Bid Attachment 2

TECHNICAL SPECIFICATIONS

CONTRACT DOCUMENTS

FOR

MANATEE COUNTY PUBLIC WORKS DEPARTMENT
RYE ROAD MASTER LIFT STATION DESIGN

MANATEE CO. PROJECT # 6086130/WO#001
HDR ENGINEERING, INC. PROJECT #10019929/225338

February 9, 2018

PROJECT OWNER:

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c/o Manatee County Purchasing Division
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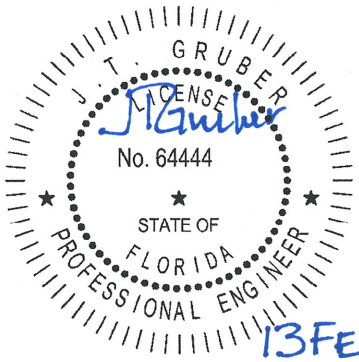

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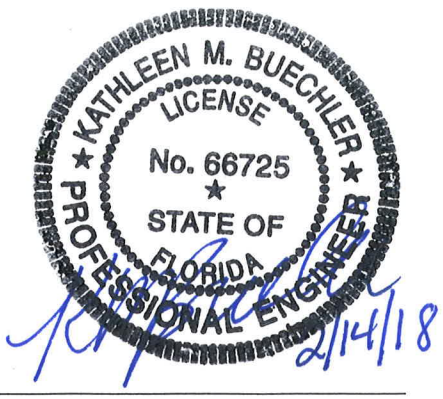

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INFRASTRUCTURE ENGINEERING STANDARD SPECIFICATIONS

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PREMANUFACTUERED BUILDING SPECIFICATION SECTION 06610 AND DRAWINGS **366**

This specification includes by reference the Manatee County Public Works Standards, Part I Utilities Standards Manual approved June 2015.

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. He 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. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the County, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all incidental costs. He 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 material men 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 him 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. He 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 so as 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 equal to Koppers 300M or provide a 1/32-inch neophrene 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 or not 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 he 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 NGVD 1929 Datum and/or NAVD 1988.

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

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 a triplex pump station on Rye Road north of Grande Vista Boulevard on the northwest side of the roadway, at the location shown on the plans, including wet well with access hatches, pumps, piping, monitoring equipment, gravity sewer and manholes, flow meter, pressure gauges, valves, above and below grade force main and fittings with connection to existing 12-inch PVC force main, concrete slabs, generator, electrical building, potable water service with spigot and backflow preventer, fencing and gates, antennae, combination air release valve, exterior control panel, electrical and control work, grounding, driveway, and associated appurtenances shown on the plans and noted in the specifications. Contractor is responsible for developing a wastewater bypass plan, providing all necessary vacuum trucks and temporary bypass pumping and piping.

The work included in this contract consists also of the rehabilitation of pump station 355 at Gene Witt Elementary School as shown on the plans. Work shall include the replacement of the two existing pumps, discharge elbow, pump base mounting plate, guide rails, mounting brackets, rail supports and appurtenances, control panel work: pump breakers and overloads, 6-inch force main furnish and installation and tie-in and conversion of existing force main, plugging 6-inch influent line that is to be taken out of service at the existing PS-355 upstream manhole, PS-355 wet well, rehabilitating generator enclosure and fuel tank, replacement of the existing gate, replacement of the water spigot and backflow preventer, thirty (30) foot hose, de-vegetating the existing fence line, and repainting the existing above grade water main valve and meter assembly within the existing fence line. Contractor to order pumps,. Contractor to coordinate with Barney's pumps and County with respect to item lead times, station shutdown, station testing and startup. Contractor is responsible for developing a wastewater bypass plan, providing all necessary vacuum trucks and temporary bypass pumping and piping.

The work included in this contract consists also of the furnish and installation of 203 linear feet (LF) of twelve (12) inch high density polyethylene (HDPE) via horizontal directional drill and 43 LF of ten (10) inch C900 PVC water main and the removal of 261 LF of the existing ten (10) inch water main, as well as, the installation of a ten (10) inch cut-in (insertion) gate valve. The work is associated with a bridge widening on Rye Road north of Fire Station No. 3 as part of the SR64 to Upper Manatee River Roadway (6086160).

The utility work is associated with the roadway widening work from SR64 to Upper Manatee River Roadway (6086160).

B. The Contractor shall furnish all shop drawings, operation and maintenance manuals, asbuilts, surveying, 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.

D. Contractor to not begin tie-in work or station shut-down until bypass plan and connection plan has been approved and FDEP Clearance has been issued.

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, he 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 section 01570 of this specification.

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. He 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 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; such as, building department permits, right-of-way permits, and NPDES dewatering permits. 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 utilities 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 insure 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.

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

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

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

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 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.

1.03 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
4410-B 66th St. W.
Bradenton, FL 34210

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

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

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

1. Shop Drawings, Working Drawings.
2. Clearing, grubbing and grading except as hereinafter specified.
3. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
4. Dewatering associated with removal from water main and force main, as well as, ground dewatering associated with the ten (10) inch water main relocation at the bridge and disposal of surplus water. Dewatering of ground associated with the pump station construction is to be paid for under Bid Item 32 Dewatering.
5. Structural fill, backfill, and grading.
6. Replacement of unpaved roadways, and shrubbery plots.
7. Foundation and borrow materials, except as hereinafter specified.
8. Testing and placing system in operation.
9. Any material and equipment required to be furnished, installed and utilized for the tests.
10. Pipe, structures, pavement replacement, asphalt and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
11. Maintaining the existing quality of service during construction.
12. Maintaining or detouring of traffic.
13. Appurtenant work as required for a complete and operable system.
14. Seeding and hydromulching unless covered under a bid item.
15. As-built Record Drawings and Operation and Maintenance Manuals.
16. Surveying and geotechnical engineering.
17. Permitting other than the Florida Department of Environmental Protection (FDEP) permits, such as, building permits, right-of-way permits, NPDES dewatering permits, etc.

1.08 BID ITEMS

Bid Item No. 1 MOBILIZATION, DEMOBILIZATION, BONDS, AND PERMITS

1. 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 is not limited to: preparation and movement of personnel, equipment, supplies and incidentals such as safety and sanitary supplies/ facilities

2. The cost of permits and any required insurance and any other preconstruction expense necessary for the start of the work, excluding the cost of construction

materials, shall also be included in this item. The costs for audio-visual documentation, indemnification, and for provision of the field office (if erected) shall be included in this item. This bid item shall also include demobilization at the end of the Contract.

3. Payment for this bid item 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%).

4. 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

5. 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 MAINTENANCE OF TRAFFIC AND PEDESTRIAN SAFETY

1. Maintenance of traffic and pedestrian safety within the limits of the project for the duration of the construction period will be in accordance with the requirements of Section 102 of the Florida Department of Transportation's "Standard Specifications for Road & Bridge Construction," latest edition and the State of Florida's "Manual of Traffic Control and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations," applicable edition, except as amended by these Contract Specifications (Section 01570 Traffic Regulations).

2. The work specified under this Section shall include furnishing all labor, materials, and equipment necessary to maintain public roadway and pedestrian traffic including flag men, uniformed police officers, temporary barricades of whatever type required, warning lights/flashers, safety ropes, and for such duration as may be required by the Engineer. This will also include all materials and construction necessary for temporary connections and driveway maintenance. Also included is furnishing, installing and maintaining a Traffic Control Plan, control and safety devices, control of dust, temporary crossing structures over trenches, any necessary detour facilities, and other special requirements for the safe and expeditious movements of traffic.

3. The Contractor will take all necessary precautions for the protection of the Work and safety of the public for the duration of the construction period.

4. The Contractor will provide barriers to prevent unauthorized entry to construction areas and to protect persons and property from damage due to construction operations. Contractor will provide temporary fencing where needed to protect the Work or Contractor's office, materials, and equipment.

5. This item will be paid for at the applicable contract unit price of lump sum (LS) as listed in the Contract Plans and paid monthly based on the Work completed as part of the pay application.

Bid Item No. 3 EROSION AND SEDIMENTATION CONTROL

1. Erosion and Sedimentation Control within the limits of the project for the duration of the construction period will be in accordance with the requirements of Manatee County Public Works Standards Manual, latest edition, and Section 104 of the Florida Department of Transportation's "Standard Specifications for Road & Bridge Construction," latest edition. Contractor to develop erosion and sedimentation control plan and receive County approval prior to construction. Install silt fences, rock bags, and other erosion and sedimentation control devices as depicted in the Contractor developed erosion and sedimentation control plan or as directed by the Engineer or County.

2. The work specified under this Bid Item will include furnishing all labor, materials, and equipment to control and prevent sediment transportation from the Work area to adjacent properties, including installation, maintenance, and removal of temporary erosion and sediment controls for such duration as may be required by the Engineer or County.

3. The Contractor will clean up the site to preconstruction condition, as described in Section 01710.

4. This item will be paid for at the applicable contract unit price of lump sum (LS) as listed in the Contract Plans.

Bid Item No. 4 CLEANUP AND MISCELLANEOUS WORK

1. Payment for all work included in this Bid Item will be made at the applicable unit price of lump sum (LS) as an allowance permitted by the County. Payment shall include the furnish and installation of sodding, sprigging and seeding of disturbed areas not specifically covered under other bid items. Payment shall include site preparation, clean up and restoration not specifically covered under other bid items. Payment shall include trash disposal and dust control. Contractor shall minimize dirt/earth from site from being transferred onto Rye Road via work truck tires. Contractor shall remove dirt/earth or other work related elements from Rye Road as needed and at County's request. Payment shall include development of record drawings; development and submittal of operation and maintenance manuals for equipment, instrumentation and appurtenances; development and submittal of shop drawings. Payment shall include work and coordination efforts not specifically noted within other bid items that are necessary to complete work as noted in the Contract Documents, complete and satisfactory by the County.

Bid Item No. 5 HYDROMATIC PUMP AND APPURTENANCES REPLACEMENT [*PS-355 REHABILITATION*]

1. Payment for work under this Bid Item shall be made at the Contract unit price bid of lump sum (LS) for the replacement of existing pumps, discharge elbow, guide rails and appurtenances and install pump base mounting plate, as well as, replacement of existing pump breakers and overloads located at the existing pump station 355; existing to be removed and disposed and new to be furnished and installed complete and operational. Payment shall include removal and disposal of existing pumps, discharge elbow, guide rails and appurtenances and furnish and install pump base mounting plate. Payment shall include the furnish and installation of two (2) Hydromatic S4N, 5 hp, 6.70" impeller pumps, BPIU discharge elbow, stainless steel lifting chain, pump base mounting plate, guide rails, mounting brackets, rail supports and appurtenances from Barney's pumps. Contractor to coordinate with Barney's Pumps and County with respect to item lead times, delivery, station shutdown, station testing and startup at pump station 355. Payment shall include removal and disposal of existing pump breakers and overloads and furnish and installation of new pump breaker and overloads compatible with the new Hydromatic S4N pumps. Payment shall include all necessary vacuum trucks and temporary bypass pumps and piping necessary to bypass the pump station 355 and affected upstream pump stations. Contractor to coordinate with the County to determine bypass pumping flow and head requirements. Bypass plan must be submitted and accepted by the County prior to starting construction. Payment shall include all other labor, equipment, and materials needed to remove and replace the existing pumps and pump appurtenances as well as remove and replace the existing breakers and overloads and place pump station 355 back into service.

Bid Item No. 6 ENCLOSURE GATE REPLACEMENT [*PS-355 REHABILITATION*]

1. Payment for work under this Bid Item shall be made at the Contract unit price bid for each (EA) existing double swing chain link fence gate located at the existing pump station 355 removed, disposed, and furnish and install of new swing gate. New double swing chain gate shall meet requirements of these Specifications and Detail US-19 on the Contract Plans. Contractor to measure existing gate prior to placing order. Payment shall include all labor, equipment and materials required to remove the existing gate, dispose of existing gate per federal, state and local regulations, and furnish and install the new gate. Payment shall include relocation of signs (if any) from the existing gate to the new gate, attached via same methodology as existing.

Bid Item No. 7 VALVE VAULT RECOAT [*PS-355 REHABILITATION*]

1. Payment for work under this Bid Item shall be made at the Contract unit price bid of lump sum (LS) for the rehabilitation of the existing valve vault located at existing pump station 355. Payment to include cleaning (pressure washing) interior of existing valve vault taking care to protect the existing piping and valve paint, removal of pitted concrete to structurally sound concrete, repair of voids with SewperCoat (see Section 09920), interior coating of System No. 120-1 Vinester per Section 09900. Payment shall include all necessary labor, equipment, and

materials needed to rehabilitated the interior of the existing valve vault at pump station 355. Payment to include repainting of existing piping and valves within the valve vault if paint damaged during rehabilitation of valve vault

Bid Item No. 8 CLEARING AND GRUBING OF FENCE LINE [*PS-355 REHABILITATION*]

1. Payment for work under this Bid Item shall be made at the Contract unit price bid of lump (LS) for the removal and disposal of vegetation from the chain link fence and within the existing pump station 355 site, as well as, removal and disposal of vegetation (except grass/sod which is to remain) within three (3) feet of chain link fence.

Bid Item No. 9 GENERATOR AND FUEL TANK REHABILITATION [*PS-355 REHABILITATION*]

1. Payment for work under this Bid Item shall be made at the Contract unit price bid of lump sum (LS) for the rehabilitation of the existing generator fuel tank and enclosure located at PS 355. Payment to include the removal and disposal of the existing coating from the existing generator fuel tank and enclosure at pump station 355 (visible surfaces only) and coat with System No. 73-1: Epoxy/High Build Urethane per Section 09900; final coat color to match existing as close as possible (off white). Payment shall include all necessary labor, equipment, and materials needed to remove existing coating and re-coat the existing generator fuel tank at pump station 355. Contractor to follow coating manufacturer's recommended application means and methods.

Bid Item No. 10 ABOVE GRADE WATER MAIN/MASTER METER ASSEMBLY REPAINT [*PS-355 REHABILITATION*]

1. Payment for work under this Bid Item shall be made at the Contract unit price bid of lump sum (LS) for the rehabilitation of the existing above grade water main/backflow preventer assembly located at existing pump station 355. Payment to include the removal and disposal of the existing paint from the existing above grade water main/master meter assembly at pump station 355 (visible surfaces only) and painting with System No. 73-1: Epoxy/High Build Urethane per Section 09900; color to be water main blue. Payment shall include all necessary labor, equipment, and materials needed to repaint the existing water main/backflow preventer assembly at pump station 355.

Bid Item No. 11 BACKFLOW PREVENTER AND HOSE BIBB REPLACEMENT [*PS-355 REHABILITATION*]

1. Payment for work under this Bid Item shall be made at the Contract unit price bid of lump sum (LS) for the replacement of the existing water service backflow preventer and hose bibb at pump station 355. Payment to include the removal and disposal of the existing ¾-inch backflow preventer and hose bibb and furnish and installation of new back flow preventer and hose bib in accordance with these Specifications and the Contract Plans. Payment shall include the furnish and installation of a hose rack and thirty (30) foot hose near the hose bibb. Payment shall include all necessary labor, equipment, and materials needed to replace the

existing backflow preventer and hose bibb and install a hose rack and hose at pump station 355.

Bid Item No. 14 PUMP AND APPURTENANCES [*RYE ROAD PUMP STATION*]

1. Payment for work included under this Bid Item shall be made at the applicable Contract unit price bid per each (EA) submersible pump installed. Payment shall include the furnish and installation of a Hydromatic pumps (Model S8LA12500M4-4, 125 HP, 8-inch discharge) (or equal), 8-inch BPIU discharge elbow (Hydromatic Part No. 134420083); Type 316 stainless steel pump guide rail; Type 316 stainless steel upper guide rail bracket (Hydromatic Part No. 518330045); Type 316 pipe supports; Type 316 stainless steel 1/2" pump lifting chain with grip eye (or equal); Type 316 stainless steel anchor bolts; and all other Type 316 stainless steel hardware necessary to complete installation. Payment shall include furnish and installation of 3/4-inch stainless steel elbow mounting plate under discharge elbow (Hydromatic Part No. 2426-75). Payment shall include start-up and testing. Payment shall include the cost of all labor, materials, and equipment required for the complete installation of the pump including testing and associated items.

Bid Item No. 15 WET WELL AND STATION APPURTENANCES [*RYE ROAD PUMP STATION*]

1. Wet well and station appurtenances bid item will be paid for at the applicable contract unit price of lump sum (LS) as listed in the Bid Form. Payment shall include the wet well precast sections; three (3) aluminum hatches in a single frame; 8-inch schedule 80 PVC (below grade) and schedule 80 CPVC (above grade) air vent piping and fittings starting 48-inches below grade within wet well to one foot above grade next to odor control slab with cap for connection by odor control vendor (Evoqua); one Type 304L stainless steel cable holder rack (with minimum 6 hooks); necessary length of 8-inch HDPE (DR 11, DIP size) discharge piping (with one end fused and one flanged end with ductile iron back-up ring) and 8-inch 90 degree molded HDPE (DR11, DIP size) elbows (with one fused end and one flanged end with ductile iron back-up ring); concrete required to create wet well slopes indicated on the Contract Plans; Type 316 stainless steel pipe supports within wet well; Type 316 stainless steel anchor bolts; all other Type 316 stainless steel hardware necessary to complete installation; five (5) back up mercury floats (Model S50NO Rotofloat level controls or equal); Type 316 SST flange pipe supports for above grade flange piping and connection hardware; Coordination with Evoqua (odor control vendor), furnish and installation of water line from the proposed backflow preventer, ball valve and meter box to be installed on southwest side of Odor Control slab for connection to Odor Control Unit (Odor Control Unit to be installed by Evoqua) and, furnish and installation of power conduit from electrical building to odor control slab for connection to Odor Control Unit, furnish and installation of three (3) inch PVC drain line from 6-8 inches above grade at odor control slab to 3 feet below grade discharging into wet well (minimum 1% slope) with end cap above grade for connection by odor control vendor; emergency eye wash and shower station area (Detail 3, C-206); rain gauge, signal and power lines and conduits, and appurtenances as depicted on Detail 2, C-204; excavation, including rock as necessary, bedding, backfill; complete system (pump station) testing and start-up; and all other items called for or necessary for a complete installation in accordance with the Contract Documents and County Standards. Payment shall include a Pump Station

Identification/Emergency Contact Sign with phone number and "No Trespassing sign" to be installed on the new/proposed fence that faces Rye Road. Payment shall include the cost of all labor, materials and equipment, all surveying, excavation, sheet and shoring, dewatering, backfilling, compaction, and all items necessary and as shown on the Contract Drawings to construct the wet well and station appurtenances noted within this bid item description complete and ready for service.

Bid Item No. 16 MANHOLES, LINED [*RYE ROAD PUMP STATION*]

1. Payment for work under this Bid Item shall be made at the Contract unit price bid for each (EA) manhole furnished and installed including frame and cover, liner, construction of invert, all protective coatings, drop connections if applicable, sealing of lift holes, rainwater protector, etc.

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

Bid Item No. 17 12-INCH, DIP, FLANGE [*RYE ROAD PUMP STATION*]

1. Payment for all work included in these Bid Items shall be made at the applicable Contract unit price bid per linear foot (LF) for furnishing and installing the listed diameter of ductile iron flanged pipe (Class 53) as shown on the Contract Drawings and listed in the Bid Form. 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, testing and equipment required to complete these Bid Items. Payment for shall include Protecto 401 epoxy liner (or equal). Payment shall include all labor, material, testing and equipment required to complete these Bid Items.

Bid Item No. 12 6-INCH, C900 PVC, RJ [*PS-355 REHABILITATION*]
Bid Item No. 18 6-INCH, C900 PVC, RJ [*RYE ROAD PUMP STATION*]
Bid Item No. 19 12-INCH, C900 PVC, RJ [*RYE ROAD PUMP STATION*]
Bid Item No. 20 24-INCH, C905 PVC, GRAVITY SANITARY [*RYE ROAD PUMP STATION*]

1. Payment for all work included in these Bid Items shall be made at the applicable Contract unit price bid per linear foot (LF) for furnishing and installing the listed diameter PVC force main and gravity sewer main (AWWA C-900 DR18, CL-150 or C-905 DR18, CL-235) 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, excavation, including rock, dewatering, bedding, backfill, compaction, connecting to existing mains, marking tape, locate wire, locate wire stations (2), testing and equipment required to complete these Bid Items. 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.

2. All force main (pressure) C-900 and C-905 is to be restrained joint installed as part of this project. Mechanical restraints are to be polyethylene wrapped.

3. Payment for 6-inch PVC, C-900 PVC, RJ, includes tying into existing 6-inch force main, existing 6-inch force main removal and disposal as shown on the Contract Drawings. Payment shall also include the locating of the existing 6-inch inch force main, furnish and installing 6-inch stainless steel line stops or utilizing existing isolation valves to facilitate existing force main shut down and tie-in of proposed main, removing and disposing wastewater from the 6-inch force main in preparation for tie-ins, cutting and disposing of necessary section of six (6) inch force main, bypassing the wastewater flow within the existing 6-inch force main with vacuum trucks at upstream lift stations and/or temporary bypass pumping piping. Contractor must provide adequate bypassing to allow for tie-ins. Contractor to coordinate with the County to determine available shut down time for the 6-inch force main and upstream affected stations. Bypass plan must be submitted and accepted by the County prior to starting construction.

Bid Item No. 21 **8-INCH GATE VALVES [*RYE ROAD PUMP STATION*]**
Bid Item No. 22 **12-INCH GATE VALVES [*RYE ROAD PUMP STATION*]**
Bid Item No. 23 **8-INCH CHECK VALVES [*RYE ROAD PUMP STATION*]**
Bid Item No. 55 **10-INCH, GATE VALVE, CUT IN [*WATER MAIN REPLACEMENT*]**

1. Payment for all work included in these Bid Items shall be made at the applicable Contract unit price bid per each (EA) valve for furnishing and installing the listed diameter valve, box, cover and concrete pad as shown on the Contract Drawings and listed on the Bid Form. Payment shall represent full compensation for all labor, material, excavation, including rock as necessary, bedding, backfill, compaction, testing and disinfection and equipment required to complete these Bid Items.

2. Above grade gate and check valves do not require valve box, cover or concrete pad. Above grade gate and check valves to include hand actuators and shall be painted per specifications, see Section 09900 (color Green for Wastewater).

Bid Item No. 24 **FLOW METER [*RYE ROAD PUMP STATION*]**

1. Payment for magnetic flow meter (ABB DN300 or equal) shall be based on the actual number of units installed in the locations shown on the Contract Drawings at the unit price of each (EA) as listed in the Bid Form. Flow meter shall include all labor, materials and equipment necessary to install the meter above grade per Manufacturer's recommendations and requirements. Payment shall also include furnish and installation of control wiring (length as needed) and conduit from the meter to the control/monitor system located in the electrical room, installation of power line as necessary to provide power to the meter and controller/monitor, excavation, including rock as necessary, bedding, backfill, compaction, testing removing excess material, testing, clean-up, and all items necessary to furnish and install the flow meter complete and ready for service.

Bid Item No. 25 LEVEL TRANSDUCER [*RYE ROAD PUMP STATION*]

1. Payment for level transducer (Model GXS3 Dylix level transducer or equal)shall be based on the actual number of units installed in the locations shown on the Contract Drawinfs at the unit price of each (EA) as listed in the Bid Form. Level transducer shall include all labor, materials and equipment necessary to furnish and install the level transducer and stilling well within the proposed wet well per Manufacturer's recommendations and requirements. Payment shall also include furnish and installation of control wiring (100 feet) and conduit from the transducer to the control/monitoring system, installation of power line and conduit as necessary to provide power to the transducer, excavation, including rock as necessary, bedding, backfill, compaction, testing ,removing excess material, testing, clean-up, and all items necessary to furnish and install the level transducer complete and ready for service.

Bid Item No. 13 6-INCH DIP FITTINGS, WASTEWATER [*PS-355 REHABILITATION*]
Bid Item No. 26 6-INCH DIP FITTINGS, WASTEWATER [*RYE ROAD PUMP STATION*]
Bid Item No. 27 12-INCH DIP FITTINGS, WASTEWATER [*RYE ROAD PUMP STATION*]
Bid Item No. 28 24-INCH DIP FITTINGS, WASTEWATER [*RYE ROAD PUMP STATION*]

1. Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid each (EA) for furnishing and installing each listed ductile iron fitting (Protecto 401 epoxy lined) and cam-lok fittings as shown on the Contract Drawings and listed on the Bid Form. Payment will be made for each fitting installed and will represent full compensation for all labor, material, excavation, including rock, bedding, backfill, compaction, testing and equipment required to complete these Bid Items.
2. The 6-inch DIP fittings include the cost of post restraining the required length of existing 6-inch force main. Pump station-355 6-inch fittings include the cost to plug the existing influent line to the pump station-355 upstream manhole to be furnished and installed per County Standards, no separate payment for the manhole influent line plug will be made.

Bid Item No. 29 ASPHALT DRIVEWAY [*RYE ROAD PUMP STATION*]

1. Proposed driveway shall be paid for at the applicable contract unit price per square foot (SF). Payment shall include roadway base, compaction, asphalt and other materials and appurtenances necessary to install the U-shaped driveway from Rye Road through the pump station fenced areas as shown on the Contract Drawings. Payment shall include all labor, materials, and equipment necessary to install the driveway, road base, asphalt, all surveying, development of record drawings, clearing and grubbing, excavation, sheet and shoring, dewatering, backfilling, compaction, removal of excess material, testing, clean-up, and all items necessary to construct the asphalt driveway complete and ready for service. The payment shall include the removal of waste material produced, and necessary backfill and compaction required to fill holes left by the removal of vegetation.

Bid Item No. 30 WATER SERVICE [*RYE ROAD PUMP STATION*]

1. Water service bid item will be paid for at the applicable contract unit price of lump sum (LS) as listed in the Bid Form. Payment for the water service for the pump station shall include the necessary length of polyethylene service line and casing furnished installed from the existing water main and extending as shown on the Contract Drawings. Payment shall include the furnishing of all labor, materials, and equipment necessary to complete the work, including all surveying, excavation, sheet and shoring (as needed), dewatering, pipe laying, jointing, backflow preventer, meter, double strap stainless steel saddle, valves, fittings, marking tape, locating wire, locate wire stations (2), backfilling, compaction, connections to existing water main, removing excess material, testing, clean-up, and all items necessary to construct the piping systems complete and ready for service. Payment shall also include a 1" spigot and hose bibb with support, a 2" spigot and cam-lock connection with support, hose rack and heavy duty blue nylon hose (2 x50 foot hoses) with pressure nozzle, hose rack, one (foot) semi circle of gravel/stones around spigot, furnishing, installation, testing, clean-up, and all items, labor, materials, and equipment necessary to construct the water service (wash down station) complete and ready for service.

Bid Item No. 31 GATES AND FENCING [*RYE ROAD PUMP STATION*]

1. Payment for the chain link fence and two (2) double swing gates, and posts will be paid for at the applicable contract unit price of lump sum (LS). Payment price shall include the furnishing of all labor, materials, and equipment necessary to complete the work, including line posts and corner posts (with caps), truss bars/rods, chain link fence fabric, tie wire, top rail, bottom tension wire, galvanize clips, HDPE fence slants and blinds (green) by Top Lock or Equal, two (2) double swing gates, concrete for post anchoring, gate center stops; all surveying, excavation, backfilling, compaction, removing excess material, clean-up, and all items necessary to construct the fence and gates complete and ready for service unless specifically covered by other pay items specified under this Contract.

Bid Item No. 32 NO. 57 STONE [*RYE ROAD PUMP STATION*]

1. Payment for all work included in these Bid Items will be made at the applicable Contract unit price bid per cubic yard (CY) for furnishing and installing number 57 stone within the County owned pump station fence lines. Contractor is to assume all areas within the fence line that is not asphalt driveway or concrete slab shall be number 57 stone at a minimum depth of 3-inches. Payment shall represent full compensation for all labor, materials, necessary equipment, and incidentals necessary to complete the work, ready for approval and acceptance by the County.

Bid Item No. 33 SITE GRADING, LANDSCAPING, IRRIGATION [*RYE ROAD PUMP STATION*]

1. Payment for site grading, landscaping, and irrigation lines for the proposed pump station shall be paid for at the contract unit price of lump sum (LS) as an allowance; County to approve landscaping and irrigation plan prior to construction. Landscape general requirements are noted on Contract Drawing details. Payment shall consist of all labor, material, equipment and all operations necessary for the

furnish and installation of the bushes. Payment shall include the installation of a reclaimed water irrigation line from the existing reclaimed water main located within the right of way on the southeast side of Rye Road, double strap stainless steel service saddle, irrigation meter at the fence line (or as directed by the County), irrigation piping, sprinklers, and rain sensor as requested by the County. Payment shall include coordination with the County concerning irrigation line locations and spacing of sprinkler heads and landscaping preferences.

2. Payment shall include side grading as needed to obtain site slope as noted on the Contract Drawings, site to drain from center to fence line. The lump sum price shall also include any off-site material required to establish finish grade and the removal and off-site disposal of any unsuitable excavated material or debris. Payment shall include all labor, materials, and equipment necessary to grade the site, furnish and install irrigation lines, and landscape pump station.

Bid Item No. 34 ELECTRICAL BUILDING, PREMANUFACTURED, AND APPURTENANCES [*RYE ROAD PUMP STATION*]

1. Payment for site premanufactured electrical building and appurtenances for the proposed pump station shall be paid for at the contract unit price of lump sum (LS). Payment shall include all items noted within the electrical building specification and as shown on the electrical building layout provided by others, including but not limited to heating, ventilation and air conditioning (HVAC), lighting, two (2) doors with panic push bars, fire extinguisher and mounting equipment (to be mounted to interior wall), red alarm light (exterior), and other appurtenances as shown on the building layout provided by others. Payment shall include all necessary permits necessary to construct and place building into operation. Payment shall include all labor, materials, and equipment necessary to furnish and install the electrical building and appurtenances complete and operational. Electrical Building and appurtenances to meet requirements noted in Appendix A.

Bid Item No. 35 DEWATERING [*RYE ROAD PUMP STATION*]

1. Contractor shall supply all necessary pumps, sheeting and shoring, conduits and other equipment to dewater ground in which work is to be performed for the installation of the new pump station. Dewatering for the water main and force main is to be paid for under respective pipe installation Bid Item. Dewatering system shall be of sufficient capacity to handle keep trench / pit dry minimum three feet below proposed installation elevation of respective pump station component (e.g manhole, wet well, etc). The Contractor shall be responsible for furnishing the necessary labor and supervision required to set up and operate the dewatering wells and pumping system. Payment for dewatering shall be based at the contract unit price of lump sum (LS), assessed as an allowance. Dewatering shall include all labor, materials, furnish and installation of materials, equipment, tools, all necessary permits, and incidentals for well and pump setup, sheeting and shoring, excavation, including rock, bedding, backfill, compaction, water discharge, water treatment (as needed), discharge piping, power or gasoline/diesel fuel, and maintenance. Payment shall include site cleanup and removal of all dewatering wells, pumps, equipment, and surface restoration.

Bid Item No. 36 CONCRETE SLABS [*RYE ROAD PUMP STATION*]

1. Payment for work under this Bid Item shall be made at the Contract unit price bid of lump sum (LS) at the proposed pump station. Measurement shall be for all concrete slabs shown on the Contract Plans constructed complete and accepted. Payment shall be include excavation, site preparation, dewatering, concrete, rebar, rebar ties, and other appurtenances necessary for the construction of the pump station concrete slabs. Excavation, including rock as necessary, bedding, backfill, rebar inspection, strength testing, and any and all other items necessary, in accordance with the Contract Documents shall be included. Payment shall represent full compensation for all labor, materials, equipment and incidental items necessary to complete each concrete slab, ready for approval and service by the County.

Bid Item No. 37 SERVICE ENTRANCE DISCONNECT, 480V, 3PH, 600A, NEMA 4X [*RYE ROAD PUMP STATION*]
Bid Item No. 38 ATS, 480V, 3-PHASE, 600A [*RYE ROAD PUMP STATION*]
Bid Item No. 39 GENERATOR, 480V, 3-PHASE, 350 KW [*RYE ROAD PUMP STATION*]
Bid Item No. 40 GENERATOR, CONNECTION CABINET [*RYE ROAD PUMP STATION*]
Bid Item No. 41 POWER PANEL, 480/277V,600A, 42KAIC, NEMA 3R [*RYE ROAD PUMP STATION*]
Bid Item No. 42 VFD, 480V, 3PH, 125HP [*RYE ROAD PUMP STATION*]
Bid Item No. 43 DISCONNECT SWITCH, 480V, 3PH, 200A [*RYE ROAD PUMP STATION*]
Bid Item No. 44 PUMP CONTROL PANEL, ANTENNA [*RYE ROAD PUMP STATION*]
Bid Item No. 45 PUMP LOCAL CONTROL PANEL [*RYE ROAD PUMP STATION*]
Bid Item No. 46 CABLE, CONDUIT [*RYE ROAD PUMP STATION*]
Bid Item No. 47 LIGHT, POLE [*RYE ROAD PUMP STATION*]

1. Electrical work Bid Items shall be paid for at the contract unit price as noted in Bid Form, for respective Bid Item. Payment for each Bid Item shall include all conduit and electrical wiring, furnishing of all labor, materials, and equipment necessary to complete the work, including all surveying, excavation, conduit laying, jointing, marking tape and locating wire, threading of wire through conduit(s), pull boxes (as needed), connections of existing electrical systems to new transformer, testing, backfilling, compaction, removing excess material, clean-up, and all items necessary to construct the conduit, electrical and control systems complete and ready for service. This item shall include payment for all temporary electrical work and wiring necessary during construction, shown on the Contract Drawings and noted within these Specifications.
2. Pay item (Power Panel) includes the furnish and installation of the power line within casing under Rye Road via horizontal directional drill. Payment shall include all labor, materials, excavation (including rock), horizontal directional drilling equipment, materials and trucks, vacuum trucks, disposal of bentonite fluid, butt heat fusion of HDPE casing pipe per ASTM D3261, dewatering, sheeting and shoring, bedding, backfill, compaction, testing and equipment required to complete the installation.

Bid Item No. 48 EXPLOSION PROOF Y-TYPE ALUMINUM CONDUIT SEAL [*RYE ROAD PUMP STATION*]

1. Payment for Explosion Proof Y-type Aluminum Conduit Seals will be paid for at the applicable contract unit price of each (EA). Payment price shall include the furnishing of all labor, materials, tools, and equipment necessary to furnish and install the explosion proof y-type aluminum conduit seals, size to be dictated by conduit size furnished and installed by Contractor which is minimum 2-inch SCH 80 PVC, complete and operational to the satisfaction of the Engineer and County. Payment includes removing excess material and clean-up.

Bid Item No. 49 EXISTING WATER MAIN REMOVAL [*WATER MAIN REPLACEMENT*]

1. Measurement will be based on linear feet of pipe removed and disposed at locations called out in the Contract Documents. Payment will be at the applicable contract unit price of linear feet (LF) and shall include all labor, materials and equipment.

2. The work specified in these items consists of taking existing pipes out of service, removing and disposing as shown in the plans. The unit price will include all cost of excavation, backfill and compaction, dewatering, disposing of chlorinated water, sheeting and shoring, backfill, compaction, testing and equipment required to complete the installation all labor, equipment and materials necessary to perform all the work associated with removal and disposal of the of existing water as indicated on the Construction Drawings. The unit price will include trench safety.

Bid Item No. 50 12-INCH, HDPE, HDD [*WATER MAIN REPLACEMENT*]

1. Payment for all work included in this Bid Item shall be made at the applicable Contract unit price per linear foot (LF) for furnishing and installing the listed diameter HDPE DR11, ductile iron pipe size, water main (AWWA C906) installed via horizontal directional drill method as shown on the Contract Drawings and listed on the Bid Form. Payment shall be made for the linear foot of actual length of the listed diameter pipe and installed and will represent full compensation for all labor, materials, excavation (including rock), horizontal directional drilling equipment, materials and trucks, vacuum trucks, disposal of bentonite fluid, butt heat fusion of HDPE pipe per ASTM D3261, development of frac out plan, dewatering, sheeting and shoring, bedding, backfill, compaction, testing, disinfection, and equipment required to complete this Bid Item. 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 No. 51 12-INCH, C900 PVC, RJ [*WATER MAIN REPLACEMENT*]
Bid Item No. 52 10-INCH, C900 PVC, RJ [*WATER MAIN REPLACEMENT*]

1. Payment for all work included in this Bid Item shall be made at the applicable Contract unit price bid per linear foot (LF) for furnishing and installing the listed diameter PVC water main (AWWA C-900 DR18, CL-150) pipe as shown on the Contract Drawings and listed in the Bid Form. 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, excavation, including rock, dewatering, bedding, backfill, compaction, testing and disinfection and equipment required to complete these Bid Items. 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 No. 53 **10-INCH DIP FITTINGS, POTABLE WATER [*WATER MAIN REPLACEMENT*]**

Bid Item No. 54 **12-INCH DIP FITTINGS, POTABLE WATER [*WATER MAIN REPLACEMENT*]**

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

2. Ductile iron fittings connecting to HDPE water main shall include the furnishing and installing HDPE (ductile iron pipe size) to ductile iron (DI) transition adapters, size as required, in accordance with Detail UG-6 of the Contract Drawings.

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 insure 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), 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.

B. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the County. This log should 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. 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.

C. 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.

D. 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.

E. 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.

F. 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.

G. 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 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.

1.07 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.

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.

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 al least 3 days in advance of the closure. All signs must be covered when no 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 sign, 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.

1. Size of signs and lettering: as required by regulatory agencies, or as appropriate to usage.
2. Colors: as required by regulatory agencies, otherwise of uniform colors throughout project.

B. 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, 200X and be completed in July 200X.

Location Map

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

A. Contractor
Contractor Address
Contractor Phone (Site Phone)

Project Manager
PM Address
PM Phone No. & Ext.

B. 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.

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

C. Rough Hardware: Galvanized.

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

PART 3 EXECUTION

3.01 PROJECT IDENTIFICATION SIGN

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

B. 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 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.

1.04 SUBSTITUTIONS AND PRODUCT OPTIONS

Contractor's Options:

1. For products specified only by reference standard, select any product meeting that standard.
2. For products specified by naming one or more products or manufacturers and "or equal", Contractor must submit a request for substitutions of any product or manufacturer not specifically named in a timely manner so as not to adversely affect the construction schedule.

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, 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.

A. 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 insure 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 GENERAL

1.01 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.

1.02 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.

1.03 MARKING DEVICES

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

1.04 RECORDING

A. Label each document "PROJECT RECORD" in neat large printed letters.

B. Record information concurrently with construction progress.

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

D. Drawings; Legibly mark to record actual construction:

1. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc. Locations of drainage ditches, swales, water

lines and force mains shall be shown every 200 feet (measured along the centerline) or alternate lot lines, whichever is closer. Dimensions at these locations shall indicate distance from centerline of right-of-way to the facility.

2. Field changes of dimension and detail.
3. Changes made by Field Order or by Change Order.
4. Details not on original contract drawings.
5. Equipment and piping relocations.
6. Locations of all valves, fire hydrants, manholes, water and sewer services, water and force main fittings, underdrain cleanouts, catch basins, junction boxes and any other structures located in the right-of-way or easement, shall be located by elevation and by station and offset based on intersection P.I.'s and centerline of right-of-way. For facilities located on private roads, the dimensioning shall be from centerline of paving or another readily visible baseline.
7. Elevations shall be provided for all manhole rim and inverts; junction box rim and inverts; catch basin rim and inverts; and baffle, weir and invert elevations in control structures. Elevations shall also be provided at the PVI's and at every other lot line or 200 feet, whichever is less, of drainage swales and ditches. Bench marks and elevation datum shall be indicated.
8. Slopes for pipes and ditches shall be recalculated, based on actual field measured distances, elevations, pipe sizes, and type shown. Cross section of drainage ditches and swales shall be verified.
9. Centerline of roads shall be tied to right-of-way lines. Elevation of roadway centerline shall be given at PVI's and at all intersections.
10. Record drawings shall show bearings and distances for all right-of-way and easement lines, and property corners.
11. Sidewalks, fences and walls, if installed at the time of initial record drawing submittal, shall be located every 200 feet or alternate lot lines, whichever is closer. Dimensions shall include distance from the right-of-way line and the back of curb and lot line or easement line.
12. Sanitary sewer mainline wyes shall be located from the downstream manhole. These dimensions shall be provided by on-site inspections or televiewing of the sewer following installation.
13. Elevations shall be provided on the top of operating nuts for all water and force main valves.
14. Allowable tolerance shall be ± 6.0 inches for horizontal dimensions. Vertical dimensions such as the difference in elevations between manhole inverts shall have an allowable tolerance of ± 1/8 inch per 50 feet (or part thereof) of horizontal distance up to a maximum tolerance of ± 2 inch.
15. Properly prepared 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.

E. 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.

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

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

system and instrumentation system.

1.05 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 an AutoCAD version on a recordable compact disk (CD).

C. The CD shall contain media in AutoCad Version 2004 or later, or in any other CAD program compatible with AutoCad in DWG or DXF form. All fonts, line types, shape files or other pertinent information used in the drawing and not normally included in AutoCad shall be included on the media with a text file or attached noted as to its relevance and use.

D. Accompany submittal with transmittal letter, containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Title and number of each Record Document.
5. Signature of Contractor or 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 2 STANDARDS

2.01 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. Drawings shall meet the criteria of paragraph 1.04 D above.

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.

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

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

C. 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:
   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:
   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 MODIFICATIONS TO EXISTING STRUCTURES, PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required to 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 (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor shall cut, repair, reuse, excavate, demolish or otherwise remove parts of the existing structures or appurtenances, as indicated on the Contract Drawings, herein specified, or necessary to permit completion of the work under this Contract. The Contractor shall 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. The Contractor shall dismantle and remove all existing equipment, piping, and other appurtenances required for the completion of the work. Where called for or required, the contractor shall cut existing pipelines for the purpose of making connections thereto. Anchor bolts for equipment and structural steel removed shall be cut off one inch below the concrete surface. Surface shall be finished as specified in the Contract Documents.

C. 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, is part of the installation shall also be installed as directed by the County.

D. No existing structure, equipment, or appurtenance shall be shifted, cut, removed, or otherwise altered except with the express approval of and to the extent approved by the County.

E. When removing materials or portions of existing utility pipelines and/or structures or when making openings in walls and partitions, the Contractor shall 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 permitted, line drilling will be required in cutting existing concrete.

F. 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 become the property of the Contractor to be disposed of by him off the work site at his own place of disposal. Operating equipment shall be thoroughly cleaned, lubricated, and greased for protection during prolonged storage.

G. All alterations to existing utility pipes and structures shall be done at such time and in such manner as to comply with the approved time schedule. So far as possible 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 delay.

H. All workmanship and new materials involved in constructing the alterations shall conform to the General Specifications for the classes of work insofar as such specifications are applicable.

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 Specifications covering the new work. When not covered, the work shall be carried on in the manner and to the extent directed by the Resident Project Representative.

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

K. Non-shrink grout shall be used for setting wall castings, sleeves, leveling pump bases, doweling anchors into existing concrete and elsewhere as shown.

L. Where necessary or required for the purpose of making connections, the Contractor shall cut existing pipelines in a manner to provide an approved joint. Where required, he shall use flanges, or provide Dresser Couplings, all as required.

M. The Contractor shall provide flumes, hoses, piping 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 under this Contract.

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

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 Manatee County representative 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 abatement contractor or subcontractor registered in the State of Florida. After removal of the facilities, all trenches shall be backfilled in accordance with the Contract Documents. The cost of

disposing of the removed materials shall be borne by the Contractor.

B. The asbestos abatement contractor or subcontractor 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 Contractor shall be responsible for all fees associated with permits, licenses and notices to the governing regulatory agencies. An asbestos manifest form must accompany each and every 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 (Phone #748-5543) is required.

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. National Emission Standards Hazardous Air Pollution (NESHAP), 40 CFR, Part 61, Subpart M, latest revision.
3. Occupational Safety and Health Act, 29 CFR, 1910.1001 – Asbestos.
4. Title 40 CFR, Part 763, Asbestos.
5. Florida Statute Title XXXII, Chapter 469, Asbestos Abatement.

D. All asbestos cement nipples between tees and valves shall be replaced.

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 sand/cement grout as specified herein. When such pipes are constructed with asbestos cement materials, the abandonment activities shall be performed by a licensed asbestos abatement contractor as specified in these Specifications.

B. Grout shall be injected within the pipe sections indicated on the Drawings. The ends of these sections shall be capped and/or plugged. The grouting program shall consist of pumping sand-cement grout with suitable chemical additives at pressures necessary to fill the pipe sections shown on the Drawings to prevent the potential for future collapse.

C. The pump used for grouting should be a continuous flow, positive displacement model with a pugmill type mixing vat having a minimum shaft speed of 60 rpm and incorporated as an integral part of the equipment. Alternate equipment may be used subject to the approval of the County. The rate of pumping shall not exceed six (6) cubic feet per minute. The pumping pressures shall be in the range of 100 to 150 psi.

D. The Contractor shall provide standpipes and/or additional means of visual inspection as required by the County to determine if adequate grout material has filled the entire pipe section(s). The Contractor shall make necessary provisions for the County's representative to monitor all grouting operations.

E. All pipe to be abandoned shall be capped or plugged with a fitting or material that will prevent soil or other material from entering the pipe. All caps and plugs shall be subject to approval by the County.

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

END OF SECTION

SECTION 02100 SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

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

B. The Contractor shall clear and grub all 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 in force 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 County not choose to receive any or all excess topsoil materials, the Contractor shall dispose of said material at no additional cost to 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.

3.05 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 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 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.

3.05 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 traand earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

3.06 FIELD QUALITY CONTROL

A. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM test 1557-70T, 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 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 6" 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.
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. 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. 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. Structural fill material shall be a minimum of 60 percent clean sand, free of organic, deleterious and/or compressible material. Minimum acceptable density shall be 98 percent of the maximum density as determined by AASHTO T-180. Rock in excess of 2-1/2" in diameter shall not be used in the fill material. If the moisture content is improper for attaining the specified density, either water shall be added or material shall be permitted to dry until the proper moisture content for compaction is reached.

C. Common Fill

1. Common fill material shall be free from organic matter, muck or marl and rock exceeding 2-1/2" in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar materials. Existing soil may be used to adjust grades over the site with the exception of the construction area.

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.

D. Crushed Stone

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

PART 3 EXECUTION

3.01 TRENCH EXCAVATION AND BACKFILLING

A. Excavation for all trenches required for the installation of pipes and electrical ducts shall be made to the depths indicated on the Drawings and in such manner and to such widths as will give suitable room for laying the pipe or installing the ducts within the trenches.

B. Rock shall be removed to a minimum 6" clearance around the bottom and sides of all the pipe or ducts being laid.

C. Where pipes or ducts are to be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

D. Where the pipes or ducts are to be laid directly on the trench bottom, the lower part of the trenches shall not be excavated to grade by machinery. The last of the material being excavated manually, shall be done in such a manner that will give a flat bottom true to grade so that pipe or duct can be evenly supported on undisturbed material. Bell holes shall be made as required.

E. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed and inspected and the trench filled with suitable compacted material to the mid-diameter of the pipe.

F. Backfilling over ducts shall begin not less than three days after placing concrete encasement.

G. All backfilling shall be prosecuted expeditiously and as detailed on the Drawings.

H. Any space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth, free from stones having a diameter greater than 2" and thoroughly compacted with a tamper as fast as placed, up to a level of one foot above the top of the pipe.

I. The filling shall be carried up evenly on both sides with at least one man tamping for each man shoveling material into the trench.

J. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted by rolling, ramming, or puddling, as the County may direct, sufficiently to prevent subsequent settling.

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. Should the material at the level of trench bottom consist of fine sand, sand and silt or soft earth, the subgrade material shall be removed as directed by the County and the excavation shall be refilled with crushed stone or washed shell.

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

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.

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 02284 PRECAST CONCRETE LIFT STATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Precast concrete utility structures, and appurtenant items.
    a. Lift Stations.
2. Design and fabrication of precast concrete utility structures.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Procurement and Contracting Requirements.
2. Division 01 - General Requirements.
3. Section 03002 - Concrete.
4. Division 9 - Painting (and coatings).
5. Section 13340 - Lift Station Specification

1.02 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of State Highway and Transportation Officials (AASHTO).
2. ASTM International (ASTM):
    a. A48, Standard Specification for Gray Iron Castings.
    b. A536, Standard Specification for Ductile Iron Castings.
    c. C857, Standard Practice for Minimum Design Loading for Underground Precast Concrete Utility Structures.
    d. C858, Standard Specification for Underground Precast Concrete Utility Structures.
    e. C890, Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
    f. C923, Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
    g. C990, Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
    h. C1619, Standard Specification for Elastomeric Seals for Joining Concrete Structures.
    i. D1227, Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.

1.03 SUBMITTALS

A Shop Drawings:

1. See Division 1 for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
    a. Acknowledgement that products submitted meet requirements of standards referenced.
    b. Manufacturer's installation instructions.
3. Concrete mix design(s):
    a. Include submittal information defined in Specification Section 03002.
    b. Certification in accordance with ASTM C858, Section 12.
4. Fabrication and/or layout drawings:
    a. Include detailed diagrams of utility structures showing typical components and dimensions, reinforcement, and other details.
    b. Itemize, on separate schedule, elevations or sectional breakdown of each utility structure with all components and refer to drawing identification number or notation.
    c. Indicate required penetration details for all piping entering each structure.
5. Drawings and calculations: All Drawings, including layout drawings, certifications and calculations (including buoyancy) shall be sealed by a Professional Engineer registered in the State of Florida.
    a. Provide certification stating that calculations provided have been prepared specifically for this Project and that they match and pertain to the Shop Drawings provided.
    b. Provide a summary document as part of the above certification listing the design criteria used for precast design including:
        1) Codes and standards.
        2) Soil load.
        3) Exterior groundwater load.
        4) Live loads.
        5) Other loads.
6. Test Reports:
    a. Copies of source quality control tests, including compressive strength and air content, for units provided.

1.04 SITE CONDITIONS

A. Design groundwater elevation for precast structure design shall be the 100-year flood elevation shown on the Contract Documents.
    1. If the 100-year flood elevation is not shown on the Contract Documents, the design groundwater elevation shall be equal to the ground surface elevation at the structure.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Access doors (hatches):
    a. Halliday.
    b. Bilco.
2. Manhole rings, covers and frames:
    a. Shall meet ASTM A48, Specification for Gray Iron Castings, Class 30 or Grade 60-45-12 Ductile Iron meeting the requirements of ASTM A536, Specification of Ductile Iron Casting.
3. Premolded joint sealant:
    a. NPC Bidco, Inc., C-56.
    b. Ram-Nek, Henry Co.
    c. EZ-Stik, Press-Seal Gasket Corp.
    d. CS-102, Conseal.
4. Elastomeric joint seals:
    a. Kent Seal.
5. External joint wrap.
    a. NPC, Bidco, Inc.
    b. EZ-Wrap, Press-Seal Gasket Corp.
    c. RUBR-Nek, Henry Co.
5. Emulsified fibrated asphalt compound:
    a. Sonneborn Hydrocide 700B Semi-Mastic.

B. Submit request for substitution in accordance with Division 1 Specification.

2.02 PRECAST UTILITY STRUCTURE COMPONENTS

A. Provide utility structures with interior dimensions as shown on the Drawings.

B. Provide the following components for each utility structure:

1. Precast base section with integral or cast in place base slab.
2. Precast wall section(s).
3. Precast flat top.
    a. Where reinforcement is shown for top slab, furnish slab with reinforcing as designed, but not less than reinforcing shown on Drawings.

C. Provide openings and appurtenances as shown on Drawings.

1. Access doors (hatches):
    a. Cast access doors into top slab.

b. Where access door frames have drainage channels, cast PVC drain lines in top slab to drain location shown on Drawings. If no drain location is shown, drain frames to outer edge of top slab.

c. Protect doors and frames from damage during concrete placement and shipping.

2. Manhole frames and covers:

a. Cast frames into top slab.

D. Concrete:

1. Conform to requirements of Specification Section 03002.

2. Conform to requirements of ASTM C858, where stricter than Specification Section 03002.

a. Minimum 28-day compressive strength 5000 psi.

b. All portions of precast utility structure are considered to be exposed to freeze-thaw cycles.

E. Joints:

1. Joints of precast riser and top sections:

a. Preformed flexible joint sealants: ASTM C990.

b. Exterior joint wrap.

2. Pipe and conduit entry for utility structures.

a. Resilient seal per ASTM C-923; detail US-21.

F. Coatings:

1. Vertical wall surfaces:

a. Emulsified fibrated asphalt compound meeting ASTM D1227 Type I for all vertical wall exterior surfaces.

2.03 DESIGN

A General Design Requirements:

1. Design precast units and appurtenances in accordance with ASTM C858.

a. Notify Engineer and furnish cast-in-place structures if sizes of precast utility structures shown on Drawings can not be designed or fabricated.

B. Design loads:

1. Design precast units for all loads and load cases described in ASTM C857, with the following values and selections:

a. Minimum uniform live load for exposed roof slabs shall be 300 psf.

b. Wheel loads shall be considered.

1) Use wheel load designation HS20-44.

2) Wheel loads and uniform live load do not act concurrently.

c. Unit weight of soil W shall be taken as no less than 125 LB/CU FT, unless noted otherwise.

d. Minimum lateral soil pressure coefficient (K_0): 0.515, unless noted otherwise.

C. Specific Design Requirements:

1. Out-of-plane shear:

a. Out-of-plane shear shall be shown in the calculations.

b. Wall thickness shall be determined based on meeting design requirements for out-of-plane shear resulting from soil and groundwater loads.

c. Wall sections shall be designed as one-way spans between corners for calculation of out-of-plane shear. Transfer of shear or bending load shall not be considered to be transferred across joints between precast units or between walls and slabs, unless unit as integrally cast together.

d. Use of shear steel reinforcement to increase out-of-plane shear capacity shall be prohibited.

2. The distribution of moments in adjacent walls of different lengths in rectangular structures shall be considered.

3. Design precast units taking into account reduced cross section at openings and penetrations.

4. Structure shall be checked for buoyancy.

a. The minimum factor of safety for uplift with the design groundwater elevation shall be 1.25, unless a larger factor of safety is required by the local governing body or Building Code.

b. The minimum factor of safety for uplift at the fully submerged condition shall be no less than 1.10.

c. If the buoyant weight of soil above base slab extensions beyond the external dimensions of the structure is used to resist uplift, the volume of soil considered to resist uplift shall be limited to soil within the vertical projection of the edge of the base slab extensions.

PART 3 EXECUTION

3.01 PRECAST UTILITY STRUCTURE CONSTRUCTION

A. General:

1. Prepare subgrade for base as directed by Geotechnical Engineer.

a. For precast base slabs, place and compact 6 IN (minimum)of Granular Fill or Bedding Material as directed by Geotechnical Engineer.

b. For cast-in-place concrete base slabs, support base section and prepare bottom joint with preformed strip-type hydrophilic waterstop in accordance with Specification Section 03002.

c. Confirm that base is level and fully supported by stable material.

2. Ensure accurate vertical placement and leveling prior to placement of interior grout.

a. Provide vertical alignment tolerance of maximum 1 IN horizontal to 10 FT vertical.

B. Build each structure to dimensions shown on plans and at such elevation that pipe sections built into wall of structure will be true line of pipe extensions.

C. For all horizontal mating surfaces between precast concrete units, install resilient O-ring type gaskets.

D. Seal all pipe penetrations in manhole.

1. Where post-installed seals are permitted, form pipe openings smooth and well shaped.

2. After installation, seal exterior of penetration with non-shrink grout.

3. After grout cures, wire brush smooth and apply two coats emulsified fibrated asphalt compound to minimum wet thickness of 1/8 IN to ensure complete seal.

E. Set top slab level to elevation shown on Drawings.

3.02 FIELD QUALITY CONTROL

A. Any proposed repairs of precast components or structures shall be submitted to Engineer for approval.

B. Structures shall be observed for signs of leakage during periods of high groundwater.

C. No leakage that includes visible flow through joints between precast concrete sections or through pipe penetrations shall be permitted.

D. Damp spots on interior wall surfaces shall be considered leakage and shall not be permitted.

1. Damp spots shall be defined as spots where moisture from a source outside the structure can be picked up on a dry hand.

2. Locate the source of water movement through the wall and permanently seal.

E. Dampness on the top of the base slab will not be construed as leakage.

END OF SECTION

SECTION 02325 ROAD AND RAILROAD CROSSINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

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

1.02 OPERATIONS ON MANATEE COUNTY OR STATE OF FLORIDA PROPERTY

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

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

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

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

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

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

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

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

I. The Contractor shall be responsible for all damages arising from his negligence or failure to comply with any State or Manatee County regulations or requirements or

deviations from the Contract Documents.

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

K. Traffic control requirements and procedures are detailed in Section 01570 of this specification.

1.03 SHOP DRAWINGS

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

1.04 SUBMITTALS

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

1. Site layout plan for entry and exit pit locations, drawn to scale, depicting the position of all required equipment, access points, existing facilities to remain in place, existing traffic lanes to be maintained in operation, office trailers and storage sites.
2. Qualification information on jack/bore contractor.
3. Manufacturer's information on equipment to be used.
4. Methods and materials for retaining walls for jacking and receiving pits.

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

PART 2 PRODUCTS

2.01 MATERIALS

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

PART 3 EXECUTION

3.01 JACKING SLEEVE

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

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

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

manufacturer's recommendation.

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

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

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

3.02 INSTALLING PIPE IN SLEEVE

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

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

3.03 TESTING

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

END OF SECTION

SECTION 02444 FENCING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, material, equipment and incidentals necessary for complete installation of chain link fence systems. The fencing shall be installed according to manufacturer's specifications unless otherwise directed or authorized by the County.

B. The Contractor's security fencing is at his expense and option and is not covered in this Section.

1.02 QUALITY ASSURANCE

A. Standards of Manufacture shall comply with the standards of the Chain Link Fence Manufacturer's Institute for "Galvanized Steel Chain Link Fence Fabric" and as herein specified.

B. Provide each type of steel fence and gates as a complete unit produced by a single manufacturer, including, but not limited to accessories, fittings, fasteners and appurtenances complete and ready for use.

