control Specialist.

1. At no time will more than one (1) lane of a roadway be closed to vehicles and pedestrians without an approved road closure from the County Transportation Department. With any such closings, adequate provision shall be made for the safe expeditious movement of each.
2. All traffic control signs must be in place and inspected at least 1 day in advance of the closure. Multi-day closures notification signs shall be in place at least 3 days in advance of the closure. All signs must be covered when not in effect, and checked twice a day by the Worksite Traffic Supervisor when they are in effect.

C. The Contractor shall be responsible for removal, relocation, or replacement of any traffic control device in the construction area which exists as part of the normal preconstruction traffic control scheme. Any such actions shall be performed by the Contractor under the supervision and in accordance with the instructions of the applicable highway department unless otherwise specified.

D. The Contractor will consult with the County immediately on any vehicular or pedestrian safety or efficiency problem incurred as a result of construction of the project.

E. The Contractor shall provide ready access to businesses and homes in the project area during construction. The Contractor shall be responsible for coordinating this work with affected homeowners.

F. When conditions require the temporary installation of signs, pavement markings and traffic barriers for the protection or workers and traffic, the entire array of such devices shall be depicted on working drawings for each separate stage of work. These drawings shall be submitted to the County for review and approval prior to commencement of work on the site.

G. Precast concrete traffic barriers shall be placed adjacent to trenches and other excavations deeper than six inches below the adjacent pavement surface.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01580 PROJECT IDENTIFICATION AND SIGNS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Furnish, install and maintain County project identification signs.

B. Remove signs on completion of construction.

C. Allow no other signs to be displayed except for traffic control and safety.

1.02 PROJECT IDENTIFICATION SIGN (COUNTY)

A. Two painted signs, of not less than 32 square feet (3 square meters) area, with painted graphic content to include:

1. Title of Project.
2. Name of County.
3. Names and titles of authorities as directed by County.
4. Prime Contractor.

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

C. Erect on the site at a lighted location of high public visibility, adjacent to main entrance to site, as approved by the County

1.03 INFORMATIONAL SIGNS

A. Painted signs with painted lettering, or standard products.

B. Size of signs and lettering: as required by regulatory agencies, or as appropriate to usage.

C. Colors: as required by regulatory agencies, otherwise of uniform colors throughout project.

D. Erect at appropriate locations to provide required information.

1.04 QUALITY ASSURANCE

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

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

1.05 PUBLIC NOTIFICATION

A. Door Hangers: The Contractor shall generate and distribute door hangers to all residents who will be impacted by project construction.

1. Residents impacted include anyone who resides inside, or within 500 feet of project limits of construction.

B. Door Hangers shall be distributed prior to start of construction of the project. Hangers shall be affixed to doors of residents via elastic bands or tape.

EXAMPLE:

PLEASE PARDON THE INCONVENIENCE WHILE THE ROADWAY IS BEING RECONSTRUCTED IN YOUR NEIGHBORHOOD

This project consists of utility improvements and the reconstruction of ??? Boulevard from U.S. ??? to ??? Street West. The project is expected to begin in August, 20XX and be completed in July 20XX.

Location Map

WE HOPE TO KEEP ANY INCONVENIENCE TO A MINIMUM. HOWEVER, IF YOU HAVE ANY PROBLEMS, PLEASE CONTACT THE FOLLOWING:

Contractor	Project Manager
Contractor Address	PM Address
Contractor Phone (Site Phone)	PM Phone No. & Ext.

Project Inspector
Inspector Phone Number

AFTER HOURS EMERGENCY NUMBER – (941) 747-HELP
THANK YOU FOR YOUR UNDERSTANDING AND PATIENCE
MANATEE COUNTY GOVERNMENT – PROJECT MANAGEMENT DEPT.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

A. Structure and Framing: May be new or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.

B. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard large sizes to minimize joints.

C. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.

D. Rough Hardware: Galvanized.

E. Paint: Exterior quality, as specified in the Contract Documents.

PART 3 EXECUTION

3.01 PROJECT IDENTIFICATION SIGN

Paint exposed surface or supports, framing and surface material; one coat of primer and one coat of exterior paint.

Paint graphics in styles, size and colors selected.

3.02 MAINTENANCE

The Contractor shall maintain signs and supports in a neat, clean condition; repair damages to structures, framing or sign.

3.03 REMOVAL

The Contractor shall remove signs, framing, supports and foundations at completion of project.

END OF SECTION

SECTION 01590 COUNTY'S FIELD OFFICE

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Contractor shall furnish, install and maintain one temporary field office during the entire construction period for the sole use of the County.

1.02 OTHER REQUIREMENTS

Prior to installation of the County's field office, the Contractor shall consult with the County on location, access and related facilities.

All site use approvals shall be obtained by the Contractor.

Upon completion of construction, the Contractor shall remove the field office and restore the site to its original condition.

1.03 REQUIREMENTS FOR FACILITIES

A. Construction:

1. The field office shall be structurally sound, weather tight, with floors raised aboveground.
2. At Contractor's option, portable or mobile buildings may be used.

B. Office for Field Engineer:

1. A separate office for sole use of the County with secure entrance doors, key and lock shall be provided.
2. Area: 250 sq. ft. minimum, with minimum dimension of 8 feet.
3. Windows:
    a. Minimum of three (3).
    b. Operable sash and insect screens.
    c. Locate field office to provide maximum view of construction areas.
4. Furnishings:
    a. Two standard size chairs and desks with three drawers each.
    b. One drafting table: 39"x72"x36" high, with one equipment drawer.
    c. One metal, double-door storage cabinet with lock and key.
    d. One plan rack to hold a minimum of six sets of project drawings.
    e. One standard four-drawer legal-size metal filing cabinet with lock and key.
    f. Six linear feet of bookshelves.
    g. One swivel arm chair.
    h. Two straight chairs.
    i. One drafting table stool.
    j. One waste basket.
    k. One tackboard, 36"x30".
    l. One fire extinguisher.
    m. One first aid kit.

5. Services:
    a. Adequate lighting.
    b. Exterior lighting at entrance door.
    c. Automatic heating and mechanical cooling equipment to maintain comfort conditions.
    d. Minimum of four 110 volt duplex electric convenience outlets, at least one on each wall.
    e. Electric distribution panel: Two circuits minimum 110 volt, 60 hertz service.
    f. Convenient access to drinking water and toilet facilities.
6. Telephone: One private direct line instrument.
7. Fax: combination fax/duplicator.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

May be new or used, but must be serviceable, adequate for required purpose and must adhere to all applicable codes or regulations including the Manatee County Building Codes.

PART 3 EXECUTION

3.01 PREPARATION

Fill and grade site as necessary for temporary structure to provide positive surface drainage.

3.02 INSTALLATION

Construct temporary field office on proper foundation and provide connections for all utility services.

1. Secure portable or mobile building when used.
2. Provide steps and landings at entrance doors.

END OF SECTION

SECTION 01600 MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Material and equipment incorporated into the work:

1. Conform to applicable specifications and standards.
2. Comply with size, make, type and quality specified, or as specifically approved in writing by the County.
3. Manufactured and Fabricated Products:
   a. Design, fabricate and assemble in accordance with the best engineering and shop practices.
   b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
   c. Two or more items of the same kind shall be identical and manufactured by the same manufacturer.
   d. Products shall be suitable for service conditions.
   e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
4. Do not use material or equipment for any purpose other than that for which it is specified.
5. All material and equipment incorporated into the project shall be new.

1.02 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to County. Maintain one set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with County prior to proceeding. Do not proceed with work without clear instructions.

1.03 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site.

1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals and that products are properly protected and undamaged.

B. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

C. The Contractor shall take extreme care when handling pipe, valves, fittings to ensure the interior lining does not get damaged during construction. Lined pipe, valves, and fittings must be handled only from the outside surfaces. No forks, chains, straps, hooks, etc. shall be placed inside the pipe, valves, and fittings for lifting, positioning, or laying. The materials shall not be dropped or unloaded by rolling.

D. Care should be taken not to let the pipe, valves, and fittings strike sharp objects while swinging or being off loaded. Materials should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers.

E. A County representative shall have the right to deny any pipe/valve/fitting that shows cracking due to improper handling/storage.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01620 STORAGE AND PROTECTION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Provide secure storage and protection for products to be incorporated into the work and maintenance and protection for products after installation and until completion of Work.

1.02 STORAGE

A. Store products immediately on delivery and protect until installed in the Work, in accord with manufacturer's instructions, with seals and labels intact and legible.

B. Exterior Storage

1. Provide substantial platform, blocking or skids to support fabricated products above ground to prevent soiling or staining.
   a. Cover products, particularly any pipe, fittings, and valves, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
   b. Prevent mixing of refuse or chemically injurious materials or liquids.

C. Arrange storage in manner to provide easy access for inspection.

1.03 MAINTENANCE OF STORAGE

A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:

1. State of storage facilities is adequate to provide required conditions.
2. Required environmental conditions are maintained on continuing basis.
3. Surfaces of products exposed to elements are not adversely affected. Any weathering of products, coatings and finishes is not acceptable under requirements of these Contract Documents.

B. Mechanical and electrical equipment which requires servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package.

1. Equipment shall not be shipped until approved by the County. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the County.
2. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the County until such time as the equipment is to be installed.
3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.
4. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.

5. Lubricants shall be changed upon completion of installation and as frequently as required, thereafter during the period between installation and acceptance.
6. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

1.04 PROTECTION AFTER INSTALLATION

A. Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, prior to completion of work.

B. Control traffic to prevent damage to equipment and surfaces.

C. Provide coverings to protect finished surfaces from damage.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01700 CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the work.

1.02 SUBSTANTIAL COMPLETION

A. The Contractor shall submit the following items when the Contractor considers the work to be substantially complete:

1. A written notice that the work, or designated portion thereof, is substantially complete.
2. A list of items to be completed or corrected.

B. Within a reasonable time after receipt of such notice, the County shall make an inspection to determine the status of completion.

C. Project record documents and operations and maintenance manuals must be submitted before the project shall be considered substantially complete.

D. If the County determines that the work is not substantially complete:

1. The County shall notify the Contractor in writing, stating the reasons.
2. The Contractor shall remedy the deficiencies in the work and send a second written notice of substantial completion to the County.
3. The County shall reinspect the work.

E. When the County finds that the work is substantially complete:

1. The Engineer shall prepare and deliver to the County a tentative Certificate of Substantial Completion (Manatee County Project Management Form PMD-8) with a tentative list of the items to be completed or corrected before final payment.
2. The Engineer shall consider any objections made by the County as provided in Conditions of the Contract. When the Engineer considers the work substantially complete, he will execute and deliver to the County a definite Certificate of Substantial Completion (Manatee County Project Management Form PMD-8) with a revised tentative list of items to be completed or corrected.

1.03 FINAL INSPECTION

A. When the Contractor considered the work to be complete, he shall submit written certification stating that:

1. The Contract Documents have been reviewed.
2. The work has been inspected for compliance with Contract Documents.
3. The work has been completed in accordance with Contract Documents.
4. The equipment and systems have been tested in the presence of the County's representative and are operational.

5. The work is completed and ready for final inspection.

B. The County shall make an inspection to verify the status of completion after receipt of such certification.

C. If the County determines that the work is incomplete or defective:

1. The County shall promptly notify the Contractor in writing, listing the incomplete or defective work.
2. The Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to County that the work is complete.
3. The County shall reinspect the work.

D. Upon finding the work to be acceptable under the Contract Documents, the County shall request the Contractor to make closeout submittals.

E. For each additional inspection beyond a total of three (3) inspections for substantial and final completion due to the incompleteness of the work, the Contractor shall reimburse the County's fees.

1.04 CONTRACTOR'S CLOSEOUT SUBMITTALS TO COUNTY

A. Project Record Documents (prior to substantial completion).

B. Operation and maintenance manuals (prior to substantial completion).

C. Warranties and Bonds.

D. Evidence of Payment and Release of Liens: In accordance with requirements of General and Supplementary Conditions.

E. Certification letter from Florida Department of Transportation and Manatee County Department of Transportation, as applicable.

F. Certificate of Insurance for Products and Completed Operations.

G. Final Reconciliation, Warranty Period Declaration, and Contractor's Affidavit (Manatee County Project Management Form PMD-9).

1.05 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to the County.

B. Statement shall reflect all adjustments to the Contract Sum:

1. The original Contract Sum.
2. Additions and deductions resulting from:
    a. Previous Change Orders
    b. Unit Prices
    c. Penalties and Bonuses
    d. Deductions for Liquidated Damages
    e. Other Adjustments

3. Total Contract Sum, as adjusted.
4. Previous payments.
5. Sum remaining due.

C. Project Management shall prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.06 FINAL APPLICATION FOR PAYMENT

Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01710 CLEANING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Execute cleaning during progress of the work and at completion of the work, as required by the General Conditions.

1.02 DISPOSAL REQUIREMENTS

Conduct cleaning and disposal operations to comply with all Federal, State and Local codes, ordinances, regulations and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

A. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulation of waste materials, rubbish and wind-blown debris, resulting from construction operations.

B. Provide on-site containers for the collection of waste materials, debris and rubbish.

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

C. Prior to final completion or County occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire work is clean.

END OF SECTION

SECTION 01720 PROJECT RECORD DOCUMENTS

PART 1 STANDARDS

1.01 MINIMUM RECORD DRAWING STANDARDS FOR ALL RECORD DRAWINGS SUBMITTED TO MANATEE COUNTY

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 County.

B. Record drawings shall meet the criteria of these specifications and the latest edition of Manatee County Public Works Standards, Part I Utilities Standards Manual.

PART 2 STANDARDS

2.01 REQUIREMENTS INCLUDED

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

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. County'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 County.

2.03 MARKING DEVICES

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

2.04 RECORDING DRAWINGS PREPARATION

A. Record information concurrently with construction progress.

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

C. Record drawings shall be legibly produced to record actual construction. It shall minimally include the following:

1. The Cover Sheet shall include a list of all contractors/subcontractors that performed work to complete the project and their specific role(s).
2. Record drawings shall have a revision note such as “Record Drawing” in the revision block and a date corresponding to the date the record drawing was issued.
3. Record drawing notes shall be notably bold, italicized, or boxed ([X]) to identify them as record information.
4. The drawing scales used in the record drawings shall be the same as were used in the construction drawings, and the sheet number of each record drawing sheet shall be the same as the sheet numbers that were used on the construction drawings from which the record drawings originate. If additional sheets need to be added shall be numbered with a letter following the preceding sheet number: a sheet added between sheet 4 and 5 would be labeled 4a.
5. All plan, profile, and detail sheets that were used to depict locations and elevations of utility structures in the construction drawings shall be included in the record drawing set.
6. Record drawings shall accurately depict all existing improvements within the immediate vicinity of the constructed utilities. Existing improvements shall include, but not be limited to:
    1. Sidewalks, walls, fences, road surfaces, buildings, and other utilities,
    2. Areas within utility easements and areas within rights of way,
    3. Areas within 15 feet of potable water mains, reclaimed water mains, sanitary force mains, and gravity sewer mains,
    4. Areas within 10 feet of potable water meters, reclaimed water meters, backflow prevention assemblies, and fire hydrants.
7. Rights of way, easements, and property corners shall be shown and shall be of sufficient detail as to determine if the constructed utilities are within the easements or rights of way. A reference to the recording document (O.R. Book or Plat Book and Page) shall be included with any depiction of a right-of-way or easement. O.R. Book or Plat Book and Page are not required to be shown on the record drawings of a project for proposed rights of way or proposed easements that will be identified on the proposed final plat for the said project.
8. Each roadway depicted on the drawings shall have the correct roadway name noted on it.
9. Horizontal locations required for valves, fittings, services, and other utility structures shall be to the center of each installation.
    a. Horizontal locations of all features shall be reported to the nearest 0.1 feet.
10. Vertical elevations of required valves, fittings, services, and other utility structures shall be reported as follows:
    a. Top of ground or pavement elevations required along pipelines shall

be reported to the nearest 0.1 feet.

b. Top of pipe elevations shall be to the nearest 0.1 feet.

c. Elevations of manhole rims and manhole pipe inverts shall be reported to the nearest 0.01 feet.

11. Water distribution utility systems, reclaimed water (or irrigation) utility systems, and sanitary sewer collection utility systems shall be located and the locations shall be depicted and noted on the record drawings by Northing and Easting (NAD83 Florida State Planes, West Zone, US Foot), and by Swing-ties, with Elevations relative to established benchmarks. For "single point" installations, swing ties rather than station and offset may be allowed.

12. Elements of the utility systems that shall be located and noted by State Plane Northing and Easting and Swing-ties:

    a. water services (center of meter or meter box),

    b. reclaimed water (or irrigation) services (center of meter or meter box),

    c. backflow prevention assembly (directly beneath the assembly),

    d. other miscellaneous utility structures with features at or above the surface of the ground.

13. Elements of the utility systems that shall be located and noted by State Plane Northing and Easting, Swing-ties, and Elevation:

    a. center of valve cover lids,

    b. top of nut elevation,

    c. center of sanitary sewer manhole covers (top of rim for elevations),

    d. center of lift stations along with quadrant points of round tops / corners of rectangular tops (top of slab for elevations),

    e. center of above-ground valve assembly slab, along with corners of slab (top of slab for elevation),

    f. bottom center elevation of the lowest control panel cabinet,

    g. all fittings, including water and reclaimed water service saddles,

    h. center of sanitary sewer service clean-out cover (invert of 45° wye that is located directly below the clean-out cover for elevation),

    i. center of fire hydrants, (center of 5-inch Storz connection nozzle for elevation).

14. At locations where a top-of-pipe elevation is required for pipeline, a top-of-ground or top-of-pavement elevation shall also be measured and noted on the drawings.

15. Elements of the utility systems that shall be located and noted by elevation only: sanitary sewer manhole inverts of individual sewer pipes where they enter and exit the manhole.

16. On record drawings, the actual positions of the pipelines or structures shall be measured, and they shall be depicted in their actual installed positions on the record drawings in all plan and profile views.

17. Record information shall include:

    a. A thorough description of the pipes and all appurtenances that have been installed, including type of material or casing, size, class, diameter ratio, and other basic information, i.e., 45° Bend DI, or 6"

PVC (DR18), etc.).

b. The recalculated slopes of gravity sewer mains, based on the record survey of manhole inverts and lengths of pipes. Rounding up shall not be allowed.

c. A bold notation shall be placed on each sheet, near the title block, indicating the status of the electrically detectable path marking tape and/or tracer wire installations. “Electrically detectable path marking tape and tracer wire were installed and successfully tested”; and/or “No electrically detectable path marking tape was required”; and/or “No tracer wire was required.” The notation shall also include the date of the successful test”

d. For new valves, the manufacture type (as in gate, plug, etc.), size (pipe nominal diameter) and make (manufacturer) of each valve shall be noted on the record drawings.

e. Pipelines shall be dimensioned every 200 feet (measured along the centerline) or alternate lot lines, whichever is closer, from the right-of-way to the centerline of the facility.

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

g. Details not on original contract drawings.

h. Equipment and piping relocations.

i. 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.

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

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

l. 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.

18. If applicable, Lift station control and equipment elevations that were shown on the original construction drawing lift station detail sheet shall be measured and the record survey elevations shall be shown on the record drawing revision of the detail sheet. Record pump information, including pump make, model, year of manufacture, serial number, impeller diameter, voltage, horsepower and speed, shall be shown on the record drawing revision of the lift station detail sheet.

19. Also included shall be the “Lift Station Start-up Information Sheet” provided by the pump manufacturer shall be included in the record drawings.

20. Horizontal Directional Drilling (HDD) and Jack-and-Bore locations and elevations shall be shown on the Record Drawing. The Surveyor shall locate the beginning, ending and the surface tracking locations of the driller’s log readings, and these locations shall be indicated on the record drawings. The HDD Contractor shall provide a certified report and bore log indicating the horizontal and vertical location at least every 25 lineal feet along the pipe. The horizontal locations on the bore log shall also indicate the location per the stationing of the construction baseline. The information provided by the HDD Contractor shall be depicted on the Record

Drawing and identified as having been provided by the HDD Contractor.

21. Abandoned infrastructure shall also be depicted as record information and noted as "abandoned".

22. Each sheet of the record drawings shall have the title "RECORD DRAWING" printed on it in large, bold lettering, near the title block. Each sheet shall also have the words "COUNTY MAINTAINED - WATER", "-SEWER" and/or "- RECLAIMED", or "PRIVATELY MAINTAINED - WATER", "- SEWER", and/or "-RECLAIMED" in large, bold lettering near the title block, and shall clearly define the separation between Public and Private via a text box with a leader arrow.

23. Every set of record drawings shall have a cover sheet with a vicinity map, which shows where the project is located, and the address of the property.

24. Computer drawing files submitted shall be AutoCAD 2016 or later release date versions. All CAD files and referenced CAD files, fonts, plot styles, etc. used to create the signed and sealed record drawings shall be provided and are required to be included in the submitted digital files. Computer drawing files' format submitted shall be compatible with the County's current version of AutoCAD, shall be in a .DWG format only, and shall be Windows 10 compatible. (*Tip: Use the e-transmit function of the AutoCad program.)*

25. Properly prepared record drawings on mylar, together with two copies, 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 County.

D. Monumentation Requirements:

1. Record information within the right-of-way shall be referenced by State Plane coordinates and swing-ties.

2. A minimum of one on-site benchmark shall be described including datum. All benchmarks shall be based upon NAVD88. All record drawings shall be in NAVD88.

3. All locations and elevations shall be field located by or under the direct supervision of a Florida Licensed Surveyor and Mapper.

E. Certification Requirements:

1. Record Drawings shall be certified by a Florida Licensed Surveyor and Mapper. The certification shall state that the Record Locations and Elevations depicted on the Record Drawing are true and correct and were collected in the field by the Surveyor and Mapper or by a representative under the direct supervision of the Surveyor and Mapper.

2. Record Drawings shall be certified by the Engineer-of-Record. The certification must state that the improvements have been constructed in substantial conformance with the approved plans.

3. All visible record features, including sewer inverts, must be measured and located by the Surveyor or by personnel under his or her direct supervision. The certifying Surveyor shall be fully responsible for the accuracy of the record locations and elevations shown on the record drawings. However, the Surveyor may include statements on the record drawings indicating the following:

   a. With the exception of the beginning, ending and the surface locations of the Horizontal Directional Drilling (HDD) log readings, the Horizontal Directional Drilling (HDD) locations and elevations provided by the HDD Contractor have not been field verified.

   b. State Plane coordinates and offset of pipe fittings are based on PVC

pipe markers or 2" x 4" markers inserted by the Contractor on the top of pipe fittings.

c. State Plane coordinates and elevation of potable water mains, reclaimed water mains, and sanitary force mains are based on PVC pipe markers or 2" x 4" markers inserted by the Contractor on the top of pipe.

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

1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
2. Changes made by field order or by change order.

G. 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 County. 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), as stipulated by the Land Development Ordinance and submitted on signed and sealed paper drawings, signed and dated mylar drawings together with AutoCAD drawings. Computer drawing files submitted shall be AutoCAD 2016 or later release date versions. All CAD files and referenced CAD files, fonts, plot styles, etc. used to create the signed and sealed record drawings shall be provided and are required to be included in the submitted digital files. Computer drawing files' format submitted shall be compatible with the County's current version of AutoCAD, shall be in a .DWG format only, and shall be Windows 10 compatible.

C. 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 his authorized representative.

Note: The data required to properly prepare these record drawings shall be obtained at the site, at no cost to the County 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

SECTION 01730 OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Compile product data and related information appropriate for County's maintenance and operation of products furnished under Contract.

B. Prepare operating and maintenance data as specified in this and as referenced in other pertinent sections of Specifications.

C. Instruct County's personnel in maintenance of products and equipment and systems.

D. Provide three (3) sets of operating and maintenance manuals for each piece of equipment provided within this Contract.

1.02 FORM OF SUBMITTALS

A. Prepare data in form of an instructional manual for use by County's personnel.

B. Format:

1. Size: 8-1/2 inch x 11 inch
2. Paper: 20 pound minimum, white, for typed pages
3. Text: Manufacturer's printed data or neatly typewritten
4. Drawings:
    a. Provide reinforced punched binder tab, bind in with text.
    b. Fold larger drawings to size of text pages.
5. Provide fly-leaf for each separate product or each piece of operating equipment.
    a. Provide typed description of product and major component parts of equipment.
    b. Provide indexed tabs.
6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List the following:
    a. Title of Project.
    b. Identity of separate structures as applicable.
    c. Identity of general subject matter covered in the manual.

C. Binders:

1. Commercial quality three-ring binders with durable and cleanable plastic covers.
2. Maximum ring size: 1 inch.
3. When multiple binders are used, correlate the data into related consistent groupings.

1.03 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit three copies of complete manual in final form.

B. Content for each unit of equipment and system, as appropriate:

1. Description of unit and component parts.

a. Function, normal operating characteristics and limiting conditions.
b. Performance curves, engineering data and tests.
c. Complete nomenclature and commercial number of replaceable parts.

2. Operating Procedures:
   a. Start-up, break-in, routine and normal operating instructions.
   b. Regulation, control, stopping, shut-down and emergency instructions.
   c. Summer and winter operating instructions.
   d. Special operating instructions.
3. Maintenance Procedures:
   a. Routine operations.
   b. Guide to "trouble-shooting".
   c. Disassembly, repair and reassembly.
   d. Alignment, adjusting and checking.
4. Servicing and lubricating schedule.
   a. List of lubricants required.
5. Manufacturer's printed operating and maintenance instructions.
6. Description of sequence of operation by control manufacturer.
7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
   a. List of predicted parts subject to wear.
   b. Items recommended to be stocked as spare parts.
8. As installed control diagrams by controls manufacturer.
9. Each contractor's coordination drawings.
   a. As installed color coded piping diagrams.
10. Charts of valve tag numbers, with location and function of each valve.
11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
12. Other data as required under pertinent sections of specifications.

C. Content, for each electric and electronic system, as appropriate:

1. Description of system and component parts.
   a. Function, normal operating characteristics and limiting conditions.
   b. Performance curves, engineering data and tests.
   c. Complete nomenclature and commercial number of replaceable parts.
2. Circuit directories of panelboards.
   a. Electrical service.
   b. Controls.
   c. Communications.
3. As-installed color coded wiring diagrams.
4. Operating procedures:
   a. Routine and normal operating instructions.
   b. Sequences required.
   c. Special operating instructions.
5. Maintenance procedures:
   a. Routine operations.
   b. Guide to "trouble-shooting".
   c. Disassembly, repair and reassembly.
   d. Adjustment and checking.
6. Manufacturer's printed operating and maintenance instructions.
7. List of original manufacture's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.

8. Prepare and include additional data when the need for such data becomes apparent during instruction of County's personnel.

D. Prepare and include additional data when the need for such data becomes apparent during instruction on County's personnel.

E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

1.04 SUBMITTAL SCHEDULE

A. Submit one copy of completed data in final form fifteen days prior to substantial completion.

1. Copy will be returned after substantial completion, with comments (if any).

B. Submit two copies of approved data in final form. Final acceptance will not be provided until the completed manual is received and approved.

1.05 INSTRUCTION OF COUNTY'S PERSONNEL

A. Prior to final inspection or acceptance, fully instruct County's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.

B. Operating and maintenance manual shall constitute the basis of instruction.

1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01740 WARRANTIES AND BONDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Compile specified warranties and bonds.

B. Compile specified service and maintenance contracts.

C. Co-execute submittals when so specified.

D. Review submittals to verify compliance with Contract Documents.

E. Submit to County for review and transmittal.

1.02 SUBMITTAL REQUIREMENTS

A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.

B. Number of original signed copies required: Two each.

C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.

1. Product or work item.
2. Firm, with name of principal, address and telephone number.
3. Scope.
4. Date of beginning of warranty, bond or service and maintenance contract.
5. Duration of warranty, bond or service maintenance contract.
6. Provide information for County's personnel:
   a. Proper procedure in case of failure.
   b. Instances which might affect the validity of warranty or bond.
7. Contractor, name of responsible principal, address and telephone number.

1.03 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size 8-1/2 inch x 11 inch punched sheets for standard 3-ring binder. Fold larger sheets to fit into binders.
2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List the following:
   a. Title of Project.
   b. Name of Contractor.

C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.04 TIME OF SUBMITTALS

A. Make submittals within ten days after date of substantial completion and prior to final request for payment.

B. For items of work, where acceptance is delayed materially beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.05 SUBMITTALS REQUIRED

A. Submit warranties, bonds, service and maintenance contracts as specified in respective sections of Specifications.

B. Approval by the County of all documents required under this section is a pre-requisite to requesting a final inspection and final payment

PART 2 PRODUCTS (NOT USED)

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

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

2.01 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 wetwells 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 County. 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 and including a new valve, shall be installed. Pipe restraint devices, if required, 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 County. 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 County, 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 in the course of making alterations and additions shall remain the property of the County, except that items not salvageable, as determined by the County, 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 County 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

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 County Inspector must be present for all tie-ins for a visual inspection.

3.03 REMOVAL AND ABANDONMENT OF ASBESTOS CEMENT PIPE AND APPURTENANCES

A. All work associated with the removal or abandonment of existing asbestos cement pipe and appurtenances shall be performed by a licensed asbestos removal Contractor registered in the State of Florida.

B. The asbestos Contractor shall contact the appropriate regulatory agencies prior to removal or abandonment of any asbestos material and shall obtain all required permits and licenses and issue all required notices. The cost for all fees associated with permits, licenses and notices to the governing regulatory agencies shall be borne by the asbestos Contractor.

C. All work associated with removal or abandonment of asbestos cement pipe and appurtenances shall be performed in accordance with the standards listed below and all other applicable local, State, or Federal standards.

(1) Florida Administrative Code, Chapter 62-257, ASBESTOS PROGRAM
(2) Title 40 CFR, Part 61, Subpart M, NATIONAL EMISSION STANDARD FOR ASBESTOS
(3) Occupational Safety and Health Act, Title 29 CFR
(4) Title 40 CFR, Part 763, ASBESTOS
(5) Florida Statute Title XXXII, Chapter 469, ASBESTOS ABATEMENT

D. All asbestos cement pipe sections indicated on the construction drawings to be removed, and all related tees, valves, fittings and appurtenances shall be removed in their entirety and disposed of by the asbestos Contractor in accordance with this Section. Asbestos cement nipples between tees and valves shall be replaced. After removal of the pipelines, all excavations shall be backfilled in accordance with the applicable provisions of the Trenching and Excavation Section of these Standards. The cost of disposing of the removed materials shall be borne by the asbestos Contractor.

E. The cutting of existing asbestos-cement (A/C, a.k.a. "Transite") pipe shall be by hand tools only. No powered machine cutting is allowed. Removal of all fragments of pipe shall be double bagged prior to shipment. Longer sections of pipe removed may be shipped without double bagging. An asbestos manifest form must accompany each shipment of such pipe or pipe material waste to the Manatee County Lena Road Landfill. Prior to each shipment,

a minimum of 24 hours notice to the Landfill field office (telephone (941) 748-5543) is required.

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 nonshrinking 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 with grout or slurry. 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 County shall be given at least 2 day notice so that the County'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 County 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 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 County.

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 MANHOLE

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

B. A new channel shall be formed in the manhole base by removing and reforming or by providing new concrete to convey the new flow into the existing channel in accordance with the standard requirements for new sewer manhole structures. Flow direction shall not change by more than 90 degrees within the manhole base.

C. Repair internal coating of existing manholes cored during connection of new sewers by applying approved coating material as listed in the County's Approved Products List in accordance with the manufacturer's recommendations. If the existing manhole is lined with a non-conforming liner, sandblast the interior of the existing manhole and apply an approved coating in accordance with the manufacturer's recommendations.

D. When connecting a force main to an existing manhole, the force main termination manhole and the next two manholes downstream shall be rehabilitated and lined with a liner listed in the County's Approved Products List . If the existing manholes are lined with a non-conforming liner, the existing liner shall be removed and replaced, unless otherwise noted on the plans or with written approval by the County.

END OF SECTION

SECTION 02100 SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section covers general site preparation such as, clearing, grubbing, stripping of the project site and/or along the pipeline route, grading, dust abatement, etc.

B. The Contractor shall clear and grub all of 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 County prior to the beginning of any clearing.

C. The Contractor's attention is directed to any Soil Erosion and Sediment Control Ordinances enforced in Manatee County. The Contractor shall comply with all applicable sections of these ordinances.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CLEARING

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 County. Clearing operations shall be conducted so as to prevent damage to existing structures and installations and to those under construction, so as 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 County requirements.

3.02 GRUBBING

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

In areas so designated, topsoil shall be stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. The County shall have the option to receive all excess topsoil materials. The Contractor shall pay all equipment and labor cost to deliver excess top soil material to a remote site chosen by the County within a five mile radius of the construction site. Should the County not choose to receive any or all excess topsoil materials, the Contractor shall dispose of said material at no additional cost to the County.

3.04 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

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.

3.04 DUST ABADEMENT

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

3.05 PRESERVATION OF TREES

Those trees which are not designated for removal by the County 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 County 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 County.

3.07 PRESERVATION OF PUBLIC PROPERTY

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 County.

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 County.

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 County. 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 County.