C. Acceptable Manufacturers: Anchor, Cyclone, or approved equal

D. Erector Qualifications: The Contractor or approved subcontractor, must have a minimum of two years experience in similar fence installation.

1.03 SUBMITTALS

A. Product Data:

For Steel Fences and Gates, the Contractor shall submit for review and approval to the County, five (5) copies of the manufacturer's technical data, details of fabrication, installation instructions and procedures for steel fences and gates. The Contractor shall be responsible for a copy of each instruction to be given to the Installer.

B. Samples:

The Contractor shall submit two samples approximate size 6-inches long, or 6-inches square of fabric material, framework members and typical accessories to the County for review and approval.

C. Certificates:

The Contractor shall provide manufacturer's certification that materials meet or exceed the Contract Document requirements.

PART 2 PRODUCTS

2.01 GENERAL

A. The pipe sizes indicated are commercial pipe sizes.

B. The tube sizes indicated are nominal outside dimension.

C. Framework and appurtenances shall be finished with not less than minimum weight of zinc per sq. ft. and shall comply with the following:

1. Pipe: ASTM A53 (1.8 oz. zinc psf)
2. Square tubing: ASTM A 123 (2.0 oz. zinc psf)
3. Hardware and Accessories: ASTM A 153 (zinc weight per Table I).

D. All fence components shall be galvanically compatible.

E. Vinyl coatings for fabric, posts, rails, gates, and all other fittings and components shall be thermally fused polyvinyl chloride; heavy mil coating per ASTM F 668.

2.02 FABRIC

Fabric shall be 0.148 inch (9 gage) steel wire, 2-inch diamond mesh and both top and bottom salvages shall be twisted and barbed for fabric over 60-inches high. Finish shall be hot dipped galvanized, ASTM A 392, Class II.

2.03 POSTS, RAILS AND BRACES

A. End, Corner and Pull Posts:

1. The Contractor shall furnish end, corner and pull posts of the minimum size and weight as follows:
   a. Up to 5 foot fabric height
      (1) 2.375-inch OD pipe weighing 3.65 pounds per linear ft.
      (2) 2.50-inch square tubing weighing 5.59 pounds per linear foot.
   b. Over 5 foot fabric height
      (1) 2.875-inch OD pipe weighing 5.79 pounds per linear foot.
      (2) 2.50-inch square tubing weighing 5.59 lbs. per linear foot.

B. Line Post:

1. The Contractor shall furnish line posts of the minimum sizes and weight as follows. Post shall be spaced 10 foot o.c. maximum, unless otherwise indicated:
   a. Up to 5 foot fabric height.
      (1) 1.90-inch OD pipe weighing 2.72 pounds per linear foot.
   b. Over 5 foot fabric height.
      (1) 2.375-inch OD pipe weighing 3.65 pounds per linear foot.

C. Gate Posts:

1. The Contractor shall furnish gate posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:
   a. Up to 6 feet wide.
      (1) 2.875-inch OD pipe weighing 5.79 pounds per linear foot.

(2) 2-1/2 inch square tubing weighing 5.59 pounds per linear foot.

b. Over 6 feet and up to 13 feet wide.
   (1) 4-inch OD pipe weighing 9.11 pounds per linear foot.

c. Over 13 feet and up to 18 feet wide.
   (1) 6.625 inches OD weighing 18.97 pounds per linear foot.

d. Over 18 feet.
   (1) 8.625 inches OD weighing 28.55 pounds per linear foot.

D. Top Rails:

1. The Contractor shall furnish the following top rails unless otherwise indicated:
   a. 1.660-inch OD pipe weighing 2.27 pounds per linear foot.

E. Post Brace Assembly:

1. The Contractor shall furnish bracing assemblies at the end, gate, at both sides of corner and pull posts, with the horizontal brace located at mid-height of the fabric.
2. Use 1.660-inch OD pipe weighing 2.27 pounds per linear foot for horizontal brace and 3/8-inch diameter rod with turnbuckles for diagonal truss.

F. Tension Wire:

1. The Contractor shall furnish tension wire consisting of galvanized 0.177 inch (7 gage) coiled spring wire as per ASTM A824 at the bottom of the fabric only.

G. Barbed Wire Supporting Arms:

1. The Contractor shall furnish pressed steel, wrought iron, or malleable iron barbed wire supporting arms, complete with provisions for anchorage to posts and attaching three rows of barbed wire to each arm. Supporting arms may be attached either to posts or integral with post top weather cap. The Contractor shall provide a single 45 degree arm for each post where indicated.

H. Barbed Wire:

1. The Contractor shall furnish barbed wire. It shall be 2 strand, 12-1/2 gauge wire with 14 gauge, 4-point barbs spaced 5-inch o.c., galvanized, complying with ASTM A121, Class 3.

I. Post Tops:

1. The Contractor shall furnish post tops. Tops shall be pressed steel, wrought iron, or malleable iron of ASTM F626 designed as a weathertight closure cap (for tubular posts). The Contractor shall furnish one cap for each post unless equal protection is afforded by a combination of post top cap and barbed wire supporting arm. The Contractor shall furnish caps with openings to permit through passage of the top rail.

J. Stretcher Bars:

1. The Contractor shall furnish stretcher bars. Bars shall be one piece lengths

equal to the full height of the fabric, with a minimum cross-section of 3/16-inch x 3/4-inch. The Contractor shall provide one stretcher bar for each gate and end post and two bars for each corner and pull post, except where fabric is integrally woven into the post.

K. Stretcher Bar Bands:

1. The Contractor shall furnish stretcher bar bands. Bands shall be steel, wrought iron, or malleable iron, a maximum space of 15-inch o.c. to secure stretcher bars to end, corner, pull and gate posts.

2.04 GATES

A. The Contractor shall provide fabricated gate perimeter frames of tubular members. Additional horizontal and vertical members shall ensure proper gate operation and attachment of fabric, hardware and accessories. The maximum space of the frame members shall not be more than 8-inches apart. Fabrication is as follows:

1. Up to 5 feet high, or leaf width 8 feet or less.
   a. 1.660-inch OD pipe weighing 2.27 pounds per linear foot.
   b. 1.5 inch sq. tubing weighing 2.27 pounds per linear foot.
2. Over 5 feet high, or leaf width exceeding 8 feet.
   a. 1.90 inch OD pipe weighing 2.72 pounds per linear foot.
   b. 2-inch square tubing weighing 2.60 pounds per linear foot.

B. The Contractor shall assemble gate frames by welding or with special malleable or pressed steel fittings and rivets for rigid connections. He shall use the same fabric width as for the fence, unless otherwise indicated in the Contract Documents or authorized by the County. He shall install the fabric with stretcher bars at vertical edges. The bars may also be used at the top and bottom edges. The contractor shall attach stretchers to the gate frame at a maximum spacing of 15-inch o.c. He shall attach the hardware with rivets or by other means which will prevent removal or breakage.

C. The Contractor shall install diagonal cross-bracing consisting of 3/8-inch diameter adjustable length truss rods on gates as necessary to ensure frame rigidity without sag or twist.

D. The Contractor shall install barbed wire above the gates. He shall extend the end members of gate frames 12-inches above the top member which will be prepared for three strands of wire. The Contractor shall provide necessary clips for securing wire to extensions.

E. Gate Hardware:

1. The Contractor shall furnish the following hardware and accessories for each gate.
   a. Hinges: Pressed or forged steel or malleable iron to suit gate size, non-lift-off type, offset to permit 180 degrees gate opening. Provide 1-1/2 pair of hinges for each leaf over six feet nominal height.
   b. Latch: Forked type of plunger-bar type to permit operation from either side of gate with padlock eye as integral part of latch.

c. Keeper: Provide keeper for all vehicle gates, which automatically engages the gate leaf and holds it in the open position until manually released.
d. Double Gates: Provide gate stops for double gates, consisting of mushroom type of flush plate with anchors. Set in concrete to engage the center drip drop rod or plunger bar. Include locking device and padlock eyes as an integral part of the latch, using one padlock for locking both gate leaves.
e. Where gates are between masonry piers, provide "J" with 4-inch square anchor plate to masonry contractor for building in.

2.05 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Wire Ties: The Contractor shall tie fabric to line posts. He shall use 9 gauge wire ties spaced 12-inches o.c. For tying fabric to rails and braces, he shall use 9 gauge wire ties spaced 24-inches o.c. For tying fabric to tension wire, he shall use 11 gauge hog rings spaced 24-inches o.c. The finish of ties shall match the fabric finish.

B. Concrete: The Contractor shall provide portland cement concrete in compliance with ASTM C-150 and the Contract Documents. Aggregates shall comply with ASTM C-33. The Contractor shall mix the materials to obtain a minimum 28-day compressive strength of 2500 psi, using a minimum of 4 sacks of cement per cubic yard, a maximum size aggregate of 1-inch, a maximum 3-inch slump and air entrainment of 2 percent to 4 percent.

C. Privacy Decorative Slatting (PDS) shall be PVC, bottom locking, non-fin type, sized to match the fabric height and color in both the fence and gates.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall not start the fence installation prior to the final grade completion, and the finish elevations established, unless otherwise authorized by the County.

B. The Contractor shall repair damaged coatings in the shop or in the field by recoating utilizing manufacturers recommended repair compounds and as applied per manufacturer's recommendations.

C. Excavation:

1. For post footings, the Contractor shall drill holes in firm, undisturbed or compacted soil of the diameters and spacings shown or called out in the Contract Documents.
   a. For holes not shown or called out on the Contract Documents, the Contractor shall excavate minimum diameters recommended by the fence manufacturer.
   b. Post holes shall be in true alignment and of sufficient size to provide a permanent concrete foundation. Concrete shall be poured against undisturbed earth sides and bottom. All holes shall be 48-inches deep with posts and corner posts placed in the concrete to a depth of 36-inches. The gate posts shall be set in the concrete to a depth of 42-

inches below the surface in firm, undisturbed soil. Holes shall be well centered on the posts. A minimum diameter of 12-inches shall be required for all post holes.

c. Excavated soil shall be removed from the County's property.

d. If solid rock is encountered near the surface, the Contractor shall drill into rock at least 12-inches for line posts and at least 18-inches for end, pull, corner or gate posts. Hole shall be drilled to at least 1-inch greater diameter than the largest dimension of the post to be place.

e. If the Contractor encounters solid rock below solid overburden, he shall drill to the full depth required; however, rock penetration need not exceed the minimum depths specified.

D. Setting Posts:

1. The Contractor shall remove loose and foreign materials from the sides and bottoms of holes, and moisten soil prior to placing concrete.

   a. Center and align posts in holes above bottom of excavation.

   b. Place concrete around posts in a continuous pour and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations. The top of concrete shall extend 2-inches above finish grade.

   c. Trowel finish tops of footings and slope or dome to direct water away from posts. Extend footings for gate posts to the underside of bottom hinge. Set keeps, stops, sleeves and other accessories into concrete as required.

   d. Keep exposed concrete surfaces moist for at least 7 days after placement, or cure with membrane curing materials, or other acceptable curing method.

   e. Grout-in posts set into sleeved holes, concrete constructions, or rock excavations with non-shrink portland cement grout, or other acceptable grouting material.

E. Concrete Strength:

The Contractor shall allow the concrete to attain at least 75% of its minimum 28-day compressive strength no sooner than 7 days after placement, before rails, tension wires, barbed wire, or fabric is installed. The Contractor shall not stretch and tension fabric or wires and shall not hang gates until the concrete has attained its full design strength.

F. Top Rails:

The Contractor shall run the rail continuously through post caps or extension arms and bend to radius for curved runs. He shall provide expansion coupling as recommended by fencing manufacturer.

G. Brace Assemblies:

The Contractor shall install braces so that posts are plumb when diagonal rod is under proper tension.

H. Tension Wire:

The Contractor shall install tension wires by weaving through the fabric and tying to each post with not less than 0.170 inch galvanized wire, or by securing the wire to the fabric.

I. Fabric:

The Contractor shall leave approximately 3-inches between finish grade and bottom salvage, except where the bottom of the fabric extends into the concrete. He shall pull the fabric taut and tie it to posts, rails and tension wires. He shall install fabric on the security side of the fence and anchor it to the framework so that the fabric remains in tension after the pulling force is released.

J. Stretcher Bars:

The Contractor shall thread through or clamp the bars to the fabric 4-inches o.c. and secure them to posts with metal bands spaced 15-inches o.c.

K. Barbed Wire:

The Contractor shall install 3 parallel wires on each extension arm on the security side of fence, unless otherwise indicated. He shall pull the wire taut and fasten securely to each extension arm.

L. Gate:

The Contractor shall install gates plumb, level and secure for full opening without interference. He shall install ground-set items in concrete for anchorage, as recommended by the fence manufacturer. He shall adjust hardware for smooth operation and lubricate where necessary.

M. Tie Wires:

The Contractor shall use U-shaped wire, conforming to the diameter of the attached pipe, and shall clasp the pipe and fabric firmly with twisted ends of at least 2 full turns. He shall bend the end of the wire to minimize hazard to persons or clothing.

N. Fasteners:

The Contractor shall install nuts for tension band and hardware bolts on the side of fence opposite the fabric side. Pen ends of bolts or score threads to prevent removal of nuts.

3.02 INSTALLATION

Fence shall be constructed such that each run of fence between corner posts or gate posts has equal spacing between the line posts. Spacing shall not exceed 10 feet, and shall not exceed 8 feet for fabric with privacy decorative slatting.

END OF SECTION

SECTION 02480 LANDSCAPING

PART 1 GENERAL

1.10 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment, and incidentals required to install trees, ground cover, and shrubs, to place accessory planting materials, to maintain and guarantee all planted areas. All work shall be in strict accordance with sound nursery practice and shall include maintenance and watering of all of the work of this Contract until final completion and acceptance by the County.

B. The landscaping shall be performed by a contractor or subcontractor who specializes in landscaping and who is fully familiar and experienced in projects of this type and scope. The landscaping contractor or subcontractor shall be subject to the approval of the County.

C. The Contractor shall provide all landscaping complete and ready for use as specified in the Contract Documents and as shown on the Drawings.

1.02 SUBMITTALS

A. The Contractor shall submit to the County for review and approval, shop drawings and complete written maintenance instructions for each type of plant furnished under this Contract.

B. The Contractor shall submit representative samples of any or all of required accessory planting materials as requested by the County.

1.03 OBSTRUCTIONS BELOW GROUND

A. The County may change the location of plant material if underground construction, utilities or obstructions are encountered in excavation of planting areas or pits.

B. The Contractor shall make such changes without additional compensation from the County.

PART 2 PRODUCTS

2.01 MATERIALS

A. Plant species and size shall conform to those indicated in the Plant List and in plan locations shown on the Drawings. Nomenclature shall conform to the Florida Department of Agriculture: "Grades and Standards for Nursery Plants". The designated authority for identification of plants shall be in conformance with FDOT Standard Specification Section 580-2.1.1 Plants.

B. Plants shall be sound, healthy, vigorous, free from plant diseases, insects, pests, or their eggs and shall have healthy normal root systems. Plants shall be nursery grown stock, freshly dug. No heeled in, cold storage, or collected stock shall be accepted.

C. Shape and Form

1. Plant material shall be symmetrical, typical for the variety and species, and shall conform to the measurements specified in the Plant List.
2. Plants used where symmetry is required shall be matched as nearly as possible.
3. Plants shall not be pruned prior to delivery except as authorized by the County.
4. All plants shall have been transplanted or root pruned at least once in the past three years.
5. Unless otherwise noted, street trees shall be free of branches up to six feet, with the single leader well branched, and with straight trunks.
6. Shrubs shall have been transplanted twice, have fully developed root systems, be heavily canned with foliage to base, fulfill dimensions required, and be typical of species.
7. Ground covers shall have sturdy fibrous root systems and shall be heavily leafed.

D. Measurement: The height and/or width of trees shall be measured from the ground or across the normal spread of branches with the plants in their normal position. This measurement shall not include the immediate terminal growth.

E. Substitutions in plant species or size shall be made only with the written approval of the County.

F Ground cover plants shall be planted in beds of four inches of approved topsoil. The beds shall be thoroughly disked into the soil. The compacted and settled finished surface shall be set to the required grade. Plants shall be spaced as described in the Contract Documents or shown on the Contract Drawings, or otherwise directed by the County in accordance with the best practices of the trade.

G. Planting Soil

1. Soil for backfilling around plants and planting beds shall be a good grade of garden loam as approved by the County. Soil shall be free of heavy clay, coarse sand, stones, lumps, sticks, or other foreign material. The soil shall not be delivered or used in a muddy condition.
2. The soil shall be taken from ground that has never been stripped. There shall be a slight acid reaction to the soil with no excess of calcium or carbonate. The soil shall be free from excess weeds or other objectionable material.
3. Soil for trees and shrubs shall be delivered in a loose, friable condition. All trees shall average approximately one cubic yard per tree, except Sabal Palmetto, which shall be planted with clean sand. There shall be a minimum of 4-inches of planting soil in ground cover areas and 1/8 cubic yard per shrub or vine.
4. No marl shall be allowed in ground cover planting beds.

H. Before plants are backfilled with planting soil, fertilizer tablets, Agriform 20-10-5 or equal, shall be placed in each pit. The Contractor shall provide three tablets for each tree and one for each shrub or vine.

I. Tree Staking: All tree staking and bracing shall be included herein in accordance with sound nursery practice and shall be in accordance with the Contract Documents. The Contractor shall furnish all materials required for staking and bracing as approved.

J. Landscaping stones shall be inert and nonleaching. The Contractor shall provide

physical samples for approval prior to installation. Crushed limerock shall not be acceptable.

PART 3 EXECUTION

3.01 PLANTING PROCEDURES

A. Plant Locations: All plants shall be located as shown on the Drawings, to dimensions if shown, to scale if not dimensioned. Large areas or beds shall be scaled and the plants spaced evenly. Approval by the County is required before any plants may be installed.

B. Tree Pits: Pits for trees shall be at least two feet greater in diameter than the specified diameter of the ball. Pits shall be of sufficient depth to allow a 12-inch layer of planting soil under the ball when it is set to grade. Bottom of pit shall be loosened prior to backfilling.

C. Digging and Handling

1. Plants shall be handled at all times so that roots or balls are adequately protected from sun or drying winds. Tops or roots of plant allowed to dry out will be rejected.
2. Balled and burlapped plants shall be moved with firm, natural balls of soil, not less than one foot diameter of ball to every one inch caliper of trunk, and a depth of not less than 2/3 of ball diameter. No plant shall be accepted when the ball of earth surrounding its roots has been cracked or broken. All trees, except palms, shall be dug with ball and burlapped. Root pruning shall have been done at minimum of four weeks before planting at the job.
3. Bare root plants shall be dug with spread of root and of sufficient depth to insure full recovery of plant.

D. Cabbage Palms (Sable Palmetto):

1. Cabbage Palms shall be taken from moist black sand areas. Only a minimum of fronds shall be removed from the crown to facilitate moving and handling. Clear trunk or overall height shall be as specified after the minimum of fronds have been removed.
2. Cabbage Palms buds shall be tied to a suitable support with a burlap strip, to be left in place until the tree is well established in its new location.
3. Cabbage Palms shall be planted in sand, thoroughly washed in during planting operations, and with a dished or saucer depression left at the soil line for future waterings. Palms with marred or burned trunks will be accepted at the discretion of the County only.
4. Trees moved by winch or crane shall be thoroughly protected from chain marks, girdling or bark slippage by means of burlap, wood battens, or other approved method.

E. When balled or burlapped plants are set, planting soil shall be carefully tamped under and around the base of the balls to prevent voids. All burlap, rope, wires, etc., shall be removed from the sides and tops of balls, but no burlap shall be pulled from underneath. Roots of bare rooted plants shall be properly spread out and planting soil carefully worked in among them.

F. All plants shall be set straight or plumb, in locations shown on the Drawings. Except as otherwise specified, plants shall be planted in pits which shall be set at such level that, after settlement, they bear the same relation to the finished grade or the surrounding ground as they bore to the grade of the soil from which they are taken.

G. Pruning shall be carefully done by experienced plantsmen. Prune immediately upon acceptance by the County, including any broken branches, thinning small branches and tipping back main branches (except main leaders).

H. Excess soil and debris shall be disposed of off the project site unless ordered stockpiled by the County.

3.02 NORMAL MAINTENANCE OF PLANT MATERIALS

A. Plant material maintenance shall begin when planting operations start and shall extend until final acceptance of work.

B. Maintain all plant materials under this Contract to the satisfaction of the County. Maintenance shall include necessary watering, cultivation, weeding, pruning, spraying, tightening and repair to guy wires, removal of dead material, resetting, and other work required to conform with referenced standards and accepted nursery standards as approved.

C. Plant materials which are in a tilted or in a leaning position shall be properly righted.

D. After final acceptance by the County and until one calendar year after acceptance of all plantings, the landscaping contractor or subcontractor shall make monthly inspections of materials and report in writing to the County the conditions of the plants and the necessary requirements to keep the plants in a healthy growing condition.

3.03 TREE AND PLANT PROTECTION

A. The Contractor shall remove all trees (if any) within the limit of landscaping shown on the detail sheet except those designated to be salvaged (if any). Prior to removal of said trees, the Contractor shall obtain a tree removal permit, if required. All other trees in the vicinity of the work shall be protected against damage by the Contractor until all work under the Contract has been completed.

B. Consult with the County, and remove agreed-on roots and branches which interfere with construction. Employ qualified tree surgeon to remove, and to treat cuts.

C. Provide temporary barriers to a height of six feet around each group of trees and plants.

D. Protect root zones of trees and plants

1. Do not allow vehicular traffic or parking.
2. Do not store materials or products.
3. Prevent dumping or refuse or chemically injurious materials or liquids.
4. Prevent puddling or continuous running water.

E. Carefully supervise excavating, grading, and filling, and subsequent construction operations, to prevent damage.

F. In case of inadvertent damage to any tree or plant by the Contractor or any of his subcontractors or employees, the Contractor shall provide replacement of each such damaged tree or plant with a new one of acceptable type, size and quality.

G. Completely remove barricades, including foundations, when construction has progressed to the point that they are no longer needed, and when approved by the County.

H. Clean and repair damage caused by installation, fill and grade the areas of the site to required elevations and slopes, and clean the area.

3.04 GUARANTEE

The life and satisfactory condition of all plant material planted shall be guaranteed by the Contractor for a minimum of one calendar year. Guarantee shall include complete replacement with material of the same kind and size as in the original work if not in a healthy condition, as determined by the County, at the end of the guarantee period.

3.05 REPLACEMENT

A. At the end of the guarantee period, any plant required under this Contract that is dead or not in satisfactory growth as determined by the County, shall be removed. Plants replaced shall be guaranteed for 90 days after date of replacement.

B. Replacement of plants necessary during guarantee period shall be the responsibility of the Contractor, except for possible replacements of plants resulting from removal, vandalism, acts of neglect on the part of others, or acts of God.

C. All replacements shall be plants of the same kind and size as specified in the Drawings. They shall be furnished and planted as herein specified. The cost shall be the responsibility of the Contractor.

END OF SECTION

SECTION 02485 SEEDING AND SODDING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials and equipment necessary to satisfactorily return all construction areas to their original conditions or better.

B. Work shall include furnishing and placing seed or sod, fertilizing, planting, watering and maintenance until acceptance by County.

1.02 RELATED WORK NOT INCLUDED

Excavation, filling and grading required to establish elevation shown on the Drawings are included under other sections of these Specifications.

1.03 QUALITY ASSURANCE

A. It is the intent of this Specification that the Contractor is obliged to deliver a satisfactory stand of grass as specified. If necessary, the Contractor shall repeat any or all of the work, including grading, fertilizing, watering and seeding or sodding at no additional cost to the County until a satisfactory stand is obtained. For purposes of grassing, a satisfactory stand of grass is herein defined as a full lawn cover over areas to be sodded or seeded, with grass free of weeds, alive and growing, leaving no bare spots larger than 3/4 square yard within a radius of 8 feet.

B. All previously grassed areas where pipelines are laid shall be sodded. All sodding and grassing shall be installed in accordance with these Specifications or as directed by the County.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fertilizer: The fertilizer shall be of the slow-release type meeting the following minimum requirements: 12 percent nitrogen, 8 percent phosphorus, 8 percent potassium; 40 percent other available materials derived from organic sources. At least 50 percent of the phosphoric acid shall be from normal super phosphate or an equivalent source which will provide a minimum of two units of sulfur. The amount of sulfur shall be indicated on the quantitive analysis card attached to each bag or other container. Fertilizer shall be uniform in composition, dry and free flowing delivered to sites in original unopened containers bearing manufacturer's statement or guarantee.

B. Seeding/Grassing: The Contractor shall grass all unpaved areas disturbed during construction which do not require sod. All grassing shall be completed in conformance with FDOT Specifications, Sections 570 and 981. The grassed areas shall be mulched and fertilized in accordance with FDOT Specifications, except that no additional payment will be made for mulching, fertilizing and/or watering.

C. Sodding: Sod shall be provided as required on the construction drawings or at locations

as directed by the County in accordance with Florida Department of Transportation, Specifications Section 575 and 981. The Contractor shall furnish bahia grass sod or match existing sod. Placement and watering requirements shall be in accordance with FDOT Specifications Section 575, except that no additional payment will be made for placement and/or watering. This cost shall be included in the Contract price bid for sodding.

D. Topsoil: Topsoil stockpiled during excavation may be used as necessary. If additional topsoil is required to replace topsoil removed during construction, it shall be obtained off site at no additional cost to the County. Topsoil shall be fertile, natural surface soil, capable of producing all trees, plants and grassing specified herein.

E. Water: It is the Contractor's responsibility to supply all water to the site, as required during seeding and sodding operations and through the maintenance period and until the work is accepted. The Contractor shall make whatever arrangements that may be necessary to ensure an adequate supply of water to meet the needs for his work. He shall also furnish all necessary hose, equipment, attachments and accessories for the adequate irrigation of lawns and planted areas as may be required. Water shall be suitable for irrigation and free from ingredients harmful to plant life.

PART 3 EXECUTION

3.01 INSTALLATION

A. When the trench backfill has stabilized sufficiently, the Contractor shall commence work on lawns and grassed areas, including fine grading as necessary and as directed by the County.

B. Finish Grading: Areas to be seeded or sodded shall be finish graded, raked, and debris removed. Soft spots and uneven grades shall be eliminated. The County shall approve the finish grade of all areas to be seeded or sodded prior to seed or sod application.

C. Protection: Seeded and sodded areas shall be protected against traffic or other use by placing warning signs or erecting barricades as necessary. Any areas damaged prior to acceptance by the County shall be repaired by the Contractor as directed by the County.

3.02 CLEANUP

Soil or similar materials spilled onto paved areas shall be removed promptly, keeping those areas as clean as possible at all times. Upon completion of seeding and sodding operations, all excess soil, stones and debris remaining shall be removed from the construction areas.

3.03 LANDSCAPE MAINTENANCE

A. Any existing landscape items damaged or altered during construction by the Contractor shall be restored or replaced as directed by the County.

B. Maintain landscape work for a period of 90 days immediately following complete installation of work or until County accepts project. Watering, weeding, cultivating,

restoration of grade, mowing and trimming, protection from insects and diseases, fertilizing and similar operations as needed to ensure normal growth and good health for live plant material shall be included at no additional cost to the County.

3.04 REPAIRS TO LAWN AREAS DISTURBED BY CONTRACTOR'S OPERATORS

Lawn areas planted under this Contract and all lawn areas damaged by the Contractor's operation shall be repaired at once by proper soil preparation, fertilizing and sodding, in accordance with these Specifications.

END OF SECTION

SECTION 02513 ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials and equipment necessary to complete all milling asphalt pavement and asphalt concrete paving (including restoration of driveways) as called out on the Contract Documents or as shown on the Drawings.

1.02 QUALITY ASSURANCE

A. Qualifications of Asphalt Concrete Producer: The only materials permitted shall be furnished by a bulk asphalt concrete producer exclusively engaged in the production of hot-mix, hot-laid asphalt concrete.

B. Qualification of Testing Agency: The County may employ a commercial testing laboratory to conduct tests and evaluations of asphalt concrete materials and design. The Contractor shall:

1. Provide asphalt concrete testing and inspection service acceptable to County.
2. Include sampling and testing asphalt concrete materials proposed, and tests and calculations for asphalt concrete mixtures.
3. Provide field testing facilities for quality control testing during paving operations.

C. Requirements of Regulatory Agencies: The Contractor shall comply with the applicable requirements of:

1. Manatee County Utility Operations Department
2. Manatee County Transportation Department
3. State of Florida Dept. of Transportation

1.03 PAVING QUALITY REQUIREMENTS

A. General: In addition to other specified conditions, the Contractor shall comply with the following minimum requirements:

1. In-place asphalt concrete course shall be tested for compliance with requirements for density, thickness and surface smoothness.
2. Final surface shall be provided of uniform texture, conforming to required grades and cross sections.
3. A minimum of four inch diameter pavement specimens for each completed course shall be taken from locations as directed by the County.
4. Holes from test specimens shall be repaved as specified for patching defective work.

B. Density:

1. When subjected to 50 blows of standard Marshall hammer on each side of an in place material specimen, densities shall be comparable to a laboratory specimen of same asphalt concrete mixture.

2. The minimum acceptable density of in-place course material shall be 98% of the recorded laboratory specimen density.

C. Thickness: In-place compacted thicknesses shall not be acceptable if less than the minimum thicknesses shown on the Drawings.

D. Surface Smoothness:

1. Finished surface of each asphalt concrete course shall be tested for smoothness, using a 10 ft. straightedge applied parallel to and at right angles to centerline of paved areas.
2. Surface areas shall be checked at intervals directed by County.
3. Surfaces shall not be acceptable if they exceed the following:
   a. Base Course: 1/4 in. in 10 ft.
   b. Surface Course: 3/16 in. in 10 ft.
   c. Crowned Surfaces:
      (1) Test crowned surfaces with a crown template, centered and at right angles to the crown.
      (2) Surfaces will not be acceptable if varying more than 1/4 in. from the template.

1.04 SUBMITTALS

A. Samples: The Contractor may be required to provide samples of materials for laboratory testing and job-mix design.

B. Test Reports: The Contractor shall submit laboratory reports for following materials tests:

1. Coarse and fine aggregates from each material source and each required grading:
   a. Sieve Analysis: ASTM C 136 (AASHO T 27).
   b. Unit Weight of Slag: ASTM C29 (AASHO T 19).
   c. Soundness: ASTM C 88 (AASHO T 104) for surface course aggregates only.
   d. Sand Equivalent: ASTM D 2419 (AASHO T 176).
   e. Abrasion of Coarse Aggregate: ASTM C131 (AASHO T 96),for surface course aggregates only.
2. Asphalt cement for each penetration grade:
   a. Penetration: ASTM D5 (AASHO T49).
   b. Viscosity (Kinematic): ASTM D2170 (AASHO T 201).
   c. Flash Point: ASTM D92 (AASHO T 48).
   d. Ductility: ASTM D 113 (AASHO T 51).
   e. Solubility: ASTM D 4 (AASHO T 44).
   f. Specific Gravity: ASTM D 70 (AASHO T 43).
3. Job-mix design mixtures for each material or grade:
   a. Bulk Specific Gravity for Coarse Aggregate: ASTM C 117(AASHO T 85).
   b. Bulk Specific Gravity for Fine Aggregate: ASTM C 128(AASHO T 84).
4. Uncompacted asphalt concrete mix: Maximum Specific Gravity: ASTM D 2041 (AASHO T 209).
5. Compacted asphalt concrete mix:

a. Bulk Density: ASTM D 1188 (AASHO T 166).
b. Marshall Stability and Flow: ASTM D 1559.

6. Density and voids analysis:
   a. Provide each series of asphalt concrete mixture text specimens, in accordance with A.I. MS-2 "Mix Design Methods for Asphalt Concrete".
   b. Use Marshall method of mix design unless otherwise directed or acceptable to the County.
   c. Report the quantity of absorbed asphalt cement in pounds of dry aggregate, percent air voids, and percent voids in mineral aggregate.
7. Sampling and testing of asphalt concrete mixtures for quality control during paving operations:
   a. Uncompacted asphalt concrete mix.
      (1) Asphalt Cement Content: ASTM D 2172 (AASHO T 164).
      (2) Penetration of Recovered Asphalt Cement: ASTM D 5(AASHO T 49).
      (3) Ductibility of Recovered Asphalt Cement: ASTM D 113(AASHO T 51).
   b. Compacted asphalt concrete mix:
      (1) Bulk Density: ASTM D 1188 (AASHO T 166).
      Marshall Stability and Flow: ASTM D1559).
   c. Perform at least one test for each day's paving.
8. Asphalt plant inspection: ASTM D 290.
9. Additional testing:
   b. Retesting shall be required if previous tests indicate insufficient values, or if directed by the County.
   b. Testing shall continue until specified values have been attained.
10. Asphalt concrete materials which do not comply with specified requirements shall not be permitted in the work.

1.05 JOB CONDITIONS

A. Weather Limitations:

1. Apply bituminous prime and tack coats only when the ambient temperature in the shade is 50 degrees F. and when the temperature has not been below 35 degrees F. for 12 hours immediately prior to application.
2. Do not apply when the base surface is wet or contains an excess of moisture which would prevent uniform distribution and the required penetration.
3. Construct asphalt concrete surface course only when atmospheric temperature is above 40 degrees F., when the underlying base is dry, and when weather is not rainy.
4. Base course may be placed when air temperature is not below 30 degrees F. and rising, when acceptable to the County.

B. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope, for each course during construction operations.

C. Traffic Control: Maintain vehicular and pedestrian traffic during paving operations, as required for other construction activities.

PART 2 PRODUCTS

2.01 MATERIALS

A. Soil Cement or Shell Base Course: as specified in FDOT Section 270, "Material for Base and Stabilized Base", and as called for in the Contract Documents.

B. Aggregate for Asphalt Concrete, General:

1. Sound, angular crushed stone, crushed gravel, or crushed slag: ASTM D 692.
2. Sand, stone, or slag screening: ASTM D 1073.
3. Provide aggregate in gradations for various courses to comply with local highway standards.

C. Surface Course Aggregates:

1. Provide natural sand, unless sand prepared from stone, slag, or gravel or combinations are required to suit local conditions.

D. Asphalt Cement: Comply with ASTM D 946 for 85-100 penetration grade.

E. Prime Coat:

1. Cut-back liquid asphalt.
2. Medium-Curing type: ASTM D 2027, Grade MC-70.

2.02 ASPHALT-AGGREGATE MIXTURES

A. Job-mix criteria:

1. Provide job-mix formulas for each required asphalt-aggregate mixture.
2. Establish a single percentage of aggregate passing each required sieve size, a single percentage of asphalt cement to be added to aggregate, and a single temperature at which asphalt concrete is to be produced.
3. Comply with the mix requirements of local governing highway standards.
4. Maintain material quantities within allowable tolerances of the governing standards.

2.03 TRAFFIC AND PARKING MARKING MATERIALS

A. Traffic lane marking paint with chlorinated rubber base.

B. Factory mixed, quick drying and non bleeding, FS TT-P-115C, Type III.

C. Color: Driving Lane Dividers - White
No Parking Zone - Yellow
Parking Dividers - White

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. Subbase Preparation:

1. The Contractor shall remove from the area all organic substance encountered to a depth of six or eight inches (6" or 8"), or to such depth and width as directed by the County. The entire area shall be plowed and dragged prior to placing a stabilizing additive, if required to meet minimum bearing value.
2. Subbase shall be compacted to a minimum density of 98 percent of the maximum as determined by the Modified Proctor Density AASHTO T180, and shall have a minimum bearing value of 40 pounds per square inch as determined by the Florida Bearing Test.

B. Base Course:

1. Check subgrade for conformity with elevations and section immediately before placing base material.
2. Place base material in compacted layers not more than 6 inches thick, unless continuing tests indicate the required results are being obtained with thicker layers.
3. In no case will more than 8-inches of compacted base be placed in one lift.
4. Spread, shape, and compact all base material deposited on the subgrade during the same day.
5. Compact base course material to be not less than 95% of maximum density: ASTM D 1557, Method D (98 percent maximum density: AASHTO T-180).
6. Test density of compacted base course: ASTM D 2167.
7 Conduct one test for each 250 sq. yds. of in-place material, but in no case not less than one daily for each layer.

C. Loose and Foreign Material:

1. Remove loose and foreign material from compacted subbase surface immediately before application of paving.
2. Use power brooms or blowers, and brooming as required.
3. Do not displace subbase material.

D. Prime Coat:

1. Uniformly apply at rate of 0.20 to 0.5 gal. per sq. yd. over compacted and cleaned subbase surface.
2. Apply enough material to penetrate and seal, but not flood the surface.
3. Allow to cure and dry as long as required to attain penetration and evaporation of volatile, and in no case less than 24 hours unless otherwise acceptable to the County.
4. Blot excess asphalt with just enough sand to prevent pick-up under traffic.
5. Remove loose sand before paving.

E. Tack Coat:

1. Dilute material with equal parts of water and apply to contact surfaces of previously constructed asphalt concrete or portland cement concrete and similar surfaces.
2. Apply at rate of 0.05 to 0.15 gal. per sq. yd. of surface.
3. Apply tack coat by brush to contact surfaces of structures projecting into or abutting asphalt concrete pavement.
4. Allow surfaces to dry until material is at condition of tackiness to receive

pavement.

3.02 MANHOLE FRAME / VALVE BOX ADJUSTMENTS (IF APPLICABLE)

A. Placing Manhole frames:

1. Surround manhole frames set to elevation with a ring of compacted asphalt concrete base prior to paving.
2. Place asphalt concrete mixture up to 1 in. below top of frame, slope to grade, and compact by hand tamping.

B. Adjust manhole frames to proper position to meet paving.

C. If permanent covers are not in place, provide temporary covers over openings until completion of rolling operations.

D. Set cover manhole frames to grade, flush with surface of adjacent pavement.

3.03 PREPARING THE MIXTURE

A. Comply with ASTM D 995 for material storage, control, and mixing, and for plant equipment and operation.

B. Stockpiles:

1. Keep each component of the various-sized combined aggregates in separate stockpiles.
2. Maintain stockpiles so that separate aggregate sizes shall not be intermixed.

C. Heating:

1. Heat the asphalt cement at the mixing plant to viscosity at which it can be uniformly distributed throughout mixture
2. Use lowest possible temperature to suit temperature-viscosity characteristics of asphalt.
3. Do not exceed 350 degrees F. (176.6 degrees C.).

D. Aggregate:

1. Heat-dry aggregates to reduce moisture content to not more than 2.0%.
2. Deliver dry aggregate to mixer at recommended temperature to suit penetration grade and viscosity characteristics of asphalt cement, ambient temperature, and workability of mixture.
3. Accurately weigh or measure dry aggregates and weigh or meter asphalt cement to comply with job-mix formula requirements.

E. Mix aggregate and asphalt cement to achieve 90-95% of coated particles for base mixtures and 85-90% of coated particles for surface mixture, when tested in accordance with ASTM D 2489.

F. Transporting:

1. Transport asphalt concrete mixtures from mixing site in trucks having tight, clean compartments.
2. Coat hauling compartments with a lime-water mixture to prevent asphalt concrete mixture from sticking.
3. Elevate and drain compartment of excess solution before loading mix.
4. Provide covers over asphalt concrete mixture when transporting to protect from weather and to prevent loss of heat.
5. During periods of cold weather or for long-distance deliveries, provide insulation around entire truck bed surfaces.

3.04 EQUIPMENT

A. Provide size and quantity of equipment to complete the work specified within project time schedule.

B. Bituminous Pavers: Self-propelled that spread hot asphalt concrete mixtures without tearing, shoving or gouging surfaces, and control pavement edges to true lines without use of stationary forms.

C. Rolling Equipment:

1. Self-propelled, steel-wheeled and pneumatic-tired rollers that can reverse direction without backlash.
2. Other type rollers may be used if acceptable to the County.

D. Hand Tools: Provide rakes, lutes, shovels, tampers, smoothing irons, pavement cutters, portable heaters, and other miscellaneous small tools to complete the work specified.

3.05 PLACING THE MIX

A. Place asphalt concrete mixture on prepared surface, spread and strike-off using paving machine.

B. Spread mixture at a minimum temperature of 225 degrees F. (107.2 degrees C.).
C. Inaccessible and small areas may be placed by hand.

D. Place each course at thickness so that when compacted, it will conform to the indicated grade, cross-section, finish thickness, and density indicated.

E. Paver Placing:

1. Unless otherwise directed, begin placing along centerline of areas to be paved on crowned section, and at high side of sections on one-way slope, and in direction of traffic flow.
2. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.
3. Complete base courses for a section before placing surface courses.
4. Place mixture in continuous operation as practicable.

F. Hand Placing:

1. Spread, tamp, and finish mixture using hand tools in areas where machine spreading is not possible, as acceptable to County.
2. Place mixture at a rate that will insure handling and compaction before mixture becomes cooler than acceptable working temperature.

G. Joints:

1. Carefully make joints between old and new pavements, or between successive days' work, to ensure a continuous bond between adjoining work.
2. Construct joints to have same texture, density and smoothness as adjacent sections of asphalt concrete course.
3. Clean contact surfaces free of sand, dirt, or other objectionable material and apply tack coat.
4. Offset transverse joints in succeeding courses not less than 24 inches.
5. Cut back edge of previously placed course to expose an even, vertical surface for full course thickness.
6. Offset longitudinal joints in succeeding courses not less than 6 inches.
7. When the edges of longitudinal joints are irregular, honeycombed, or inadequately compacted, cut back unsatisfactory sections to expose an even, vertical surface for full course thickness.

3.06 COMPACTING THE MIX

A. Provide sufficient rollers to obtain the required pavement density.

B. Begin rolling operations as soon after placing when the mixture will bear weight of roller without excessive displacement.

C. Do not permit heavy equipment, including rollers to stand on finished surface before it has thoroughly cooled or set.

D. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

E. Start rolling longitudinally at extreme lower side of sections and proceed toward center of pavement. Roll to slightly different lengths on alternate roller runs.

F. Do not roll centers of sections first under any circumstances.

G. Breakdown Rolling:

1. Accomplish breakdown or initial rolling immediately following rolling of transverse and longitudinal joints and outside edge.
2. Operate rollers as close as possible to paver without causing pavement displacement.
3. Check crown, grade, and smoothness after breakdown rolling.
4. Repair displaced areas by loosening at once with lutes or rakes and filling, if required, with hot loose material before continuing rolling.

H. Second Rolling:

1. Follow breakdown rolling as soon as possible, while mixture is hot and in

condition for compaction.
2. Continue second rolling until mixture has been thoroughly compacted.

I. Finish Rolling:

1. Perform finish rolling while mixture is still warm enough for removal of roller marks.
2. Continue rolling until roller marks are eliminated and course has attained specified density.

J. Patching:

1. Remove and replace defective areas.
2. Cut-out and fill with fresh, hot asphalt concrete.
3. Compact by rolling to specified surface density and smoothness.
4. Remove deficient areas for full depth of course.
5. Cut sides perpendicular and parallel to direction of traffic with edges vertical.
6. Apply tack coat to exposed surfaces before placing new asphalt concrete mixture.

3.07 MARKING ASPHALT CONCRETE PAVEMENT

A. Cleaning:

1. Sweep surface with power broom supplemented by hand brooms to remove loose material and dirt.
2. Do not begin marking asphalt concrete pavement until acceptable to the County.

B. Apply paint with mechanical equipment.

1. Provide uniform straight edges.
2. Not less than two separate coats in accordance with manufacturer's recommended rates.

3.08 CLEANING AND PROTECTION

A. Cleaning: After completion of paving operations, clean surfaces of excess or spilled asphalt materials to the satisfaction of the County.

B. Protection:

1. After final rolling, do not permit vehicular traffic on asphalt concrete pavement until it has cooled and hardened, and in no case sooner than 6 hours.
2. Provide barricades and warning devices as required to protect pavement.
3. Cover openings of structures in the area of paving until permanent coverings are placed (if applicable).

END OF SECTION

SECTION 02575 PAVEMENT REPAIR AND RESTORATION

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment, obtain County or State right-of-way permits and incidentals required and remove and replace pavements over trenches excavated for installation of water or sewer lines and appurtenances as shown on the Contract Drawings.

1.02 GENERAL

A. The Contractor shall take before and after photographs.

B. The Contractor shall repair in a manner satisfactory to the County or State, all damage done to existing structures, pavement, driveways, paved areas, curbs and gutters, sidewalks, shrubbery, grass, trees, utility poles, utility pipe lines, conduits, drains, catch basin, flagstones, or stabilized areas or driveways and including all obstructions not specifically named herein, which results from this Project.

C. The Contractor shall keep the surface of the backfilled area of excavation in a safe traffic bearing condition and firm and level with the remaining pavement until the pavement is restored in the manner specified herein. All surface irregularities that are dangerous or obstructive to traffic are to be removed. The repair shall conform to applicable requirements of Manatee County Transportation Department requirements for pavement repair and as described herein, including all base, subbase and asphalt replacement.

D. All materials and workmanship shall meet or exceed the County requirements and as called for in the Contract Documents and nothing herein shall be construed as to relieve the Contractor from this responsibility.

E. All street, road and highway repair shall be made in accordance with the FDOT and County details indicated on the Drawings and in accordance with the applicable requirements and approval of affected County and State agencies.

PART 2 PRODUCTS

2.01 PAVEMENT SECTION

A. Asphaltic concrete shall consist of asphalt cement, coarse aggregate, fine aggregate and mineral filler conforming to FDOT Type S-III Asphalt. Pavement replacement thickness shall match that removed but in no case shall be less than 1-1/2" compacted thickness. All asphalt concrete pavement shall be furnished, installed and tested in accordance with FDOT Specifications for Road and Bridge Construction.

B. Asphalt or crushed concrete or approved equal base material shall be furnished and installed under all pavement sections restored under this Contract. Asphalt base shall have a minimum 6" compacted thickness, meet requirements for FDOT ABC III (Minimum Marshall Stability of 1000) and be furnished, installed and tested in

accordance with the requirements of the FDOT Standards. Crushed concrete base shall be 10" minimum compacted thickness. Crushed concrete aggregate material shall have a minimum LBR of 140 compacted to 98% T-180 AASHTO density. Asphalt base and crushed concrete base are acceptable. Other bases shall be submitted for approval.

C. Prime and tack will be required and applied in accordance with Section 300 - FDOT Specifications: Prime and Tack Coat for Base Courses.

PART 3 EXECUTION

3.01 CUTTING PAVEMENT

A. The Contractor shall saw cut in straight lines and remove pavement as necessary to install the new pipelines and appurtenances and for making connections to existing pipelines.

B. Prior to pavement removal, the Contractor shall mark the pavement for cuts nearly paralleling pipe lines and existing street lines. Asphalt pavement shall be cut along the markings with a rotary saw or other suitable tool. Concrete pavement shall be scored to a depth of approximately two (2) inches below the surface of the concrete along the marked cuts. Scoring shall be done by use of a rotary saw, after which the pavement may be broken below the scoring with a jackhammer or other suitable equipment.

C. The Contractor shall not machine pull the pavement until it is completely broken and separated along the marked cuts.

D. The pavement adjacent to pipe line trenches shall neither be disturbed nor damaged. If the adjacent pavement is disturbed or damaged, irrespective of cause, the Contractor shall remove and replace the pavement. In addition, the base and sub-base shall be restored in accordance with these Specifications, Florida Dept. of Transportation Standard Specifications and as directed by the County.

3.02 PAVEMENT REPAIR AND REPLACEMENT

A. The Contractor shall repair, to meet or exceed original surface material, all existing concrete or asphaltic pavement, driveways, or sidewalks cut or damaged by construction under this Contract. He shall match the original grade unless otherwise specified or shown on the Drawings. Materials and construction procedures for base course and pavement repair shall conform to those of the Florida Dept. of Transportation.

B. The Contractor's repair shall include the preparation of the subbase and base, place and maintain the roadway surface, any special requirements whether specifically called for or implied and all work necessary for a satisfactory completion of this work. Stabilized roads and drives shall be finished to match the existing grade. Dirt roads and drives shall have the required depth of backfill material as shown on the Contract Drawings.

C. The asphaltic concrete repairs shall be in accordance with the Manatee County Public Works Standards, Part I Utilities Standards Manual, Detail UG-12. The asphaltic concrete repairs shall extend the full width and length of the excavation or to the limits

of any damaged section. The edge of the pavement to be left in place shall be cut to a true edge with a saw or other approved method so as to provide a clean edge to abut the repair. The line of the repair shall be reasonably uniform with no unnecessary irregularities. The existing asphalt beyond the excavation or damaged section shall be milled 25' back from the saw cut. Final overlay shall match existing with no discernable "bump" at joint.

3.03 MISCELLANEOUS RESTORATION

Sidewalks or driveways cut or damaged by construction shall be restored in full sections or blocks to a minimum thickness of four inches. Concrete curb or curb and gutter shall be restored to the existing height and cross section in full sections or lengths between joints. RCP pipe shall be repaired or installed in accordance with manufacturer's specifications. Grassed yards, shoulders and parkways shall be restored to match the existing sections with grass sod of a type matching the existing grass.

3.04 SPECIAL REQUIREMENTS

The restoration of all surfaces, as described herein, disturbed by the installation of pipelines shall be completed as soon as is reasonable and practical. The complete and final restoration of both paved and shell stabilized roads within a reasonable time frame is of paramount importance. To this end, the Contractor shall, as part of his work schedule, complete the restoration of any area of road within five weeks after removing the original surface. Successful leak testing shall be performed prior to restoring any area of road. All restoration and replacement or repairs are the responsibility of the Contractor.

3.05 CLEANUP

After all repair and restoration or paving has been completed, all excess asphalt, dirt and other debris shall be removed from the roadways. All existing storm sewers and inlets shall be checked and cleaned of any construction debris.

3.06 MAINTENANCE OR REPAIR

All wearing surfaces shall be maintained by the Contractor in good order suitable for traffic prior to completion and acceptance of the work.

END OF SECTION

SECTION 02614 STEEL PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and install, complete, ready for operation and field test all steel pipe as shown on the drawings and specified herein.

B. Steel pipe shall include black steel, galvanized steel, and stainless steel pipe and fittings.

C. Provide steel pipe only where specifically called out on the drawings.

1.02 DESCRIPTION OF SYSTEM

A. All of the equipment specified herein is intended to be standard steel pipe for use in transporting certain chemicals and liquids as shown on the drawings and specified herein.

1.03 QUALIFICATIONS

A. All steel pipe shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the steel pipe to be furnished. The equipment shall be designed, constructed, installed in accordance with the best practices and methods and shall comply with all these specifications.

B. Steel pipe and fittings shall conform to all applicable standards of ASTM, ANSI and AWWA.

1.04 SUBMITTALS

A. Submit to the County for approval in accordance with the General Conditions and Section 01340, shop drawings to include dimensioning and technical specifications for all pipe to be furnished.

PART 2 MATERIALS

2.01 STEEL PIPE AND FITTINGS FOR PIPING

A. Black Steel Pipe: All black steel pipe shall be seamless, Grade B and in conformance with ASTM Designation A-53 and ANSI B36.10.

B. Galvanized Steel Pipe:

1. Galvanized steel pipe for plant and potable water service shall be hot-dipped, zinc coated galvanized, Grade A, electric resistance welded, Schedule 40 conforming to ASTM Designation A120. All joints shall be threaded joints. Threaded joints shall be made up with a stiff mixture of graphite and mineral oil, or an approved, nontoxic, nonhardening, pipe joint compound applied to the

male thread only. After having been set up, a joint shall not be backed off unless the joint is completely broken, the threads cleaned and new compound applied. All joints shall be airtight. A sufficient number of unions shall be provided to allow for convenient removal of piping. Fittings for galvanized steel pipe shall be galvanized malleable iron, 150 psi service rating.

2. Where flanged connections are indicated or otherwise required for connection to flanged valves, fittings, and appurtenances, they shall be made up using companion type flanges. Where flanged fittings are indicated or otherwise required, they shall be made up using thread galvanized steel nipples and steel companion type flanges. Companion flanges shall be steel, 150-psi ANSI Standard flat face flanges of the threaded type. Flanges shall be spot-faced on the back around each bolt hole.
3. All exposed threads, wrench marks, or other damage to the zinc coating, shall be protected by the application of two coats of a heavy consistency, bituminous paint, or with two wraps of an approved vinyl or polyvinyl pressure sensitive tape. Bituminous paint shall be equal to Koppers Bitumastic No. 50, brush applied. Tape shall be equal to 3M Company Scotchrap No. 50, 0.010-inch thick, installed as recommended by 3M Company over a primer.

C. Stainless Steel Pipe:

Stainless steel pipe shall be provided as shown on the drawings. Pipe shall be Schedule 40S, Type 316L, annealed, white pickle finish and shall be in accordance with ASTM Specification A312 and ANSI B36.19. Where indicated on the Drawings, holes shall be drilled in the pipe at the factory by the manufacture.

D. Steel Pipe Sleeves:

Sleeves for pipe that passes through floors and walls shall be galvanized Schedule 40 steel pipe conforming to ASTM Designation A120. Sleeve dimensions shall conform to the details shown on the drawings. Sleeve ends shall be cut and ground smooth. Sleeves shall be flush with walls and ceilings, but shall extend above the floor as shown on the drawings. Sleeves for use with mechanical type seals shall be sized in conformance with the seal manufacturer's requirements.

2.02 STEEL PIPE FOUR (4) INCHES AND LARGER

A. Except as modified or supplemented herein, all steel pipe, fittings and specials shall conform to the applicable requirements of the following standard specifications latest editions:

AWWA Standards

C200 Steel Water Pipe 6 Inches and Larger

C203 Coal-Tar Protecting Coatings and Linings for Steel Water Pipelines - Enamel and Tape-Hot-Applied.

C205 Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 inches and larger - Shop Applied.

C206 Field Welding of Steel Water Pipe

C207 Steel Pipe Flanges for Waterworks Service - Sizes 4 inches through 144 inches, Class D.

C208 Dimensions for Steel Water Pipe Fittings

B. All steel pipe shall be manufactured and tested in accordance with the standards set forth in AWWA C200 latest edition for fabricated or mill type water pipe. The pipe shall be made from sheet or plate rolled into sections having longitudinal or spirally formed butt-welded seams. Girth seams shall be butt welded and shall be at least 8 feet apart except in specials and fittings. The steel shall conform to the standards established in Section 2 and Section 3 AWWA C200.

1. Minimum Physical Properties of Steel Plate or Sheet:

a. All steel pipe, specials and fittings shall be manufactured from steel plate or sheet having a specified minimum yield of 35,000 psi and specified minimum tensile of 60,000 psi. Test reports verifying the actual physical and chemical properties of the piping must be submitted to the County as soon as possible after manufacturing and fabrication. The test reports shall state the hydrotest pressure applied to all sections of straight pipe and to straight pipe used in fabrication of specials and fittings.

b. All steel pipe, specials and fittings shall be manufactured or fabricated to the diameter as shown on the drawings. The normal size shall be the outside diameter of 14 inches and larger. For sizes less than 14 inches, the pipe shall be the normal steel pipe dimensions as listed in ASTM A53 specification. All diameters of steel pipe, specials and fittings shall have minimum nominal wall thicknesses as stated herein below:

Diameter	Minimum Wall Thickness
54"	.375
48"	.375
42"	.375
36"	.375
30"	.375
24" & smaller	.250

C. All fittings and specials shall be provided with ends as required for installation and shall be fabricated to the dimensions as shown on the drawings. All fittings shall be fabricated in accordance with the standards set forth in AWWA C208 latest edition. Fittings and specials shall be fabricated from hydrostatically tested pipe meeting AWWA C200 and will not require any further hydrostatic test in the shop. In reducing sections, the wall thickness will be governed by the largest end. Elimination of joints shown on the drawings must be approved by the County prior to the fabrication process.

D. Flanged and Coupling Standards:

1. All flanges, bolts, nuts and gaskets shall meet standards established in AWWA C207. Flanges shall be Class D suitable for pressure up to and

including 150 psi with facing and drilling as stated in Section 3 of C207. Procedure for attachment of flanges shall be in accordance with Section 10 of AWWA C207. Blind flanges shall conform in diameter drilling and thickness to the flanges to which they attach and shall produce a watertight joint under the specified test pressure.

2. Mechanical couplings shall be Dresser Style 38, Rockwell Style 411 or equal. The middle ring of each coupling shall have a minimum thickness at least equal to that specified for the size of pipe on which the coupling is to be used and shall be 7 inches long for pipe 30 inches and smaller, 10 inches long for pipe 36 inches and larger. The pipe stop shall be omitted from the inner surface of the middle rings and the couplings shall be cleaned and shop primed with the manufacturer's standard rust inhibitive primer. The filter backwash header and where shown on the drawings shall the mechanically coupled joints be restrained with harness bolts and lugs. Joint harnesses, where applicable, shall conform to the details on the drawings. Lugs shall be attached to the pipe in the shop and coated as specified for the adjacent pipe. The dimensions shall be stated in AWWA M011 19.8.

E. Pipe supports, anchors, blocking and hangers shall be fabricated in accordance with the details shown on the drawings and shall be installed complete with all accessories required for proper operation of the system. Should it be necessary to modify the details for proper installation, all such modifications shall be subject to approval by the County. Lugs required for anchorage of the piping system shall be attached in the shop and coated as the adjacent pipe.

F. All steel pipe, fittings, specials and appurtenances shall be prepared, primed, coated and lined as specified herein below:

1. Exterior surfaces of all steel pipe, fittings, specials, flanges, anchors and pipe supports exposed in above ground or interior locations shall be thoroughly cleaned in the shop by blasting with grit, shot or sand to SSPC SP6. One coat of primer shall be applied to the cleaned dry surface in a proper workmanship like manner and as recommended by the primer manufacturer. The primer shall be subject to approval of the County and compatible to the finish coat as specified in the paid section of the specifications. Field painting of the installed system shall be as specified in the painting section.
2. Interior surfaces of all steel pipe, fittings, and specials, which are to be installed exposed aboveground or in interior locations shall be thoroughly cleaned in the shop by blasting with grit, shot or sand to SSPC SP6. Two coats of paint shall be applied to the interior of the pipe at the shop. The paint coats shall be Koppers Bitumastic Super Tank Solution applied at a minimum of 8 mils D.F.T. per coat.
3. Exterior surfaces of all steel pipe, fittings and specials which are to be installed underground and in manholes which will not be encased in concrete shall be coated in the shop with coal tar enamel in accordance with the standards established in AWWA C203-78, except as modified or supplemented herein.
4. The exterior coating system for below ground steel pipe shall consist of coal tar enamel, fibrous glass mat, asbestos pipelines felt wrap and finally wrapped with kraft paper and shall be applied by the procedure

described in AWWA C203. The coating shall be held back 12 inches from ends to be mechanically coupled with uncoated areas primed with coat tar primer. The coating system must be done in the shop by an established pipe coating applicator acceptable to the coating materials manufacture and the County. Repairs of the any damage to the coating system incurred during the shipment and the field coating of couplings and ends where coatings have held back for joints shall be done by experienced and qualified personnel approved by the County. Procedure for such field coating shall be as described in AWWA C203.

5. The interior surfaces of all steel pipe, fittings, and specials which are to be installed below ground shall be cleaned and lined with cement mortar conforming to the standards set forth in AWWA C205-80. All work performed in the lining process shall be done in a thorough and workmanship like manner by trained personnel under the supervision of experienced men skilled in the operations they supervise. The lining thickness shall be as follows:

Pipe Size (Inches)	Coating Thickness (Inches)	Tolerance (Inches)
4-10	1/4	-1/32 + 1/32
11-23	5/16	-1/16 + 1/8
24-36	3/8	-1/16 + 1/8
over 36	1/2	-1/16 + 1/8

Handling and transporting of cement mortar lined pipe shall be in accordance with Section 6 of AWWA C205 and Section 2.14 of AWWA C203.

6. The interior surface of all steel air piping shall be coated with a two part epoxy coating system equivalent to 7.0 mils DFT of Mobil Chemical 78-D-7 followed by 7.0 mils DFT of Mobil Chemical 78-W-3 or equal.

2.03 STEEL PIPE AND FITTING AND CHLORINE GAS PIPING

A. If steel pipes are used for chlorine gas lines, they shall be Schedule 80 seamless steel pipe conforming to ASTM A120. All joints shall be threaded. Threaded joints shall be made up with a cement prepared from litharge and glycerin, or teflon tape. The cement shall be applied to the male thread only. Fitting except unions, shall be carbon steel 2,000 pounds CWP. Unions shall be of the flanged, ammonia type, either two-bolt or four-bolt square.

PART 3 EXECUTION

3.01 INSTALLATION AND TESTING

A. Steel pipe shall be installed true to alignment and rigidly supported anchors shall be provided where indicated.

After installation, the piping shall be tested by undergoing a four-hour pressure test at 20 percent above the designed operating pressure plant water supply lines. If any joint or pipe proves to be defective, it shall be repaired to the satisfaction of the County.

B. Screwed joints shall be made up with good quality thread compound and applied to the male thread only. After having been set up, a joint must not be backed off unless the joint is completely broken, the threads cleaned and new compound applied. All joints shall be air tight.

C. Stainless steel pipe shall have threaded joints or otherwise as required and shall be installed as shown on the Drawings.

D. Sleeves of the proper size shall be installed for pipes passing through floors and walls as indicated on the drawings. Sleeves shall be given a prime coat of rust inhibitive primer such as Koppers No. 621, or equal.

E. When cutting of pipe is required, the cutting shall be done by machine in a neat workmanlike manner without damage to the pipe. Cut ends shall be smooth and at right angles to the axis of the pipe.

F. All field welding shall be in accordance with the American Welding Society Standards. The strength of the field weld shall develop the strength of the pipe. Welds shall receive a field coating of paint as specified in Section 09900 and as approved by the County.

G. All galvanized steel pipe thread shall be clean, machine cut, and all pipe shall be reamed before erection. Each length of pipe as erected shall be up-ended and rapped to dislodge dirt and scale.

H. All galvanized steel piping shall have a sufficient number of unions to allow convenient removal of piping. Unions shall be compatible with pipe.

3.02 PAINTING

A. Pipe and fittings exposed to view, except stainless steel, shall receive a prime coating of rust inhibitive primer such as Koppers 621 or equal. Prior to prime coating, all surfaces shall be cleaned of all mill scale, rust, dirt, grease and other foreign matter.

B. All piping and fittings exposed to view except stainless steel pipe shall be painted as specified.

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 and restrained joint ductile iron pipe and cast iron or ductile iron restrained joint 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 him from laying and jointing different or additional items where required.

C. The Contractor shall furnish all labor, materials, equipment and incidentals required to install push-on 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 installed underground shall be poly 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 ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51. Thickness of pipe shall be Class 50 or pressure Class 350. All pipe not buried shall be Class 53. All ductile iron pipe shall be clearly marked on the outside of the barrel to readily identify it from cast iron.

B. Unrestrained joint pipe shall be supplied in lengths not to exceed 21 feet. Unless otherwise called for in the Contract Documents, unrestrained joint pipe shall be either the rubber-ring type push-on joint or standard mechanical joint pipe as manufactured by the American Cast Iron Pipe Company, U.S. Pipe and Foundry Company, or approved equal.

C. All mechanical joint fittings shall be pressure rated for 350 psi and meet the requirement of AWWA C110 or AWWA C153; flanged fittings shall be rated for 250 psi. Rubber gaskets shall conform to AWWA C111 for mechanical and push-on type joints and shall be EPDM (Ethylene-Propylene Diene Monomer) rubber for potable water and reclaimed water pipelines. Standard gaskets shall be such as Fastite as manufactured by American Cast Iron Pipe Company, or an approved equal. Acrylonitrile butadiene

(NBR) gaskets shall be used for potable water mains that are located in soil that is contaminated with low molecular-weight petroleum products or non-chlorinated organic solvents or non-aromatic organic solvents. Fluorocarbon (FKM) gaskets shall be used for potable water mains that are located in soil that is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons. Fluorocarbon (FKM) gaskets shall be used where both classes of contaminates are found.

D. Water Main and Reclaimed Water Main Coatings: All ductile iron pipe used in water and reclaimed water systems 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 ductile iron or gray iron fittings used in water and reclaimed water systems shall have standard thickness cement linings on the inside per AWWA C104 and an asphaltic exterior coating or they shall have factory-applied fusion bonded epoxy coatings both inside and outside in accordance with AWWA C550.

E. Wastewater Main Coatings: All ductile iron pipe and fittings used in wastewater sewer systems shall have a factory applied dry film thickness 40-mil Protecto 401 or 40-mil Novocoat SP2000W amine cured novalac ceramic epoxy lining on the inside. The interior lining application is to be based on the manufacturer's recommendation for long-term exposure to raw sewage. To ensure a holiday-free lining, documentation must be provided, prior to shipment, showing each section of lined pipe has passed holiday testing at the time of production per ASTM G62. The lining shall have a minimum ten year warranty covering failure of the lining and bond failure between liner and pipe. Exterior coatings for ductile iron pipe and fittings used in wastewater systems shall be either an asphaltic coating per AWWA C151 or a factory-applied epoxy coating per AWWA C550.

F. Restrained joints shall be provided at all horizontal and vertical bends and fittings, at casings under roads and railroads and at other locations shown on the Contract Drawings. Restrained joint pipe fittings shall be designed and rated for the following pressures: 350 psi for pipe sizes up to and including 24" diameter; 250 psi for pipe sizes 30" diameter and above.

2.02 IDENTIFICATION

A. Each length of pipe and each fitting shall be marked with the name of the manufacturer, size and class 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. Pipe shall be polyethylene-wrapped blue for water mains, purple (Pantone 522 C) for reclaimed water mains and green for sewer mains, per AWWA C105. Pipe need not be entirely polyethylene wrapped if soil testing, which is performed by the Engineer of Record or the Contractor in accordance with AWWA C105, indicates that the soil at the site is not corrosive. If soil testing indicates that the soil at the site is not corrosive, pipe may be spiral wrapped with color coded polyethylene at a six-inch minimum spacing, or the ductile iron pipe (DIP) may be painted with a minimum 1-inch wide color coded stripe on the top and both sides of the DIP.

C. All above ground potable water mains and appurtenances shall be painted safety blue.

END OF SECTION

SECTION 02616 DISINFECTING POTABLE WATER PIPE LINES

PART 1 GENERAL

1.01 SCOPE OF WORK

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

1.02 CLEANING WATER MAINS

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

1.03 DISINFECTING POTABLE WATER PIPE LINES

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

B. Prior to being placed in service, all potable water pipe lines shall be chlorinated in accordance with AWWA 651, “Standard Procedure for Disinfecting Water Main”. The procedure shall meet Health Department requirements. The location of the chlorination and sampling points shall be determined by the County. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required.

C. The general procedure for chlorination shall be to flush all dirty or discolored water from the lines, then introduce chlorine in approved dosages through a tap at one end while water is being withdrawn at the other end of the line. The chlorine solution shall remain in the pipe line for 24 hours.

Water for flushing, filling and disinfecting the new lines must be obtained without contaminating existing pipe lines. Water obtained from existing pipe lines for this purpose shall pass through an approved air gap or backflow prevention device.

D. Following the chlorination period, all treated water shall be flushed from the lines at their extremities and replaced with water from the distribution system. Bacteriological sampling and analysis of the replacement water shall then be made by an approved laboratory or the Health Department in full accordance with the AWWA Manual C651. The line shall not be placed in service until the requirements of the State and County Public Health Department are met. Results of the bacteriological tests together with certified record drawings must be submitted to the Health Department (FDEP) within 30 days of the tests.

E. 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 AND TESTING OF PRESSURE PIPE

PART 1 GENERAL

1.01 INSTALLING PIPE AND FITTINGS

A. The Contractor shall install all pipe in accordance with the recommendations of the pipe manufacturer and as specified herein.

B. The Contractor shall take care in handling, storage and installation of pipe and fittings to prevent injury to the pipe or coatings. All pipe and fittings shall be examined before installation and pipe which is deemed to be defective by the County shall not be installed.

C. The Contractor shall thoroughly clean and keep thoroughly clean, all pipe and fittings prior to during and after installation.

D. The Contractor shall lay the pipe to the lines and grades shown on the Contract Drawings with bedding and backfill as shown on the Drawings or called out in the Contract Documents. Blocking under the pipe shall not be permitted except through casing sleeves.

E. The Contractor shall keep the open ends of all pipe closed with a tightly fitting plug when installation is not in progress or the potential exists for dirt or debris to enter the pipe.

F. The pipe or accessories shall not be dropped into the trench under any circumstances.

G. The Contractor shall construct all water mains pursuant to the provisions of "Recommended Standards for Water Works", Part 8, incorporated by reference in Rule 17-555.330(3), F.A.C.

H. 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. 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.

I. 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.

J. 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.

1.02 PROCEDURE FOR TESTING WATER LINES, FORCE MAINS AND RECLAIMED WATER LINES

A. A 48-hour notice 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. All pressure pipe lines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipe lines shall be subjected to a hydrostatic pressure test for two (2) hours at full working pressure, but not less than 180 psi for water/reclaimed (150 psi for force main). Maximum length of pipe to be tested at one time is 2,600 feet. If line is longer than 2,600 feet and cannot be sectioned in 2,600 feet (max.) lengths, the allowable leakage will be figured at 2,600 feet.

D. Allowable leakage shall be determined by AWWA C600 table for hydrostatic tests. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof; to maintain the test pressure after the air in the pipe line has been expelled and the pipe has been filled with water.

E. All digging on the job site in the right-of-way must be completed before any testing of water or sewer. Any digging or boring across water or sewer lines after they have been tested may result in a retest of the lines at the County's request.

F. If any revisions or changes are made after initial testing, lines will be re-tested at the County's request.

G. Disconnect water supply during test.

H. All force mains will be tested from the valves in the valve vault at the lift station to the point of connection whether it be against a valve on another force main or into a manhole.

I. All services to be aboveground during test. The services should be the correct length so they will be one (1) foot inside right-of-way line.

J. All fire hydrant gate valves to be open during test.

K. All visible leaks are to be repaired, regardless of the amount of leakage.

L. Check gauge pressure periodically during test. If test pressure drops to 175 psi for water/reclaimed lines or to 145 psi for force mains during test, the line must be repumped back to 180 psi for water/reclaimed (150 psi force mains) and the amount of leakage measured. The test will continue on with the remaining time left. At the end of

the test, the line must be repumped again back to 180 psi (150 psi for force main) and the amount of leakage measured and added to any previous leakage determined earlier in the test.

M. After the line passes the test, the pressure will be blown off from the opposite end of line from the gauge location. Fire hydrants, services and end-of-line blow offs will be opened to demonstrate they were on line during the test.

N. At end of test, the test gauge must return to zero. The pressure gauge must read 0 psi to a maximum of 300 psi in 5 psi increments.

O. The section of line being tested must be identified on the charge sheet. The length and size of pipe, the exact area being tested and the valves being tested against, must be identified. Use Station numbers if available.

P. A punch list must be made at the end of all tests.

Q. A copy of the charge sheet will be given to the County and the Contractor at the end of the test.

1.03 INSPECTION/TESTING PROCEDURE COVERING BORED PIPE LINES 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, pipe lines and bores that will cross, or be closer than 5'-0" horizontally and 18 inches vertically to, previously tested water and sewer lines that are still under the ownership of the developer/contractor.

1. Notify the County and obtain the best as-built information available. Allow sufficient time for the County to field locate the existing pipe lines.
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, pipe lines 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 pipe line or casing installation, the cost of any repairs and retesting will be paid for by the utility company that installed the bore. The actual clearance between a bored casing crossing a water or sewer pipe should not be less than 18 inches.

1.04 DETECTION

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

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

END OF SECTION

SECTION 02618 PIPELINE CLEANING

PART 1 GENERAL

1.01 SCOPE OF WORK

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

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

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

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

cleaning of potable water lines.

2.02 MATERIALS

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

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

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

PART 3 EXECUTION

3.01 PIPELINE CLEANING

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

3.02 ACCEPTANCE

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

1. The pressures in the pipe during the pigging procedure.
2. Any inline problems encountered during the procedure including all excavations with detailed locations, reason for the excavation and any corrective measures taken to the pipeline.
3. A record of the pigs used, their sizes, styles and other pertinent information regarding what materials were used during the cleaning.
4. An analysis of the condition of the pipeline before and after the cleaning procedure.

END OF SECTION

SECTION 02619 HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.01 SCOPE

The Contractor shall furnish all labor, materials, equipment and incidentals required to install all pipe, fittings and appurtenances as shown on the Drawings and specified in the Contract Documents by Horizontal Directional Drilling (HDD).

1.02 GENERAL

A. All existing structures, water and sewer lines, storm drains, utilities, driveways, sidewalks, signs, mail boxes, fences, trees, landscaping, and any other improvement or facility in the construction area that the Contractor disturbs for his own construction purposes shall be replaced to original condition at no additional cost to the County.

B. For “Navigable Waters of the U.S.” reference 33 of the Code of Federal Regulations, Part 329.

C. For “Waters of the U.S.” reference 33 of the Code of Federal Regulations, Part 323.

D. For “Waters of the State” reference Section 62-301 of the Florida Administrative Code.

1.03 TESTING

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

B. Compaction tests shall be taken at every excavation, except in the road crossings or road shoulders; tests are to be taken according to current FDOT Standards.

C. All pipe shall be tested in accordance with the appropriate material specifications.

D. Reference Standards: American Society for Testing and Materials (ASTM), D1557, Moisture-Density Relations of Soils Using 10-lb. Rammer and 18-in. Drop.

E. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM test 1557-70T, Method A or C.

1.04 QUALIFICATIONS

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

B. Drilling Supervisor: The Contractor shall provide a competent boring specialist who shall remain on the project site during the entirety of the directional boring operation. This includes, but is not limited to, drilling fluid preparation, seaming, boring and pulling. The boring specialist shall have a minimum of five years of experience in supervising directional bores of similar nature, diameter, materials and lengths.

C. Pipe Fusion: All boring and fusing equipment shall be certified for operation. The Contractor responsible for thermal butt fusing pipe and fittings shall have manufacturer certification for performing such work or a minimum of five years of experience performing this type of work. If no certification is available, written documentation of the required work experience shall be submitted for approval.

D. Drilling Fluid Specialist: The personnel responsible for supervising the supply, mixing, monitoring fluid quality, pumping and re-circulation system proposed for the drilling fluid shall have a written certification issued by the Drilling Fluid manufacturer for performing such work or a minimum of five years of experience performing this type of work. If no certification is available, written documentation of the required work experience for the proposed personnel shall be submitted for review and approval.

1.05 SUBMITTALS

A. Detailed description including specifications and catalog cuts for:

1. Shop drawings and catalog data for all HDD equipment.
2. The pipe manufacturer's maximum degree of radial bending allowed for the pipe when full and when empty and pullback force recommended setting.
3. Steering and tracking devices including specific tracer wire.
4. Drilling fluids; the drilling fluid submittal shall include the ratio of mixture to water, including any additives, based on the Contractor’s field observations prior to construction, knowledge and experience with drilling in similar conditions, and any soil data provided in the Contract Documents, which shall be verified by the fluid specialist.
5. Shop drawings for the breakaway swivel, including the method of setting the swivels’ break point and set point to be used.
6. Shop drawings for sizing of the mandrel for pull through testing
7. Pipe assembly procedure, details of support devices, and staging area layout including methods to avoid interference with local streets, driveways, and sidewalks.
8. Details of pipe fusion procedures and copies of the fusion technician qualification certification or documentation.
9. Drilling fluid technician qualification certification or documentation

B. If the Contractor proposes any changes to the pull-back distance or profile shown on the drawings, he may be required to submit a complete design for the proposed pipe including an analysis for pull-back forces, external loads including full hydrostatic pressure if empty, external forces due to borehole collapse, ovalization during pull-back, thermal stress while exposed to Sun-light, shortening after release of pull-back force, and tensile stress during pull-back.

C. Bore Plan: For all contiguous piping installations over 300 feet in length or any installations for piping larger than 4” in diameter, the Contractor shall submit a Bore Plan that includes the following:

1. Contact information and experience for the drilling fluid specialist.
2. The number of passes the bore will include to get the product pipe installed.
3. The pilot bore and all reaming bore sizes including the final pullback with the product pipe.

4. Drilling rod length in feet.
5. The pilot bore, pre-ream bores (if any) and pullback production rate in minutes per (drilling) rod to maintain adequate mud flow.
6. Details of the entry and exit pit locations along with entry and exit angles for the bore, drawn to scale, depicting the position of all required equipment, access points, existing facilities to remain in place, existing traffic lanes to be maintained in operation, office trailers and storage sites.
7. The method of fusing or joining pipe of adjacent bores to ensure that the joint is on grade with the installed pipe.

D. Furnish a Bore Path Report to the County within seven days of the completion of each bore path. Data collected by the County Representative does not relieve the Contractor from the responsibility of recording his own data. Include the following in the report:

1. Location of project, project name and number
2. Name of person collecting data, including title, position and company name
3. Investigation site location (Contract plans station number or reference to a permanent structure within the project right-of-way)
4. Driller's Log & identification of the detection method used
5. Elevations and offset dimensions of installed pipe as referenced to the drawings
6. Data log of pullback force during product pipe installation
7. All failed bores. Include length of pipe left in place and explanation of failed installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Incidental materials that may or may not be used to install the product depending on field requirements are not paid for separately and will be included in the cost of the installed product.

B. Drilling Fluids shall use a mixture of bentonite clay or other approved stabilizing agent mixed with potable water with a pH of 8.5 to 10.0 to create the drilling fluid for lubrication and soil stabilization. Vary the fluid viscosity to best fit the soil conditions encountered. Contractor shall have appropriate additives for drilling fluid available for different soil conditions that may be encountered. Do not use any other chemicals or polymer surfactants in the drilling fluid without written consent from the County. Certify to the County in writing that any chemicals to be added are environmentally safe and not harmful or corrosive to the product pipe.

C. For drilling operations that will be below waters of the State of Florida, only bentonite free drilling fluids shall be used. Acceptable products are BioMax, manufactured by M-I Swaco, Inc., P.O. Box 2216, Laurel, Mississippi 39440, Phone: (800) 731-7331 or Bio-Bore, manufactured by Baroid Drilling Fluids, Inc., P.O. Box 1675, Houston, Texas 77251, Phone: (731) 987-5900 or approved equal.

D. Identify the source of water for mixing the drilling fluid. Approvals and permits are required for obtaining water from such sources as streams, rivers, ponds or fire hydrants. Any water source used other than potable water may require a pH test.

E. The tracer wire to be used for all directional drills shall be a solid, 10 gauge, high

strength, copper clad steel wire with a polyethylene jacket of appropriate color manufactured by Copperhead Industries or Manatee County approved equal.

F. Breakaway connectors shall be supplied by DCD Design & Manufacturing, Condux International, Inc. or approved equal.

PART 3 EXECUTION

3.01 SITE CONDITIONS

A. Carry out excavation for entry, exit, recovery pits, slurry sump pits, or any other excavation as specified in the Contract documents. Sump pits are required to contain drilling fluids if vacuum devices are not operated throughout the drilling operation, unless approved by the County.

B. Within 48 hours of completing installation of the boring product, clean the work site of all excess slurry or spoils. Take responsibility for the removal and final disposition of excess slurry or spoils. Ensure that the work site is restored to pre-construction conditions or as identified on the plans.

C. Exposure of product pipe to sunlight shall be limited to 14 consecutive days unless approved by the County.

D. The pipe shall be supported at intervals along its length with rollers or Teflon pads to minimize frictional forces when being pulled, and to hold the pipe above the ground. Surface cuts or scratches greater than or equal to the maximum defect depth in 3.08 E are not acceptable.

3.02 DAMAGE RESTORATION & REMEDIATION

A. The Contractor shall take responsibility for restoration for any damage caused by heaving, settlement, separation of pavement, escaping drilling fluid (frac-out), or the directional drilling operation, at no cost to the County.

B. When required by the County, provide detailed plans which show how damage to any roadway facility will be remedied. These details will become part of the Record Drawings Package. Remediation Plans must follow the same guidelines for development and presentation of the Record Drawings. When remediation plans are required, they must be approved by the County before any work proceeds.

C. For HDD operations that will be below waters of the State of Florida, the contractor shall be responsible for any damage caused by the drilling operation, including, but not limited to, fracturing of the channel bottom. Any State or Federal required environmental cleanup due to the release of drilling fluids into State waters shall be at the Contractor's expense. The Contractor may at his own expense increase the depth of his drilling operations upon the approval from the County.

3.03 QUALIFICATIONS FOR REJECTION OF DIRECTIONAL BORE

A. The County may reject any portion of the work that is deemed to be non-responsive to the Contract requirements or not in conformance with approved plans and submittals, and for other factors including the following:

1. Failed Bore: When there is any indication that the installed product has sustained damage, stop all work, notify the County and investigate damage. The County may require a pressure and / or mandrel test at no additional cost to the County and shall have a County representative present during the test. Perform all testing within 24 hours unless otherwise approved by the County. Furnish a copy of the test results and all bore logs to the County for review and approval. The County is allowed up to 5 working days to approve or determine if the product installation is not in compliance with the specifications.
2. Obstructions: If an obstruction is encountered during boring which prevents completion of the installation in accordance with the design location and specification, the pipe may be taken out of service and left in place at the discretion of the County.
3. Pull-back Failure: If the installed breakaway device should fail during pull back.
4. Loss of Drilling Fluids: If the drilling fluid is “lost” during the pull back of the product and cannot be regained within the required timeframe of the manufacturer or if more than a reasonable amount of fluid is used to fill an unknown void and flow cannot be regained. No pipe shall be pulled without visible flow of drilling fluid.
5. Test Failure: If the pipe shall fail a hydraulic pressure test or mandrel test as specified by the County.
6. Damaged Pipe: If at any time when the product is pulled back and any exposed areas have a greater than allowable “gouging” or visible marring of the pipe per the table in 3.08 E.
7. Alignment Tolerance Exceeded: If the vertical and horizontal limits are not within tolerances.
8. Defective Material: Any other defect in material or workmanship which would affect the quality, performance, or installation life of the installed pipeline.

B. Remediation: All rejected bores shall be at the Contractors expense to correct and provide a satisfactory installed product. The Contractor shall submit to the County a revised installation plan and procedure for approval before resuming work. The County may require non-compliant installations to be filled with excavatable flowable fill or to be completely removed at no additional cost to the County.

3.04 PRODUCT LOCATING AND TRACKING

A. The County recognizes walkover, wire line, and wire line with surface grid verification, or any other system as approved by the County, as the accepted methods of tracking directional bores. Use a locating and tracking system capable of ensuring that the proposed installation is installed as intended. The locating and tracking system must provide information on:

1. Clock and pitch information
2. Depth
3. Transmitter temperature
4. Battery status
5. Position (x,y)
6. Azimuth, where direct overhead readings (walkover) are not possible (i.e. sub aqueous)

B. Ensure proper calibration of all equipment before commencing directional drilling

operation.

C. Prepare the Driller's Log. Take and record alignment readings or plot points such that elevations on top of and offset dimensions from the center of the product to a permanent fixed feature are provided. Such permanent fixed feature must have prior approval of the County. Provide elevations and dimensions at all bore alignment corrections (vertical and horizontal) with a minimum distance between points of 10 feet. Provide a sufficient number of elevations and offset distances to accurately plot the vertical and horizontal alignment of the installed product.

D. Installation Location Tolerances: The location of the initial bored hole shall be deemed acceptable by the County if the deviations of the bore from the design alignment or approved adjustments do not exceed the following tolerances:

1. Profile:
   a. 2.0 feet within a length of 100 feet
   b. No reverse curvature within 200 feet
   c. Total deviation not to exceed 5 feet
2. Alignment:
   a. 3.0 feet within a length of 200 feet
   b. No reverse curvature
   c. Total deviation not to exceed 7.0 feet

3.05 PRODUCT BORE HOLE DIAMETER

Minimize potential damage from soil displacement/settlement by limiting the ratio of the bore hole to the product size. The size of the back reamer bit or pilot bit, if no back reaming is required, will be limited relative to the product diameter to be installed as follows:

Maximum Pilot or Back-Reamer Bit Diameter When Rotated 360 Degrees	
Nominal Inside Pipe Diameter Inches	Bit Diameter Inches
2	4
3	6
4	8
6	10
8	12
10	16
12 and greater	Maximum Product OD plus 6

3.06 EQUIPMENT REQUIREMENTS

A. The HDD equipment selected by the Contractor shall be capable of drilling, steering, tracking, reaming and installing the pipeline through all the subsurface conditions that may be present at the site.

B. Match equipment to the size of pipe being installed. Obtain the County's approval for installations differing from the above chart. Ensure that the drill rod can meet the bend radius required for the proposed installation.

C. All HDD equipment shall have an electronic data logger to record pull back force during all pipe installations.

D. All HDD equipment that has the capability to exceed the maximum recommended pulling force shall have a breakaway swivel properly attached to the product pipe that will release if the pullback force exceeds the pipe manufacturers recommended pulling force.

3.07 THRUST / PULLBACK REQUIREMENTS

The Contractor shall provide as part of the required working drawings submittal complete data regarding the operational and maximum thrust or pulling forces to be used for the initial drill head and back-reamer installations, and the final pull-back of the pipe. Gages or other measurement tools shall be used to monitor the forces being used.

3.08 INSTALLATION PROCESS

A. Ensure adequate removal of soil cuttings and stability of the bore hole by monitoring the drilling fluids such as the pumping rate, pressures, viscosity and density during the pilot bore, back reaming and pipe installation. Relief holes can be used as necessary to relieve excess pressure down hole. Obtain the County's approval of the location and all conditions necessary to construct relief holes to ensure the proper disposition of drilling fluids is maintained and unnecessary inconvenience is minimized to other facility users.

B. The Contractor shall determine the pull-back rate in order to allow the removal of soil cuttings without building excess down-hole pressure and to avoid local heaving, or spills. Contain excess drilling fluids at entry and exit points until they are recycled and separated from excavated materials, or removed from the site or vacuumed during drilling operations. Ensure that entry and exit pits and storage tanks are of sufficient size to contain the expected return of drilling fluids and soil cuttings. The bored hole shall always be maintained full of drilling fluids for support of surfaces, and the fluid re-circulation equipment shall operate continuously until the pipe installation is completed and accepted by the County.

C. Ensure that all drilling fluids are disposed of or recycled in a manner acceptable to the appropriate local, state, or federal regulatory agencies. When drilling in suspected contaminated ground, test the drilling fluid for contamination and appropriately dispose of it. Remove any excess material upon completion of the bore. If in the drilling process it becomes evident that the soil is contaminated, contact the County immediately. Do not continue drilling without the County's approval.

D. The timing of all boring processes is critical. Install a product into a bore hole within the same day that the pre-bore is completed to ensure necessary support exists. Once pullback operations have commenced, the operation shall continue without interruption until the pipe is completely pulled into the borehole.

E. All prepared pipe that is being used for installation shall be adequately supported off the ground along the entire length to avoid damaging of the material during pullback due to ground surface conditions. Surface cuts or scratches greater than or equal to the maximum defect depth are not acceptable.

Pipe Size	Max. Defect Depth
In.	In.
4	1/16
6	1/11
8	5/32
10	3/16
12	1/4
> 12	Per Pipe Manufacturer's Recommendations

F. The drilling fluid specialist shall remain on the project site during the entirety of the directional boring operation to ensure proper mixture and production of drilling fluids needed for the bore.

G. Upon successful completion of the pilot hole, the borehole shall be reamed to a minimum of 25 percent greater than the outside diameter of the pipe being installed.

H. For bores with more than two radii of curvature (entrance and exit), the borehole should be reamed up to 50 percent larger than the outside diameter of the carrier pipe. Prereaming may be necessary dependent on size of material to be pulled.

I. Additional passes for prereaming may be required for larger pipe. Incremental increases shall be used as needed until appropriate bore hole size has been achieved.

J. Prereaming must be accomplished with no product attached to the reamer head on all bore pipe 6" and larger. The bore product maybe pulled back on final pass of prereaming upon prior approval from the County.

K. After reaming the borehole to the required diameter, the pipe shall be pulled through the hole. In front of the pipe shall be a breakaway swivel and barrel reamer to compact the borehole walls.

L. The Contractor shall not attempt to ream at a rate greater than the drilling equipment and drilling fluid system are designed to safely handle.

M. Install all piping such that their location can be readily determined by electronic designation (tracer wire) after installation.

1. For non-conductive installations, externally attach two (2) tracer wires; see Section 2.01 – Materials, Part I. above, to the top of product pipe and secure in place with duct tape or 10-mil thickness polyethylene pressure sensitive tape at every joint and at 5 foot intervals.

N. Connect any break in the conductor line before construction with an electrical clamp, or solder, and coat the connection with a rubber or plastic insulator to maintain the integrity of the connection from corrosion. Clamp connections must be made of brass or copper and of the butt end type with wires secured by compression. Soldered connections must be made by tight spiral winding of each wire around the other with a finished length minimum of 3 inches overlap. Tracking conductors must extend 2 feet beyond bore termini. Test conductors for continuity. Each conductor that passes must be identified as such by removing the last 6 inches of the sheath. No deductions are

allowed for failed tracking conductors. Upon completion of the directional bore, the Contractor shall demonstrate to the County that the wire is continuous and unbroken through the entire run of the pipe by providing full signal conductivity (including splices) when energizing for the entire run in the presence of the County Representative. If the wire is broken, the Contractor shall repair or replace it at no additional cost to the County.

3.09 PIPELINE TESTING

A. HYDROSTATIC TESTING

1. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.7.

B. MANDREL DEFLECTION TESTING PROCESS

1. The deflection test for flexible pipe systems shall be performed by pulling a mandrel through the pipe line. The mandrel shall have a diameter equal to 80 percent of the inside diameter of the pipe system being tested. When the mandrel cannot be pulled through the pipe line the Contractor shall locate and correct the defect to the satisfaction of the County. After the defect is corrected and trench backfilled, the section of line shall then be retested to compliance.

2. Deflection tests shall be performed not sooner than 30 days after completion of placement and densification of backfill. The pipe shall be cleaned and inspected for offsets and obstructions prior to testing.

3. The mandrel types that can be used are:
   a. a rigid, nonadjustable, odd number of legs (9 legs minimum), mandrel having an effective length not less than its nominal diameter; and (2) be fabricated of steel, fitted with pulling rings at each end, stamped or engraved on some segment other than a runner indicating the pipe material specification, nominal size and be furnished in a suitable carrying case labeled with the same data as stamped or engraved on the mandrel.

   b. If approved by the County, a smaller diameter piece of similar pipe material that is approximately 3 feet long and meets the 80% reduction of the inside diameter of the pipe being tested.

4. The mandrel shall be pulled through the pipe by hand to ensure that maximum allowable deflections have not been exceeded or that “necking” has not occurred. Prior to use, the mandrel shall be inspected by County personnel. Use of an unapproved mandrel or a mandrel altered or modified after inspection will invalidate the test. If the mandrel fails to pass, the pipe will be deemed overdeflected or necked.

5. Overdeflected or necked pipe shall be abandoned and reinstalled. The replaced pipe shall be tested for deflection not sooner than 30 days after installation.

D. The following deficiencies in the flexible pipe system installation shall be corrected by the Contractor at no cost to the County:

1. Overdeflections
2. Stretched or “Necked” Pipe
3. Damaged Pipe
4. Improper Pipe Welds
5. Infiltration Points
6. Debris in the line

E. The County will not accept a credit, maintenance bond, or any other form of compensation in lieu of corrective measures that may be required to correct any sections of flexible pipe system that are improperly installed or do not meet the requirements of these specifications. In addition, all corrective measures proposed by the Contractor shall be approved by the County. In addition, should repairs of the flexible pipe system be accomplished by the use of any unauthorized materials or procedure, the County will require replacement of those substandard portions or repairs made to conform to the requirements of these specifications.

END OF SECTION

SECTION 02620 POLYETHYLENE (PE) PRESSURE PIPE

PART 1 GENERAL

1.01 SCOPE OF WORK

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

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

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

1.02 QUALIFICATIONS

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

1.03 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 polyethylene pipe and fittings.

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

C. The Contractor shall submit shop drawings showing installation method and the proposed method and specialized equipment to be used.

PART 2 PRODUCTS

2.01 POLYETHYLENE PRESSURE PIPE

A. Polyethylene pipe 4" diameter and larger shall be high-density bimodal PE3408/PE 100/PE4710 polyethylene resin with a minimum cell classification of 445574 per ASTM D3350, Class 160, DR 11, Performance Pipe DriscoPlex 4000, or an approved equal, meeting the requirements of AWWA C906. All pipe materials used in potable water systems shall comply with NSF Standard 61. Outside diameters of water, reclaimed water and pressure sewer HDPE pipes shall be ductile-iron sizing system (DIPS).

B. Polyethylene tubing 2 inches in diameter and smaller for potable water and reclaimed water shall be high density PE 3408 polyethylene resin per ASTM D2737, Pressure Class 200, Copper Tube Size (CTS), SDR 9, Performance Pipe DriscoPlex 5100, Endot EndoPure, Charter Plastics or an approved equal, meeting the requirements of AWWA C901. Butt fusion or CTS brass connections shall be used. All pipe materials used in potable water systems shall comply with NSF Standard 61.

C. Polyethylene pipe 3 inches in diameter (for potable water and reclaimed water), and 3

inches in diameter and smaller (for wastewater force mains) shall be high-density PE 3408 polyethylene, per ASTM D2737, Pressure Class 160, iron pipe size (IPS) outside diameter, DR 11, Performance Pipe DriscoPlex 4100 or an approved equal, meeting the requirements of ASTM D 3035 and AWWA C901.

2.02 JOINTS

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

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

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

2.03 DETECTION

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

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

2.04 IDENTIFICATION

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

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

PART 3 EXECUTION

3.01 INSTALLING POLYETHYLENE PRESSURE PIPE AND FITTINGS

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

3.02 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 test per section 02617.

END OF SECTION

SECTION 02622 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS (AWWA SPECIFICATIONS C-900 & C-905)

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and incidentals required to install the plastic piping, fittings and appurtenances complete and ready for use as specified in the Contract Documents and 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.

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

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

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

1.05 TOOLS

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

PART 2 PRODUCTS

2.01 MATERIALS

A. Pressure Class-Rated Polyvinyl Chloride (PVC) Pipe

1. Pressure class-rated PVC pipe and accessories four to twelve inches (4"-12") in diameter, shall meet the requirements of AWWA Specification C-900 "Polyvinyl Chloride (PVC) Pressure Pipe". Pipe shall be Class 250, meeting requirements of Dimension Ratio (DR) 18 and shall have the dimension of ductile iron outside

diameters. Each length of pipe shall be hydrostatically tested to four (4) times its class pressure by the manufacturer in accordance with AWWA C-900.

2. Fourteen inch (14") thru thirty-six (36") PVC pipe for sewer force mains shall meet AWWA C-905 requirements for dimension ratio (DR) 18. Each length of pipe shall be tested at twice the pressure rating (PR 235 psi) for a minimum dwell of five seconds in accordance with AWWA C-905.

   PVC pipe shall not be used for potable and reclaim waterlines 16 inches and larger.

   Pipe shall be listed by Underwriters Laboratories. Provisions shall be made for expansion and contraction at each joint with an elastomeric ring, and shall have an integral thickened bell as part of each joint. PVC Class pipe shall be installed as recommended by the manufacturer. Pipe shall be furnished in nominal lengths of approximately 20 feet, unless otherwise directed by the County. Pipe and accessories shall bear the NSF mark indicating pipe size, manufacturer's names, AWWA and/or ASTM Specification number, working pressure, and production code.

3. Rubber gaskets shall conform to AWWA C111 for mechanical and push-on type joints and shall be EPDM (Ethylene-Propylene Diene Monomer) rubber for potable water and reclaimed water pipelines. Standard gaskets shall be such as Fastite as manufactured by American Cast Iron Pipe Company, or an approved equal.

4. PVC pipe 3" and less in diameter may be constructed using pipe conforming to ASTM D2241 with push-on joints. Pipe shall be 200 psi pipe-SDR 21 unless otherwise specified by the County. This PVC pipe shall not be used for working pressures greater than 125 psi.

5. Pipe shall be blue for potable water mains, green for sewage force mains and purple for reclaimed water mains. All potable water pipe shall be NSF certified and copies of lab certification shall be submitted to the County.

6. Where colored pipe is unavailable, white PVC color coded spiral wrapped pipe shall be installed.

B. Joints

1. The PVC joints for pipe shall be of the push-on type unless otherwise directed by the County so that the pipe and fittings may be connected on the job without the use of solvent cement or any special equipment. The push-on joint shall be a single resilient gasket joint designed to be assembled by the positioning of a continuous, molded resilient ring gasket in an annular recess in the pipe or fitting socket and the forcing of the plain end of the entering pipe into the socket, thereby compressing the gasket radially to the pipe to form a positive seal. The gasket and annular recess shall be designed and shaped so that the gasket is locked in place against displacement as the joint is assembled.

   The resilient ring joint shall be designed for thermal expansion or contraction

with a total temperature change of at least 75 degrees F in each joint per length of pipe. The bell shall consist of an integral wall section with a solid cross section elastomeric ring which shall meet requirements of ASTM F-477. The thickened bell section shall be designed to be at least as strong as the pipe wall. Lubricant furnished for lubricating joints shall be nontoxic, 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. Gaskets shall be suitable for use with potable water, reclaimed water or sanitary sewer as applicable.

2. Restrained joints shall be provided at all horizontal and vertical bends and fittings, at casings under roads and railroads and at other locations shown on the Contract Drawings. PVC joints for pipe shall be restrained by the following methods: thrust blocks, restraining glands such as Certa-Lok Restraining Joint Municipal Water Pipe by the Certain Teed Corporation of Valley Forge, PA, or approved equal. All Grip, Star Grip by Star Products, MJR by Tyler Pipe, Tyler, Texas. Restrained joint PVC pipe shall be installed in strict accordance with the manufacturer's recommendation.

C. Fittings

1. All fittings for class-rated PVC pipe shall be ductile iron with mechanical joints and shall conform to the specifications for ductile iron fittings, unless otherwise directed. Class 200, C-900 PVC fittings are allowable for sewage force main applications up to and including 12" diameter only. DR ratio shall be the same as the pipe.

2. The manufacturer of the pipe shall supply all polyvinyl chloride accessories as well as any adapters and/or specials required to perform the work as shown on the Drawings and specified herein. Standard double bell couplings will not be accepted where the pipe will slip completely through the coupling.

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

3.02 INSPECTION AND TESTING

All pipe lines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipe lines shall be subjected to a hydrostatic pressure test for two (2) hours at full working pressure, but not less than 180 psi for water/reclaimed (150 psi for force main). All visible leaks shall be repaired and retested for approval by the County. Prior to testing, the pipe lines shall be supported in a manner approved by the County to prevent movement during tests.

END OF SECTION

SECTION 02623 POLYVINYL CHLORIDE (PVC) PIPE (GRAVITY SEWER)

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, Working Drawings and Samples for approval to the County.

B. The Contractor shall submit to the County not less than fourteen (14) calendar days after the date of the Notice to Proceed, a list of materials to be furnished, the names of suppliers and an expected schedule of delivery of materials to the site.

C. The Contractor shall furnish in duplicate to the County sworn certificates that all tests and inspections required by the Specifications under which the pipe is manufactured have been satisfied.

D. 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.

1.03 INSPECTION AND TESTS

A. All pipe and accessories installed under this Contract shall be inspected and tested as required by the Standard Specifications to which the material is manufactured. The pipe shall be tested at the place of manufacture or taken to an independent laboratory by the manufacturer.

B. Each length of pipe shall be subject to inspection and approval at the factory, point of delivery and site of work. Sample of pipe to be tested shall be selected at random by the County or the testing laboratory and shall be delivered by the Contractor to the testing laboratory approved by the County.

C. When the specimens tested conform to applicable standards, all pipe represented by such specimens shall be considered acceptable based on the test parameters measured. Copies of test reports shall be submitted to the County prior to the pipe installation. Acceptable pipe shall be stamped with an appropriate monogram under the supervision of the testing laboratory.

D. All pipe test specimens failing to meet the applicable standards shall be rejected. The Contractor may provide two additional test specimens from the same shipment or

delivery for each failed specimen. The pipe shall be acceptable if both of these additional specimens meet the requirements of the applicable standards.

E. Pipe which has been deemed unacceptable by the County shall be removed from the work site by the Contractor and shall be replaced with acceptable pipe.

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. PVC pipe, sizes 6" through 12", for use in non-pressure gravity sewer mains and laterals shall have an SDR of 26 and conform to ASTM D-3034. PVC pipe shall be made of PVC plastic, homogenous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The pipe shall be uniform in color, density and other physical properties.

B. PVC pipe sizes over 12" shall be approved by Manatee County.

C. All pipe shall be in compliance with the above standard and be clearly marked as follows at intervals of 5 feet or less:

1. Manufacturer's name or trademark.
2. Nominal pipe size.
3. PVC cell classification (eg. 12454-B).
4. The legend "Type PSM SDR-26 PVC Sewer Pipe" and the designation ASTM D-3034.

D In addition to the above mentioned requirements, all PVC sanitary sewer pipe shall be color coded green to conform with Manatee County Standards.

E. PVC sewer fittings shall conform to the requirements of ASTM D-3034 and shall have an SDR of 26. Six inch PVC fittings for sewer laterals shall be SDR 26. Fittings shall be molded in one piece with elastomeric joints and minimum socket depths as measured in accordance with ASTM D-3034. Fittings not currently available in molded form may be fabricated in accordance with ASTM D-3034 with manufacturer's standard pipe bells and gaskets. Gasket shall have a minimum cross sectional area of 0.20 sq. in. and conform to ASTM F-477 specification.

2.03 JOINTING PVC PIPE

A. The PVC joints shall be of the push-on type so that the pipe and fittings may be connected on the job without the use of solvent cement or any special equipment. The push-on joint shall be a single rubber gasket conforming to ASTM F-477, designed to be assembled by the positioning of a continuous molded rubber ring gasket in an

annular recess in the pipe of fitting socket and the forcing of the plain end of the entering pipe into the socket, thereby compressing the gasket radially to the pipe to form a positive seal. The gasket and annular recess shall be designed and shaped so that the gasket is locked in place against displacement as the joint is assembled. The rubber ring joint shall be designed for thermal expansion or contraction with a total temperature change of at least 75 degrees F in each joint per length of pipe. The bell shall consist of an integral wall section with a solid cross-section elastomeric ring which shall meet requirements of ASTM F-477. The thickened bell section shall be designed to be at least as strong as the pipe wall. Lubricant furnished for lubricating joints shall be nontoxic, shall not support the growth of bacteria, and shall have no deteriorating effects on the gasket or pipe material.

B. Wyes and riser fittings shall be gasketed connections. If female adapters SDR 26 or 35 are unavailable, solvent welds shall be acceptable upon approval by the County.

C. Rubber doughnuts are not to be used.

2.04 JOINTS FOR DISSIMILAR PIPE

Joints between pipe of different materials shall be made using shielded fernco coupling or protecto 401 mechanical joint connections. Metal piping shall not be threaded into plastic fittings, valves, or couplings, nor shall plastic piping be threaded into metal valves, fittings, or couplings.

2.05 PIPE BEDDING AND PIPE COVER MATERIALS

A. Pipe bedding and cover material shall be as specified in the Contract Documents.

B. Pipe bedding and cover material for polyethylene coated ductile iron pipe fittings shall be well graded sand.

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. He shall not drop pipe of any size from the bed of the truck to the ground. He shall not distribute more than one weeks 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. He 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. He 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. He 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	Minimum Depth of 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 C-387 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 install a green metallic tape as shown in these Standards below finish grade along the entire pipeline PVC sewer main pipe route.

D. 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 insure 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, he shall place and carefully compact pipe bedding material for the full width of the trench to the springline of the pipe. He 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 flexible 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 described herein.

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 LAMP TEST FOR GRAVITY SEWER MAINS

A. Prior to testing, the Contractor shall prepare the lines for testing. All lines shall be thoroughly cleaned.

B. The Contractor shall furnish all equipment necessary for testing including, but not limited to, ladders, a lamping light and a vehicle to use as power source.

C. Gravity lines shall be lamped from both the upstream and downstream ends between the manholes.

D. A minimum image of 75% shall be acceptable.

E. Failure to meet the 75% image requirement shall result in the Contractor having to video tape the line at his own expense. The County or his representative shall be present while the line is video taped. The tape shall be submitted to Manatee County for evaluation.

F. The Contractor shall relay or otherwise correct any line deemed unacceptable by the County. This work shall be done entirely at the Contractor's expense.

G. Grouting of sewer lines or re-rounding machines are not approved corrective measures.

H. Sewer lines shall be re-lamped and may be required by Manatee County to be video taped again.

3.14 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.

END OF SECTION

SECTION 02640 VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE OF WORK

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

B. All 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 one manufacturer.

C. All valves and appurtenances shall have the name of the manufacturer and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.

D. All valves shall have a factory applied, fusion bonded epoxy coating on interior and exterior unless noted otherwise in the plans or this specification.

E. All valves are to be holiday free and have current testing certification papers stating the valve passed holiday free testin.

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

1. Gate valves (Sec. 2.01)
2. Ball Valves (Sec. 2.02)
3. Valve Actuators (Sec. 2.03)
4. Air Release Valves (Sec. 2.04)
5. Valves Boxes (Sec. 2.05)
6. Corporation Cocks (Sec. 2.06)
7. Flange Adapter Couplings (Sec. 2.07)
8. Hose Bibs (Sec. 2.08)
9. Check Valves (Sec. 2.09)
10. Restrained Joints (Sec. 2.10)

1.02 DESCRIPTION OF SYSTEMS

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

1.03 QUALIFICATIONS

All of the types of valves and appurtenances shall be products of well established reputable firms who are fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications as applicable. Valves shall be as covered under mechanical devices in Section 8 of ANSI/NSF Standard 61.

1.04 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.

1.05 TOOLS

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

PART 2 PRODUCTS

2.01 GATE VALVES

A. All valves shall have cast or ductile iron three (3) piece valve bodies.

B. When installed underground, gate valves shall be provided with a box cast in a concrete slab and a box cover. Length of box shall include slab thickness. Box cover opening shall be for valve stem and nut. Valve wrenches and extension stems shall be provided by the manufacturer to actuate the valves. The floor box and cover shall be equal to those manufactured by Rodney Hunt Machine Company, Orange, Massachusetts, Clow, DeZurik or approved equal.

C. Gate valves with 3"-20" diameters shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 or C515 and UL/FM of latest revision and in accordance with the following specifications. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve. Gate valves shall have internal coating of Protecto 401 (or approved equal)

D. Wrench nut shall be provided for operating the valve.

E. Gate valves meeting AWWA C509 requirements shall be rated for an operating pressure of 200 psi and shall be tested in accordance with AWWA C509. Valves meeting AWWA C515 requirements shall be rated for an operating pressure of 250 psi and shall be tested in accordance with AWWA C515. Flanged valves shall be faced and drilled to the ANSI 150 lb. standard.

F. All bonnet bolts, nuts and studs shall be stainless steel.

G. Above grade gate valves shall be supplied with hand actuators.

2.02 BALL VALVES FOR PVC PIPE

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

flanged ends as required. Ball valves for wastewater, 2-inch through 3-inch, shall be 316 stainless steel body, cap, stem and ball per ASTM A351, full port, full flow, 1/4-turn check, ball valves, steam rated for 150 psi, pressure rating 1,000 psi CWT, Apollo 76F or approved equal, with threaded or flanged ends as required.

Curb Stops for Water and Reclaimed Water

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

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

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

2.03 VALVE ACTUATORS

A. General

1. All valve actuators shall conform to Section 3.8 of the AWWA Standard Specification and shall be either manual or motor operated.
2. 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.
3. Butterfly valve actuators shall conform to the requirements of Section 3.8 of the AWWA Standard specifications for Rubber Seated Butterfly Valves, Designated C504, insofar as applicable and as herein specified.

B. Manual Actuators

1. Manual actuators shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities. Actuators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. They shall turn counter-clockwise to open valves. Manual actuators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Actuators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 80 pounds on the handwheel or chainwheel. Actuator components shall withstand an input of

450 foot pounds for 30" and smaller and 300 foot pounds for larger than 30" size valves at extreme actuator positions without damage. Valves located above grade shall have handwheel and position indicator, and valves located below grade shall be equipped with a two inch (2") square AWWA operating nut located at ground level and cast iron extension type valve box. Valve actuators shall conform to AWWA C504, latest revision.

2.04 AIR RELEASE VALVES

The air release valves for use in water or force mains shall be installed as shown on the Drawings. The valves shall have a ductile iron body cover and baffle, stainless steel float, bronze water diffuser, Buna-N or Viton seat, and stainless steel trim. The fittings shall be threaded. Reference the Manatee County Public Works Standards for acceptable models.

2.05 VALVE BOXES

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

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

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

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

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

F. All potable water, sewer, and reclaimed water grade-adjustment risers shall be cast iron material just like the valve box.

G. A centering device AFC part no. B 59434 or equal shall be installed in the valve box.

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

2.06 CORPORATION STOPS

A. Corporation stops for connections to ductile iron and PVC water and reclaimed water mains shall be all red brass, alloy 85-5-5-5, per ASTM B 62, and shall conform to AWWA C800. 1-inch through 2-inch corporation stops shall be ball type, 300 psi working pressure rated, with AWWA MIP threaded inlets and compression, pack joint, flare, or FIP threaded joint outlets, Mueller as shown in the table below, or an approved equal. All joints made to CTS size HDPE tubing shall use stainless steel insert stiffeners.

Corporation Stops

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

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

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

D. Connections to PVC sanitary force mains for services up to 2 inches shall be made using Romac Style 306 double bolt stainless steel service saddles or equivalent.

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

2.07 FLANGE ADAPTER COUPLINGS

Plain end couplings and adapters shall be fusion-bonded epoxy coated carbon steel with Ethylene Propylene Diene Monomer (EPDM) rubber gaskets and stainless steel

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

2.08 HOSE BIBS

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

2.09 CHECK VALVES

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

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

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

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

2.10 RESTRAINED JOINTS

A. Pipe joints shall be restrained by poured-in-place concrete thrust blocks or by other mechanical methods, including stainless steel tie rods, Stargrip and Allgrip, as manufactured by Star Pipe Products or Megaflange and 2000 PV, as manufactured by EBAA Iron Sales. Flanged joints may be used above ground.

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

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

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 corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the 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. Flanged joints and mechanical joints shall be made with high strength, low alloy Corten or 316 stainless steel bolts, nuts and washers.

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

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

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

3.02 HYDRANTS

A. Hydrants shall be set at the locations designated by the 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 INSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS. Concrete used for backing shall be as specified herein.

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

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

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

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

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

3.03 SHOP PAINTING

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

3.04 FIELD PAINTING

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

All above ground potable water main valves shall be painted safety blue.

3.05 INSPECTION AND TESTING

Completed pipe shall be subjected to hydrostatic pressure test for two hours at 180 psi. All leaks shall be repaired and lines retested as approved by the County. Prior to testing, the pipelines shall be supported in an approved manner to prevent movement during tests.

END OF SECTION

SECTION 02720 SANITARY SEWER BYPASS PUMPING

PART 1 GENERAL

1.01 SCOPE

The Contractor shall furnish all labor, materials, equipment and incidentals required to maintain existing and anticipated flows within the affected portion of the collection system throughout the construction period.

1.02 PUBLIC IMPACTS

The contractor shall not create a public nuisance due to excessive noise or dust, nor impact the public with flooding of adjacent lands, discharge of raw sewage, or release of other potential hazards, nor shall he encroach on or limit access to adjacent lands. No extra charge may be made for increased costs to the contractor due to any of the above.

1.03 SUBMITTALS

A. The Contractor shall, within 30 days of the date of the Notice to Proceed, submit to the Project Manager a detailed Pumping Plan for each site by-pass pumping will be needed. The Pumping Plan shall address all measures and systems to prevent a sanitary sewer overflow (SSO) as defined by the EPA. The Plan shall include as a minimum:

1. Working drawings and sketches showing work location, pump location, piping layout & routing. Show all proposed encroachment and access impacts on adjacent properties or facilities.
2. Pump, control, alarm and pipe specifications or catalog cuts. Detailed sketch of controls and alarm system.
3. Power requirements and details on methods to provide by-pass power or fueling.
4. Calculation and determination of response times to prevent an SSO after a high water alarm. If anticipated peak flows are 750 G.P.M. or greater, an operator is required on site at all times pump is in service. If the anticipated peak flows are less than 750 G.P.M. an operator may not be required to be on site at all times; show operator on-site schedule.
5. Procedures to be taken in case of power, pump, or piping failures; including contact names and numbers for emergency notifications.
6. Frequency and specific responsibility for monitoring pump operation, fuel levels, pump maintenance and entire length of piping.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Pumps:

1. By-pass pumping system shall consist of at least a primary pump and a backup

pump. Each pump shall have a minimum pumping capacity of 150% of the anticipated peak flows. When bypassing a pump station, 150% of the lift station capacity (G.P.M. & T.D.H) shall be provided.

2. Pumps shall be low noise or sound attenuated. The noise level at any operating condition, in any direction, shall not exceed 70dBA at a distance of twenty three (23) feet (7 meters) from the pump and/or power source.

B. Controls:

The by-pass pump system shall be equipped with automatic controls and an alarm system. The automatic controls will automatically start the backup pump in the event of a high water condition or failure of the primary pump. The alarm system will immediately notify the Contractor of a pump failure or high water condition.

C. Pipe:

Pipe shall be of adequate size and capacity to match the pumps. Pipe type and materials will depend on the particulars of the site conditions, and shall be detailed in the Pumping Plan. Contractor will provide all connections.

PART 3 EXECUTION

3.01 SITE CONDITIONS

Site conditions will vary by site. Contractor is responsible to determine and address requirements such as traffic control, excavation, connections & fittings, impacts on access to adjacent properties, routing and support of by-pass piping, etc., in the Pumping Plan.

3.02 ON-SITE MONITORING

A. All by-pass operations where the anticipated flow rates are 750 G.P.M or greater shall require an employee on-site at all times (full-time on-site monitoring attended by personnel experienced with the pumps and controls, with demonstrated ability to monitor, turn on & off, and switch between pumps while the by-pass pump system is in service.

B. By-pass operations where the anticipated flow rates are less than 750 G.P.M may not require an employee on-site at all times while the by-pass pump system is in operation. The Contractor shall have personnel experienced with the pumps and controls on site within the calculated response time to prevent an SSO after a high water alarm.

C. During by-pass operations, the Contractor shall have posted on site with the permit, a copy of the approved Plan and the name and 24 hour contact number of the primary response person, the job site superintendent, and the construction company owner.

3.03 OPERATIONS

A. The Contractor is responsible for securing and providing power, fuel, site security, traffic control and all other supplies, materials and permits required for the by-pass pumping.

B. Contractor shall demonstrate automatic pump switching and alarm system to the satisfaction of: the County inspector, Project Manager, or Lift Stations Superintendent prior to beginning by-pass pumping. Satisfactory demonstration shall be documented by the inspector's, PM's or Lift Station Superintendent's dated signature on the posted copy of the approved Pumping Plan.

3.04 DAMAGE RESTORATION & REMEDIATION

A. The Contractor shall be responsible for any pre-pump notifications, all restoration of pre-pump conditions and any damage caused by by-pass operations.

B. Should there be an SSO caused by or as a direct result of the by-pass pumping, the contractor is responsible for all immediate & long term response, notifications, clean up, mitigation, etc. Copies of all written response plans, notifications, documentation, mitigation plans, etc., shall be submitted to the County Project Manager.

END OF SECTION

DIVISION 3 CONCRETE

SECTION 03002 CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cast-in-place concrete and grout.

B. Related Specification Sections include but are not necessarily limited to:

1. Division 00 - Contracting Requirements.
2. Division 01 - General Requirements.

1.02 QUALITY ASSURANCE

A. Referenced Standards:

1. American Concrete Institute (ACI):
   a. 117, Specification for Tolerances for Concrete Construction and Materials.
   b. 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
   c. 212.3R, Chemical Admixtures for Concrete.
   d. 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
   e. 304.2R, Placing Concrete by Pumping Methods.
   f. 305.1, Hot Weather Concreting.
   g 306.1, Cold Weather Concreting.
   h. 315, Details and Detailing of Concrete Reinforcement
   i. 318, Building Code Requirements for Structural Concrete.
   j. 350, Code Requirements for Environmental Engineering Concrete Structures
   k. 347, Guide to Formwork for Concrete.
   l. CT-13, Concrete Terminology.
2. ASTM International (ASTM):
   a. A82, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
   b. A185, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
   c. A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
   d. A1064, Standard Specification for Steel Wire and Welded Wire Replacement, Plain and Deformed, for Concrete.

e. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.

f. C33, Standard Specification for Concrete Aggregates.

g. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

h. C94/C94M, Standard Specification for Ready-Mixed Concrete.

i. C138, Standard Method of Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.

j. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.

k. C150, Standard Specification for Portland Cement.

l. C172, Standard Practice for Sampling Freshly Mixed Concrete.

m. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

n. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

o. C260, Standard Specification for Air-Entraining Admixtures for Concrete.

p. C289, Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).

q. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

r. C494, Standard Specification for Chemical Admixtures for Concrete.

s. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

t. C1315, Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

u. D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

v. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

w. D1056, Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.

x. D1709, Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.

y. D1751, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

z. E96, Standard Test Methods for Water Vapor Transmission of Materials.

aa. E329, Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

3. Corps of Engineers (COE):

a. CRD-C621, Standard Specification for Packaged, Dry, Hydraulic-Cement Grout (Nonshrink).