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

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

2.03 UNSUITABLE MATERIAL

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 County.

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 County.

C. All material excavated shall be placed so as 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 County who will make an inspection of the excavation. No concrete or masonry shall be placed until the excavation has been approved by the County.

C. The elevations of the footing bottom and the base slab as shown on the Drawings, shall be considered as approximate and the County 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 County, 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 County 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 County 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 County 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 County 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 County 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 County.

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 County. The Contractor shall securely tamp the backfill with pneumatic rammer around all wall foundations. The method of compaction shall be satisfactory to the County.

D. Compaction of structural backfill by ponding and jetting may be permitted when, as determined by the County: 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 County, 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 County.

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 County.
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 his own subsurface investigations and take into consideration all conditions that may affect his 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 County. 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 County. During the progress of the work, the County 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 he deems it desirable for his 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 County. 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 his own expense so as to provide the necessary clearances and dimensions.

5. Drawings of the cofferdams and design computations shall be submitted to the County 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. Where required, the Contractor shall provide a minimum of two operating groundwater observation wells at each structure to determine the water level during construction of the pipeline or structure. Locations of the observation wells shall be at structures and along pipelines as approved by the County prior to their installation. The observation wells shall be extended to 6 inches above finished grade, capped with screw-on caps protected by 24" x 24" wide concrete base and left in place at the completion of this Project.

7. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the County 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.

8. As part of his 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.

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

10. 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 as fill and backfill shall be described below and shall be from an FDOT certified pit. For each material, the Contractor shall notify the County of the source of the material and shall furnish the County, 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. Wood for shoring and sheeting shall be green, rough cut hardwood planking.

D. 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.

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

F. 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 County, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials by the Contractor.

G. 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 soils 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 in the bottom of the trench immediately below the middle third of the pipe diameter, and place the pipe upon it. 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. Soils that were over-excavated due to rocky, soft or otherwise unsuitable soil foundation conditions shall also be replaced with Selected Common Fill. 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. Pipe sections for gravity flow systems shall be laid with spigots downstream and bells upstream. 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. 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. 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.

J. Backfill compaction tests shall be performed every 500 feet in pipe line trenches and for every utility structure. Test reports shall be presented to the County Inspector.

3.03 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 County 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 County 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 County 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.

3.04 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 County 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 County, 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 County 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 his own convenience; due to failure in properly dewatering the trench; disturbs the subgrade before dewatering is sufficiently complete; he shall be directed by the County to excavate below grade. 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 02260 FINISH GRADING

PART 1 GENERAL

1.01 WORK INCLUDED

A. The Contractor shall finish grade sub-soil.

B. The Contractor shall cut out areas to receive stabilizing base course materials for paving and sidewalks.

C. The Contractor shall place, finish grade and compact top soil.

1.02 PROTECTION

A. The Contractor shall prevent damage to existing fencing, trees, landscaping, natural features, bench marks, pavement and utility lines. Damage shall be corrected at no cost to the County.

PART 2 PRODUCTS

A. Topsoil: Shall be friable loam free from subsoil, roots, grass, excessive amount of weeds or other organics, stones, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. The Contractor may use topsoil stockpiles on site if they conform to these requirements.

PART 3 EXECUTION

3.01 SUB-SOIL PREPARATION

A. The Contractor shall rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Uneven areas and low spots shall be eliminated. Debris, roots, branches or other organics, stones, and sub-soil shall be removed by the Contractor and disposed of in a manner consistent with the latest Manatee County Standards as well as any affected regulatory agency. Should contaminated soil be found, the Contractor shall notify the County.

B. The Contractor shall cut out areas to sub-grade elevation to stabilize base material for paving and sidewalks 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.

C. The Contractor shall bring sub-soil to required profiles and contour graces gradually; and blend slopes into level areas.

D. The Contractor shall slope the structure grade a minimum of two (2) inches in ten (10) feet unless indicated otherwise on the Drawings.

E. The Contractor shall cultivate sub-grade to a depth of 3 inches where the topsoil is to be placed. He shall repeat cultivation in areas where equipment use has compacted sub-soil.

F. The Contractor shall not make grade changes which causes water to flow onto adjacent

lands.

3.02 PLACING TOPSOIL

A. The Contractor shall place topsoil in areas where seeding, sodding and planting is to be performed. He shall place from the following minimum depths, up to finished grade elevations:

1. 6 inches for seeded areas
2. 4-1/2 inches for sodded areas
3. 24 inches for shrub beds
4. 18 inches for flower beds

B. The Contractor shall use topsoil in a dry state as determined by the County. He shall place the material during dry weather.

C. The Contractor shall use fine grade topsoil eliminating rough and low areas to ensure positive drainage. He shall maintain levels, profiles and contours of the sub-grades.

D. The Contractor shall remove stone, roots, grass, weeds, debris, and other organics or foreign material while spreading the material.

E. The Contractor shall manually spread topsoil around trees, plants and structures to prevent damage which may be caused by grading equipment.

F. The Contractor shall lightly compact and place the topsoil.

3.03 SURPLUS MATERIAL

A. The Contractor shall remove surplus sub-soil and topsoil from site at his expense.

B. The Contractor shall leave stockpile areas and entire job site clean and raked, ready for landscaping operations.

END OF SECTION

SECTION 02276 TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

A. The work specified in this Section consists of the design, provision, maintenance and removal of temporary erosion and sedimentation controls as necessary.

B. Temporary erosion controls include, but are not limited to: grassing, mulching, netting, watering, and the reseeding of on-site surfaces and spoil and borrow area surfaces, interceptor ditches at ends of berms and other such work at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the County.

C. Temporary sedimentation controls include, but are not limited to: silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which shall ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the County.

D. The Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

1.02 REFERENCE DOCUMENTS

A. Florida Building Code.

B. FDEP/COE Dredge and Fill Regulations and/or Permit as applicable.

C. SWFWMD Permit Regulations and/or Permit as applicable.

D. Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual.

PART 2 PRODUCTS

2.01 EROSION CONTROL

A. Netting - fabricated of material acceptable to the County.

B. Seed and sod.

2.02 SEDIMENTATION CONTROL

A. Bales - clean, seed free cereal hay type.

B. Netting - fabricated of material acceptable to the County.

C. Filter stone - crushed stone conforming to Florida Dept. of Transportation specifications.

D. Concrete block - hollow, non-load-bearing type.

E. Concrete - exterior grade not less than one inch thick.

PART 3 EXECUTION

3.01 EROSION CONTROL

A. Minimum procedures for grassing shall be:

1. Scarify slopes to a depth of not less than six inches and remove large clods, rock, stumps, roots larger than 1/2 inch in diameter and debris.
2. Sow seed within twenty-four (24) hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.
3. Apply mulch loosely and to a thickness of between 3/4-inch and 1-1/2 inches.
4. Apply netting over mulched areas on sloped surfaces.
5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.

3.02 SEDIMENTATION CONTROL

A. The Contractor shall install and maintain silt dams, traps, barriers, and appurtenances as shown on the approved descriptions and working drawings. Deteriorated hay bales and dislodged filter stone shall be replaced by the Contractor at his expense.

3.03 PERFORMANCE

A. The Contractor, at his own expense, shall immediately take whatever steps are necessary to correct any deficiencies of the temporary erosion and sediment control measures employed if they fail to produce results or do not comply with the requirements of the State of Florida or any other federal, governmental or regulatory agency.

END OF SECTION

SECTION 02590 WATER SERVICES ON PRIVATE PROPERTY

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals necessary for complete installation of potable water services for and on the lots identified on the Drawings when authorized by the County and Property Owner. The Contractor shall construct water service lines on private property from the proposed County meter to a connection point within the customer's water system. In addition, the Contractor shall remove the existing water meter and box assembly and cap and abandon the existing water service at the service line, or as directed by the County. Backflow Preventers and associated Thermal Expansion Tanks and vacuum breakers on all outside hose bibs shall be installed by the Contractor where cross connection risks are present, as required by the applicable County Ordinances and Plumbing Codes. Installation of Expansion Tanks will often require the Contractor to access inside existing buildings and coordinate work and timing with individual property owners.

Per LDC Section 802.6.A.4.d, all new and replacement water supply systems in the 100 year floodplain shall be located and designed to have a backflow prevention device (BPD) required for all systems connected to the Manatee County Public Water Supply.

a. The BPD device required will be per the Manatee County Cross Connection Control Code. (The BPD shall be a dual check device if flood is the only potential hazard present. If other potentially hazardous conditions exist (irrigation system, reclaimed water, swimming pool, other potential water source, etc.) then BPD shall be a reduced pressure device.)
b. All commercial properties require a BPD.
c. Residential properties constructed after 1987 that have an identified potential hazard shall have the appropriate BPD.
d. Residential properties constructed in 1987 or prior, that have pulled a permit for plumbing or a pool after 1987, and have an identified potential hazard shall have an appropriate BPD.
e. Residential properties that do not have a potential hazard will not be required to have a BPD.

1.02 GENERAL

A. The work shall include furnishing and installing a pipe, fittings, valves, and appurtenances necessary to convey water from the customer's water meter at the property line to the house service connection, including restoration of all lawns, drives, walkways, plants, customer private property, and other activities necessary to restore the site to a condition equal to or better than that which existed prior to construction. The Contractor shall carefully examine the Drawings and shall be responsible for the proper fittings of materials and equipment in each building and on each lot or site. All work shall comply with local code requirements.

B. Plumbing fixtures, devices and pipe shall be installed in such a manner to prohibit a cross connection or interconnection between a potable water supply and a polluted supply. The plumbing installation shall further prohibit the backflow of sewage, polluted water, or waste into the water supply system. The Contractor shall install vacuum breakers on all outside hose bibs where backflow preventers are required.

C. Required materials not covered by the Specifications shall meet the requirements of the local Plumbing Code, other applicable State and Local Ordinances and Codes, the AWWA, NSF, and shall conform to accepted plumbing practice.

D. The Contractor shall coordinate all work called for in the Contract Documents with the County Meter Superintendent and other involved parties, and shall establish a work plan to install the new water service lines which results in minimal impact to customer private property.

E. All work on customer service lines conducted on private property shall be performed by a plumber licensed in Manatee County and experienced in furnishing and installing potable water plumbing systems.

F. Upon completion of water service construction on private property, the Contractor shall obtain a Building Department inspection and approval to place the system into operation.

G. Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. Upon completion of all work, the fixtures, materials and equipment shall be thoroughly cleaned, adjusted and operated.

1.03 SUBMITTALS

A. The Contractor shall submit to the Engineer for review and approval in accordance with the Contract Documents: complete shop drawings, working drawings, and product data for all materials and equipment furnished under this Section. The Contractor shall meet with each property owner to coordinate the routing of the water service line on private property prior to the commencement of any work and shall document the agreed upon route on a sketch signed and dated by all parties and submit them to the Engineer.

1.04 CODES, ORDINANCES AND PERMITS

A. The Contractor shall comply with all of the laws, ordinances, and codes, rules and regulations of the local and state authorities having jurisdiction over any of the work specified herein. He shall apply and pay for all necessary permits, including Manatee County Building Permits for all lots. Permits at $75 each may be required, with up to 10 adjacent lots on each permit.

B. If any part of the Plans and Specifications conflict with existing laws and codes, the Contractor shall call it to the Engineer's attention prior to the commencement of work.

1.05 GUARANTEE

A. The Contractor shall warrant all labor and materials free from defects for a period of one (1) year from the date of acceptance and shall, upon notification during this period, promptly repair or replace any defective items of material or equipment at no additional cost.

1.06 ACCESSIBILITY

A. The Contractor shall inform himself fully regarding the peculiarities and limitations of the space available for the installation of all material in this Contract.

B. The Contractor is responsible for obtaining access to the private properties identified on the

Drawings. The County will issue notices to the Owners of the Properties requesting their cooperation with the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

A. Refer to latest edition of the Manatee County Utility Standards and the County's Approved Products List for material details. All pipe, fittings, materials, and appurtenances shall be furnished and installed to meet the requirements of this project and the requirements of the Florida Building Code - Plumbing, and Residential Chapter 29 (Water Supply & Distribution).

B. If required by site specific conditions, the Backflow Preventer, Thermal Expansion Tank, and vacuum breakers shall be in accordance with Manatee County Utility Standards, latest edition and are subject to the approval of the Engineer.

C. Water service pipe shall be per Section 02620 of these Specifications.

D. A dielectric coupling shall be provided between ferrous and nonferrous materials.

E. The Contractor shall furnish certified statements from the manufacturer that the material conforms to the requirements specified above.

PART 3 EXECUTION

3.01 PLANNING AND COORDINATION

A. The Contractor shall coordinate with each water customer, property owner and the County Meter Superintendent to establish a reasonable plan and location for installation of each new customer water service line. The Contractor shall perform exploratory work and have all materials in hand at the commencement of construction to reduce the risk of delays in completion of the work associated with lack of materials.

B. The Contractor shall schedule the installation of the new water service lines with County. The Contractor shall carefully schedule the work of subcontractor licensed plumbers to ensure that customer water service disruption is minimized and is not interrupted for longer than the period specified in the Specifications. The Contractor shall schedule the inspection of the work by Manatee County Building officials as necessary to allow for timely use of the new customer service.

C. The County will provide new and/or existing water meters to the Contractor to install in proposed meter boxes. The Contractor shall remove existing meters from meter boxes as part of this Contract, return the meters to the County Meter Division, and shall verify with the County Meter Division which meters shall be reinstalled new and which will be reused. Just prior to removing an existing meter from service, the Contractor shall notify the customer, record the existing meter reading, and record the serial number prior to returning meters to the County meter division.

3.02 PRIVATE WATER SERVICE CONSTRUCTION

A. The Contractor shall install new water service lines at a location on the customer's property that is agreed to by the property owner, minimizes impact to existing site features and private

property improvements and which most directly connects the new water meter location with the connection point for the customers water service.

B. The new water service connection on private property shall include new customer service line from the new meter location to the agreed upon point of connection with the customer house water service line; piping, fittings, valves, and appurtenances, excavation and backfill as required; restoration of grass, shrubs, drives, walkways, and other customer property damaged by construction and related work required to result in a new customer service line system that meets code requirements.

3.03 STERILIZATION

The entire potable water collection and distribution system shall be thoroughly sterilized with a solution of not less than 50 parts per million of available chlorine. The sterilizing solution shall be allowed to remain in the system for a period of three hours after which time all valves and faucets shall be opened and the system shall be flushed with clean water until the residual chlorine content is not greater than 0.92 parts per million, unless otherwise directed.

END OF SECTION

SECTION 02615 DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install ductile iron pipe (DIP) and fittings, complete, as shown on the Drawings and specified in these Standards.

B. Fittings are noted on the drawings for the Contractor's convenience and do not relieve the Contractor from laying and jointing different or additional items where required.

C. The Contractor shall furnish all labor, materials, equipment and incidentals required to install flanged joint, push-on joint, mechanical joint, or restrained joint ductile iron pipe, complete as shown on the Drawings and Specifications.

D. Newly installed pipe shall be kept clean and free of all foreign matter. All DI pipe and fittings installed underground shall be polyethylene wrapped unless noted otherwise on the plans.

1.02 SUBMITTALS

A. The Contractor shall submit to the County, within ten days after receipt of Notice to Proceed, a list of materials to be furnished, the names of the suppliers and the appropriate shop drawings for all ductile iron pipe and fittings.

B. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ductile iron pipe shall conform to AWWA C150 and AWWA C151. Buried pipe shall be push-on mechanical joint, Pressure Class 350 for sizes 4” through 16” and Pressure Class 250 for sizes 18” and larger. All aboveground pipe shall be flanged joint, Special Thickness Class 53. All pipe materials used in potable water systems shall comply with NSF Standard 61.

B. Unrestrained joint pipe shall be either the Fastite or Tyton push-on joint.

C. Rubber gaskets shall conform to AWWA C111. Gaskets shall be Ethylene Propylene Diene Monomer (EPDM) rubber for potable and reclaimed water mains. Acrylonitrile butadiene (NBR) gaskets shall be used for potable and reclaimed 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 and reclaimed water mains that are located in soil that is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons. Fluorocarbon (FKM) gaskets shall be used where both classes of contaminates are found. Gaskets shall be labeled with factory embossed or etched letters stating the gasket material.

D. Thrust restraint devices shall be provided at all bends and fittings, in casings under roads and railroads, and at other locations specifically indicated on the Construction Drawings. Thrust restraint devices shall be either concrete thrust blocks, ductile iron restraining glands, restrained joint rubber gaskets, or restraining locking ring/segments. Refer to Section 02640 of these Specifications for details.

E. Ductile iron pipe shall be supplied in lengths not to exceed 21 ft.

F. Restrained joint rubber gasket material shall be furnished per 2.01C of this Section. The gasket shall have special grade of corrosion-resistant, hardened, series 300 stainless steel locking segments vulcanized into the rubber gasket.

G. Pipe joints shall be restrained both upstream and downstream from valves or fittings at distances as required by these Standards.

H. All mechanical joint fittings shall be pressure rated for 350 psi for sizes 4-16 inches and 250 psi for sizes 18 inches and larger. All flanged fittings shall be pressure rated for 250 psi for all sizes. All fittings shall meet the requirements of AWWA C110 or AWWA C153.

I. Potable and Reclaimed Water Main Coatings:

1. All buried ductile iron pipe shall have a standard thickness cement lining on the inside in accordance with AWWA C104 and a standard 1-mil asphaltic exterior coating per AWWA C151. All aboveground ductile iron pipe shall have a standard thickness cement lining on the inside in accordance with AWWA C104 and have an exterior shop applied epoxy primer.

2. All ductile iron fittings used in potable and reclaimed water systems shall have double the standard thickness cement lining on the inside per AWWA C104. All buried ductile iron fittings shall have a standard 1-mil asphaltic exterior coating per AWWA C151. All aboveground ductile iron fittings shall have an exterior shop applied epoxy primer.

J. Wastewater Force Main Coatings:

1. All ductile iron pipe and fittings shall have a green, factory applied 40-mil dry-film thickness of an amine cured novolac epoxy or a modified polyamine ceramic epoxy interior lining. The interior lining application is to be based on the manufacturer's recommendation for long-term exposure to raw sewage.

2. To ensure a holiday-free lining, documentation must be provided, at time of delivery, showing each section of lined pipe has passed holiday testing at the time of production per ASTM G62, method B (high voltage). The lining shall have a minimum three (3) year warranty covering failure of the lining and bond failure between liner and pipe.

3. A County representative shall have the right to deny any pipe/fitting that shows coating cracks due to improper handling/storage of the pipe/fittings or failure to provide a holiday-free certification letter.

4. Exterior coatings for buried ductile iron pipe and fittings used in wastewater systems shall have a standard 1-mil asphaltic coating per AWWA C151. Aboveground ductile iron pipe and fittings shall have a shop applied epoxy primer.

K. Acceptable pipe sizes for potable and reclaimed water mains are 4" and larger, and 36" and larger for wastewater force mains. All sizes are acceptable for lift station valve and metering assemblies as well as aerial crossings.

L. Refer to the latest edition of the County's Approved Products List for acceptable products.

PART 3 EXECUTION

3.01 HANDLING

A. The Contractor shall take extreme care when handling pipe and fittings to ensure the interior lining does not get damaged during construction. Lined pipe and fittings must be handled only from the outside of the pipe and fittings. No metallic forks, chains, straps, hooks, etc. shall be placed inside the pipe and fittings for lifting, positioning, or laying. The pipe shall not be dropped or unloaded by rolling.

B. Care should be taken not to let the pipe strike sharp objects while swinging or being off loaded. Ductile iron pipe should never be placed on grade by use of hydraulic pressure from an excavator bucket or by banging with heavy hammers.

3.02 DETECTION

A. Pipe shall have a 6-inch wide electronic detectable warning/path marking tape, color-coded per service type, placed directly above the pipe center. The tape shall be placed at least 12 inches below finished grade to a maximum depth of 24 inches below finished grade.

B. The electronic detectable warning/path marking tape shall have detectable markers embedded in the tape and spaced adequately to provide a near continuous path to allow for easy detection at any point along the pipe. The embedded markers shall be spaced every 8-feet along the warning tape. The electronic marking tape shall be supplied per the latest edition of the County's Approved Products List.

B. Tracer wire shall be required for all pipeline construction, except gravity sewer, per Specification Section 02800.

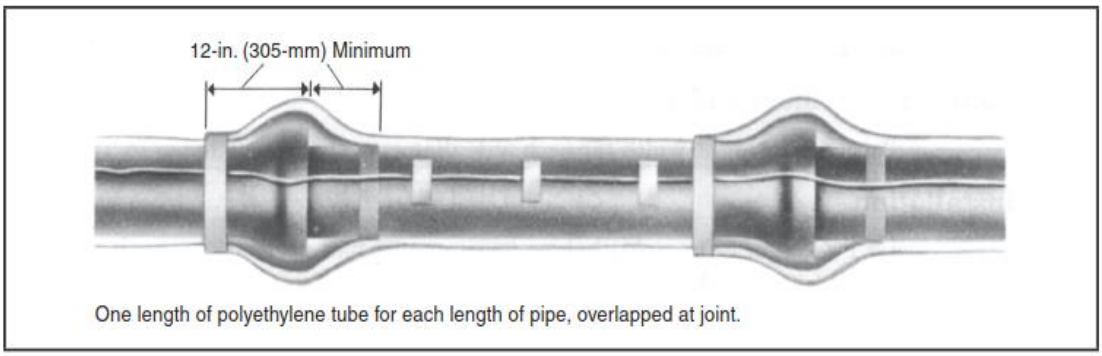
3.03 IDENTIFICATION

A. Each length of pipe and each fitting shall be marked with the name of the manufacturer, size and class, lining type, and shall be clearly identified as ductile iron pipe. All gaskets shall be marked with the name of the manufacturer, size and proper insertion direction.

B. All ductile iron pipe and fittings, appurtenances, and valves shall be entirely polyethylene-tube wrapped blue for potable water mains, purple for reclaimed water mains, or green for sewer mains, per AWWA C105 and sized per manufacturer's recommendations.

C. Contractor shall ensure that no soil or embedment material is trapped between the pipe, fitting, appurtenance, or valves and the polyethylene wrap. The polyethylene film shall be snuggly fitted to the contour of the pipe barrel with sufficient slack to prevent stretching the

polyethylene where it bridges irregular surfaces such as bell-spigot interfaces, bolted joints, or fittings. The tube-form polyethylene should be used with both ends thoroughly sealed with adhesive tape or plastic tie straps at the joints overlap. The wraps shall overlap at the joints as shown below.



One length of polyethylene tube for each length of pipe, overlapped at joint.

D. The polyethylene shall have circumferential wraps of tape placed at 2 ft intervals at the pipe barrel.

E. When it is not practical to wrap valves, tees, crosses, or other odd-shaped pieces in a tube, wrap with a polyethylene flat sheet or split length of polyethylene tube by passing the sheet under the piece and wrap around the body. Make seams by bringing the edge of the polyethylene sheet together, folding them over twice, and taping them.

F. Provide openings in the encasement for branches, service taps, blowoffs, valves, and similar appurtenances by cutting an "X" in the polyethylene and temporarily folding back the film. After the device is installed, tape the slack securely to the appurtenance with tape.

G. Service lines of dissimilar metals shall be wrapped with polyethylene for a minimum clear distance of 3 feet away from the ductile-iron pipe.

H. Polyethylene encasement shall be furnished per the latest revision of the County's Approved Products List.

I. All restrained push-on joint pipe that is restrained with restraining gaskets/locking segments shall have weather-resistant, min. 6 mil thick, 4" wide, solid red PVC marking tape around the polyethylene wrap at the pipe bell to indicate that the joint is restrained.

J. All aboveground piping, fittings, and appurtenances shall be painted Scott Paints safety blue for potable water, Pantone 522C purple for reclaimed water, and Hunter Green (Rustoleum 7538) for pressure sewer.

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 02617.

1.03 DISINFECTING & BACTERIOLOGICAL TESTING OF POTABLE WATER PIPELINES

A. All record drawing requirements must be submitted to the County 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 County 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 County and State. 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.

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 County 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 Manatee County Public Works Engineering Department has provided written acceptance.

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

END OF SECTION

SECTION 02617 INSTALLATION, TESTING, AND CLEANING OF PRESSURE PIPE

PART 1 GENERAL

Reference Section 1.8, Installation of Pipelines in the Manatee County Public Works Utility Standards Part 1-Utility Standards Manual.

1.01 SCOPE OF WORK

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. 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.

C. This work shall include the furnishing and installation of all pig launching and retrieval devices and the appropriate pigs for the cleaning procedure, and all necessary excavations, shutdowns, fittings and valves required.

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 County.

B. The Contractor shall submit to the County 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 County reserves the right to approve or disapprove the Contractor, based on the submitted qualifications.

PART 2 PRODUCTS

2.01 GENERAL

A. All pipe crossing state or federal roads, local arterial, thoroughfares, or railroads shall be installed in a casing pipe (steel, PVC, or HDPE).

B. Potable and reclaimed water mains shall be ductile iron or protected by a casing pipe in the following instances:

1. Mains that are installed under and run parallel with a paved roadway shall be ductile iron only;
2. Mains that cross under more than 48 LF of paved roadway (as measured from outer most edge of pavement to outer most edge of pavement of the entire right-of-way cross-section) shall be in a casing; less than 48 LF shall be ductile iron pipe;
3. Mains that are installed under paved areas, (i.e. parking lots, etc.) shall be ductile iron only;

C. Force mains shall be protected by a casing pipe in the following instances:

1. Mains that cross under more than 48 LF of paved roadway (as measured from outer most edge of pavement to outer most edge of pavement of the entire right-of-way cross-section) shall be in a casing. Mains that cross less than 48 LF shall be determined on a case-by-case basis (i.e. cul-de-sacs, dead-end roads, etc.);

D. 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, sanitary cleanouts, or potable/reclaimed/force main appurtenances such as meters, hydrants, backflow prevention assemblies that is owned and maintained by County. An approved root barrier shall be used where trees are planted closer than 10 feet.

E. All distribution waterlines that enter private property become private lines and shall have a backflow preventer device (BFD) installed at the right-of-way in accordance with Chapter 2-31, Article X of the Manatee County Code of Ordinances. BFD can be part of a meter assembly or a BFD / detector check assembly.

F. 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.

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

H. No line stops shall be used in potable water or reclaimed water mains.

I. Water mains installed on short cul-de-sacs or permanent dead-ends, where future growth is not feasible (or expected), shall be reduced in diameter to 4-inch and/or 2-inch based on the hydraulic needs of the distribution system. On longer cul-de-sacs, the water main shall be reduced to 4-inch and/or 2-inch after the fire hydrant; also based on the hydraulic needs of the distribution systems. In all cases, dead-end mains shall require a manual blow-off assembly.

J. Generally, not more than 4, or the equivalent of 4, residences shall be connected to a 2-inch diameter water line, unless the main is looped or otherwise supplied from two connections with mains of adequate capacities. A looped 2-inch main shall serve no more than 40 residences, or the equivalent water demand of 40 residences. A 2-inch diameter

main shall not exceed 1,000 feet in length.

K. The hydraulic calculations and distribution design shall produce a system that limits the need for constant regular flushing of water to ensure water-quality levels are met. Dead-end public mains, with more than a 4-day water turn-over rate, shall require the installation of a metered blow-off assembly with an auto-flusher. Refer to the latest edition of the County's Approved Product List for acceptable manufacturers.

2.02 INSTALLATION MATERIALS

A. Services under any kind of pavement shall be Polyethylene tubing meeting AWWA C901, Type "K" copper, or Schedule 40 stainless steel pipe encased in minimum 2" diameter SDR 21 PVC or Polyethylene SDR 9 piping conforming to ASTM 2241. Casing shall be color coded blue for potable water or purple for reclaimed water.

B. Ductile iron pipe meeting AWWA C150/151 shall be allowed for potable/reclaimed water mains size 4" and larger. High density polyethylene pipe meeting AWWA C906 shall be allowed for potable/reclaimed water mains size 2" through 12". The use of 16" and larger HDPE pipe for potable and reclaimed water mains shall require written approval by County. PVC pipe meeting AWWA C900-16 shall be allowed for potable/reclaimed water mains sizes 4" through 12". The use of 14" pipe shall require written approval by County.

C. Ductile iron pipe meeting AWWA C150/151 shall be allowed for force mains for pipe sizes 36" and larger. High density polyethylene pipe meeting AWWA C906 shall be allowed for force mains for sizes 4" through 36". PVC pipe meeting AWWA C900-16 shall be allowed for force mains sizes 4" through 36". The use of 14" pipe must be authorized by the County prior to ordering and installation.

D. Proper gasket material shall be supplied as specified in these Specifications depending on soil condition.

2.03 CLEANING 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 SOIL TESTING

A. If instructed by the County, soil testing in accordance with AWWA C105 soil samples shall be collected during the design phase to determine if the soil is corrosive. One (1) soil test shall be performed for pipe lengths under 500 lineal feet, with an additional soil test every 500 lineal feet of additional pipe to be installed. The soil testing shall be performed by a Florida licensed geotechnical engineering and signed and sealed report shall be supplied to the County for review prior to installation of the pipe for evaluation. The soil testing results shall be used to determine if additional requirements for the installation of pipe gaskets are required.

3.02 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 damages. 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 County, 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 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.

3.03 INSTALLATION

A. Pipe, fittings, valves and other appurtenances shall be installed in accordance with the manufacturer's written installation instructions and with the provisions of "Recommended Standards for Water Works" report as incorporated by reference in Chapter 62-555, F.A.C., and with the provisions of "Recommended Standards for Wastewater Facilities" report as incorporated by reference in Chapter 62-604, F.A.C.

B. In general, all pressure pipe, (potable water, reclaimed water and force main sewer), shall be designed with no less than three feet of cover, but not more than six feet of cover from final grade, unless otherwise shown on the plans and approved by Utilities.

C. In all cases, all pipe shall be laid to such lines, gradients and levels as shown on the construction drawings. Gravity sewer pipe shall be laid on grade with bell upgrade and spigot downgrade.

D. It is the Contractor's responsibility to preserve uniform gradients and correct alignment. If it is determined the pipe is incorrect in size, level or grade, then all deficiencies shall be corrected.

E. Where shown on the construction drawings, special bends shall be provided for horizontal or vertical changes of direction. Where such bends are not shown on the construction drawings, changes of direction shall be affected by angling the joints.

F. No joint shall be angled to such an extent as to impair its effectiveness and tightness.

G. When making a joint, pipes should always be in line and if required, deflection made after making the joint. The deflection shall not be greater than 75% the maximum value recommended by the pipe manufacturer.

H. Installation Tolerances of Pipe Lines:

1. Direct Bury:
    a. Vertical Alignment = ±0.5 feet
    b. Horizontal Alignment = ±1.0 feet
2. Horizontal Directional Drill (Trenchless Technologies):
    a. Vertical Alignment:
        1) max. slope shall not exceed 2% (2.0 feet within a length of 100 feet).
        2) No reverse curvature within 200 feet
        3) No vertical deviation greater than ten (10) percent of the proposed depth of cover at that specific station.
    b. Horizontal Alignment:
        1) max. rate of deviation shall not exceed 1.5% (1.5 feet within a length of 100 feet
        2) No reverse curvature
        3) Total deviation not to exceed 2.0 feet

I. The trenches and bedding for the pipe installations shall be prepared according to Section 02221, Trenching, Backfill, and Excavation, of these specifications. Pipe sections shall be laid in full contact with the prepared pipe bedding, with bell holes dug out, to provide a continuous and uniform bearing and support for the pipe barrel between joints. Blocking under the pipe shall not be permitted (except through casing sleeves).

J. While laying pipe in gravity sewer installations, the pipe alignment shall not deviate by more than 1/2 inch for line and 1/4 inch for grade, as measured at the pipe inverts at the manhole, from the design line and grade established on the construction drawings, provided that such variance does not result in a level or a reverse sloping pipe invert. Line and grade of gravity sewer pipelines shall be measured at the pipe invert and shall be controlled during installation by laser beam method. Other methods of controlling line and grade may be approved by the County if the laser beam method is shown to be unworkable. A “Caution - Laser Light” placard shall be displayed in a conspicuous place while laser beam pipe laying equipment is in use. Pipe grade between manholes shall not deviate by more than 1 inch from the design grade line, as measured with the television (TV) camera’s depth gauge

during the mandatory pre-acceptance TV inspection, provided that such deviation does not result in a level or a reverse sloping pipe invert.

K. Joining of pipe sections shall be done in strict accordance with the pipe manufacturer's written instructions. The joining surfaces of the bell and spigot and the rubber seal ring shall be thoroughly cleaned and lubricated immediately prior to joining the pipe per the written instructions. After the joint has been made, the pipe alignment shall be checked. Place sufficient compacted backfill material around and over the pipe to secure the pipe from movement before installing the next joint to assure proper pipe alignment and joint makeup.

L. When cutting or machining pipe in the field is necessary, the pipe installer shall use only the tools and methods recommended by the manufacturer in the written instructions. Care shall be taken to not damage the pipe coating or linings. Damage to linings shall be cause for rejections of the complete section of pipe, or for the rejection of a fitting or valve. Damage to exterior coatings shall be corrected to the original standard material specification.