4. Concrete Reinforcing Steel Institute (CRSI):

a. CRSI Placing Reinforcing Bars.

5. National Ready Mixed Concrete Association (NRMCA).

6. Florida State Highway Department.

B. Quality Control:

1. Concrete testing agency:

a. Inspection and testing will be performed by the testing laboratory currently under contract to Manatee County, Florida in accordance with Contract Documents.

2. Do not begin concrete production until proposed concrete mix design has been approved by Engineer.

a. Approval of concrete mix design by Engineer does not relieve Contractor of his responsibility to provide concrete that meets the requirements of this Specification.

3. Adjust concrete mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.

a. Do not use revised concrete mixes until submitted to and approved by Engineer.

4. Perform structural calculations as required to prove that all portions of the structure in combination with remaining forming and shoring system has sufficient strength to safely support its own weight plus the loads placed thereon.

C. Qualifications:

1. Ready mixed concrete batch plant certified by NRMCA.

2. Formwork, shoring and reshoring for slabs and beams except where cast on ground to be designed by a professional engineer currently registered in the state where the Project is located.

3. Reinforcing:

a. Manufacture shall be regularly engaged in the fabrication of reinforcing steel and welded wire reinforcing.

b. Installer shall have a minimum of three years of experience in the installation of reinforcing steel and welded wire reinforcing.

1.03 DEFINITIONS

A. Per ACI CT-13 except as modified herein:

1. Concrete fill: Non-structural concrete.

2. Concrete Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.

3. Exposed concrete: Exposed to view after construction is complete.
4. Indicated: Indicated by Contract Documents.
5. Nonexposed concrete: Not exposed to view after construction is complete.
6. Required: Required by Contract Documents.
7. Specified strength: Specified compressive strength at 28 days.
8. Submitted: Submitted to Engineer.
9. County: Manatee County, Florida

1.04 SUBMITTALS

A. Shop Drawings:

1. See D1340 for requirements for the mechanics and administration of the submittal process.
2. Concrete mix designs proposed for use.
    a. Concrete mix design submittal to include the following information:
        1) Sieve analysis and source of fine and coarse aggregates.
        2) Test for aggregate organic impurities.
        3) Test for deleterious aggregate per ASTM C289.
        4) Proportioning of all materials.
        5) Type of cement with mill certificate for cement.
        6) Type of fly ash with certificate of conformance to specification requirements.
        7) Slump.
        8) Air content.
        9) Brand, type, ASTM designation, and quantity of each admixture proposed for use.
        10) 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.
3. Product technical data including:
    a. Acknowledgement that products submitted meet requirements of standards referenced.
    b. Manufacturer's installation instructions.
    c. Manufacturers and types:
        1) Joint fillers.
        2) Curing agents.
        3) Chemical sealer.
        4) Bonding and patching mortar.
        5) Construction joint bonding adhesive.

6) Nonshrink grout with cure/seal compound.

4. Reinforcing steel:
   a. Show grade, sizes, number, configuration, spacing, location and all fabrication and placement details.
   b. In sufficient detail to permit installation of reinforcing without having to make reference to Contract Drawings.
   c. Obtain approval of Shop Drawings by Engineer before fabrication.
   d. Mill certificates.
5. Scaled (minimum 1/8 IN per foot) drawings showing proposed locations of construction joints, control joints, expansion joints (as applicable) and joint dimensions.
6. Strength test results of in place concrete including slump, air content and concrete temperature.
7. Certifications:
   a. Certification of standard deviation value in psi for ready mix plant supplying the concrete.
   b. Certification that the material and sources submitted in the mix design will be used in the concrete for this project.
8. Test reports:
   a. Cement mill reports for all cement to be supplied.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Storage of Material:
1. Cement and pozzolan:
   a. Store in moistureproof, weathertight enclosures.
   b. Do not use if caked or lumpy.
2. Aggregate:
   a. Store to prevent segregation and contamination with other sizes or foreign materials.
   b. Obtain samples for testing from aggregates at point of batching.
   c. Do not use frozen or partially frozen aggregates.
   d. Do not use bottom 6 IN of stockpiles in contact with ground.
   e. Allow sand to drain until moisture content is uniform prior to use.
3. Admixtures:
   a. Protect from contamination, evaporation, freezing, or damage.
   b. Maintain within temperature range recommended by manufacturer.
   c. Completely mix solutions and suspensions prior to use.
4. Reinforcing steel: Support and store all rebars above ground.

B. Delivery:

1. Concrete:

a. Prepare a delivery ticket for each load for ready-mixed concrete.

b. Truck operator shall hand ticket to Owner's Representative at the time of delivery.

c. Ticket to show:

1) Mix identification mark.

2) Quantity delivered.

3) Amount of each material in batch.

4) Outdoor temp in the shade.

5) Time at which cement was added.

6) Numerical sequence of the delivery.

7) Amount of water added.

2. Reinforcing steel:

a. Ship to jobsite with attached plastic or metal tags with permanent mark numbers.

b. Mark numbers to match Shop Drawing mark number.

c. Handle and store materials to prevent contamination.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following products and manufacturers are acceptable:

1. Nonshrink, nonmetallic grout:

a. Sika "SikaGrout 212."

b. Euclid Chemial "NS Grout."

c. BASF Admixtures, Inc. "Masterflow 713."

2. Expansion joint fillers:

a. Permaglaze Co.

b. Rubatex Corp.

c. Williams Products, Inc.

3. Form coating:

a. Richmond "Rich Cote."

b. Industrial Lubricants "Nox-Crete Form Coating."

c. Euclid Chemical "Kurez DR VOX."

4. Bonding agent:

a. Euclid Chemical Co.

b. BASF Admixtures, Inc.

c. L&M Construction Chemicals Inc.

B. Contractor may submit a request for substitution if product or manufacturer not specifically named in a timely manner so as not to adversely affect the construction schedule.

2.02 MATERIALS

A. Portland Cement:

1. Conform to ASTM C150 Type II.

B. Admixtures:

1. Air entraining admixtures: ASTM C260.

2. Water reducing, retarding, and accelerating admixtures:

a. ASTM C494 Type A.

b. Conform to provisions of ACI 212.3R.

c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Engineer and at no cost to Owner.

d. Follow manufacturer's instructions.

e. Use chloride free admixtures only.

3. Maximum total water soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:

a. 0.10 all concrete.

4. Do not use calcium chloride.

5. Pozzolanic admixtures: ASTM C618.

6. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.

C. Water: Potable, clean, free of oils, acids and organic matter.

D. Aggregates:

1. Normal weight concrete: ASTM C33, except as modified below.

2. Fine aggregate:

a. Clean natural sand.

b. No manufactured or artificial sand.

3. Coarse aggregate:

a. Crushed rock, natural gravel, or other inert granular material.

b. Maximum amount of clay or shale particles: 1 percent.

4. Gradation of coarse aggregate:

a. All concrete: Size #57 or #67.

E. Concrete Grout:

1. Nonshrink, nonmetallic grout:

a. Nonmetallic, noncorrosive, nonstaining, premixed with only water to be added.

b. Grout to produce a positive but controlled expansion.

c. Mass expansion not to be created by gas liberation.

d. Minimum compressive strength of nonshrink grout at 28 days: 6500 psi.

e. In accordance with COE CRD-C621.

2. Epoxy grout:

a. 3-component epoxy resin system.

1) Two liquid epoxy components.

2) One inert aggregate filler component.

b. Each component packaged separately for mixing at jobsite.

F. Reinforcing Steel:

1. Reinforcing bars: ASTM A615, Grade 60.

2. Welded wire reinforcement:

a. ASTM A185 or ASTM A1064.

b. Minimum yield strength: 60,000 psi.

G. Forms:

1. Prefabricated or job built.

2. Wood forms:

a. 5/8 or 3/4 IN 5-ply structural plywood of concrete form grade.

b. Built-in-place or prefabricated type panel.

3. Metal forms:

a. Metal forms may be used except for aluminum in contact with concrete..

b. Forms to be tight to prevent leakage, free of rust and straight without dents to provide members of uniform thickness.

4. Chamfer strips: Clear white pine, surface against concrete planed.

H. Form Ties:

1. Commercially fabricated for use in form construction.

a. Field fabricated ties are unacceptable.

2. Constructed so that ends or end fasteners can be removed without causing spalling at surfaces of the concrete.

3. 3/4 IN minimum diameter cones on both ends.

4. Embedded portion of ties to be not less than 1 IN from face of concrete after ends have been removed.

5. Cone size:
    a. 1/2 IN maximum diameter cones and 1 IN long.
    b. Depth of cone not to exceed the concrete reinforcing cover.
6. Form release: Nonstaining and shall not prevent bonding of future finishes to concrete surface.

I. Chairs, Runners, Bolsters, Spacers, and Hangers:
1. Stainless steel, epoxy coated, or plastic coated metal.
    a. Plastic coated: Rebar support tips in contact with the forms only.

J. Tie Wire
1. Minimum 16-gauge annealed type, or patented system accepted by County.

K. Membrane Curing Compound:
1. ASTM C309, Type II-B.
2. Resin based, dissipates upon exposure to UV light.
3. Curing compound shall not prevent bonding of any future coverings, coatings or finishes.

L. Expansion Joint Filler:
1. Exterior driveways, curbs and sidewalks:
    a. Asphalt expansion joint filler.
    b. ASTM D994.
2. Other use:
    a. Fiber expansion joint filler.
    b. ASTM D1751.

2.03 CONCRETE MIXES

A. General:
1. All concrete to be ready mixed concrete conforming to ASTM C94/C94M.
2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
3. All concrete to be normal weight concrete.

B. Strength:
1. Provide specified strength and type of concrete for each use in structure(s) as follows:

TYPE	WEIGHT	SPECIFIED STRENGTH (*)
All general use concrete	Normal weight	4000 psi

(*) Minimum 28-day compressive strength.

C. Air Entrainment:

1. Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:

MAX AGGREGATE SIZE	TOTAL AIR CONTENT PERCENT
1 IN or 3/4 IN	6 ±1-1/2
<3/4 IN	6-1/2 ±1-1/2

2. Air content to be measured in accordance with ASTM C231, ASTM C173, or ASTM C138.

D. Slump - 4 IN maximum, 1 IN minimum:

1. Measured at point of discharge of the concrete into the concrete construction member.
2. 8 IN maximum after addition of superplasticizer (if used).
3. Concrete of lower than minimum slump may be used provided it can be properly placed and consolidated.
4. Pumped concrete:
   a. Provide additional water at batch plant to allow for slump loss due to pumping.
   b. Provide only enough additional water so that slump of concrete at discharge end of pump hose does not exceed maximum slump specified above.
5. Determine slump per ASTM C143.

E. Selection of Proportions:

1. General:
   a. Proportion ingredients to:
      1) Produce proper workability, durability, strength, and other required properties.
      2) Prevent segregation and collection of excessive free water on surface.
2. Minimum cement contents and maximum water cement ratios for concrete to be as follows:

SPECIFIED STRENGTH	TARGET CEMENT, MAXIMUM AGGREGATE SIZE			MAXIMUM WATER CEMENT RATIO BY WEIGHT
	1/2 IN	3/4 IN	1 IN	
4000	564	564	564	0.45

3. Concrete mix proportioning methods for normal weight concrete:
   a. Proportion mixture to provide desired characteristics using one of methods described below:
      1) Method 1 (Trial Mix):
         a) Per ACI 318, Chapter 5, except as modified herein.

b) Air content within range specified above.

c) Record and report temperature of trial mixes.

d) Proportion trial mixes per ACI 211.1.

2) Method 2 (Field Experience):

a) Per ACI 318, Chapter 5, except as modified herein:

b) Field test records must be acceptable to Engineer to use this method.

c) Test records shall represent materials, proportions and conditions similar to those specified.

4. Sand cement grout:

a. Three parts sand.

b. One part Portland cement

c. Entrained air: 6 percent +/- 1 percent

d. Sufficient water for required workability

e. Minimum 28-day compressive strength: 3000 psi.

5. Required average strength to exceed the specified 28-day compressive strength by the amount determined or calculated in accordance with the requirements of Chapter 5 of ACI 318 using the standard deviation of the proposed concrete production facility.

PART 3 EXECUTION

3.01 FORMING AND PLACING CONCRETE

A. Formwork:

1. Contractor is responsible for design and erection of formwork.

2. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.

a. Allowable tolerances: As recommended in ACI 347.

3. Provide slabs of minimum indicated depth when sloping foundation base slabs.

a. For slabs on grade, slope top of subgrade to provide floor slabs of minimum uniform indicated depth.

4. Openings:

a. Provide openings in formwork to accommodate work of other trades.

b. Accurately place and securely support items built into forms.

5. Chamfer strips: Place 3/4 IN chamfer strips in forms to produce 3/4 IN wide beveled edges on permanently exposed corners of members.

6. Clean and adjust forms prior to concrete placement.

7. Tighten forms to prevent mortar leakage.

8. Coat form surfaces with form release agents prior to placing reinforcing bars in forms.

B. Reinforcement:

1. Position, support and secure reinforcement against displacement.
2. Locate and support with chairs, runners, bolsters, spacers and hangers, as required.
3. Set wire ties so ends do not touch forms and are directed into concrete, not toward exposed concrete surfaces.
4. Lap splice lengths: ACI 318 Class B top bar tension splices unless indicated otherwise on the Drawings.
5. Extend reinforcement to within 2 IN of concrete perimeter edges.
    a. If perimeter edge is earth formed, extend reinforcement to within 3 IN of the edge.
6. Minimum concrete protective covering for reinforcement: As shown on Drawings.
7. Do not weld reinforcing bars.
8. Welded wire reinforcement:
    a. Install welded wire reinforcement in maximum practical sizes.
    b. Splice sides and ends with a splice lap length measured between outermost cross wires of each fabric sheet not less than:
        1) One spacing of cross wires plus 2 IN.
        2) 1.5 x development length.
        3) 6 IN.
    c. Development length: ACI 318 basic development length for the specified fabric yield strength.
9. Reinforcing shall be clear, free of loose scale, dirt, or other foreign coating or containment before concrete placement.

C. Embedments:

1. Set and build in anchorage devices and other embedded items required for other work that is attached to, or supported by concrete.
2. Use setting diagrams, templates and instructions for locating and setting.

D. Placing Concrete:

1. Place concrete in compliance with ACI 304R and ACI 304.2R.
2. Notify County and testing agency a minimum of 24 hours prior to commencement of concreating operation.
3. Place in a continuous operation within planned joints or sections.
4. Begin placement when work of other trades affecting concrete is completed.
5. Place concrete by methods which prevent aggregate segregation.
6. Do not allow concrete to free fall more than 4 FT.

7. Where free fall of concrete will exceed 4 FT, place concrete by means of tremie pipe or chute.

8. Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature, and tests taken.

E. Consolidation: Consolidate all concrete using mechanical vibrators supplemented with hand rodding and tamping, so that concrete is worked around reinforcement and embedded items into all parts of forms.

F. Protection:

1. Protect concrete from physical damage or reduced strength due to weather extremes.

2. In cold weather comply with ACI 306.1 except as modified herein.

a. Do not place concrete on frozen ground or in contact with forms or reinforcing bars coated with frost, ice or snow.

b. Do not place heated concrete that is warmer than 80 DegF.

c. If freezing temperatures are expected during curing, maintain the concrete temperature at or above 50 DegF for 7 days or 70 DegF for 3 days.

d. Do not allow concrete to cool suddenly.

3. In hot weather comply with ACI 305.1 except as modified herein.

a. At air temperature of 90 DegF and above, keep concrete as cool as possible during placement and curing.

b. Do not allow concrete temperature to exceed 90 DegF at placement.

c. Prevent plastic shrinkage cracking due to rapid evaporation of moisture.

d. Do not place concrete when the actual or anticipated evaporation rate equals or exceeds 0.2 LBS/SF/HR as determined from ACI 305.1, Figure 2.1.5.

G. Curing:

1. Begin curing concrete as soon as free water has disappeared from exposed surfaces.

2. Cure concrete by use of moisture retaining cover, burlap kept continuously wet or by membrane curing compound.

3. Provide protection as required to prevent damage to concrete and to prevent moisture loss from concrete during curing period.

4. Provide curing for minimum of 7 days.

5. Form materials left in place may be considered as curing materials for surfaces in contact with the form materials except in periods of hot weather.

6. In hot weather follow curing procedures outlined in ACI 305.1.

7. In cold weather follow curing procedures outlined in ACI 306.1.

8. Curing vertical surfaces with a curing compound:

a. Cover vertical surfaces with a minimum of two coats of the curing compound.

b. Allow the preceding coat to completely dry prior to applying the next coat.

c. Apply the first coat of curing compound immediately after form removal.

d. Vertical surface at the time of receiving the first coat shall be damp with no free water on the surface.

e. A vertical surface is defined as any surface steeper than 1 vertical to 4 horizontal.

H. Form Removal:

1. Remove forms after concrete has hardened sufficiently to resist damage from removal operations or lack of support.

2. Allow County to inspect concrete surfaces immediately upon form removal.

3.02 CONCRETE FINISHES

A. Tolerances:

1. Class A: 1/8 IN in 10 FT.

2. Class B: 1/4 IN in 10 FT.

B. Surfaces Exposed to View:

1. Provide a smooth finish for exposed concrete surfaces and surfaces that are:

a. To be covered with a coating or covering material applied directly to concrete.

b. Scheduled for grout cleaned finish.

2. Remove fins and projections, and patch voids, air pockets, and honeycomb areas with cement grout.

a. All patching and repair procedures shall be submitted to and approved by County prior to use.

C. Surfaces Not Exposed to View:

1. Patch voids, air pockets and honeycomb areas with cement grout.

a. See Section 3.2 B 2 a

2. Fill tie holes with nonshrink, nonmetallic grout.

D. Slab Float Finish:

1. After concrete has been placed, consolidated, struck off, and leveled, do no further work until ready for floating.

2. Do not use water to aid in finishing.

3. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit operation.

4. During or after first floating, check planeness of entire surface with a 10 FT straightedge applied at not less than two different angles.

5. Cut down all high spots and fill all low spots during this procedure to produce a surface within Class B tolerance throughout.

6. Refloat slab immediately to a uniform sandy texture.

E. Troweled Finish:

1. Float finish surface.

2. Next power trowel, and finally hand trowel.

3. Do not use water to aid in finishing.

4. Produce a smooth surface which is relatively free of defects with first hand troweling.

5. Perform additional trowelings by hand after surface has hardened sufficiently.

6. Final trowel when a ringing sound is produced as trowel is moved over surface.

7. Thoroughly consolidate surface by hand troweling.

8. Leave finished surface essentially free of trowel marks, uniform in texture and appearance and plane to a Class A tolerance.

9. On surfaces intended to support floor coverings remove any defects of sufficient magnitude that would show through floor covering by grinding.

F Broom Finish: Immediately after concrete has received a float finish as specified, give it a transverse scored texture by drawing a broom across surface.

G. Approval of Finishes

1. All concrete surfaces will be inspected during the finishing process by the County.

2. Surfaces which, in the opinion of the County, are unsatisfactory shall be refinished or reworked until approved by the County.

H. Defective Concrete

1. Modify or replace concrete not conforming to required lines, details and elevations as determined by County.

2. Repair or replace concrete not properly placed resulting in excessive honeycomb and other defects. Do not patch, fill, touch-up, repair, or replace exposed architectural concrete except upon express direction of County for each individual area.

3.03 GROUT

A. Preparation:

1. Nonshrinking, nonmetallic grout:

a. Clean concrete surface to receive grout.

b. Saturate concrete with water for 24 HRS prior to grouting.

B. Application:

1. Nonshrinking, nonmetallic grout:

a. Mix in a mechanical mixer.

b. Use no more water than necessary to produce flowable grout.

c. Place in accordance with manufacturer's instructions.

d. Completely fill all spaces and cavities below the bottom of baseplates.

e. Provide forms where baseplates and bedplates do not confine grout.

f. Where exposed to view, finish grout edges smooth.

g. Except where a slope is indicated on Drawings, finish edges flush at the baseplate, bedplate, member, or piece of equipment.

h. Protect against rapid moisture loss by covering with wet rags or polyethylene sheets.

i. Wet cure grout for seven (7) days, minimum.

3.04 FIELD QUALITY CONTROL

A. Owner will employ and pay for services of a concrete testing laboratory to perform testing of concrete placed during construction.

1. Contractor to cooperate with Owner in obtaining and testing samples.

2. Contractor to provide free access to work and cooperate with appointed firm.

B. Tests During Construction:

1. Strength test:

a. For each strength test, mold and cure cylinders from each sample in accordance with ASTM C31.

1) Cylinder size: Per ASTM C31.

a) 4 IN cylinders may not be used for concrete mixes with concrete aggregate size larger than 1 IN.

2) Quantity:

a) 6 IN DIA by 12 IN high: Four (4) cylinders.

b) 4 IN DIA by 8 IN high: Six (6) cylinders.

b. Field cure one (1) cylinder for the seven (7) day test.

1) Smaller pours shall have test cylinders taken as directed by County representative.

2) Laboratory cure the remaining.

c. Test cylinders in accordance with ASTM C39.

1) 6 IN DIA cylinders:

a) Test two (2) cylinders at 28 days for strength test result and the one (1) field cured sample at seven (7) days for information.

b) Hold remaining cylinder in reserve.

2) 4 IN DIA cylinders:

a) Test three (3) cylinders at 28 days for strength test result and the one (1) field cured cylinder at seven (7) days for information.

b) Hold remaining cylinders in reserve.

d. Strength test result:

1) Average of strengths of two (2) 6 IN DIA cylinders or three (3) 4 IN DIA cylinders from the same sample tested at 28 days.

2) If one (1) cylinder in a test manifests evidence of improper sampling, molding, handling, curing, or testing, discard and test reserve cylinder(s); average strength of remaining cylinders shall be considered strength test result.

3) Should all cylinders in any test show any of above defects, discard entire test.

e. Frequency of tests:

1) All concrete:

a) One (1) strength test to be taken not less than once a day, nor less than once for each 60 CU YD or fraction thereof placed in any one (1) day.

b) Once for each 5000 SQ FT of slab or wall surface area placed each day

c) If total volume of concrete on Project is such that frequency of testing required in above paragraph will provide less than five (5) strength tests for each concrete mix, tests shall then be made from at least five (5) randomly selected batches or from each batch if fewer than five (5) batches are provided.

2. Slump test:

a. Per ASTM C143.

b. Determined for each strength test sample.

c. Additional slump tests may be taken.

3. Air content:

a. Per ASTM C231, ASTM C173, and ASTM C138.

b. Determined for each strength test sample.

4. Temperature: Determined for each strength test sample.

C. Evaluation of Tests:

1. Strength test results:

a. Average of 28-day strength of two cylinders from each sample.

1) If one cylinder manifests evidence of improper sampling, molding, handling, curing or testing, strength of remaining cylinder will be test result.

2) If both cylinders show any of above defects, test will be discarded.

D. Acceptance of Concrete:

1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:

a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.

b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 psi.

2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Engineer.

a. Perform additional tests and/or corrective measures at no additional cost to Owner.

E. Concrete tolerances per ACI 117.

3.05 SCHEDULES

A. Form Types:

1. Surfaces exposed to view:

a. Prefabricated or job-built wood forms.

b. Laid out in a regular and uniform pattern with long dimensions vertical and joints aligned.

c. Produce finished surfaces free from offsets, ridges, waves, and concave or convex areas.

d. Construct forms sufficiently tight to prevent leakage of mortar.

2. Surfaces normally submerged or not normally exposed to view: Wood or steel forms sufficiently tight to prevent leakage of mortar.

3. Other types of forms may be used:

a. For surfaces not restricted to plywood or lined forms.

b. As backing for form lining.

B. Grout:

1. Nonshrinking, nonmetallic grout: General use.

2. Sand cement grout: Keyways of precast members.

C. Concrete:

1. Normal weight concrete: All concrete.

2. General use concrete: All other locations.

D. Concrete Finishes:

1. Slab finishes:

a. Use following finishes as applicable, unless otherwise indicated:

1) Floated finish: Surfaces intended to receive roofing, concrete topping, lean concrete, concrete fill and waterproofing.

2) Troweled finish: Interior floor slabs, exposed roof slabs and base slabs of structures, equipment bases, and column bases.

3) Broom finish: Sidewalks, docks, concrete stairs, and ramps.

END OF SECTION

SECTION 03410 PRECAST CONCRETE STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all materials, labor and equipment and construct valve vaults, meter vaults, concrete pipe and accessory items, consisting of precast sections as shown on the Drawings and as specified herein.

B. The forms, dimensions, concrete and construction methods shall be approved by the County in advance of construction.

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

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

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

F. All interior surfaces of valve vaults and meter vaults shall be painted with two coats of coal tar epoxy paint dry film thickness of 8 mils each coat, as approved by the County.

1.02 SUBMITTALS

A. Submit to the County in accordance with the Contract Documents, shop drawings showing details of construction, reinforcing, and joints.

B. Shop Drawings

1. Content
   a. Dimensions and finishes.
   b. Estimated camber.
   c. Reinforcing and connection details.
   d. Lifting and erection inserts.
   e. Other items cast into members.
2. Show location of unit by same identification mark placed on member.
3. Include design calculations.

C. Manufacturer's Literature: Manufacturer's recommended installation instructions.

D. Manufacturer's certificates of material conformance with Specifications.

E. Test Reports: Reports of tests on concrete. A minimum of three compression test cylinders will be required for each pour.

1.03 INSPECTION

A. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection and approval by the County, or other representatives of the County. Such inspection may be made at the place of manufacture, or at the site after delivery, or at both places and the sections shall be subject to rejection at any time due to failure to meet any of the Specification requirements; even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the project site shall be marked for identification and shall be removed from the project site at once. All sections which have been damaged after delivery will be rejected and if already installed, shall be acceptably repaired, if permitted, or removed and replaced entirely at the Contractor's expense.

B. At the time of inspection, the sections will be carefully examined for compliance with the applicable ASTM designation and these Specifications and with the approved manufacturer's drawings.

1. All sections shall be inspected for general appearance, dimension, "scratch-strength", blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.
2. All sections shall meet the manufacturing tolerance requirements of ASTM C-478 or the following casting tolerances, whichever are more severe:

Wall Thickness	± 3/8"
Inside Diameter	± 3/8"
Outside Diameter	± 1/2"
Height or Length	± 3/8"

C. Imperfections may be repaired, subject to the approval of the County, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi at the end of 7 days and 5,000 psi at the end of 28 days, when tested in 3-inch by 6-inch cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs subject to the approval of the County.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE SECTIONS

A. Joints between precast concrete sections shall be set by plastic shims and filled with non-metallic non-shrink grout as specified in the Contract Documents and shown on the Drawings.

B. The top slab sections shall be fitted with water tight hatches as specified in the Construction Drawings. The frames and covers will be sized for the openings shown on the Contract Drawings.

C. The various precast sections shall have the inside dimensions and minimum thickness of concrete as indicated on the Drawings. All precast and cast-in-place concrete members shall conform to the Building Code Requirements for Reinforced Concrete ACI 318 and applicable ASTM Standards.

D. Fillets shall be provided and installed in the wet wells as shown on the Drawings. They shall be constructed using concrete fill and shall conform to the Contract Documents.

E. Precast structures shall be constructed to the dimensions as shown on the Drawings and as specified in these Specifications. Flow channels, inverts, and benches in manholes shall be precast, not constructed after installation. Provide a true curve of the largest radius possible for changes in direction of sewer and entering branch or branches.

F. Type II cement shall be used, typically at a compressive strength of 4,000 psi, except as otherwise approved.

G. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section.

H. Sections shall be cured by an approved method and shall not be shipped until at least seven (7) days after having been fabricated.

I. Each precast section manufactured in accordance with the Drawings shall be clearly marked to indicate the intended installation location. The Contractor shall be responsible for the installation of the correct precast sections in their designated locations.

J. Wet wells receiving flow from lift stations shall be precast with a cast in place PVC protective liner
    1. The liners shall be integrally cast into the concrete tops, risers and base sections, which shall be in all other respects manufactured in accordance with ASTM C478 using Type II Portland Cement per ASTM C150. The plastic liner shall have no surface degradation when exposed to nitric acid, hydrochloric acid, ammonia, sodium hydroxide, sulfuric acid, acetone, unleaded gasoline and turpentine in accordance with test method ASTM D1308, and shall not be attacked when immersed in acetone according to test method ASTM D2152.
    2. The prefabricated wetwell or manhole liner shall be a non-load bearing component installed and adequately anchored inside a new precast concrete wetwell or manhole riser during the concrete casting process at the concrete precaster's manufacturing facility. The liner must be fully supported during the casting process.
    3. The liners shall be resistant to the chemical environment normally found in the gravity wastewater transmission systems to which they will be exposed.
    4. The liner shall have a warranty against defect in material and workmanship for a period of three years.
    5. After assembly and installation, in the field, all internal seams are to be sealed by bonding or welding per the manufacturer's standard method and details.
    6. Any repairs or other modifications to the liner, such as patching or sealing PVC sleeves used for pipe penetrations of the structure, shall sealed by bonding or welding per the PVC liner manufacturer’s standard methods and details.

K. Manholes shall be precast with cast in place FRP GU Liners, as manufactured by GU Florida or an approved equal. The base liner for manholes shall have preformed flow channels with water-tight gasketed pipe bell connections or boot holes that extend to the

outside profile of the precast concrete structure. FRP GU, HDPE AGRU, or PVC DURA-PLATE liners shall be installed with the remaining sections, including the cone section of the manhole.

1. The wall thickness for manholes and wetwells with liners, including the liner thickness, shall be 8 inches minimum or 1/12 of the inside diameter, whichever is greater. The minimum thickness of the bottom of the base section shall be 8 inches under the bottom of the flow channel.
2. Manhole cast iron frames shall be adjusted to grade with concrete grade rings same as for un-lined manholes. Lined manholes shall be equipped with a GU Liner Convertible Collar as manufactured by GU Florida or an approved equal. The collar shall form a water-tight seal to the manhole top with a GU Lip Seal rubber gasket, or approved equal. The collar shall be sealed water-tight against the base of the cast iron frame using a butyl rubber sealant.
3. The liners shall be integrally cast into the concrete risers and base sections, which shall be in all other respects manufactured in accordance with ASTM C478 using Type II Portland Cement per ASTM C150. The plastic liner shall have no surface degradation when exposed to nitric acid, hydrochloric acid, ammonia, sodium hydroxide, sulfuric acid, acetone, unleaded gasoline and turpentine in accordance with test method ASTM D1308, and shall not be attacked when immersed in acetone according to test method ASTM D2152.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall be responsible for handling ground water to provide firm, dry subgrade for the structure, shall prevent water rising on new poured-in-place concrete or grouted joint sections within 24 hours after placing and shall guard against flotation or other damage resulting from ground water or flooding.

B. A minimum of an 8-inch shell base compacted layer of washed shell or crushed stone shall be placed as a foundation for the wet well base slabs and valve and/or meter vault pits.

C. Backfill materials around the wet well and above the pipe bedding shall be select material as specified in the Contract Documents.

D. Precast bases, conforming to all requirements of ASTM C478 and above listed requirements for precast sections, may be used.

E. The structure shall not be set into the excavation until the installation procedure and excavation have been approved by the County.

F. The base may be cast-in-place concrete placed on a thoroughly compacted crushed rock subbase. The tops of the cast-in-place bases shall be shaped to mate with the precast barrel section and shall be adjusted in grade so that the top slab section is at the approximately correct elevation.

G. Precast concrete structure sections shall be set so as to be vertical and with sections in true alignment with a 1/4-inch maximum tolerance to be allowed. The outside and inside joint shall be filled with a non-shrink grout and finished flush with the adjoining surfaces. Allow joints to set for 24 hours before backfilling. Backfilling shall be done in

a careful manner, bringing the fill up evenly on all sides. The Contractor shall install the precast sections in a manner that will result in a watertight joint. Leaking joints are not acceptable.

H. Holes in the concrete sections required for handling or other purposes shall be plugged with a non-shrink grout or by grout in combination with concrete plugs.

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

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

ASTM A48-74, or most recent revision, Specification for Gray Iron Castings, Class 30 or Grade 60-45-10 Ductile Iron meeting the requirements of ASTM A536-72, or most recent revision, Specification for Ductile Iron Castings. Cast in a true symmetrical pattern of tough, dense and even grained iron, free from warping, scales, lumps, blisters, sandholes, or any defects of any kind. Provide indented pattern lids with lettering as shown on the Drawings. Machine or grind frames and lids at touching surfaces to provide firm seats and prevent rocking. Remove and replace any set not matching perfectly. All frames and covers shall be designed to withstand an HS20-44 wheel loading as defined by AASHTO specifications.

K. Manhole inserts: Watertight manhole inserts shall be 316 stainless steel and are required for all sanitary sewer manholes installed. Inserts shall be as manufactured by FRW Industries, Conroe, Texas, or approved equal. Neoprene gaskets shall be installed under the insert lip to insure a leakproof seal.

L. Penetrations and connections into precast or existing structures shall be accomplished by rotary core boring.

M. Cast in place liners shall be repaired, fitted around penetrations, sealed at joints, etc. in accordance with the manufacturer’s recommendations for that liner. As a general rule, repairs, sleeves and patches shall be welded in place, glues and sealants shall nt be used unless approved by the manufacturer.

3.04 TESTING

A. After constructed to its finished height and before being backfilled, each manhole shall be tested for water tightness.

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

Time of Test in Seconds			
Depth Feet	Manhole Diameter in Feet		
	4	5	6
4 8 12 16 20 24	10 20 30 40 50 60	13 26 39 52 65 78	16 32 48 64 80 96
T	5	6.5	8

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

B. Failure to pass this test requires the Contractor to correct the problems and retest. The Contractor will replace leaking gaskets and/or concrete sections and retest the completed manhole. No manhole will be accepted without successfully passing this test.

END OF SECTION

DIVISION 5 METALS

SECTION 05500 MISCELLANEOUS METAL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, equipment and incidentals required and install covers, grates, frames and other miscellaneous metals as shown on the Drawings and specified herein. The miscellaneous metal items include but are not limited to the following:

1. All metal frames, ladders, stairs, stair rails, floor opening frames including gratings and supports.
2. Prefabricated access hatches and frames.
3. Anchors and anchor bolts except those specified to be furnished with all equipment.
4. Railings, posts and supports both interior and exterior.
5. Cast iron frames, covers, grates, drain leaders and drains.
6. Bridge crane track supports.
7. Stair nosings, steel plates, overhead steel door frames, angle frames, plates and channels.
8. Exterior H.V.A.C. hoods.
9. Pump guide rail system.

1.02 COORDINATION

A. The work in this Section shall be completely coordinated with the work of other Sections. Verify at the site both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.

B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.

1.03 SHOP DRAWINGS AND SAMPLES

A. Detail drawings, as provided for in the Contract Documents, showing sizes of members, method of assembly, anchorage, and connection to other members shall be submitted to the County for approval before fabrication.

B. Samples shall be submitted at the request of the County for concurrent review with Shop Drawings.

1.04 FIELD MEASUREMENTS

A. Field measurements shall be taken at the site to verify or supplement indicated dimensions and to insure proper fitting of all items.

1.05 REFERENCED SPECIFICATIONS

A. Unless otherwise specified, materials shall conform to the following:

Structural Steel	ASTM A36
Welded & Seamless Steel Pipe	ASTM A53
Gray Iron Castings	ASTM A48, Class 30
Galvanizing, general	ASTM A123
Galvanizing, hardware	ASTM A153
Galvanizing, assemblies	ASTM A386
Aluminum (Extruded Shapes)	6061-T6 (Alum. alloy)
Aluminum (Extruded Pipe)	6061-T6 (Alum. alloy)
Aluminum Bar Structural	6061-T6 (Alum. alloy)
Bolts and Nuts	ASTM, A307
Stainless Steel Bolts, Fasteners	AISI, Type 316
Stainless Steel Plate and Sheet, Wire	AISI, Type 316
Welding Rods for Steel	AWS Spec. for Arc Welding

PART 2 PRODUCTS

2.01 ANCHORS, BOLTS AND FASTENING DEVICES

A. Anchors, bolts, etc., shall be furnished as necessary for installation of the work of this Section.

B. Compound masonry anchors shall be of the type shown or required and shall be equal to Star Slug in compounded masonry anchors manufactured by Star Expansion Industries, equal by Phillips Drill Co., Rawlplug, or equal. Anchors shall be minimum "two unit" type.

C. The bolts used to attach the various members to the anchors shall be the sizes shown or required. Stainless steel shall be attached to concrete or masonry by means of stainless steel machine bolts and iron or steel shall be attached with steel machine bolts unless otherwise specifically noted.

D. For structural purposes, unless otherwise noted, expansion bolts shall be Wej-it "Ankr-Tite", Phillips Drill Co. "Wedge Anchors", or Hilti "Kwik-Bolt". When length of bolt is not called for on the Drawings, the length of bolt provided shall be sufficient to place the wedge portion of the bolt a minimum of 1-inch behind the reinforcing steel within the concrete. Material shall be as noted on the Drawings. If not listed, all materials shall be stainless steel.

2.02 ALUMINUM ITEMS

A. Aluminum gratings shall be of serrated I-Bar Aluminum Alloy 6061-T6, fabricated to the depths and thicknesses shown on the Drawings and shall be Reliance Steel Products Company, I-Lok Type 7/8 R4 Aluminum Grating; IKG Industries, "Galok" Aluminum I-Bar Grating Type S194-I, or equal. All openings 2 inches and greater in diameter shall be banded with a bar of the same depth and thickness as the main bearing bars of the grating, or furnished with continuous cross bridges. Each cut bar shall be welded to the band if banding is utilized. The ends of all grating sections shall be likewise banded. Clamps and bolts used for attaching grating to supporting members shall be stainless

steel. All grating shall be clamped unless noted otherwise. Clamps shall be as recommended by the manufacturer.

B. Stair treads shall be as specified above for grating and shall have abrasive nonslip nosing.

C. Aluminum nosing at concrete stairs shall be an extrusion of 4-inch minimum width with abrasive filled and shall be Wooster Products, Inc., Alumogrit Treads, Type 116; equal by Barry Pattern and Foundry Co.; Andco; or equal. Embedded anchors shall be furnished with a minimum of three anchors per tread.

D. Aluminum ladders shall be fabricated to the dimensions and details and installed as shown on the Drawings. Treads to be of cast aluminum by Dixie Metals, Inc. of Fort Lauderdale, Florida or equal.

E. Aluminum Handrails, Mechanically Fastened Type:

1. All aluminum mechanically fastened type pipe handrails and guardrails shall be clear anodized aluminum finish and installed as specified herein and indicated on the Drawings. Handrails shall be made of nominal 1-1/2 inches inside diameter pipe (Schedule 40) fabricated or seamless 6063-T6 alloy. The supplier of the handrail system shall supply all necessary fittings, rackets, transition, corner and connector pieces, toeboards, protective gaskets, etc., for a complete job at the locations, indicated on the Drawings. All mounting hardware including bolts, studs, nuts, etc., shall be stainless steel Type 316. Bends shall be smooth and accurate to the details shown. Railings shall be the "Rigid Rail System" as manufactured by Reynolds Aluminum of Reynolds Metal Company as Reynolds II pipe railing system or the "Connectorail System" as manufactured by Julius Blum & Co., Inc., Carlstadt, New Jersey. The handrail systems shall comply with all OSHA and D Section 1208.2 of the Standard Building Code.
2. Spacing of posts where posts are required shall be as noted on shop drawings, but in all cases, shall be uniform and shall not exceed the requirements of OSHA and Section 1208.2 of the Standard Building Code. Shorter spacing may be used where required to maintain the maximum spacing. The fabricator of the aluminum handrail and guardrail system shall be responsible for the design and preparation of shop drawings and design calculations (signed and sealed by Florida Registered Engineer) to meet OSHA requirements and Section 1208.2 of Standard Building Code.
3. All railings shall be erected in line and plumb. Field splicing and expansion compensation shall be accomplished using internal splice sleeves. Make provisions for removable railing sections as detailed and where shown on the Drawings.
4. Where handrail or guardrail posts are set in concrete as per the manufacturer's requirements the posts shall be set into aluminum sheeves cast in the concrete and firmly cemented with 1651 epoxy resin by E-Bond Epoxies, Oakland Park, Florida, Moulded Reinforced Plastics, Inc., Fort Lauderdale, Florida or equal. Collars shall be placed on the posts and fastened in place, as shown and as detailed on approved shop drawings.
5. Where handrail is supported from structural members, it shall be done by the use of approved sockets, flanges, brackets, or other approved means which will provide neat and substantial support for the pipe railing.

6. All railing shall be properly protected by paper, or by an approved coating or by both against scratching, splashes or mortar, paint, or other defacements during transportation and erection and until adjacent work by other trades has been completed.

F. Toeboards: Contractor shall furnish and install aluminum toeboards conforming to latest OSHA requirements on all railings and other locations where indicated on the Drawings.

1. Toeboards shall consist of an extruded 6063-T6 aluminum shape bolted by means of a pipe clamp to the railing posts without requiring any drilling or welding of the toeboard to the railing posts as manufactured by Reynolds Aluminum, Julies Blum & Company, Thompson Fabricating Company or equal. Toeboards shall have pitched top and tear drop bottom to prevent accumulation of dirt, or other material.
2. All fastening hardware shall be Type 316 stainless steel.

G. Kickplates, if required, shall be fabricated and installed as shown on the Drawings.

H. Aluminum safety gate shall be fabricated of extruded aluminum.

I. Prefabricated checkerplate aluminum floor hatches shall be Type "JD", or "KD" as manufactured by Bilco Co., Babcock-Davis Associates, Inc.; Type "AM" Inland-Ryerson Construction Products Co., Milcor Division; or equal, sized as shown. Hatches with either dimension over 3 feet-6 inches shall be double leaf type. Hatches shall be designed for a live load of 300 pounds per square foot. Hatches shall be watertight.

J. Ship ladders shall be of all aluminum construction as detailed. Treads shall have abrasive nosing as manufactured by Reliance Steel Products Co., IKG Industries, or equal.

K. Checkplate aluminum cover plates shall be fabricated to the details shown and installed at the locations shown.

L. Structural aluminum angle and channel door frames shall be provided as shown on the Drawings and shall be anodized. Frames shall be fabricated with not less than three anchors on each jamb.

M. Miscellaneous aluminum shapes and plates shall be fabricated as shown. Angle frames for hatches, beams, grates, etc., shall be furnished complete with welded strap anchors attached. Furnish all miscellaneous aluminum shown, but not otherwise detailed. Structural shapes and extruded items shall conform to the detail dimensions on the Plans within the tolerances published by the American Aluminum Association.

2.03 STEEL ITEMS

A. Sleeves shall be steel or cast iron pipe in walls and floors with end joints as shown on the Drawings. All pipe sleeves shall have center anchor around circumference as shown.

B. Miscellaneous steel pipe for sleeves and lifting attachments and other uses as required shall be Schedule 40 pipe fabricated according to the details as shown on the Drawings.

C. Miscellaneous steel shall be fabricated and installed in accordance with the Drawings and shall include: beams, angles, support brackets, closure angles in roof at edge of T-beams; base plates to support ends of T-beams; door frames; splice plates, anchor bolts; lintels and any other miscellaneous steel called for on the Drawings and not otherwise specified.

2.04 CAST IRON ITEMS

A. Outside pipe clean-out frames and covers shall be heavy duty, R-6013-R-6099 series as manufactured by Neenah Foundry Co., or equal. All outside pipe clean-outs shall be 6-inch diameter.

B. Frames and covers for valve vaults and manholes shall be of a good quality, strong, tough even grained cast iron except as otherwise specified below. Castings shall be as manufactured by the U. S. Foundry, Neenah Foundry, Mechanics Iron Foundry, or equal. Covers to have letters "WATER", "SEWER" or "DRAIN", as applicable, embossed on top.

PART 3 EXECUTION

3.01 FABRICATION

A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.

B. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Steel accessories and connection to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fitting.

C. Welded joints shall be rigid and continuously welded or spot welded as specified or shown. The face of welds shall be dressed flush and smooth. Exposed joints shall be close fitting and jointed where least conspicuous.

D. Welding of parts shall be in accordance with the Standard Code of Arc and Gas Welding in Building Construction of the AWS and shall only be done where shown, specified, or permitted by the County. All welding shall be done only by welders certified as to their ability to perform welding in accordance with the requirements of the AWS Code. Component parts of built-up members to be welded shall be adequately supported and clamped or held by other adequate means to hold the parts in proper relation for welding.

E. Welding of aluminum work shall be on the unexposed side as much as possible in order to prevent pitting or discoloration.

F. All aluminum finish exposed surfaces, except as specified below, shall have manufacturer's standard mill finish. Aluminum handrails shall be given an anodic oxide

treatment in accordance with the Aluminum Association Specification AA-C22-A41. A coating of methacrylate lacquer shall be applied to all aluminum shipment from the factory.

G. Castings shall be of good quality, strong, tough, even-grained, smooth, free from scale, lumps, blisters, sand holes, and defects of any kind which render them unfit for the service for which they are intended. Castings shall be thoroughly cleaned and will be subjected to a hammer inspection in the field by the County. All finished surfaces shown on the Drawings and/or specified shall be machined to a true plane surface and shall be true and seat at all points without rocking. Allowances shall be made in the patterns so that the thickness specified or shown shall not be reduced in obtaining finished surfaces. Castings will not be acceptable if the actual weight is less than 95 percent of the theoretical weight computed from the dimensions shown. The Contractor shall provide facilities for weighing castings in the presence of the County showing true weights, certified by the supplier.

H. All steel finish work shall be thoroughly cleaned, in accordance with the Contract Documents, of all loose mill scale, rust, and foreign matter before shipment and shall be given one shop coat of primer compatible with finish coats specified in Painting Section after fabrication but before shipping. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spread and well worked into joints and other open spaces. Abrasions in the field shall be touched up with primer immediately after erection. Final painting is specified in the Contract Documents.

I. Galvanizing, where required, shall be the hot-dip zinc process after fabrication. Following all manufacturing operations, all items to be galvanized shall be thoroughly cleaned, pickled, fluxed, and completely immersed in a bath of molten zinc. The resulting coating shall be adherent and shall be the normal coating to be obtained by immersing the items in a bath of molten zinc and allowing them to remain in the bath until their temperature becomes the same as the bath. Coating shall be not less than 2 oz. per sq. ft. of surface.

3.02 INSTALLATION

A. Install all furnished items imbedded in concrete or other masonry. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted. All dimensions shall be verified at the site before fabrication is started.

B. All steel surfaces to come in contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation or provide a 1/32-inch neophrene gasket between the steel surface and the concrete or masonry.

C. Where aluminum is embedded in concrete, apply a heavy coat of approved bitumastic troweling mastic in accordance with the manufacturer's instructions prior to installation.

D. Where aluminum contacts masonry or concrete, provide a 1/32-inch neophrene gasket between the aluminum and the concrete or masonry.

E. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer and provide a 1/32-inch neoprene gasket between the aluminum and the dissimilar metal.

Where aluminum contacts wood, apply two coats of aluminum metal and masonry paint to the wood.

END OF SECTION

DIVISION 7 THERMAL AND MOISTURE PROTECTION

SECTION 07100 WATERPROOFING, DAMPPROOFING AND CAULKING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all materials, labor, equipment, and incidentals required to perform all through wall flashing work, waterproofing, dampproofing, caulking, and related work necessary for the proper completion of the project as required by the Drawings and as specified herein.

B. Dampproof the exterior surfaces of all exterior poured- in-place concrete walls or concrete masonry foundation walls from the top of the footings up to 6 inches below finished grade.

1.02 APPLICABLE SCHEDULE

A. Deliver all materials in original manufacturer's packages with labels and seals intact. Handle and store in accordance with manufacturer's instructions.

B. Inspect job conditions for defects which would prevent proper installation of caulking. Do not proceed until defects have been corrected.

C. Caulk all exterior wall joints between metal wall panels and adjacent materials, between frames in openings and adjacent materials, between masonry and cast-in-place concrete, brick paver expansion and control joints and all other joints shown on the Drawings or required for the completion of the Work.

D. Caulk all interior joints between frames and masonry, at tops of masonry walls, between masonry and structural concrete, expansion and control joints in ceramic tile and brick pavers, exterior window and door frames, louvers, and all other joints shown on the drawings or required for the completion of the Work.

E. Joints noted as "caulk", "caulking", or "sealant" shall be caulked with the sealant specified herein.

F. Furnish and place through wall flashing in exterior masonry walls as shown on the Drawings.

G. Furnish and place vapor barrier under all building structure slabs contacting soil as specified herein.

1.03 SUBMITTALS

Submit two representative samples of any or all other proposed materials and installation method required for the work of this Section as requested by the County.

PART 2 PRODUCTS

2.01 DAMPPROOFING

A. Dampproofing shall be Bitumastic Black Solution by the Koppers Company, Inc., Dehydrating 4 by W.R. Grace and Co., or equal.

2.02 CAULKING

A. Caulking Compound: One component, synthetic rubber base sealant, soft curing, nonstaining, conforming to F.S. TT-S-00230 and Thiocol's Building Trade Performance Specifications for Type 1 Class B sealants. Colors shall match material receiving caulking, as directed by the County.

B. Interior Silicone Sealant: F.S. TT-001543 for perimeter of plumbing fixtures against walls and floors and joints between laminated plastic counters and walls shall be transparent.

C. Primer: As recommended by caulking compound manufacturer.

D. Back-up Material: Closed cell foam polyethylene, or similar nonbituminous material as recommended by manufacturer of caulking compound and completely compatible with selected compound.

2.03 HYDRAULIC CEMENT

A. Material for quick-set hydraulic cement shall be Waterplug as manufactured by Thoro System Products, or equal.

2.04 VAPOR BARRIER

A. Vapor barrier shall be 10 mil thick polyethylene sheet with a vapor transmission rating of 0.20 perms. Laps between adjacent sheets shall be 10 inches minimum. Vapor barrier shall be carefully inspected by the County prior to concrete placement. Additional polyethylene sheet required for repair or replacement of damaged vapor barrier shall be furnished and installed by the Contractor as directed by the County at no additional cost to the County.

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation of Dampproofing

1. Surface to be treated shall be free from oil and dirt and shall be in the proper condition as indicated by the manufacturer prior to the application of the dampproofing material. The concrete shall have been completely cured and the surface shall be dry and free from frost at the time of application.
2. Surfaces to be dampproofed shall receive two (2) heavy coats 10 mils thick, the first coat being carefully applied so that "holidays" or untreated air-bubble depressions in the surface shall be completely filled and the second coat will guarantee a 100% coating of the surface.
3. Particular care shall be given to the application of dampproofing at all construction joints which are encountered.
4. The number of coats specified is in addition to primer coats as recommended by the manufacturer.

B. Installation of Caulking

1. Surface Preparation: Clean metal surfaces free of grease, oil, wax, lacquer, and other foreign residue by wiping with a clean cloth moistened with a suitable solvent. Scrape or brush masonry surfaces clean. Apply appropriate primer to contact surfaces.
2. Joint Preparation: Joints to be caulked having a depth in excess of 3/8-inch shall be packed with back-up material. Round back-up material shall be sized to require 20 percent to 5 percent compression upon insertion. In joints not of sufficient depth to allow packing, install polyethylene bond-breaking tape at back of joint. Avoid lengthwise stretching of back-up material. Cut all corners, avoid wrapping around corners.
3. Application: Apply compound with pressure flow gun with nozzle of proper size and shape to suit width of joint, promptly after mixing and with sufficient pressure to fill joint. Apply as a continuous operation horizontally in one direction and vertically from bottom to top, except joints having excessive widths where compound might sag, the joints shall be built up with excessive beads. Finish joints smooth and slightly covered.
4. Cleaning: Immediately clean adjacent material which may be soiled by caulking operation.

C. Installation of Quick-Set Hydraulic Cement

1. The surface shall be cleaned and free of dirt, loose mortar particles, paints, films, protective coatings, efflorescence, laitance, form treatments, curing compounds, and other materials.
2. Cut out crack at least 3/4 inches wide and deep, cutting back into wall slightly. Flush away all cuttings and dirt. Force water-plug into prepared crack with a round tool and smooth out. Form cove at junction.
3. To be applied under manufacturer's recommendations.

END OF SECTION

DIVISION 8 DOORS AND WINDOWS

SECTION 08200 FIBERGLASS REINFORCED PLASTIC DOORS AND FRAMES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, tools and incidentals required to install, test and place in service the fiberglass reinforced plastic doors and frames as well as the associated anchors and hardware as hereinafter specified and/or shown on the Contract Drawings.

See Appendix A for Electrical Building specific requirements.

1.02 SUBMITTALS

A. The requirements of Section 01340 shall be met - i.e., the Contractor shall submit to the County for review, complete shop drawings, working drawings and product data showing all dimensions and details of fabrication, installation and operation of the doors, frames, anchors and hardware.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver the doors, frames, anchors and hardware in the manufacturer's original packaging. The packaging shall be unopened, undamaged, and with the labels legible and intact.

B. Store the doors, frames, anchors and hardware in the unopened original packaging until needed. Storage shall be in such a manner as to prevent damage from either environmental conditions and/or from construction activities.

C. Handle the packaged products in accordance with the manufacturer's instructions.

1.04 MANUFACTURER

A. In order to match the existing architecture and to minimize spare parts requirements, the doors and frames shall be as manufactured by CHEM-PRUF Door Company of Brownsville, Texas. CHEM-PRUF shall also furnish the anchors and hardware for the door installations.

PART 2 PRODUCTS

2.01 MATERIALS

A. FIBERGLASS REINFORCED PLASTIC (FRP)

1. All door panels, stiles and rails, frames, thresholds, and "header to jamb" joint clips shall be fabricated from FRP. The resins used to formulate the FRP shall be premium grade iso-polyesters, shall be both USDA and FDA approved, and shall be specially formulated to withstand the rigors of a water treatment facility environment. The FRP laminates used shall have a glass to resin ratio of 30% to

70% for superior strength and a minimum R-value of 11.

B. BALSA WOOD

1. All door cores shall be fabricated from end-grain balsa wood. Alternatively, either a 4-6 pound density polyurethane foam or a phenolic coated Kraft Honeycomb may be used.

C. STAINLESS STEEL

1. All door anchors and, to the extent possible, all hardware items - screws, nuts, bolts, fasteners, clips, washers, kickplates, hinges, locksets, door closer, etc. - shall be fabricated from stainless steel.

2.02 FABRICATION

A. DOORS

1. The doors shall be 1-3/4-inches thick and shall be composed of an end-grain balsa wood core sandwiched between FRP panels and stiles and rails. The doors shall be of flush construction without seams or cracks. All mortises shall be molded in at the factory.
   a. Door Cores
      1) The door cores shall be formed from end-grain balsa wood impregnated with lightweight resin. Alternatively, either a 4-6 pound density polyurethane or a phenolic coated Kraft Honeycomb may be used.
   b Door Panels
      1) The door panels shall have a nominal thickness of 1/8-inch and shall be molded in one continuous piece using at least two layers of 1.5-ounce per square foot fiberglass mat and a layer of 16-ounce per square yard unidirectional glass roving.
      2) The door panels shall be coated with a white gel, 15 mils minimum thickness, with a mirror-like finish of 88 or better per ASTM D-523. The gel coat shall be classified as self-extinguishing and shall be Neste Polyester, Inc., 7000 Series, or approved equal.
   c. Stiles and Rails
      1) Stiles and rails shall be constructed from the outside to the inside starting with a 15-20 mil coat of white gel followed by a matrix of at least three layers of 1.5-ounce per square foot fiberglass mat.
      2) The stile and rail shall be molded in one continuous U-shaped piece to the exact dimensions of the door. Pultrusions will not be acceptable for stiles and rails under this Specification.
   d. Reinforcement
      1) To accommodate the mounting of such items as hinges, locksets, door closers, kickplates, etc., reinforcing and/or compression members shall be provided.
      2) Sixteen gauge mild steel plates shall be used wherever practical. The plates shall be totally molded in and completely covered by the fiberglass matrix - no exposed surfaces will be allowed. In no case shall screws be used into the fiberglass matrix for holding any structured attachment.

B. FRAMES

1. The frames shall be similar to the door panels in construction except that the frames shall be solid fiberglass.
2. The stop and frame shall be molded all in one piece which shall be integrally white gelcoated to match the door panels. The stop shall cover the door by no less than 3/8-inch when the door is in the closed position.
3. Mortises shall be molded into the frames. Routing-in mortises or removing any material from the head or jambs to provide mortises will not be acceptable under this Specification.
4. The frames shall have standard steel door institute dimensions - i.e., a 2-inch face and a 5-3/4-inch profile.
5. The jambs shall be flat on the backside (against the opening) and uniform in thickness so as to provide a solid, uniform flat surface against the wall opening. The use of wood blocks and/or spacers will not be acceptable under this Specification.
6. Reinforcement for mounting hinges, etc., shall be 16-gauge mild steel plates totally molded in and completely covered by the fiberglass matrix - no exposed surfaces will be allowed. In no case shall screws be used into the fiberglass matrix for holding any structured attachment.

2.03 HARDWARE

A. HARDWARE SUPPLIER AND INSTALLER

1. The door manufacturer shall furnish all requisite hardware. The hardware shall be enclosed in the original packaging along with the hardware manufacturer's installation instructions.
2. The Contractor shall be responsible for properly storing, handling, and installing the hardware once it reaches the job site.

B. In order to match the existing architecture and to minimize spare parts requirements, the following items of hardware shall be furnished as listed, NO SUBSTITUTIONS:

1. Hinges - 4-1/2" x 4-1/2", half surface, stainless steel, CHEM-PRUF HSSS US 32D NRP.
2. Kickplates - 10" x 34", stainless steel, Trimco 10 x 34 SS 32D.
3. Door Closers, stainless steel arm, 1600 Series, Norton SB 1604 SS Arm.
4. Locksets - Mortise Lockset, ML2200 Series, Corbin/Russwin 2251 NSAxM26 32D.
5. Threshold - Fiberglass, with grit finish, CHEM-PRUF CP FRP W/Grit Fin.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall install the doors, frames, thresholds and hardware in strict accordance with the instructions and recommendations of the manufacturers and the approved shop drawings. The installations shall also be in full compliance with the applicable portions of Steel Door Institute SDI-100.

B. The frames shall be installed plumb and square and shall be securely attached to the

structure before the spreader bars are removed.

C. The doors shall be hung plumb and square within the frames and shall not bind at any point. The Contractor shall not cut or otherwise alter the door to fit the frame. Should the door and frame not properly mate, the Contractor shall consult with the door manufacturer for remediation instructions.

D. The thresholds shall be installed in such a manner as to provide a smooth, trip-free pathway through the doorway for both ingress and egress.

E. After the doors are properly hung in the frames and the thresholds are installed, the Contractor shall attach the kickplates, door closers and locksets to the doors in a thoroughly workmanlike manner.

F. After the door installations are completed, the Contractor shall take adequate precautions to protect the exposed surfaces from damage by both environmental conditions and construction activity.

3.02 TESTS

A. After installation, the Contractor shall check the doors and attached appurtenances for proper operation.

B. The doors shall swing smoothly and freely without binding, the door closers shall allow both an easy opening and a "slamless" closing, and the keys shall freely lock and unlock the locksets without any binding of the locking plunger.

3.03 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee and/or warrant the door installations against defects in materials and workmanship in accordance with the requirements of Section 01740 of these Specifications.

B. The door manufacturer shall unconditionally guarantee the doors for 10-years against failures due to corrosion from environmental conditions surrounding a water treatment facility.

END OF SECTION

DIVISION 9 PAINTING

SECTION 09865 SURFACE PREPARATION AND SHOP PRIME PAINTING

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required for the surface preparation and application of shop primers on ferrous metals, excluding stainless steels, as specified herein.

1.02 SUBMITTALS

A. Submit to the County for approval, as provided in the Contract Drawings for shop drawings, manufacturer's specifications and data on the proposed primers and detailed surface preparation, application procedures and dry mil thickness.

B. Submit representative physical samples of the proposed primers, if required by the County.

PART 2 PRODUCTS

2.01 MATERIALS

A. Submerged Services: Shop primer for ferrous metals which will be subject to splash action or which are specified to be considered submerged service shall be sprayed with one coat of Koppers 654 epoxy Primer or Koppers Inertol Primer 621-FDA, dry film thickness 3.5 to 4.5 mils by Koppers Co., Inc., or equal.

B. Nonsubmerged Services: Shop primer for ferrous metals other than those covered by paragraph 2.01 A shall be sprayed with one coat of Koppers Pug Primer, dry film thickness 3.0 to 4.0 mils by Koppers Co., Inc. or equal.

C. Nonprimed Surfaces: Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during all periods of storage and erection and shall be satisfactory to the County up to the time of the final acceptance.

D. Compatibility of Coating Systems: Shop priming shall be done with primers that are guaranteed by the manufacturer to be compatible with their corresponding primers and finish coats specified in the Contract Documents for use in the field and which are recommended for use together.

PART 3 EXECUTION

3.01 APPLICATION

A. Surface Preparation and Priming:

1. Non submerged components scheduled for priming, as defined above, shall be sandblasted clean in accordance with SSPC-SP-6, Commercial Grade, immediately prior to priming. Submerged components scheduled for priming, as defined above, shall be sandblasted clean in accordance with SSPC-SP-10. Near White, immediately prior to priming.
2. Surfaces shall be dry and free of dust, oil, grease, dirt, rust, loose mill scale and other foreign material before priming.
3. Shop prime in accordance with approved paint manufacturer's recommendations.
4. Priming shall follow sandblasting before any evidence of corrosion has occurred and within 24 hours.

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, 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. SSPC - Steel Structures Painting Council
2. Exterior - Outside, exposed to weather
3. Interior Dry - Inside, concealed or protected from weather
4. Interior Wet - Inside, subject to immersion services
5. ASTM - American Society of Test Materials
6. NACE - National Association of Corrosion Engineers
7. NSF - National Sanitation Foundation
8. AWWA - American Water Works Association

D. 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 painting, or flooring installation between the Contractor, the Paint Manufacturer, whose products are to be used, and the County. 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 County 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 County by the Painting Contractor.

D. It shall be the responsibility of the Coating Manufacturer to have their factory representative meet in person with the Contractor and County a minimum of three times during the job as a consultant on surface preparation, mil thickness of coating and proper application of coating unless meeting is determined to be unnecessary by the County.

1.04 SUBMITTALS

A. Contractor shall submit catalog data and cut sheets for the painting system being used if not the TNEMEC materials specified.

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 provide free of charge 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 manufactured by the TNEMEC Company, Inc., North Kansas City, Missouri. These products are specified to establish standards of quality and are approved for use on this Project.

B. Equivalent materials of other manufacturers may be substituted on approval of the County. Requests for substitution shall include manufacturer's literature for each product giving the name, generic type, descriptive information and evidence of satisfactory past performance and an independent laboratory certification that their product meets the performance criteria of the specified materials.

C. Abrasion - Fed. Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load.

D. Adhesion - Elcometer Adhesion Tester.

E. Exterior Exposure - Exposed at 45 degrees facing the ocean (South Florida Marine Exposure)

F. Hardness - ASTM D3363-74

G. Humidity - ASTM D2247-68

H. Salt Spray (Fog) - ASTM B117-73

I. 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. Prime and finish coats of all surfaces shall be furnished by the same manufacturer.

J. 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.

K. Colors, where not specified, shall be as selected by the County or their Representative.

L. All coatings in contact with potable water need to be NSF Certified in accordance with ANSI/NSF Standard 61.

M. All above ground potable water mains and appurtenances shall be painted safety blue.

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. Recoating times of manufacturer's printed instructions shall be adhered to.

D. Coating thickness shall be determined by the use of a properly calibrated "Nordson-Mikrotest" "Positest" Coating Thickness Gauge (or equal) for ferrous metal or an OG232 "Tooke" Paint Inspection gauge (or equal) for non-ferrous and cementitious surfaces. Please note that use of the "Tooke" gauge is classified as a destructive test.

3.02 SURFACE PREPARATION

The surface shall be cleaned as specified for the paint system being used. All cleaning shall be as outlined in the Steel Structures Painting Council's Surface Preparation Specification, unless otherwise noted. If surfaces are subject to contamination, other than mill scale or normal atmospheric rusting, the surfaces shall be pressure washed, and acid or caustic pH residues neutralized, in addition to the specified surface preparation.

3.03 STANDARDS FOR SURFACE PREPARATION

A. Chemical and/or 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. 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. 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. Flame Cleaning: Dehydrating and removal of rust, loose mill scale and some light mill scale by use of flame, followed by wire brushing.

E. White Metal Blast Cleaning: Complete removal of all mill scale, rust, rust scale, previous coating, etc., leaving the surface a uniform gray-white color.

F. Commercial Grade 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.

G. 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.

H. Pickling: Complete removal of rust and mill scale by acid pickling, duplex pickling or electrolytic pickling (may reduce the resistance of the surface to corrosion, if not to be primed immediately).

I. 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.

J. 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.

K. 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.

L. Oil, grease, soil, dust, etc., deposited on the surface preparation that has been completed shall be removed prior to painting according to Solvent Cleaning under this Specification.

M. Weld flux, weld spatter and excessive rust scale shall be removed by Power Tool Cleaning as per these Specifications.

N. All weld seams, sharp protrusions and edges shall be ground smooth prior to surface preparation or application of any coatings.

O. All areas requiring field welding shall be masked off prior to shop coating, unless waived by the County.

P. All areas which require field touch-up after erection, such as welds, burnbacks, and mechanically damaged areas, shall be cleaned by thorough Power Tool as specified in these Specifications.

Q. Touch-up systems will be same as original specification except that approved manufacturer's organic zinc-rich shall be used in lieu of inorganic zinc where this system was originally used. Also strict adherence to manufacturer's complete touch-up recommendations shall be followed. Any questions relative to compatibility of products shall be brought to the County's attention; otherwise, Contractor assumes full responsibility.

3.03 PRETREATMENTS

When specified, the surface shall be pretreated in accordance with the specified pretreatment prior to application of the prime coat of paint.

3.04 STORAGE

Materials shall be delivered to the job site in the original packages with seals unbroken and with legible unmutilated labels attached. Packages shall not be opened until they are inspected by the County and required for use. All painting materials shall be stored in a clean, dry, well-ventilated place, protected from sparks, flame, direct rays of the sun or from excessive heat. Paint susceptible to damage from low temperatures shall be kept in a heated storage space when necessary. The Contractor shall be solely responsible for the protection of the materials stored by himself at the job site. Empty coating cans shall be required to be neatly stacked in an area designated by the County and removed from the job site on a schedule determined by the County. County may request a notarized statement from Contractor detailing all materials used on the Project.

3.05 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. Catalysts or thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction.

3.06 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 below 50 deg F, 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 5deg above dew point; temperature must be maintained during curing.

C. See coating schedule for actual coating systems to be used on this project.

3.07 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 5deg above this point. Temperature must be maintained during curing.

Example

If air temperature is 70 deg F and relative humidity is 65%, the dew point is 57 deg F. No coating should be applied unless surface temperature is 62 deg 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 County.

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 County.

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. 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 County).

K. 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.

L. 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.

3.08 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.

3.09 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. Special care shall be taken with thinners and paint temperatures so that paint of the correct formula reaches the receiving surface.
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.

3.10 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.

3.11 TOUCH-UP MATERIALS

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 County for future touch-up. Two gallons may by required for (2) component materials.

3.12 ON-SITE INSPECTION

During the course of this Project, the County will reserve the option of incorporating the services of a qualified inspection service. The inspection service will be responsible for assuring the proper execution of this Specification by the successful Contractor.

3.13 STEEL - STRUCTURAL, TANKS, PIPES AND EQUIPMENT

A. EXTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 73-1: Epoxy/High Build Urethane

This system is highly resistant to abrasion, wet conditions, corrosive fumes and chemical contact. Provides 3-4 times the color and gloss retention of conventional paints. Second coat to be same color or close to finish color. Specify Series 74 Endura-Shield for gloss finish.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 66-1211 Epoxoline Primer	3.0 - 4.0	
2nd Coat: 66-Color Hi-Build Epoxoline	2.0 - 3.0	
3rd Coat: 73-Endura-Shield III	2.0 - 3.0	
	Dry Film Thickness	7.0 - 10.0
	Minimum	8.0 Mils

2. System No. 73-2: High Build Urethane for Marginally Cleaned Surfaces or Topcoating Existing System

This system can be used over factory finish paint or cover non-sandblasted steel and offer the high performance of a urethane coating. Specify Series 74 Endura-Shield for gloss finish.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning or SSPC-SP3

Power Tool Cleaning

Shop Coat: Manufacturer Standard Primer (or existing coating)	1.5 - 2.0
2nd Coat: 135 Chembuild	3.0 - 5.0
3rd Coat: 73-Color Endura-Shield	2.0 - 3.0
Dry Film Thickness	6.5 - 10.0
Minimum	7.5 Mils

3. System No. 82-1: Silicone Alkyd Enamel - Gloss

Coating system for outstanding color and gloss retention and weatherability. This system will provide better performance than alkyd enamel, but not as good as a urethane. Series 82 includes a minimum of 30% silicone resin and conforms to SSPC-Paint 21-78, Type 1.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 37H-77 Chem Prime	2.0 - 3.5
2nd Coat: 23-Color Enduratone	2.0 - 3.0
3rd Coat: 82-Color Silicone Alkyd Enamel	1.0 - 2.0
Dry Film Thickness	5.0 - 8.5
Minimum	6.0 Mils

4. System 90-97: Zinc/Epoxy/Urethane

This system offers 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.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 90-97 Tneme-Zinc	2.5 - 3.5
2nd Coat: 66-Color Hi-Build Epoxoline	2.0 - 3.0
3rd Coat: 73 Endurashield III	2.0 - 3.0
Dry Film Thickness	6.5 - 9.5
Minimum	8.0 Mils

B. INTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 69.1: High Solids Epoxy

This coating will provide maximum protection. It offers chemical and corrosion resistance for long-term protection against salt spray, moisture, corrosive fumes, and chemical attack. Series 69 is a polyamidoamine cured epoxy. Primer coat must be touched-up before second coat is applied.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 69-1211 Epoxoline Primer II	3.0 - 5.0
2nd Coat:	

69-Color Hi-Build Expoxoline II	4.0 - 6.0
Dry Film Thickness	7.0 - 11.0
Minimum	9.0 Mils

2. System No.66-2: High Build Epoxy

This system will provide chemical and corrosion resistance against abrasion, moisture, corrosion fumes, chemical contact and immersion in non-potable water. Primer coat must be touched-up before second coat is applied. Substitute Series 161 for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 69-1211 Epoxoline Primer	3.0 - 5.0
2nd Coat: 69-Color Hi-Build Expoxoline	4.0 - 6.0
Dry Film Thickness	7.0 - 11.0
Minimum	9.0 Mils

3. System No. 66-6: High Build Epoxy (Over OEM Finishes)

This system is to be used over standard manufacturer's primer to offer a high performance epoxy finish. Excellent for areas of rust not able to be completely cleaned.

Surface Preparation: Spot SSPC-SP6 Commercial Blast Cleaning or SSPC-SP11 Power Tool Cleaning to Bare Metal

Shop Coat: Manufacturer's Standard (or existing coating)	1.0 - 2.0
2nd Coat: 50-330 Poly-Ura-Prime	2.0 - 3.0
3rd Coat: 66-Color Hi-Build Expoxoline	2.0 - 4.0
Dry Film Thickness	5.0 - 9.0
Minimum	7.0 Mils

C. IMMERSION

1. System No. 69-2: High Solids Epoxy (Non-Potable Water)

This system provides maximum protection in immersion service. Scarify the surface before topcoating if the Series 69 has been exterior-exposed for 90 days or longer. If primer coat is damaged, it must be touched-up before second coat is applied.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat:	
69-1211 Hi-Build Epoxoline II	3.0 - 5.0
2nd Coat:	
69-Color Hi-Build Expoxoline II	6.0 - 8.0
Dry Film Thickness	9.0 - 13.0
Minimum	11.0 Mils

2. System No. 66-2: High Solids Epoxy (Non-Potable Water)

This system will provide chemical and corrosion resistance for protection against abrasion, moisture, corrosive fumes, chemical contact and immersion. Primer coat must be touched-up before second coat is applied. Scarify the surface before topcoating if the Series 66 has been exterior-exposed for 60 days or longer. Substitute Series 161 for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat: 66-1211 Epoxoline Primer	3.0 - 5.0
2nd Coat: 66-Color Hi-Build Expoxoline	3.0 - 5.0
3rd Coat: 66-Color Hi-Build Expoxoline	3.0 - 5.0
Dry Film Thickness	9.0 - 15.0
Minimum	11.0 Mils

3. System No. 20-1: Epoxy-Polyamide (Potable Water)

This system meets American Water Works Association AWWA D 102 Inside Paint System Number 1. Series 20 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Substitute Series FC20 for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat:	
20-WH02 Pota-Pox (Tank White)	3.0 - 5.0
2nd Coat: 20-1255 Pota-Pox (Beige)	4.0 - 6.0
3rd Coat: 20-WH02 Pota-Pox (Tank White)	4.0 - 6.0
Dry Film Thickness	11.0 - 17.0
Minimum	12.0 Mils

4. System No. 140: High Solids Epoxy (Potable Water)

Series 140 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat: 140-1255 Pota-Pox II (Beige)	6.0 - 8.0
2nd Coat:	
140-WH02 Pota-Pox II (Tank White)	6.0 - 8.0
Dry Film Thickness	12.0 - 16.0
Minimum	14.0 Mils

5. System No. 46-30: Coal Tar-Epoxy (Non-Potable Water Only)

May be applied in a two-coat application. Review critical recoat time if utilized.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning*

One Coat: 46H-413 Hi-Build Tneme Tar

Minimum Dry Film Thickness 14.0 - 20.0

*SSPC-SP-6 Commercial Blast Cleaning may be used for non-immersion service.

6. System No. 46-26: Coal Tar Epoxy (Non-Potable Water Only)

Must be recoated within four days at 75deg F. Higher temperature will shorten recoat time.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning*

1st Coat: 46-413 Tneme Tar	8.0 - 10.0	
2nd Coat: 46-413 Tneme Tar	8.0 - 10.0	
	Dry Film Thickness	16.0 - 20.0
	Minimum	16.0 Mils

*SSPC-6 Commercial Blast Cleaning may be used for non-immersion service.

3.14 OVERHEAD METAL DECKING, JOIST

A. INTERIOR EXPOSURE

System No. 15-1: Uni-Bond

This system should be used on ceiling areas where a one-coat system is desired. Can be applied over steel, galvanized and aluminum decking, joist, beams, conduits and concrete.

Surface Preparation: Surfaces must be dry, clean and free of oil, grease and other contaminates. Allow concrete to cure 28 days.

Coating: 15-Color Uni-Bond

Dry Film Thickness 2.5 - 3.5

B. EXTERIOR EXPOSURE

System No. 135-1: Chembuild

This system can be applied over a wide variety of coatings and factory finishes. It can also be applied direct to galvanized aluminum decking, joists, conduits and tight rust.

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)

Coating: 135-Color Chembuild

Dry Film Thickness 3.0 - 5.0

3.15 MILL COATED STEEL PIPE

A. EXTERIOR/INTERIOR EXPOSURE (NON-IMMERSION)

System No. 66-3: Epoxy-Polyamide

This system can be applied directly to mill coated steel pipe without sandblasting for use in non-immersion. There may be some bleed through with the 1st coat. Do not apply over glossy varnish type mill coatings.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 66-1211 Epoxoline Primer	3.0 - 4.0
2nd Coat: 66-Color Hi-Build Expoxoline	4.0 - 6.0
3rd Coat: (If required)	(4.0 - 6.0)
Dry Film Thickness	11.0 - 16.0
Minimum	11.0 Mils

3.16 GALVANIZED STEEL - PIPE AND MISCELLANEOUS FABRICATIONS

A. EXTERIOR / (NON-IMMERSION)

System No. 73-1: Epoxy/High Build Urethane

Series 66 has excellent adhesion to galvanized steel. This system is highly resistant to abrasion, wet conditions, corrosive fumes and chemical contact. Provides 3-4 times the color and gloss retention of conventional paints. First coat to be same color as or close to the finish color. Specify Series 74 Endura-Shield for gloss finish.

Surface Preparation: SSPC-SP1 Solvent Cleaning

1st Coat: 66-Color Hi-Build Epoxoline	2.0 - 4.0
2nd Coat: 73-Color Endura-Shield	2.0 - 4.0
Dry Film Thickness	4.0 - 8.0
Minimum	5.0 Mils

B. INTERIOR EXPOSURE (NON IMMERSION) AND ALUMINUM IN CONTACT WITH CONCRETE

System No. 66-6: Polyamide Epoxy

Surface Preparation: SSPC-SP1 Solvent Cleaning

1st Coat: 66-Color Hi-Build Epoxoline	2.0 - 4.0
2nd Coat: 66-Color Hi-Build Epoxoline	2.0 - 4.0
Dry Film Thickness	4.0 - 8.0
Minimum	5.0 Mils

C. IMMERSION (POTABLE WATER)

System No. 20-1: Epoxy-Polyamide (Potable Water)

Series 20 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Substitute Series FC20 for low

temperature cure of quick recoat.

Surface Preparation: SSPC-SP 7 Brush Off Blast Cleaning

1st Coat: 20-1255 Pota-Pox Primer	3.0 - 5.0
2nd Coat: 20-WH02 Pota-Pox Finish	4.0 - 6.0
Dry Film Thickness	7.0 -11.0
Minimum	9.0 Mils

3.17 CHAIN-LINK FENCES

A. GALVANIZED STEEL & NON-FERROUS METAL

System No. 22-1: Oil-Cementitious

Surface Preparation: Surface shall be clean and dry

One Coat: 22-Color Galv-Gard

Dry Film Thickness 3.0 - 4.0

3.18 CONCRETE

A. EXTERIOR - ABOVE GRADE

1. System No. 52-1 Modified Epoxy - Sand Texture

Series 52 is a high build, decorative sand texture finish that hides minor surface irregularities and gives long-term protection against weather, driving rain, ultraviolet exposure, alternate freezing and thawing. Series 52 will actually become part of the concrete. Available in Series 55, Tneme-Crete smooth finish. For porous substrates, a second coat of Series 52 is required. Substitute Series 180 or 181 W.B. Tneme-Crete when specified over existing acrylic or latex coatings.

Surface Preparation: Surface shall be clean and dry.

One Coat: 52-Color Tneme-Crete

Dry Film Thickness 8.0 - 10.0

2. System No. 6-1: Acrylic Emulsion Low Sheen

If semi-gloss finish is desired, use Series 7 Tneme-Cryl SG as the second coat.

Surface Preparation: Surface must be clean and dry.

1st Coat: 6-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3. System No. 156-1: Modified Acrylic Elastomer

If texture is needed, use 157 Enviro-Crete TX (medium texture) or 159 Enviro-Crete XTX (coarse texture). For application over previously applied coatings, use TNEMEC Series 151 Elasto-Grip at 1.0 - 2.5 mils DFT prior to the application of Series 156 Enviro-Crete.

Surface Preparation: Surface must be clean and dry.

1st Coat: 156-Color Enviro-Crete	4.0 - 8.0	
2nd Coat: 156-Color Enviro-Crete	4.0 - 8.0	
	Dry Film Thickness	8.0 - 16.0
	Minimum	10.0 Mils

B. EXTERIOR - BELOW GRADE

1. System No. 46-61: Coal Tar Pitch Solution

Surface Preparation: Surface must be clean and dry, Level all protrusions.

1st Coat: 46-465 H.B. Tnemecol	8.0 - 12.0	
2nd Coat: 46-465 H.B. Tnemecol	8.0 - 12.0	
	Dry Film Thickness	16.0 - 24.0
	Minimum	16.0 Mils

2. System No. 46-31: Coal Tar-Epoxy

Surface Preparation: Surface shall be clean and dry.

One Coat: 46H-413 Hi-Build Tneme-Tar

Dry Film Thickness	14.0 - 20.0

3. System No. 100-1: Crystaline Waterproofing

This system can be applied to concrete that is still wet or has not developed final cure. It can be used where wet surface conditions exist or where there is the potential for water intrusion due to hydrostatic pressure. Application shall be per Xypex specification manual.

Surface Preparation: Surface to be clean and roughened by Brush Blasting or Acid Etching.

1st Coat: XYPEX Concentrate at 1.5 lbs/SY
2nd Coat: XYPEX Modified at 1.5 lbs/SY

C. EXTERIOR/INTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 6-1: Acrylic Emulsion, Low Sheen (Interior/Exterior)

This system will provide a decorative coating with good exterior durability, color retention, and a high vapor transmission rate. For Semi-Gloss finish, use 7-Color Tneme-Cryl S/G.

Surface Preparation: Surface shall be clean and dry. Allow concrete to cure for

28 days.

1st Coat: 6-Color Tneme-Cryl	2.0 - 3.0	
2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0	
	Dry Film Thickness	4.0 - 6.0
	Minimum	5.0 Mils

2. System No. 66-4: Epoxy-Polyamide
(Interior/Exterior)

Series 66 provides excellent protection from abrasion, moisture, corrosive fumes and chemical contact. For exterior exposures, topcoat with Series 73, or 74 Endura-Tone for gloss and color retention.

Surface Preparation: Surfaces shall be clean and dry. Allow concrete to cure for 28 days. SSPC-SP-7 Brush-Off Blast Clean.

1st Coat: 66-Color Hi-Build Epoxoline	3.0 - 5.0	
2nd Coat: 66-Color Hi-Build Epoxoline	4.0 - 6.0	
	Dry Film Thickness	7.0 -11.0
	Minimum	9.0 Mils

3. System No. 83-1: High Solids Catalyzed Epoxy
(Interior)

Surface Preparation: Surface shall be clean and dry. Allow concrete to cure for 28 days. SSPC-SP-7 Brush Off Blast Clean. Concrete block surfaces: Allow to cure 28 days. Level fins, protrusions and mortar splatter.

1st Coat: 83-Color Ceramlon II	6.0 - 10.0	
2nd Coat: 83-Color Ceramlon II	6.0 - 10.0	
	Dry Film Thickness	12.0 - 20.0
	Minimum	14.0 Mils

D. IMMERSION - POTABLE & NON-POTABLE WATER

1. System No. 66-4: Epoxy Polyamide (Non-Potable Water)

Surface irregularities and bug holes should be filled to a smooth uniform appearance as required with TNEMEC Series 63-1500 Filler and Surfacer.

Surface Preparation: SSPC-SP-7 Brush-Off Blast Cleaning

1st Coat: 66-Color Hi-Build Epoxoline	4.0 - 6.0	
2nd Coat: 66-Color Hi-Build Epoxoline	4.0 - 6.0	
	Dry Film Thickness	8.0 -12.0
	Minimum	10.0 Mils

2. System No. 104-5: High Solids Epoxy (Non-Potable Water)

Surface irregularities and bug holes should be filled to a smooth uniform appearance as required with TNEMEC Series 63-1500 Filler and Surfacer.

Surface Preparation: SSPC-SP-7 Brush-Off Blast Cleaning

1st Coat: 104-1255 H.S. Epoxy Primer	6.0 - 10.0	
2nd Coat: 104 Color H.S. Epoxy	6.0 - 10.0	
	Dry Film Thickness	12.0 - 20.0
	Minimum	14.0 Mils

3. System No. 46-31: Coal Tar-Epoxy (Non-Potable Water)

   May be applied in a two-coat application. Review critical recoat time is utilized. Surface irregularities and bugholes should be filled to a smooth uniform appearance as required with TNEMEC Series 63-1500 Filler and Surfacer.

   Surface Preparation: Brush-Off Blast Cleaning

   One Coat: 46H-413 Hi-Build Tneme-Tar

   Dry Film Thickness 14.0-20.0

4. System No. 45-27: Coal Tar Epoxy (Non-Potable Only)

   Must be recoated within four days at 75deg F. Higher temperature will shorten recoat time.

   Surface Preparation: Brush-Off Blast Cleaning

1st Coat: 46-413 Tneme Tar	8.0 - 10.0	
2nd Coat: 46-413 Tneme Tar	8.0 - 10.0	
	Dry Film Thickness	16.0 - 20.0
	Minimum	16.0 Mils

5. System No. 20-2 Epoxy-Polyamide (Potable Water)

   This system meets American Water Works Association AWWA D 102 Inside System No. 1. Series 20 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Surface irregularities and bug holes should be filled to a smooth uniform appearance as required with TNEMEC Series 63-1500 Filler and Surfacer. (NSF Standard 61 approved). Substitute Series FC20 for low temperature cure or quick recoats.

   Surface Preparation: SSPC-SP10 Near White Blast Cleaning

1st Coat: 20-1255 Pota-Pox	4.0 - 6.0	
2nd Coat: 20-WH02 Pota-Pox Finish	4.0 - 6.0	
	Dry Film Thickness	8.0 - 12.0
	Minimum	10.0 Mils

6. System No. 139-2: Epoxy-Polyamine (Potable Water)

   Series 139 meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Surface irregularities and bug holes should be filled to a smooth uniform appearance as

required with TNEMEC Series 63-1500 Filler and Surfacer. (NSF Standard 61 approved.)

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

1st Coat: 139-1255 Pota-Pox II	6.0 - 8.0
2nd Coat: 139-WH02 Pota-Pox II	6.0 - 8.0
Dry Film Thickness	12.0 - 16.0
Minimum	14.0 Mils

E. INTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 104-3: High Solids Expoxy

This system will produce a slick, tile-like finish that has excellent chemical and water resistance. Surface will be easy to clean.

Surface Preparation: Surface to be clean and dry.

1st Coat: 104-Color H.S. Epoxy	6.0 - 8.0
2nd Coat: 104-Color H.S. Epoxy	6.0 - 8.0
Dry Film Thickness	12.0 - 16.0
Minimum	14.0 Mils

2. System No. 113-1: Acrylic-Epoxy Semi-Gloss

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. Specify Series 114 Tneme-Tuffcoat for Gloss Finish.

Surface Preparation: Surface must be clean and dry.

One Coat: 113-Color Tneme-Tuffcoat

Dry Film Thickness	4.0 - 6.0

3.19 CONCRETE FLOORS

A. EPOXY FLOOR COATINGS

1. System No. 67-1: Epoxy-Polyamide

This system will provide a durable, long-wearing coating that bonds tightly to concrete and stands up under heavy foot traffic, frequent cleaning and spillage of water, oil, grease, or chemical.

Surface Preparation: Acid Etch or Brush-Off Blast Cleaning

1st Coat: 67-Color Tnema-Tread	2.0 - 3.0
2nd Coat: 67-Color Tnema-Tread	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

2. System No. S67-1: Epoxy-Polyamide (Non-Skid)

This system will provide the same protection and durability as System 67-1 with the addition of a non-skid finish.

Surface Preparation: Acid Etch or Brush-Off Blast Cleaning

1st Coat: S67-Color Tneme-Tread	2.0 - 3.0
2nd Coat: 67-Color Tneme-Tread	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3. System No. 73-12: Epoxy/Urethane

This system will provide maximum protection against chemical splash and spillage, wet conditions and abrasion. Specify Series 70 Endura-Shield for Gloss finish. First coat must be thinned 20% prior to application. For non-skid finish, specify Series S67 Tneme-Tread for the first and second coat.

Surface Preparation: Acid Etch or Brush-Off Blast Cleaning

1st Coat: 67-Color Tneme-Tread	2.0 - 3.0
2nd Coat: 67-Color Tneme-Tread	2.0 - 3.0
3rd Coat: 71-Color Endura-Shield	1.5 - 2.5
Dry Film Thickness	5.5 - 8.5
Minimum	6.5 Mils

4. System No. 281-1: High Build Polyamine-Epoxy Floor

Please refer to manufacturer's Installation Guide and Technical Data for proper installation.

Surface Preparation: Abrasive blast cleaning (refer to Installation Guide of manufacturer.

1st Coat: 201 Epoxoprime	6.0 - 8.0
2nd Coat: 281 Tneme-Glaze	6.0 - 8.0
Dry Film Thickness	12.0 - 16.0
Minimum	14.0 Mils

5. System No. 221/281: Functional Flooring (Non-Slip)

Please refer to manufacturer's Installation Guide and Technical Data for proper installation.

Surface Preparation: Abrasive blast cleaning (refer to Installation Guide of manufacturer.

1st Coat: 201 Epoxoprime	6.0 - 8.0
2nd Coat: 221 Lami-Tread (2 cts. @ 1/16" ea.)	1/8"
3rd Coat: 281 Tneme-Glaze	8.0 - 12.0

Minimum Dry Film Thickness 1/4"+

3.20 POROUS MASONRY

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 52-2: Modified Epoxy - Sand Texture

First coat of Tneme-Crete will act as a filler coat while the second coat will completely seal and finish. Long-term life and high performance. Available in Series 55 Tneme-Crete smooth finish.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 52-Color Tneme-Crete 60 - 80 SF
2nd Coat: 52-Color Tneme-Crete Per Gal/Per Coat

2. System No. 6-2: Acrylic Emulsion, Low Sheen

This system will fill the block and provide a sealed surface. For Semi-Gloss Finish, use 7-Color Tneme-Cryl S/G.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 54-562 Modified Epoxy Masonry Filler
80 SF Gal
2nd Coat: 6-Color Tneme-Cryl 2.0 - 3.0
3rd Coat: 6-Color Tneme-Cryl 2.0 - 3.0
*4.0 - 6.0

*Total Dry Film Thickness of Topcoats Only.

3. System No. 66-15: Epoxy-Polyamide (Interior)

Block Filler is a modified epoxy designed for high moisture.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 54-660 Epoxy Masonry Filler 100 SF/Gal
2nd Coat: 66-Color Hi-Build Epoxoline 4.0 - 6.0
3rd Coat: 66-Color Hi-Build Epoxoline 4.0 - 6.0
*8.0 - 12.0

*Total Dry Film Thickness of Topcoats Only.

4. System No. 104-6: High Solids Epoxy (Interior Only)

This system will produce a film thickness of 16 mils. The surface will be tile-like for easy cleaning and will provide protection against chemical attack, corrosive fumes, high humidity and wash down. Backfold first coat to fill porosity.

Surface Preparation: Surface to be clean and dry.

1st Coat: 104-Color H.S. Epoxy	6.0 - 10.0	
2nd Coat: 104-Color H.S. Epoxy	6.0 - 10.0	
	Dry Film Thickness	12.0 - 20.0
	Minimum	14.0 Mils

5. System No. 113-1: Acrylic-Epoxy Semi-Gloss (Interior Only)

   Series 113 Tneme-Tufcoat has very low odor and can be used when painting in occupied areas. Specify Series 114 Tneme-Tufcoat for a gloss finish.

   Surface Preparation: Surface must be clean and dry.

1st Coat: 130 Envirofill	100 SF/Gal	
2nd Coat: 113-Color Tnema-Tufcoat*	4.0 - 6.0	
		**4.0 - 6.0

   * Two coats may be required if applied by roller
   ** Total Dry Film Thickness of Topcoats Only

6. System No. 156-1: Modified Acrylic Elastomer

   If texture is needed, use 157 Enviro-Crete TX (medium texture of 159 Enviro-Crete XTX - coarse texture). For application over previously applied coatings, use TNEMEC 151 Elasto-Grip at 1.0 - 2.5 mils DFT.

   Surface Preparation: Surfaces must be clean and dry.

1st Coat: 130 Envirofil	100 SF/Gal	
2nd Coat: 156-Color Enviro-Crete	4.0 - 8.0	
3rd Coat: 156-Color Enviro-Crete	4.0 - 8.0	
	Dry Film Thickness	8.0 - 16.0
	Minimum	10.0 Mils
		(For 2nd & 3rd Coats)

3.21 GYPSUM WALLBOARD

A. INTERIOR EXPOSURE

1. System No. 111-5: Acrylic-Epoxy

   Surface Preparation: Surface must be clean and dry.

1st Coat: 51-792 PVA Sealer	1.0 - 2.0	
2nd Coat: 113 H.B. Tnemetufcoat*	4.0 - 5.0	
	Dry Film Thickness	5.0 - 7.0
	Minimum	6.0 Mils

   *Two coats may be required if application is by brush and roller.

2. System No. 66-22: Hi-Build Epoxoline

Surface Preparation: Surface must be clean and dry.

1st Coat: 51-792 PVA Sealer	1.0 - 2.0
2nd Coat: 66-Color Hi-Build Epoxoline*	4.0 - 6.0
Dry Film Thickness	5.0 - 8.0
Minimum	5.0 Mils

*Two coats may be required if applied by roller

3. System No. 6-1: Acrylic Emulsion, Low Sheen (Interior/Exterior Exposure)

This system is designed for mild use areas like office walls, laboratory ceilings, stairwells, etc. For Semi-Gloss finish, use 7-color Tneme-Cryl S/G.

Surface Preparation: Surface must be dry and clean.

1st Coat: 6-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3.22 WOOD

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 23-4: Alkyd Semi-Gloss

Specify Series 2H Hi-Build Tneme-Gloss for High Gloss finish.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 36-603 Undercoater	2.5 - 3.5
2nd Coat: 23 Enduratone	1.5 - 3.5
3rd Coat: 23 Enduratone	1.5 - 3.5
Dry Film Thickness	5.5 - 10.5
Minimum	6.0 Mils

2. System No. 6-5: Acrylic Latex

Substitute Series 7 if semi gloss finish is desired.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 36-603 Undercoater	2.0 - 3.5
2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
3rd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
Dry Film Thickness	6.0 - 9.5
Minimum	7.5 Mils

3.23 PVC PIPE

A. EXTERIOR OR INTERIOR

System No. 66-23: Epoxy-Polyamide

Optional topcoat of Series 73/74 Endura-Shield would give long-term color and gloss retention for exterior exposure.

Surface Preparation: Surface shall be clean and dry.

One Coat: 66-Color Hi-Build Epoxoline

Dry Film Thickness 4.0 - 6.0

3.24 INSULATED PIPE

A. INTERIOR EXPOSURE

System No. 6-1: Acrylic Emulsion, Low Sheen

For semi-gloss finish, use 7-Color Tneme-Cryl S/G.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 6-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 6-Color Tneme-Cryl	2.0 - 3.0
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3.25 HIGH HEAT COATING

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 39-2: Silicone Aluminum (1200deg F Maximum)

   Surface Preparation: SSPC-SP10 Near-White Blast Cleaning - 1.0 Mil Surface Profile

1st Coat: 39-1261 Silicone Aluminum	1.0 - 1.5
2nd Coat: 39-1261 Silicone Aluminum	1.0 - 1.5
Dry Film Thickness	2.0 - 3.0
Minimum	2.0 Mils

2. System No. 39-4: Silicone Aluminum (600deg F Maximum)

   Surface Preparation: SSPC-SP10 Near-White Blast Cleaning - 1.0 Mil Surface Profile

1st Coat: 39-661 Silicone Aluminum	1.0 - 1.5
2nd Coat: 39-661 Silicone Aluminum	1.0 - 1.5
Dry Film Thickness	2.0 - 3.0
Minimum	2.0 Mils

3.26 SURFACES EXPOSED TO H2S/H2SO4 (SEVERE EXPOSURE/IMMERSION)

A. CEMENTITIOUS SURFACES

System No. 120-1: Vinester

Surface Preparation: Abrasive blast clean to remove all laitance, fines and contamination.

1st Coat: 120-5002 Vinester	6.0 - 10.0*
2nd Coat: 120-5003 Vinester F&S	As Required**
3rd Coat: 120-5002 Vinester	12.0 - 18.0
4th Coat: 120-5001 Vinester	12.0 - 18.0
Dry Film Thickness	30.0 - 46.0
Minimum	36.0 Mils+

*First coat is to be applied by roller application or spray applied followed by backrolling.

**All surface voids, cracks, pinholes and other defects must be filled flush with the adjacent surfaces by putty knife, trowel, float, squeegee, or other suitable method.

B. FERROUS METAL SURFACES

System No. 120-2: Vinyl Ester

Surface Preparation: SSPC-SP-5 White Metal Blast Cleaning (3.0 Mil Profile)

1st Coat: 120-5002 Vinester	12.0 - 18.0
2nd Coat: 120-5001 Vinester	12.0 - 18.0
Dry Film Thickness	24.0 - 36.0
Minimum	30.0 Mils

3.27 EXTERIOR OF PRESTRESSED CONCRETE TANKS

A. System No. 156-1: New Tanks

Surface Preparation: Surface to be clean and dry.

1st Coat: 156-Color Envirocrete	4.0 - 6.0
2nd Coat: 156-Color Envirocrete	4.0 - 6.0
Dry Film Thickness	8.0 - 12.0
Minimum	10.0 Mils

B. System No. 156-2: Existing Tanks (Previously Painted)

Major cracks (wider than 1/64") can be repaired with TNEMEC Series 152 Tneme-Tape per instructions.

Surface Preparation: Remove all dirt, oil, grease, chalk, and loose paint per high pressure water blast (min. 3500 psi).

1st Coat: 151 Elasto-Grip	1.0 - 2.5

Stripe Coat: Stripe all hairline cracks with a brushed coat of Series 156 Envirocrete	3.0 - 5.0
Topcoat: 156-Envirocrete	4.0 - 6.0
Dry Film Thickness (Cracks)	8.0 - 13.5
Dry Film Thickness (Other)	5.0 - 8.5

3.28 SECONDARY CONTAINMENT AREAS

A. System No. 66-4: Epoxy Polyamide

This system will provide excellent resistance to most chemicals including petrochemicals.

Surface Preparation: Surfaces shall be clean and dry. Allow new concrete to cure for 28 days. Abrasive Blast Clean per SSPC-SP7 (Brush Off Blast)

Primer: 66-Color Hi-Build Epoxoline	4.0 - 6.0
Topcoat: 66-Color Hi-Build Epoxoline	4.0 - 6.0
Dry Film Thickness	8.0 - 12.0
Minimum	10.0 Mils

B. System No. 61-1: Amine Epoxy

This system offers superior chemical resistance to a wide range of chemicals. Use TNEMEC Series 63-1500 between coats as a filler and surfacer wherever it is required.

Surface Preparation: Surfaces shall be clean and dry. Allow new concrete to cure for 28 days. Abrasive Blast Clean per SSPC-SP7 (Brush Off Blast).

Primer: 61-5002 Tneme-Liner (Beige)	8.0 - 12.0
Topcoat: 61-5001 Tneme-Liner (Gray)	8.0 - 12.0
Dry Film Thickness	16.0 - 24.0

C. System 262-1: Flexible Polyurethane

-

Multiple passes may be required to achieve recommended film thickness. See Elasto-Shield application guide for additional instructions. This product is only available in black.

Surface Preparation: Surfaces shall be clean and dry. Allow new concrete to cure for 28 days. Abrasive Blast Clean per SSPC-SP7 (Brush Off Blast)

Coating: 262 Elasto Shield (Black)

Minimum Dry Film Thickness 50.0

3.29 CLEAR WATER REPELLENT FOR CONCRETE, MASONRY AND BRICK

A. Silane Sealer (Min. 20% Solids)

Surface Preparation: Allow new concrete to cure 28 days. Clean surfaces to be sealed by abrasive blasting or waterblasting.

COATING: BRICK, CONCRETE
HULS Chem-Trete BSM 20....75-200 SF/GAL

SPLIT FACED OR POROUS MASONRY
HULS Chemtrete PB.....35-100 SF/GAL

3.30 MANHOLES, WET WELLS AND LIFT STATIONS

A. System No. 120-1: Vinester

Surface Preparation: Abrasive blast clean to remove all laitance, fines and contamination.

1st Coat: 120-5002 Vinester	6.0 - 10.0*
2nd Coat: 120-5003 Vinester F&S	As Required**
3rd Coat: 120-5002 Vinester	12.0 - 18.0
4th Coat: 120-5001 Vinester	12.0 - 18.0
Dry Film Thickness	30.0 - 46.0
Minimum	36.0 Mils+

*First coat to be applied by roller application or spray applied followed by backrolling.

**All surface voids, cracks, pinholes and other defects must be filled flush with the adjacent surfaces by putty knife, trowel, float, squeegee, or other suitable method.

B. System No. 100-1: Crystaline Waterproofing

This system can be applied to concrete that is still wet or has not developed final cure. It can be used where wet surface conditions exist or where there is the potential for water intrusion due to hydrostatic pressure.

Surface Preparation: Surface to be clean and roughened by Brush Blasting or Acid Etching.

1st Coat: XYPEX Concentrate @ 1.5 lbs./SY
2nd Coat: XYPEX Modified @ 1.5 lbs./SY

3.31 CANAL PIPE CROSSINGS

A. System 90-97: Zinc/Epoxy/Urethane for New Pipe or Pipe Requiring Removal of Existing Coatings

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Primer: 90-97 Tneme-Zinc	2.5 - 3.5
2nd Coat: 66-Color Hi-Build Epoxoline	2.0 - 3.0
3rd Coat: 74-Color Endurashield	2.0 - 3.0
Dry Film Thickness	6.5 - 9.5
Minimum	8.0 Mils

B. System No. 135-2: High Build, High Gloss Urethane for Marginally Cleaned Surfaces or

Topcoating Over Existing Systems

Surface Preparation: High Pressure Water Blast (min. 3500 psi) or Solvent Clean (SSPC-SP1) and Spot Hand and Power Tool Clean (SSPC-SP 2 & 3) or Brush Blast (SSPC-SP7). Existing coatings must be clean, dry and tightly adhering prior to application of coatings.

1st Coat: 135-Color Chembuild	3.0 - 4.0
2nd Coat: 74-Color Endurashield	2.0 - 3.0
	Minimum Dry Film Thickness 5.0

C. Ductile Iron Pipe (Above grade)

A test patch is always recommended to insure proper adhesion to existing coatings without lifting of existing coatings.

Surface Preparation: Clean and dry. (Do not solvent clean.)

1st Coat: TNEMEC Series 66*	3.0 - 5.0
2nd Coat: TNEMEC Series 66	3.0 - 5.0
	Minimum Dry Film Thickness 6.0 - 10.0

*Allow the black asphaltic coating to "bleed" through the first coat. After the first coat is cured, apply second coat.

3.32 PROJECT DESIGNER SYSTEMS REFERENCE GUIDE

A. STEEL

EXTERIOR (NON-IMMERSION)

A.1 System No. 73-1: Epoxy/High Build Urethane
A.2 System No. 73-2: High Build Urethane
A.3 System No. 2H-3: Alkyd Gloss
A.4 System 90-97: Zinc/Epoxy/Urethane

INTERIOR EXPOSURE (NON-IMMERSION)

B.1 System No. 69-1: High Solids Epoxy
B.2 System No. 66-2: High Build Epoxy
B.3 System No. 66-6: High Build Epoxy

IMMERSION

C.1 System No. 69-2: High Solids Epoxy (Non-Potable)
C.2 System No. 66-2: High Build Epoxy (Non-Potable)
C.3 System No. 20-1: Epoxy-Polyamide (Potable)
C.4 System No. 140: High Solids Epoxy (Potable Water)
C.5 System No. 46-30: High Build Coat Tar Epoxy (Non-Potable Only)
C.6 System No. 46-26: Coal Tar Epoxy (Non Potable Water Only)

B. OVERHEAD METAL DECKING, JOIST (INTERIOR EXPOSURE)

System No. 15-1: Uni-Bond

C. OVERHEAD METAL DECKING, JOINT (EXTERIOR EXPOSURE)

System No. 135-1: Chembuild

D. MILL COATED STEEL PIPE

System No. 66-3: Epoxy Polyamide

E. GALVANIZED STEEL-PIPE AND MISCELLANEOUS FABRICATORS

System No. 73-1: Epoxy/High Build Urethane

F. GALVANIZED STEEL-INTERIOR EXPOSURE (NON-IMMERSION) AND ALUMINUM IN CONTACT WITH CONCRETE

System No. 66-6: Polyamide Epoxy

G. GALVANIZED STEEL - IMMERSION (POTABLE WATER)

System No. 20-1: Epoxy Polyamide (Potable Water)

H. CHAIN LINK FENCES

System No. 22-1: Oil-Cementitious

I. CONCRETE

EXTERIOR-ABOVE GRADE

A.1 System No. 52-1: Modified Epoxy-Sand Texture
A.2 System No. 6-1: Acrylic Emulsion Low Sheen
A.3 System No. 156-1: Modified Acrylic Elastomer

EXTERIOR-BELOW GRADE

B.1 System No. 46-61: Coal Tar Pitch Solution
B.2 System No. 46-31: Coal Tar Epoxy
B.3 System No. 100-1: Crystaline Waterproofing

EXTERIOR/INTERIOR EXPOSURE (NON-IMMERSION)

C.1 System No. 6-1: Acrylic Emulsion Low Sheen
C.2 System No. 66-4: Epoxy-Polyamide
C.3 System No. 83-1: High Solids Catalyzed Epoxy

IMMERSION (POTABLE & NON-POTABLE)

D.1 System No. 66-4: Epoxy-Polyamide (Non-Potable)
D.2 System No. 104-5: High Solids Epoxy (Non-Potable)

D.3 System No. 46-31: High Build Coal Tar Epoxy (Non-Potable Only)
D.4 System No. 46-27: Coal Tar Epoxy (Non Potable Only)
D.5 System No. 20-2: Epoxy Polyamide (Potable)
D.6 System No. 139-2: Epoxy Polyamide (Potable)

INTERIOR EXPOSURE (NON-IMMERSION)

E.1 System No. 104-3: High Solids Epoxy
E.2 System No. 113-1: Acrylic Epoxy Semi-Gloss

J. CONCRETE FLOORS

A.1 System No. 67-1: Epoxy-Polyamide
A.2 System No. S67-1: Epoxy-Polyamide (Non-Skid)
A.3 System No. 73-12: Epoxy/Urethane
A.4 System No. 281-1: High Build Polyamide-Epoxy Flooring
A.5 System No. 221/281: Functional Flooring (Non-Slip)

K. POROUS MASONRY - EXTERIOR/INTERIOR EXPOSURE

A.1 System No. 52-2: Modified Epoxy-Sand Texture
A.2 System No. 6-2: Acrylic Emulsion, Low Sheen
A.3 System No. 66-15: Epoxy-Polyamide (Interior)
A.4 System No. 104-6: High Solids Epoxy (Interior Only)
A.5 System No. 113-1: Acrylic Epoxy Semi-Gloss (Interior Only)
A.6 System No. 156-1: Modified Acrylic Elastomer

L. GYPSUM WALLBOARD

A.1 System No. 111-5: Acrylic Epoxy
A.2 System No. 66-22: Hi-Build Epoxoline
A.3 System No. 6-1: Acrylic Emulsion, Low Sheen

M. WOOD EXTERIOR/INTERIOR EXPOSURE

A.1 System No. 23-4: Alkyd Semi-Gloss
A.2 System No. 6-5: Acrylic Latex

N. PVC PIPE EXTERIOR/INTERIOR EXPOSURE

A.1 System No. 66-23: Epoxy-Polyamide

O. INSULATED PIPE-INTERIOR EXPOSURE

A.1 System No. 6-1: Acrylic Emulsion, Low Sheen

P. HIGH HEAT SURFACES-FERROUS METAL

A.1 System No. 39-2: Silicone Aluminum (1200deg F Maximum)
A.2 System No. 39-4: Silicone Aluminum (600deg F Maximum)

Q. SURFACES EXPOSED TO H_2S/H_2SO_4 (SEVERE EXPOSURE/IMMERSION)

A.1 System No. 120-1: Vinester

R. EXTERIOR OF PRESTRESSED CONCRETE TANKS

A. System 156-1: New Tanks
B. System 156-2: System 156-2 Existing Tanks (Previously Painted)

S. SECONDARY CONTAINMENT AREAS

A. System No. 64-4: Epoxy Polyamide
B. System No. 61-1: Amine Epoxy
C. System No. 262-1: Flexible Polyurethane

T. CLEAR WATER REPELLENT FOR CONCRETE, MASONRY AND BRICK

A. Silane Sealer (Min. 20% Solids)

U. MANHOLES, WET WELLS & LIFT STATIONS

A. System No. 120-1: Vinester
B. System No. 100-1: Crystaline Waterproofing

V. CANAL PIPE CROSSINGS

A. System No. 90-97: Zinc/Epoxy/Urethane
B. System No. 135-2: High Build/High Gloss Urethane
C. Ductile Iron Pipe Above Grade: Series 66 High Build Epoxy

END OF SECTION

SECTION 09920 SEWPERCOAT SURFACING SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install and test the SewperCoat surface system and appurtenances complete for the rehabilitation of the lift stations listed in the Specifications and as shown on the Drawings.

B. The Contractor shall accurately field measure each individual lift station. The Contractor is reminded that each existing sewer field measurement shall be the sole responsibility of the Contractor.

C. The purpose of this Section is to obtain a dense and durable fiber reinforced concrete liner for the repair of voids for the restoration of structural integrity, and to provide corrosion resistance to concrete or any other masonry material.

1.02 RELATED WORK

A. Bypass pumping, surface cleaning, and removal and off-site disposal of rubble is the responsibility of the General Contractor.

1.03 SUBMITTALS

A. Submit to the County, shop drawings and schedules of all surface coating systems and appurtenances required. Submit design data and specification data sheets listing all parameters used in the surface coating system.

B. Submit to the County, within 30 days of the effective date of the Agreement, the name of the surface coating supplier, a list of materials to be furnished, and the qualifications (per 1.05 A) of the application contractor..

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

ASTM C882 Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete

ASTM D2247 Practice for Testing Water Resistance for Coatings in 100% Relative Humidity

B. For casted specimens:

ASTM 666 Test Method for Freeze Thaw - 600 Cycles (No Damage)

ASTM C596 Test Method for Shrinkage - 0% at 95% R.H.

ASTM C109 Test Method for Compressive Strength - 24 hr., 8,000 psi; 28 day, 9,000 psi.

ASTM C348 Test Method for Flexural Strength - 24 hr., 1,300 psi; 28 day, 1,400 psi.

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALIFICATIONS

A. The Contractor performing the surface coating work shall be fully qualified, experienced a minimum of seven years and equipped to complete this work expeditiously and in a satisfactory manner. The Contractor shall submit the following information to the County for review and approval before any surface coating work is performed.

1. The number of years of experience in performing this type of specialized work must be seven years minimum.
2. Name of the surface coating manufacturer and supplier for this work and previous work listed below. The Contractor shall be an approved installer as certified and licensed by the manufacturer and equipment supplier.
3. A list of clients that the Contractor has performed this type of work.
    a. The list shall contain names and telephone numbers of persons who can be called to verify previous satisfactory performance.
    b. Installation dates and a description of the actual work performed.
    c. The manufacturer shall provide an installation list of his product used for similar sewer lift station rehabilitation projects. The list shall provide the same information as required in paragraphs 3.a and 3.b above.

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

1.06 GUARANTEE

A. All surface coatings shall be guaranteed by the Contractor for a period of three years from the date of acceptance. During this period, all defects discovered in the surface coating as determined by the County, shall be repaired or replaced in a satisfactory manner at no cost to the County.

1.07 QUALITY ASSURANCE

All surface coating products shall be from a single manufacturer. The supplier shall be responsible for the provisions of all test requirements specified in ASTM Standards as applicable.

1.08 DELIVERY, STORAGE AND HANDLING

A. Care shall be taken in shipping, handling and placing to avoid damaging. Extra care will be necessary during cold weather construction. Any product damaged in shipment shall be replaced as directed by the County.

B. Any product showing deterioration, or which has been exposed to any other adverse storage condition that may have caused damage, even though no such damage can be

seen, shall be marked as rejected and removed at once from the work.

PART 2 EQUIPMENT

A. The equipment shall be clean and free of any hydrated or unhydrated Portland Cement to prevent acceleration of SewperCoat 2000 HS Regular.

B. Shotcrete shall be thoroughly mixed in machine before being dispatched to hopper. At this time, if specified, the addition of fibers (polypropylene, alkali resistant, nylon steel, etc.) should be conducted as well as predampening of SewperCoat (.5% by weight).

C. Water must be clean and potable. Warmer water may be used to accelerate setting time during "cold" temperatures.

D. Each batch should be entirely discharged before recharging begins.

E. The mixer should be cleaned thoroughly to remove all adherent materials from the mixing vanes and from the drum at regular intervals.

F. Mixer and predampened material that has stood 45 minutes during warm weather months shall be discarded.

G. Gauged water (predampen + nozzle) shall not exceed 0.60 gallons (U.S.) per 50 lbs. per bag of SewperCoat.

PART 3 EXECUTION

3.01 INSTALLATION

A. The Contractor shall clean each structure and shall dispose of any resulting material.

1. Use a high power jet wash at a minimum of 4000-6000 psi water pressure with a 20 percent muriatic acid wash to remove all dust, laitance, biological growths, grease, oil, paint, or other surface contaminants or coatings.
2. Coatings that cannot be removed shall be profiled via sand blasting to rough the surface sufficient to obtain and insure adequate bonding.
3. The Contractor shall completely remove all coated, scaly or unsound masonry material to achieve a good bonding surface.
4. In order to insure a good bond, the Contractor shall water blast the surface thoroughly so that it is moistened with water prior to application of SewerCoat 2000 HS Regular.

B. The Contractor shall conduct a visual inspection of each structure after it is cleaned. He shall remove all loose mortar and rubble, and prepare each station to receive surface coating as necessary by restoring walls and floors where required. All interior surfaces shall be prepared for surface coating as recommended by the manufacturer.

1. All cracks and other voids must be repaired and filled with suitable non-shrinking cements, sealants, or grouts. No latex materials will be allowed or resaturating grout materials.
2. All surfaces shall be clean and structurally sound prior to the application of the

surface coating.

3. No separate payment shall be made for any preparatory work required prior to application of the surface coating.

C. The Contractor shall notify the Project Manager and Utility Superintendent at least 48 hours in advance, giving the date, start time and estimated completion time for the work being conducted.

D. The Contractor shall provide bypass pumping of sewage flows (as required) where and when the rehabilitation work is being performed.

E. "Shooting" shall be from an angle as near perpendicular to the surface as practicable.

F. If flow of material at the nozzle is not uniform and slugs, sand spots, or wet sloughs result, the nozzleman shall direct the nozzle away from the work until the faulty conditions are corrected.

G. Shotcreting shall be suspended if:

1. Air velocity separates the cement from the aggregate at the nozzle.
2. Temperature approaches freezing and the newly placed shotcrete cannot be protected.

H. Shotcrete shall be applied in one or more layers to such total thickness as required to restore the area as detailed over the original lines of the adjoining surface, unless otherwise specified.

I. To prevent concrete "tearing", a gunned finish is appropriate. However, once material has been applied, it can immediately be trowelled or "wet" brushed.

J. In most instances, keeping doors closed should suffice for moist curing. However, the use of a curing compound may be desirable.

K. Once material is applied, caution should be taken to minimize exposure of direct sunlight and strong air movement. If this is the case, a curing compound (ASTM C309) should be applied after installation in addition to keeping doors closed. This is used for minimizing rapid evaporation of moisture.

L. Material shall be spray applied at a minimum of one-half inch thickness. This may be applied in one application.

M. Rebound materials shall not be reused.

3.02 FIELD TESTING AND ACCEPTANCE

A. Field acceptance of coating shall be based on the County's evaluation of the proper surfacing of the lift station and the appropriate installation and curing test data along with review of the inspections.

B. The coating shall provide a continuous surface with uniform thickness throughout the lift stations.

If the thickness of the coating is not uniform or is less than specified, it shall be repaired or replaced at no additional cost to the County.

1. The County will measure the coating cured thickness from a specimen retrieved by the Contractor. Retrieve the specimen by physically cutting through the surfacing (by drilling or coring). There will be up to three thickness measurement locations in each lift station. A suitable non-destructive type of thickness measurement may also be used.
2. All the coating thickness measurement locations shall be repaired by the Contractor in accordance with the manufacturer's recommendations. These repairs shall be included in the three year guarantee.