M. At connections to manholes or other concrete structures, the pipe joint shall be located a minimum of 18 inches outside of the edge of the structure.

N. At stub-outs from new structures to future pipelines, the pipe stub-out length shall be the same as the standard pipe length being laid. Stub-out pipes shall be closed off with standard restrained plug or cap fittings.

O. Thrust restraint devices shall be either cast-in-place concrete thrust blocks or other approved restrained joint devices. Cast-in-place concrete for thrust blocks shall have a 28-day strength of 3,000 psi. The concrete shall be placed between undisturbed soil and the fittings or appurtenance to be supported. Concrete shall not be placed on or around the pipe, bells, flanges, or other joints.

P. All ductile iron pipe(s) and fitting(s) shall be protected with a polyethylene encasement, thickness as defined by the Approved Products List.

Q. At all fire hydrant laterals, the lateral pipe from tee to fire hydrant shoe shall have all joints restrained. The lateral shall also be restrained from side movement by concrete thrust blocks placed at the fire hydrant shoe and at the lateral tee.

R. Place and secure a black bag over all fire hydrants not yet placed into service to designate them as such and to serve as a warning that the water is not safe to drink.

3.04 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.

C. A PVC pipe marker or 2" x 4" marker shall be inserted by the Contractor at the beginning and end of each horizontal directional drill (HDD). The HDD Contractor shall provide a certified report and bore log indicating the horizontal and vertical location every 25 linear feet or less along the pipe.

D. A 2" PVC pipe marker with a painted end cap shall be inserted by the Contractor at the ROW line indicating each individual new service location or stub out. The marker shall be a 6 foot length of PVC pipe inserted 2 feet into the ground and shall be painted "safety" blue for potable water, purple for reclaimed water, and green for sewer.

3.05 PROCEDURE FOR TESTING POTABLE WATER, RECLAIMED WATER, AND FORCE MAINS

A. A 48-hour notice to County and Engineer 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. County and Contractor must be present for all testing, except for testing tapping valves and sleeves.

C. HYDROSTATIC TESTING

1. Refer to Manatee County Public Works Part I Utilities Standards Manual Section 1.9.

3.06 INSPECTION/TESTING PROCEDURE COVERING BORED PIPELINES OR CASING AND CONDUITS INSTALLED ACROSS PREVIOUSLY TESTED AND/OR COUNTY 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 Manatee County Utility Operations 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, <u>previously tested water and sewer lines that are still under the ownership of the developer/contractor</u>.

1. Notify the County and obtain the best as-built information available. Allow sufficient time for the County to field locate the existing pipelines.
2. Submit drawings of proposed location to the County and Manatee County Utility Operations Dept. Utility Locations Section for review.
3. Obtain a County Right-of-Way Use Permit if the work area is within a dedicated area of right-of-way.

4. Perform installation in the presence of a County representative. Call (941) 792-8811, ext. 5061 or ext. 5069 with at least two (2) working days notice.
5. Submit two (2) copies of as-built information to the County to incorporate into the record drawings to be submitted to the County.
6. 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 Manatee County:

1. Obtain record drawing information from the County.
2. If roadway has been dedicated to Manatee County, obtain Right-of-Way Use Permit and copy the Project Management Department Locations Section with proposed location drawing.
3. 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 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.

3.07 PIPELINE CLEANING

A. The cleaning of the pipeline shall be done by the controlled and pressurized passage of a polyurethane pig of varying dimensions, coatings and densities as determined by the County 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 County.

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 County. The Contractor shall be responsible for all applicable flushing and disinfection requirements for potable water lines.

J. 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.

K. Inspectors must be notified 48 hours in advance of any pigging and flushing operations. With the County Inspector present, all new pressure mains 4 inches and larger shall be pigged and then flushed. All new pressure mains less than 4 inches shall be flushed to clean all parts of the system and to remove any accumulation of construction debris, rocks, sand, gravel, silt and other foreign material. If necessary, also make use of mechanical rodding or bucketing equipment. Short pipe lengths (i.e. stubs) may be flushed without pigs with prior approval from County.

L. For flushing, a minimum velocity of at least 3.0 ft/sec, preferably 3.5 ft/sec, shall be obtained in the pipe. This velocity shall be maintained long enough to allow three (3) complete pipe volume changes of water for proper flushing action. Successful flushing shall be determined visually by the County Inspector and may be deemed acceptable when the water is clear and free of debris.

3.08 DETECTION

A. Pipe shall have a 6-inch wide electronic detectable warning/path marking tape, color-coded per service type, placed directly above the pipe center. The tape shall be placed at least 12 inches below finished grade to a maximum depth of 24 inches below finished grade.

B. The electronic detectable warning/path marking tape shall have detectable markers embedded in the tape and spaced adequately to provide a near continuous path to allow

for easy detection at any point along the pipe. The embedded markers shall be spaced every 8-feet along the warning tape. The electronic marking tape shall be supplied per the latest edition of the County's Approved Products List.

C. All direct buried pressure potable and reclaimed water, and force main pipelines laid in trenches shall have a continuous, No. 10 gauge solid copper clad wire with minimum 30-mils polyethylene insulation rated UF or USE by Underwriter's Laboratories attached to the pipe. The polyethylene insulation shall be color coded blue (potable water), purple (reclaimed water) or green (sanitary sewer). The wire shall be placed on top of the pipe and secured in place at every joint and at 5 foot intervals with color coded 6 mil thick PVC marking tape.

D. In directional bore applications, one No. 10 gauge extra high strength copper clad steel tracer wire shall be pulled and secured to the top of the pipe with color coded 6 mil thick PVC marking tape or 10-mil thickness polyethylene pressure sensitive tape at every joint and at 24-inch intervals. The tracer wire shall have minimum 45-mil polyethylene insulation rated UF or USE by Underwriter's Laboratories. The polyethylene insulation shall be color coded blue (potable water), purple (reclaimed water) or green (sanitary sewer).

E. Underground splice connections shall be minimized and shall be rated for direct burial service. Spliced tracer wire connections shall be underground water-proof wire connectors meeting UL 486D test standards. The wire shall terminate at fire hydrants, backflow prevention assemblies, and at each meter box with a underground water-proof terminal connector. The wire shall also terminate at valve boxes for gate valves, plug valves, tapping valves, air release valves and blow-off valves. The tracer wire shall also terminate at gate valve boxes that are not located within 200 feet of a fire hydrant, backflow prevention assembly, meter box, plug valve, air release valve or blow-off valve. Meter boxes shall have at least 12 inches of wire looped into the boxes. The looped termination shall allow for the connection of an electronic locator transmitter.

END OF SECTION

SECTION 02622 POLYVINYL CHLORIDE (PVC) PRESSURIZED PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to install AWWA C900-16 PVC piping, fittings and other appurtenances complete and ready for use as indicated on the construction drawings.

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

1.02 DESCRIPTION OF SYSTEM

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

1.03 QUALIFICATIONS

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 County including, but not limited to, dimensions and technical specifications for all piping and fittings.

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

C. The Contractor shall submit and shall comply with 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

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

PART 2 PRODUCTS

2.01 MATERIALS

A. For potable and reclaimed water, Polyvinyl chloride (PVC) pressure pipe, 4-12 inches in diameter, shall be ductile iron pipe size (DIPS), Class 235, DR 18, meeting the requirements of AWWA C900-16. Each length of pipe shall be hydrostatically tested to two times its pressure class of the pipe by the manufacturer in accordance with AWWA C900-16. PVC

pressure pipe shall not be used for potable or reclaimed water mains larger than 12-inch diameter.

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 Manatee County. 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. For grinder pump stations only, Polyvinyl chloride (PVC) pressure pipe, 2-inches in diameter, shall be Pressure Rated 200, SDR21, conforming to ASTM D2241, and shall have Iron Pipe Size (IPS) outside diameters. SDR 21 PVC pipe 2-inches in diameter shall not be used for working pressures greater than 125 psi. PVC pipe shall not be used in applications, which require pipes that are less than 2 inches in diameter for wastewater force mains.

D. 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 F477 and shall be EPDM rubber for potable and reclaimed water pipes. Gaskets shall be labeled with factory embossed or etched letters stating the gasket material. Ductile iron pipe, with gasket materials as required in these standards, shall be used in soil that is contaminated with low molecular-weight petroleum products, aromatic hydrocarbons, chlorinated hydrocarbons or organic solvents.

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 installed at all bends, fittings, in casings under roads and railroads, and at pipe joint locations both upstream and downstream from bends or fittings as required by these Specifications. Thrust restraint devices for standard PVC pipe and fittings shall be either concrete thrust blocks, restraining glands, or self-restraining gaskets.

G. All fittings for pressurized PVC pipe shall be made of ductile iron, with mechanical joints for buried pipe or flanged joints for aboveground pipe, and shall conform to AWWA C110/AWWA C153 and to the applicable sections of these Specifications for ductile iron fittings.

H. All fittings for drop manholes P-Trap pipe assemblies shall be made of PVC, Pressure Class 150, DR 18, and shall conform to AWWA C900-16/ AWWA C907.

I. All pipe materials used in potable water systems shall comply with NSF Standard 61.

J. Refer to the latest edition of the County's Approved Products List for approved products.

PART 3 EXECUTION

3.01 INSTALLATION

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

3.02 DETECTION

A. Pipe shall have a 6-inch wide electronic detectable warning/path marking tape, color-coded per service type, placed directly above the pipe center. The tape shall be placed at least 12 inches below finished grade to a maximum depth of 24 inches below finished grade.

B. The electronic detectable warning/path marking tape shall have detectable markers embedded in the tape and spaced adequately to provide a near continuous path to allow for easy detection at any point along the pipe. The embedded markers shall be spaced every 8-feet along the warning tape. The electronic marking tape shall be supplied per the latest edition of the County's Approved Products List.

B. Tracer wire shall be required for all pipeline construction per Specification Section 02800.

3.03 IDENTIFICATION

A. PVC pipe shall bear identification markings in accordance with AWWA C900-16 or ASTM D2241.

B. PVC pipe shall be color coded blue for water, purple for reclaimed water, or green for sanitary sewer using a solid pipe color pigment.

C. All self-restrained PVC pipe shall have weather-resistant, min. 6 mil thick, 4" wide, solid red PVC marking tape around the pipe bell to indicate that the joint is restrained.

3.04 INSPECTION AND TESTING

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. Refer to Manatee County Public Works Part I Utilities Standards Manual Section 1.9. Prior to testing, the pipe lines shall be supported in a manner approved by the County to prevent movement during tests.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, equipment, materials, pipe and incidentals and shall construct gravity sewers, complete, as shown on the drawings and as herein specified.

B. The work shall include furnishing, laying and testing gravity sewer pipe.

1.02 SUBMITTALS DURING CONSTRUCTION

A. The Contractor shall submit prior to construction, Shop Drawings for approval to the County.

B. The pipe manufacturer shall inspect all pipe joints for out-of-roundness and pipe ends for squareness. The Contractor shall furnish to the County, a manufacturer's Notarized Affidavit stating all pipe meets the requirements of ASTM, ASCE, ANSI, the Contract Documents, as well as all applicable standards regarding the joint design with respect to square ends and out-of-round joint surfaces.

PART 2 MATERIALS

2.01 GENERAL

A. The sizes of gravity sewer pipe shall be shown on the Drawings.

B. Each length of pipe shall bear the name or trademark of the manufacturer, the location of the manufacturing plant and the class or strength classification of the pipe. The markings shall be plainly visible on the pipe barrel.

2.02 POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE

A. Polyvinyl chloride (PVC) gravity sewer pipe and fittings, 4-15 inches in diameter, shall be SDR 26, meeting the requirements of ASTM D3034 and D3212. Joining of pipe sections and fittings shall be by water-tight push-on joints using elastomeric gaskets in accordance with ASTM F477.

B. Polyvinyl chloride (PVC) gravity sewer pipe, 18-54 inches in diameter, shall be DR 25, meeting the requirements of AWWA C900-16. Joining of pipe sections and fittings shall be by water-tight push-on joints using elastomeric gaskets in accordance with ASTM F477.

C. All PVC sewer pipe bell ends shall be field inspected for out-of-roundness and spigot ends shall be field inspected for out-of-roundness and for squareness of the pipe end. Any materials not in conformance with the tolerances of ASTM D3212 or ASTM F477 shall be removed from the work site.

D. All PVC sewer pipe sections shall also be field inspected for excessive cross-section deflection. Any pipe section visually found to have a pipe deflection, before installation, of 2 percent of the Base Inside Diameter or greater shall be removed from the work site. After installation and backfill, pipe deflection shall not be allowed to be 5 percent or greater of the Base Inside Diameter. Any length of pipe found installed having excessive deflection shall be dug up and either reinstalled or removed from the work site.

E. Six inch PVC fittings for sewer laterals shall also be SDR 26, molded in one piece, with elastomeric joints in accordance with ASTM D3034. Fittings not currently available in molded form may be fabricated in accordance with ASTM D3034 with manufacturer's standard pipe bells and gaskets.

2.03 JOINING PVC GRAVITY SEWER AND FITTING

A. The PVC joints shall be of the push-on type with a single rubber gasket conforming to ASTM F477.

B. Wyes and riser fittings shall be gasketed connections. Rubber doughnuts are not to be used.

C. Joints between pipes of different materials shall be made using couplings per the latest edition of the County's Approved Products List. Metal piping shall not be threaded into plastic fittings, valves, or couplings, nor shall plastic piping be threaded into metal valves, fittings, or couplings.

2.04 CLOSED CIRCUIT TELEVISION (CCTV) CAMERA

A. Video inspection shall be performed using National Association of Sewer Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) certified software.

B. Closed Circuit Television Inspection Equipment shall produce a color video.

C. Pipe inspection camera shall be a pan-and-tilt and radial viewing pipe inspection camera that pans a minimum of ± 275 degrees and rotates 360 degrees.

D. A slope indicator shall be included on the camera and accurately calibrated per manufacturer's instructions for measurement of pipe slope.

E. A camera with an accurate footage counter shall be used, which displays on the monitor the exact distance of the camera from the centerline of the starting manhole.

F. The camera will be capable of height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe being televised.

G. Lighting for the camera shall be suitable to allow a clean picture of the entire periphery of the pipe. A reflector in front of the camera may be required to enhance lighting in dark or large diameter pipe.

H. The camera, television monitor and other components of the video system shall be capable of producing a minimum 500-line resolution colored video picture.

PART 3 EXECUTION

3.01 PIPE DISTRIBUTION

The Contractor shall not distribute material on the job faster than it can be used to good advantage. He shall unload pipe, which cannot be physically lifted by workers from the trucks, by a forklift or other approved means. Contractor shall not drop pipe of any size from

the bed of the truck to the ground. Contractor shall not distribute more than one week's supply of material in advance of laying, unless otherwise approved by the County.

3.02 PIPE PREPARATION AND HANDLING

A. The Contractor shall inspect all pipe and fittings prior to lowering them into trench. Cracked, broken, or otherwise defective materials are not acceptable and shall not be used. The Contractor shall clean the ends of the pipe thoroughly. Contractor shall remove foreign matter and dirt from inside of pipe and keep the pipe clean during and after laying.

B. The Contractor shall use proper implements, tools and facilities for the safe and proper protection of the work. Contractor shall lower the pipe into the trench in a manner to avoid any physical damage to the pipe, remove all damaged pipe from the job site and under no circumstances shall the pipe be dropped or dumped into trenches.

3.03 LINE AND GRADE

A. The Contractor shall not deviate more than 1/2-inch for line and 1/4-inch for grade from the line design and design grade established by the County provided that such variation does not result in a level or a reverse sloping invert. Contractor shall measure the grade at the pipe invert and not at the top of the pipe. The Contractor shall furnish, set and control the line and grade by laser beam method. Other methods of controlling line and grade may be submitted to the County for approval if using the laser beam method proves to be impractical because of other conditions.

B. The Contractor shall use the laser beam method of maintaining line and grade. The Contractor shall submit evidence to the County that a qualified operator shall handle the equipment during the course of construction. A "Caution-Laser Light" placard shall be displayed in a conspicuous place. When "in the pipe" method is used, grade boards shall be installed for the first 50 feet of pipe. The Contractor shall check the line and grade at any additional points at which offset stakes have been placed and when requested by the County. A fan shall be provided to circulate the air if bending of the beam due to air temperature variations becomes apparent with "in the pipe" units. However excessive air velocity shall not be permitted to cause pulsating or vibrating of the beam. If, in the opinion of the County, the beam cannot be accurately controlled, this method of setting line and grade shall be discontinued. When the above ground method is used, the set-up shall be checked with the three grade boards including one set at the upstream manhole. If the laser has a gradient indicator, two boards may be used to check the set-up. The grade board at the up-stream manhole shall be retained to check into as pipe laying progresses.

3.04 PREPARATION OF TRENCH

A. The Contractor shall provide pipe bedding material under all the pipe for the full trench width. The minimum depth of bedding material below the pipe barrel shall be as follows:

Pipe Size	Bedding Under Pipe Barrel
15" & Smaller	4 inches
18" to 36"	6 inches
42" & Large	9 inches

B. The depth of pipe bedding material under the pipe bell shall not be less than three inches under normal trench conditions.

C. The Contractor shall hand-grade bedding to proper grade ahead of the pipe laying operation. The bedding shall provide a firm, unyielding support along the entire pipe length.

D. Should the Contractor excavate the trench below the required depth for pipe bedding material placement without direction from the County, the Contractor shall fill the excess depth with pipe bedding material as specified herein to the proper subgrade.

E. The Contractor shall excavate bell holes at each joint to permit proper assembly and inspection of the entire joint.

3.05 DEWATERING

The Contractor shall prevent water from entering the trench during excavation and pipe laying operations to properly grade the bottom of the trench and allow for proper compaction of the backfill. Pipe shall not be laid in water.

3.06 LAYING AND JOINTING PIPE AND FITTINGS

A. The Contractor shall lay pipe upgrade with spigot ends pointing in direction of flow. After a section of pipe has been lowered into the prepared trench, he shall clean the end of the pipe to be joined, the inside of the joint and, if applicable, the rubber ring immediately prior to joining the pipe. The Contractor shall assemble the joint in accordance with the recommendations of the manufacturer of the type of joint used. He shall provide all special tools and appliances required for the jointing assembly.

B. The Contractor shall lay all pipe uniformly to line and grade so that the finished sewer shall present a uniform bore. Variations from line and grade in excess of the tolerances specified under LINE AND GRADE are not acceptable and the work shall be rejected.

C. The Contractor shall check the pipe for alignment and grade after the joint has been made. The pipe bedding shall form a continuous and uniform bearing and support for the pipe barrel between joints. Sufficient pressure shall be applied to the joint to assure that the joint is "home" as defined in the standard installation instructions provided by the pipe manufacturer. The Contractor shall place sufficient pipe cover material to secure the pipe from movement prior to installing the next joint to assure proper pipe alignment and joint makeup.

D. Pipe 21" and smaller intended to be in straight alignment shall be laid so that the inside joint space does not exceed 3/8" in width. If interior joints on 24" and larger pipe laid either in straight alignment or on a curve are greater than 3/8", the Contractor shall thoroughly clean the joint surfaces and fill and seal the entire joint with premixed mortar conforming to ASTM C387 only after the trench has been backfilled, unless otherwise approved by the County. Trowel smooth on the inside surface. Water shall not be allowed to rise in or around, or pass over any joint before it has substantially set.

E. When the Contractor lays pipe within a movable trench shield, he shall take all necessary precautions to prevent pipe joints from pulling apart when moving the shield ahead.

F. The Contractor shall prevent excavated or other foreign material from getting into the pipe during the laying operation. He shall close and lock the open end of the last laid section of pipe to prevent entry of foreign material or creep of the gasketed joints when laying

operations cease, at the close of the day's work, or whenever the workers are absent from the job.

G. The Contractor shall plug or close off the pipes which are stubbed off with temporary plugs.

H. The Contractor shall take all necessary precautions to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.

I. The Contractor shall make connections of non-reinforced pipe to manholes or concrete structures, so that a standard pipe joint is located at a minimum of 18" outside the edge of structure.

J. When field cutting and/or machining the pipe is necessary, the Contractor shall use only tools and methods recommended by the pipe manufacturer and approved by the County.

K. Service lateral shall be constructed by the Contractor as shown on the standard sewer details and located approximately as shown on the Contract Drawings.

3.07 LAYING PLASTIC PIPE

A. Polyvinyl chloride (PVC) pipe shall be installed by the Contractor in accordance with the instructions of the manufacturer, as shown on the Drawings and as called out in the Contract Documents.

B. The Contractor shall lay the pipe, bedding and backfill to lines and grade shown on the Drawings and called out in the Contract Documents. Blocking under the pipe will not be permitted.

C. The Contractor shall use care in the handling, storage and installation of pipe. Storage of pipe on the job site shall be done in accordance with the pipe manufacturer's recommendation.

3.08 BACKFILL IN THE PIPE ZONE

A. The pipe zone shall be considered to include the full width of the excavated trench from the bottom of the trench to a point above the top outside surface of the barrel of the pipe.

B. The Contractor shall pay particular attention to the area of the pipe zone from the flow line to the springline of the pipe to insure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of the pipe zone.

C. The Contractor shall take care to ensure that the pipe does not rest directly on the bell or pipe joint, but is uniformly supported on the barrel throughout its entire length.

D. After the pipe is laid by the Contractor to line and grade, the Contractor shall place and carefully compact pipe bedding material for the full width of the trench to the springline of the pipe. Contractor shall place the material around the pipe in 6-inch layers and thoroughly hand tamp with approved tamping sticks supplemented by "walking in" and slicing with a shovel to assure that all voids are filled.

E. The Contractor shall backfill and carefully compact the area above the pipe springline with pipe cover material to a point 12" above the top outside surface of the pipe barrel. Pipe bedding material may, at the Contractor's option, be substituted for pipe cover material.

3.09 EXCESS TRENCH WIDTH

A. Normal trench widths shall be as shown on the Drawings. If the normal trench width below the top of the pipe is exceeded for any reason, the Contractor shall furnish an adequate support for the pipe. The County may determine that the pipe being used is strong enough for the actual trench width or the Contractor may furnish a stronger pipe or a concrete cradle for approval.

B. Concrete thickness under the pipe shall be one-third of the nominal diameter of the pipe, but not less than four inches. Concrete block or brick may be used for adjusting and maintaining proper grade and elevation of pipe. After the pipe is laid to line and grade, the Contractor shall place 3,000 psi concrete under the pipe for the full width of the trench to form a cradle of the required length and thickness with the concrete brought up to a level equal to 1/4 of the inside pipe diameter below the springline of the pipe. Start and terminate the concrete cradle at the face of a pipe bell or collar. Do not encase pipe joints at the ends of the concrete cradle.

C. After the concrete has taken initial set, the Contractor shall place cover material over the concrete cradle and up to a level 12" above the pipe barrel and for the full width of the trench. Cover material shall be placed by hand or by equally careful means.

3.10 CONNECTING DISSIMILAR PIPE MATERIALS

The Contractor shall use the following method to connect dissimilar pipe materials. Use concrete closure collars only when approved by the County and then only to make connections between dissimilar pipe when standard rubber gasketed joints or shielded couplings are impracticable. Before the closure collars are poured, wash the pipe to remove all loose material and soil from the surface on which the concrete will be placed. Wet nonmetallic pipe thoroughly prior to pouring the collars. Wrap and securely fasten a light gauge of sheet metal or building-felt around the pipe to insure that no concrete shall enter the line. Place reinforcement as shown on the plans. Make entire collar in one pour using 3,000 psi concrete and extend a minimum 12" on each side of the joint. The minimum thickness around the outside diameter of the pipe shall be 6". No collar shall be poured in water. After the collars are poured and have taken their initial set, cure by covering with well-moistened earth.

3.11 PIPE BULKHEADS

A. Connections for future sewers shall be bulkheaded by the Contractor in the following manner:

1. All wyes and bell-and-spigot pipe sewers 18" in diameter or smaller shall be bulkheaded with caps or disc stoppers with factory-fabricated resilient joints. The disk or cap shall be banded or otherwise secured to withstand all test pressures without leakage.

2. Connections 21" and 24" in diameter shall be bulkheaded with a four-inch brick wall, using clay brick or concrete brick. The wall shall be capable of withstanding all test pressures without leakage.
3. Connections 27" in diameter and larger shall be bulkheaded with an eight-inch wall, using clay brick or concrete brick. The wall shall be capable of withstanding all test pressures without leakage.

3.12 AIR TEST FOR GRAVITY SEWERS - GENERAL

A. Gravity sewers shall be required to pass the low pressure air test. All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. Refer to Manatee County Public Works Part I Utilities Standards Manual Section 1.9.

B. Air loss rates may be measured by the County. These tests shall be performed by the Contractor under the observation of the County Inspector.

C. The groundwater height above the installed pipe shall be determined by attaching a transparent plastic tube to a pipe nipple in the manhole and using the plastic tube as a manometer. A test hole may be dug directly above the sewer main for visual inspection.

D. The ends of branches, laterals, tees, wyes and stubs included in a test section shall be plugged to prevent air leakage. All plugs shall be secured to prevent blowout due to internal pressure. A test section is defined as the length of sewer between manholes.

E. The Contractor shall repair all visible leaks in manholes and pipe, even if the leakage test requirements are met.

3.13 CLOSED CIRCUIT TELEVISION (CCTV) INSPECTION OF GRAVITY SEWERS

A. TV inspection of the entire length of the inside of new gravity sewer mains shall be conducted by the Contractor. The County Inspector shall have been notified and shall be present during the TV inspection.

B. The sewer pipelines shall be thoroughly cleaned of all dirt, debris or obstructions before the TV inspection. Water shall be added to the upstream manhole until it is seen flowing from the most downstream point of the system to be inspected

.

C. The Contractor shall provide Manatee County with digital media that includes video and data base file that is compatible with Granite XP in NASSCO PACP format. Compatibility issues with software other than Granite XP latest version are the Contractor’s responsibility.

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

E. Perform CCTV inspection immediately after line cleaning. Before insertion of the camera into the sewer, the camera shall record on video the upstream and downstream manhole asset numbers, pipe size, specific location of the sewer, and the direction in which the camera will travel. The camera shall be moved through the line in either direction at a moderate rate, stopping when necessary to permit proper documentation of the sewer’s condition in audio and documented on the television inspection log.

F. The camera height shall be adjusted so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe being televised.

G. The camera shall not travel at a speed greater than thirty (30) feet per minute. To better understand the flow from each individual lateral (if flowing) the camera shall be positioned at each lateral for a sufficient duration to determine the nature of flow and condition of the lateral (minimum of 30-seconds).

H. Videos shall span beginning and ending manholes to demonstrate that all debris has been removed. A manhole inspection shall be performed for all manholes.

I. Manual winches, power winches, TV cable powered rewinds, or selfpropelled cameras may be used to move the camera through the sewer line.

J. When manually operated winches are used to pull the television camera through the line, telephones or other suitable means of communication should be set up between the two manholes of the section being inspected to ensure good communication between members of the crew.

K. If during CCTV inspection of a pipeline, the television camera is unable to pass through the entire pipeline section, the Contractor shall set up his equipment so that the inspection can be performed from the opposite direction (reverse setup) in order to obtain a complete video of the line. If, again, the camera fails to pass through the pipeline section, the Contractor shall contact the Engineer for direction. Contractor is responsible for identifying cause of blockage and repairing the section to allow a fully unobstructed flow.

L. In the event that the TV camera encounters broken pipe, the Contractor shall be responsible for repairing the pipe per Specification Section 02626.

M. Distance Measurements: The accuracy of the measurements for location of defects, service connections, changes in pipe materials, and all other PACP recognized conditions is paramount, particularly when it may require later corrective action or a dig-up. The accuracy of the footage meter shall be checked by taking a reading at the entrance to the away manhole and comparing with a surface measurement made with a steel tape or walking meter (Roll-A-Tape). These measurements shall be performed by the Contractor in the presence of the Manatee County inspector. Measurement meters shall be accurate to one-tenth of a foot over the entire length of the sewer line section being inspected. Otherwise, the Contractor shall take corrective action.

N. The video inspection shall be clear and visible with adequate lighting to enable the viewer to discern even small defects in the pipe being inspected. Camera distortions, inadequate lighting, dirty lens, or blurred/hazy picture will be cause for rejection of a video and rejection of the associated line segment. Any pipeline television inspection video that does not meet this requirement or fails to meet PACP specifications shall be cause for Contractor to re-inspect the pipe at no additional cost to the County. Payment for television inspection and sewer rehabilitation will not be made until the County approves the quality of the video and logs.

O. CCTV inspection video shall be continuous for pipe segments between manholes. Do not leave gaps in the video of a segment between manholes and do not show a single segment on more than one video, unless specifically allowed by the County.

P. Documentation of television inspection by the Contractor shall be performed in accordance with the Specifications. TV reports can be assembled elsewhere, but documentation must be done in the field. A video inspection report shall be prepared by the Contractor for every segment and manhole that is CCTV-inspected. The Contractor shall provide written records that show the location in relation to an identified manhole of each infiltration point observed during inspection. In addition, other points of significance such as locations of building sewers, unusual conditions, roots, sewer connections, broken pipe, presence of scale and corrosion, and other discernible features shall be recorded on the PACP television inspection report. The video, PACP television inspection report and the NASSCO Manhole Inspection Form (latest version), with all applicable fields accurately completed per PACP format, shall be supplied to the County with each Pay Request.

Q. A calibration report shall be submitted with each digital video disk (DVD), which shall include a drawing of the depth gauge, indicating the marks on the gauge, and what depth each mark represents.

R. The County Inspector shall be present and will observe the TV monitor along with the camera operator as the camera progresses through the pipe. All pipelines will be inspected with the camera progressing in an upstream direction when possible. The camera operator shall record the manhole numbers and the distance the camera has progressed from the downstream manhole as the inspection proceeds. The operator shall stop the progress of the camera and record the distance at all locations along the pipeline where unusual or defective features are encountered. The operator shall record the distance and depth of the water in the pipe at all locations where the depth is greater than or equal to 75% of the maximum depth as listed in the table below. The camera operator shall make records where cracked, dented or deformed pipe is found, or at joints that are not properly installed, or where infiltration is observed, or at any other abnormality or where any other defective feature is encountered.

S. Pipe grade between manholes shall not deviate by more than the maximum depth as list below from the design grade line, as measured with the television (TV) camera's depth gauge during the TV inspection, provided that such deviation does not result in a level or a reverse slope. Joint deflection and longitudinal pipe deflection between manholes that exceeds the maximum depth or more than two deflections that exceed 75% of the maximum depth, as measured with the television camera's depth gauge during the TV inspection, shall not be accepted.

Pipe Sizes	Water Holding Max Depth (inches)
8 inch to 15 inch	1.00
18 inch to 21 inch	2.00
24 inch and greater	2.50

T. At the end of the inspections, or at the end of the day, one original digital video disk (DVD) or external removable drive of the TV record shall be submitted to the County Inspector along with the written inspection report and depth gauge calibration for evaluation. The

County's representative shall be the sole judge of whether any information imparted by the TV test digital media will cause the County to accept or reject the pipe test section.

3.14 PIPE RING DEFLECTION TESTING OF GRAVITY SEWERS (MANDREL)

A. The Contractor shall perform a pipe ring deflection test on all new gravity sanitary sewer mains. The rigid ball or mandrel used for the ring deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe depending on which is specified in the ASTM C3034, to which the pipe is manufactured. The test shall be performed without mechanical pulling devices.

B. The allowable ring deflection is 5 percent of the inside pipe diameter. Pipes that have a ring deflection that exceeds this amount shall not be accepted.

3.15 FINAL SEWER CLEANING

A. Prior to final acceptance and final manhole-to-manhole inspection of the sewer system by the County, the Contractor shall flush and clean all parts of the system, remove all accumulated construction debris, rocks, gravel, sand, silt and other foreign material from the sewer system at or near the closest downstream manhole.

B. During the final manhole-to-manhole inspection of the sewer system, the County may require the Contractor to reflush and clean any section or portion of the line if any foreign matter is still present in the system.

3.16 IDENTIFICATION

A. PVC gravity sewer pipe shall bear identification markings in accordance with ASTM D3034 or AWWA C900-16.

B. PVC gravity sewer pipe shall be color-coded green using a solid pipe color pigment.

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 to completely install ready for operation valves and appurtenances as shown on the Drawings and as specified herein.

B. All 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 NSF Standard 61 for mechanical devices.

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, and wastewater 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, 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 min. 304 stainless steel extension stems and alignment rings where needed to bring the operating nut to within 4 feet below the box lid. Valve boxes and alignment rings shall be furnished per the latest edition of the County's Approved Products List.

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

I. All buried valves shall have bonnet bolts, gland bolts, nuts, washers, and other trim hardware made of min. 304 stainless steel, unless otherwise specified in the following specification. All aboveground valves shall have bonnet bolts, gland bolts, nuts, washers, and other trim hardware made of min. 316 stainless steel, unless otherwise specified in the following specification.

J. All aboveground external thrust restraints, flange adapters, and plain end coupling t-bolts, bolts, tie rods, nuts, and washers shall be 316 stainless steel.

K. All underground external thrust restraints, mechanical joint adapters, and plain end coupling 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 County's Approved Products List. The coating shall pass a 2000 hour salt spray test with less than 15% red rust per ASTM B117. Alternatively, 316 SS hardware shall be acceptable.

L. All ductile iron valves shall have a factory applied, min. 8 mils average dry film thickness, fusion bonded epoxy coating on the interior and exterior conforming to AWWA C550, unless otherwise noted in the plans or the following specification.

1. A holiday-free certification letter shall be provided to the County at time of delivery stating that the internal coating of the valve has passed the Holiday testing in accordance with ASTM G62, Method A (Low-Voltage).

2. The Contractor shall take extreme consideration when handling valves to ensure coating does not get damaged during construction. County representative shall have the right to deny the installation of the valve if the Contractor damages the internal coating.

M. All other painted items exposed to sunlight, including field painted box lids, etc., shall be painted the appropriate color with an epoxy type paint per Section 09900 of these Specifications.

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

O. All manually-operated geared valves shall require a torque limiting device per Section 02640, 2.05

P. The brass alloy used for all surfaces coming in contact with potable water shall meet the requirements of UNS/CDA number C89833 as listed in ANSI/AWWA C800 Standard and the products produced with this alloy shall meet the ANSI/NSF Standard 61 and/or ANSI NSF Standard 372 as applicable, complying with the Safe Drinking Water Act. These products shall have the letters "NL" cast into the main body for proper identification.

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

1. Gate Valves (Sec. 2.01)
2. Combination Pressure Reducing and Pressure Sustaining with Check Valves Option (Sec. 2.02)
3. Ball Valves and Curb Stops (Sec. 2.03)
4. Plug Valves (Sec. 2.04)
5. Valve Actuators and Torque Limiting Devices (Sec. 2.05)
6. Air Release Valves (Sec. 2.06)
7. Valves Boxes (Sec. 2.07)
8. Corporation Stops and Service Saddles (Sec. 2.08)
9. Plain End Couplings (Sec. 2.09)
10. Flange Adapters (Sec. 2.10)
11. Hose Bibs (Sec. 2.11)
12. Swing Check Valves (Sec. 2.12)
13. Swing-Flex Check Valves (Sec. 2.13)
14. Hydrants (Sec. 2.14)
15. Restrained Joints (Sec. 2.15)
16. Tapping Sleeves and Tapping Valves (Sec. 2.16)
17. Tracer Wire Boxes (Sec. 2.17)

18. Insertion Valves (Sec. 2.18)

1.02 SUBMITTALS

A. Submit to the County 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 County for approval in accordance with the Specifications.

1.03 TOOLS

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

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. Min. 304 stainless steel 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 3 inches to 54 inches in diameter shall be resilient seated, manufactured to meet or exceed the requirements 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. Buried gate valves shall have a non-rising min. 304 stainless steel stem to eliminate lead content. Buried gate valve bolts, nuts and washers shall be min. 304 stainless steel to eliminate exterior corrosion and maintain fastener strength. Manufacturer shall use anti-seize lubricant during assembly of bolt and nut sets to prevent corrosion and galling of metals. Stem seals shall be provided and shall be of the O-ring type, two above and one below the thrust collar. Aboveground valves for potable and reclaimed water shall be OS&Y with flanged joints. Aboveground valves for wastewater shall be non-rising stem (NRS) type. All aboveground valves shall have 316 stainless steel stems, bolts, nuts, and washers.

E. The wedge shall be ductile iron that is fully encapsulated with an EPDM rubber. The Elastomer type shall be permanently embossed or formed on the valve body or wedge. 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 and bonnet shall be ductile iron meeting or exceeding all the requirements of AWWA C515.

G. Valves 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 counterclockwise. The wedge nut shall be bronze.

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 Manatee County Government.

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

K. Valves with 16" diameter and larger shall be equipped with manufacturer's standard heavy duty, externally adjustable gearbox that is totally enclosed to prevent water infiltration. Gearbox shall be permanently grease filled. For buried service, vertical installation valves shall be supplied with spur-type gear and horizontal installation valves shall be supplied with bevel-type gear.

L. All horizontally-installed gate valves shall require a flush line installation per Manatee County's Utilities Standards Manual.

M. All gate valves installed for wastewater application shall be installed vertically. Gate valves for force mains shall only be allowed for sizes 24-inch and above. Gate valves for lift stations aboveground metering and valve assemblies shall be allowed for sizes 3-inch and larger.

N. All manually operated geared gate valves shall be furnished with a torque limiting device per Section 02640, 2.05.

O. Gate valves shall be furnished per the latest edition of the County's Approved Products List.

2.02 COMBINATION PRESSURE RELIEF & PRESSURE SUSTAINING CONTROL VALVE WITH CHECK VALVE OPTION

A. Pressure relief/sustaining control valve and check valve shall be pilot operated diaphragm actuated valve with cast iron body, bronze disc guide, bronze seat, bronze cover bearing, and 125-pound flanged ends. The stem, nut, and spring shall be min. 304 stainless steel. The pilot 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. Main valve shall be single chamber type, with minimum 304 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 min. 304 stainless steel trim.

D. Pressure relief/sustaining control valve assembly shall be furnished per the latest edition of the County's Approved Products List.

2.03 BALL VALVES AND CURB STOPS

A. Curb stop ball valves for potable and reclaimed water services, in sizes 3/4-inch through 2-inch, shall have a brass alloy 85-5-5-5 body, stem and ball per ASTM B62. Valves shall be full port, full flow, 1/4-turn check valves, rated for 300 psi, with compression, pack joint, flare, threaded or flanged ends as required. Curb stop ball valves shall be supplied per the latest edition of the County's Approved Products List.

B. Ball valves for wastewater, 2-inch through 3-inch, shall have 316 stainless steel body, cap, stem, stem gland, and ball per ASTM A276. Valves shall be full port, full flow, 1/4-turn check, steam rated for 150 psi, pressure rating 1,000 psi CWT, with threaded or flanged ends as required. Ball valves for wastewater shall be supplied per the latest edition of the County's Approved Products List.

C. All valves shall be mounted in such a position that valve position indicators are plainly visible. Abovegrade ball valves shall have a vinyl coated lever handle. Lever handle and nut shall be min. 304 stainless steel.

D. Potable water plastic service pipe material and compression/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 leaktight 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. Plug valves 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 at hydrostatic pressure of 175 psi for 2-inch to 12-inch diameter and 150 psi for larger than 12-inch diameter when field pressure tested in accordance to AWWA C517-16.

B. Plug valves shall also be subjected, at the factory, to the Hydrostatic Testing specified in AWWA C517-16. The shell test shall be performed at a hydrostatic pressure of 1-1/2 times the design pressure of the valve. The seat pressure test shall be a certified hydrostatic test at the full design pressure of the valve. 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 B16.1, 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 cast iron per ASTM A126, Class B or ductile iron grade 65-45-12 per ASTM A526 in accordance with AWWA C517-16. The integral plug and shaft shall be ductile iron grade 65-45-12 per ASTM A526. The entire plug and stem shall be fully encapsulated with nitrile (Buna N) rubber. Per AWWA C517-16, the rubber compound shall have been vulcanized to the metal plug and shall have a minimum strength of not less than 250 psi when tested according to ASTM D429, Method A or shall have a peel strength of not less than 75 psi when tested according to ASTM D429, Method B. Valve seats for sizes 3-inch and larger shall be at least 95 percent pure nickel, welded-in overlay into the cast or ductile iron body. The top and bottom shaft bearings shall be sintered, oil

impregnated 316 stainless steel. Valves shall have top and bottom grit seals made of Buna-N rubber or PTFE.

E. Plug valves shall have a full round/circular cross-sectional area of the nominal pipe size area. The internal opening shall have an unobstructed waterway equal to the full circular cross-sectional area of the inside diameter of the pipe it is attached.

F. Below grade plug valves, 3-inch and larger shall have a manufacturer standard heavy duty worm gear type actuators with 2-inch square operating nuts. The gearbox shall be externally adjustable and totally enclosed to prevent water infiltration. Actuators for buried service valves shall be not less than 90% grease packed and totally sealed by means of gaskets or O-rings. Actuators shall be self-locking and designed to transmit twice the required actuator torque without damage to the faces of the gear teeth. Gearboxes shall be certified to meet ISO 9001 standards. The gearbox worm gear shall be hardened steel or ductile iron ASTM A536 Class 65-45-12. Gearbox shaft shall be manufactured of hardened steel. Gearbox bearings shall be high efficiency, oil impregnated, manufactured of bronze or hardened steel.

G. All manually operated geared plug valves shall be furnished with a torque-limiting device per Section 2.05.

H. Plug valves shall be installed side-ways with plug shaft horizontal so that the plug rotates upward when it opens, with the flow entering the seat end of the valve.

I. All plug valves shall be internally and externally coated with at least 16-mils average dry film thickness of a factory applied, two-part high solids epoxy conforming to AWWA C550. A holiday-free certification letter shall be provided to the County at time of delivery stating that the internal coating of the valve has passed the Holiday testing in accordance with ASTM G62, Method A (Low Voltage). The Contractor shall take extreme consideration when handling valves to ensure coating does not get damaged during construction. County representative shall have the right to deny the installation of the valve if the Contractor damages the internal coating.

J. Plug valves shall be furnished per the latest edition of the County's Approved Products List.

2.06 VALVE ACTUATORS AND TORQUE LIMITING DEVICES

Gate, Tapping, and Plug Valve Torque-Limiting Devices:

A. Gate, tapping, and plug buried valves that are furnished with a gearbox shall also require a valve torque-limiting device to prevent valve and actuator damage caused by excessive operating torque.

B. The overtorque protection mechanism enclosed in a hermetically sealed cast iron housing and permanently lubricated with molydisulfide-bearing, water-resistance, high pressure synthetic grease.

C. The housing shall have integrally cast, 2-inch AWWA operating nut and matching socket to operate and to fit over the actuator or extension shaft nut, respectively. The socket shall be provided with a set screw to fit to the device.

D. The device shall transmit sufficient torque to free up and operate the valve and shall be factory set to 1.5 times the input torque of the valve provided that the trip limit is at least 100 ft-lb less than the valve breaking torque. Refer to the latest edition of the County's Approved Products List for the trip limits set for each specified valve.

E. The torque limiting device shall be internally and externally coated with a fusion-bonded epoxy and enamel top-coat conforming to AWWA C-213.

F. All hardware shall be minimum 304 stainless steel.

G. The torque limiting device shall be furnished per the latest edition of the County's Approved Products List.

Manual Actuators:

H. 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.

I. 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.

J. Actuators shall be equipped with mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. They shall turn counter-clockwise to open valves.

K. 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.

L. Manual actuators shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities.

Motor Actuators (Modulating):

M. 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.

N. 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.

O. 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.

P. 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.

Q. 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.

R. 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.

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

T. 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.

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

V. Actuators shall be Flowserve Limitorque L120 with Mudotronic Control System. Actuator shall containing a position transmitter with a 4-20MA output signal.

Motor Actuators (Open-Close):

W. 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.

X. 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.

Y. 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.

Z. The motor shall be prelubricated and all bearings shall be of the anti-friction type.

AA. 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.

AB. 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.

AC. 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.

AD. 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.

AE. 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.

AF. 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.

AG. Motor operators shall be Flowserve Limitorque L120 with Mudotronic Control System.

2.06 AIR RELEASE VALVES

A. Air release valves shall be automatic float operated, with 2" inlet size and working pressure ratings as required, and NPT connections.

B. Air release valves for standard application shall have body and cover made of ductile iron per ASTM A536, Class B. The orifice, float and linkage shall be 316 stainless steel. The seat shall be (Buna N) nitrile elastomer. The external fasteners including bolts, washers, and nuts shall be made of 316 stainless steel.

C. Air release valves installed over waterways shall have body and cover made of 316 stainless steel, with 2" inlet size and working pressure ratings as required, and NPT connections. Diaphragm, debris shield, float, debris screen, diaphragm holder, and upper air valve part shall be made of homopolymer (PP) or Delrin (POM). The external fasteners including bolts, washers, and nuts shall be made of 316 stainless steel.

D. Air release valves shall be furnished with a County-approved 316 stainless steel ball valve.

E. Air release valves shall be furnished per the latest edition of the County's Approved Products List.

2.07 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 water, purple for reclaimed water, and green for sanitary sewer.

B. Cast iron boxes shall be two-piece or three-piece, screw type, with extensions, as required to make the desired box length. 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 min. 304 stainless steel adjustable stem. Bottom barrel shall have flanged bottom to prevent settling. All bolts, screws and pins shall be min. 304 stainless steel.

D. Reclaimed Valve Boxes shall be square 9-inch x 9-inch load bearing marked "Reclaimed Water" and painted purple.

E. All valves shall either have operating nuts within 4 feet below the top of the lid or shall have min. 304 stainless steel 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 min. 304 stainless steel fastener.

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

G. A box alignment ring device shall be installed in the valve box per the latest edition of the County's Approved Product List.

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

2.08 CORPORATION STOPS AND SERVICE SADDLES

A. Corporation stop ball valves for connections to potable and reclaimed water mains, made of PVC or ductile iron, shall conform to AWWA C800 and be NSF 61 certified. Brass components in contact with potable water shall conform to ASTM B584, UNS C89833 and shall be identified with "NL". Alternatively, Brass components not in contact with potable water can conform to ASTM B62 and ASTM B584, UNS C83600 85-5-5-5 in lieu of requirements above. 1-inch through 2-inch corporation stops shall be ball type, 300 psi working pressure rated. Inlets shall be AWWA MIP or tapered threaded type and outlets shall be compression, pack joint, flare, or FIP threaded joint type. All joints made to CTS size HDPE tubing shall use min. 304 stainless steel insert stiffeners. Corporation stops shall be furnished per the latest edition of the County's Approved Product List.

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-25025 (Saddle)
Copper	Flare x AWWA Taper Thread	B-25000 (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. For potable water, 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 saddles, straps, and hardware of red brass, alloy 85-5-5-5, per ASTM B62 and/or ASTM

B584, UNS C83600. Alternatively, the saddles, straps, and hardware shall be minimum 304 stainless steel. The assembly shall be NSF 61 certified. No ductile iron, cast iron or steel saddles will be allowed. Service saddles shall be furnished per the latest edition of the County's Approved Products List.

D. Connections to sanitary mains for services up to 2 inches shall be made using the service saddles per the latest edition of the County's Approved Products List. Saddles, straps, and hardware shall be 316 SS.

E. Service and air release valve (ARV) connections to HDPE potable, reclaimed water and force mains shall be properly sized per the manufacturer product information and be installed according to the manufacturer's written instructions. Service saddles shall be furnished per the latest edition of the County's Approved Products List.

F. For potable and reclaimed water mains, service saddles shall use Ethylene Propylene Diene Monomer (EPDM) rubber gaskets. The letters "EPDM" and company logo shall be factory stamped with white ink on gasket. Alternatively, the letters "EPDM" shall be factory engraved/edged on the exterior saddle body. Refer to Specification Section 02615 for gasket materials in contaminated soils.

2.09 PLAIN END COUPLINGS

A. For potable and reclaimed water mains, plain end couplings shall use Ethylene Propylene Diene Monomer (EPDM) rubber gaskets. Shall have EPDM rubber gaskets with the letters "EPDM" factory embossed or etched into gasket. Refer to Specification Section 02615 for gasket materials in contaminated soils.

B. All aboveground plain end coupling t-bolts, bolts, tie rods, nuts, and washers shall be 316 stainless steel. All buried plain end coupling 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 County'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.

C. The coupling shall have a high performance internal epoxy coating from the factory. Contractor shall provide a holiday-free certification letter shall be provided to the County at time of delivery stating that the internal coating of the coupling has passed the Holiday testing in accordance with ASTM G62, Method A (Low Voltage).

2.10 FLANGE ADAPTERS

A. Flange adapters to be used on ductile iron and PVC piping shall have a ductile iron ASTM A536 body with a factory applied fusion bonded or a thermally cured fluoropolymer epoxy interior (min. 15 mils DFT) and exterior (min. 6 mils) coating. The coating shall meet NSF-61 standards for potable water mains. The adapter shall adapt and restrain plain end pipe to flanged pipe or fittings, where the flange conforms to AWWA C111/A21.11-17 and meets ANSI B16.5 Class 150/125 drilling pattern per AWWA C110/A21.10.

B. All aboveground gland bolts, flange connection bolts, t-bolts, tie-rods, nuts, and washers shall be 316 stainless steel. All underground flange 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 A-242 standards and shall be coated with a factory applied blue fluoropolymer coating with min. 1 mil DFT per the latest edition of the County'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.

C. For potable and reclaimed water mains, flange adapters shall use Ethylene Propylene Diene Monomer (EPDM) rubber gaskets with the letters "EPDM" factory embossed or edged into gasket. Refer to Specification Section 02615 for gasket materials in contaminated soils.

D. Flange adapters to be used with plain end ductile iron pipe conforming to AWWA C151 shall have the following minimum pressure ratings:

Size	Pressure Rating
2"-16"	350 PSI
18" and Larger	250 PSI

E. Flange adapters to be used with plain end PVC pipe (DR 18) conforming to AWWA C900-16 shall have the following minimum pressure rating:

Size	Pressure Rating
2”-36”	235 PSI

F. Flange adapters to be used with HDPE pipe (DR 11) conforming to AWWA C906 shall be thermally fused per manufacturer’s recommendations, shall have 316 stainless steel backup ring and pipe stiffeners, and shall have the following minimum pressure rating:

Size	Pressure Rating
4” and Larger	200 PSI

G. Flange adapters shall be furnished per the latest edition of the County’s Approved Products List.

2.11 RESTRAINED JOINTS

A. Pipe joints shall be restrained by poured-in-place concrete thrust blocks, by external thrust restraint devices, internal restrained joint gaskets or locking segments. Flanged joints shall be used aboveground.

B. For potable and reclaimed water mains, thrust restraint devices shall use Ethylene Propylene Diene Monomer (EPDM) rubber gaskets with the letters "EPDM" factory embossed or etched into gasket. Refer to Specification Section 02615 for gasket materials in contaminated soils.

Concrete Thrust Restraints:

A. Cast-in-place or precast concrete for thrust blocks shall have a 28-day strength of 3,000 psi. The concrete shall be placed between undisturbed soil and the fittings or appurtenance to be supported. Concrete shall not be placed on or around the pipe, bells, flanges, or other joints. If contact with concrete is unavoidable, these areas shall be protected with a double wrap of 6-mil polyethylene film to allow for disassembly and repair of the fitting or appurtenance.

External Thrust Restraint Devices:

A. External thrust restraint devices shall be made of ductile iron in accordance with ASTM A536, Grade 65-45-12. The gland body and wedges shall have a standard factory applied fusion bonded epoxy, thermally cured fluoropolymer epoxy, or acrylic enamel coating per the latest edition of the County’s Approved Products List.

B. External thrust restraint devices shall use wedge-action restraint type or split-casing restraint type.

C. All aboveground gland bolts, t-bolts, tie-rods, nuts, and washers shall be 316 stainless steel. All buried external thrust restraint 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 A-242 standards and shall be coated with a factory applied blue fluoropolymer coating with min. 1 mil DFT per the latest edition of the County’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.

D. Additionally, all restraint assemblies of split-casing style which require a bolt and nut to join both halves shall have a side clamping bolt made of min. 316 stainless steel per ASTM A193 Grade B8M class 2 and side clamping nut made of min. 316 stainless steel per ASTM A194 Grade 8M class 1.

E. External thrust restraint devices to be used with plain end ductile iron pipe conforming to AWWA C151 shall have the following minimum pressure ratings:

Size	Pressure Rating
2”-16”	350 PSI
18” and Larger	250 PSI

F. External thrust restraint devices to be used with plain end PVC pipe (DR 18) conforming to AWWA C900-16 shall have the following minimum pressure rating:

Size	Pressure Rating
2”-36”	235 PSI

G. External thrust restraint devices to be used with HDPE pipe (DR 11) conforming to AWWA C906 shall have the following minimum pressure rating:

Size	Pressure Rating
4” and Larger	200 PSI

H. Refer to the latest edition of the County’s Approved Products List for acceptable manufacturer and model.

Internal Self-Restrained Joints for Ductile Iron Pipe:

A. Internal self-restrained joint gaskets for Fastite or Tyton joint ductile iron pipe shall be allowed in lieu of external thrust restraint devices. The gasket material shall be designated depending on the soil conditions described in Section 02615. The gasket shall restrain the pipe due to the wedging action of the high strength min. 304 stainless steel teeth spaced around the interior of the gasket.

B. Internal self-restrained split locking rings made of high-strength, low-alloy (HSLA) steel conforming to AWWA C111 shall be allowed on ductile iron pipe manufactured for this type of joint restraint. The pipe shall have a shop-applied welded-on retainer ring.

C. Internal self-restrained ductile iron split flexible rings shall be allowed when used with a beveled ductile iron, welded-on retainer ring in accordance with manufacturer’s recommendations. The split flexible ring shall be assembled behind the retainer ring to provide the means of restraint. For pipe 14” and larger, a shop applied nickel-iron weld bead and a rubber-back ring containing ductile iron segments shall provide the means of restraint.

D. Internal self-restrained ductile iron locking segments, inserted through slots in the pipe bell face, which provide a positive axial lock between the bell interior surface and a retainer weldment on the pipe spigot end, shall be allowed on ductile iron pipe manufactured for this type of joint restraint. Restraining components shall be ductile iron in accordance with

applicable requirements of AWWA C110 and AWWA C153 with the exception of the manufacturer's proprietary design dimensions.

E. All self-restrained push-on joint pipe shall have a weather-resistant, minimum 6-mil thick, 4-inch wide solid-red PVC marking tape around pipe bell.

F. Refer to the latest edition of the County's Approved Products List for acceptable manufacturers and models.

Internal Self-Restrained Joint Gasket for Pressurized PVC:

A. Internal restrained joint gaskets PVC C900-16 pipe shall provide uniform circumferential restraint through the use of a metallic restraint casing and lock ring. The gasket material shall be designated depending on the soil conditions described in Section 02615.

B. Refer to the latest edition of the County's Approved Products List for acceptable manufacturers and models.

2.12 HOSE BIBS

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

2.13 LEVER & WEIGHT CHECK VALVES

A. Check valves shall be swing type, weighted lever, conforming to AWWA C508. Valves shall be iron-body, bronze-mounted, single disc, with ANSI B16.1 Class 125 flanged ends.

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. Hinge pins shall be extended bronze or 316 stainless steel. All external bolts, nuts, and washers shall be 316 stainless steel.

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.

E. All check valves shall be internally and externally coated with at least 12-mils average dry film thickness of a factory applied, two-part high solids epoxy conforming to AWWA C550. A holiday-free certification letter shall be provided to the County at time of delivery stating that the internal coating of the valve has passed the Holiday testing in accordance with ASTM G62, Method A (Low Voltage). The Contractor shall take extreme consideration when handling valves to ensure coating does not get damaged during construction. County representative shall have the right to deny the installation of the valve if the Contractor damages the internal coating.

F. Refer to the latest edition of the County's Approved Products List for acceptable manufacturer and model.

2.14 SWING FLEX CHECK VALVES

A. Swing Flex Check valves shall be of the full flow body type, with a domed access cover. It shall be equipped with a flexible disc, which is the only moving part, and it shall conform to AWWA C508.

B. Valves body and cover shall be ASTM A536 Grade 65-45-12 ductile iron with ANSI B16.1 Class 125 flanged ends. The disc shall be precision molded EPDM.

C. When there is no flow through the line, the disc shall hang lightly against its inclined seat. When open, the disc shall swing clear of the waterway.

D. Check valves shall be lead free, ductile iron conforming to NSF 61. All external bolts, nuts, and washers shall be 316 stainless steel nuts and bolts on bolted covers.

E. Valves shall be constructed so that the 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.

F. Valves shall be equipped with minimum 17-4 stainless steel seat position indicator and minimum 304 stainless steel backflow actuator.

G. All swing flex check valves shall be internally and externally coated with at least 8-mils average dry film thickness of a factory applied, two-part high solids epoxy conforming to AWWA C550. A holiday-free certification letter shall be provided to the County at time of delivery stating that the internal coating of the valve has passed the Holiday testing in accordance with ASTM G62, Method A (Low Voltage). The Contractor shall take extreme consideration when handling valves to ensure coating does not get damaged during construction. County representative shall have the right to deny the installation of the valve if the Contractor damages the internal coating.

H. Refer to the latest edition of the County's Approved Products List for acceptable manufacturer and model.

2.15 HYDRANTS

A. Hydrants shall be dry barrel and shall conform to AWWA C502 and UL/FM certified. The hydrants shall meet the specific requirements and exceptions which follow:

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

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

D. 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.

E. The upper and lower stem rod shall be min. 304 stainless steel and shall have a breakable stem-rod coupling of min. 304 stainless steel, or cast iron or ductile iron with a fusion bonded epoxy coating, with min. 304 stainless steel pins and clips.

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

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

H. All nozzle threads shall be American National Standard.

I. Each nozzle cap shall be provided with a rubber washer.

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

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

L. The breakaway coupling can be fusion bonded epoxy coated or min. 304 stainless steel. Only one hydrant extension is allowed per hydrant.

M. Weepholes shall be excluded from fire hydrants.

N. 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. The letters “EPDM” shall be factory embossed or etched into the rubber.

O. Hydrant bonnets, weather cover, nozzle section, caps and shoe shall be cast iron or ductile iron. Hydrant shoe shall be fusion bonded epoxy coated inside and outside. Standpipe shall have standard thickness cement lining on the inside in accordance with AWWA C104 and standard 1-mil asphaltic exterior coating or shall have fusion bonded epoy inside and outside. Hydrant bonnets, weather cover, nozzle section, and caps shall have interior and exterior epoxy primer. Aboveground parts shall have a UV-resistant external top coat of minimum 4-mils DFT per the latest edition of the County’s Approved Products List; color Safety Yellow for fire hydrants that are connected to the public potable water system or Pantone 522C purple for fire hydrants that are connected to the reclaimed water system.

P. Abovegrade exterior nuts, bolts and washers shall be 316 stainless steel. Bronze nuts may be used below grade.

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

R. Refer to the latest edition of the County’s Approved Products List for acceptable manufacturer and model.

2.16 TAPPING SLEEVES AND VALVES

A. Tapping valves shall be provided with a box cast in a concrete pad and a box cover. Minimum 304 stainless steel 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.

B. Tapping valves 3 inches to 54 inches in diameter shall be resilient seated, manufactured to meet or exceed the requirements 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 to accommodate the full size shell cutter.

C. The valves shall have a non-rising minimum 304 stainless steel stem to eliminate lead content. All valve bolts, nuts and washers shall be minimum 304 stainless steel to eliminate exterior corrosion and maintain fastener strength. Manufacturer shall use anti-seize lubricant during assembly of bolt and nut sets to prevent corrosion and galling of metals. Stem seals shall be provided and shall be of the O-ring type, two above and one below the thrust collar.

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

E. The valve body and bonnet shall be ductile iron meeting or exceeding all the requirements of AWWA C515. The valves shall be flanged with alignment ring by mechanical joint.

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

G. The valves are to have 2-inch cast or ductile iron AWWA operating nuts and shall open left or counterclockwise. The wedge nut shall be bronze.

H. 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 Manatee County Government.

I. Valves shall be assembled and tested in a certified ISO 9001 manufacturing facility within the United States and provide their certification of meeting internationally recognized quality control procedures.

J. Valves with 16" diameter and larger shall be equipped with manufacturer's standard heavy duty, externally adjustable gearbox that is totally enclosed to prevent water infiltration. Gearbox shall be permanently grease filled. For buried service vertical installations valves shall be supplied with spur-type gear and horizontal installation valves shall be supplied with bevel-type gear.

K. All horizontally-installed tapping valves shall require a flush line installation per Manatee County's Utilities Standards Manual.

L. All tapping valves installed for wastewater application shall be installed vertically.

M. All tapping valves shall be furnished with a torque limiting device per 2.06A of this Section.

N. Full faced flange gaskets shall cover the entire area of the flange surface and be 1/8-inch minimal thickness of rubber.

O. For potable and reclaimed water mains, tapping valve and sleeves shall use Ethylene Propylene Diene Monomer (EPDM) rubber gaskets with the letters "EPDM" factory embossed or edged into gasket. Refer to Specification Section 02615 for gasket materials in contaminated soils.

P. Tapping sleeves and straps shall be constructed from 316 stainless steel. All hardware for joining the two sleeve halves and the tapping valve including bolts, nuts, and washers shall be 316 stainless steel. Threads must be coated to prevent galling.

Q. Tapping sleeves shall seal to the pipe by the use of a gasket compounded for water or sewer, 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 316 stainless steel 3/4-inch NPT test plug shall be provided for pressure testing. Threads must be coated to prevent galling.

R. If the tapping sleeves have rubber wrap around gasket, it shall be provided with the elastomer letters and company logo factory stamped with white ink. Alternatively, the elastomer letters shall be factory engraved/etched on the exterior shell of the tapping sleeve.

S. The diameter of the tapping sleeve outlet shall be a minimum of 2" less than the inside diameter of the branch line.

T. Tapping sleeves and valves shall be furnished per the latest edition of the County's Approved Products List.

2.17 TRACER WIRE TEST STATION BOXES

A. Tracer wire test station boxes shall be provided at plug 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. Where test boxes will be in streets or subject to vehicular traffic, use H-20 rated lids, 5-1/4 inch diameter or equal, centered in a separate concrete pad similar to a valve box pad.

B. Where possible, locate the tracer wire testing station outside of travel lanes, in medians, or in grassy areas adjacent to the travel lanes. All tracer wire(s) shall be attached to the lid, allowing testing to be performed without removing the lid.

C. Refer to Section 02800 for proper installation of the tracer wire system.

D. Refer to the latest edition of the County's Approved Products List for acceptable manufacturer and model.

2.18 INSERTION VALVE

A. Insertion valves shall be resilient wedge gate valves, manufactured to meet or exceed the requirements 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.

B. Buried gate valves shall have a non-rising min. 304 stainless steel stem to eliminate lead content. Buried gate valve bolts, nuts and washers shall be min. 304 stainless steel to eliminate exterior corrosion and maintain fastener strength. Manufacturer shall use anti-seize lubricant during assembly of bolt and nut sets to prevent corrosion and galling of metals. Stem seals shall be provided and shall be of the O-ring type, two above and one below the thrust collar.

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

D. The valve body and bonnet shall be ductile iron meeting or exceeding all the requirements of AWWA C515.

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

F. The valves are to have 2-inch cast or ductile iron AWWA operating nuts and shall open left or counterclockwise. The wedge nut shall be bronze.

G. 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 Manatee County Government.

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

I. Contractor shall be qualified to perform the installation and shall provide written certification by valve manufacturer guaranteeing the Contractor is qualified to perform the Work.

J. Sizes 12" and smaller must be capable of working on ductile iron pipe, PVC IPS, PVC C900-16, or Asbestos Clay without having to change either the top or bottom portion of split valve body.

K. Valve shall have a minimum 10-mil fusion bonded epoxy on the interior and exterior.

PART 3 EXECUTION

3.01 INSTALLATION

A. All valves and appurtenances shall be installed in the location shown, 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 County.

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

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 he 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. Prior to 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.

F. 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.

G. 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 County 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.

3.03 TAPPING SLEEVE AND VALVE

A. 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.

B. 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.

C. 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.

D. 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.

E. Tapping sleeves and valves shall be squarely centered on the main to be tapped. Adequate support shall be provided under the sleeve and valve during the tapping operation. 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.

3.04 SHOP PAINTING

Ferrous surfaces of valves and appurtenances shall receive a coating of min. 8 mils average dry film thickness rust-inhibitive epoxy, unless otherwise specified in this Section. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

3.05 FIELD PAINTING

All ferrous valves and appurtenances specified herein and exposed to view shall have a top coat painted safety blue for water mains, Pantone 522C for reclaimed water mains, or green for force mains per Specifications Section 09900.

3.06 INSPECTION AND TESTING

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. Refer to Manatee County Public Works Part I Utilities Standards Manual Section 1.9. Prior to testing, the pipe lines shall be supported in a manner approved by the County to prevent movement during tests.

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

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 County'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 County'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 County'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 9 PAINTING

SECTION 09865 SURFACE PREPARATION AND SHOP PRIME PAINTING

PART 1 GENERAL

1. This Section includes shop-applying a special coating product to items and surfaces scheduled, including surface preparation & cleanliness, environmental conditions during application, product preparation, and application method.