C. There shall be no cracks, voids, pinholes, uncured spots, dry spots, lifts, delaminations or other type defects in the lift station.

D. If any defective coating is discovered after it has been installed, it shall be repaired or replaced in a satisfactory manner within 72 hours and at no additional cost to the County. This requirement shall apply for the entire three year guarantee period.

END OF SECTION

SECTION 09970 SURFACE PROTECTION SPRAY SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install and test the coating system complete and ready for operation for the structures listed in the specifications and as shown on the Drawings.

B. The work includes coating of all surfaces as shown and specified on the Drawings. This includes, but is not limited to stairs, walls, floors, concrete divider, concrete slabs, manholes wet wells, and all other work obviously required to be coated 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.

1.02 RELATED WORK

A. Bypass pumping is the responsibility of the General Contractor.

B. Concrete surface cleaning in each lift station is the responsibility of the General contractor.

C. Removal and offsite disposal of rubble is the responsibility of the General Contractor.

1.03 SUBMITTALS

A. Submit to the County shop drawings and schedules of all surfacing systems and appurtenances required. Submit design data and specification data sheets listing all parameters used in the surfacing system design and thickness calculations based on applicable provisions of ASTM.

B. Submit to the County the name of the surfacing supplier, a list of materials to be furnished, and the qualification (per 1.05 A) of the application contractor.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

ASTM D-638
ASTM D-790

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALIFICATIONS

A. The Contractor performing the surfacing work shall be fully qualified, experienced a minimum of seven years and equipped to complete this work expeditiously and in a satisfactory manner. The Contractor shall submit the following information to the

County for review and approval before any surfacing work is performed.

1. The number of years of experience in performing this type of specialized work must be seven years minimum.

2. Name of the surfacing manufacturer and supplier for this work and previous work listed below. The Contractor shall be an approved installer as certified and licensed by the surfacing manufacturer and equipment supplier.

3. A list of clients that the Contractor has performed this type of work.

   a. The list shall contain names and telephone numbers of persons who can be called to verify previous satisfactory performance.

   b. Installation dates and a description of the actual work performed.

   c. The surfacing manufacturer shall provide an installation list of his product used for similar sewer rehabilitation projects. The list shall provide the same information as required in paragraphs 3.a and 3.b above.

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

1.06 GUARANTEE

All surfacing shall be guaranteed by the Contractor for a period of five years from the date of acceptance. During this period, all defects discovered in the surfacing, as determined by the County, shall be repaired or replaced in a satisfactory manner at no cost to the County, this shall include, but is not limited to, all work and costs associated with the shut down of any pump stations and all bypass operations needed for the proper repairs to be made.

1.07 QUALITY ASSURANCE

A. All surfacing products shall be from a single manufacturer. The supplier shall be responsible for the provisions of all test requirements specified in ASTM Standards D-638 and D-790 as applicable.

B. The Contractor shall employ specialty workers who have proven ability to perform the Work included herein. This will consist of a minimum of two years or two project experiences installing this product. This is a requirement for each and every employee.

1.08 DELIVERY, STORAGE AND HANDLING

A. Care shall be taken in shipping, handling and placing to avoid damaging. Any material damaged in shipment shall be replaced as directed by the County.

B. Any material showing deterioration, or which has been exposed to any other adverse storage condition that may have caused damage, even though no such damage can be seen, shall be marked as rejected and removed at once from the work.

PART 2 PRODUCTS

2.01 GENERAL

A. The material sprayed onto the surface shall be a urethane resin system formulated for the application within a sanitary sewer environment. The urethane will exhibit suitable corrosion resistance to corrosive gases and fluids found within domestic sanitary sewage. Unless dictated by varying effluent, the spray system shall be a urethane and exhibit the cured physical strengths specified herein.

B. When cured, the surface coating shall form a continuous, tight-fitting, hard, impermeable surfacing data which is suitable for sewer system service and chemically resistant to any chemicals or vapors normally found in domestic sewage.

C. The surface shall be an integral part of the structure being rehabilitated after being placed and cured. The surface shall cover the complete interior of the existing structure. The surface shall provide a continuous watertight seal or barrier.

1. The surface shall effectively seal the interior surfaces of the structure and prevent any penetration or leakage of groundwater infiltration.

2. Provide water resistance data on surface based on ASTM Standards.

3. The surface shall be compatible with the thermal conditions of existing sewer lift stations and manholes. Surface temperature will range from 30 to 80 degrees F. Provide test data on thermal compatibility based on ASTM Standards.

2.02 MATERIALS

A. Approved materials include

1. Aquatapoxy A-6 and Raven 405 epoxy by Raven Lining Systems
2. Green Monster
3. Sauereisen 210 system (210T & 210GL - Manatee County Light Brown Formula)
4. SpectraShield system
5. Spraywall Urethane by Sprayroq

B. Polyurethane spray application shall comply with the following specifications:

The cured urethane system shall conform to the minimum physical standards, as listed below. The long-term data is for a 50-year design life of the process.

Cured Urethane	Standard	Long-Term Data
Tensile Stress	ASTM D-638	5,000 psi
Flexural Stress	ASTM D-790	10,000 psi
Flexural Modulus	ASTM D-790	550,000 psi

C. Epoxy spray application shall be 100% VOC free / 100% solids.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

A. The contractor shall clean each structure and shall dispose of any resulting material.

B. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.

C. All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface or replaced.

D. Surface preparation method(s) should be based upon the conditions of the substrate, service environment and the requirements of the protective coating to be applied.

E. Surfaces to receive protective coating shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide a strong bond between the protective coating and the substrate. Generally, this can be achieved with a high pressure water cleaning using equipment capable of 5,000 psi at 4 gpm. Other methods such as abrasive blasting, shotblasting, grinding, scarifying or acid etching may also be used. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete. Whichever method(s) are used, they shall be performed in a manner that provides a uniform, sound clean neutralized surface that is not excessively damaged.

F. Infiltration shall be stopped by using a material which is compatible with and is suitable for topcoating with the specified protective coating.

G. The area between the manhole and the manhole ring and any other area that might exhibit movement or cracking due to expansion and contraction, shall be grouted with a flexible grout or gel before surface coating spray application.

H. All surfaces should be inspected by the Inspector during and after preparation and before the repair material is applied.

I. No separate payment shall be made for any preparatory work required prior to application of the surface coating.

3.02 INSTALLATION

A. The Contractor shall notify the Project Manager at least 48 hours in advance, giving the date, start time and estimated completion time for the work being conducted.

B. The Contractor shall provide bypass pumping of sewage flows (as required) where and when the rehabilitation work is being performed. No flows will be permitted in the structure until the spray coating has properly cured to the manufactures specifications.

C. The installation of the surface coating shall be in complete accordance with the applicable provisions of ASTM and the manufacturer's specifications. A representative of the manufacturer shall be present during the actual installation.

1. Prior to placing the surface coating, the manufacturer's representative must approve the surface preparation work and installation conditions including temperatures.

2. All surfaces shall be sufficiently smooth and even, to ensure good flow handling characteristics when complete.

3. All surfaces shall have the surface coating applied to the required thickness by spray application.

D. Application procedures shall conform to the recommendations of the protective coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.

E. The spray equipment shall be specifically designed to accurately ratio and apply the specified protective coating materials and shall be regularly maintained and in proper working order.

F. The protective coating material must be spray applied by a Certified Applicator of the protective coating manufacturer.

G. Polyurethane spray application shall be applied such that all surfaces shall be coated in accordance with the manufactures recommended thickness but not be less than 125 mils.

H. Epoxy spray application shall be applied such that all surfaces shall be coated in accordance with the following:

1. Specified surfaces shall be coated by spray application of a moisture tolerant, solvent-free, 100% solids, epoxy protective coating as further described herein. Spray application shall be to a minimum wet film thickness in accordance with the following table or manufacturer’s recommendation, whichever is greater:

Concrete, New/Smooth	80-100 mils for immersion, 60-80 mils for atmospheric, splash and spill exposure
Concrete, Rough	100-125+ mils
Masonry/Brick	125-150+ mils
Steel	16-80 mils for immersion, 16-40 mils for atmospheric, splash and spill exposure; also profile dependent
Fiberglass Systems	40-60 mils tack coat, 9 oz/yd2 fabric, 40-60 mils top coat. Varies with circumstances

2. Airless spray application equipment approved by the coating manufacturer shall

be used to apply each coat of the protective coating. Air assisted spray application equipment may be acceptable, especially for thinner coats (<10 mils), only if the air source is filtered to completely remove all oil and water.

3. If necessary, subsequent topcoating or additional coats of the protective coating should occur as soon as the basecoat becomes tack free, ideally within 12 hours but no later than the recoat window for the specified products. Additional surface preparation procedures will be required if this recoat window is exceeded.

3.03 FIELD TESTING AND ACCEPTANCE

A. Field acceptance of surface coatings shall be based on the County's evaluation of the proper surfacing of the structure and the appropriate installation and curing test data along with review of the structure inspections.

B. The surface coatings shall provide a continuous monolithic surfacing with uniform thickness throughout the structure interior. If the thickness of the coating surface is not uniform or is less than specified, it shall be repaired or replaced at no additional cost to the County.

1. The County will measure the surface cured thickness from a specimen retrieved by the Contractor. The Contractor shall retrieve the specimen by physically cutting through the surfacing (by drilling or coring). There will be up to three thickness measurement locations in each structure. A suitable non-destructive type of thickness measurement may also be used.

2. All the surface coating thickness measurement locations shall be repaired by the Contractor in accordance with the manufacturer's recommendations. These repairs shall be included in the five year surface coating guarantee.

C. All pipe connections shall be open and clear.

D. There shall be no cracks, voids, pinholes, uncured spots, dry spots, lifts, delaminations or other type defects.

E. If any defective surface coating is discovered after it has been installed, it shall be repaired or replaced in a satisfactory manner within 72 hours and at no additional cost to the County. This requirement shall apply for the entire five year guarantee period.

END OF SECTION

DIVISION 10 SPECIALTIES

SECTION 10520 FIRE EXTINGUISHERS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and install fire extinguishers and the requisite wall mounting brackets at the locations shown on the Contract Drawings. A fire extinguisher is to be furnished and mounted inside the electrical room, location designated by the County. The cost for the fire extinguisher is to be incorporated into the cost of the Electrical Building.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fire extinguishers shall be 10 pound capacity, dry chemical type, rated for A, B and C Class fires. Extinguishers shall be red enamel painted steel cylinders with indicating gauge and shall be as manufactured by Larsen's Manufacturing Company, Fyr-Fyter Company, or County Fire Equipment Company.

B. Brackets for wall mounting, as manufactured by extinguisher manufacturer, shall be furnished for all fire extinguishers.

PART 3 EXECUTION

3.01 INSTALLATION

A. Fire extinguishers and brackets shall be wall mounted.

B. Mount brackets 4 feet 6 inches above finish floor with expansion bolts or toggle bolts into concrete blocks.

END OF SECTION

DIVISION 13 SPECIAL CONSTRUCTION

SECTION 13340 LIFT STATION SPECIFICATION

PART 1 GENERAL

A. Furnish all labor, materials, equipment and incidentals required to install complete automatic, underground lift stations with all required equipment installed in a concrete wet well and adjacent above-ground valve assembly (and meter). The principal items of equipment shall include three submersible motor-driven sewage pumps, valves, internal piping, automatic pumping level controls, control panel and telemetry. All materials shall be new, without defects and of the best quality. All materials furnished and all work done shall be in strict accordance with the National Electrical Code and all local requirements and codes.

B. All lift stations that re-pump sewage from five (5) other lift stations and/or have a discharge flow 500 gpm or greater shall have an on-site generator equipped with an automatic power transfer switch, transducer level controls with backup float switches, submersible inline magnetic flow meter, and wet well level transmitter, along with an onsite fuel tank of no more than 540 gallons.

1.01 STRUCTURES AND EQUIPMENT

A. Lift Station Wet Well

The wet well shall be precast concrete with a full protective liner designed to accommodate the peak hour developmental flow from all contributing areas. See Contract Plans for wet well depth and elevation requirements.

Wet well shall be 12 feet in diameters with minimum 12 inch wall thickness.

All lift stations shall have a single gravity-flow influent pipe discharging into the wet well. Multiple gravity pipelines and force mains upstream shall all terminate at a separate manhole before flowing into the lift station wet well.

B. Above-ground Valve Assembly

1. Tri-plex stations have four gate valves and three check valves. The pump-out connection shall be equipped with a gate valve and a male aluminum quick-coupler, as shown on the Contract Plans. All valves shall have factory applied, fusion bonded epoxy coating on interior and exterior. All bolt, nuts and washers in or on the wet well or valve assembly shall be 316 stainless steel.

C. Access Doors (Hatches)

The lift station wet well valve shall be equipped with an aluminum access cover of adequate size to permit easy removal and installation of sewage pumps and equipment. All access covers shall be constructed of aluminum with a minimum load rating of 300 lbs/sq. ft. and equipped with stainless steel hinges, a recessed lifting handle which lies flush with the door surface, and a stainless steel staple which may be

used to secure the door with a padlock when closed. The doors shall have a raised diamond thread pattern to provide a skid-resistant surface and shall open to 90 degrees and lock automatically in that position, with a handle to release the doors for closing. The hatch assemblies shall be as manufactured by Bilco, Halliday or an approved equal.

D. Sewage Pump Assemblies

1. Pumping station shall have two identical, totally submersible sewage pump assemblies rated and suitable for continuous duty, underwater operation with a space for a third future pump as shown on the Contract Plans. These units and their associated power and signal cables shall have watertight integrity to a depth of 65 feet. The pump, pump motor and associated components shall all be the products of the same manufacturer. Pump assemblies shall be painted after assembly with an approved air dry enamel which will adequately protect the exterior housings from the corrosive environment in the wastewater sewer system; see Section 09900. Coating thickness shall be a minimum of 4 mils.

2. Factory testing of the pump assemblies shall be required and as a minimum, shall include:

   a. All tests recommended by the manufacturer.
   b. Verify the integrity of assembly and connections (no leaks, tightness of hardware, proper alignment, assembly, etc.) and that the nameplate and specified pump and pump motor (HP, Voltage, Phase and HZ) correspond.
   c. The motor windings and seal housing chambers shall be hi-potted to test for insulation defects and moisture content. Check the resistance of the stator windings with a bridge to verify that the readings of all three phases are basically equal and within tolerance.
   d. Energize pump motor, verify direction of rotation and that it corresponds to the nameplate.
   e. Provide a written report of all testing with the shipped pump.

3. All pumps assemblies shall be warranted against defects in workmanship and materials for whichever is the greater of: a minimum period of 18 months from the date of purchase or as provided in the Defect Security Agreement with the County.

4. Furnish and install submersible non-clog wastewater pump(s). Each pump shall be equipped with a 125 HP submersible electric motor, connected for operation on 460 volts, 3 phase service, see Section 16152 for motor requirements, with 100 feet of submersible cable (SUBCAB) suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards and also meet with P-MSHA Approval.

5. The pump shall be supplied with a mating cast iron 8 inch discharge connection and be capable of delivering 779 GPM at 204.7 FT. TDH and 1500 GPM at 180 FT. TDH. The pump(s) shall be automatically and firmly connected to the discharge connection, guided by no less than two guide bars extending from the top of the station to the discharge connection; see Contract Plans for discharge piping support requirements and spacing. There shall be no need for personnel to enter the wet-well. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact. Sealing of the

discharge interface with a diaphragm, O-ring or profile gasket will not be acceptable. No portion of the pump shall bear directly on the sump floor. Each pump shall be fitted with 50 feet of 1/2 inch lifting stainless steel chain or stainless steel cable. The working load of the lifting system shall be 50% greater than the pump unit weight.

6. Chains shall be attached to the pump lifting bails using stainless steel shackles and shall extend to the inside top of the wetwell. All rails and mounting hardware shall be stainless steel.

7. RYE ROAD PUMP STATION SPECIFIC PUMP REQUIRMENTS:

   a. Make/Model: Hydromatic (Model S8LA12500M4-4)
   b. Horse power: 125 HP
   c. Discharge Size: 8-inch
   d. Pump Speed: 1750 RPM
   e. Impeller Diameter: 14.38 inch
   f. Shutoff Head: 236 FT
   g. Curve Point 1: 779 GPM at 204.7 FT TDH, 54.55% Pump Efficiency minimum
   h. Curve Point 2: 1500 GPM at 180 FT TDH
   i. Modifications: Explosion Proof (X)
   j. See Section 16152 for motor requirements.

8. PUMP CONSTRUCTION

   a. Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts or bolts shall be of stainless steel construction. All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

   b. Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

   c. Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

   d. Each pump motor shall be sufficiently cooled by submergence in the pumped media.

9. CABLE ENTRY SEAL

   a. The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of

dual cylindrical elastomer grommets, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter. The grommets shall be compressed by the cable entry unit, thus providing a strain relief function. The assembly shall provide ease of changing the cable when necessary using the same entry seal. The cable entry junction chamber and motor shall be sealed from each other, which shall isolate the stator housing from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered equal.

10. BEARINGS

    a. The integral pump/motor shaft shall rotate on two bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease. The upper motor bearing shall be a two row angular contact ball bearing. The lower bearing shall be a two row angular contact ball bearing to handle the thrust and radial forces. The minimum L10 bearing life shall be 50,000 hours at any usable portion of the pump curve.

11. MECHANICAL SEALS

    a. Each pump shall be provided with a positively driven dual, tandem mechanical shaft seal system consisting of two seal sets, each having an independent spring. The lower primary seal, located between the pump and seal chamber, shall contain one stationary and one positively driven rotating corrosion and abrasion resistant tungsten-carbide ring. The upper secondary seal, located between the seal chamber and the seal inspection chamber shall be a leakage-free seal. The upper seal shall contain one stationary and one positively driven rotating corrosion and abrasion resistant tungsten-carbide seal ring. The rotating seal ring shall have small back-swept grooves laser inscribed upon its face to act as a pump as it rotates, returning any fluid that should enter the dry motor chamber back into the lubricant chamber. All seal rings shall be individual solid sintered rings. Each seal interface shall be held in place by its own spring system. The seals shall not depend upon direction of rotation for sealing. Mounting of the lower seal on the impeller hub is not acceptable. Shaft seals without positively driven rotating members or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces are not acceptable. The seal springs shall be isolated from the pumped media to prevent materials from packing around them, limiting their performance.

    b. Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and shall provide capacity for lubricant expansion. The seal lubricant chamber shall have one drain and one inspection plug that are accessible from the exterior of the motor unit. The seal system shall not rely upon the pumped media for lubrication.

    c. The area about the exterior of the lower mechanical seal in the cast iron housing shall have cast in an integral concentric spiral groove. This groove

shall protect the seals by causing abrasive particulate entering the seal cavity to be forced out away from the seal due to centrifugal action.

d. A separate seal leakage chamber shall be provided so that any leakage that may occur past the upper, secondary mechanical seal will be captured prior to entry into the motor stator housing. Such seal leakage shall not contaminate the motor lower bearing. The leakage chamber shall be equipped with a float type switch that will signal if the chamber should reach 50% capacity.

e. Seal lubricant shall be non-hazardous.

12. PUMP SHAFT

a. The pump and motor shaft shall be a single piece unit. The pump shaft is an extension of the motor shaft. Shafts using mechanical couplings shall not be acceptable. The shaft shall be ASTM/AISI 431 stainless steel. Shaft sleeves will not be acceptable.

13. IMPELLER

a. The impeller shall be of ASTM A-532 (Alloy III A) 25% chrome cast iron, dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, able to pass 3-inch solid. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The leading edges of the impeller shall be hardened to Rc 60 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impeller shall be locked to the shaft, held by an impeller bolt and shall be coated with alkyd resin primer.

14. VOLUTE / SUCTION COVER

a. The pump volute shall be a single piece grey cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. The insert ring shall be cast of ASTM A-532 (Alloy III A) 25% chrome cast iron and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

15. PROTECTION

a. Each pump motor stator shall incorporate three thermal switches, one per stator phase winding and be connected in series, to monitor the temperature of the motor. Should the thermal switches open, the motor shall stop and

activate an alarm. A float switch shall be installed in the seal leakage chamber and will activate if leakage into the chamber reaches 50% chamber capacity, signaling the need to schedule an inspection.

b. The thermal switches and float switch shall be connected to a control and status monitoring unit.

c. All electrical components used in or in conjunction with the sewage pump assembly shall be UL approved when UL approval is available for that type component. Temperature/moisture monitor shall be shipped separately to VFD supplier for installation in VFD.

E. Riser and Fittings

1. All force main piping and fittings within the wetwell and the valve vault from the pump base elbow to the check valve, shall be DR11 HDPE. Ductile iron and cast iron flanged fittings installed inside the wetwell shall be painted for submergence within corrosive environment per Section 09900. All connections of HDPE to iron bodied flange fittings in the wetwell shall be made using HDPE flange adapters with 316 stainless steel backup rings. All HDPE connections shall be thermal fused or electro-fused. All piping above grade shall be flanged ductile iron and all piping below grade shall be PVC DR 14 C-900 restrained via mechanical restraint.

2. All flanged fittings inside the wetwell and valve vault shall use stainless steel bolts, nuts and washers. All threads shall be treated with Bostik Never-Seez anti-seizing compound or approved equal. All bolts on the flange connection at the pump base elbows shall have two nuts with a lock washer between them or a nylon lock nut.

3. All stainless steel fasteners shall be treated with Never-Seez prior to assembly and torque according to the fitting manufacturer's recommendation. The bands around the piping shall be constructed from a minimum of 1 inch wide by 12 gauge stainless steel strap stock, shaped to fit the piping and sized to grip the piping without deforming the pipe when bolted to the braces.

4. The pipe support system shall be constructed using 4-inch stainless steel angle.

F. Hardware

Six (6) 316 stainless steel cable hooks shall be installed inside the wet well access opening for supporting the float switches and pump electric cables. The hook connection point shall be constructed from ¼" x 2" type 316 stainless steel flat stock with individual hooks constructed of ¼" type 316 stainless steel rod stock. Individual hooks shall be installed opposite on each side of the upper guide rail bracket for each pump to support the pump lifting chain and power cable. Hooks for the floats are to be installed on the opposite side from the pump guide rails. The pump power cable hook shall be constructed from ¼" x 1" type 316 stainless steel flat stock.

G. Painting and Coating

All paint and other coatings shall be applied in accordance with the product

manufacturer's specifications for the surfaces being coated. All iron body valves shall have a factory applied fusion bonded epoxy coating inside and outside. All ductile iron fittings shall have a 40-mil Protecto 401 or equal epoxy on the inside in accordance with manufacturer's specifications and an asphaltic coating on the outside. Above ground piping to be painted per Section 09900, color green.

H. Stilling Well

Stilling well shall be a 6" PVC stilling well mounted such that the top is available to an open hatch cover. The bottom of the stilling well shall have two 316 stainless steel bolt all the way through both sides, passing through the center of the pipe, approximately 4" from the base of the pipe. It shall have ½" diameter holes drilled around the circumference at a rate of one hole per inch of length for at least the full wetted height. All mounting hardware shall be 316 stainless steel.

I. Magnetic Flow Meter

Flow meter shall be rated for 0.05% accuracy with a polyurethane liner, flush electrodes, FM Class 1, Division 2, Groups A,B,C&D and shall be constructed for a flanged mount. Meter shall be supplied with a like size spool piece. The exterior control module/transmitter shall be mounted inside the control panel in the electrical building. Model shall be ABB model DN300, unless otherwise approved by the County.

J. Level Transducer

See 2.01.J of this Section for level sensor requirements.

K. Emergency Eye Wash and Shower Station

Emergency Eye Wash and Shower Station to be HAWS 8300CRP, or approved equal. Emergency Eye Wash and Shower Station to be installed with drain and drain area as shown in detail 4 on sheet C-206.

L. Rain Gauge
1. Type – Tipping bucket
2. Functional/Performance – Measure rainfall volume and/or rate at a resolution of
3. 0.01 mm. Measurement accuracy is +/-0.5% at a rate of 0.5 inch per hour.
4. Physical – All components shall be corrosion resistant
5. Manufacturers: Allweatherinc – 6011 series – Model 6011-A
6. Appurtenances as depicted on the detail 2 on sheet C-204.

2.01 ELECTRICAL

A. Service and Metering

The Contractor shall be responsible and shall pay for any permits, fees, and inspections required by the local power company for service installations. Three phase power shall be used unless otherwise approved by the County. The service voltage shall be 460V. No phase converters will be accepted. All lift stations shall be equipped with a knife-type fused safety switch in a NEMA 4X stainless steel enclosure, lockable in the ON and OFF position, between the service meter and the power panel to permit servicing of the main breaker without removing the service meter. All meter bases shall

be aluminum. Minimum service size shall be 600 amp. Conduit connections to the disconnect shall be sealed using Myers conduit hub connectors (disconnect side).

B. Conductors

All power conductors shall be single conductor, 600 volt, type THW or THHN stranded copper. Minimum conductor size shall be #12 AWG. ALUMINUM WIRE IS NOT PERMITTED. All control wiring shall be single conductor #14 AWG, 600 volt, type THHN stranded copper. All terminations and interconnections of control wiring shall be by means of compression-type lugs of the nylon self insulated type with an inner bronze insulation grip sleeve on identified terminal strips. All control wiring shall be color coded as indicated on the standard details.

C. Conduit

All power conductors from the utility source to the service meter shall be enclosed in PVC Schedule 80 conduit below ground (NO I.M.C. ALLOWED). All lift stations shall be equipped with one conduit to the wet well for each pump power cables and a separate conduit to the wet well for the control (floatball) and signal cables. In lift stations with large horsepower pumps and pumps equipped with sensor cables, the conduit size and quantity shall be determined by the County. All conduit to the lift station wet well shall be minimum 2" Schedule 80 PVC and shall be run by the shortest route possible. Minimum burial depth is 36". All terminations shall be made per the Drawings. No junction boxes mounted under control panel for pump and float cables will be accepted. All flexible conduit shall be non-metallic.

Duct Spacers/Supports:

1. High density polyethylene or high impact polystyrene.
2. Interlocking.
3. Provide 2 IN minimum spacing between conduits.
4. Accessories, as required:
    a. Hold down bars.
    b. Ductbank strapping.

Direct-Buried Conduit(s):

1. Install so that the top of the uppermost conduit, at any point:
    a. Is not less than 30 IN below grade.
    b. Is below pavement sub-grading.
2. Provide a uniform minimum clearance of 2 IN between conduits.
    a. Maintain the separation of multiple planes of conduits by one of the following methods:
        1) Install multilevel conduits with the use of conduit supports and separators to maintain the required separations, and backfill with flowable fill (100 PSI).
        2) Install the multilevel conduits one level at a time.
            a) Each level is backfilled with the appropriate amount of soil and compaction to maintain the required separations.

D. Control Panel

1. All lift stations shall have one automatic control panel. The control panel

enclosure shall be NEMA 4X and shall be made of 304 stainless steel. It shall be continuously welded at the seams and the welds are to be ground smooth. The enclosure shall be equipped with a rain shield and the door shall be sealed with a closed-cell neoprene door gasket. The outer door shall be held in the closed position with a 1/4-turn handle that has a minimum of three latching points. The door shall be padlock lockable in the closed position. The inner swing panel (dead front door) shall be stainless steel or aluminum with a continuous stainless steel piano type hinge, and shall have 1/4-turn handles at the top and bottom with single latch contact points each. Both doors shall be hinged on the same side. The enclosure backplate shall be 12 gage or thicker aluminum or stainless steel.

2. No fittings shall enter from the top or back of the control panel. All fittings shall enter the side or bottom of the control panel and shall penetrate the control panel with either sealing locknuts or Myers Hubs.

3. The overall control panel shall be a minimum of 30"x36"x12" deep and of adequate size to completely cover (without crowding) all wiring and components mounted inside it. It shall have provisions for the mounting of all basic and optional controls and instrumentation. Install engraved nameplates defining door mounted hardware. The electrical control panel shall have a complete wiring schematic which is laminated in plastic and attached to the inside of the outer control panel door.

4. All components shall be installed per the most current NEMA and NEC regulations and standards. The components shall be industrial NEMA rated (I.E.C. is not acceptable) and UL approved when UL approval is available for that particular type component. The components of the panel shall be held in place with stainless steel, slotted, plan head machine screws with star type washers. The panel shall be tapped to accept the mounting screws of the components and no self-tapping type screws shall be used. The control panel shall have the following items installed on the back plane or on aluminum high hats attached to the back plane, so the body of the component is flush with the dead front door to allow operation and reset of the components without opening the dead front door: main power breaker, control circuit breaker, G.F.I. duplex receptacle circuit breaker, and TCU-Pack telemetry/motor controller. The control panel shall have the following items installed directly to the back plane: grounding bar/lugs, terminal strips, RTU battery case, Input/Output device (RIO128), 2 inch PVC conduit for control and telemetry wiring and fuses, surge suppressor, and resistors for telemetry/controller. The control panel shall have one G.F.I. duplex receptacle installed on the dead front door. The exterior of the control panel shall have one flashing red light, and one audible alarm with reset button. The individual placement of all the components of the control panel shall be installed as indicated in the standard details.

E. Ratings

The controls shall be rated for 120V single-phase, 60Hz supply voltage. All control voltage to the wet well shall not exceed 24 volts d.c.

F. Wiring Method

All electrical panel components shall have individual neutral wires. All neutral wiring shall be connected via a Square D model SN12-125 neutral assembly. Wiring is to be continuous with no splices between connections. Provide a Square D model PK9GTA grounding bar at the bottom of the backplate. This grounding bar will be the central connection point of all ground wires for the system with the exception of the pump power cords and surge arresters. The pump power cords and surge arresters shall be grounded via individual ground lugs that are to be attached to the control panel back plane. Provide two 12 terminal, Ideal model 6YH68 terminal strips to make electrical connections in the control panel. One terminal strip shall be used exclusively for 24 volt DC connections (TB-1) and the other shall be used exclusively for 120 volt AC connections (TB-2). The power distribution block, neutral assembly, grounding bar and terminal strips shall be located as indicated in the standard details. Use stainless steel screws and fasteners for all wiring connections.

G. Circuit Breakers

The power panel shall be equipped with a main circuit breaker for a minimum size of service of 600 amps. The control panel shall be equipped with a main circuit breaker, a 20 amp circuit breaker for the flow meter and a minimum 20 amp circuit breaker for the 120 volt GFI protected convenience outlet that is mounted on the inner control panel door. All circuit breakers shall be mounted in the control panel. The circuit breakers shall be of the heavy duty thermal magnetic trip variety. For circuit breakers up to 100 amps, use Square D series QOU or County approved equal. For circuit breakers greater than 100 amps, use Square D Mag Guard series with adjustable trip.

H. Variable Frequency Drives

Pump motors shall each have a Variable Frequency Drive (VFD) as called for on the construction plans. The drives shall be equipped with under voltage release and overload protection on all three phases.. See Section 16370.

I. Lightning Arresters

There shall be a Ditek DTK Series, Category B lightning arrester/surge suppressor installed on the incoming power source. It shall be mounted on the bottom exterior of the safety switch enclosure and connected to the LOAD SIDE of the safety switch and overload reset.

The RTU circuit breaker shall also have a Ditek CM+Series lightning arrester/surge suppressor connected to the load side of the breaker wiring. These lightning arresters/surge suppressors shall be mounted with the supplied adhesive strip on the back of the high hat supporting the breakers. The exact model lightning arresters/surge suppressors shall be based on the voltage and number of phases of the protected circuits.

J. Liquid Level Switches and Sensors

Two float switches are to be installed in the wetwell to alarm and provide backup to the level transmitter. The switches shall be a single pole mechanical type switch (as manufactured by MDI, Connerly Manufacturing or approved equal). They shall be

designed to actuate when the longitudinal axis of the float is horizontal, and deactuate when the liquid level falls one inch below the actuation elevation. The switching arrangement shall be normally open when deactivated. The output leads shall be connected in the control panel as shown in the Drawings. The control voltage to the level switches shall be 24 volts DC. and the switches shall be sized to operate at that voltage. In addition to the above, the lift station shall have a Dylix Model GXS3 level transducer transmitter mounted inside a stilling well as the primary level sensor.

The wiring connecting the control panel to the wet well floats shall be a continuous length (no splices) of flexible rate 600 volt, minimum diameter of #18, type S.O. cable for each instrument or switch point. The float switches shall have all connections made inside the control panel. The wiring shall be installed so there is a minimum of four feet, and a maximum of 6 feet, of excess cable in the wetwell for relocation of the float switches.

K. Alarms

Each lift station shall have one flashing red light and one audible alarm with silence button to signal high level conditions. An automatic shutoff timer for the horn (variable setting 0-20 minutes) is to be installed in the control panel. A flasher unit shall be installed in the control panel to operate the flashing light. These components shall be mounted to the control panel.

L. Seal Leak Moisture Detector

Provide for each pump a moisture sensing sensor which will detect when moisture has penetrated the seal chamber. An indicating lamp is to be mounted on the VFD to also signal the seal failure.

N. Remote Terminal Unit

The remote terminal/pump control unit shall be a complete TCU Pack system as manufactured by Data Flow Systems, Inc. The unit is to be a fully programmable, dual function device. It shall be used to monitor and control SCADA equipment and it shall have all the necessary hardware and software to control three pump VFDs. Its operation is based on level inputs from a level transmitter and backup float ball switches in the wet well. It shall have the ability to control pump alternation, activate and deactivate remote and local alarms, and communicate with the TAC II SCADA System. It shall be equipped with RTU surge protection and a transient filter shield. The unit shall have an Uninterruptible Power Source and contain all the components and be electrically connected as indicated in the standard details. It shall be equipped with an antenna with supporting mast and coaxial cable that is required by the manufacturer for that particular system. The installation shall include the required FCC licensing. The antenna and mast shall be rated for 150 MPH winds. Lift stations that re-pump sewage flows from other lift stations will also require an Analog Monitor Module to receive input from the flow meter.

Provide foundation(s) adequate for the tower(s) and/or mast(s) including any specified future expansion. Provide all masts, supports, lightning suppressors, and other apparatus required to make a complete and operable radio telemetry system.

O. Grounding

Install 5/8" x 10' copper-clad ground rod for the electrical service. Connect to the ground rod with a ground clamp and run a #6 bare copper wire to connect with the control panel grounding bar. Provide another, separate ground rod, clamp and #6 bare copper wire to connect directly to the antenna mast.

P. Site Lighting

An LED light shall be mounted on the tower for illumination of the lift station area. The light shall be a RAB, WPLED18N, 4000K, 120VAC or equal, mounted on ¾" galvanized rigid conduit connected to the tower using 90 degree korns clamps. Fixture shall be equipped with photoelectric control.

4.01 WATER SERVICE

All lift stations shall be equipped with a 3/4" lock shield and loose key water service (hose bib) adjacent to the valve assembly. Each water service shall be equipped with a 5/8" water meter, a reduced-pressure principle backflow preventer (Watts Model 909 or Equal) and a 3/4" brass hose bib. The water meter and backflow preventer shall be located within two feet of the lift station easement (or property) line. All water meters shall be obtained from the Manatee County Meter Department.

5.01 PERMITS

The Contractor shall be responsible for obtaining and shall pay for any permits and/or inspections required.

6.01 SHOP DRAWINGS AND INSPECTIONS

When calling for inspection, the Contractor shall have these approved shop drawings available on-site for review by the inspectors. The Contractor shall also deliver to the Lift Station Section inspector, the pump manufacturer's technical manual with the model number, serial number, and certified pump curve, for each pump prior to acceptance by the County for maintenance.

7.01 EASEMENTS

An easement for ingress and egress to the lift station and an easement for the lift station must be granted and recorded before the lift station can be accepted by the County for operation and maintenance.

8.01 LANDSCAPING

The Contractor shall be responsible for providing a landscaped screening or buffer with irrigation and shall maintain the lift station site in accordance with the Manatee County Land Development Code Section 715 unless a waiver is requested and approved by the Department of Public Works Director or his designee.

9.01 FLOODING

Wastewater pumping station structures and electrical and mechanical equipment shall be fully protected from physical damage and flood water intrusion by the 100 year flood. Wastewater pumping stations should remain fully operational and accessible during the 25 year flood. Regulations of state and federal agencies regarding flood plain obstructions shall be considered.

10.01 ACCESSIBILITY AND SECURITY

The pumping station shall be readily accessible by maintenance vehicles during all weather conditions and during all stages of development construction. The facility shall be located off the traffic way of streets and alleys. Security fencing and access hatches with locks shall be provided.

END OF SECTION

SECTION 13350 PS-355 LIFT STATION REHABILITATION

PART 1 GENERAL

The Contractor shall furnish all labor, materials, equipment and incidentals required to remove / replace and install the pumps and appurtenances and perform other rehabilitation work as noted on the drawings and within these specifications. The principal items of equipment shall include replacement of two submersible motor-driven sewage pumps and existing control panel upgrades as needed for new pump installation. Existing vault to be re-coated, vegetation to removed from fence line, above ground piping to be repainted, and double swing gate replaced. The existing generator is to be salvaged and slab to be demolished.

All materials shall be new, without defects and of the best quality and be ordered from Barney's Pumps. All materials furnished and all work done shall be in strict accordance with all local requirements and codes.

1.01 EQUIPMENT, MATERIALS AND WORK

A. Pumps

1.	Make/Model:	Hydromatic S4N
2.	Horespower:	5 HP
3.	Discharge Size:	Match Existing
4.	Impeller:	6.70 inch
5.	Operating Point:	210 gpm at 30 ft TDH

See Section 13340 (1.01.D) for additional pump requirements.

B. Pump Appurtenances:

Contractor to remove and replace discharge elbow, pump base mounting plate, guide rails, mounting brackets, rail supports, lifting chains, and appurtenances necessary for pump replacement. Parts are to be ordered from Barney's Pumps. Contractor to coordinate with Barney's pumps and County with respect to item lead times, station shutdown, station testing and startup.

1. Lifting chains shall be 3/8" stainless steel type 316 attached to the pump lifting bail using stainless steel shackles.
2. All pump mounting systems shall be of the front loading slide rail type BPIU, from Barney's Pump.
3. All rails and mounting hardware and other hardware shall be 316 stainless steel.
4. All nuts, bolts, washer, fasteners, brackets, and other hardware installed in the wetwell shall be type 316 stainless steel.
3. Pump base plate to be per installed if not currently present and reusable and meet same requirements as noted for the Rye Road MPS detail.

C. Painting and Coating

1. All paint and other coatings shall be applied in accordance with the project

manufacturer's specifications for the surfaces being coated. The interior surfaces of the vault shall be coated with two coats of Tnemec Series 69 Hi-Build epoxy coating or equal.

2. The exterior of all ductile iron pipe, fittings and valves shall be per sections 02615 or 02640 and 09900 of these specifications.

D. Water backflow preventer assembly to be replaced and painted.

E. Gate to be replaced, see drawings for detail.

F. Fence line to be de-vegetated.

G. Existing generator and fuel tank to be salvaged. Generator slab foundation to be demolished and disposed.

2.01 ELECTRICAL

A. Conduit: Contractor to install new conduits if needed but will reuse existing if possible. Cost of new conduit would be considered incidental to the work effort and covered under the cost for the new pump furnish and installation.

B. Control Panel is existing. Contractor to coordinate with Barney's pumps for pump breaker and overload replacement within the existing control panel.

3.01 PERMITS

The Contractor shall be responsible for and shall pay for any permits and/or inspections required; such as, the County building department permit.

4.01 SHOP DRAWINGS AND INSPECTIONS

Shop drawings shall be submitted for approval in accordance with these Specifications prior to construction. When calling for inspection, the contractor should have these approved drawings available for review by the inspectors prior to acceptance by the County for maintenance. All inspections shall be arranged by contacting the Project Manager.

5.01 LANDSCAPING

The Contractor shall grade and fill the construction area to its original lines and grades and sod all disturbed or damaged grassed areas. Unless noted otherwise on the plans, the County shall restore the landscaping and shrubs around the lift station.

6.01 LINER REPAIRS

The contractor shall repair all existing liners in accordance with the manufacturer's recommendations. All HDPE and PVC liner repairs shall be performed by a contractor certified by the liner manufacturer to install and repair the liner.

END OF SECTION

DIVISION 15 MECHANICAL

SECTION 15094 PIPE HANGERS AND SUPPORTS

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals and install pipe hangers, supports, concrete inserts and anchor bolts including all metallic hanging and supporting devices for supporting exposed piping.

1.02 QUALIFICATIONS

A. Hangers and supports shall be of approved standard design where possible and shall be adequate to maintain the supported load in proper position under all operating conditions. The minimum working factor of safety for pipe supports shall be five (5) times the ultimate tensile strength of the material.

Note: Lift Stations have their own pipe support hanger and support design and detail, shown in the Utility Standards if not shown on the plans.

B. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the Contractor shall submit a certification stating that such requirements have been complied with.

1.03 SUBMITTALS

A. Submit to the County for approval, as provided in the Contract Documents, shop drawings of all items to be furnished under this Section.

B. Submit to the County, for approval, samples of all materials specified herein.

C. All pipe hangers, supports, hanger rods, clamps, concrete inserts and wall brackets, etc., whether specified or not, shall be submitted (together with load calculations) to the County for approval, if requested.

PART 2 PRODUCTS

2.01 GENERAL

A. All pipe and tubing shall be supported as required to prevent significant stresses in the pipe or tubing material, valves, and fittings and to support and secure the pipe in the intended position and alignment. All supports shall be designed to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe, and personnel contact. All pipe supports shall be approved prior to installation.

B. All materials used in manufacturing hangers and supports shall be capable of meeting the respective ASTM Standard Specifications with regard to tests and physical and chemical properties, and be in accordance with MSS SP-58.

C. Hangers and supports shall be spaced in accordance with ANSI B31.1.0 except that the maximum unsupported span shall not exceed 10 feet unless otherwise specified herein.

D. Unless otherwise specified herein, pipe hangers and supports shall be as manufactured by Grinnell Co., Inc., Carpenter and Patterson, Inc., or equal. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product and shall not be considered as proprietary. Any item comparable in type, style, quality, design and performance will be considered for approval.

2.02 PIPE HANGERS AND SUPPORTS FOR METAL PIPE

A. Suspended single pipes shall be supported by hangers suspended by steel rods from galvanized concrete inserts, beam clamps, or ceiling mounting bolts.

The following sizes are minimum requirements and are subject to the County's approval:

1. Hanger rods shall be rolled steel machine threaded with load ratings conforming to ASTM Specifications and the strength of the rod shall be based on root diameter. Hanger rods shall have the following minimum diameters:

Pipe Size, Inches	Min. Rod Diameter, In.
Less than 2-1/2	3/8
2-1/2 through 4	1/2
4	5/8
6	3/4
8-12	7/8
14-18	1
20-30	1-1/4
Above 30	See SPECIAL SUPPORTS Paragraph 2.04

2. Where applicable, structural attachments shall be beam clamps. Beam clamps, for rod sizes 1/2-inch through 3/4-inch shall be equal to Grinnell Fig. No. 229, and for rod sizes 7/8-inch through 1-1/4 inches shall be equal to Grinnel Fig. No. 228, or equal.
3. Concrete inserts for pipe hangers shall be continuous metal inserts designed to be used in ceilings, walls or floors, spot insets for individual pipe hangers, or ceiling mounting bolts for individual pipe hangers and shall be as manufactured by Unistrut Corp., Wayne, Michigan; Carpenter and Patterson, Inc., Laconia, New Hampshire; Richmond or equal and shall be as follows:
   a. Continuous concrete inserts shall be used where applicable and/or as shown on the Drawings and shall be used for hanger rod sizes up to and including 3/4-inch diameter. Inserts to be used where supports are parallel to the main slab reinforcement shall be Series P3200 by Unistrut Corp., Fig. 1480 Type 2 by Carpenter and Patterson, Inc. or equal. Inserts to be used where supports are perpendicular to the main slab

reinforcement shall be Series P3300 by Unistrut Corp., Fig. 1480 Type I by Carpenter and Patterson, Inc., or equal.

b. Spot concrete inserts shall be used where applicable and shall be used for hanger sizes up to and including 7/8-inch diameter. Inserts shall be Fig. 650 by Carpenter and Patterson, Inc. for hanger rod sizes 1/2-inch through and including 3/4-inch and Fig. 266 by Carpenter and Patterson, Inc., for 7/8-inch hanger rods.

c. Ceiling mounting bolts shall be used where applicable and be for hanger rod sizes 1-inch through and including 1-1/4 inches shall be Fig. 104M as manufactured by Carpenter and Patterson, Inc. or equal.

d. All pipe hangers shall be capable of vertical adjustment under load and after erection. Turnbuckles, as required and where applied, shall be equal to Grinnell Fig. No. 230.

4. Wall or column supported pipes shall be supported by welded steel brackets equal to Grinnell Fig. 194, 195 and 199 as required, for pipe sizes up to and including 20-inch diameter. Additional wall bearing plates shall be provided where required.

   a. Where the pipe is located above the bracket, the pipe shall be supported by an anchor chair and U-bolt assembly supported by the bracket for pipes 4-inches and larger or by a U-bolt for pipes smaller than 4-inches. Anchor chairs shall be equal to Carpenter & Patterson Fig. 127. U-bolts shall be equal to Grinnell Fig. 120 and 137.

   b. Where the pipe is located below the bracket, the pipes shall be supported by pipe hangers suspended by steel rods from the bracket. Hangers and steel rods shall be as specified above.

   c. Wall or column supported pipes 2-inches and smaller may be supported by hangers equal to Carpenter and Patterson Figures 74, 179 or 237 as required.

5. Floor supported pipes 3-inches and larger in diameter shall be supported by either cast-in-place concrete supports or adjustable pipe saddle supports as directed by the County. In general, concrete supports shall be used when lateral displacement of the pipes is probable (unless lateral support is provided), and adjustable pipe saddle type supports shall be used where lateral displacement of the pipes is not probable.

   a. Each concrete support shall conform to the details shown on the Drawings. Concrete shall be poured after the pipe is in place with temporary supports. Top edges and vertical corners of each concrete support shall have 1-inch bevels. Each pipe shall be secured on each concrete support by a wrought iron or steel anchor strap anchored to the concrete with cast-in-place bolts or with expansion bolts. Where directed by the County, vertical reinforcement bars shall be grouted into drilled holes in the concrete floor to prevent overturning or lateral displacement of the concrete support. Unless otherwise approved by the County, maximum support height shall be five (5) feet.

   b. Concrete piers used to support base elbows and tees shall be similar to that specified above.

      Piers may be square or rectangular.

   c. Each adjustable pipe saddle support shall be screwed or welded to the corresponding size 150 lb. companion flanges or slip-on welding flanges respectively. Supporting pipe shall be of Schedule 40 steel pipe construction. Each flange shall be secured to the concrete floor by a minimum of two (2) expansion bolts per flange. Adjustable saddle

supports shall be equal to Grinnell Fig. No. 264. Where used under base fittings, a suitable flange shall be substituted for the saddle.

d. Floor supported pipes less than 3-inches shall be supported by fabricated steel supports.

6. Vertical piping shall be supported as follows:
   a. Where pipes change from horizontal to vertical, the pipes shall be supported on the horizontal runs within two feet of the change in direction by pipe supports as previously specified herein.
   b. For vertical runs exceeding 15 feet, pipes shall be supported by approved pipe collars, clamps, brackets, or wall rests at all points required to insure a rigid installation.
   c. Where vertical piping passes through a steel floor sleeve, the pipe shall be supported by a friction type pipe clamp which is supported by the pipe sleeve. Pipe clamps shall be equal to Grinnell Fig. 262.
7. Anchor bolts shall be equal to Kwik-Bolt as manufactured by Hilti Fastening Systems, Tulsa, Oklahoma or Wej-it manufactured by Wej-it Expansion Products, Inc., Bloomfield, Colorado.
8. All rods, hangers, inserts, brackets, and components shall be furnished with galvanized finish.

2.03 PIPE HANGERS AND SUPPORTS FOR PLASTIC PIPE

A. Single plastic pipes shall be supported by pipe supports as previously specified herein.

B. Multiple, suspended, horizontal plastic pipe runs, where possible, and rubber hose shall be supported by ladder type cable trays such as the Electray Ladder by Husky-Burndy, the Globetray by the Metal Products Division of United States Gypsum, or equal. Ladder shall be of mild steel construction. Rung spacing shall be approximately 18 inches for plastic pipe and 12 inches for rubber nose. Tray width shall be approximately 6-inch for single runs of rubber hose and 12 inches for double runs of rubber hose. Ladder type cable trays shall be furnished complete with all hanger rods, rod couplings, concrete inserts, hanger clips, etc. required for a complete support system. Individual plastic pipes shall be secured to the rungs of the cable tray by strap clamps or fasteners equal to Globe Model M-CAC, Huskey-Burndy Model SCR or equal. Spacing between clamps shall not exceed 9 feet. The cable trays shall provide continuous support along the length of the pipe.

C. Individual clamps, hangers, and supports in contact plastic pipe shall provide firm support, but not so firm as to prevent longitudinal movement due to thermal expansion and contraction.

2.04 SPECIAL SUPPORTS

A. The pipes shall be supported by means of a supporting framework suitably anchored into the floor or curbing. The vertical piping shall be suitably secured to horizontal support members connected at each end to vertical support members and spaced as required to provide a rigid installation.

1. The complete supporting system shall be as manufactured by the Unistrut Corporation, Globe-Strut as manufactured by the Metal Products Division of U.S. Gypsum, or equal.
2. Vertical and horizontal supporting members shall be U-shaped channels similar

to Unistrut Series P1000. Vertical piping shall be secured to the horizontal members by pipe clamps or pipe straps equal to Unistrut Series P1100M and Series P2558. All components shall be of mild steel.

3. The assemblies shall be furnished complete with all nuts, bolts, and fittings required for a complete assembly.
4. The design of each individual framing system shall be the responsibility of the Contractor. Shop drawings shall be submitted and shall show all details of the installation including dimensions and types of supports.

B. Any required pipe supports for which the supports specified in the Section are not applicable, including pipe supports for above 30-inch pipe, shall be fabricated or constructed from standard aluminum shapes in accordance with Specifications, concrete and anchor hardware similar to items previous specified herein and shall meet the minimum requirements listed below and be submitted to the approval of the County.

1. Pipe support systems shall meet all requirements of this Section and all related Sections of this Specification.
2. Complete design details of the entire pipe support systems shall be provided by the Contractor, for approval by the County.
3. The pipe support system shall not impose loads on the supporting structures, in excess of the loads for which the supporting structure is designed.
4. Hanger rods for above 30-inch pipe shall be a minimum of 1-1/2 inch diameter and shall not exceed the manufacturer's standard maximum recommended safe load.

C. Pipe supports in lift stations shall be as shown in the Utility Standards details.

PART 3 EXECUTION

3.01 INSTALLATION

A. All pipes, horizontal and vertical, shall be rigidly supported from the building structure by approved supports. Supports shall be provided at changes in direction and elsewhere as shown in the Drawings or specified herein. No piping shall be supported from other piping or from metal stairs, ladders, and walkways, unless it is so indicated on the Drawings, or specifically directed or authorized by the County.

B. All pipe supports shall be designed with liberal strength and stiffness to support the respective pipes under the maximum combination of peak loading conditions to include pipe weight, liquid weight, liquid movement, and pressure forces, thermal expansion and contraction, vibrations, and all probable externally applied forces. Prior to installation, all pipe supports shall be approved by the County.

C. Pipe supports shall be provided to minimize lateral forces through valves, both sides of split type couplings, and sleeve type couplings and to minimize all pipe forces to pump housings. Pump housings shall not be utilized to support connecting pipes.

D. Pipe supports shall be provided as follows:

1. Cast iron and ductile iron shall be supported at a maximum support spacing of 10 feet-0-inches with a minimum of one support per pipe section at the joints.
2. Supports for multiple PVC pipes shall be continuous wherever possible.

Individually supported PVC pipes shall be supported as recommended by the manufacturer except that support spacing shall not exceed five (5) feet.

3. Support spacing for galvanized steel pipe and copper tubing shall not exceed five (5) feet.
4. All vertical pipes shall be supported at each floor or at intervals of at least 15 feet by approved pipe collars, clamps, brackets, or wall rests and at all points necessary to insure rigid construction.

E. Pipe supports shall not result in point loadings, but shall distribute pipe loads evenly along the pipe circumference.

F. Effects of thermal expansion and contraction of the pipe shall be accounted for in pipe support selection and installation.

G. Inserts for pipe hangers and supports shall be installed on forms before concrete is poured. Before setting these items, all drawings and figures shall be checked which have a direct bearing on the pipe locations. Responsibility for the proper location of pipe supports is included under this Section.

H. Continuous metal inserts shall be embedded flush with the concrete surface.

3.02 PRIME COATING

A. Prior to prime coating, all pipe hangers and supports shall be thoroughly clean, dry, and free from all mill-scale, rust, grease, dirt, paint, and other foreign substances to the satisfaction of the County.

B. All submerged pipe supports shall be prime coated with TNEMEC 69-1211 Epoxy Primer or equal. All other pipe supports shall be prime coated with TNEMEC 66-1211, or equal.

C. Finish coating shall be compatible with the prime coating used and shall be applied as specified in the Contract Documents.

END OF SECTION

SECTION 15500 AIR CONDITIONING SYSTEM

PART 1 GENERAL

1.01 SCOPE

Furnish and install a complete air conditioning system for climate control. The system shall be tonnage noted on Premanufactured Building plans, provided as attachment and designed by others, high efficient air conditioning unit manufactured by Carrier, York or approved equal, with a minimum SEER rating of 12. The system shall include all necessary components to insure a complete operable system. The major components shall include inside air handler/evaporator unit, outside condensing unit, duct system, condensate line, thermostat, electrical power and wiring.

1.02 CODES AND STANDARDS

All work performed under this specification shall conform to the requirements of the latest edition of the following codes and standards as modified by local ordinances:

NFPA Compliance: Comply with applicable provisions of ANSI/NFPA 70 ANational Electric Code@. Also conform to Pamphlet 90A of NFPA.

Flame-Smoke Ratings: Provide air handling unit thermal insulation with flame-spread index of 25 or less, fuel-contributed index of 50 or less, and smoke-developed index of 50 or less.

AMCA Standards: Comply with Air Movement and Control Association (AMCA) standards as applicable for testing and rating fans, and testing louvers, dampers and shutters.

SMACNA Compliance: Comply with Sheet Metal and Air-Conditioning Contractors National Association (SMACNA) duct work construction standards.

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Handbook.

ARI Certification: Provide central station packaged air handling units which comply with Air-Conditioning and Refrigeration Institute (ARI) Standard 430 and display ARI=s certification symbols.

UL Compliance: Provide electric components for air handling units which have been listed and labeled by Underwriters Laboratories.

Construction shall comply with ANSI B9.1 safety code.

Standard Building Code.

Standard Mechanical Code.

National Warm Air Heating and Air Conditioning Association - Manual 4.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver all components in factory-fabricated protective containers.

B. Handle all components carefully to avoid damage to components, enclosures and finish. Do not install damaged components; replace and return damaged components to manufacturer.

C. Store all components in clean dry place and protect from weather and construction traffic.

1.04 SUBMITTALS

A. Thoroughly coordinated shop drawings shall be submitted for approval.

1. Submit shop drawings and complete performance data for all major pieces of equipment, showing dimensions arrangement, connection sizes, electrical wiring diagram, power requirements and clearances required for access of service. Shop drawings shall include factory certification that the equipment has the required capacity, or shall include copies of manufacturer=s published performance data.
2. Equipment proposed will require complete shop drawings, which clearly show how the equipment fits the available space and in relation to adjacent equipment, with all connections shown such as piping and duct work.
3. Provide submittal data for major component, air distribution devices, installation materials and duct work.
4. Submit for approval complete power and control field wiring diagrams.
5. Submit for approval a drawing indicating location and sizes of all wall penetrations and supports required for this work.

B. All shop drawings submitted for approval shall be stamped by the Contractor before submission to indicate that the shop drawings are complete, checked and comply with all aspects of the requirements of all Contract Documents.

C. Shop drawing approvals by the County will not relieve the Contractor from responsibility for his own errors, nor from his responsibility for full compliance with the Contract Documents.

D. All data and drawings shall be submitted simultaneously in an indexed booklet.

E. Warranty for the equipment under this Section.

1.05 OPERATING AND MAINTENANCE MANUALS

A. When the installation is completed, submit to the County, one copy of the following, bound in a hard cover booklet:

1. General operating instructions, including copies of posted specific instructions and automatic control diagrams.
2. Maintenance instructions, followed by tabulated manufacturer=s descriptive literature, shop drawings, performance curves and rating data, spare parts lists and manufacturer=s maintenance manuals.
3. Names, addresses and telephone numbers of local service representatives of the manufacturer=s of the installed equipment.

PART 2 PRODUCTS

2.01 OUTSIDE CONDENSING UNIT

A. Provide factory assembled self-contained, air cooled condensing unit, complete with compressor section, integral condenser, all necessary controls and interconnecting

refrigerant piping. Furnish manufacturer=s five (5) year parts and labor warranty for motor compressor.

B. All components shall be protected against corrosion and shall be mounted in a steel casing of a minimum of 14-gauge panels with steel angle framing and adequate access panels for inspection and maintenance.

C. Provide all piping, valves, and fittings required to properly interconnect all system components.

D. Tubing for coils shall be copper; fins shall be aluminum.

2.02 INSIDE AIR HANDLER/EVAPORATOR UNIT

A. Casing walls shall be fabricated of continuous galvanized steel and coated with baked enamel finish not lighter than 18 gauge. Removable panels shall provide access to the interior of the unit.

B. Fan and coil sections shall be internally insulated with 1-inch thick, 3 lb. density neoprene coated fiberglass. Insulation shall be secured to the casing with waterproof adhesive and permanent fasteners.

C. Fan wheel shall be forward curved type, non-overloading, and keyed to the shaft. Fan wheel shall be dynamically and statically balanced at factory.

D. V-belt driven fan shall be designed for 50 percent overload capacity.

E. Bearings shall be designed for a minimum of 200,000 hours average life.

F. Coil section shall encase cooling coils and drain pan. Coils shall be arranged for horizontal air flow. Coil headers, valves and all piping shall be completely enclosed within the insulated casing.