2. Documents affecting work of this Section include, but are not limited to, General Conditions, Supplementary Conditions, Sections in Division 1 of these Specifications, and including the following Divisions:

   a. Division 5 – Metals
   b. Division 7 – Thermal & Moisture Protection
   c. Division 9 – Painting

3. REFERENCES

   A. American Society for Testing and Materials (ASTM):
      1. ASTM B 117 Standard Test Method for Corrosion Resistance.
      2. ASTM D 2794 Standard Test Method for Measuring Direct Impact.
      3. ASTM D 3359 Standard Test Methods for Measuring Adhesion by Tape Test.
      4. ASTM D 3363 Standard Test Method for Film Hardness by Pencil Test.
      5. ASTM D 4060 Standard Test Method for Abrasion Resistance.
      6. ASTM D 4541 Standard Test Method for Pull-off Strength of Coatings Using Portable Adhesion Testers.
      7. ASTM E 119 (UL 263) Standard Test Method for Fire Tests of Building and Construction Materials.
      8. ASTM E 736 Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
   B. Society of Protective Coatings (SSPC):
      1. SSPC Surface Preparation Specifications (SSPC-SP)
      2. SSPC Paint Application Specifications and Guides (SSPC-PA)
   C. American Institute of Steel Construction
      1. Slip Coefficient and Tension Creep
   D. NACE International

4. DEFINITIONS
   A. Definitions as used in Finish Schedule shown on Drawings and Coating Schedule included herein.
      1. Coatings: Paint or heavy duty finishes for use on surfaces subject to interior and exterior exposure, submergence, high moisture, splash, or chemical environment, including primers, sealers, fillers, and intermediate and finish coats.
      2. Normal: Surfaces subject to normal temperature and humidity.
      3. First Coat: Factory primer or shop primer.
      4. DFT: Dry Film Thickness (Mils/coat).
      5. SqFt: Square feet per gallon (per coat).
      6. OWNER'S REPRESENTATIVE: Person, company, or architectural/engineering firm authorized by the property owner to make

decisions regarding coating selection.

5. Submittals
   A. Product Data:
      1. Manufacturer's literature including application recommendations and generic makeup for each coating scheduled.
      2. List each material and cross-reference the specific coating, finish system, and application.
   B. Submit one copy of manufacturer's Material Safety Data Sheets (MSDS) for each type of coating to OWNER'S REPRESENTATIVE'S field office for information. CONTRACTOR shall post a copy of MSDS on the site at all times when coating is in progress.

6. QUALITY ASSURANCE

A. Regulatory Requirements:

   1. All coatings shall conform to OSHA requirements for allowable exposure to lead and other hazardous substances.

B. Product Manufacturer:
   1. Manufacturer shall be a company that specializes in producing high quality industrial coating materials. This company shall have 10 years or more experience demonstrated by case histories in the designated field of application.

C. Applicator Qualifications:
   1. Engage an experienced applicator with 5 years or more experience who has successfully completed coating system applications similar in material and extent to those indicated.

D. Single-Source Responsibility:
   1. Provide coating material produced by the same manufacturer for each system.

E. Performance Testing:
   1. The OWNER'S REPRESENTATIVE may request testing from the manufacturer for required performance tha may include but is not limited to adhesion to the substrate and between coating layers, and resistance to abrasion, humidity, freeze/thaw, and Ultra-violet light exposure.

7. DELIVERY, STORAGE, AND HANDLING

   A. Materials shall be delivered to the site in original containers with labels intact and seals unbroken.

   B. Protect and heat or cool material storage location to maintain temperature ranges recommended by coating manufacturers, but not less than 50 degrees F.

   C. Oily rags and waste must be removed from buildings each night or kept in appropriate metal containers. Provide fire extinguishers of the type recommended by coating manufacturers in areas of storage and where finishing is occurring. Allow no smoking or open containers of solvent.

   D. Empty containers shall have labels canceled and clearly marked as to use.

8. PROJECT / SITE CONDITIONS

A. Environmental Requirements:

1. Use indirect-fired dry heat and ventilate areas to obtain conditions recommended by coating manufacturer.
2. Relative humidity conditions as specified by coating manufacturer shall be adhered to.
3. No unprotected, unheated exterior coating shall be undertaken when cold, damp, foggy, or rainy weather appears probable, nor when the temperature of the substrate is below 35 degrees F, unless listed in this specification or approved in writing by the coating manufacturer.
4. Maintain the manufacturer's environmental requirements until the coating is fully cured.
5. Apply no coating in areas where dust is being generated.
6. Testing and disposal of any waste and coating shall be the responsibility of the CONTRACTOR.

PART 2 PRODUCTS

1. MANUFACTURERS

A. Tnemec Company, Inc., or OWNER'S REPRESENTATIVE approved equal.

2. SHOP APPLIED PRIMERS FOR METAL

A. Factory-applied coating products of Tnemec Company, Inc. are listed as the standard of quality and performance, and it is not the intent of the Specifier that these materials are to be used to the exclusion of equivalent products of other manufacturers.

B. Only coatings that meet or exceed the performance of these specified coatings may be submitted for use. No substitutions will be considered that change the generic chemistry of the coatings specified.

C. No substitution will be considered unless the Architect/Owner has received a written request for approval at least 10 days prior to the bid date for receipt of bids.

D. Each request shall include the name of the specified material for which a substitute is being requested; name of the proposed substitute material; and a complete description of the proposed substitute including performance & test data, cure times, recoat windows, and generic composition.

E. No request for substitution will be considered that would decrease film thickness or offer a change in the generic type of coating specified.

F. The decision of the OWNER'S REPRESENTATIVE regarding approval or disapproval of the proposed substitution shall be final.

3. MIXING AND THINNING

A. Where thinning is necessary, only the products of the manufacturer furnishing the

coating will be allowed. All such thinning shall be done in strict accordance with the coating manufacturer's recommendations

B. Mix in accordance to the manufacturer's recommendations

4. SOURCE QUALITY

A. Source Quality: Obtain painting, coating, and thinning materials from a single manufacturer.

PART 3 EXECUTION

1. MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including technical information, catalogue instructions, and product instructions listed on material containers.

2. EXAMINATION

A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to the timely and proper completion of the work. Materials removed and replaced to correct defects due to errant application such as overspray or drips on unsuitable surfaces shall be at the CONTRACTOR'S expense.

3. SURFACE PREPARATION

A. General:
1. All surfaces to be coated shall be prepared as specified herein and in accordance with the coating manufacturer's recommendations. The object shall be to obtain a uniform, clean, and dry surface.
2. Quality of surface preparation described herein is considered a minimum. If the coating manufacturer requires a higher degree of preparation, comply with the coating manufacturer's recommendations.
3. Workmanship for surface preparation shall conform to the following Society of Protective Coatings (SSPC) / NACE specification:

a.	Solvent Cleaning:	SSPC-SP1
b.	Hand Tool Cleaning:	SSPC-SP2
c.	Power Tool Cleaning:	SSPC-SP3
d.	White Metal Blast Cleaning:	SSPC-SP5/NACE No. 1
e.	Commercial Blast Cleaning:	SSPC-SP6 / NACE No. 3
f.	Brush-Off Blast Cleaning:	SSPC-SP7 / NACE No. 4
g.	Near-White Blast Cleaning:	SSPC-SP10 / NACE No. 2
h.	Power Tool to Bare Metal Cleaning:	SSPC-SP11
i.	High Pressure Water Jetting:	SSPC-SP12 / NACE No. 5

4. FERROUS METAL

A. Ferrous Metal unprimed or shop-primed with an incompatible primer shall be abrasive blast cleaned prior to the application of a primer. Enclosed structural metals or those scheduled for overcoating with fire-resistive materials shall be

prepared in accordance with SSPC-SP3. Exposed exterior elements shall be prepared in accordance with SSPC-SP6. Slip critical connections shall be prepared in accordance with SSPC-SP3 or SP5.

5. APPLICATION

A. Surfaces shall be dry at the time of application.

B. The minimum surface temperature shall be 35 degrees F and rising unless noted otherwise.

C. Apply in strict accordance to the manufacturer's recommendations by airless spray application.

D. Each coat shall be allowed to dry in accordance to the manufacturer's requirements. Drying time shall be construed to mean "under normal conditions." Where conditions other than normal exist, because of weather or because of confined space, longer times will be necessary.

E. Coatings shall be applied to provide an opaque smooth surface of uniform coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable.

F. Edges of coatings adjoining other materials or other colors shall be sharp and clean without overlapping.

G. Crevices and other hard to apply areas shall be brushed in prior to the complete application.

6. FINAL TOUCH-UP AND CLEANING

A. Prior to substantial completion, examine the coated surfaces and retouch or refinish surfaces to leave in condition acceptable to the OWNER'S REPRESENTATIVE

7. SHOP APPLIED COATING SCHEDULE

A. All shop-applied coatings shall be in accordance with Section 09900, the High Performance Coatings section of this specification. This requirement supersedes all other options listed below.

B. Perimeter Structural Steel, steel where extended field exposure is expected, steel intended for immersion service, slip-critical connections, wet conditions, moderate to severe exposures, all other circumstances, which may also include interior, dry, mild environments.
   1. Common Use: For use on unprimed structural and miscellaneous steel.
   2. Shop primer may be enclosed, covered with approved/tested spray-applied fireproofing, or finish painted.
   3. Surface Preparation:
      a. SSPC-SP3 – Enclosed areas or members to be fireproofed
      b. SSPC-SP6 – Exterior exposures, Moderate Exposures, or Slip Critical Connections

c. SSPC-SP10 – Immersion & Severe Exposures

4. Moisture-Cured Urethane Primer
   a. Shop Primer: Tnemec Series 394 PerimePrime @ 2.5 – 3.5 mils DFT.
   b. Specifier Note Series 394 PerimePrime is UL Classified in accordance with UL 263 (ASTM E 119) for use under W.R. Grace Monokote MK-6/HY and Isolatek's (Cafco) Blaze-Shield II (Type II) fire-resistive materials. PerimePrime is tested in accordance with ASTM E 736 and found compatible with a variety of widely used fire-resistive materials. Contact your Tnemec Representative for ASTM E 736 compatibility results.
      Performance Requirements:
      1. ASTM B 117: Primer Shall Pass 10,000 Hours Salt Fog Corrosion Resistance.
      2. ASTM E 736: Primer Shall Pass Bond Test Requirements.
      3. ASTM D 3359: Primer and complete coating system shall have a Rating not less than 5.
      4. ASTM 2794: No Visible Cracking or Delamination of Film after 160 Inch-Pounds Or Less Direct And Indirect Impact.
      5. ASTM D 4585: No Blistering, Cracking, Rusting or Delamination of Film after 5,000 Hours Exposure.
      6. UL 263 (ASTM E 119): Primer Shall Be UL Classified for use Under Selected Fire-Resistive Materials.
      7. AISC Static Fatigue: Primer Shall Meet Requirements Of A Class B Surface With A Mean Slip Coefficient No Less Than 0.56 And A Tension Creep Not In Excess Of .005 Inch Over SSPC-SP3 Or SP5 Prepared Substrate.

C. Steel intended for interior, dry, mild exposures only.
   1. Common Use: For use on unprimed structural and miscellaneous steel.
   2. Surface Preparation
      a. SSPC-SP2 or SSPC-SP3
      b. SSPC-SP6 – When extended field exposure is expected
   3. Modified Alkyd Primer
      a. Shop Primer: Tnemec Seies V10 Tnemec Primer @ 2.0 – 3.5 mils DFT.
      b. Performance Requirements:
         1) ASTM D 4060: No more than 90.0 mg loss after 500 cycles with 500 gram load, average of three tests.
         2) ASTM D 4541 (On SSPC-SP1 solvent cleaned steel): No less than 825 psi (5.69 MPa) adhesion after ten freeze/thaw cycles, average of three trials.
         3) ASTM D 5894 (On SSPC-SP1 solvent cleaned steel): No blistering, cracking, rusting or delamination of the film and no rust creepage at the scribe after 1,008 hours (three cycles).
         4) Exterior Exposure (Mild industrial area, On SSPC-SP1 solvent cleaned steel): No blistering, cracking, rusting or delamination of the film after 12 months exposure.

END OF SECTION

SECTION 09900 PAINTING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, tools, materials, equipment, scaffolding or other structures and incidentals necessary to complete this Contract in its entirety.

B. The work includes painting and finishing of all new interior and exterior exposed items above and below grade and surfaces, such as structural steel, miscellaneous metals, ceilings, walls, floors, doors, frames, transoms, roof fans, construction signs, guardrails, posts, pipes, fittings, valves, tanks, equipment and all other work obviously required to be painted unless otherwise specified herein or on the Drawings. The omission of minor items in the Schedule of Work shall not relieve the Contractor of his obligation to include such items where they come within the general intent of the Specification as stated herein.

C. The following items shall not be painted:

1. Any code-requiring labels, such as Underwriter's Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.
2. Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts, unless otherwise indicated.
3. Aluminum handrails (except where in contact with concrete) walkways, windows, louvers and grating unless otherwise specified herein.
4. Signs and nameplates.
5. Finish hardware.
6. Chain link fence.
7. Piping buried in the ground or embedded in concrete.
8. Concealed surfaces of pipe or crawl space.
9. Nonferrous metals, unless specifically noted otherwise.
10. Electrical switchgear and motor control centers.
11. Stainless steel angles, tubes, pipe, etc.
12. Products with polished chrome, aluminum, nickel or stainless steel finish.
13. Plastic switch plates and receptacle plates.
14. Flexible couplings, lubricated bearing surfaces, insulation and metal and plastic pipe interior.
15. Sprinkler heads.
16. Lifting chain on cranes and hoists
17. Electrical cable, festooned conductor system, cables, collector pole brackets, etc.

D. All work shall be done in strict accordance with this Specification, the Design Drawings and the painting package, including manufacturer's printed instructions.

E. The Contractor will obtain, at its own expense, all permits, licenses and inspections and shall comply with all laws, codes, ordinances, rules and regulations promulgated by authorities having jurisdiction which may bear on the Work. This compliance will include Federal Public Law 91-596 more commonly known as the "Occupational Safety and Health Act of 1970".

1.02 DEFINITIONS

A. Field Painting is the painting of new or rebuilt items at the job site. Field painting shall be the responsibility of the Contractor.

B. Shop Painting is the painting of new or rebuilt items in the shop prior to delivery to the jobsite.

C. Abbreviations: The abbreviations and definitions listed below, when used in this specification, shall have the following meanings:

1. Owner – The term owner is used to refer to either the owner or an appointed owner's representative such as an engineer, architect, etc.
2. SSPC - The Society for Protective Coatings
3. Exterior - Outside, exposed to weather
4. Interior Dry - Inside, concealed or protected from weather
5. Interior Wet - Inside, subject to immersion services
6. ASTM - American Society of Test Materials
7. NACE - National Association of Corrosion Engineers
8. NSF - National Sanitation Foundation
9. AWWA - American Water Works Association
10. ICRI - International Concrete Restoration Institute
11. NAPF – National Association of Pipe Fitters
12. Dry Film Thickness shall be in Mils

1.03 RESOLUTION OF CONFLICTS

A. It shall be the responsibility of the Contractor to arrange a meeting prior to the start of any coatings applications between the Contractor, the Coating Manufacturer, whose products are to be used, and the Owner. All aspects of surface preparation, application and coating systems as covered by this Specification will be reviewed at this meeting.

B. Clarification shall be requested promptly from the Owner when instructions are lacking, conflicts occur in the Specifications, or the procedure seems improper or inappropriate for any reason.

C. Copies of all manufacturer's instructions and recommendations shall be furnished to the Owner by the Painting Contractor.

D. It shall be the responsibility of the Coating Manufacturer to have their representative meet in person with the Contractor and Owner before and during the job as a consultant on proper preparation and application of the coating materials unless a meeting is determined to be unnecessary by the Owner.

1.04 SUBMITTALS

A. Contractor shall submit catalog data and cut sheets for the painting system being used.

B. Samples as detailed in 3.01 B shall be submitted regardless of system being used, showing each color to be used.

C. Hazardous Material Disposal documentation shall be submitted if applicable.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Effective oil and water separators shall be used in all compressed air lines serving spray painting and sandblasting operations to remove oil or moisture from the air before it is used. Separators shall be placed as far as practicable from the compressor.

B. All equipment for application of the paint and the completion of the work shall be furnished by the Contractor in first-class condition and shall comply with recommendations of the paint manufacturer.

C. Contractor will make available to the County a "Nordson-Mikrotest" or "Positest" dry film thickness gauge for ferrous metal and an OG232 "Tooke" gauge or equal for non-ferrous and cementitious surface, to be used to inspect coatings by the County and Contractor. The gauges may be used by the Contractor and returned each day to the County. County will return gauges to Contractor at completion of job.

2.02 MATERIALS

A. All materials specified herein are specified to establish standards of quality and are approved for use on this Project. These materials shall be used unless otherwise stated in the Contract documents.

B. Equivalent materials of other manufacturers may be substituted on approval of the County. Requests for substitution must include a side-by-side comparison of equality, including: manufacturer's literature for each product giving the name, generic type, volume solids, descriptive information, evidence of satisfactory past performance, and an independent laboratory certification that their product meets the performance criteria of the specified materials.

C. To allow time for review, all requests for substitution shall be submitted by the coating manufacturer a minimum of 21 days prior to the scheduled work.

D. Substitutions which decrease the total film thickness, change the generic type of coating, or fail to meet the performance criteria of the specified materials shall not be approved. Substitutions which otherwise reduce performance shall not be approved.

E. All coatings to be shop applied must meet the requirements for volatile organic compounds (VOC) of not more than 3.5 lbs/gallon after thinning.

F. Colors, where not specified, shall be as selected by the Owner or their Representative.

G. All coatings in contact with potable water need to be NSF Certified, Tested, and Listed in accordance with ANSI/NSF Standard 61.

H. All above ground potable water mains and appurtenances shall be painted Safety Blue (Tnemec 11SF), above ground reclaimed water mains and appurtenances shall be painted purple (Pantone 522C), and above ground pressure sewer mains and appurtenances shall be painted green (Rustoleum 7538 Hunter Green).

2.03 REFERENCES

A. This section contains references to the governing standards and documents listed below. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the more stringent of the requirements shall prevail

B. Unless otherwise specified, references to documents shall mean the documents in effect at the time of receipt of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued, or replaced.

C. Referenced publications found within this specification shall be the latest revision unless otherwise specified; and applicable parts of the referenced publications shall become a part of this specification as if fully included.

D. ASTM International (ASTM):

1. ASTM B117 – Salt Spray (Fog)
2. ASTM C140 – Water Absorption (Applied to Cast Mortar Cubes)
3. ASTM C307 – Tensile Strength, Elongation, Modulus of Elasticity
4. ASTM C531 – Thermal Expansion
5. ASTM C579 – Compressive Strength
6. ASTM C580 – Flexural Strength and Modulus of Elasticity
7. ASTM C67 – Water Absorption (Applied to Fire Clay Brick)
8. ASTM C793 – Accelerated Weathering
9. ASTM C97 – Water Absorption (Applied to Ohio Sandstone)
10. ASTM D1014 – Exterior Exposure
11. ASTM D2047 – Coefficient of Friction
12. ASTM D2240 - Hardness
13. ASTM D2247 - Humidity
14. ASTM D2370 – Tensile Strength, Elongation, Modulus of Elasticity
15. ASTM D2794 - Impact
16. ASTM D3273 – Fungal/Mold/Mildew Resistance
17. ASTM D4060 - Abrasion
18. ASTM D4141, Method C (EMMAQUA) – Exterior Exposure
19. ASTM D4541 – Adhesion
20. ASTM D4585 – Humidity
21. ASTM D4587 – QUV Exposure
22. ASTM D522 – Flexibility and Elongation

23. ASTM D5590 – Fungal/Mold/Mildew/Algal Resistance
24. ASTM D5894 – Cyclic Salt Fog/UV Exposure
25. ASTM D624 – Tear Strength
26. ASTM D638 – Tensile Strength, Elongation, Modulus of Elasticity
27. ASTM D648 – Deflection Temperature
28. ASTM D6695 – Xenon Arc Weathering
29. ASTM D695 – Compressive Strength
30. ASTM D7234 - Adhesion
31. ASTM D790 – Flexural Strength and Modulus of Elasticity
32. ASTM D870 – Immersion
33. ASTM G85 – Prohesion

E. NACE International (NACE):

1. NACE TM-01-74

F. Federal Specification (FED):

1. FED TT-C-555B - Wind Driven Rain

G. Military and Government Specs & Standards:

1. MIL D3134 – Impact

H. British Standard:

1. BS EN 598: 2007+A1: 2009 - Rocking Abrasion

I. American Association of State Highway and Transportation Officials

1. AASHTO T-259 – Chloride Ion Penetration

PART 3 EXECUTION

3.01 INSPECTION OF SURFACES

A. Before application of the prime coat and each succeeding coat, all surfaces to be coated shall be subject to inspection by the County. Any defects or deficiencies shall be corrected by the Contractor before application of any subsequent coating.

B. Samples of surface preparation and of painting systems shall be furnished by the Contractor to be used as a standard throughout the job, unless omitted by the County.

C. When any appreciable time has elapsed between coatings, previously coated areas shall be carefully inspected by the County, and where, in his opinion, surfaces are damaged or contaminated, they shall be cleaned and recoated at the Contractor's expense.

D. The Contractor shall follow the Manufacturer’s latest printed recommended minimum and maximum recoat times. If the maximum recoat time has been exceeded, the Contractor shall follow the Manufacturer’s latest printed instructions.

E. Coating thickness shall be determined by the use of a properly calibrated "Nordson-

Mikrotest" or "Positest" Coating Thickness Gauge (or equal) for ferrous metal. Please note that a “Tooke” gauge may be used on cementitious surfaces, and that use of the "Tooke" gauge is classified as a destructive test.

F. Before performing any destructive tests on a newly applied coating system, the Owner and Contractor shall determine which of them is responsible for the cost of repairing the damaged coatings.

3.02 STANDARDS FOR SURFACE PREPARATION

A. SSPC-SP1: Solvent Cleaning: Remove all grease, oil, salt, acid, alkali, dirt, dust, wax, fat, foreign matter and contaminates, etc. by one of the following methods: steam cleaning, alkaline cleaning, or volatile solvent cleaning.

B. SSPC-SP2: Hand Tool Cleaning: Removal of loose rust, loose mill scale and loose paint to a clean sound substrate by hand chipping, scraping, sanding and wire brushing.

C. SSPC-SP3: Power Tool Cleaning: Removal of loose rust, loose mill scale and loose paint to a clean sound substrate by power tool chipping, descaling, sanding, wire brushing and grinding.

D. SSPC-SP5/NACE No.1: White Metal Blast Cleaning: Complete removal of all mill scale, rust, rust scale, previous coating, etc., leaving the surface a uniform gray-white color.

E. SSPC-SP6/NACE No.3: Commercial Blast Cleaning: Complete removal of all dirt, rust scale, mill scale, foreign matter and previous coating, etc., leaving only shadows and/or streaks caused by rust stain and mill scale oxides. At least 66% of each square inch of surface area is to be free of all visible residues, except slight discoloration.

F. SSPC-SP7/NACE No.4: Brush-Off Blast Cleaning: Removal of rust scale, loose mill scale, loose rust and loose coatings, leaving tightly-bonded mill scale, rust and previous coatings. On concrete surfaces, brush-off blast cleaning shall remove all laitance, form oils and solid contaminates. Blasting should be performed sufficiently close to the surface so as to open up surface voids, bugholes, air pockets and other subsurface irregularities, but so as not to expose underlying aggregate.

G. SSPC-SP10/NACE No.2: Near-White Blast Cleaning: Removal of all rust scale, mill scale, previous coating, etc., leaving only light stains from rust, mill scale and small specks of previous coating. At least 95% of each square inch of surface area is to be free of all visible residues and the remainder shall be limited to slight discoloration.

H. SSPC-SP11: Power Tool Cleaning to Bare Metal: Complete removal of rust, rust scale, mill scale, foreign matter and previous coatings, etc., to a standard as specified on a Commercial Grade Blast Cleaning (SSPC-SP-6, NACE-3) by means of power tools that will provide the proper degree of cleaning and surface profile.

I. SSPC-SP13/NACE No.6: Surface Preparation of Concrete: Provides requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems.

a. International Concrete Restoration Institute (ICRI):

1. ICRI 310.1R - Exposed Reinforcing bar (Rebar) Repair
2. ICRI-CSP 1 - Concrete Surface Profile 1
3. ICRI-CSP 2 - Concrete Surface Profile 2
4. ICRI-CSP 3 - Concrete Surface Profile 3
5. ICRI-CSP 4 - Concrete Surface Profile 4
6. ICRI-CSP 5 - Concrete Surface Profile 5
7. ICRI-CSP 6 - Concrete Surface Profile 6

J. SSPC-SP14/NACE No.8: Industrial Blast Cleaning: An industrial blast cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dust, and dirt. Traces of tightly adherent mill scale, rust, and coating residues are permitted to remain on 10% of each unit area of the surface if they are evenly distributed.

K. SSPC-SP15: Commercial Grade Power Tool Cleaning: A commercial grade power tool cleaned steel surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, rust, coating, oxides, mill scale, corrosion products, and other foreign matter, except as noted. Random staining shall be limited to no more than 33 percent of each unit area of surface as defined.

L. Visual standards "Pictorial Surface Preparation Standards for Painting Steel Surfaces", and the National Association of Corrosion Engineer, "Blasting Cleaning Visual Standards" TM-01-70 and TM-01-75 shall be considered as standards for proper surface preparation.

M. NAPF 500-03-04: External Pipe Surface: When viewed without magnification, the exterior surfaces shall be free of all visible dirt, dust, loose annealing oxide, rust, mold, coatings, and other foreign matter.

N. NAPF 500-03-05: Fitting Blast Clean #2: When viewed without magnification, no more than 5% staining may remain on the surface and the exterior surfaces shall be free of all visible dirt, dust, annealing oxide, rust, mold, coatings, and other foreign matter.

3.03 SURFACE PREPARATION

A. The surface shall be cleaned as specified for the paint system being used.

B. All cleaning shall be as outlined in the Society for Protective Coatings (SSPC) Surface Preparation Specification, National Association of Corrosion Engineers (NACE), and the International Concrete Repair Institute (ICRI) unless otherwise noted.

C. If surfaces are subject to contamination, other than mill scale or normal atmospheric rusting, the surfaces shall be checked for chloride contamination, pressure washed, and acid or caustic pH residues neutralized, in addition to the specified surface preparation.

D. Oil, grease, soil, dust, etc., deposited on the surface preparation that has been completed shall be removed prior to painting according to SSPC-SP1 Solvent Cleaning under this Specification.

E. Weld flux, weld spatter, and rust scale shall be removed by a minimum of SSPC-SP3 Power Tool Cleaning as per these Specifications.

F. All weld seams, sharp protrusions and edges shall be ground smooth prior to surface preparation or application of any coatings.

G. All areas requiring field welding shall be masked off prior to shop coating, unless waived by the Owner.

H. All areas which require field touch-up after erection, such as welds, burnbacks, and mechanically damaged areas, shall be prepared per the Manufacturer's latest written recommendations.

I. In the event that an existing coating's max recoat window has been exceeded, all surfaces to be overcoated must be thoroughly and uniformly de-glossed and scarified before the application of additional coatings.

J. All surfaces must be clean and dry prior to the application of any coatings.

K. All bare concrete surfaces exposed to wastewater or similar corrosive atmospheres shall be confirmed to have a minimum pH of 9 prior to the application of coatings.

3.04 PRETREATMENTS

When specified, the surface shall be pretreated in accordance with the specified pretreatment prior to application of the prime coat of paint.

3.05 STORAGE

Materials shall be delivered to the job site in the original packages with seals unbroken and with legible unmutilated labels attached. Packages shall be available for inspection by the County. All coating materials shall be stored in accordance with the Manufacturer's latest written recommendations. The Contractor is responsible for following the Manufacturer's suggested storage temperatures and conditions. The Contractor shall be solely responsible for the protection of the materials stored by himself at the job site. Empty coating cans shall be neatly stacked in an area designated by the County and removed from the job site on a schedule determined by the Contractor. County may request a notarized statement from Contractor detailing all materials used on the Project.

3.06 PREPARATION OF MATERIALS

A. Mechanical mixers, capable of thoroughly mixing the pigment and vehicle together, shall mix the paint prior to use where required by manufacturer's instructions; thorough hand mixing will be allowed for small amounts up to one gallon. Pressure pots shall be equipped with mechanical mixers to keep the pigment in suspension, when required by manufacturer's instructions. Otherwise, intermittent hand mixing shall be done to assure that no separation occurs. All mixing shall be done in accordance with SSPC Vol. 1, Chapter 4, "Practical Aspects, Use and Application of Paints" and/or with manufacturer's recommendations.

B. Thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction. Partial kits may only be used when components are accurately measured and mixed per the Manufacturer’s latest written recommendations.

3.07 APPLICATION

A. Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather, unless otherwise allowed by the paint manufacturer. Except as provided below, painting shall not be permitted when the atmospheric temperature is outside limit of the manufacturer’s latest written recommendations, or when freshly painted surfaces may be damaged by rain, fog, dust, or condensation, and/or when it can be anticipated that these conditions will prevail during the drying period.

B. No coatings shall be applied unless surface temperature is a minimum of 5°F above dew point; temperature must be maintained during curing.

C. See coating schedule for actual coating systems to be used on this project.

3.08 DEW POINT CALCULATION CHART

DEW POINT CALCULATION CHART

Ambient Air Temperature - Fahrenheit

Relative Humidity	20	30	40	50	60	70	80	90	100	110	120
90%	18	28	37	47	57	67	77	87	97	107	117
85%	17	26	36	45	55	65	76	84	95	104	113
80%	16	25	34	44	54	63	73	82	93	102	110
75%	15	24	33	42	52	62	71	80	91	100	108
70%	13	22	31	40	50	60	68	78	88	96	105
65%	12	20	29	38	47	57	66	76	85	93	103
60%	11	29	27	36	45	55	64	73	83	92	101
55%	9	17	25	34	43	53	61	70	80	89	98
50%	6	15	23	31	40	50	59	67	77	86	94
45%	4	13	21	29	37	47	56	64	73	82	91
40%	1	11	18	26	35	43	52	61	69	78	87
35%	-2	8	16	23	31	40	48	57	65	74	83

SURFACE TEMPERATURE AT WHICH CONDENSATION OCCURS

Dew Point

Temperature at which moisture will condense on surface. No coatings should be applied unless surface temperature is a minimum of 5°F above this point. Temperature must be maintained during curing.

Example

If air temperature is 70°F and relative humidity is 65%, the dew point is 57°F. No coating should be applied unless surface temperature is 62°F minimum.

A. No coating shall be applied unless the relative humidity is below 85%.

B. Suitable enclosures to permit painting during inclement weather may be used if provisions are made to control atmospheric conditions artificially inside the enclosure, within limits suitable for painting throughout the painting operations.

C. Field painting in the immediate vicinity of, or on, energized electrical and rotating equipment, and equipment and/or pipes in service shall not be performed without the approval of the Owner.

D. Extreme care shall be exercised in the painting of all operable equipment, such as valves, electric motors, etc., so that the proper functioning of the equipment will not be affected.

E. The Contractor's scaffolding shall be erected, maintained and dismantled without damage to structures, machinery, equipment or pipe. Drop cloths shall be used where required to protect buildings and equipment. All surfaces required to be clear for visual observation shall be cleaned immediately after paint application.

F. Painting shall not be performed on insulated pipe within three (3) feet of insulation operations or on insulation whose covering and surface coat have not had time to set and dry. Painting shall not be performed on uninsulated pipe within one (1) foot of any type of connection until the connection has been made, except as directed by the Owner.

G. The prime coat shall be applied immediately following surface preparation and in no case later than the same working day. All paint shall be applied by brushing, paint mitt and roller, conventional spraying, or airless spraying, using equipment approved by the paint manufacturer.

H. Each coat of paint shall be recoated as per manufacturer's instructions. Paint shall be considered recoatable when an additional coat can be applied without any detrimental film irregularities such as lifting or loss of adhesion.

I. Surfaces that will be inaccessible after assembly shall receive either the full specified paint system or three shop coats of the specified primer before assembly.

J. Unless otherwise specified, each full coat within a coating system shall be of a different or alternating color.

K. Finish colors shall be in accordance with the COLOR SCHEDULE and shall be factory mixed (i.e., there shall be no tinting by the Contractor, unless authorized by the Owner).

L. All edges and weld seams in immersion service shall receive a "stripe coat" (applied by brush) of the 2nd coat prior to application of the full 2nd coat.

M. All open seams in the roof area of tanks shall be filled after application of the topcoat with a flexible caulking such as Sika Flex 1A.

3.09 WORKMANSHIP

A. The Contractor must show proof that all employees associated with this Project shall have been employed by the Contractor for a period not less than six (6) months.

B. Painting shall be performed by experienced painters in accordance with the recommendations of the paint manufacturer. All paint shall be uniformly applied without sags, runs, spots, or other blemishes. Work which shows carelessness, lack of skill, or is defective in the opinion of the County, shall be corrected at the expense of the Contractor.

C. The Contractor shall provide the names of at least three other projects of similar size and scope that they have successfully completed under their current company name.

3.10 APPLICATION OF PAINT

A. By Brush and/or Rollers

1. Top quality, properly styled brushes and rollers shall be used. Rollers with a baked phenol core shall be utilized.
2. The brushing or rolling shall be done so that a smooth coat as nearly uniform in thickness as possible is obtained. Brush or roller strokes shall be made to smooth the film without leaving deep or detrimental marks.

3. Surfaces not accessible to brushes or rollers may be painted by spray, by dauber or sheepskins, and paint mitt.
4. It may require two coats to achieve the specified dry film thickness if application is by brush and roller.