G. Tubing for coils shall be copper. Fins shall be aluminum.

H. Drain pan shall be galvanized steel, with a heavy coat of mastic.

I. Filter Section: Filter section shall be designed to hold throwaway filters.

2.03 SHEET METAL DUCTWORK

A. All round and rectangular sheet metal duct work shall be fabricated from galvanized sheet steel complying with ASTM A 527, Lock forming Quality; with G 90 zinc coating in accordance with ASTM 525. Zinc coating shall be of uniform thickness; free from blisters, slivers and pits; and capable of withstanding normal sheet metal forming operating without flaking or splitting.

B. Joints, gauge, reinforcement and fabrication techniques shall conform to minimum standards listed in SMACNA AHVAC Duct Construction Standards@ using actual duct dimensions and system pressures.

C. Ductwork shall be installed in strict accordance with manufacturer=s recommendations and in compliance with SMACNA AHVAC Duct Construction Standards@.

D. Thermal Insulation:

1. Insulation material shall be similar in all respects to that manufactured by Owens-Corning, Certainteed, Armstrong, or equal. Exterior wrap for sheet metal shall be type 703 FRK 25. Provide and install all thermal insulation for the HVAC system.
2. Except for materials which are subsequently exempted, all other materials used as part of the thermal insulation shall have a fire hazard rating not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed.

E. Components:

1. Provide all adhesives, sealers, vapor barrier coatings, etc., compatible with the material to which they are applied. They shall not corrode, soften, or otherwise attack such material in either the wet or dry state and must be suitable for the service temperature.

F. Ceiling Diffusers:

Provide adjustable-blade high-performance louver with 6" frame depth, constructed of extruded aluminum.

G. Sound Adsorption and Isolation:

Neoprene vibration isolation supports shall be provided on the air conditioning unit and other equipment that may transmit noise or vibration to the building structure.

2.04 TEMPERATURE CONTROLS

Furnish and install a heavy duty corrosion resistant wall mounted thermostat with locking cover. Use Carrier thermostat control or equal.

PART 3 TESTING AND BALANCING

A. The Contractor shall test and balance the air conditioning system.

B. The term Aair conditioning systems@ shall be understood and intended to mean all air conditioning supply systems, and all associated equipment and accessories.

PART 4 EXECUTION

4.01 GENERAL

A. Install the air conditioning system where indicated, in accordance with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that units comply with requirements and serve intended purposes.

B. Coordinate with other work, including plumbing, ceiling and truss construction, roof

decking, electric, piping, and overhead crane system as necessary to interface installation of air handling units with other work.

C. Install air handling unit on vibration mounts and comply with manufacturer=s indicated installation method.

D. Spare Parts:

1. Provide one complete extra set of filters for the air handling unit. Install new filters at completion of air handling system work, and prior to testing, adjusting and balancing work.
2. Provide one spare set of belts for the air handling unit.

4.02 INSTALLATION

A. All major components shall be rigidly and strongly supported with suitable braces, tees, or angles to keep them true to shape and prevent buckling.

B. Pocket joints or bar slips, if used, must be riveted at the corners. Approved means must be provided to prevent pocket and slip joints pulling apart such as riveting on 12 inch centers, clip punching on 8 inch centers or button pressing on 4 inch centers. Sheet metal screws puncturing ducts will not be allowed in the construction of seams and joints.

C. Sealing and Leak Testing: All seams, joints, gaps, holes, etc. in the ductwork shall be sealed with mastic and checked for airtightness before insulation is applied.

D. Ductwork Cleaning: Contractor shall thoroughly clean all ductwork chambers, fans, etc., manually. After this is done, blow out the systems with a built-up velocity so as to properly clean the interior of all ductwork, leaving same free of all foreign matter. The cleaning work shall be done before any painting is done.

END OF SECTION

DIVISION 16 ELECTRICAL

SECTION 16050 ELECTRICAL - GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, devices, equipment, appurtenances, and incidentals required for a complete electrical system as hereinafter specified and/or shown on the Contract Drawings. This work may necessarily include interfacing with and/or completely installing devices and/or equipment furnished under other sections of these Specifications.

B. It is the intent of these Specifications that the electrical system be suitable in every way for the service required. All materials and all work/labor which may be reasonably implied as being incidental to the requirements of this Section shall be furnished at no additional cost to the County.

C. All power interruptions to existing equipment shall be at the County's convenience. Each interruption shall have prior approval. Request(s) for power interruption(s) shall be made at least forty-eight (48) hours in advance.

D. The work shall include complete testing of all electrical components, including wiring.

E. All workmanship shall be of the highest quality. Substandard work will be rejected and it shall be replaced entirely at the Contractor's expense with no cost to the County.

F. It shall be the responsibility of each bidder or his authorized representative to physically visit the job site in order that he may be personally acquainted with the area(s), buildings and/or structures intended for use in the installation/construction under this Specification. The submittal of a proposal/bid by a bidder shall be considered evidence that he has complied with this requirement and accepts all responsibility for a complete knowledge of all factors governing his work. Therefore, failure to comply with this requirement of the Specifications will NOT be grounds for the successful bidder (Contractor) to request approval of change orders and/or additional monetary compensation.

1.02 TEMPORARY ELECTRICAL SERVICE

A. The Contractor shall make the requisite arrangements for securing temporary electrical power for his use in accordance with Section 01510 of these Specifications.

1.03 CODES, INSPECTIONS AND FEES

A. All materials and installations shall be in accordance with the National Electrical Code (latest edition) and the latest editions of all applicable national, state, county and local codes.

B. To the extent that any item is routinely tested and rated by the Underwriter's Laboratories, Inc., that item shall bear the U.L. label. Additionally, all items shall be

manufactured to the applicable NEMA standards.

C. The Contractor shall make the necessary arrangements for obtaining all requisite permits and inspections and pay any applicable fees.

1.04 TESTS

A. The Contractor shall test all items individually and as a system for proper operation.

B. The Contractor shall, at his expense, make all the requisite repairs, adjustments and/or alterations to correct any shortcomings found as a result of the tests performed under Item 1.04.A above.

C. A representative of the County shall be present during all testing. The County shall be notified at least two (2) days prior to any testing.

1.05 SLEEVES AND FORMS FOR OPENINGS

A. Provide and place all sleeves for conduits penetrating floors, walls, partitions, etc. Locate all necessary slots for electrical work and form before concrete is poured.

1.06 CUTTING AND PATCHING

A. All cutting and patching shall be done in a thoroughly workmanlike manner - i.e., care shall be taken when cutting not to damage or mar surrounding areas, and when patching to match the original finish as closely as possible while providing a watertight seal. Refer to Item 1.01.E above.

1.07 INTERPRETATION OF DRAWINGS

A. The layouts and arrangements as shown on the Contract Drawings are indicative of the physical arrangements desired; however, they are not intended to restrict the Contractor's freedom to accommodate the exact conditions as found in the field. Any deviations from the arrangements shown must be approved by the County prior to the final placement of the item(s) in question.

B. The Contract Drawings are not intended to show exact locations of conduit runs.

C. Circuit and conduit layouts shown are not intended to indicate the exact installation details. The Contractor shall furnish and install all requisite items, including all fittings, junction boxes, etc., to insure that the electrical system operates in conformance with the Specifications and the specific requirements of an individual piece of equipment.

D. Where circuits are shown as "home-runs", all necessary fittings and boxes shall be provided for a complete conduit installation.

E. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Contract Drawings.

F. Surface mounted items such as panelboards, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between the equipment and the mounting surface.

G. The County shall make the final decision in determining the exact location(s) and mounting height(s) of any item(s) or piece(s) of equipment in question.

H. All connections to equipment shall be made in accordance with the approved shop and manufacturer's drawings, regardless of the number of conductors shown on the Contract Bid Drawings.

I. The Contractor shall coordinate the work of the different trades in order to prevent interferences between conduit(s), piping and other non-electrical equipment. In case any interference develops, an authorized representative of the County shall decide which equipment, conduit(s) or piping must be relocated, regardless of which was installed first. Any such interferences shall be remedied solely at the Contractor's expense without any additional cost to the County.

1.08 EQUIPMENT SIZING AND HANDLING

A. The Contractor shall thoroughly check all entryways, doors, hallways, stairways, buildings and structures through which equipment must be transported to reach its final location.

B. If necessary for safe passage of the equipment, the manufacturer shall be required to ship his material in sections sized to pass through the restricted areas. This requirement holds even if such equipment sizing differs from the manufacturer's standard shipping section.

C. To the extent possible, the equipment shall be kept upright at all times. If equipment has to be tilted for ease of passage through restricted areas, the manufacturer shall provide specific handling instructions as well as any requisite bracing in order to assure both the functional integrity of the equipment and the validity of the equipment warranty.

1.09 SUBMITTALS

A. As specified under Section 01340 of these Specifications, the Contractor shall submit shop drawings and/or manufacturer's cut sheets for approval of all materials, equipment, devices, apparatus, and other items as required by the County.

1. Prior to submittal by the Contractor, all shop drawings shall be checked for accuracy and Contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to the Specifications and Contract Drawings. This statement shall also list all discrepancies with the Specifications and Contract Drawings. Shop drawings not so checked and noted shall be returned unchecked by the County.

2. The County's check shall be only for conformance with the design concept of the Project and compliance with the Specifications and Contract Drawings. The responsibility for, or the necessity of, furnishing materials and workmanship required by the Specifications and Contract Drawings which may not be indicated on the shop drawings is included under the work of this Section.

3. No material shall be ordered, no equipment manufacturing shall be started, nor shall any shop work/fabrication commence until the County has approved the shop drawings. Any deviation from this requirement of the Specifications shall be entirely at the risk and expense of the Contractor without any additional cost to the County.

B. Record Drawings: As the work progresses, the Contractor shall legibly record all field changes on a set of Contract Drawings. When the project is completed, the Contractor shall furnish the County with a complete set of reproducible "as-built" drawings.

1.10 MANUFACTURER'S SERVICES

A. The Contractor shall arrange for an authorized manufacturer's representative who shall be an experienced field service engineer to be present for the inspection, installation, testing, calibration, adjusting and start-up of any item(s) or piece(s) of equipment as deemed necessary by the County.

B. In addition to the duties of Item 1.11.A above, the manufacturer's representative shall also instruct the County's personnel in the proper operation and maintenance of the item(s) in question.

1.11 MATERIALS

A. All materials used shall be new, unused and as hereinafter specified. Where not specifically called out, all materials shall be of the very best quality of their respective kinds. Unless specifically otherwise approved in writing by the County, only material manufactured in the United States shall be used!

B. Where applicable, all materials and equipment shall conform with the requirements of Item 1.03.B above.

C. Electrical equipment shall at all times during construction be adequately protected against both mechanical injury and damage by water. Electrical equipment shall be stored indoors in dry shelters. Any damaged equipment shall be replaced by the Contractor at his own expense.

D. All items shall be manufactured from the materials specified - substitute materials will NOT be acceptable.

E. Only the specified manufacturer's equipment shall be used unless an "or approved equal" is noted. The County shall be the sole determiner of what constitutes an "approved equal".

1.12 GUARANTEES AND WARRANTIES

A. All items furnished under the Electrical Specifications shall be guaranteed and/or warranted, in writing, against defects in materials, construction and workmanship as specified under Section 01740 of these Specifications.

END OF SECTION

SECTION 16108 MISCELLANEOUS EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install all miscellaneous equipment as hereinafter specified and/or shown on the Drawings.

B. Installation shall be in the locations described herein and/or shown on the Drawings and/or where directed by the County's authorized personnel.

PART 2 PRODUCTS

2.01 MATERIALS

A. CIRCUIT BREAKERS

1. The circuit breakers shall be the molded case bolt-on type, and shall be rated as indicated on the Drawings.
2. To match existing equipment, the circuit breakers shall be the Square "D" Catalog No. Q0B120 with "VISI-TRIP" indicator for use on a Square "D" NQOD panelboard, NO SUBSTITUTIONS!

B. SAFETY SWITCHES

1. The safety switches shall be the visible blade, non-fusible, heavy duty type, shall have a quick-make, quick-break, single throw operating mechanism, and shall have both a dual cover interlock and a color coded indicator handle.
2. The safety switches shall have ratings as indicated on the Drawings and shall have all current carrying parts made of copper, and shall be furnished in a NEMA 4X rainproof enclosure.
3. The safety switches shall have 1-inch bolt-on hubs, a solid neutral assembly, and a copper ground kit.
4. In addition to being UL listed under files E2875 and 154828, the safety switches shall comply with the following standards:
   a. UL 98, Enclosed and Dead Front Switches.
   b. NEMA KS1, Enclosed Switches.
   c. Federal Spec WS-865c for Type "HD".
5. To match existing equipment, the safety switches shall be the Class 3110 Heavy Duty Safety Switch, Square "D" Catalog No. HU361RB, NO SUBSTITUTIONS!

C. PAD SUPPORT STRUCTURE

1. A support structure, firmly embedded into the concrete pad shall be provided to mount the equipment shown on the Drawings.
2. The support structure shall be fabricated from stainless channels and shall have all stainless steel mounting hardware.

3. The height of the support structure shall be such as to maintain an even 6'-0" mounting height from the top surface of the concrete pad to the top surface of the individual devices mounted on the support structure.
4. The width of the support structure as well as the length and width of the steel reinforced concrete pad are predicated on the use of the devices specified elsewhere in this Section. If other than the specified items are used, the respective dimensions may have to be altered accordingly.
5. The stainless steel channel and stainless mounting hardware shall be as manufactured by Unistrut, Kindorf, or approved equal.

D. INTRUSION SWITCH
1. Provide a two-part switch assembly consisting of a magnetic unit and a switch unit suitable for mounting on a gate, hatch or door made of wood or metal.
2. Provide a flexible metal clad cable attached to the switch unit.
3. Provide a “Form C” SPDT contact.
4. Provide a NEMA 4X housing.
5. U.L. Listed
6. Gap distance up to 3 inches.
7. Sentrol Model Series 2507A or equal.
8. Provide mounting brackets. Mount switch toward hinge side of door.

E. MINI POWER CENTER
1. Standards: IEEE C57.96, NEMA PB 1, NEMA ST 20, UL 67 and UL 1561.
2. Package power supply includes a main primary circuit breaker, an encapsulated dry-type transformer and a secondary panelboard with main circuit breaker.
3. Transformer
a. Non-ventilated, air cooled, two (2) winding type.
b. Core and coil assembly encapsulated in a proportioned mixture of resin and aggregate to provide a moistureproof, shock resistant seal.
c. Cores:
1). High grade, non-aging silicon steel with high magnetic permeability, and low hysteresis and eddy current losses.
2). Magnetic flux densities are to be kept well below the saturation point.
d. Coils: Continuous wound with electrical grade aluminum and grounded to the enclosure.
e. Insulation system: 185 DEGC with a 115 DEGC rise.
f. Taps: Two (2) 5 PCT FCBN.
g. Sound levels:
1) Manufacturer shall guarantee not to exceed the following:
a) 9 kVA and less: 40 dB.
b) 10 to 30 kVA: 45 dB.
4. Panelboard and Protective Devices:
a. Bus: Aluminum.
b. Factory installed wiring between primary breaker and transformer, secondary breaker and transformer and distribution section.
c. 480 VAC primary circuit breaker: 14,000 amp minimum interrupting rating.
d. 240 VAC or less secondary circuit breaker: 10,000 amp minimum interrupting rating.
e. Feeder breakers: Plug-in type with 10,000 amp minimum interrupting rating.

5. Enclosure:
   a. Main, secondary and feeder circuit breakers enclosed with a padlockable hinged door.
   b. Wiring compartment suitable for conduit entry and large enough to allow convenient wiring.
   c. Totally enclosed, non-ventilated, NEMA 3R, steel finished with a rust inhibitor primer and manufacturer's standard paint.

F. GENERATOR CONNECTION CABINET
1. Ratings:
   A. Voltage and amperage: As indicated on the Drawings.
   B. Short circuit withstand: Equal to or greater than the upstream equipment.
2. Construction:
   A. Bus material: Silver plated copper.
   B. Bus supported with UL Recognized Component insulators.

3. Enclosure:
   A. Pad mount or wall mount, as required. Contractor to provide equipment pad if pad mounted.
   B. NEMA 4X rated.
   C. Material: Stainless steel.
4. Lockable latches on front door.
5. Independent access panel door for field terminated cables.
6. Welded construction.
7. Drip hood.
8. Provisions for key interlock with generator or main breaker.
9. UL 1773.
10. Manufacturer: Trystar.

G. COORDINATED POWER SYSTEM PROTECTION:
1. Prepare a study to demonstrate that the equipment and system constructed meet the specified requirements for equipment ratings, coordination and protection.
2. Perform the studies in accordance with IEEE 242 and IEEE 399.
3. Include the name of the software developer, software package and software version number in the computer generated studies.
4. System short circuit study report:
   A. Begin the study at the main service electrical gear and extend down the system through all buses. Perform a balanced three-phase fault, bolted line-to-line fault and line-to-ground fault study.
   B. Prepare a one-line diagram to show the electrical system buses, transformers and all sources of fault current including generators and motors.
   C. Utilize manufacturer's data for the actual proposed equipment (e.g., transformer impedance).
   D. Coordinate the available utility fault current with the power utility company.
   E. Show input data in tabular form in the report and/or on the one-line diagram.
   F. Show available fault current at each bus in tabular form in the report and/or on the one-line diagram.

G. Perform studies for both normal power and emergency/standby power scenarios.

5. System protective coordination study report:
   A. Begin the study at the main service electrical gear and extend down the system through all buses as required to ensure a coordinated power system.
   B. Demonstrate that the maximum possible degree of selectivity has been obtained between devices specified for the protection of equipment and conductors from damage from overloads and fault conditions. Where necessary, an appropriate compromise shall be made between system protection and service continuity. Consider system protection and service continuity to be of equal importance.
   C. Prepare a one-line diagram to show the electrical system buses, transformers and protective devices.
   D. Utilize manufacturer's data for the actual proposed protective devices.
   E. Summarize the coordination study, conclusions and recommendations.
6. Arc flash study:
   A. Arc flash boundary distances and incident energy at each device shall be determined by worst case incident energy at that device resulting from maximum and minimum available fault current at main distribution switchgear or switchboard for each valid system operating/switching mode under all probable source conditions. For low voltage equipment (600 volt and below), incident energy calculations shall be made at 100 percent and 85 percent arcing current per IEEE 1584.
   B. Arc flash analysis shall be performed in accordance with NFPA 70E with calculations performed in accordance with IEEE 1584A.
   C. Provide Arc flash hazard warning label on each piece of electrical equipment.
7. Reports:
   A. Short circuit study report.
   B. Protective coordination study report.
   C. Arc Flash Study.
   D. Submit the reports for approval 90 days prior to equipment energization.

PART 3 EXECUTION

(NOT USED)

END OF SECTION

SECTION 16110 CONDUITS AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish and install the conduits, fittings, devices and appurtenances as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

The requirements of Section 01340 and Section 16050 shall be met.

1.03 APPLICATIONS

A. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all wiring shall be run in rigid conduits.

B. PVC Sch 80 or rigid aluminum conduits shall be used at all locations above ground and within structures and buildings, except where otherwise shown on the Contract Drawings.

C. PVC Sch 80 or rigid aluminum conduits shall be used at all locations for shielded instrumentation and shielded control wiring, except where otherwise shown on the Contract Drawings.

D. Schedule 80 PVC conduits shall be used for all underground, under-slab and in-slab applications except where otherwise shown on the Contract Drawings.

E. Schedule 80 PVC conduits shall be used in highly corrosive areas such as chlorine storage areas, digesters, fluoride storage and handling areas, etc.

F. All conduits of a given type shall be the product of one manufacturer.

G. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all boxes shall be metal.

H. Flush mounted switch, receptacle and control station boxes shall be pressed steel.

I. Surface mounted switch, receptacle and control station boxes shall be cast or malleable iron.

J. Devices designated as NEMA Type 4 shall be 316 stainless steel, gasketed.

K. Devices designated as NEMA Type 4X shall be fiberglass, gasketed, except as otherwise shown on the Contract Documents.

L. Combination expansion-deflection fittings shall be used where conduits cross structural expansion joints.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rigid Conduit

1. Rigid aluminum conduit shall or approved equal.
   a. AA Type 6063 aluminum alloy, T-1 temper.
   b. Maximum copper content of 0.10 PCT.
   c. Extruded, seamless.
   d. Standards: NFPA 70 Type RMC, NEMA/ANSI C80.5, UL 6.
2. Rigid PVC conduit shall be Carlon Plus 80 rigid PVC non-metallic conduit (extra heavy wall EPC-80) as manufactured by Carlon, or approved equal.

B. Liquidtight, Flexible Conduit

1. Liquidtight, flexible metal conduits shall be Sealtite, Type UA, as manufactured by Anaconda, American Flexible Conduit Co., Inc., or approved equal.
2. Liquidtight, flexible non-metallic conduits shall be Carflex Liquidtight Flexible Non-Metallic Conduit as manufactured by Carlon, or approved equal.

C. Rigid Conduit Fittings

1. Rigid Aluminum Conduit Fittings:
   a. Aluminum elbows, bends, sweeps, nipples, couplings, etc., approved equal.
2. Rigid Non-Metallic Conduit Fittings: PVC elbows, bends, sweeps, nipples, couplings, device boxes, etc., shall be Plus 80 fittings as manufactured by Carlon, or approved equal.

D. Flexible Conduit Fittings

1. Flexible Metal Conduit Fittings: Fittings used with flexible metal conduit shall be of the screw-in type as manufactured by Thomas and Betts Company, or approved equal.
2. Flexible Non-Metallic Conduit Fittings: Fittings used with flexible non-metallic conduit shall be Carflex Liquidtight Non-metallic Fittings as manufactured by Carlon, or approved equal.

E. Flexible Couplings: Flexible couplings shall be as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.

F. Wall Seals: Conduit wall seals shall be type "WSK" as manufactured by the O.Z. Electrical Manufacturing Company, or approved equal.

G. Expansion Fittings: Combination expansion-deflection fittings shall be type "XD" as manufactured by Crouse-Hinds, or approved equal.

H. Boxes

1. Device Boxes
   a. Flush mounted wall device boxes shall be galvanized pressed steel as manufactured by the Raco Manufacturing Company, or approved equal.
   b. Surfaced mounted wall device boxes shall be cast or malleable iron as

manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.

c. Flush mounted in-floor device boxes shall be cast metal, shall be watertight, shall have adjustable cover frames, and shall be as manufactured by Russell & Stoll Company, Steel City Electric, or approved equal.

2. Other Boxes

a. Terminal boxes, junction boxes, pull boxes, etc., except as otherwise specified and/or shown on the Contract Drawings, shall be PVC or 316 S.S.

b. The boxes shall have continuously welded seams and shall be ground smooth.

c. The box bodies shall be flanged, shall be not less than 14-gauge metal, and shall not have holes or knockouts.

d. The box covers shall be not less than 12-gauge metal, shall be gasketed, and shall be fastened to the box bodies with stainless steel screws.

I. Conduit Mounting Devices: Hangers, rods, channel, backplates, clips, straps, beam clamps, etc., shall be 316 stainless steel as manufactured by Unistrut Corp., or approved equal.

J. Fixture Support System

1. The fixture support system shall be the channel type and shall be furnished complete with all requisite mounting hardware and appurtenances.
2. The channel, mounting hardware and related appurtenances shall be 316 stainless steel.
3. The fixture support system shall be as manufactured by the Unistrut Corp., or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. No conduit smaller than 3/4-inch electrical trade size shall be used nor shall either 1-1/4-inch conduit or 3-1/2-inch conduit be used. Minimum size underground, under slab or in-slab shall be 1-inch.

B. No wires shall be pulled until the individual conduit runs are complete in all details. Additionally, each conduit shall be cleaned and reamed and certified clear of all burrs and obstructions before any wire is pulled.

C. The ends of all conduits shall be tightly capped to exclude dust and moisture during construction.

D. Conduits shall be supported at intervals of 8-feet or less, as required to obtain a rigid installation.

E. Exposed conduits shall be run parallel with and/or perpendicular to the surrounding surface(s). No diagonal runs will be allowed.

F. Single conduits shall be supported by one-hole pipe clamps in combination with one-

screw backplates to provide space between the conduits and the mounting surface.

G. Multiple horizontal runs of conduits shall be supported by trapeze type hangers (channel) suspended by threaded rod, 3/8-inch minimum diameter.

H. Multiple vertical runs of conduits shall be supported by structurally mounted channel in combination with conduit clamps.

I. Conduit support devices shall be attached to structural steel by welding or beam or channel clamps as indicated on the Contract Drawings.

J. Conduit support devices shall be attached to concrete surfaces by "spot type" concrete inserts.

K. Conduits terminating in pressed steel boxes shall have double locknuts and insulated bushings.

L. Conduits terminating in gasketed enclosures shall be terminated with conduit hubs.

M. Conduit wall seals, waterproof type, shall be used at all locations where conduits penetrate walls.

N. Liquidtight, flexible conduit shall be used for all motor terminations and for all connections/terminations where vibration is anticipated.

O. Flexible couplings shall be used in hazardous locations for all motor terminations and for all connections/terminations where vibration is anticipated.

P. Conduit stubouts for future construction shall be capped at both ends with threaded PVC conduit caps.

Q. The cement used for PVC conduit installations shall be as manufactured by Carlon, or approved equal.

R. Rigid aluminum conduits entering manholes and/or below grade pull boxes shall be terminated with grounding type bushings which shall be connected to a 5/8-inch by 10-foot long driven ground rod with No. 6 AWG bare copper wire.

S. Rigid aluminum conduit shall be used for all risers. The underground portion of the riser and a 12-inch section of the riser immediately above the ground or slab/floor level shall be painted with a bitumastic coating.

T.

3.02 GUARANTEES AND WARRANTIES

The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16120 WIRES AND CABLES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install all wires, cables and appurtenances as described hereinafter and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

A. The requirements of Section 01340 and Section 16050 shall be met.

B. Samples of the actual wires and cables proposed for use shall be submitted for approval. There shall be a sample for each size and type of wire and cable proposed for use. The samples shall be of sufficient length to show the maximum rated voltage, insulation type and class, conductor size, the manufacturer's name, trademark or identifying logo, and the U.L. listing number.

C. The wires and cables as approved for use shall be compared with the wires and cables actually installed. If any unapproved wires and cables are installed, they shall be removed and replaced solely at the Contractor's expense with no additional cost to the County.

1.03 APPLICATIONS

A. The wire for lighting and receptacle circuits shall be type THHN/THWN, stranded.

B. The wire for all power circuits and motor leads shall be type THHN/THWN, stranded.

C. Single conductor wires for control, indication and metering shall be type THHN/THWN, No. 14 AWG, stranded.

D. Multiconductor control cable shall be No. 14 AWG, stranded.

E. The wire for process instrumentation shall be No. 16 AWG, stranded.

1.04 MINIMUM SIZES

A. Except for control and signal leads, no conductor smaller than No. 12 AWG shall be used.

PART 2 PRODUCTS

2.01 MATERIALS

A. Wire and cables shall be made of annealed, 98% conductivity, soft drawn copper conductors.

B. All conductors shall be stranded except that the uninsulated copper grounding conductors shall be solid.

2.02 600 VOLT WIRE AND CABLE

A. Type THHN/THWN insulation shall be used for all 600 Volt wires and cables. The insulation shall be a flame-retardant, heat-resistant thermoplastic, and shall have a nylon, or equivalent, jacket.

B. The 600 Volt wires and cables shall be as manufactured by Anixter, Rome Cable, Southwire, or approved equal.

2.03 INSTRUMENTATION AND CONTROL WIRING

A. Process instrumentation wiring shall be No. 16 AWG stranded twisted pair, 600 Volt, cross-linked polyethylene insulated, aluminum tape shielded, PVC jacketed. Multiconductor cables with individually twisted pairs shall be installed where shown on the Contract Drawings.

B. Multiconductor control cables shall be No. 14 AWG, stranded, 600 Volt, cross-linked polyethylene insulated, PVC jacketed.

C. Instrumentation and control wiring shall be as manufactured by Belden, Alpha, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Wires and cables shall be sized as shown on the Contract Drawings and/or, where applicable, sized to match existing wiring.

B. All conductors shall be carefully handled to avoid kinks or damage to the insulation.

C. Lubricants or pulling compounds shall be used to facilitate wire pulling. Such lubricants/compounds shall be U.L. listed for use with the insulation specified.

D. Use pulling means - fish-tape, cable, rope, basket weave wire/cable grips, etc. - which will not damage the wire/cable insulation or the raceway.

E. Shielded instrumentation wire shall be installed from terminal to terminal with no splicing at any intermediate point.

F. Shielded instrumentation wire shall be installed in rigid steel conduit and pull boxes that contain only instrumentation cables. Instrumentation cables shall be separated from control cables in manholes.

G. Shielding on instrumentation cables shall be grounded at the transmitter end only.

H. All new wires and cables shall be continuous and without splices between points of connection to equipment terminals. However, the County will permit a splice provided that the length between the connection points exceeds the greatest standard shipping length available from the submitted manufacturer and no other manufacturer acceptable to the County is able to furnish wires or cables of the required length.

I. All 600 volt wire and cable connections shall be made using compression type connectors. Insulated connectors shall be used for all terminations. The connections shall be made so that both the conductivity and the insulation resistance shall be not less than that of the uncut conductor.

J. All wires shall be numbered at both ends and at all intermediate junction points. Screw type terminations shall be made with forked tongue (spade), self-insulated, crimp terminals. All other wire terminations shall be made on appropriate terminal strips.

3.02 TESTS

A. Upon the completion of the pulling-in of and prior to the terminating/connecting of the 600 Volt wiring, all wires shall be individually checked and tested for continuity and short circuits, and each wire/cable shall be meggered to check insulation resistance. The test voltage shall be not less than 500 Volts. Three (3) copies of these test results shall be submitted to the County.

B. An authorized representative(s) of the County shall witness all testing. The County shall be notified at least two (2) days in advance of the testing.

C. Any faulty conditions and/or shortcomings found during the testing shall be corrected at no cost to the County. However, a retest to demonstrate compliance shall be conducted before any hook-ups or terminations are made. Any such requisite retesting shall be witnessed by an authorized representative(s) of the County.

3.03 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16152 INVERTER DUTY MOTORS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and factory test inverter duty motors of the sizes and types hereinafter specified.

1.02 MANUFACTURER'S QUALIFICATIONS

A. The motors shall be the products of a single manufacturer who has a minimum provable history of three (3) years in the manufacturing and servicing of inverter duty motors of the sizes and types hereinafter specified.

1.03 APPLICATION

A. The motors will each be used to power a variable torque load consisting of a centrifugal pump in wastewater effluent pumping service.

1.04 OPERATING CONDITIONS

A. The motors shall be able to operate under the following environmental conditions without modification or derating:

1. Temperature: 0 to 40°C.
2. Altitude: Up to 3,300' above sea level.
3. Humidity: 0 to 95%, non-condensing.

1.05 MOTOR TESTING

A. Prior to shipment, the motors shall be subjected to the manufacturer's standard tests. The tests shall include, but not necessarily be limited to, the following:

1. No-load current.
2. Air gap measurement.
3. High potential test.
4. Shaft alignment.
5. Shaft and rotor balance.
6. Bearing alignment and lubrication.

A. The manufacturer shall certify that the motors are an improved design meeting the requirements of NEMA MG 1, Part 31 for motor insulation systems - i.e., a peak voltage of 1600 V and a time rise of 0.1 microsecond; specifically, motors that do not meet both the peak voltage level and the time rise limitation will not be acceptable under this Specification.

1.06 APPROVED EQUAL

A. The County shall be the sole determiner of what constitutes an "approved equal" product.

1.07 SUBMITTALS

A. Within three (3) weeks of receiving the order and prior to start of fabrication of the motors, the motor manufacturer shall furnish the County with five (5) sets of motor drawings for review and approval. The results of the manufacturer's standard post-manufacturing test results (per 3.01 A) for the motors shall be submitted prior to shipment.

B. The motor drawings shall include, but not necessarily be limited to, motor nameplate data, motor mounting base dimensions, motor dimensions and weight, and the location and size of both the motor leads terminal box and the low voltage leads terminal box. Information shall be sufficiently detailed to allow for locating conduit stub-ups.

C. Failure to comply with Item 1.07A above shall be entirely at the manufacturer's risk. Any changes required as a result of the County's review will be solely at the manufacturer's expense with no cost to the County.

D. Certifications: When utilized with a variable frequency controller, certify motor is inverter duty and the controller and motor are compatible. Include minimum speed at which the motor may be operated for the driven machinery.

1.08 WARRANTY

A. The manufacturer shall warrant that the motors shall be free from defects in all materials and workmanship for a period of two (2) years from date of final acceptance, or for the duration of the manufacturer's standard warranty, whichever period is longer.

B. During the warranty period, any and all covered defects shall be corrected by the manufacturer solely at his own expense with no cost to the County.

PART 2 PRODUCTS

2.01 INVERTER DUTY MOTORS

A. GENERAL

1. The motors shall be of the type and size to perform the required duty without exceeding their design ratings. The motors shall not overload at any head or discharge condition of their respective pumps.
2. The motors shall be suitable for use on a 480 Volt, 3-phase, 60 Hz power system.
3. The motors shall have a 1.00 service factor. The motors shall not be operated into their service factor range on a continuous basis as a means of supplying motors smaller than that required by the specific applications.
4. The motors shall have a minimum efficiency of 93% at full load.
5. The motors shall have minimum power factors of 93% at full load and 94.5% when partially loaded. The motor manufacturer shall furnish the required power factor correction packages (capacitors, fuses, discharge resistors, etc.) to the County for installation in the motor controller enclosures. Capacitor currents shall not exceed the no-load magnetizing currents of the motors. The capacitor insulating media shall strictly conform to the requirements of the Environmental Protection Agency, particularly with regard to non-flammability and environmental safety.
6. Variable speed equipment applications: The driven equipment manufacturer shall

have single source responsibility for coordination of the equipment and VFD system and verify their compatibility.

B. CONSTRUCTION

1. The motors shall be NEMA B, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber
2. The motors will be coupled to submersible centrifugal pumps which will be used to pump a liquid consisting of wastewater effluent having a specific gravity of 1.0.
3. The motors shall be a normal torque, low slip design.
4. Motor horsepower: 125 HP.
5. All applicable NEMA, ANSI, IEEE, and U.L. standards and procedures shall be strictly followed in the design and fabrication of the motors. The motors shall be U.L. listed.
6. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31.The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of pins, bolts, screws or other fastening devices used to locate or hold the stator and that penetrate the stator housing are not acceptable.
7. The motor shall be designed for continuous duty while handling pumped media of up to 104°F. The motor shall be capable of no less than 30 evenly spaced starts per hour.
8. The rotor bars and short circuit rings shall be made of aluminum.
9. Three thermal switches shall be embedded in the stator end coils, one per phase winding, to monitor the stator temperature. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the motor control panel.
10. The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables using threaded compression type terminals. The use of wire nuts or crimp-type connectors is not acceptable. The motor and the pump shall be produced by the same manufacturer.
11. The motor windings shall be epoxy encapsuled and shall utilize copper wires. Aluminum motor windings will not be acceptable under this Specification.
12. Shaft grounding ring on all motors:
    a. Factory installed, maintenance free, circumferential, bearing protection ring with conductive microfiber shaft contacting material.
    b. Electro Static Technology AEGIS SGR Bearing Protection Ring or approved equal.
13. The stator cores shall be made from high grade steel and shall utilize reinforced end turn construction for high rigidity, minimum winding mechanical fatigue, and low resonant noise level. Aluminum stator will not be acceptable under this Specification.
14. The motor manufacturer shall provide suitable relays to the County for mounting in the VFDs for monitoring of temperature and moisture detection.
15. The temperature rise of the motors shall not exceed Class H insulation limits, with an allowable winding hot spot temperature of 115°C when operated on inverter power across the motors' nameplate speed and torque envelope.

16. Not used.
17. The motors shall be fitted with oil lubricated high thrust bearings of the type (spherical roller, ball or Kingsbury) required by the specific application. The bearings shall be locked for a momentary upthrust of 30% downthrust. Minimum bearing life shall be five (5) years as determined in accordance with AFBMA standards.
18. The integral pump/motor shaft shall rotate on two bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease. The upper motor bearing shall be a two row angular contact ball bearing. The lower bearing shall be a two row angular contact ball bearing to handle the thrust and radial forces. The minimum L10 bearing life shall be 50,000 hours at any usable portion of the pump curve.
19. Bearing housings shall be equipped with sight gauges, fillers, and drain plugs.
20. The motors shall be equipped with a submersible cable.
21. The motors shall be included in the submersible pump assembly.
22. The motors shall be furnished with permanently attached stainless steel nameplates containing the requisite NEC, NEMA data. In addition, the motor manufacturer shall expand his standard nameplate or add an additional permanently attached stainless steel data plate containing, as a minimum, the following adjustable speed performance information:

    a. Application Type - Variable Torque.
    b. Maximum approved continuous torque.
    c. Approved speed (RPM) range.
    d. Approved frequency (Hz) range.
    e. Motor full load current (Amps) on inverter power.

23. All fittings, bolts, nuts, and screws shall be plated to resist corrosion. Bolts and nuts shall be Hex type.
24. The motor frames shall have lifting lugs or "O" type bolts for ease in handling.
25. All interior and exterior motor surfaces shall have a final coating of a chemically resistant corrosion and fungus protective epoxy fortified enamel finish sprayed over two (2) coats of a red primer. The stator core and the rotor shall be epoxy coated.
26. All machined surfaces shall be coated with a rust inhibitor for easy disassembly.
27. The motors shall be "Inverter Grade" products as manufactured by U.S. Electrical Motors, or approved equal.
28. Specific motor requirements for proposed submersible pumps at new Rye Road pump station:
    a. Motor Model (Hydromatic or approved equal): Model S8LA12500M4-4, 125 HP, 8-inch discharge
    b. Stator variant: 1
    c. Frequency: 60 Hz
    d. Rated Voltage: 460 V
    e. Rated Power: 125 HP
    f. Rated Speed: 1750 RPM

PART 3 EXECUTION

3.01 FACTORY TESTING

A. Prior to shipment, the motors shall be tested in accordance with Item 1.05.A above.

B. After successfully completing the tests of Item 3.01.A above, the motors shall be tested and evaluated on inverter power over the approved speed range. Computer simulation of motor inverter operation is an acceptable alternative to actually connecting the motors to an inverter.

C. During the testing, the major motor parameters shall be recorded and the test results shall be forwarded to the County for review and approval prior to shipment of the motors.

3.02 SHIPPING

A. The motors shall be so packaged for shipment that they are maximally protected from both physical and environmental damage.

B. The motors shall be transported to the County's job sites utilizing the manufacturer's customary method of shipment.

3.03 INSTALLATION

A. The motors shall be installed by the County's personnel in accordance with the recommendations and procedures set forth in the installation manuals furnished by the manufacturer.

B. An authorized factory trained representative(s) of the manufacturer shall be available to assist the County's personnel on an "as needed" basis.

3.04 WARRANTY

A. The manufacturer shall furnish to the County a written warranty which complies with the requirements of Item 1.08 above.

END OF SECTION

SECTION 16160 PANELBOARDS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, devices, and incidentals required and install all panelboards as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

A. The requirements of Section 01340 and Section 16050 shall be met.

PART 2 PRODUCTS

2.01 RATING

A. All panelboards shall be rated for the intended voltage. Panelboard ratings shall be as shown on the Contract Drawings.

B. Panelboards shall be U.L. listed.

2.03 CONSTRUCTION

A. Interiors

1. Interiors shall be completely factory assembled with main breakers, bus bars, branch circuit breakers, wire connectors, etc.
2. All wire connectors, except screw terminals, shall be of the anti-turn solderless type.
3. All wire connectors shall be suitable for use with copper wires of the size(s) indicated on the Contract Drawings.
4. Branch circuits shall be arranged using double row construction except where narrow column panels are called for on the Contract Drawings.
5. Branch circuits shall be numbered as shown on the Contract Drawings.
6. Interiors shall be so designed that circuits may be changed without machining, drilling or tapping; without disturbing adjacent units; and without removing the main bus connectors.
7. Interiors shall be durably marked by the manufacturer with the voltage, current rating and number of phases for which the panelboards are designed. The markings, which shall be visible after installation without disturbing the interior parts or wiring, shall also include the manufacturer's name or trademark.
8. All current carrying parts, including cross connectors, shall be copper.

B. Bus Bars

1. The bus bars for the mains shall be sized as shown on the Contract Drawings.
2. Both a full-capacity neutral bus and a separate ground bus shall be provided if shown on the Contract Drawings. Neutral bus bars shall have a suitable lug for each outgoing feeder requiring a neutral connection.
3. Phase bus bars shall be full height without reduction.

4. Bus bar taps for panelboards with single pole branches shall be arranged for sequence phasing of the branch circuit devices.
5. Bus bars shall be braced to conform to industry standards for short circuit stresses in panelboards.

C. Circuit Breakers

1. The panelboards shall be equipped with circuit breakers, main and branch, with ratings as shown on the Contract Drawings.
2. The circuit breakers shall be of the molded case, bolt-on type with the number of poles as shown on the Contract Drawings.
3. Circuit breakers used in 120/240 Volt and 120/208 Volt panelboards shall have a minimum interrupting rating of 10,000 Amperes RMS symmetrical.
4. Three-pole circuit breakers used in 480 Volt panelboards shall have a minimum interrupting rating of 14,000 Amperes RMS symmetrical or as shown on the Contract Drawings.

D. GFCI (Ground Fault Circuit Interrupter)

1. GFCI units shall be provided for all circuits where shown on the Contract Drawings.
2. The GFCI units shall be 1-pole, 120 Volt, molded case, bolt-on circuit breakers incorporating a solid state ground fault interrupter circuit which shall be insulated and isolated from the breaker mechanism.
3. The GFCI units shall be U.L. listed Class A, Group I devices (5 milliamp sensitivity, 25 millisecond trip time), and shall have an interrupting capacity of 10,000 Amperes RMS symmetrical.

E. Enclosures, Covers and Trim

1. The enclosures shall be of the NEMA Type (1, 3R, 4, 4X, 12), material (code gauge steel, stainless steel, fiberglass), and mounting configuration (flush, surface) as shown on the Contract Drawings.
2. Enclosures shall be of sufficient size to provide a minimum 4-inch gutter space on all sides. At least four (4) interior mounting studs shall be provided for each enclosure. Enclosures shall be furnished without conduit knockouts. Enclosures shall have hinged doors which cover all circuit breaker handles.
3. Stainless steel enclosures and covers shall have a natural metal finish. Enclosures and covers shall be joined together with a concealed piano type stainless steel hinge. Conduit openings in the enclosures shall be field drilled and, if applicable, tapped.
4. Fiberglass enclosures and covers shall be the manufacturer's standard color. Enclosures and covers shall be joined together with a concealed piano type stainless steel hinge. Conduit openings in the enclosures shall be field drilled and, if applicable, tapped.
5. Code gauge steel enclosures and covers shall be galvanized steel finished as per Item 2.03.E.7 below. Enclosures and covers shall be joined together with a concealed piano type hinge. Conduit openings in the enclosures shall be field punched.
6. Code gauge steel enclosures shall have panel trims of code gauge sheet steel. Trims for flush mounted enclosures shall overlap the enclosures by at least 3/4-inch all around. Surface mounted enclosures shall have trims the same height

and width as the enclosures. Trims shall be fastened to the enclosures with quarter-turn clamps or screws.

7. All interior and exterior surfaces of the panelboards, enclosures and trims shall be properly cleaned, painted with a rust inhibitor (two coats), and over-coated with ANSI Z55.1, No. 61 light gray paint. The finish paint shall be of a type to which field applied paint will adhere.
8. The inside surface of each cover shall have a directory frame with a transparent cover and a directory card.
9. Covers shall have semi-flush type cylinder locks and catches, except that covers over 48-inches in height shall have vault handles and 3-point catches, complete with lock, arranged to fasten at top, bottom and center. Two (2) keys shall be furnished for each lock and all locks shall be keyed alike.

F. Manufacturer

1. 120/240 Volt and 120/208 Volt panelboards shall be type NQOD with QOB bolt-on circuit breakers as manufactured by the Square "D" Company, or approved equal.
2. 480 Volt panelboards shall be the I-Line type as manufactured by the Square "D" Company, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Surface mounted panelboards shall be installed using spacers so that there is an air space between the enclosure and the mounting surface.

B. Unless otherwise shown on the Contract Drawings, the tops of the enclosures shall be mounted at a height of 6-feet above the floor. The enclosures shall be properly aligned, true-and-square, and shall be adequately supported independently of the connecting conduits.

C. All panelboard wiring shall be neatly formed, grouped, laced, and identified to provide a neat and orderly appearance.

D. The Contractor shall type on the directory card the description/use of each active circuit. "Spare" shall be indicated in erasable pencil!

3.02 TESTS

A. Each individual circuit breaker, including the main breaker and the GFCI breaker(s), shall be tested for proper operation under the appropriate overload/ground fault conditions.

3.03 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16231 EMERGENCY GENERATOR SET

PART 1 GENERAL

1.01 SCOPE

A. Provide and install complete and operable UL 2200 listed emergency/standby electric generating systems which contain all the devices and equipment specified herein and/or required for the service. Equipment shall be new, factory and field tested, installed, and ready for operation. Timely service and reliability after the installation is accepted are critical in the choice of equipment.

B. The engine is to be of sufficient horsepower to drive the generator under full load conditions. It shall be 4-cycle, fueled with either natural gas or diesel via an adjacent or sub-base fuel tank and cooled with a closed looped radiator system. The generator is to be a low reactance brushless generator, with torque matched excitation and automatic voltage regulation. There is to be a set-mounted control panel with vibration insulators between it and the generator set. The generator, controls and associated cooling and exhaust systems are to be housed in a suitable weather protected enclosure which is to be permanently installed outdoors. The automatic transfer switch shall be installed in a separate NEMA 4X SS secure (double door) enclosure mounted on the equipment rack.

C. Where conflict between drawings, specifications or code occurs, the Contractor shall assume and provide the more stringent of the alternatives to the County.

D. Contractor shall secure all required building permits including the electrical, concrete and fire department reviews. Contractor to provide all required drawings and certifications required to secure these permits. If indicated below, contractor will also provide Flood Certification.

1.02 RATINGS

A. Generator set at site number 1 is to be installed at:

Rye Road Master Pump Station Site
Bradenton, Florida

This generator set is to be of suitable power to drive a total of 2 submersible 480 volt, 125 horsepower induction motor pumps, the current main breaker for the station is: 600A. This site shall be diesel fueled with a sub-base fuel tank. ATS manual by-pass switch is required at this site. This site is not in a flood zone and flood certification is not required. The color of the generator set powder coating shall be similar to “Buff” / Pantone Green 5545 C as determined by the County. The color of the fuel tank and skid shall be “haze grey”.

PLEASE NOTE : The induction pump motors providing the loads at the above sites all have the following characteristics and the generator sets supplied with this contract are to be built and sized bearing these facts in mind:

1. NEMA LRA Code H
2. Started with VFD starters-maximum allowable voltage dip at start is 20%-loading will be sequential, (i.e., after each pump is brought up to speed the next one will be started)
3. 480 VAC
4. 3 Phase
5. 60 HZ.

ALSO: Each generator is to be built with the following characteristics/conditions:

1. Generator sized as a sequence load.
2. Standby Emergency Rating
3. Power Factor = .8
4. Site Altitude = 100 feet
5. Range of Site Ambient Temperatures = 20 - 120° F.

1.03 GENERATOR SET PERFORMANCE

A. The voltage regulation of each set shall be ± .5% of rated voltage for any constant load from the range of no load to full rated load.

B. The frequency regulation of each set shall be accomplished through an isochronous electronic governor from the range of steady state no load to steady state full rated load.

1.04 SUPPLIER

A. The complete package - engine, generator and other auxiliary components shall be provided from a single manufacturer/supplier. Other required items such as the enclosure, fuel tank, and automatic transfer switching equipment manufactured by others shall all be packaged together before delivery by the manufacturer / supplier. The supplier shall be the manufacturer's authorized distributor who shall maintain a service center capable of emergency maintenance and repairs with a consistent record of a maximum of four hours response time. The supplier shall have 24 hour/365 days per year service availability and factory trained service technicians authorized and capable to perform warranty service on all warrantable products.

1.05 SUBMITTALS

A. Prior to and a requirement of contract award, the apparent low bidder shall provide references from at least 3 local municipalities or other businesses that have at least 5 similar type emergency generators in service with response time requirements similar to this contract. The actual service responses will be verified for response time consistency and customer satisfaction.

B. As a minimum for all equipment specified and provided, for each site, submit the following in pdf format to Manatee County. No equipment is to be ordered until the submittal is approved:

1. Specification and application data sheets for the entire system supplied.
2. Shop drawings showing a dimensioned outline plan and elevation views of the

system with certified overall and interconnection point dimensions. Indicate fabrication details, dimensions, weights, loads, required clearances, components, location and size of each field connection and method of field assembly.

3. Manufacturer's installation instructions.
4. Interconnection wiring and piping diagrams which show all external connections required. Show field wiring terminals with markings in a consistent point to point manner.
5. Manufacturer's applicable published warranty documents.
6. Generator Sizing Calculations – generator shall be sized to accommodate 2 pumps running, mini power center and future odor control.

C. Prior to the County's acceptance of generator site(s), the Contractor shall submit the following for each generator site(s):

1. Generator field test results showing compliance with the specifications.
2. Signed and sealed final record site plan prepared by a Professional Surveyor registered in the State of Florida showing all existing and new above ground facilities / improvements, new underground conduit and fuel line locations, and property corners. A CAD file of the project survey can be requested from the County, if available.

   The following information shall be provided on the final record site plans:

Location in X & Y	ATS, natural gas meter (if applicable)
Location in X, Y & Z	Egen slab, fuel tank slab (if separate from Egen slab), all new underground pipes and conduits
Location in Z (elevation)	top of fuel tank, bottom of ATS, bottom of Egen (if not on top of a fuel tank)
Call outs	Egen size in KW, conduit size, fuel tank size in gallons (if applicable)

C. A single O&M manual shall be provided that covers all parts of the generator system and controls for all installations contained in this contract. It shall be tabbed for each different size or type of equipment. The cover page shall indicate the manufacturer, date and contract number as well as listing all pump station sites it applies to.

1.06 WARRANTY

A. A comprehensive, no deductible warranty shall be supplied for the complete electrical power system (the generator set, controls and associated switches, switchgear, automatic transfer switch and all accessories) supplied for each installation. The complete systems shall be warranted by the manufacturer against defects in materials and workmanship for a period of five years or 1500 hours of operation; whichever occurs first from the date of system startup. This warranty coverage shall include parts, labor, and travel expenses.

B. The warranty of the coating of the enclosure and fuel tank shall be a non-deductible, unlimited warranty against rust and corrosion of any coated part of the enclosure for a period of ten years.

PART 2 PRODUCTS - AT EACH SITE:

2.01 EMERGENCY GENERATOR

A. Each generator shall be:

1. Used for 60 Hz Operation, 460 Volt output voltage
2. 4- Pole - 1800 RPM - Revolving Field Synchronous Machine
3. Stator Winding to be .667 Pitch
4. Air Cooled by Shaft Mounted Fans
5. 12 Leads for Output Connections
6. Class H Insulation System
7. Temperature Rise by Resistance not to Exceed 125^{o} C at Full Load
8. The stator shall have vacuum impregnated windings with fungus resistant epoxy varnish.

B. Utilize a permanent magnet generator for excitation power to an automatic voltage regulator. The permanent magnet generator shall sustain main field excitation power for optimum motor starting and to sustain short circuit current for selective operation and coordination of system over current devices.

C. The automatic voltage regulator shall be a temperature compensated solid state design. It shall be equipped with 3-phase RMS sensing. The regulator shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The regulator shall include an under frequency rolloff torque-matching characteristic which shall reduce output voltage in proportion to frequency below a threshold of 58 hz. The torque matching characteristic shall include differential rate of frequency change compensation to use maximum available engine torque and provide optimal transient load response. Regulators which use a fixed voltage per hz. characteristic are not acceptable.

D. Provide a generator main circuit breaker. This breaker is to be set mounted and wired, molded case thermal-magnetic rated for proper generator set operation. The breaker shall be UL listed. Field circuit breaker shall not be acceptable for the purpose of generator overcurrent protection. The generator circuit breaker shall incorporate:

1. Tripping characteristic: designed specifically for generator protection.
2. Trip rating is to be matched to generator rating.
3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
4. Mounting Position: Adjacent to or integrated with control and monitoring panel.

E. Provide a microprocessor-based unit that will continuously monitor current level in each phase of generator output. When signaled by the protector or other generator set protective device, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from the load circuits. This microprocessor-based unit shall also:

1. Initiate a generator overload alarm when the generator has operated at an overload equal to 110% of full load for 60 seconds.
2. Under single or three phase fault conditions, it shall regulate the generator to 300% or rated full load current for up to 10 seconds.
3. When the heating effect of overcurrent on the generator approaches the thermal damage point of the unit, the processor shall switch the excitation system off and open the generator disconnect switch to shut the generator down.
4. Sense the clearing of a fault by other overcurrent devices and control the recovery of the rated voltage to avoid overshoot.

F. Leads for water jacket heaters and space heaters shall be housed in their own separate conduit box.

G. Provide alternator strip heater or thermostatically controlled space heater(s) per manufacturer's recommendation to keep moisture out of the windings.

2.02 INSTRUMENTATION AND CONTROL

A. Each generator set is to be capable of being started and shutdown through an automatic transfer switch or manually.

B. Manually, the control shall have automatic remote start capability from a panel mounted three position (Stop, Run, Remote) switch. When the control panel is selected to the "Run" position, the generator set starts and runs. When selected to the "Stop" position, a shutdown is initiated. The "Remote" position allows the set to be operated from a remote location for future use.

C. An emergency stop button will also be installed to shut the system down. This button should be red, a minimum of two inches in diameter, labeled "STOP" and installed in a conspicuous location on the generator set. It shall be reusable and resettable.

D. The control shall shut down and lock out upon: failing to start (overcrank), overspeed, low engine oil pressure, high engine coolant temperature. A panel mounted switch shall reset the engine monitor and test all the lamps. Lamp indications on the control panel shall include as a minimum:

1. Overcrank Shutdown - Red
2. Overspeed Shutdown - Red
3. High Coolant Temperature - Red
4. Low Engine Oil Pressure - Red
5. High Engine Coolant Temperature Prealarm - Yellow
6. Low Engine Oil Pressure Prealarm - Yellow
7. Low Fuel - Yellow
8. Run - Green

E. Each generator set is to be set up by the manufacturer to indicate to a remote location through the County's RTU system:

1. When generator set is in operation.
2. When generator fails (no commercial or generator power).
3. When low fuel level is reached in the fuel tank.

The contractor shall install four wires from the generator control panel to the RTU control panel; wire type shall be 14 AWG, 16 strand flexing type MTW or TFFN 600 volt. The County's RTU system uses discrete- type signals with N/O type contacts. County shall make the actual connections to the RTU system.

The wire coloring scheme shall be:

Brown - generator run
Red - generator fail
Yellow- low fuel
Orange- common to alarms and connected to control panel power either 24 volt DC or AC

F. Regulation of NFPA 110 Level 2 shall apply for instrumentation, alarm and shutdown. The instrument panel shall include, but not necessarily be limited to:

1. Gages for engine: with ± 2% full scale accuracy:
   a. Oil Pressure
   b. Engine Coolant Temperature
   c. Voltmeter for the DC Battery
2. Gages for generator: with ± 2% full scale accuracy:
   a. AC Ammeter - dual range
   b. AC Volt Meter - dual range
   c. Frequency Meter - range of 45-65 Hz.
3. Elapsed Time Meter
4. 0-3000 RPM Tachometer - with ± 2% full scale accuracy.
5. A seven position phase selector switch with "OFF" position to show meter display of current and voltage of each generator phase. This selector switch may be manual or push-button.
6. A power source with circuit protection - 12 or 24 VDC.
7. An AC interlock to prevent starter re-engagement with engine running.
8. DC circuit protection.
9. A minimum of two panel lamps to illuminate instrument panel.

G. Switches and Controls

1. Rheostat for adjusting output voltage of the generator to ± 5% of nominal voltage.
2. Over voltage protection shutdown switch.
3. Emergency stop switch mounted on control panel.
4. Engine start switch - with Run, Off, Reset, Automatic positions.
5. Five minute engine cool down timer.
6. Cyclic cranking switch.

H. All electrical penetrations in any enclosure shall be properly sealed from the weather.

I. Primary power disconnect switch on the control panel shall be identified with an NFPA compliant Main Disconnect label.

2.03 ENCLOSURE

A. The generator set and all the equipment supplied in this contract, shall be operated in a stationary outdoor environment. At each site, it shall:

1. Require weather protected enclosures. These enclosures shall protect the unit and all equipment and devices from the elements of the weather to include rain and winds to 180 MPH. All enclosures, boxes, trays, etc shall have weep holes for condensation or water intrusion drainage. Any oil containment / catchment areas shall have provision to completely drain off water. The enclosure shall provide adequate ventilation for cooling and operation under full load conditions.
2. The enclosure shall be constructed of at least 14 gauge aluminum. The enclosure shall have an electrostatically applied, baked on, powder coated enamel or polyester finish a minimum of 2.5 mil thick. The color of the powder coating shall be similar to "Buff" or Pantone Green 5545 C, as noted on the drawings, and must be approved by Manatee County prior to installation of the product.
3. The housing shall have hinged side access doors and a rear control door that are easy to remove. The side panels shall be easy to remove to allow access to all areas of the generator. All doors shall be provided with padlock hasps so that the County can install their standard padlocks.
4. All exterior assembly hardware, bolts and/or screws, handles, hinges, and hasps shall be 316 stainless steel. All exterior bolts and/or screws shall be tamper-proof. All tamper-proof screws shall utilize the 6 lobe pin TX or Torx® pin-head security fasteners. A neoprene washer shall be installed between all bolts/nuts/washers and the enclosure's exterior finish.
5. The housing shall be factory assembled to the generator set skid base. The skid base shall be firmly fastened to a concrete foundation pad which is to be provided and installed as part of this contract. The connections shall be adequate to avoid movement from both wind and vibration loading. The skid base / framing surface protection coating shall be per the fuel tank coating requirements. All metal surfaces coming in contact with concrete or grout shall be coated with coal tar epoxy equal to Koppers 300M or a 1/32-inch neoprene gasket between the metal surface(s) and the concrete or masonry may also be used. The neoprene gasket shall be installed along the entire perimeter, not just at the fastening hardware.
6. The engine and generator shall be removable from the base for maintenance purposes.
7. The skid is to have adequate strength and rigidity to maintain alignment of mounted components without depending on the concrete foundation. Lifting attachments shall be arranged to facilitate lifting with slings without damaging any components.
8. The base shall incorporate a battery tray with battery hold down clamps within the rails. Provisions for stub up of electrical conduits shall be within the footprint of the set. Vibration isolation shall be integral between the generator set and base.
9. The enclosure shall be a low noise or sound attenuated enclosure. The noise level at any load operating condition, in any direction from the enclosure, shall not exceed 75 dBA at a distance of five (5) meters from the enclosure unless noted otherwise on the plans

2.04 ENGINE

A. The engine shall be a 4-cycle, direct injection diesel with forged steel crankshaft and connecting rods suitable for continuous operation. It shall be designed for stationary

applications and shall be complete with all necessary auxiliaries needed for operation of the AC generator. The engine block shall be cast iron construction.