B. Air, Airless or Hot Spray

1. The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied and shall be equipped with suitable pressure regulators and gauges.
2. Paint shall be applied in a uniform layer, with a 50% overlap pattern. All runs and sags should be brushed out immediately or the paint shall be removed and the surface resprayed.
3. High build coatings should be applied by a cross-hatch method of spray application to ensure proper film thickness of the coating.
4. Areas inaccessible to spray shall be brushed; if also inaccessible to brush, daubs or sheepskins shall be used, as authorized by the manufacturer.
5. Thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction.
6. Nozzles, tips, etc., shall be of sizes and designs as recommended by the manufacturer of the paint being sprayed.
7. The first coat on concrete surfaces in immersion service should be sprayed and back rolled.

3.11 PROTECTION AND CLEANUP

A. It shall be the responsibility of the Contractor to protect at all times, in areas where painting is being done, floors, materials of other crafts, equipment, vehicles, fixtures, and finished surfaces adjacent to paint work. Cover all electric plates, surface hardware, nameplates, gauge glasses, etc., before start of painting work.

B. At the option of the County during the course of this project, the Contractor will contain all spent abrasives, old paint chips, paint overspray and debris by means suitable to the County, including, but not limited to, full shrouding of the area.

C. If shrouding is required, the Contractor must provide a complete design of the intended shroud or cover. Care must be taken not to modify or damage the structure during the use of the shroud. If damage should occur, the Contractor is held responsible for all repairs.

D. At completion of the work, remove all paint where spilled, splashed, spattered, sprayed or smeared on all surfaces, including glass, light fixtures, hardware, equipment, painted and unpainted surfaces.

E. After completion of all painting, the Contractor shall remove from job site all painting equipment, surplus materials and debris resulting from this work.

F. The Contractor is responsible for the removal and proper disposal of all hazardous materials from the job site in accordance with Local, State and Federal requirements as outlined by the Environmental Protection Agency.

G. A notarized statement shall be presented to the County that all hazardous materials have been disposed of properly including, but not limited to: name of disposal company, disposal

site, listing of hazardous materials, weights of all materials, cost per pound and EPA registration number.

3.12 TOUCH-UP MATERIALS

A. All areas which require field touch-up after erection, such as welds, burnbacks, and mechanically damaged areas, shall be prepared per the Manufacturer's latest written recommendations.

B. Strict adherence to manufacturer's complete touch-up recommendations shall be followed. Any questions relative to compatibility of products shall be brought to the Owner and Manufacturer's attention. Otherwise, Contractor assumes full responsibility.

C. The Contractor shall provide, at the end of the Project, at least one (1) gallon of each generic topcoat in each color as specified by the Owner for future touch-up. Two gallons may by required for (2) component materials.

3.13 ON-SITE INSPECTION

During the course of this Project, the County will reserve the option of incorporating the services of a NACE Level III inspection service. The inspection service will be responsible for assuring the proper execution of this Specification by the successful Contractor.

3.14 STEEL & FERROUS METALS

A. FERROUS METALS - NON-IMMERSION / EXTERIOR / UV-EXPOSED

The coating systems in the FERROUS METALS - NON-IMMERSION / EXTERIOR / UV-EXPOSED section are listed in order of decreasing color & gloss retention and corrosion resistance. The first system has maximum color & gloss retention and maximum corrosion resistance.

1. System No. 700-1: Zinc/Epoxy/Fluoropolymer

This system provides outstanding resistance to ultra-violet light degradation and the absolute best color and gloss retention available. This system will have excellent resistance to abrasion and chalking, and is recommended for coastal environments and on structures where extremely long-term maintenance cycles are desired (such as elevated tanks and surfaces with custom artwork). (Note: Series 700 is gloss. If the Owner desires a semi-gloss finish then Series 700 may be replaced with Series 701.) Note: For single-component application, Series 90G-1K97 may be substituted as the primer.

Surface Preparation: SSPC-SP6/NACE No.3 Commercial Blast Cleaning with a minimum 1.5 mil angular anchor profile.

Primer: Series 90-97 Tneme-Zinc	2.5 - 3.5 mils
2nd Coat: Series 66HS Hi-Build Epoxoline	3.0 - 6.0 mils
3rd Coat: Series 700 Hydroflon	2.0 - 3.0 mils
	Total Dry Film Thickness: 7.5 - 12.5 mils
	Minimum Dry Film Thickness: 9.5 mils

2. System No. 1095-1: Zinc/Epoxy/Urethane

This system offers excellent color & gloss retention with the added corrosion protection of a zinc rich primer. Series 90-97 Tneme-Zinc is an organic zinc-rich primer that can be used for field touch up of a zinc primer or for touch up of galvanized surfaces that are damaged. For single-component applications, Series 90G-1K97 may be substituted for Series 90-97. Series 1095 has a semi-gloss finish. For a different sheen, apply Series 1094 (gloss) or Series 1096 (eggshell) at the same thickness.

Surface Preparation: SSPC-SP6/NACE No.3 Commercial Blast Cleaning with a minimum 1.5 mil angular anchor profile.

Shop Coat: Series 90-97 Tneme-Zinc	2.5 - 3.5 mils
2nd Coat: Series 66HS Hi-Build Epoxoline	3.0 - 6.0 mils
3rd Coat: Series 1095 Endurashield	2.5 - 5.0 mils
	Total Dry Film Thickness: 8.0 - 14.5 mils
	Minimum Dry Film Thickness: 10.0 mils

3. System No. 1095-2: Epoxy/Epoxy/Urethane

This system is highly resistant to abrasion, wet conditions, corrosive fumes and chemical contact. It provides excellent color & gloss retention. This system should be used for exterior steel surfaces that are neither submerged, nor buried. Series 161HS may be substituted for Series 66HS for low temperature cure or quick recoats. Series 1095 has a semi-gloss finish. For a different sheen, apply Series 1094 (gloss) or Series 1096 (eggshell) at the same thickness.

Surface Preparation: SSPC-SP6/NACE No.3 Commercial Blast Cleaning with a minimum 1.5 mil angular anchor profile.

Shop Coat: Series 66-1211 Hi-Build Epoxoline Primer	3.0 - 6.0 mils
2nd Coat: Series 66 Hi-Build Epoxoline	3.0 - 6.0 mils
3rd Coat: Series 1095 Endura-Shield	2.0 - 5.0 mils
	Total Dry Film Thickness: 8.0 - 17.0 mils
	Minimum Dry Film Thickness: 10.0 mils

4. System No. 1095-3: Epoxy Mastic/Urethane (Overcoat)

This system can be used over factory finish paint or over non-sandblasted steel and offers the high performance of an epoxy/urethane system. Series 1095 has a semi-gloss finish. For a different sheen, apply Series 1094 (gloss) or Series 1096 (eggshell) at the same thickness.

Surface Preparation: High Pressure Water Clean (min. 3500 psi, 3 to 5 gallons per minute, using an oscillating tip and potable water). A cleaning detergent such as Trisodium Phosphate should be used to facilitate cleaning. A degreaser may be required for oil soaked areas or heavily contaminated areas.

Some spot areas may require Hand Tool (SSPC-SP2), Power Tool Cleaning (SSPC-SP3), or Brush Blast (SSPC-SP7/NACE No. 4) to remove loose surface rust.

Existing coatings must be clean, dry, and tightly adhering prior to application of coatings.

Spot Prime (Areas of Bare Steel): Series 135 Chembuild	4.0 – 6.0 mils
1st Coat: Series 135 Chembuild	4.0 - 6.0 mils
2nd Coat: Series 1095 Endura-Shield	2.0 - 5.0 mils
	Total Dry Film Thickness: 6.0 - 11.0 mils*
	Minimum Dry Film Thickness: 7.0 mils

**Does not include spot prime or previously existing coatings.*

B. EXTERIOR BELOW GRADE EXPOSURE

1. System No. 66HS-1: Epoxy/Epoxy/Epoxy or Urethane

This system provides exceptional corrosion protection in buried environments. It offers better corrosion protection and a healthier application process than coal-tar epoxies. The 3rd coat is dependent on the exposure – for buried areas use an extra coat of high-solids epoxy, for uv-exposed, non-immersion areas use an aliphatic acrylic urethane. Series 1095 has a semi-gloss finish. For a different sheen, apply Series 1094 (gloss) or Series 1096 (eggshell) at the same thickness.

Surface Preparation: SSPC-SP10/NACE No. 2 Near-White Blast Cleaning with a minimum angular anchor profile of 1.5 mils.

Shop Coat: Series N140 Pota-Pox Plus	2.0 – 10.0 mils
2nd Coat: Series N140 Pota-Pox Plus	4.0 - 10.0 mils
3rd Coat (Buried Area Only): Series N140 Pota-Pox Plus	4.0 - 10.0 mils
3rd Coat (UV Exposed, Non Immersion Areas Only): Series 1095	2.5 – 5.0 mils
	Total Dry Film Thickness: 10.0 – 30.0 mils
	Minimum Dry Film Thickness: 11.0 mils

2. System No. 46H-413-1: Polyamide Epoxy-Coal Tar

This system provides a high-build coating for underground conditions.

Surface Preparation: SSPC-SP10/NACE No. 2 Near-White Blast Cleaning with a minimum angular anchor profile of 1.5 mils.

1st Coat: Series 46H-413 Hi-Build Tneme-Tar	8.0 - 10.0 mils
2nd Coat: Series 46H-413 Hi-Build Tneme-Tar	8.0 - 10.0 mils
Total Dry Film Thickness:	16.0 - 20.0 mils
Minimum Dry Film Thickness:	18.0 mils

C. INTERIOR (NON-IMMERSION)

1. System No.66HS-2: Polyamide Epoxy

This system will provide chemical and corrosion resistance against abrasion, moisture, corrosion fumes, and occasional chemical contact. Primer coat must be touched-up before second coat is applied. Substitute Series 161 for low temperature cure or quick recoats. Use this system for interior exposed, non-submerged metals.

Surface Preparation: SSPC-SP6/NACE No.3 Commercial Blast Cleaning with a minimum 1.5 mil angular anchor profile.

Shop Coat: Series 66 Hi-Build Epoxoline	3.0 - 5.0 mils
2nd Coat: Series 66 Hi-Build Epoxoline	4.0 - 6.0 mils
3rd Coat: Series 66 Hi-Build Epoxoline	4.0 - 6.0 mils
Total Dry Film Thickness:	7.0 - 11.0 mils
Minimum Dry Film Thickness:	9.0 mils

2. System No. 27WB-1: Inorganic Hybrid Water-Based Epoxy (Overcoat)

This low VOC system can be used over factory finish paint or over non-sandblasted steel and offers the high performance of an epoxy/urethane system. Series 1095 has a semi-gloss finish. For a different sheen, apply Series 1094 (gloss) or Series 1096 (eggshell) at the same thickness.

Surface Preparation: Abrasive blast cleaning in accordance with SSPC-SP7/NACE No.4 generally produces the best coating performance. If conditions will not permit this, Series 27WB may be applied to SSPC-SP2 or SP3 Hand or Power Tool Cleaned surfaces (SSPC Rust Grade Condition C).

Shop Coat: Manufacturer's Standard (or existing coating)	varies
Spot Prime (Areas of Bare Steel): Series 27WB Typoxy	3.0 - 8.0 mils
2nd Coat: Series 27WB Typoxy	3.0 - 8.0 mils
3rd Coat: Series 1095 Endura-Shield	2.5 - 5.0 mils
Total Dry Film Thickness:	5.5 - 13.0 mils*
Minimum Dry Film Thickness:	7.0 mils

**Does not include spot prime or previously existing coatings.*

D. IMMERSION

1. System No. 104-1: Cycloaliphatic Amine Epoxy (Non-Potable Water)

This system will provide chemical and corrosion resistance for protection against moisture, corrosive fumes, chemical contact and immersion in **mild to moderate** wastewater, such as clarifiers, chlorine contact basins, aeration basins, settling basins and other open top (aerobic) structures. Shop coat must be touched-up before second coat is applied.

Surface Preparation: SSPC-SP10/NACE No.2 Near-White Blast Cleaning with a minimum 1.5 mil angular anchor profile.

Shop Coat: Series 1 Omnithane	2.5 - 3.5 mils
2nd Coat: Series 104 Hi-Build Epoxoline	6.0 - 8.0 mils
3rd Coat: Series 104 Hi-Build Epoxoline	6.0 - 8.0 mils
	Total Dry Film Thickness: 14.5 - 19.5 mils
	Minimum Dry Film Thickness: 15.5 mils

Allow Series 104 to cure for 7 days at 75°F prior to immersion service.

2. System No. 142-1: Flake / Aluminum Oxide Filled Polyamine Epoxy (Non-Potable Water)

This system will provide chemical and corrosion resistance for protection against moisture, corrosive fumes, chemical contact and immersion in **mild to** ***moderate wastewater where increased abrasion resistance is required.***

Surface Preparation: SSPC-SP-10/NACE No.2 Near-White Metal Blast Cleaning (1.5 Mil Profile)

1st Coat: Series 1 Omnithane	2.5 - 3.5 mils
2nd Coat: Series 142 Epoxoline	14 - 18.0 mils
	Total Dry Film Thickness: 16.5 – 23.5 mils
	Minimum Dry Film Thickness: 20.0 mils

3. System No. 446-1: Hydrophobic Aromatic Polyurethane (Non-Potable Water)

This system will provide exceptional chemical and corrosion resistance for protection against moisture, corrosive fumes, chemical contact and **immersion in mild to moderate wastewater environments. This system is designed for situations where an extremely quick return to service is required.**

Surface Preparation: SSPC-SP10/NACE No.2 Near-White Blast Cleaning.

1st Coat: Series 1 Omnithane	2.5 – 3.5 mils
2nd Coat: 446 Perma-Shield MCU	6.0 - 8.0 mils*
3rd Coat: 446 Perma-Shield MCU	6.0 - 8.0 mils*
	Total Dry Film Thickness: 14.5 - 19.5 mils
	Minimum Dry Film Thickness: 16.0 mils

**Exceeding 10.0 mils per coat of Series 446 may cause blistering.*

Notes:

1. Series 446 is not color stable. Its color may change drastically, which will not affect the performance of the product.
2. Allow Series 446 to cure for 4 hours at 75°F prior to service.

4. System No. 142-2: Flake / Aluminum Oxide Filled Polyamine Epoxy (Methanol Liner)

This system will provide chemical and corrosion resistant liner suitable for methanol immersion service.

Surface Preparation: SSPC-SP-10/NACE No.2 Near-White Metal Blast Cleaning (1.5 Mil Profile)

2nd Coat: Series 142 Epoxoline — 15.0 - 18.0 mils

Total Dry Film Thickness: 15.0 – 18.0 mils

Minimum Dry Film Thickness: 15.0 mils

5. System No. 365-1: Novolac Epoxy (Sulfuric Acid Liner)

This system is a spray applied, 100% solids, high build, reinforced epoxy formulated for general use as an internal lining for tanks and other aggressive chemical immersion service.This lining is suitable for immersion service in 98% sulfuric acid, and **requires the use of heated plural component equipment to apply.**

Surface Preparation: SSPC-SP5/NACE No. 1 White Metal Blast Cleaning with a minimum angular anchor profile of 3.0 mils. Refer to the Series 365 Application Guide.

Surfacer/Filler (as needed to fill pits and voids): Series 351 Tank Armor

*Stripe Coat: Brush Series 365 Tank Armor into welds, seams, and edges

*Full Coat: Series 365 Tank Armor — 35.0 – 50.0 mils

Total Dry Film Thickness: 35.0 – 50.0 mils

*Consult the manufacturer's latest written recommendations and application guide before applying.

Notes:

1. If the humidity is anticipated to exceed 80%, dehumidification equipment is required.
2. Allow Series 365 to cure for 48 hours at 75°F prior to service.

6. System No. 22-1: Modified Polyamine Epoxy (Potable Water)

This is a low VOC system which meets the requirements of approval for potable water use as established by NSF Std 61. **This system may be applied up to 40.0 mils in a single coat, providing exceptional barrier protection and a quicker return to service.** This system is intended for use over simple shapes and areas with minimal detail work.

Surface Preparation: SSPC-SP10/NACE No.2 Near-White Blast Cleaning with a minimum angular anchor profile of 3.0 mils.

Pre-patch (sharp, angular pits and voids):	Series 215 as needed
Stripe Coat: Series 22	Welds, seams, and edges
Topcoat: Series 22	22.0 - 27.0 mils*
	Total Dry Film Thickness: 22.0 - 27.0 mils

**In order to maintain NSF Std. 61 approval, maximum allowable DFT is 50.0 mils.*

Notes:
1. Series 22 is to be spray applied only.
2. Allow Series 22 to cure for a minimum of 5 days at 75°F prior to service.

7. System No. 20HS-1: Epoxy-Polyamide (Potable Water)

This system meets American Water Works Association AWWA D 102 Inside Paint System Number 1. Series 20 meets the requirements of approval for potable water use as established by NSF Std 61. Substitute Series FC20 for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP10/NACE No.2 Near-White Blast Cleaning with a minimum angular anchor profile of 2.0 mils.

Shop Coat: Series 94H_2O Hydro-Zinc	2.5 – 3.5 mils
Stripe Coat (Weld Seams and Edges): 20 Pota-Pox	3.0 - 5.0 mils
2nd Coat: 20 1255 Pota-Pox (Beige)	4.0 - 6.0 mils
3rd Coat: 20-15BL Pota-Pox (Tank White)	4.0 - 6.0 mils
	Total Dry Film Thickness*: 10.5 - 15.5 mils**
	Minimum Dry Film Thickness: 11.5 mils

**Excludes stripe coat*

***Note: In order to maintain NSF Std. 61 approval, maximum allowable DFT is 18 mils.*

Allow Series 20 to cure for 7 days at 75°F prior to service.

3.15 OVERHEAD METAL DECKING, JOISTS

A. EXTERIOR EXPOSURE

System No. 1029-1: HDP Acrylic Polymer

This system can be applied over a wide variety of coatings and factory finishes. It can also be applied direct to galvanized decking, joists, & conduits. Series 1029 is suitable for application in mild to moderate exposures.

Surface Preparation: Pressure clean to remove all dirt, oil, grease, chemicals and foreign contaminates. Remove loose paint and all rust by hand and power tool cleaning (SSPC-SP 2 & 3)

1st Coat: Series 115 Uni-Bond	2.5 - 4.0 mils
2nd Coat: Series 1029 Enduratone	2.0 - 3.0 mils
	Total Dry Film Thickness: 4.5 - 7.0 mils

B. INTERIOR EXPOSURE

System No. 115-1: Self-crosslinking Hydrophobic Acrylic

This system should be used on ceilings of non-chemical storage areas where a one-coat system is desired. Can be applied over steel, galvanized and aluminum decking, joist, shop primed beams, conduits and concrete. Note: Series 115 has “dry-fall” characteristics. See manufacturer’s latest written Product Data Sheet for details.

Surface Preparation: Surfaces must be dry, clean and free of oil, grease and other contaminates.

One Coat: Series 115 Uni-Bond	2.5 – 4.0 mils
	Total Dry Film Thickness: 2.5 - 4.0 mils

3.16 GALVANIZED STEEL & NONFERROUS METALS

A. GALVANIZED STEEL, STAINLESS STEEL, ALUMINUM, OR COPPER

System No. 1095-4: Epoxy/High Build Urethane

Series 66has excellent adhesion to galvanized steel & nonferrous metals. This system is highly resistant to abrasion, wet conditions, corrosive fumes and chemical contact. It provides excellent color & gloss retention. Series 1095 has a semi-gloss finish. For a different sheen, apply Series 1094 (gloss) or Series 1096 (eggshell) at the same thickness.

Surface Preparation: SSPC-SP1 Solvent Cleaning, followed by mechanically abrading (SSPC-SP7/NACE No.4, minimum angular anchor profile of 1.5 mils)

1st Coat: Series 66 Hi-Build Epoxoline	2.0 - 4.0 mils
2nd Coat: Series 1095 Endura-Shield	2.5 - 5.0 mils
	Total Dry Film Thickness: 4.5 - 9.0 mils
	Minimum Dry Film Thickness: 5.0 mils

B. ALUMINUM IN CONTACT WITH CONCRETE

System No. 46H-413-2: Polyamide Epoxy

Surface Preparation: SSPC-SP1 Solvent Cleaning, followed by thoroughly scarifying to de-gloss and provide a minimum uniform angular anchor profile of 1.0 mil.

1st Coat: Series 46H-413 Hi-Build Tneme-Tar	3.0 - 5.0 mils
2nd Coat: Series 46H-413 Hi-Build Tneme-Tar	8.0 - 10.0 mils
	Total Dry Film Thickness: 11.0 - 15.0 mils
	Minimum Dry Film Thickness: 13.0 mils

3.17 CONCRETE & MASONRY

A. EXTERIOR - ABOVE GRADE (NON-IMMERSION, VERTICAL SURFACES)

1. System No. 156-1: Modified Waterborne Acrylate (Elastomeric)

This system provides exceptional elongation for spanning hairline cracks in concrete structures. It also provides mold & mildew resistance, as well as wind-driven rain resistance. For application over previously applied coatings, use TNEMEC Series 151 Elasto-Grip at 0.7 - 1.5 mils DFT prior to the application of Series 156 Enviro-Crete. Note: If a textured finish is preferred, use 157 Enviro-Crete TX (medium texture) @ 6.0 – 9.0 mils dry film thickness per coat.

Surface Preparation: Allow concrete to cure for 28 days. Surface must be clean and dry.

1st Coat: Series 156 Enviro-Crete	4.0 - 8.0 mils
2nd Coat: Series 156 Enviro-Crete	4.0 - 8.0 mils
	Total Dry Film Thickness: 8.0 - 16.0 mils
	Minimum Dry Film Thickness: 10.0 mils

2. System No. 1026-1: Acrylic Emulsion (Non-Elastomeric)

This system provides a durable, easy-to-use, water-based coating that offers long-wearing protection. It is low odor, low VOC, and has “dry-fall” properties. See manufacturer’s latest written Product Data Sheet for details. This system will provide a high vapor transmission rate.

Surface Preparation: Allow concrete to cure for 28 days. Surface shall be clean and dry.

Block Filler (CMU only): 1254 Epoxoblock	100 – 150 ft²/Gallon
1st Coat: Series 1026 Enduratone	2.0 - 3.0 mils
2nd Coat: Series 1026 Enduratone	2.0 - 3.0 mils
	Total Dry Film Thickness: 4.0 - 6.0 mils*
	Minimum Dry Film Thickness: 5.0 mils

*Does not include Block Filler

3. System No. 662-1: Silane /Siloxane Sealer (Min. 42% Solids)

This provides a clear, filmless, penetrating water repellent for virtually all above-grade, vertical and horizontal concrete, stucco, block, and brick masonry. This will allow the substrate to resist water and chloride ion intrusion, stain damage, freeze/thaw spalling, efflorescence, and rust damage. This system will not alter the color or texture of the surface, nor significantly affect the vapor transmission qualities of the substrate. This barrier is also resistant to ultraviolet and weather deterioration.

Surface Preparation: Allow new concrete to cure 28 days. All surfaces must be clean, dry, and free of oils, curing compounds, form release oils, and other contaminants that might interfere with the penetration of the sealer.

For Coating Brick & Concrete:
Tnemec Series 662 ..... Two Coats @ 75-200 ft²/gallon

For Coating Split-faced or Porous Masonry:
Tnemec Series 662 ..... Two Coats @ 35-100 ft²/gallon

4. System No. 626-1: Water Repellent and Graffiti Protectant

This provides superior protection against, and easy removal of, unwanted graffiti. **Series 626 is intended for use in conjunction with Series 680 Mark A Way (Cleaner) to provide a complete graffiti protection system.** This is a clear, silicone rubber-based formulation which protects vertical concrete block, brick, cast concrete, stone, and other masonry substrates with little or no change to the appearance of the untreated substrate. It has excellent stability against ultraviolet rays and salt spray.

Surface Preparation: Allow new concrete to cure 28 days. All surfaces must be clean, dry, and free of oils, curing compounds, form release oils, and other contaminants that might interfere with the penetration of the sealer.

For Coating Brick & Concrete:
Tnemec Series 626 ..... Two Coats @ 125-200 ft²/gallon

For Coating Split-faced or Porous Masonry:
Tnemec Series 626 ..... Two Coats @ 65-150 ft²/gallon

B. EXTERIOR - BELOW GRADE

1. System No. 46H-413-2: Polyamide Epoxy-Coal Tar

This system provides a high-build coating for underground conditions.

Surface Preparation: Allow new concrete to cure for 28 days. Surface shall be clean and dry.

One or Two Coats: 46H-413 Hi-Build Tneme-Tar
Total Dry Film Thickness: 16.0 - 20.0 mils*

C. INTERIOR (NON-IMMERSION)

The coating systems in the INTERIOR (NON-IMMERSION) section are listed in order of decreasing performance with regards to chemical & corrosion resistance. This generally has an inverse correlation with color & gloss retention. The first system has extremely good chemical resistance with the highest potential for yellowing, while the last system has extremely poor chemical resistance with the lowest potential for yellowing.

1. System No. 104-2: Cycloaliphatic Amine Epoxy

   This system will produce a tile-like finish for easy cleaning and superior stain resistance. It will also provide protection against chemical attack, corrosive fumes, high humidity and wash down. Backroll first coat to fill porosity.

   Surface Preparation: Allow new concrete and masonry to cure for 28 days. Surface must be clean and dry.

   For New Concrete or Porous Masonry: Apply Tnemec Series 1254 Epoxoblock WB @ 100 – 150 ft²/Gallon.

1st Coat: Series 104 H.S. Epoxy (backrolled)	8.0 - 10.0 mils
2nd Coat: Series 104 H.S. Epoxy	8.0 - 10.0 mils
	Total Dry Film Thickness: 16.0 - 20.0 mils
	Minimum Dry Film Thickness: 18.0 mils

2. System No. 66HS-6: Polyamide Epoxy

   This system provides excellent protection from abrasion, moisture, corrosive fumes and chemical contact.

   Surface Preparation: Allow new concrete and masonry to cure for 28 days. Surface must be clean and dry.

   For New Concrete or Porous Masonry: Apply Tnemec Series 1254 Epoxoblock WB @ 100 – 150 ft²/Gallon.

1st Coat: Series 66HS Hi-Build Epoxoline	3.0 - 5.0 mils
2nd Coat: Series 66HS Hi-Build Epoxoline	4.0 - 6.0 mils
	Total Dry Film Thickness: 7.0 -11.0 mils
	Minimum Dry Film Thickness: 9.0 mils

3. System No. 113-1: Acrylic-Epoxy

   This system will provide high performance and can be applied directly over existing coatings without lifting. Can be used when low odor is required during application. Note: Series 113 has a Satin finish. For a gloss finish, specify Series 114 Tneme-Tufcoat.

   Surface Preparation: Allow new concrete and masonry to cure for 28 days. Surface must be clean and dry.

   For New Concrete or Porous Masonry: Apply Tnemec Series 1254 Epoxoblock WB @ 100 – 150 ft²/Gallon.

1st Coat:113 Tneme-Tufcoat	4.0 – 6.0 mils
2nd Coat:113 Tneme-Tufcoat	4.0 – 6.0 mils
	Total Dry Film Thickness: 8.0 - 12.0 mils
	Minimum Dry Film Thickness: 9.0 mils

4. System No. 1026-2: Acrylic Emulsion

This system provides a durable, easy-to-use, water-based coating that offers long-wearing protection. It is low odor, low VOC, and has "dry-fall" properties. See manufacturer's latest written Product Data Sheet for details. This system will provide a high vapor transmission rate. Note: Series 1026 has a Matte finish. For a Semi-Gloss finish, specify Series 1029 Enduratone.

Surface Preparation: Surface shall be clean and dry. Allow concrete to cure for 28 days.

Block Filler (CMU only): 54 Masonry Filler	80 – 100 ft²/Gallon
1st Coat: Series 1026 Enduratone	2.0 - 3.0 mils
2nd Coat: Series 1026 Enduratone	2.0 - 3.0 mils
	Total Dry Film Thickness: 4.0 - 6.0 mils*
	Minimum Dry Film Thickness: 5.0 mils

**Does not include Block Filler*

D. IMMERSION

1. System No. 104-3: Cycloaliphatic Amine Epoxy (Non-Potable Water)

This system will provide chemical and corrosion resistance for protection against abrasion, moisture, corrosive fumes, chemical contact and immersion in ***mild to moderate*** Wastewater, such as clarifiers, chlorine contact basins, aeration basins, settling basins and other open top (aerobic) structures.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade per SSPC-SP13/NACE No.6 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

1st Coat: 104-1255 H.S. Epoxy Primer (backrolled)	6.0 - 8.0 mils
2nd Coat: 104 H.S. Epoxy	6.0 - 8.0 mils
3rd Coat: 104 H.S. Epoxy	6.0 - 8.0 mils
	Total Dry Film Thickness: 18.0 - 24.0 mils
	Minimum Dry Film Thickness: 20.0 mils

Allow Series 104 to cure for 7 days at 75°F prior to immersion service.

2. System No. 142-3: Flake/Aluminum Oxide Filled Polyamine Epoxy (Non-Potable Water)

This system will provide chemical and corrosion resistance for protection against moisture, corrosive fumes, chemical contact and immersion in ***mild to moderate wastewater where increased abrasion resistance is required.***

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade per SSPC-SP13/NACE No.6 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

1st Coat: Series 142 Epoxoline	8.0 - 10.0 mils
2nd Coat: Series 142 Epoxoline	8.0 - 10.0 mils
	Total Dry Film Thickness: 16.0 – 20.0 mils
	Minimum Dry Film Thickness: 18.0 mils

3. System No. 22-2: Modified Polyamine Epoxy (Potable Water)

This is a low VOC system which meets the requirements of approval for potable water use as established by NSF Std 61. **This system may be applied up to 40.0 mils in a single coat, providing exceptional barrier protection and a quicker return to service.** This system is intended for use over simple shapes and areas with minimal detail work.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade per SSPC-SP13/NACE No.6 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, and to create a monolithic, paintable surface.

Single Coat: Series 22	22.0 - 27.0 mils*
	Total Dry Film Thickness: 22.0 - 27.0 mils

**In order to maintain NSF Std. 61 approval, maximum allowable DFT is 50.0 mils.*

Notes:
1. Series 22 is to be spray applied only.
2. Allow Series 22 to cure for a minimum of 5 days at 75°F prior to service.

4. System No. 20HS-2: Epoxy-Polyamide (Potable Water)

This system meets American Water Works Association AWWA D 102 Inside System No. 1. Series 20HS meets the requirements of approval for potable water use as established by NSF Std 61.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade

per SSPC-SP13/NACE No.6 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, and to create a monolithic, paintable surface.

1st Coat: 20-15BL Pota-Pox	4.0 - 6.0 mils
2nd Coat: 20-1255 Pota-Pox Finish	4.0 - 6.0 mils
3rd Coat: 20 -15BL	4.0 - 6.0 mils
	Total Dry Film Thickness: 12.0 - 17.0 mils*
	Minimum Dry Film Thickness: 13.0 mils

**In order to maintain NSF Std. 61 approval, maximum allowable DFT is 18 mils.*

Allow Series 20 to cure for 7 days at 75°F prior to service.

5. System No. 262-1: Modified Polyurethane (Non-Potable Water)

This system is a flexible liner which provides a seamless monolithic membrane for repairing minor leaking in water basins and reservoirs. This system may also be used to span hairline cracks on substrates where movement may occur.

Surface Preparation: Prepare concrete surfaces in accordance with SSPC-SP13/NACE No.6 Joint Surface Preparation Standards and ICRI Technical Guidelines. Mechanically abrade in accordance with SSPC-SP13/NACE No.6 to remove all existing coatings, laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI-CSP 5 or greater.

Apply Tnemec Series 218 Mortarclad Modified Cementitious Mortar to fill all voids and bugholes, and to resurface the entire concrete substrate to a minimum of 1/16".

1st Coat: Series 66 Hi-Build Epoxoline	4.0 - 6.0 mils
2nd Coat: Series 66 Hi-Build Epoxoline	4.0 - 6.0 mils
3rd Coat: Series 262 Elasto-Shield*	65.0 - 75.0 mils
	Total Dry Film Thickness: 73.0 - 87.0 mils
	Minimum Dry Film Thickness: 77.0 mils

** Consult the manufacturer's latest written recommendations and application guide before applying.*

Notes:

1. In order to mitigate outgassing, Series 262 should be applied during periods of declining temperatures.
2. Series 262 Elasto-Shield must be allowed to cure for 2 days before returning to immersion service.

6. System No. 264-1: Modified Polyurethane (Potable Water)

This system is a flexible liner which provides a seamless monolithic membrane **for fixing minor leaking in potable water basins and reservoirs**. This system meets the

requirements of approval for potable water use as established by NSF Std 61.

Surface Preparation: Prepare concrete surfaces in accordance with SSPC-SP13/NACE No.6 Joint Surface Preparation Standards and ICRI Technical Guidelines. Mechanically abrade per SSPC-SP13/NACE No.6 to remove all existing coatings, laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI-CSP 5 or greater.

Apply Tnemec Series 218 Mortarclad Modified Cementitious Mortar to fill all voids and bugholes, and to resurface the entire concrete substrate to a minimum of 1/16".

1st Coat: 20 Pota-Pox	4.0 - 6.0 mils
2nd Coat: 20 Pota-Pox	4.0 - 6.0 mils
3rd Coat: 264 Elasto-Shield*	60.0 - 70.0 mils
	Total Dry Film Thickness: 68.0 - 82.0 mils
	Minimum Dry Film Thickness: 72.0 mils

**Consult the manufacturer's latest written recommendations and application guide before applying.*

Notes:

1. In order to mitigate outgassing, Series 264 should be applied during periods of declining temperatures.
2. Allow Series 264 to cure for 14 days at 75°F prior to service in a potable water tank *(For non-potable service, allow to cure for 48 hours at 75°F)*.

3.18 CONCRETE FLOORS (RESINOUS FLOORING SYSTEMS)

A. EPOXY FLOOR COATINGS

5. System No. 248-1: Aliphatic Moisture Cured Urethane (Thin Film with Increased Chemical Resistance, UV Stability, and Durability)

This system will provide a durable, long-wearing coating that bonds tightly to concrete and stands up under heavy foot traffic, frequent cleaning, spillage of water, oil, grease, or chemical, and UV Exposure. It is recommended that the 2nd and 3rd coat are the same color.

Moisture vapor transmission should not exceed three lbs per 1,000 ft² in a 24 hour period. (Reference ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.") Relative humidity should not exceed 80%. (Reference ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes.")

Note: For moisture content up to 15 lbs per 1,000 ft² or relative humidity up to 90%, Series 208 should be substituted for Series 201 as the primer. See manufacturer's latest written recommendations for Series 208 coverage rates.

Surface Preparation: Allow new concrete to cure for 28 days.

Mechanically abrade in accordance with NACE No.6/SSPC-SP13 to provide a minimum ICRI-CSP3 or greater surface profile.

1st Coat: Series 201 Epoxoprime	6.0-12.0 mils
2nd Coat: Series 237 Tneme-Glaze	8.0-16.0 mils
3rd Coat: Series 248 Everthane*, tinted with S821 colorant	2.0-3.0 mils*
	Total Dry Film Thickness: 16.0- 31.0 mils
	Minimum Dry Film Thickness: 18.0 mils

**County's Options for the 3rd Coat:*

- *For exterior exposures and increased resistance to ultra-violet light, add Series 44-600 UV Blocker to Series 248.*
- *If a more textured finish is desired, mix Tnemec Series S211-0213 (Fine) Glass Beads into the 3rd Coat. The glass beads are typically added at approximately 4 – 6 oz. per gallon.*

6. System No. 222-1: Decorative Quartz Flooring (Non-Slip)

This system provides a decorative, chemical, abrasion, impact resistant, non-slip, seamless flooring system with a moisture mitigating base coat that **resists up to 20 lbs of moisture vapor pressure, 99% relative humidity, and can be applied on 10-day old concrete.** This floor utilizes clear resins, allowing for visibility of the quartz or other aggregate. For a solid-color floor, tint the 2nd and 3rd coats with Series 820 field tint.

Surface Preparation: Allow new concrete to cure for 10 days. Mechanically abrade in accordance with NACE No.6/SSPC-SP13 to provide a minimum surface profile equal to ICRI-CSP4-5.

1st Coat: 241 Ultra-Tread MVT	70 ft² per small kit
(Broadcast with Quartz or aggregate of choice)	
2nd Coat: 222 Deco-Tread	1/16"
(Broadcast with Quartz or aggregate of choice)	
3rd Coat: 284 Tneme-Glaze (clear)	8.0 - 12.0 mils*
	Minimum Dry Film Thickness: 1/8"

**The degree of slip-resistance is affected by the thickness of the 3rd coat.*

7. System No. 287-1: Waterborne Epoxy-Amine Adduct (Thin-film)

This thin-film system provides a low odor, rapid cure, wear-resistant coating for floors, walls, and other substrates. It is capable of withstanding mild to moderate chemical and solvent exposures and repeated cleanings. **This system may also be used as an overcoat system over well-adhered, unidentified existing coatings.**

Surface Preparation: Allow new concrete to cure for 28 days.
Mechanically abrade concrete surfaces in accordance with NACE No.6/SSPC-SP13 to provide an ICRI-CSP 1-3 surface profile.

1st Coat: Series 287 Enviro-Pox	2.0-4.0 mils
2nd Coat: Series 287 Enviro-Pox	2.0-4.0 mils
	Total Dry Film Thickness: 4.0-8.0 mils
	Minimum Dry Film Thickness: 5.0 mils

3.19 GYPSUM WALLBOARD & WOOD

B. GYPSUM WALLBOARD

The coating systems in the GYPSUM WALLBOARD Section are listed in order of decreasing performance with regards to chemical resistance. This generally has an inverse correlation with color & gloss retention. The first system has very good chemical resistance with the highest potential for yellowing, while the last system has extremely poor chemical resistance with the lowest potential for yellowing.

1. System No. N69-1: Polyamidoamine Epoxy (Interior Only)

   This system provides a high-solids, low VOC epoxy coating which offers exceptional protection. It offers superior cleanup and stain-, abrasion-, chemical-, and moisture-resistance.

   Surface Preparation: Surface must be clean and dry.

1st Coat: Series 151 Elasto-Grip FC	0.7 - 1.5 mils
2nd Coat: Series N69 Hi-Build Epoxoline II	4.0 - 6.0 mils
	Total Dry Film Thickness: 4.7 – 7.5 mils
	Minimum Dry Film Thickness: 5.0 mils

   **If brushing or rolling, two coats may be required to achieve the specified film thickness.*

2. System No. 113-2: Acrylic-Epoxy (Interior Only)

   This system is designed for mild environments where frequent cleaning is expected. It provides a higher build, low odor, and fade resistant colors. It offers easy cleanup and stain-, abrasion-, chemical-, and moisture-resistance. Note: Series 113 has a satin finish. If a gloss finish is desired, specify Series 114 Tneme-Tufcoat instead.

   Surface Preparation: Surface must be clean and dry.

1st Coat: 51PVA Sealer	1.0 - 2.0 mils
2nd Coat: 113 H.B. Tneme-Tufcoat*	4.0 - 6.0 mils
	Total Dry Film Thickness: 5.0 - 8.0 mils
	Minimum Dry Film Thickness: 6.0 mils

   **If brushing or rolling, two coats may be required to achieve the specified film thickness.*

3. System No. 1026--3: Acrylic Emulsion (Interior/Exterior Exposure)

   This system is designed for mild use areas like office walls, laboratory ceilings, stairwells, etc. Note: Series 1026 has a Matte finish. For a Semi-Gloss finish, specify Series 1029 Enduratone.

   Surface Preparation: Surface must be clean and dry.

1st Coat: Series 51PVA Sealer	1.0 - 2.0 mils
1st Coat: Series 1026 Enduratone	2.0 - 3.0 mils
2nd Coat: Series 1026 Enduratone	2.0 - 3.0 mils
	Total Dry Film Thickness: 4.0 - 6.0 mils
	Minimum Dry Film Thickness: 5.0 mils

B. WOOD – EXTERIOR OR INTERIOR EXPOSURE

1. System No. 1029-2: HDP Acrylic Polymer

Series 1029 has a low semi-gloss finish. If a gloss finish is desired, specify Series 1028 Enduratone.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 10-99W Undercoater*	2.0 - 3.0 mils
2nd Coat: 1029 Enduratone	2.0 - 3.0 mils
3rd Coat: 1029 Enduratone	2.0 - 3.0 mils
	Total Dry Film Thickness: 6.0 - 9.0 mils
	Minimum Dry Film Thickness: 7.0 mils

**Allow Series 10 to cure for 3 days before topcoating with Series 1029.*

3.20 HIGH TEMPERATURE COATINGS

C. System No. 1552-1: Acrylic Silicone Copolymer (500°F Maximum)

This system provides heat and corrosion resistance for steel in service environments up to 500°F (315°C). This system has excellent resistance to weathering and UV-light degradation.

Surface Preparation: SSPC-SP6/NACE No.3 Commercial Blast Cleaning with a minimum angular profile of 1.5 mils and a maximum angular anchor profile of 2.0 mils.

1st Coat: Series 1501 Endura-Heat Primer	2.0 - 3.0 mils
2nd Coat: Series 1552 Endura-Heat	2.0 - 3.0 mils
	Total Dry Film Thickness: 4.0 - 6.0 mils
	Minimum Dry Film Thickness: 4.5 mils

D. System No. 1556-1: Modified Silicone Copolymer (1000°F Maximum)

This system provides galvanic protection for steel in service environments up to 1000°F (538°C). The topcoat outperforms conventional high-temperature topcoats with exceptional color stability, resistance to thermal cycling, and cure requirements.

Surface Preparation: SSPC-SP6/NACE No.3 Commercial Blast Cleaning with a minimum angular profile of 1.0 mil and a maximum angular anchor profile of 2.0 mils.

1st Coat: Series 1505 Endura-Heat ZR	2.0 - 3.0 mils
2nd Coat: Series 1556 Endura-Heat	2.0 - 3.0 mils
	Total Dry Film Thickness: 4.0 - 6.0 mils
	Minimum Dry Film Thickness: 4.5 mils

Note: Contractor must follow the manufacturer's most recent written recommendations regarding curing procedures.

E. System No. 1528-1: Inert Multipolymeric Matrix (1200°F Maximum)

This system provides high-performance coating protection to steel and stainless steel substrates in elevated temperatures up to 1200°F (648°C). Excellent adhesion properties allow this system to withstand severe thermal cycling (-300°F to 1200°F), and its tolerance to marginally prepared substrates makes it a viable alternative when abrasive blasting is not permitted. Its dry-fall spray characteristic provides a fast, labor-saving coating application when used with the appropriate thinner.

Surface Preparation for Exterior Exposure: SSPC-SP6/NACE 3 Commercial Blast Cleaning or ISO Sa 2 Thorough Blast Cleaning with a minimum angular anchor profile of 1.5 mils and a maximum angular anchor profile of 3.0 mils. Note: Abrasive blast cleaning generally produces the best coating performance. If conditions will not permit this, Series 1528 may be applied to SSPCSP2 or SSPC-SP3 Hand or Power Tool Cleaned surfaces in maintenance situations where mill scale has previously been removed.

Surface Preparation for Under Insulation: SSPC-SP10/NACE 2 Near-White Blast Cleaning or ISO Sa 2 1/2 Very Thorough Blast Cleaning is required.

1st Coat: Series 1528 Endura-Heat DTM	6.0 - 8.0 mils
*2nd Coat: Series 1528 Endura-Heat DTM	6.0 - 8.0 mils
	Total Dry Film Thickness: 12.0 - 16.0 mils

**For mild environments, the 2nd Coat may be omitted.*

Note: Contractor must follow the manufacturer's most recent written recommendations regarding curing procedures.

3.21 SURFACES EXPOSED TO H_2S/H_2SO4 (SEVERE EXPOSURE/IMMERSION)

The systems listed in this section are designed for severe wastewater exposure. Substrates are exposed to submergence and/or intermittent submergence in severe wastewater conditions. Substrates may also be exposed to H_2S Gas and the biogenic sulfide corrosion process associated with severe wastewater conditions.

A. CEMENTITIOUS SURFACES

1. System No. 434-1: Modified Aliphatic Amine Epoxy Mortar

This system is a 100% solids, hybrid epoxy mortar system designed for severe waste water immersion and fume environments. It is specifically formulated to withstand high levels of hydrogen sulfide gas (H_2S), sulfuric acid (H_2SO_4), as well as other gases common to sewer exposures. Aggregate reinforcement provides additional resistance to abrasions and impacts.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade per SSPC-SP13/NACE No.6 to remove all laitance, fines, curing compounds, form

release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 MortarClad to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

1st Coat: 434 Perma-Shield	1/8" or 125.0 mils minimum
2nd Coat: 435 Perma-Glaze	18.0 - 20.0 mils
	Minimum Dry Film Thickness: 144.0 mils

Allow coatings to cure for a minimum of 2 days at 75°F prior to service.

2. System No. 436-1: Fiber-Reinforced Modified Polyamine Epoxy

This system provides a thick film, 100% solids, **spray-applied,** high build, abrasion-resistant coating specifically designed for wastewater immersion and fume environments. Provides excellent resistance to H_2S gas permeation, protects against MIC, and provides chemical resistance to severe wastewater environments. Fiber-reinforcement provides superior physical strength and higher film build.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade per SSPC-SP13/NACE No.6 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 MortarClad to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

One Coat: 436 Perma-Shield FR	80.0 - 125.0 mils
	Total Dry Film Thickness: 80.0 - 125.0 mils

Allow coatings to cure for a minimum of 2 days at 75°F prior to service.

B. FERROUS METAL SURFACES

1. System No. 435-1: Modified Polyamine Epoxy

This system provides a versatile, thick film, 100% solids lining specifically designed for wastewater immersion and fume environments. It provides low permeation to H_2S gas, protects against MIC, and provides chemical resistance to severe wastewater environments.

Surface Preparation: SSPC-SP5/NACE No.1 White Metal Blast Cleaning with a minimum 3.0 mil angular anchor profile.

1st Coat: 435 Perma-Glaze	15.0 - 20.0 mils
2nd Coat: 435 Perma-Glaze	15.0 - 20.0 mils
	Total Dry Film Thickness: 30.0 - 40.0 mils
	Minimum Dry Film Thickness: 33.0 mils

Allow coatings to cure for a minimum of 2 days at 75°F prior to service.

2. System No. 431-1: Modified Polyamine Ceramic Epoxy

This system is to be used in severe wastewater exposures where increased abrasion resistance is desired. It is specifically designed for immersion and fume environments and exposure to corrosive soils. It provides low permeation to H_2S gas, protects against MIC, and provides chemical resistance to steel and ductile iron pipe for severe wastewater or buried exposure. It is a coal-tar free, resin-rich formulation with low pigment volume concentration (PVC) for maximum performance.

Surface Preparation:

Steel - SSPC-SP5/NACE No.1 White Metal Blast Cleaning with a minimum 3.0 mil angular anchor profile.

Ductile Iron Pipe Interiors - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-04: Internal Pipe Surface condition with a minimum 3.0 mil angular anchor profile.

Ductile Iron Pipe Exteriors (Applicable if exposed to H_2S gas) - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-04: External Pipe Surface condition with a minimum 3.0 mil angular anchor profile.

Ductile Iron Fittings Interiors - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-05: Fitting Blast Clean #1 condition with a minimum 3.0 mil angular anchor profile.

Ductile Iron Fittings Exteriors (Applicable if exposed to H_2S gas) - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-05: Fitting Blast Clean #1 condition with a minimum 3.0 mil angular anchor profile.

One Coat*: 431 Perma-Shield PL — 40.0 – 50.0 mils

Total Dry Film Thickness: 40.0 - 50.0 mils

Minimum Dry Film Thickness: 40.0 mils

**Series 431 may be applied in two coats to reach the above specified total dry film thickness. Consult the manufacturer's latest written recommendations and application guide before applying this product.*

Allow Series 431 to cure for 48 hours at 75°F prior to service.

3. System Permox-CTF: Amine Cured Novalac Epoxy

This system is to be used in severe wastewater exposures. It provides low chemical resistance to steel and ductile iron pipe for severe wastewater or buried exposure. It is a coal-tar free, minimum 20% by volume ceramic pigmentation, with no less than 97% solids by volume.

Surface Preparation:

Steel - SSPC-SP5/NACE No.1 White Metal Blast Cleaning with a minimum 3.0 mil angular anchor profile.

Ductile Iron Pipe/Fittings Interiors - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-04: Internal Pipe Surface condition with a minimum 3.0 mil angular anchor profile.

Ductile Iron Pipe/Fittings Exteriors (Applicable if exposed to H_2S gas) - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-04: External Pipe Surface condition with a minimum 3.0 mil angular anchor profile

One Coat: Permox-CTF — 40.0 – 50.0 mils

Total Dry Film Thickness: 40.0 - 50.0 mils
Minimum Dry Film Thickness: 40.0 mils

3.22 EXTERIOR OF PRESTRESSED CONCRETE TANKS

A. System No. 156-2: New Tanks

This system provides exceptional elongation, allowing it fill and bridge minor hairline cracks. It also provides mold & mildew resistance, as well as wind-driven rain resistance.

Surface Preparation: Allow new concrete to cure for at least (3) days. Surface to be clean and dry.

1st Coat: Series 156 Envirocrete — 4.0 - 6.0 mils
2nd Coat: Series 156 Envirocrete — 4.0 - 6.0 mils

Total Dry Film Thickness: 8.0 - 12.0 mils
Minimum Dry Film Thickness: 10.0 mils

B. System No. 156-3: Existing Tanks (Previously Painted)

This system provides exceptional elongation for spanning hairline cracks in concrete structures. It also provides mold & mildew resistance, as well as wind-driven rain resistance. Note: If a textured finish is preferred, replace Series 156 with Series 157 Enviro-Crete TX (medium texture) @ 6.0 – 9.0 mils dry film thickness per coat.

Surface Preparation: Remove all dirt, oil, grease, chalk, and loose paint per high pressure water blast (min. 3500 psi).

1st Coat: 151 Elasto-Grip — 0.7 - 1.5 mils
Stripe Coat: Use a brush to fill all hairline cracks with Series 156 Envirocrete*
Topcoat: 156 Envirocrete — 6.0 - 8.0 mils**

Total Dry Film Thickness: 6.7 - 9.5 mils***
Minimum Dry Film Thickness: 7.0 mils

**Deeper hairline cracks may require multiple brushed coats.*
***Roller or brush application may require multiple coats to obtain recommended film thickness.*
****Total Dry Film thickness does not include stripe coat.*

3.23 SECONDARY CONTAINMENT AREAS

A. System No. 239SC-1: Modified Novolac Epoxy

This system offers superior chemical resistance to a wide range of aggressive chemicals, including Sulfuric Acid, Hydrofluosilicic Acid, Sodium Hydroxide, Sodium Hypochlorite, Polymer Emulsion, and hydrocarbons. The fiber-reinforced mat within this system provides it with an exceptional ability to bridge the hairline cracks in concrete substrates.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade per SSPC-SP13/NACE No.6 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Moisture vapor transmission should not exceed three lbs per 1,000 ft² in a 24 hour period. (Reference ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.") Relative humidity should not exceed 80%. (Reference ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes.") Note: For moisture content up to 10 lbs per 1,000 ft² or relative humidity up to 90%, Series 241 may be substituted for the primer. Refer to the Series 241 product data sheet for more information.

Apply Tnemec Series 218 MortarClad to all vertical surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, and to create a monolithic, paintable surface.

Apply Tnemec Series 215 Surfacing Epoxy or Series 218 as needed to fill voids in horizontal surfaces.

Primer: Tnemec Series 239SC RCK	6.0 - 8.0 mils
Basecoat: Tnemec Series 239SC MCK	60.0 - 80.0 mils
Fiberglass Mat: Tnemec Series 211-0215SC	Embedded
Saturant Coat: Tnemec Series 239SC RCK	10.0 - 12.0 mils
Top Coat: Tnemec Series 282*	8.0 - 10.0 mils
	Total Dry Film Thickness: 84.0 - 110.0 mils

**Series 282 is not color stable. For extended color and gloss retention, apply an extra finish coat of Tnemec Series 290 CRU @ 2.0-3.0 mils DFT.*

Note: See Tnemec's Fiberglass Mat Reinforced Mortar Application Guide for System details.

B. System No. 61-1: Cycloaliphatic Amine Epoxy

This system offers excellent resistance to hydrocarbons and chemicals, such as gasoline, diesel fuel, sodium hydroxide, ferric chloride, and sodium hypochloride. Use Tnemec Series 215 Surfacing Epoxy between coats as a filler and surfacer if required.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade per SSPC-SP13/NACE No.6 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Moisture vapor transmission should not exceed three lbs per 1,000 ft² in a 24 hour period. (Reference ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.") Relative humidity should not exceed 80%. (Reference ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes.") Note: For moisture content up to 10 lbs per 1,000 ft² or relative humidity up to 90%, Series 241 may be applied prior to the "Primer" coat. Refer to the Series 241 product data sheet for more information.

Apply Tnemec Series 218 MortarClad to all ***vertical*** surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

Apply Tnemec Series 215 Surfacing Epoxy or Series 218 MortarClad as needed to fill voids in ***horizontal*** surfaces.

Primer: 61-5002 Tneme-Liner (Beige)	8.0 - 12.0 mils
Topcoat: 61-5001 Tneme-Liner (Gray)	8.0 - 12.0 mils
	Total Dry Film Thickness: 16.0 - 24.0 mils
	Minimum Dry Film Thickness: 18 mils

3.24 PIPE EXTERIOR COATING SYSTEMS

The coating systems in the PIPE EXTERIOR COATING SYSTEMS section are not intended for use over bitumastic coatings. Do not apply bitumastic prior to the application of any of these systems.

A. System No. 700-2: Zinc/Epoxy/Fluoropolymer (Ductile Iron Pipes and Fittings at Aerial Crossings or Similarly Difficult to Maintain Areas)

This system provides outstanding resistance to ultra-violet light degradation and extremely good color and gloss retention. This system will have excellent resistance to abrasion and chalking, and is recommended for coastal environments and on structures where extremely long-term maintenance cycles are desired. This system may also be applied to new steel pipes or existing steel pipes which require removal of existing coatings. (Note: Series 700 is gloss. If the Owner desires a semi-gloss finish then Series 700 may be replaced with Series 701.) Note: For single-component application, Series 90G-1K97 may be substituted as the primer.

Surface Preparation:
Steel - SSPC-SP6/NACE No.3 Commercial Blast Cleaning with a minimum 1.5 mil angular anchor profile.

Ductile Iron Pipe - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-04: External Pipe Surface condition.

Ductile Iron Fittings - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-05: Fitting Blast Clean #3 condition.

Primer: Series 90-97 Tneme-Zinc	2.5 - 3.5 mils
2nd Coat: Series 66 Hi-Build Epoxoline	2.0 - 3.0 mils
3rd Coat: Series 700 Hydroflon	2.0 - 3.0 mils
	Total Dry Film Thickness: 6.5 - 9.5 mils

Minimum Dry Film Thickness: 8.0 mils

B. System No. N140-2: Epoxy/Epoxy/Epoxy or Urethane (Standard Ductile Iron Pipe and Fittings System - Exposed)

This system provides exceptional corrosion protection in atmospheric environments. This system is to be applied to new ductile iron pipes. Series 1095 has a semi-gloss finish. For a different sheen, apply Series 1094 (gloss) or Series 1096 (eggshell) at the same thickness.

Surface Preparation:
Steel - SSPC-SP6/NACE No.3 Commercial Blast Cleaning with a minimum 1.5 mil angular anchor profile.

Ductile Iron Pipe - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-04: External Pipe Surface condition.

Ductile Iron Fittings - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-05: Fitting Blast Clean #3 condition.

Shop Primer: Series N140 Pota-Pox Plus	2.0 – 10.0 mils
2nd Coat: Series N140 Pota-Pox Plus	4.0 - 10.0 mils
3rd Coat (UV Exposed, Non-immersion Areas Only): Series 1095	2.5 - 5.0 mils
	Total Dry Film Thickness: 10.0 – 30.0 mils
	Minimum Dry Film Thickness: 11.0 mils

C. System No. 46H-413-3: Polyamide Epoxy-Coal Tar (Buried Ductile Iron Pipes and Fittings Only)

This system provides a high-build coating for underground conditions.

Surface Preparation:
Steel - SSPC-SP6/NACE No.3 Commercial Blast Cleaning with a minimum 1.5 mil angular anchor profile.

Ductile Iron Pipe - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-04: External Pipe Surface condition.

Ductile Iron Fittings - Uniformly abrasive blast using angular abrasive to a NAPF 500-03-05: Fitting Blast Clean #3 condition.

1st Coat: Series 46H-413 Hi-Build Tneme-Tar	8.0 - 10.0 mils
2nd Coat: Series 46H-413 Hi-Build Tneme-Tar	8.0 - 10.0 mils
	Total Dry Film Thickness: 16.0 - 20.0 mils
	Minimum Dry Film Thickness: 18.0 mils

D. System No. 1095-5: Acrylic Polyurethane (PVC or HDPE Pipe)

This system provides a user friendly, low VOC, aliphatic acrylic polyurethane coating which offers excellent color and gloss retention. Series 1095 has a semi-gloss finish. For a different sheen, apply Series 1094 (gloss) or Series 1096 (eggshell) at the same thickness.

Surface Preparation: SSPC-SP1 followed by hand or power sanding to thoroughly and uniformly scarify and de-gloss the surface.

1st Coat: Series 66 Hi-Build Epoxoline	2.0 – 3.0 mils
2nd Coat: Series 1095 EnduraShield	2.5 – 5.0 mils
	Total Dry Film Thickness: 4.5 – 8.0 mils
	Minimum Dry Film Thickness: 5.0 mils

E. System No. 1026-4: Acrylic Emulsion (Interior Exposed, Insulated Pipe)

Surface Preparation: Surface shall be clean and dry.

1st Coat: Series 1026 Enduratone	2.0 - 3.0 mils
2nd Coat: Series 1026 Enduratone	2.0 - 3.0 mils
	Total Dry Film Thickness: 4.0 - 6.0 mils
	Minimum Dry Film Thickness: 5.0 mils

F. System No. 700-3: Epoxy Mastic/Fluoropolymer Overcoat (Existing, Previously Coated Aerial Pipes or Similarly Difficult to Maintain Areas)

This system provides outstanding resistance to ultra-violet light degradation and extremely good color and gloss retention. This system will have excellent resistance to abrasion and chalking, and is recommended for coastal environments and on structures where extremely long-term maintenance cycles are desired. This system is to be used for overcoating existing steel pipes whose surfaces have some rust present. (Note: Series 700 is gloss. If the Owner desires a semi-gloss finish then Series 700 may be replaced with Series 701.)

Surface Preparation: High Pressure Water Clean (min. 3500 psi, 3 to 5 gallons per minute, using an oscillating tip and potable water). A cleaning detergent such as Trisodium Phosphate should be used to facilitate cleaning. A degreaser may be required for oil soaked areas or heavily contaminated areas.

Some spot areas may require Hand Tool (SSPC-SP2), Power Tool Cleaning (SSPC-SP3), or Brush Blast (SSPC-SP7/NACE No. 4) to remove loose surface rust.

Existing coatings must be clean, dry and tightly adhering prior to application of coatings.

Spot Prime (Areas of Bare Steel): Series 135 Chembuild	4.0 - 6.0 mils
1st Coat: Series 135 Chembuild	4.0 - 6.0 mils
2nd Coat: Series 700 Hydroflon	2.0 - 3.0 mils
	Total Dry Film Thickness: 6.0 – 9.0 mils*
	Minimum Dry Film Thickness: 7.0 mils

*Does not include Spot Prime or previously existing coatings

G. System No. 1095-6: Epoxy Mastic/Urethane Overcoat (Existing Pipes Previously Coated with High Performance Coatings)

This system can be used over factory finish paint or over non-sandblasted steel and offer the high performance of a urethane coating. Series 1095 has a semi-gloss finish. For a different sheen, apply Series 1094 (gloss) or Series 1096 (eggshell) at the same thickness.

Surface Preparation: High Pressure Water Clean (min. 3500 psi, 3 to 5 gallons per minute, using an oscillating tip and potable water). A cleaning detergent such as Trisodium Phosphate should be used to facilitate cleaning. A degreaser may be required for oil soaked areas or heavily contaminated areas.

Some spot areas may require Hand Tool (SSPC-SP2), Power Tool Cleaning (SSPC-SP3), or Brush Blast (SSPC-SP7/NACE No. 4) to remove loose surface rust.

Existing coatings must be clean, dry, and tightly adhering prior to application of coatings.

Spot Prime (Areas of Bare Steel): Series 135 Chembuild	4.0 – 6.0 mils
1st Coat: Series 135 Chembuild	4.0 - 6.0 mils
2nd Coat: Series 1095 Endura-Shield	2.5 - 5.0 mils
	Total Dry Film Thickness: 6.5 - 11.0 mils*
	Minimum Dry Film Thickness: 7.0 mils

**Does not include spot prime or previously existing coatings.*

3.25 INSULATIVE COATINGS – THERMAL RESISTANCE

A. SUBSTRATES UP TO 325°F

1. System No. 971-1: Personnel Protection

This system utilizes fluid-applied aerogel particles to **provide "safe touch," allowing a minimum 5 seconds of skin contact with the substrate (up to 325°F). This system is ideal for hot pipes, valves, tanks, etc.** This coating system eliminates the corrosion under insulation (CUI) issues associated with traditional insulations. **This system negates the need for a mineral wool + aluminum jacket system.**

Surface Preparation: SSPC-SP6/NACE No. 3 Commercial Blast Cleaning with a minimum angular anchor profile of 1.5 mils.*

1st Coat: Series 1224 Epoxoline WB	5.0 – 8.0 mils
2nd Coat: Series 971 Aerolon Acrylic	50.0 mils
3rd Coat: Series 971 Aerolon Acrylic	50.0 mils
4th Coat: Series 72T EnduraShield	2.0 – 5.0 mils
	Total Dry Film Thickness: 107.0 – 113.0 mils
	Minimum Dry Film Thickness: 109.0 mils

**Abrasive blast cleaning generally produces the best coating performance. If conditions will not permit this, Series 1224 may be applied to SSPC-SP2 or SSPC-SP3 Hand or Power Tool Cleaned surfaces.*

B. SUBSTRATES BELOW AMBIENT TEMPERATURE

1. System No. 971-2: Condensation Control (Sweating Substrates)

This system utilizes Series 971's fluid-applied aerogel particles and hydrophobic properties to **mitigate condensation on otherwise wet, "sweating" surfaces.** This is ideal for pipes, valves, and other substrates which have temperatures that create condensation (but do not freeze). **This system negates the need for a mineral wool + aluminum jacket system.**

Surface Preparation: SSPC-SP6/NACE No. 3 Commercial Blast Cleaning with a minimum angular anchor profile of 1.5 mils.*

1st Coat: Series 1224 Epoxoline WB	5.0 – 8.0 mils

2nd Coat: Series 971 Aerolon Acrylic	50.0 mils
3rd Coat: Series 971 Aerolon Acrylic	50.0 mils
4th Coat: Series 72T EnduraShield	2.0 – 5.0 mils
	Total Dry Film Thickness: 107.0 – 113.0 mils
	Minimum Dry Film Thickness: 109.0 mils

**Abrasive blast cleaning generally produces the best coating performance. If conditions will not permit this, Series 1224 may be applied to SSPC-SP2 or SSPC-SP3 Hand or Power Tool Cleaned surfaces.*

2. System No. 971-3: Condensation Control (Freezing Substrates)

This system utilizes Series 971's fluid-applied aerogel particles and hydrophobic properties to **mitigate condensation on surfaces that would otherwise ice & freeze over.** This is ideal for pipes, valves, and other substrates which have temperatures & condensation that are creating ice on the substrate. This coating system will significantly reduce/eliminate ice formations. **This system negates the need for a mineral wool + aluminum jacket system.**

Surface Preparation: SSPC-SP6/NACE No. 3 Commercial Blast Cleaning with a minimum angular anchor profile of 1.5 mils.*

1st Coat: Series 1224 Epoxoline WB	5.0 – 8.0 mils
2nd Coat: Series 971 Aerolon Acrylic	50.0 mils
3rd Coat: Series 971 Aerolon Acrylic	50.0 mils
4th Coat: Series 971 Aerolon Acrylic	50.0 mils
5th Coat: Series 72T EnduraShield	2.0 – 5.0 mils
	Total Dry Film Thickness: 157.0 – 163.0 mils
	Minimum Dry Film Thickness: 159.0 mils

**Abrasive blast cleaning generally produces the best coating performance. If conditions will not permit this, Series 1224 may be applied to SSPC-SP2 or SSPC-SP3 Hand or Power Tool Cleaned surfaces.*

3.26 PERFORMANCE CRITERIA

The following shall serve as a basis of comparison for material substitution requests. Any substitutions which decrease the total film thickness, change the generic type of coating, or fail to meet the performance criteria of the specified materials shall not be approved.

A. Series 1 Omnithane - Zinc/Micaceous Iron Oxide Urethane:
- Adhesion: ASTM D4541 (Method B, Type II) - No less than 1,433 psi (9.88 MPa) adhesion, average of three tests.
- Salt Spray (Fog): ASTM B117 - No blistering, cracking or delamination of film. No more than .03% rusting on plane and no more than 3/16" rust creepage at scribe after 10,000 hours exposure.

B. Series 20 Pota-Pox – Polyamide Epoxy:
- Special Qualification: Certified by NSF International in accordance with NSF/ANSI Std. 61.
- Abrasion: ASTM D4060 (CS-17 Wheel, 1,000 gram load) - No more than 68.5 mg loss after 1,000 cycles with 1,000 gram load, average of three tests

- Adhesion: ASTM D4541 - No less than 1909.3 psi (13.16 MPa) adhesion after ten freeze/thaw cycles, average of three tests
- Immersion: ASTM D870 - No blistering, cracking, rusting or delamination of the film after 1,500 hours continuous immersion in deionized water at 140°F.
- Salt Spray: ASTM B117 - No blistering, cracking, rusting or delamination of the film and no creepage at the scribe after 5000 hours
- Cyclic Salt Fog/UV Exposure: ASTM 5894 - No blistering, cracking, rusting or delamination of the film after 10,000 hours.

C. Series 22 Epoxoline – Modified Polyamine Epoxy:
- Special Qualification: Certified by NSF International in accordance with NSF/ANSI Std. 61.
- Product must be able to be applied in one single-coat application from 16.0 to 40.0 mils dry film thickness.
- VOC Content: 0.10 lbs/gallon (12 grams/litre)
- Immersion: ASTM 870 – No blistering, cracking, rusting or delamination of film after 2,000 hours continuous immersion in deionized water at 140°F (60°C), average of three tests.

D. Series 27WB Typoxy - Inorganic Hybrid Water-Based Epoxy:
- Adhesion: ASTM D4541 (Type V Tester) - No less than 1,440 psi (9.93 MPa) pull, average of three tests.
- Salt Spray: ASTM B117 - No blistering, cracking, rusting or delamination of film. No more than 3/16 inch rust creepage at scribe after 6,200 hours exposure.

E. Series 46H-413 Hi-Build Tneme-Tar – Polyamide Epoxy-Coal Tar:
- Adhesion: ASTM D4541 - Exceeds the cohesive strength of the concrete substrate (400 psi), average of three tests.
- Abrasion: ASTM D4060 (CS-17 wheel, 1,000 gram load) - No more than 142 mg loss after 1,000 cycles.
- Salt Spray (Fog): ASTM B117 - No blistering, cracking, checking, rusting or delamination of film. No rust creepage at scribe after 9,000 hours continuous exposure.

F. Series 61 Tneme-Liner – Cycloaliphatic Amine Epoxy:
- Chemical Immersion: NACE TM-01-74, Procedure B – No blistering, cracking, rusting or delamination of film after six months continuous immersion.
- Immersion: ASTM D870 - No blistering, cracking or delamination of film after 12 months continuous immersion in deionized water at 200°F (93°C).

G. Series 66 Hi-Build Epoxoline – Polyamide Epoxy:
- Salt Spray: ASTM B117 - No blistering, cracking, checking or delamination of film. No more than 1/8" rust creepage at scribe after 8,000 hours exposure.

H. Series 66 Hi-Build Epoxoline – Polyamide Epoxy:
- Abrasion: ASTM D4060 (CS-17 Wheel, 1,000 gram load) – No More than 68.5 mg loss after 1,000 cycles with 1,000 gram load, average of three tests.
- Adhesion: ASTM D4541 - No less than 1,909.3 psi (13.16 MPa) adhesion after ten freeze/thaw cycles, average of three trials.
- Salt Spray: ASTM B117 - No blistering, cracking, rusting or delamination of the film and no creepage at the scribe after 4000 hours

I. Series 90-97 Tneme-Zinc – Aromatic Zinc-Rich Urethane:
- Zinc Pigment: 83% by weight in dried film
- Adhesion: ASTM D4541 (Type II) - No less than 1,442 psi (9.94 MPa) adhesion, average of three tests.
- Salt Spray: ASTM B117 - No blistering, cracking or delamination of film. No more than 1/8" creepage at scribe and no more than 1% rusting on plane after 50,000 hours exposure.

J. Series 94H_2O Hydro-Zinc – Zinc-Rich Aromatic Urethane
- Special Qualification: Certified in accordance with ANSI/NSF Std. 61 for use on interior potable water tanks of 500 gallons or greater.
- Zinc Pigment: 83% by weight in dried film.
- Adhesion: ASTM D4541 (Type V Self-Aligning Adhesion Tester): No less than 1,713 psi adhesion, average of three tests.
- Salt Spray: ASTM B117 - No blistering, cracking or delamination of film. No rusting on plane and no more than 1/16" rust creepage at scribe after 10,000 hours.

K. Series 104 HS Epoxy – Cycloaliphatic Amine Epoxy:
- Adhesion: ASTM D4541 – No less than 900 psi (6.21 MPa) pull, average of three tests.
- Chemical Immersion: NACE TM-01-74, Procedure B – No blistering, cracking or delamination of film after seven days.
- Salt Spray (Fog): ASTM B117 - No blistering, cracking, rusting or delamination of film. No more than 1/32" (.8 mm) rust creepage at scribe after 1,500 hours exposure.

L. Series 113 Tneme-Tufcoat – Waterborne Acrylic Epoxy:
- Adhesion: ASTM D4541 - No less than 380 psi (2.6 MPa) pull, average of three tests (applied directly to concrete block).
- Humidity: ASTM D2247 - No blistering, cracking or delamination after 1,000 hours exposure.

M. Series 115 Uni-Bond DF – Self-Crosslinking Hydrophobic Acrylic:
- Adhesion: ASTM D4541 (Method C – Type V Tester) - No less than 1,472 psi pull (10.15 MPa), average of three tests
- Salt Spray: ASTM B117 - No more than 1/64" rust creepage at scribe, no more than 3% rusting on plane and no less than a blister rating of 8 after 500 hours exposure.
- Humidity: ASTM D4585 - No blistering, cracking, rusting or delamination of film after 2,000 hours exposure.

N. Series 135 Chembuild – Modified Polyamidoamine Epoxy:
- Adhesion: ASTM D4541 (Type II, Method B) - No less than 883 psi (5.86 MPa) pull, average of three tests.
- Salt Spray: ASTM B117 (Two coats, applied to SSPC-SP10/NACE No.2 Near-White Metal Blast Cleaned steel which was exterior exposed for four months until uniformly rusted, then SSPC-SP2 Hand Tool Cleaned) – No blistering, cracking, rusting or delamination of the film and no creepage at the scribe after 4000 hours

O. Series N140 Pota-Pox Plus – Polyamidoamine Epoxy:
- Adhesion: ASTM D4541 - No less than 1,943 psi (13.40 MPa) pull, average of three tests.
- Exterior Exposure: ASTM D1014 - No blistering, cracking, checking, rusting or delamination of film. No rust creepage at scribe after 5 years exposure.

- Humidity: ASTM D4585 - No blistering, cracking or delamination of film after 10,000 hours exposure.
- Immersion: ASTM D870 - No blistering, cracking, rusting or delamination of film after 2,000 hours continuous immersion in deionized water at 140°F, average of three tests.
- Salt Spray (Fog): ASTM B117 (2 Coats Series N140) - No blistering, cracking or delamination of film. No more than 1% rusting on plane. No more than 1/16" rust creepage at scribe after 6,700 hours exposure.
- Salt Spray (Fog): ASTM B117 (Series 91H_2O and 2 Coats Series N140) - No blistering, cracking, checking or delamination of film. No more than 1% rusting on plane and no more than 3/16" rust creepage at scribe after 20,000 hours exposure.

P. Series 142 Epoxoline – Modified Polyamine Epoxy:
- Adhesion: ASTM D4541 - No less than 2,042 psi (14.08 MPa) pull, average of three tests.
- Salt Spray (Fog): ASTM B117 - No blistering, cracking, rusting or delamination of film and less than 1/32 inch creepage at the scribe after 5,000 hours exposure.
- Abrasion: ASTM D4060 - No more than 59.3 mg loss after 1,000 cycles, average of two tests.

Q. Series 156 Enviro-Crete – Modified Waterborne Acrylate:
- Adhesion: ASTM D7234 – Exceeds the cohesive strength of concrete substrate (400 psi), average of three tests.
- Salt Spray: ASTM B117 - No blistering, cracking or delamination of film. No visible damage to coating or substrate after 5,000 hours.
- QUV Exposure: ASTM D4587 (UVA-340 bulbs, 8 hours UV, 4 hours condensation) - No blistering, cracking, chalking or delamination of the film. No less than 69% gloss retention, no more than 1.1 units gloss loss, and no more than 3.59 DE (FMC-2) color change (white) after 5,000 hours QUV exposure.
- Fungal/Mold/Mildew Resistance: ASTM D3273 – No More than slight mold growth after five weeks exposure.
- Tensile Strength, Elongation, Modulus of Elasticity: ASTM D2370 - Elongation no less than 200 percent, average of five tests. Tensile strength no less than 250 psi (1.7 MPa), average of three tests.
- Wind Driven Rain Resistance: FED TT-C-555B, Section 4.4.7.3 - No damage to coating or substrate. No visible moisture on the back of lightweight block after 48 hours exposure.

R. Series 201 Epoxoprime – Modified Polyamine Epoxy:
- Adhesion: ASTM D4541 - 400 psi (2.8 MPa) pull, average of three tests. 100% Concrete Failure.
- Compressive Strength: ASTM D695 - 6,866 psi (47.34 MPa) compressive strength unfilled
- Flexural Strength and Modulus of Elasticity: ASTM D790 - 12,873 psi (88.76 MPa) flexural strength average of five tests. 553,832 psi (3,818.54 MPa) flexural modulus, average of five tests.
- Tensile Strength: ASTM D638 - 4,871 psi (33.59 MPa) tensile strength, average of five tests.

S. Series 215 Surfacing Epoxy – Modified Polyamine Epoxy
- Special Qualification: Certified in accordance with ANSI/NSF Std. 61 for use on interior potable water tanks of 200 gallons or greater at 80 mils DFT
- VOC Content: 0.08 lbs/gallon
- Adhesion: ASTM D7234 (Method B): Exceeds the cohesive strength of the concrete substrate (400 psi).
- Adhesion: ASTM D4541 – Not less than 2,226 psi (15.35 MPa) pull, average of three tests.
- Compressive Strength: ASTM C579 – No less than 9,183 psi (63.3 MPa) compressive strength, average of five tests.
- Flexural Strength and Modulus of Elasticity: C580 – No less than 4,330 psi (29.9 MPa) flexural strength and 324,877 psi (2,240 MPa) flexural modulus of elasticity, average of six tests.
- Flexural Strength and Modulus of Elasticity: ASTM D790 – No less than 10,630 psi (73.29 MPa) flexural strength and 87,440 psi (602.88 MPa) flexural modulus of elasticity, average of three tests.
- Tensile Strength, Elongation, Modulus of Elasticity: ASTM C307 – No less than 2,280 psi (15.72 MPa) tensile strength, average of six tests.
- Tensile Strength, Elongation, Modulus of Elasticity: ASTM D2370 – No less than 2,011 psi (13.86 MPa) tensile strength, 304,213 psi (2,102 MPa) tensile modulus of elasticity and 1.04% elongation, average of ten tests.
- Water Absorption: ASTM C413 – No weight gained after 2 hours continuous boiling water immersion, average of three tests.

T. Series 217 Mortarcrete – Cementitious Repair Mortar:
- VOC Content: 0.0 lbs/gallon
- Compressive Strength: ASTM C579 – No less than 10,650 psi (73.43 MPa) compressive strength, average of three tests.
- Density: ASTM C188 – 2.13 g/cm³ (133 pcf) density.
- Drying Shrinkage: ASTM C596 – No more than 0% drying shrinkage, average of four specimens.
- Set Times: ASTM C266 – Fresh Mortar Properties: Initial Setting Time - 65 minutes; Final Setting Time - 80 minutes.
- Splitting Tensile Strength: ASTM C496 – No less than 850 psi (5.86 MPa) splitting tensile strength, average of three tests.
- Thermal Expansion: ASTM C531 – No more than 7.46 X 10-6 linear coefficient of thermal expansion in/in/°F, average of three tests.

U. Series 222 Deco-Tread – Colored Quartz-Filled Modified Polyamine Epoxy:
- Compressive Strength: ASTM C579 - 15,567 psi (107.33 MPa) compressive strength.
- Flexural Strength and Modulus of Elasticity: ASTM D790 - No less than 2,867 psi (19.77 MPa) flexural strength and 127,876 psi (881.67 MPa) flexural modulus of elasticity, average of five tests.
- Tensile Strength: ASTM C307 - 2,100 psi (14.5 MPa) tensile strength, average of three tests.
- Thermal Expansion: ASTM C531 - No more than 1.85 x 10-5 linear coefficient of thermal expansion per °F, average of two rounds of six tests.

V. Series 237 Power-Tread – Modified Polyamine Epoxy:
- Flexural Strength and Modulus of Elasticity: ASTM D790 - 5,274 psi (36.4 MPa) flexural

strength and 222,933 psi (1,537 MPa) flexural modulus of elasticity, average of five tests.
- Impact: Mil D3134 - No more than 1/16" permanent indentation. No cracking, checking or delamination of film after 240 in-lb (27 J) direct impact.

W. Series 239SC Chembloc – Modified Novolac Polyamine Epoxy:
- Chemical Immersion: NACE TM-01-74, Procedure B – No blistering, cracking, rusting or delamination of film after 72 hours continuous contact with chemical.
- Compressive Strength: ASTM C579 - Not less than 11,195 psi (77.19 MPa) compressive strength, average of six tests.
- Flexural Strength and Modulus of Elasticity: ASTM D790 - Not less than 6,270 psi (43.23 MPa) flexural strength and 323,900 psi (2,233 MPa) flexural modulus of elasticity, average of five tests.

- Impact: MIL D3134 (modified using 2.5 lb steel ball) - No more than 1/16" permanent indention. No cracking, checking or delamination of film after 240 in-lb (27 J) direct impact, average of three tests.
- Tensile Strength, Elongation, Modulus of Elasticity: ASTM D638 - No less than 7,913 psi (54.56 MPa) tensile strength, 222,975 psi (1,537 MPa) tensile modulus of elasticity and 6.14% elongation at break.

X. Series 241 Ultra-Tread MVT – Polyurethane Modified Concrete:
- Can be applied to 10 day old concrete
- Withstands moisture vapor transmission up to 20 lbs per ASTM F1869
- Withstands relative humidity up to 99% per ASTM F2170
- Adhesion: ASTM D7234 - Exceeds the cohesive strength of the concrete substrate (˜400 psi), average of three tests.
- Compressive Strength: ASTM C579 - No less than 4,922 psi (33.94 MPa) compressive strength, average of six tests.
- Flexural Strength and Modulus of Elasticity: ASTM C580 - No less than 2,438 psi (16.81 MPa) flexural strength and 313,614 psi (2,162 MPa) modulus of elasticity (tangent), average of five tests.
- Tensile Strength: ASTM C307 - No less than 1,015 psi (7.00 MPa) tensile strength, average of six tests.

Y. Series 248 Everthane – Aliphatic Moisture Cured Urethane:
- Chemical Resistance: TTM-59 (Covered Spot Test) - No blistering, cracking, checking or delamination of film. No more than slight softening or very slight swelling and loss of gloss after 24 hours exposure to the following reagents: 30% Sulfuric Acid, 10% Hydrochloric Acid, 50% Phosphoric Acid, 10% Acetic Acid, 50% Sodium Hydroxide, 10% Ammonium Hydroxide, Methyl Ethyl Ketone, Ethyl Alcohol, Hexane, Xylene, Gasoline, Ethylene Glycol, Skydrol, Brake Fluid, Transmission Fluid, Aviation Gas, Jet Fuel (JP4)
- Abrasion: ASTM D4060 (CS-17 Wheel, 1,000 gram load) – No more than 18 mg loss after 1,000 cycles, average of three tests.

Z. Series 262 Elasto-Shield – Modified Polyurethane:
- Abrasion: ASTM D4060 (CS-17 Wheel, 1,000 grams load) – No more than 1.2 mg loss after 1,000 cycles.
- Deflection Temperature: ASTM D648 – (Minimum use temp) Below -60°F (-15°C).
- Flexibility and Elongation: ASTM D522 – Must pass 1/8” bend with no cracking or

delamination.
- Tear Strength: ASTM D624 – 150 lbs/inch.
- Tensile Strength, Elongation, Modulus of Elasticity: ASTM D412 – Requirement: (extension to break) 400%. 900 psi.

AA. Series 264 Elasto-Shield – Modified Polyurethane:
- Special Qualification: Certified by NSF International in accordance with NSF/ANSI Std. 61. Maximum contact area is 20 cm² per litre of water, with minimum allowable size of tanks 5,000 gallons; cold water applications.
- Abrasion: ASTM D4060 (CS-17 Wheel, 1,000 grams load) – No more than 1.2 mg loss after 1,000 cycles.

- Deflection Temperature: ASTM D648 – (Minimum use temp) Below -60°F (-15°C).
- Flexibility and Elongation: ASTM D522 – Must pass 1/8" bend with no cracking or delamination.
- Tear Strength: ASTM D624 – 180 lbs/inch.
- Tensile Strength, Elongation, Modulus of Elasticity: ASTM D412 – Requirement: (extension to break) 300%. 1,000 psi.

BB. Series 282 Tneme-Glaze – Polyamine Novolac Epoxy:
- Chemical Immersion: NACE TM-01-74, Procedure B – No blistering, cracking, rusting or delamination of film after 72 hours continuous contact with chemical.
- Compressive Strength: ASTM C579 - Not less than 11,195 psi (77.19 MPa) compressive strength, average of six tests.
- Immersion: 140°F Deionized Water Immersion - No blistering, cracking, rusting or delamination of film after 2,000 hours continuous immersion.
- Impact: ASTM D2794 - No visible cracking or delamination of film after 59 in/lbs direct impact, average of three tests.
- Salt Spray (Fog) – ASTM B117 - No blistering, cracking, rusting or delamination of film. No more than 1/16 inch rust creepage at scribe after 3,500 hours exposure.

CC. Series 284 Deco-Clear – Modified Polyamine Epoxy:
- Coefficient of Friction: ASTM D2047 - 1.2 static coefficient of friction, average of 12 tests.
- Flexural Strength and Modulus of Elasticity: ASTM D790 - 2,867.1 psi (19.768 MPa) flexural strength average of five tests. 127,876 psi (881.67 MPa) flexural modulus, average of five tests.
- Impact: ASTM D2794 - 160 inch pounds (18.08 J) average, direct impact.
- Tensile Strength: ASTM D638 - 2,182.9 psi (15.1 MPa) tensile strength, average of five tests.

DD. Series 287 Enviro-Pox – Waterborne Epoxy-Amine Adduct:
- Adhesion: ASTM D4541 - Exceeds the cohesive strength of the concrete substrate (400 psi), average of three tests.
- Impact: ASTM D2794 - No visible cracking or delamination of film after 60 in-lb (6.8 J) direct impact, average of three tests.
- Abrasion: ASTM D4060 (CS-17 Wheel, 1,000 grams load) - No more than 113.3 mg loss after 1,000 cycles, average of three tests.

EE. Series 365 Tank Armor – Novolac Epoxy:
- Adhesion: ASTM D4541, Type II – No less than 1,650 psi (11.38 MPa) adhesion,

average of three tests.
- Hardness: ASTM D2240 (Shore D Durometer) – Not less than 90 Shore Type D hardness, average of five tests.

FF. Series 431 Perma-Shield PL – Modified Polyamine Ceramic Epoxy:
- Severe Wastewater Analysis Test: ASTM G210 - Initial impedance of 11.18 log-Z at 0.001 Hz (ohms cm²). No blistering, cracking, checking or delamination. No less than 88.7% EIS retention or not more than 1.26 ohms cm² reduction in log-Z electrochemical impedance at 0.001 Hz after 28 days exposure. No less than 2,363 psi (16.30 MPa) adhesion or no loss of adhesion after 28 days in S.W.A.T., average of three tests.
- Abrasion Resistance: ASTM D4060-14 (CS-17 Wheel, 1,000 cycles, 1,000 gram load) – No more than 41 mg loss, average of three tests.
- Abrasion Resistance: BS EN 598: 2007+A1: 2009 (Rocking Abrasion) - No more than 0.14 mm (5.5 mils) thickness of coating loss after 1,000,000 cycles.

GG. System Permox-CTF: Amine Cured Novalac Epoxy
- Abrasion Resistance: ASTM D4060-14 (CS-17 Wheel, 1,000 cycles, 1,000 gram load) – No more than 300 mg loss

HH. Series 434 Perma-Shield H_2S – Modified Aliphatic Amine Epoxy Mortar:
- Severe Wastewater Analysis Test: ASTM G210 - Initial impedance of 10.6 log-Z at 0.01 Hz (ohms cm²). No blistering, cracking or checking. No less than 86.7% retention or not more than 1.4 ohms cm² reduction in log-Z electrochemical impedance at 0.01 Hz after 28 days exposure.
- Abrasion Resistance: ASTM D4060 (CS-17 Wheel, 1,000 gram load) – No more than 88 mg loss after 1,000 cycles, average of three tests.
- Impact: ASTM D2794 – No visible cracking or delamination after 160 inch-pounds (18.1 J) direct impact.
- Compressive Strength: ASTM D695 – Not less than 12,331 psi (85.0 MPa) compressive strength, average of five tests.

II. Series 435 Perma-Glaze – Modified Polyamine Epoxy:
- Severe Wastewater Analysis Test: ASTM G210 - Initial impedance of 12.46 log-Z at 0.01 Hz (ohms cm²). No blistering, cracking, checking or delamination. No less than 84.3% retention and no more than 1.95 ohms cm² reduction in electrochemical impedance after 28 days exposure. No less than 93% loss of tensile adhesion after 28 days in S.W.A.T. average of three tests.
- Abrasion Resistance: ASTM D4060 (CS-17 Wheel, 1,000 gram load) – No more than 72 mg loss after 1,000 cycles, average of three tests.

JJ. Series 436 Perma-Shield FR – Fiber-Reinforced Modified Polyamine Epoxy:
- Severe Wastewater Analysis Test: ASTM G210 - Initial impedance of 10.2 log-Z at 0.01 Hz (ohms cm²). No blistering, cracking or checking. No less than 83.7% retention or not more than 1.6 ohms cm² reduction in log-Z electrochemical impedance at 0.01 Hz after 28 days exposure.
- Abrasion: ASTM D4060 (CS-17 Wheel, 1,000 gram load) – No more than 74.6 mg loss after 1,000 cycles, average of three tests.
- Impact: ASTM D2794 – No visible cracking or delamination of film after 88 inch-pounds direct impact.
- Compressive Strength: ASTM D695 – No less than 8,866 psi (6.13 MPa) compressive strength, average of five tests.

KK. Series 446 Perma-Shield MCU – Hydrophobic Aromatic Polyurethane:
- Minimum Time to Return to Immersion Service: 4 Hours
- Severe Wastewater Analysis Test: ASTM G210 - Initial impedance of 10.2 (log-Z). No blistering, cracking, checking or loss of adhesion. No more than 0.1 (log-Z) reduction in electrical impedance after 28 days exposure.

LL. Series 626 Dur A Pell GS – RTV Silicone Rubber Water & Graffiti Protectant:
- Accelerated Weathering: ASTM C793 - No signs of deterioration except for dirt accumulation after 4,000 hours exposure.
- Chloride Ion Penetration: AASHTO T-259 - No less than a 1500% reduction in the chloride ion content when compared to untreated concrete, average of two tests.

MM. Series 662 Prime-A-Pell Plus – Modified Siloxane/Silane with Diffused Quartz Carbide:
- QUV Exposure: ASTM D4587 (UVA-340 bulbs, Cycle 4: 8 hours UV/4 hours condensation) – No reduction in water repellent performance after 5,000 hours exposure.
- Water Absorption: ASTM C67 (Applied to Ohio Sandstone) - No less than a 96% reduction in water absorption as compared to untreated samples following 24 hours of immersion.
- Water Absorption: ASTM C97 (Applied to Fire Clay Brick) - No less than a 93% reduction in water absorption as compared to untreated samples following 24 hours of immersion.
- Water Absorption: ASTM C140 (Applied to Cast Mortar Cubes) - No less than a 96% reduction in water absorption as compared to untreated samples following 24 hours of immersion.

NN. Series 700 Hydroflon – Advanced Thermoset Solution Fluoropolymer:
- Exterior Exposure: ASTM D1014 (AAMA 2604-98) (South Florida Marine Exposure) - exceeds the exterior weathering requirements of the American Architectural Manufacturers Association (AAMA) 2604-98 standard.
- Exterior Exposure: ASTM D4141, Method C (EMMAQUA) - No blistering, cracking or chalking. No less than 100% gloss retention, no more than 1 unit gloss loss and no more than 0.23 DEHunter color change (white) after 1,500 MJ/m² (69,109MJ/m² total) EMMAQUA exposure.
- QUV Exposure: ASTM D4587 - No blistering, cracking or chalking. No less than 61% gloss retention (31.4 units gloss change) and 1.89 DEFMC2 (MacAdam units) color change (white) after 25,000 hours exposure.
- Xenon Arc Weathering: ASTM D6695 - No blistering, cracking or chalking. No less than 87% gloss retention (11.9 units gloss change) and no greater than 0.37 DE00 color change (white) after 8,000 hours Xenon Arc exposure.

OO. Series 971 Aerolon – Fluid-Applied Acrylic Insulation Coating:
- Thermal Conductivity: ASTM C518 - Thermal Conductivity shall not be greater than 0.0356 W/m-°K or 0.2468 BTU-in/ft²-hr-°F (R value at one inch equals 4.1).

PP. Series 1026 Enduratone – Acrylic Emulsion:
- VOC Content: 0.38 lbs/gallon (1.4 grams/litre)
- QUV Exposure: ASTM D4587 (UVA-340 bulbs, 8 hours UV, 4 hours condensation) - No blistering, cracking, chalking or delamination of film. No less than 49% gloss retention (2.3 units gloss change) and 0.39 DE00 color change after 10,000 hours exposure.

QQ. Series 1029 Enduratone – HDP Acrylic Polymer:
- Algal Resistance: ASTM D5590 - No more than traces of fungal growth (less than 10%) after three weeks continuous exposure.
- Fungal/Mold/Mildew Resistance: ASTM D5590 - No more than traces of fungal growth (less than 10%) after four weeks continuous exposure.
- QUV Exposure: ASTM D4587 (UVA-340 bulbs, 8 hours UV, 4 hours condensation) - No blistering, cracking or delamination of film. No less than 100% gloss retention, no more than 0.45 DE00 color change and no units gloss loss after 3,000 hours.

RR. Series 1095 Endura-Shield – Aliphatic Acrylic Polyurethane:
- Volatile Organic Compounds (Thinned 5%): 0.77 lbs/gallon (92 grams/litre)
- QUV Exposure: ASTM D4587 (UVA-340 bulbs, 8 hours UV, 4 hours condensation) - No blistering, cracking or delamination. No less than 52% gloss retention or 23 units gloss change and .59 DECIE2000 color change (white) after 2,000 hours exposure.

3.27 SYSTEMS REFERENCE GUIDE

A. STEEL & FERROUS METALS

FERROUS METALS - NON-IMMERSION / EXTERIOR / UV-EXPOSED

3.14.A.1 System No. 700-1: Zinc/Epoxy/Fluoropolymer
3.14.A.2 System No. 1095-1: Zinc/Epoxy/Urethane
3.14.A.3 System No. 1095-2: Epoxy/Epoxy/Urethane
3.14.A.4 System No. 1095-3: Epoxy Mastic/Urethane (Overcoat)

EXTERIOR – BELOW GRADE

3.14.B.1 System No. N140-1: Epoxy/Epoxy/Epoxy or Urethane
3.14.B.2 System No. 46H-413-1: Polyamide Epoxy-Coal Tar

INTERIOR (NON-IMMERSION)

3.14.C.1 System No. 66-1: Polyamide Epoxy
3.14.C.2 System No. 27WB-1: Inorganic Hybrid WB Epoxy (Overcoat)

IMMERSION

3.14.D.1 System No. 104-1: Cycloaliphatic Amine Epoxy (Non-Potable)
3.14.D.2 System No. 142-1: Flake / Aluminum Oxide Epoxy (Non-Potable)
3.14.D.3 System No. 446-1: Aromatic Polyurethane (Non-Potable)
3.14.D.4 System No. 142-2: Methanol
3.14.D.5 System No. 365-1: Sulfuric Acid
3.14.D.6 System No. 22-1: Modified Polyamine Epoxy (Potable)
3.14.D.7 System No. 20-1: Polyamide Epoxy (Potable)

B. OVERHEAD METAL DECKING, JOIST

3.15.A System No. 115-1: Self-crosslinking Hydrophobic Acrylic (Interior)
3.15.B System No. 1029-1 HDP Acrylic Polymer (Exterior)

C. GALVANIZED STEEL & NONFERROUS METALS

GALVANIZED STEEL, STAINLESS STEEL, ALUMINUM, OR COPPER

3.16.A System No. 1095-4: Epoxy/High Build Urethane

ALUMINUM IN CONTACT WITH CONCRETE

3.16.B System No. 46H-413-2: Polyamide Epoxy-Coal Tar

D. CONCRETE & MASONRY

EXTERIOR-ABOVE GRADE (VERTICAL SURFACES)

3.17.A.1 System No. 156-1: Modified Waterborne Acrylate (Elastomeric)
3.17.A.2 System No. 1026-1: Acrylic Emulsion (Non-Elastomeric)
3.17.A.3 System No. 662-1: Clear Silane/Siloxane Sealer (Min. 42% Solids)
3.17.A.4 System No. 626-1: Clear Water Repellent and Graffiti Protectant

EXTERIOR-BELOW GRADE

3.17.B.1 System No. 46H-413-3: Polyamide Epoxy-Coal Tar

INTERIOR (NON-IMMERSION)

3.17.C.1 System No. 104-2: Cycloaliphatic Amine Epoxy
3.17.C.2 System No. 66-2: Polyamide Epoxy
3.17.C.3 System No. 113-1: Acrylic Epoxy
3.17.C.4 System No. 1026-2: Acrylic Emulsion

IMMERSION

3.17.D.1 System No. 104-3: Cycloaliphatic Amine Epoxy (Non-Potable)
3.17.D.2 System No. 142-3: Flake / Aluminum Oxide Epoxy (Non-Potable)
3.17.D.3 System No. 22-2: Modified Polyamine Epoxy (Potable Water)
3.17.D.4 System No. 20-2: Polyamide Epoxy (Potable)
3.17.D.5 System No. 262-1: Modified Polyurethane (Non-Potable Repairs)
3.17.D.6 System No. 264-1: Modified Polyurethane (Potable Repairs)

E. CONCRETE FLOORS (RESINOUS FLOORING SYSTEMS)

3.18.A.1 System No. 248-1: Moisture Cured Urethane (Thin film with increased chemical resistance, UV stability, and durability)
3.18.A.2 System No. 222-1: Decorative / Functional Flooring (Non-Slip)
3.18.A.3 System No. 287-1: Waterborne Epoxy-Amine Adduct (Thin-film)

F. GYPSUM WALLBOARD & WOOD

GYPSUM WALLBOARD

3.19.A.1 System No. N69-1: Polyamidoamine Epoxy

3.19.A.2 System No. 113-2: Acrylic Epoxy
3.19.A.3 System No. 1026-3: Acrylic Emulsion

WOOD – EXTERIOR or INTERIOR EXPOSURE

3.19.B.1 System No. 1029-2: HDP Acrylic Polymer

G. HIGH TEMPERATURE COATINGS

3.20.A System No. 1552-1: Acrylic Silicone Copolymer (500°F Max)
3.20.B System No. 1556-1: Modified Silicone Copolymer (1000°F Max)
3.20.C System No. 1528-1: Silicone Aluminum (1200°F Max)

H. SURFACES EXPOSED TO H_2S/H_2SO_4 (SEVERE EXPOSURE/IMMERSION)

CEMENTITIOUS SURFACES

3.21.A.1 System No. 434-1: Modified Aliphatic Amine Epoxy Mortar
3.21.A.2 System No. 436-1: Fiber-Reinforced Modified Polyamine Epoxy

FERROUS METAL SURFACES

3.21.B.1 System No. 435-1: Modified Polyamine Epoxy
3.21.B.2 System No. 431-1: Modified Polyamine Ceramic Epoxy
3.21.B.3 System Permox-CTF: Amine Cured Novalac Epoxy

I. EXTERIOR OF PRESTRESSED CONCRETE TANKS

3.22.A System 156-2: New Tanks
3.22.B System 156-3: Existing Tanks (Previously Painted)

J. SECONDARY CONTAINMENT AREAS

3.23.A System No. 239SC-1: Modified Novolac Epoxy
3.23.B System No. 61-1: Cycloaliphatic Amine Epoxy

K. PIPE EXTERIOR COATING SYSTEMS

3.24.A System No. 700-2: Zinc/Epoxy/Fluoropolymer (New Aerials)
3.24.B System No. N140-2: Epoxy/Epoxy/Topcoat (Exposed)
3.24.C System No. 46H-413-4: Polyamide Epoxy-Coal Tar (Buried Only)
3.24.D System No. 1095-5: Acrylic Polyurethane (PVC or HDPE Pipe)
3.24.E System No. 1026-4: Acrylic Emulsion (Interior Insulated Pipe)
3.24.F System No. 700-3: Epoxy Mastic/Fluoropolymer (Overcoat)
3.24.G System No. 1095-6: Epoxy Mastic/Urethane (Overcoat)

L. INSULATIVE COATINGS – THERMAL RESISTANCE

SUBSTRATES UP TO 325°F

3.25.A.1 System No. 971-1: Personnel Protection (up to 325°F)

SUBSTRATES BELOW AMBIENT TEMPERATURE

3.25.B.1 System No. 971-2: Condensation Control (Sweating)
3.25.B.2 System No. 971-3: Condensation Control (Freezing/Icing)

3.28 COATING SCHEDULE - TO BE DEVELOPED BY PROJECT AS NEEDED

END OF SECTION