B. The engine shall have an electronic governor which shall provide isochronous frequency regulation.

C. The engine shall have an electric starter and battery(ies). See the Starting System section for further details.

D. The engine shall have a mechanical, positive displacement, engine driven, lubrication oil pump. Provide full flow lubrication oil filters with replacement spin-on canister elements. Provide a dipstick for oil level indication and an easily accessible fill location.

E. Supply a replaceable dry element air cleaner with restriction indicator.

F. Provide an engine mounted thermostatically controlled water jacket heater. The heater(s) wattage size shall be determined by the manufacturer. The heater voltage shall be single phase, 240V, 60HZ. The maximum circuit breaker rating to the heater should be 30A.

2.04.1 STARTING SYSTEM - ENGINE

A. The battery(ies) used for cranking the engine shall be the lead acid type, 12 or 24 volt, sized as recommended by the generator manufacturer. The battery(ies) shall have sufficient capacity to crank the engine for at least three cycles of 15 seconds on - 15 seconds off, for a total of 75 seconds. They shall be provided as new with the entire manufacturer's warranty.

B. The battery(ies) shall be fastened securely in its(their) own tray within the foot print of the skid. The tray shall be acid resistant.

C. Include all interconnecting conductors and connection accessories.

D. A battery charger of appropriate rating which is voltage regulated, shall be provided for the engine. It shall be sized for the proper current, 120VAC input voltage (max 10A) and output DC voltage. The charger shall be equipped with float, taper and equalize charge settings.

E. A meter on the charger shall provide a visual output reading of the charger.

F. On the engine, provide a factory mounted alternator with solid state voltage regulation and 35 Amp minimum continuous rating.

2.04.2 FUEL SUPPLY SYSTEM- DIESEL ENGINE

A. Provide a double walled fuel tank, made of heavy gauge construction that is designed for full weather exposure. The tank shall be the sub-base type. There is to be visual tank to foundation clearance. The tank is to have the following features:

1. Tank shall be UL 142 listed.
2. The capacity of the fuel tank shall be sufficient to run the generator continuously

for 96 hours at 75% load up to a maximum of 540 gallons, unless otherwise stated on the plans.

3. Equipped with a mechanical fuel gage and low fuel level alarm that may be monitored from a remote location by an RTU which uses N/O type contacts.
4. Two inch NPT fuel opening with spill protection and a lockable lid that is easily accessible.
5. Emergency pressure relief vent opening on the inner and outer tanks.
6. Inner tank leak alarm kit and low fuel alarm that may be monitored at a remote location by an RTU.
7. Basin drain.
8. Overfill protection / containment.
9. Provide an integral fuel pump of sufficient capacity to sufficiently charge the fuel lines under any start or run condition.

B. The overall fuel system is to comply with all applicable NFPA regulations as well as those required by the Florida Department of Environmental Regulation. This includes NFPA compliant labels for the fuel shut-off location and application of Diesel HAZMAT symbol stickers.

C. Provide an anti-siphon valve in the fuel line at the output of the tank.

D. A fuel filter shall be installed between the fuel tank and fuel inlet to the engine. It shall have a fuel water separator. The filter element shall be disposable and be easily removed and installed for maintenance purposes.

E. Provide supply and return fuel lines of sufficient diameter for all load requirements, flexibility for maximum resistance to fatigue due to component operation and made of material which has maximum resistance to corrosion due to environment and fuel supply.

F. The skid base for the fuel tank shall be firmly fastened to a concrete foundation which is to be provided and installed as part of this contract. The fuel tank & skid assembly shall be removable from the base. Lifting points shall be provided for the tank skid. All metal surfaces coming in contact with concrete or grout shall be coated with coal tar epoxy equal to Koppers 300M or provide a 1/32-inch neoprene gasket between the metal surface(s) and the concrete or masonry may also be used. The neoprene gasket shall be installed along the entire perimeter, not just at the fastening hardware.

G. The exterior coating of the fuel tank and skid base shall be Sherwin Williams SherGlass FF glass flake reinforced amine epoxy (formulated for immersion service) or equal. Color shall be haze grey, two coats of 12-15 mils on top of a stripe coat over all welds, crevices, edges and sharp angles, per manufacturer's recommendations.

H. The fuel tank shall be full and topped off by the contractor when it is accepted by the County.

2.04.3 COOLING SYSTEM- ENGINE

A. The engine shall be cooled by a unit mounted closed loop radiator system rated for full load operation in 50° C ambient condition with the ambient temperature as measured at the air inlet to the radiator. Radiator shall be provided with a duct adapter flange. The

cooling system shall use a 50/50 (Prestone, Xerex or equivalent coolant and water) mixture provided by the supplier.

B. Provide drain cocks or plugs in the engine block and radiator for easy changing and flushing of the coolant. Provide coolant drain extensions where necessary for easy access to the drainage device.

C. Protection from rotating parts (fan, fan belt) shall be provided.

D. Install a self contained thermostat module to automatically regulate coolant flow to maintain optimum constant coolant temperature as recommended by the engine manufacturer.

E. Provide a coolant heater which is thermostatically controlled in the jacket of the engine.

2.04.4 EXHAUST SYSTEM- ENGINE

A. The muffler for the engine shall be the critical grade made from aluminized steel of thickness and design as recommended by the manufacturer. The muffler shall be housed within the generator enclosure.

B. All exhaust piping shall be aluminized steel. Vertical discharge exhaust shall be equipped with a rain cap, appropriate condensation drains in the piping, and the outlet, and shall be designed so no external rain or moisture may enter the engine from the outside even if the rain cap fails. Vertical or horizontal discharge exhaust shall be designed so no external rain or moisture may enter the generator enclosure. Care must be exercised so there is no recirculation of exhaust gases into the intake system.

C. The connection of the engine to the exhaust system shall be a flexible section of corrugated stainless steel pipe. The connection of the exhaust pipe to the muffler shall be a stainless steel expansion joint with liners.

D. The exhaust emissions shall fall within the guidelines of the EPA and other state and governmental agencies.

2.05 AUTOMATIC TRANSFER SWITCH

A. Supply an automatic transfer switch at each site with built-in control logic monitors to sense any interruption in the utility supplied power. When the power fails, the automatic transfer switch starts the engine and transfers the load after the generator has reached proper voltage and frequency. When the utility power has been restored to the proper voltage and frequency, the automatic transfer switch will switch the load back to the utility source and after a time delay to sufficiently cool down the generator, shut down the engine. The utility power service size to each site shall be verified by the contractor and shall be factored in when determining the size of the automatic transfer switch.

B. The automatic transfer switch shall be housed in a separate free-standing NEMA 4X SS secure (double door) enclosure. The enclosure shall be constructed of at least 14 gauge 304 stainless steel. All ATS controls shall be secure inside the enclosure behind the front cover and not face mounted.

C. The transfer switch shall meet or exceed the following standards for emergency standby power system automatic transfer switches:

1. UL 1008
1. NFPA 110
2. NEC - articles 700 thru 702
3. NEMA 1 CS-2-447

D. The automatic transfer switch is to have the following features:

1. Unit shall have a bypass switch with rating equal to the automatic transfer switch. The bypass switch shall be a manual type switch. The bypass switch shall be integral to the automatic transfer switch enclosure.
2. Suitable for emergency and standby applications on all classes of load.
3. Adjustable normal source voltage sensing for pickup and dropout. The voltage is to be monitored line to line for all three phases of the switch.
4. The normal source voltage sensing is to be adjustable from a minimum of 70%-90% of nominal voltage for drop out and a minimum of 75%-100% for pickup.
5. There shall be a single phase sensing of the emergency source. It shall have an adjustable pickup setting of a minimum of 70% to 100% of nominal voltage.

E. There shall be time delays activated in the automatic transfer switch as follows:

1. Provide an adjustable time delay to override momentary normal source outages. If the utility provided power does not correct itself to a nominal range of values for voltage and frequency before the time on the relay expires, then all applicable transfer and engine starting signals will be activated. If the power goes back into specification, then no transfer will take place.
   a. Upon loosing commercial power:
      - 30 seconds for time delay start
      - 2 minutes to neutral transfer
      - 1 minute from neutral to emergency power
   b. After commercial power is restored:
      - 10 minutes to neutral transfer
      - 1 minute from neutral to utility
2. Provide an adjustable time delay for transferring the load to emergency power.
3. Provide an adjustable time delay for retransferring back to the utility power from emergency power.
4. Provide a non-adjustable (five minute minimum) unloaded running time for cool down of the generator after the power has switched back to the utility supply mode.
5. Provide a time delay to absorb momentary voltage and frequency spikes or dips during initial genset loading.

F. The automatic transfer switch shall be a 4-pole switch.

G. The automatic transfer switch is to have a disconnect switch which will prevent transfer.

H. The automatic transfer switch shall have in phase transfer control logic which will initiate an in phase transfer of motor loads between line sources. This logic shall help prevent nuisance tripping of distribution circuit breakers and damage to mechanical loads resulting from out of phase power transfer.

I. The automatic transfer switch is to be designed to be completely front accessible.

J. The automatic transfer switch is to have true double throw operation.

K. The automatic transfer switch shall have a solid neutral connection with full rated terminal lugs for normal, emergency and load.

L. The automatic transfer switch shall be equipped with a ground stud for the installation of customer provided ground terminations.

M. The automatic transfer switch shall have, as a minimum, the following equipment for the control panel.

1. Microprocessor based electrical controls with circuitry protected against EMI, voltage transients, ESD, shock vibration, and other hostile environments.
2. Analog or digital kilowatt meter, frequency meter, AC voltmeter and ammeter.
3. Reset switch.
4. LCD display, touch key pad, and LED indicators for user access to system information and settings. Provide a green light for when normal source is in operation and red light when generator is operating.
5. Generator set exerciser control.
6. Test pushbutton to simulate a normal power source failure.
7. Provision for optional interface with a P.C.

N. The automatic transfer switch shall have a surge suppressor which provides protection from transient voltage surges produced by lightning and other sources. The surge suppressors are to be composed of an array of matched metal oxide varistors with sufficient capacity to protect the transfer switch. It is to be connected to the normal power source terminals and installed at the factory.

2.06 HOUSE KEEPING SLAB FOUNDATION

A. The reinforced concrete slab(s) for the generator and fuel tank are to be suitable to fully support the complete load under all load conditions with a reasonable safety factor. The top of the slab shall be a minimum of two inches above the surrounding grade and extend a minimum of six inches past the footprint of the generator set.

B. The Manatee County Building Department will require the contractor to submit a plan for each poured-in-place concrete slab being installed. The Building Department will accept a slab designed by the manufacturer for their respective generator, provided the back-up information accompanies each plan. If the manufacturer does not provide a slab design, then the contractor shall submit a slab design that is signed and sealed by a Professional Engineer and meets the Florida Building Code.

PART 3 EXECUTION - AT EACH SITE:

3.01 INSTALLATION

A. The contractor shall furnish and install the entire product to include all necessary site preparation, concrete foundation(s), electrical connections, and all devices described in this contract so that it is fully functional and operable as intended, including breakers

and other modifications to the existing control panel for heaters, battery chargers, etc. The installation of the devices shall be per the manufacturer's instructions provided in item 1.05. The contractor shall connect the existing system equipment at each site to the equipment he is providing and insure compatibility between the system he is providing and the existing system. The contractor shall complete the installation of the equipment he provides to the existing site equipment to the degree that it shall not be necessary for the County to make further modifications or connections in order to have a fully functional system.

B. The contractor shall install the generator, automatic transfer switch, and conduit as shown on the approved site plan he has prepared for each site.

1. County to provide an existing site plan.
2. Contractor and Lift Station Superintendent shall meet on each site and determine the exact location for the generator, fuel tank and transfer switch.

C. All wiring shall be installed in conduit sized according to the National Electrical Code for the number and size of conductors contained within. All trenches for underground installation of conduit shall be hand dug. Any electrical wiring that is installed between the lift station's wet well and the valve vault shall be installed in a carrier pipe that is strapped to the wet well or valve vault.

D. Install the electrical components per Manatee County Standards (see typical wiring layouts in the latest Manatee County Public Works Utility Standards details US 23 & US 24).

3.02 FIELD QUALITY CONTROL

A. Upon completion of item 3.01, a factory authorized service representative of the product supplied is to inspect all field assembled and installed components and make any necessary corrections to insure proper equipment operation.

3.03 TESTING

A. All test instruments used to perform the testing are to have been calibrated within the past 12 months. The calibration shall be performed in accordance with the standards of the National Institute for Standards and Technology.

B. Perform the following on-site tests after items 3.01 and 3.02 have been completed:

1. All necessary tests recommended by the manufacturer
2. All NFPA 110 tests that are in addition to:
   - System Integrity Test: Verify proper installation, connection, and integrity of each of the components of the diesel generator system before and during operation.
   - Noise level test: Measure and calculate the A-weighted (DbA) levels emanating from the product assembly at five (5) meters for at least six equally spaced points around the enclosure while the machine is under load. Include such points as the exhaust discharge, and cooling air intake and discharge. The noise level test is to be taken at the site after installation and shall adhere to the conditions described in section 2.03A - item 9. Also refer to the test method as defined by ISO 3744.
   - Load Bank test: Run a two hour minimum test with all applicable field load (See

section 1.02 for the ratings of the pump loads at each respective site). The automatic transfer switch is to be engaged and fully tested for all phases of operation during this test. The load bank may be either resistive or inductive. For purposes of the load test, the NEMA LRKVA/HP Code of the pump motors is H.

C. Compare all measured quantities with required values of testing. Correct all deficiencies identified by tests and repeat test and correction procedure until specified test requirements are met. All problems and shortcomings in the product provided shall be remedied and corrected with no cost to the County.

D. The County shall have the option of whether or not to witness all testing that is performed. Report all test results in writing to the County.

3.04 TRAINING AND DEMONSTRATION

A. A factory representative of the product is to provide the County's maintenance personnel with a thorough period of instruction and hands-on session regarding the operation, trouble shooting and maintenance of all components of the product. Typical training period: one hour for each site.

3.05 DELIVERY

A. The product described in these specifications shall be fully installed and fully operational, tested and demonstrated within the agreed upon number of days after the award of the bid has been made.

3.06 NOTICE OF DELIVERY, TESTING, TRAINING AND DEMONSTRATION

A. At least seven business days of notice is to be given by the contractor to the County for delivery, installation, testing, training and demonstration of the product.

END OF SECTION

SECTION 16370 VARIABLE FREQUENCY DRIVES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish variable frequency drives as specified hereinafter.

1.02 DRIVE APPLICATION

A. The variable frequency drives will be used to control the speed of inverter duty rated NEMA B design squirrel cage induction motors driving centrifugal pumps in wastewater effluent pumping service.

1.03 DRIVE PARAMETERS

A. The variable frequency drives shall be designed and sized for the loads intended, shall not exceed their full-rated capacity when the driven pumps are operating at maximum capacity, shall not overload under any operating condition of the pumps, and shall be provided with an integral bypass motor starter package.

1.04 SPARE PARTS

A. As a minimum, each of the variable frequency drives shall be furnished with the following spare parts:

1. One (1) circuit board of each type used.
2. Three (3) spare bulbs of each type and size used.
3. Three (3) lens caps of each color and size used.
4. Three (3) sets of power fuses.
5. Three (3) sets of control fuses.

1.05 MANUFACTURER'S QUALIFICATIONS

A. Manufacturer shall be FUJI Mega model, unless otherwise approved by the Owner.

B. The manufacturer shall have a factory authorized representative (s) and/or a certified repair shop(s) located within the State of Florida staffed with factory trained service personnel capable of providing installation and start-up assistance, routine and 24-hour emergency repair services (including parts), and training for the County's personnel in operating and maintenance procedures associated with the specific variable frequency drives furnished.

C The manufacturer shall offer both standard and extended period service contracts as part of his normal operating policy.

1.06 MANUFACTURER'S REPRESENTATIVE

A. A factory trained authorized representative(s) of the manufacturer shall be available to perform the following functions:

1. Provide installation assistance to the County's personnel on an "as needed" basis, one (1) scheduled day minimum.
2. Provide checkout and start-up services as well as conduct the final acceptance tests, two (2) scheduled days.
3. Provide training for the County's personnel in the proper operation and maintenance techniques to be used with the specific VFD's furnished, two (2) scheduled days.

B. The manufacturer shall include in his bid sufficient funds to cover all the costs (travel, meals, lodging) associated with providing the services listed in Item 1.06.A.1, 2 and 3 above.

1.07 SUBMITTALS

A. Within three (3) weeks of receiving the order, the manufacturer shall furnish the County with certified dimension prints which clearly show the nameplate data and outline dimensions.

B. Prior to start of manufacture of the variable frequency drives, the manufacturer shall submit sets of drawings which shall include, but not necessarily be limited to, enclosure drawings showing the location of both internally and externally mounted components, master wiring diagrams showing all interconnections to the discrete component level, elementary or control schematics including coordination with other external control devices operating in conjunction with the variable frequency drives, and outline drawings with sufficient details to allow for locating conduit stub-ups and field wiring.

C. Failure to comply with Item 1.06.B above shall be entirely at the manufacturer's risk. Any changes required as a result of the County's review will be solely at the manufacturer's expense with no cost to the County.

1.08 WARRANTY

A. The manufacturer shall warrant that the variable frequency drives shall be free from defects in all materials and workmanship for a period of two (2) years from date of final acceptance.

B During the Warranty period, any and all covered defects shall be corrected by the manufacturer solely at his own expense with no cost to the County.

PART 2 PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES

A. GENERAL

1. The variable frequency drives shall be the adjustable frequency (AF), variable torque (VT), pulse width modulated (PWM) type designed to provide continuous speed adjustment of 3-phase NEMA B squirrel cage induction motors, inverter duty rated.
2. The adjustable frequency drives (VFD's) shall be rated for the horsepower (HP), full-load current (Amps), and speed (RPM) of the motors actually supplied.
3. The VFD's shall be furnished in NEMA Type 3R floor-mounted enclosuresThe

enclosures shall be forced air ventilated using door-mounted fans. Fan installation shall include cleanable, reuseable air filters.

B. CONSTRUCTION

1. The VFD's shall be microprocessor based solid state devices consisting of three (3) basic sections:
   a. A rectifier section to change the constant frequency AC input voltage to a DC voltage. A full wave rectifier shall be used to prevent input line notching. Internal fast acting semiconductor fuses shall be installed to preclude the necessity for having external AC line fuses.
   b. A DC bus/link section to interconnect the rectifier section and the inverter section. A DC line reactor and capacitors shall be used to smooth the DC bus/link operation, improve displacement power factor, lower harmonic distortion, and eliminate the need for an isolation transformer.
   c. An inverter section to convert the DC voltage to a variable frequency AC voltage. Insulated gate bipolar transistors (IGBT's) shall be used as output switching devices to allow "tripless" operation, reduce motor noise, provide smoother motor operation, assure reliable and safe shutdowns under fault conditions, and increase drive efficiency; specifically, SCR's, GTO's, and Darlington Transistors are <u>not</u> acceptable as switching devices under this Specification.
2. The VFD's shall be capable of operating from a 3-phase input voltage of 480 Volts ±10% over a frequency range of 48-63 Hertz while providing a constant volts per Hertz excitation to the motors.
3. The VFD's shall have a one minute overload rating of 150%, minimum.
4. The VFD's shall employ surface mount technology for reduced size, high reliability, ease of maintenance, and resistance to vibration.
5. The VFD's shall incorporate full internal protection against short circuits, ground faults, over- and undervoltage, over- and undercurrent, and temperature extremes.
6. The VFD's shall contain an adjustable electronic motor overload (I^2t) circuit to eliminate the need for an external motor overload relay.
7. The VFD's shall utilize advanced diagnostic techniques to simplify trouble shooting and correcting problems.
8. The VFD's shall have a minimum drive efficiency of 97% at full speed and full load.
9. The VFD's shall have a minimum fundamental power factor of 0.98 at all speeds and loads.
10. The VFD's shall be able to operate under the following environmental conditions without modification or derating:
    a. Temperature: 0 to 50EC.
    b. Altitude: Up to 3,300' above sea level.
    c. Humidity: O to 95%, non-condensing.
11. The VFD's shall be UL listed and shall comply fully with the applicable standards and provisions of ANSI, NEMA, IEEE, IEC, and NEC, latest revisions.

C. STANDARD FEATURES

1. The VFD's shall, as a minimum, have the standard features and adjustments listed below:
   a. The VFD's shall have the same customer interface regardless of horsepower rating, including keypad, digital display, and user connections.

The keypad and the digital display shall be accessible without opening the main door of the drive enclosures.

b. The keypad shall be the seven (7) button touch type and shall be used for start-up, for setting all parameters, for stepping through the displays and menus, and for local control, including speed adjustments.

c. In addition to the keypad speeds adjustment provisions, the VFD's shall also be furnished with a manual speed adjustment potentiometer. The potentiometer shall be accessible without opening the main door of the drive enclosures.

d. The digital display shall be the LCD alphanumeric type with 40-character, 2-line capability. The LCD display shall be backlit to provide easy viewing at any angle in any light condition. The display shall have adjustable contrast.

e. The display shall utilize plain English - i.e., all set-up parameters, indications, faults, warnings, and other such information must be displayed in words for easy user understanding; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification.

f. The VFD's shall incorporate pre-programmed application macros for ease of start-up. To reduce programming time, the macros shall provide one command operation to reprogram all parameters and user interfaces for a particular application.

g. The VFD's shall provide a user selectable option of either displaying a fault or running at a preset speed if a reference input is lost.

h. The VFD's shall be capable of a "flying start" into a rotating load and accelerating to setpoint without safety tripping or damage to the drives or driven equipment.

i. The user terminal strip shall be isolated from both the line and ground.

j. The VFD's shall have the ability to automatically restart after an overcurrent, overvoltage, undervoltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable. If the time between reset attempts is greater than zero, the time remaining until reset occurs shall count down on the display to warn an operator that a restart will occur.

k. The VFD's shall be equipped with an automatic extended power loss ride-through circuit which will utilize the inertia of the load to keep the drive powered. Minimum power loss ride-through shall be one-cycle, based on full load and no inertia. Removing power from the motor will not be an acceptable method of increasing power loss ride-through under this Specification.

l. The VFD's shall be optimized for a 3 kHz carrier frequency to reduce motor noise.

m. The VFD's shall incorporate the following three (3) separate current limit circuits to provide "trip free" operation:

    1) A slow current regulation limit circuit which shall be an adjustable percentage of the VFD's variable torque current rating, minimum setting of 125%. This adjustment shall be made via the keypad and shall be displayed in actual amperes, not as a percentage of full load.

    2) A rapid current regulation limit circuit which shall be an adjustable percentage of the VFD's variable torque current rating, minimum setting of 170%.

3) A current switch-off limit circuit which shall be a fixed percentage of the VFD's variable torque current rating, minimum setting of 255% instantaneous.

n. In addition to any software items listed above, the VFD's shall, as a minimum, contain the following built-in software features:

1) Automatic slip-compensation for maintaining motor speed under varying load conditions.
2) A motor under-load function to protect the pumps.
3) Starting torque up to 180% of full load torque.
4) User selectable manual or automatic IR compensation for torque increases over a selected frequency range.
5) Five (5) adjustable/selectable critical frequency lock-out bands to avoid load resonance points during ramp-up or ramp-down.
6) Two (2) acceleration and two (2) deceleration ramps, adjustable from 0.1 seconds to 1800 seconds.
7) Three (3) adjustable S-curve acceleration and deceleration patterns.
8) User selectable linear, squared, or automatic control of the Volts-per-Hertz shape to assure maximum energy efficiency.
9) Precise full range frequency resolution adjustable in 0.01 Hertz increments.
10) Integral kilowatt-hour and elapsed-time displays.
11) Integral PI and sequential control functions.
12) Hand-Off-Auto function for local control through the integral keypad and remote control via pushbuttons and/or potentiometers.

o. The VFD's shall have seven (7) programmable preset speeds as well as unidirectional rotation and coast-to-a-stop features.

p. The VFD's shall have two (2) programmable analog inputs capable of accepting either a current or a voltage signal. Inputs shall be filtered and shall have adjustable gain and offset.

q. The VFD's shall have six (6) programmable digital inputs.

r. The VFD's shall have two (2) programmable analog outputs proportional to the chosen reference (frequency, motor speed, etc.).

s. The VFD's shall have three (3) programmable digital outputs. Outputs must be true Form C relays; specifically, open collector outputs will not be acceptable under this Specification.

t. The VFD's shall be equipped with an RS-485 serial port capable of communicating with external PLC's, DCS's, DDC's, and touch-screen graphic operator panels.

u. The VFD's digital display shall contain, as a minimum, the following information shown in complete English words; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification:

Output Frequency	DC Bus Voltage
Output Voltage	Heatsink Temperature
Motor Speed	Analog Input Values
Motor Current	Keypad Reference Values
Calculated Motor Torque	Elapsed Time
Calculated Motor Power	Kilowatt-hours

v. The VFD's shall, as a minimum, incorporate the following protective circuits which, in the case of a protective trip, shall stop the drive and announce the fault condition in complete English words; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification:
   1) Overcurrent: Trip set at 315% instantaneous (225% RMS) of the VFD's variable torque current rating.
   2) Overvoltage: Trip set at 130% of the VFD's rated voltage.
   3) Undervoltage: Trip set at 65% of the VFD's rated voltage.
   4) Overtemperature: Trip set at +70EC or +85EC dependent upon drive furnished.
   5) Ground Fault: Both "running" and "at start".
   6) Adaptable Electrical Motor Overload (I^2t): Motor protection shall be based on motor speed and load; specifically, circuits which are not speed dependent will not be acceptable under this Specification.

w. The VFD's shall incorporate a parameter lock feature which will prevent unauthorized personnel from altering the drive parameters without entering a programmable password or combination number. The parameter lock shall also be settable to a digital input.

x. The VFD shall house the submersible pump temperature/moisture monitor as shipped from the pump supplier for installation in VFD.

D. FACTORY INSTALLED OPTIONS

1. In addition to the Hand-Off-Auto switch and speed potentiometer mentioned hereinabove, the VFD's shall include the following factory installed options:
   a. Circuit Breaker: The circuit breaker shall be the thermal magnetic, thru-the-door interlock type, padlockable in the Off position.
   b. 115 VAC Control Transformer and Terminal Board: A terminal board shall be provided for convenient connection of all field control wiring, including all drive inputs and outputs and 115 VAC start input. A control transformer, 150 VA minimum, shall also be included.
   c. Manual Bypass with Service Switch: A manually operated bypass switch shall allow the motor to be connected directly across the line and operate at full synchronous speed. In bypass, power is to be removed from the drive, but the start signals and the safety interlocks are to remain active. Normal and bypass pilot lights and an external fault circuit with an indicating lamp which illuminates whenever any external safety device has shut down the motor shall be included. Pilot lights shall be the push-to-test type. The service switch shall allow power to be removed from the drive for servicing while the motor operates from line power. The service switch shall be internally mounted to prevent unauthorized personnel from disrupting operation.
   d. Motor Overload Relay: A standard, manually resettable, bimetallic, motor overload relay with a Class 20 trip curve shall be installed to provide thermal motor protection in the bypass mode. A thru-the-door reset button for the motor overload relay shall also be included.
   e. Numbered Wires: All internal drive wires shall be numbered at both ends to facilitate maintenance and trouble shooting.

E. ACCEPTABLE MANUFACTURERS: The VFD's shall be as manufactured by the ABB Industrial Systems Inc., Eaton Corporation (Cutler Hammer Division), Square "D" Company, Allen-Bradley, or Robicon.

PART 3 EXECUTION

3.01 FACTORY TESTING

A. Prior to assembly in the VFD's, all printed circuit boards shall be thoroughly factory tested and given a minimum eight (8) hour burn-in.

B. After assembly, the drives shall be given a minimum eight (8) hour load test using a driven motor. The load shall be continuously cycled from no-load to full rated load to induce maximum stress and thermal variations in the drive components.

C. During the load test, the major drive parameters (input volts, output volts, output current, output speed, output frequency, percent load, etc.) shall be recorded and a copy of the test results shall be reviewed by the County prior to the shipment of the VFD's. Similarly, any failure(s) of the drives during the load test shall be recorded, analyzed, corrected, and reported to the County before shipment of the VFD's.

3.02 SHIPPING

A. The VFD's shall be so packaged for shipment that they are maximally protected from both physical and environmental damage.

B. The VFD's shall be transported to the County's job sites utilizing the manufacturer's customary method of shipment.

3.03 INSTALLATION

A. The VFD's shall be installed by the County's personnel in accordance with the recommendations and procedures set forth in the installation manual furnished by the manufacturer.

B. An authorized factory trained representative(s) of the manufacturer shall be available to assist the County's personnel on an "as needed" basis.

3.04 CHECKOUT AND START-UP

A. Prior to start-up, a factory trained representative(s) of the manufacturer shall be on hand to assure that the VFD's have been properly installed and that all field wiring is correctly terminated.

B. After checkout, the manufacturer's representative(s) shall then conduct a certified factory start-up using procedures and forms established by the manufacturer of the VFD's.

C. A copy of the certified start-up form(s) for each drive shall be provided to the County, and a copy shall be kept on file by the manufacturer.

3.05 FIELD TESTING

A. After satisfactory completion of the checkout and start-up procedures, the manufacturer's representative(s) shall begin an eight (8) hour acceptance test using actual plant loads.

B. Any and all short-comings discovered and/or failures occurring during the acceptance test shall be remedied by the manufacturer solely at his own expense with no cost to the County.

C. Any time after four (4) hours of acceptance testing, the County may, at his option, curtail further testing and take acceptance of the VFD's.

3.06 TRAINING

A. As set forth in Items 1.05.B and 1.06.A above, a factory trained authorized representative(s) of the manufacturer shall be available at such a time(s) and place(s) established by the owner to train the County's personnel in the proper operation and maintenance procedures required by the specific VFD's furnished.

3.07 WARRANTY

A. The manufacturer shall furnish to the County a written warranty which complies with the requirements set forth in Item 1.08 above.

END OF SECTION

SECTION 16450 GROUNDING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install a complete grounding system in strict accordance with Article 250 of the National Electrical Code and/or as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

A. The requirements of Section 01340 and Section 16050 shall be met.

B. Test results as indicated in 3.02 C shall be submitted.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ground Rods: The ground rods shall be solid copper or copper-clad steel having a diameter of 5/8-inch and a length of 10-feet. The ground rods shall be as manufactured by Copperweld, or approved equal.

B. Grounding Conductors

1. All grounding conductors shall be copper. Aluminum or copper-clad aluminum grounding conductors will not be allowed.
2. The grounding conductors shall be sized in accordance with the latest edition of the National Electrical Code, Table 250-94 or Table 250-95, whichever is applicable to the particular grounding conductor.

C. Ground Rod Clamps: The ground rod clamps shall be malleable iron or cast bronze fittings suitable for use with copper conductors. The ground rod clamps shall be as manufactured by Bridgeport Fittings, Inc.; ITT Blackburn, Inc.; or approved equal.

D. Dissimilar Metals Junctions: Connections between different metals shall be sealed using NO-OXIDE paint, Grade A, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Wherever possible, the Contractor shall connect to an existing plant, area or building grounding grid. Where no such grounding grid exists, the Contractor shall provide grounding as hereinafter specified and/or as shown on the Contract Drawings.

B. Building grounding grid conductors shall be embedded in backfill material around the structures.

C. All underground conductors shall be laid slack and, where exposed to mechanical injury,

shall be protected by pipes or other substantial guards. If guards are iron pipe or other magnetic material, conductors shall be electrically connected to both ends of the guard.

D. Grounding electrodes shall be driven as required. Where rock is encountered, grounding plates may be used in lieu of grounding rods.

E. All equipment enclosures, motor and transformer frames, conduit systems, cable armor, exposed structural steel and similar items as required by Article 250 of the NEC shall be grounded.

F. All steel building columns shall be bonded together and connected to the building ground grid.

G. Exposed connections shall be made utilizing approved grounding clamps. Buried connections shall be Cadweld, or approved equal, welding process.

H. The ground bus of service entrance equipment shall be connected to the plant, area or building ground grid, whichever is applicable.

I. For reasons of mechanical strength, grounding conductors extending from the plant, area or building grounding grid or service entrance ground bus, whichever is applicable, to the ground buses of motor control centers and/or unit substations shall be No. 1/0 AWG bare copper.

J. Lighting transformer neutrals shall be grounded to the nearest grounding electrode.

K. Conduits stubbed-up below a motor control center shall be fitted with insulated grounding bushings and connected to the motor control center ground bus. Boxes mounted below motor control centers shall be bonded to the motor control center ground bus. The grounding wire shall be sized in accordance with Table 250-95 of the National Electrical Code, except that a minimum No. 12 AWG shall be used.

L. Motors shall be grounded in accordance with Section 16150, Item 3.01.A of these Specifications.

M. The Contractor shall exercise care to insure good ground continuity, in particular between conduits and equipment frames and enclosures. Where necessary, jumper wires shall be installed.

3.02 TESTS

A. The Contractor shall test the ground resistance of the system. The Contractor shall provide all test equipment of which the County shall have approval.

B. The dry season resistance of the system shall not exceed five (5) ohms. If a single driven rod does not produce this value, the Contractor shall drive additional rods and/or take other measures as directed by the County without any cost to the County.

C. The Contractor shall furnish to the County three (3) copies of the test report certifying that the system is in compliance with the ohmic value requirement. The certified test report shall include, but not necessarily be limited to, the following:

1. Description of the test.
2. Type of test equipment used.
3. Moisture content of the soil.
4. Date and time of the test.
5. Resistance measurement of each rod cluster.
6. Name of individual(s) performing the test.
7. Contractor's certification stamp or seal.

3.03 GUARANTEES AND WARRANTIES

A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

ATTACHMENT A:

PREMANUFACTUERED BUILDING SPECIFICATION SECTION 06610 AND DRAWINGS PROVIDED AND DESIGNED BY ORENCO COMPOSITES

*HDR ENGINEERING, INC. DOES NOT TAKE OWNERSHIP OF THESE DRAWINGS AND SPECIFICATIONS AND ARE NOT PART OF THE SIGNED AND SEALED SET OF SPECIFICATIONS OR DRAWINGS. CONTRACTOR TO SUBMIT FLORIDA LICENSED ENGINEER SIGNED AND SEALED DRAWINGS FOR FRP BUILDING THAT MEETS THE REQUIREMENTS NOTED IN DRAWINGS AND SECTION 06610 IN ATTACHMENT A.

SECTION 06610
FIBER REINFORCED POLYMER (FRP) BUILDINGS
[PERFORMANCE SPECIFICATION]

PART 1 GENERAL

1.01 DESCIPTION

The Contractor shall furnish and install all FRP buildings, equipment, components and accessories as specified herein. All said buildings, equipment, components and accessories shall be provided by a single supplier or manufacturer to assure compatibility and proper performance.

1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

All buildings, equipment, components and accessories shall be designed, manufactured, inspected and delivered in accordance with the latest edition of the following specifications, codes and standards:

ASTM C 518	Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM D 256	Standard Test Method for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics
ASTM D 618	Standard Practice for Conditioning Plastics for Testing
ASTM D 638	Standard Test Method for Tensile Properties of Plastics
ASTM D 732	Standard Test Method for Shear Strength Plastics by Punch Tool
ASTM D 790	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
ASTM D 792	Standard Test Method for Specific Gravity (Relative Density) and Density of Plastics by Displacement
ASTM D 1622	Standard Test Method for Apparent Density of Rigid Cellular Plastics
ASTM D2563	Standard Practice for Classifying Visual Defects in Glass-Reinforced Plastic Laminate Parts
ASTM D 2583	Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor

1.03 WARRANTY

The FRP building shall be provided with a minimum ten (10) year manufacturer's warranty against defects in material and workmanship. All equipment, components and accessories shall be provided with a minimum two (2) year contractor warranty against defects in material and workmanship unless otherwise stated in the project bid documents.

1.04 SUBMITTALS

The supplier or manufacturer shall submit the following documents for acceptance prior to manufacturing, assembling and/or shipping the specified buildings, equipment, components or accessories:

1. Complete fabrication and assembly drawings showing all materials and dimensions of the FRP building and associated appurtenances.

2. Complete assembly drawings showing the locations of all equipment, components and accessories to be provided by the manufacturer or supplier in accordance with this specification.

3. Original Equipment Manufacturer (OEM) product data sheets for all equipment, components and accessories being provided by the manufacturer or supplier in accordance with this specification.

4. Color chart showing the available colors for external and internal building coatings for final color selection by Owner.

5. Complete design calculations for all design loads including: dead loads, live loads, wind loads, and seismic loads prepared and signed by Registered Civil Engineer licensed in the State of which the project will be completed.

6. Detailed information and/or drawings showing standard options for building anchorage. All material, equipment, labor and provisions associated with the FRP building foundation and anchorage design and construction shall not be made part of this specification section and shall not be provided by the FRP building supplier or manufacturer.

7. Instructions and recommendations for unloading, handling, storage, and installation.

8. One set of drawings covering the electrical design, including dimensioned floor plan showing equipment locations, one line diagram, and panelboard schedule.
   (a) The plans should identify quantity and location of conduit penetrations to coordinate with the Contract Drawings.
   (b) The plans should identify location and dimensions of all electrical equipment to be located in the building. Dimensions should be based on final approved shop drawing submittals.
   (c) Provide equipment pads for all floor mounted equipment.

1.05 DELIVERY, STORAGE AND HANDLING

1. The manufacturer or supplier shall take the proper precautions to protect all products covered within this specification section from damage during shipment. All damage incurred during shipment shall be the sole liability of the supplier or manufacturer.

2. The contractor shall take the proper precautions to protect all products covered within this specification section from damage following receipt of shipment. Damage incurred while loading, unloading, moving, storing, assembling or installing the products covered within this specification section shall be the sole liability of the contractor.

PART 2 PRODUCTS

2.01 APPROVED MANUFACTURERS AND SUPPLIERS

1. **Orenco Composites, a Division of Orenco Systems, Inc. – Roseburg, OR – (541) 459-6970**

2. To submit on alternative manufacturers or suppliers the following requirements must be met:

(a) The engineer must receive a formal substitution request no later than ten (10) days prior to the assigned bid date. Furthermore, no substitution requests will be considered after the project has formally bid.
(b) All substitution requests shall include a contractor signed affidavit certifying the proposed substitution fully complies with the requirements of this specification section. Products found to be noncompliant shall be removed and replaced at the sole liability of the contractor.
(c) All substitution requests shall include sufficient manufacturer provided literature, data sheets and drawings such that the engineer is able to confirm that all requirements of this specification section are met.
(d) All substitution requests shall include five (5) written end-user references with contact information.
(e) All buildings, equipment, components and accessories required within this specification section shall be provided by a single supplier or manufacturer to assure compatibility and proper performance.

2.02 FRP BUILDING DESIGN AND MANUFACTURING REQUIREMENTS

1. The FRP building shall comply with the following design requirements:

   (a) Structure Name: Rye Road Master Pump Station Electrical Building

   (b) Exterior Width: 10 Feet

   (c) Wall Height: 10 Feet

   (d) Exterior Length: 20 Feet

   (e) FRP Floor Requirement (where applicable): N/A

   (f) Design Wind Load: 160 MPH

   (g) Design Live Load: 100 psf

   (h) Design Thermal Resistance: R-24

   (i) Foam Core Material Thickness: 4” minimum in walls, roof and floor

   (j) Exterior Color: Torque Tan

   (k) Interior Color: White

2. The FRP building shall be a seamless, molded, one-piece structure manufactured using a closed-molded RTM or vacuum-bagging process. Open-molded and/or panel assembled buildings shall not be acceptable.

3. To reduce the risk of delamination due to rotting, swelling and/or rusting, the FRP building shall be manufactured of 100% composite materials. Embedded wood and or ferrous metals shall not be allowed. All equipment and accessories shall be mounted directly to the FRP wall using either walldog screws (60lb design pull-out strength, 406lb ultimate) and/or rivet nuts (200lb design pull-out strength, 1,781lb ultimate) depending on the equipment loading requirements. In-wall mounting board (wood or composite) shall not be allowed.

4. The FRP building shall be manufactured from fiberglass reinforced polyester resin, using grades of resin and fiberglass considered acceptable for use in water and wastewater environments. The laminate layers shall obtain a glass: resin ratio of 70% (+/- 10%). Insulation foam with a minimum density of 2 lb/ft3 shall be polyurethane or polyisocyanurate and shall be integrally molded within

the structure walls, roof and floor. The FRP building walls, roof and floor shall be manufactured to include integrally molded FRP beams, spaced at a minimum of 12" on-center, to increase structural integrity and prevent delamination.

5. The inside structure surface shall be protected with a polyester gelcoat. The outside surface shall be protected with a high performance, UV resistant polyaspartic urethane coating rated for continuous outdoor exposure.

6. The FRP building shall be manufactured with an integral pocket flange for securing the building to a concrete slab. A manufacturer provided gasket shall be installed between the FRP building and concrete foundation at the time of placement

7. The FRP building shall include a roof and/or floor of identical construction (including materials and thicknesses) to that of the walls. The roof shall be adequately sloped to allow drainage.

8. The FRP building shall be equipped with lifting brackets or eyebolts installed on the ceiling exterior to allow lifting of the building by crane, excavator, or similar equipment.

2.03 DOORS, FRAMES AND HARDWARE

1. The FRP structure shall be supplied with the type, size and quantity of doors and hardware as specified below or as shown on the project plans and Orenco provided product sketch (Appendix A of the Technical Specifications.

2. All single/double doors shall be of FRP construction with a 2" minimum polyurethane or polyisocyanurate foam core (minimum density of 2 lb/ft3).

3. Each single/double door shall be hung on 4-inch × 4-inch stainless steel ball bearing hinges with non-removable pins. The hinges shall be bolted through the door jam with 304 stainless steel fasteners. Single/double doors are supplied with hardware as noted in 2.04 below.

4. Door frames shall be of FRP materials and shall be mounted separately to the structure after the molding process is complete. Submarine style door systems, or other framing techniques in which the frame is molded into the structure itself, shall not be allowed.

5. The FRP structure shall be provided with a drip cover above the entire length of the door.

2.04 ACCESSORIES AND EQUIPMENT

6. All accessories and equipment shall be wired in accordance with the plans and all federal, state and local electrical codes. Wiring of all equipment shall be performed by the manufacturer or supplier prior to shipment.

7. Engineer and/or owner approved equivalent products may be considered in place of the accessories and equipment listed below.

8. Provide one door (door #1): 36" wide, fiberglass door and trim with stainless steel hinges and FRP drip cover, right hand reverse.
   (a) Door closer: Norton 8301H
   (b) Door hardware: Stainless steel Corbin Russwin door hardware, keyed, grade 1, entry lever and panic bar emergency exit device.

9. Provide one door (door #2): 36" wide fiberglass door and trim with stainless steel hinges and FRP drip cover, left hand reverse.
   (a) Door closer: Norton 8301H

(b) Door hardware: Stainless steel Corbin Russwin door hardware, keyed, grade 1, entry lever and panic bar emergency exit device.

10. Provide one Mitsubishi split ductless HVAC unit: MSZ-GE24NA (24,000btu/hr)

11. Provide one Exhaust Fan: 649 cfm minimum, Fantech FR250 w/ rain cover

12. Provide one Timer: Intermatic ST01 (for cycling ventilation fan)

13. Provide one thermostat: Dayton 4LZ94A

14. Provide one Intake Louver: 18" x 18", wall-mounted, adjustable damper, insect screen, rain cover, Dayton 5NKH6 with flange kit, Dayton 33W754

15. Provide six interior light fixtures: 4' LED, vapor tight, MaxLite LSV4806SU50

16. Provide two exterior light fixtures (one adjacent to each access door): Compact LED, 120V, 19W, 1017 lumens, photocell, Lithonia TWS LED 1 50K 120PE

17. Provide one mini-power center: 15 KVA Rating, 3-Phase, 480V to 208Y/120V, 115 Degree Celsius, Eaton P48G28T15P

    (a) Load center shall be sized adequately for building loads in addition to the following site loads:
    (i) Qty. 1 – 20A, 1-pole, 120V breaker for pump control panel CP-1.
    (ii) Qty. 1 - 20A, 1-pole, 120V breaker for area light.
    (iii) Qty. 1 - 20A, 1-pole, 120V breaker for generator battery charger.
    (iv) Qty. 1 – 30A, 2-pole, 240V breaker for generator jacket heater.

18. Provide one dry type transformer, 480-120/240V, 1-phase to feed load center.

19. Provide two receptacles: duplex, GFCI, 15A, 125V, 20A feed-thru, weatherproof Carlon cover, WC596 compliant, Leviton WR599-W

20. Provide 2-gang, weatherproof, outdoor rated light switches as required for fully functional system

21. All equipment within the building shall be pre-wired using 12 awg, EMT conduit

22. Each electrical equipment item in the station shall be properly grounded per Section 250 of the National Electrical Code. Items to be grounded include, but are not limited to, control panel, transformer, convenience receptacles, air conditioner, lights, light switch, exhaust fans.

PART 3 EXECUTION

3.01 GENERAL

1. All buildings, equipment, components and accessories shall be stored, fabricated, assembled, erected, moved and tested in accordance with the bid documents and the manufacturers, suppliers and original equipment manufacturers (OEM's) written recommendations and instructions.

3.02 INSTALLATION

1. All buildings, equipment, components and accessories shall be installed in strict accordance with manufacturer's printed recommendations. Appropriately sized lifting equipment shall be used to off-load the building using the manufacturer supplied lifting lugs.

2. All buildings shall be installed on level and flat concrete slabs or foundations free of cracks and vertical projections. The contractor shall install a manufacturer supplied neoprene gasket in between the FRP building and concrete foundation at the time of placement.

   (a) Anchorage
   • 1/2" diameter, 7" length, 304 Stainless Steel Red Head Trubolt anchors to obtain a minimum embedment depth of 4.125"
   • Maximum anchor spacing of 2 feet, center to center.

3. All pipe and conduit penetrations through concrete foundation, FRP roof, and FRP walls shall be completely sealed to provide an air and weather tight structure. Consult manufacturer or supplier for recommended materials and procedures.

4. All building equipment and accessories shall be mounted directly to the FRP wall using either walldog screws (60lb design pull-out strength, 406lb ultimate, each) and/or rivet nuts (200lb design pull-out strength, 1,781lb ultimate, each) depending on the equipment loading requirements. The contractor shall consult with the manufacturer or supplier should equipment loadings exceed the aforementioned mounting hardware capabilities.

END OF SECTION

DESCRIPTION	QTY.
DURAFIBER BUILDING, 10'W x 10'H x 20'L x 4-3/8" WALL CONSTRUCTIONS, EXTERIOR COLOR TORQUE TAN, INTERIOR COLOR WHITE	1
FIBERGLASS RAIN DIVERTER FOR 3'-0" DOOR	2
FIBERGLASS DOOR AND TRIM, 3'-0" RIGHT HAND REVERSE, COLOR BRONZE TONE	1
FIBERGLASS DOOR AND TRIM, 3'-0" LEFT HAND REVERSE, COLOR BRONZE TONE	1
HYDRAULIC DOOR CLOSER, NORTON 8301H	2
DOOR HARDWARE, ENTRY LEVER WITH STAINLESS HARDWARE, KEYED, PANIC BAR, CORBIN RUSSWIN	2
LIGHTING, EXTERIOR: COMPACT LED, 120V, 19W, 1017 LUMENS, PHOTO SENSOR, LITHONIA TWS LED 1 50K 120PE	2
UTILITY METER (SUPPLIED BY OTHERS)	1
SW-1 (SUPPLIED BY OTHERS)	1
MITSUBISHI ELECTRIC WALL-MOUNTED AC OUTDOOR UNIT	2
LIFTING BRACKET & EYENUT - 4" BUILDING	4
LIGHTING, INTERIOR: 4' LED, VAPOR TIGHT FIXTURE, MAXLITE LSV4806SU50	4
TIMER FOR VENTILATION FAN; INTERMATIC ST01	1
2-GANG, WEATHERPROOF LIGHT SWITCH	1
THERMOSTAT, DAYTON 4LZ94A	1
LOAD CENTER, EATON P48G28T15P	1
MITSUBISHI ELECTRIC WALL-MOUNTED AC INDOOR UNIT	2
ATS-1 (SUPPLIED BY OTHERS)	1
PP-1 (SUPPLIED BY OTHERS)	1
MPC-1 (SUPPLIED BY OTHERS)	1
CP-1 (SUPPLIED BY OTHERS)	1
ODOR CONTROL (SUPPLIED BY OTHERS)	1
VFD (SUPPLIED BY OTHERS)	3

BUILDING IS MANUFACTURED FROM FIBERGLASS REINFORCED POLYESTER RESIN, USING GRADES OF RESIN AND FIBERGLASS CONSIDERED ACCEPTABLE FOR USE IN WATER AND WASTEWATER ENVIRONMENTS. INSULATION FOAM IS A MINIMUM 2 LB/FT3 (32 KG/M3) POLYURETHANE OR POLYISOCYANURATE.

BUILDING IS MANUFACTURED WITH A CLOSED-MOLDED RTM OR VACUUM-BAGGING PROCESS TO ENSURE INTEGRAL BONDING OF THE FOAM CORE WITH THE FIBERGLASS LAMINATES. WALLS AND CEILING ARE 4", R24 INSULATION VALUE.

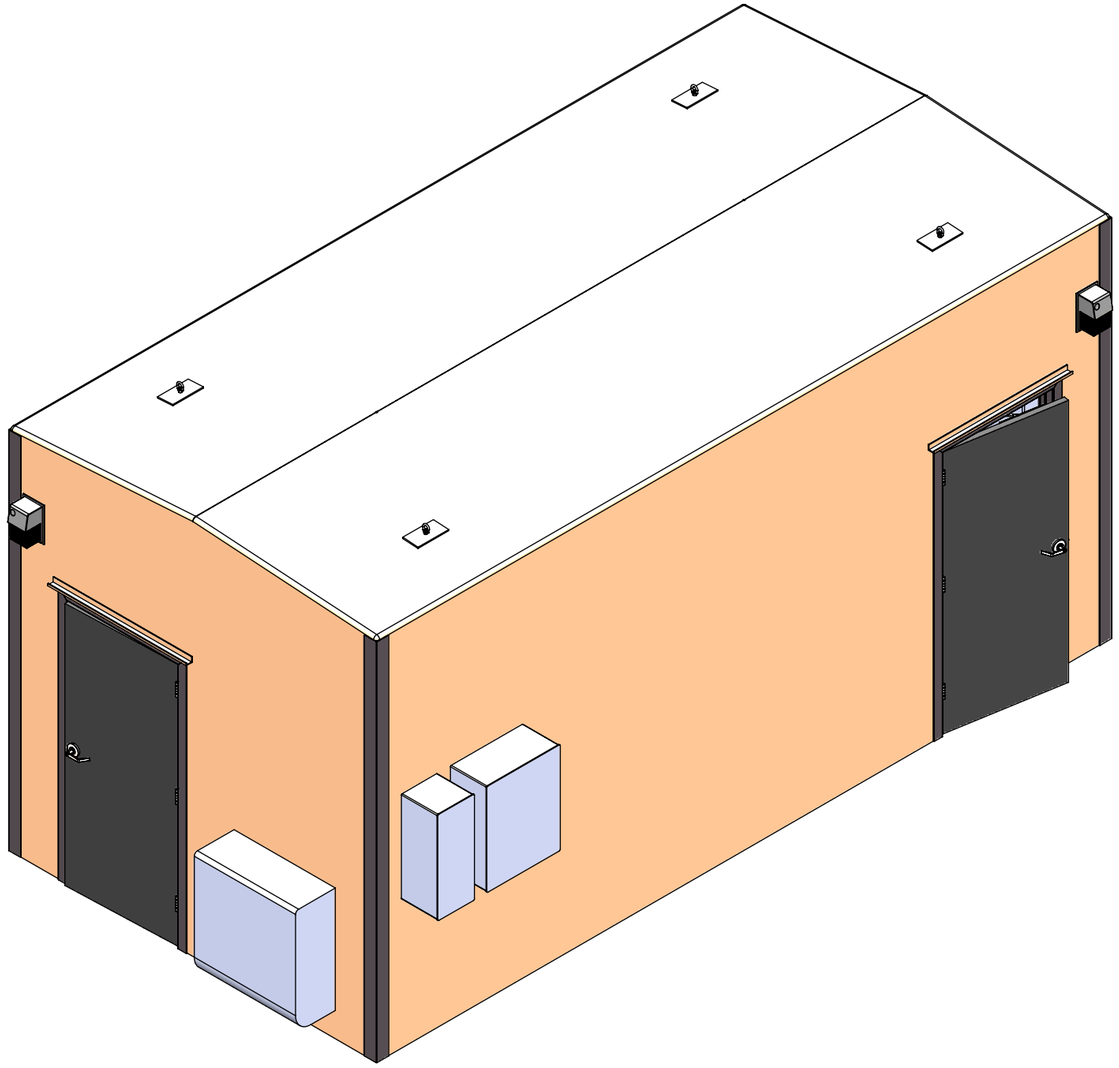
DOOR, DOOR FRAME ARE FIBERGLASS CONSTRUCTION.

HARDWARE AND FASTENERS ARE STAINLESS STEEL.

ALL ELECTRICAL EQUIPMENT IS INSTALLED AND WIRED IN CONFORMITY TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE.

ELECTRICAL LOCATIONS MAY VARY ± 4"

NOTE: ALL ITEMS MARKED AS "SUPPLIED BY OTHERS" ARE SHOWN WITH ACCURATE WIDTH DIMENSIONS FOR SIZING PURPOSES, ACTUAL HEIGHT AND DEPTH MAY VARY.



ISO VIEW

CUSTOMER APPROVAL:_____DATE:_____

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IN PROGRESS

UNLESS SPECIFIED: DIMS. ARE INCHES

TOLERANCES:
FRACTION: ± 1/16"
ANGULAR: ± .5°
DECIMAL: ± .02
CRITICAL: ± .005

DATE: 8/15/2017
DATE APRVD:
DATE APRVD:

DRAWN BY: SBILLINGS
APRVD BY:
APRVD BY:

NAME: UFL-MANATEE_CO

DESCRIPTION: FIBERGLASS BUILDING, 10' X 10' X 20'

SHEET(S): 1 OF 4

REVISION:

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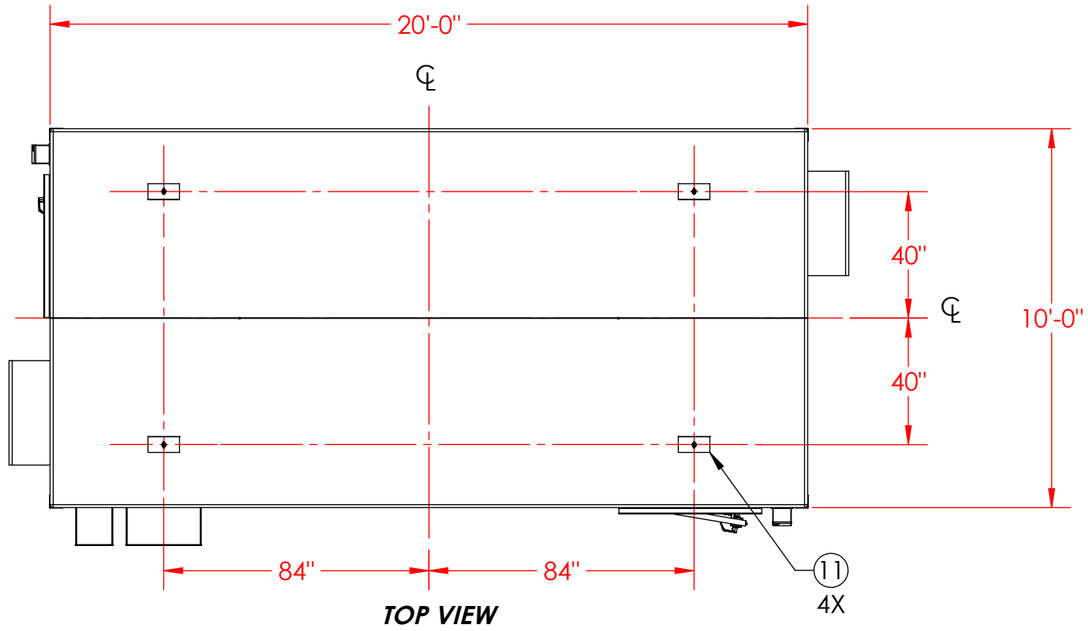
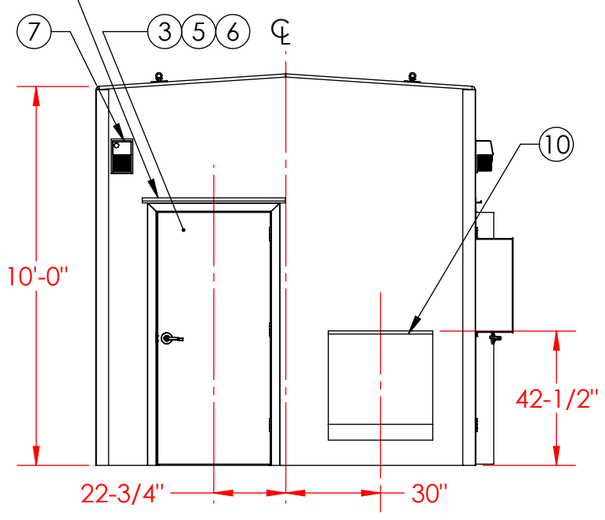
ORENCO COMPOSITES

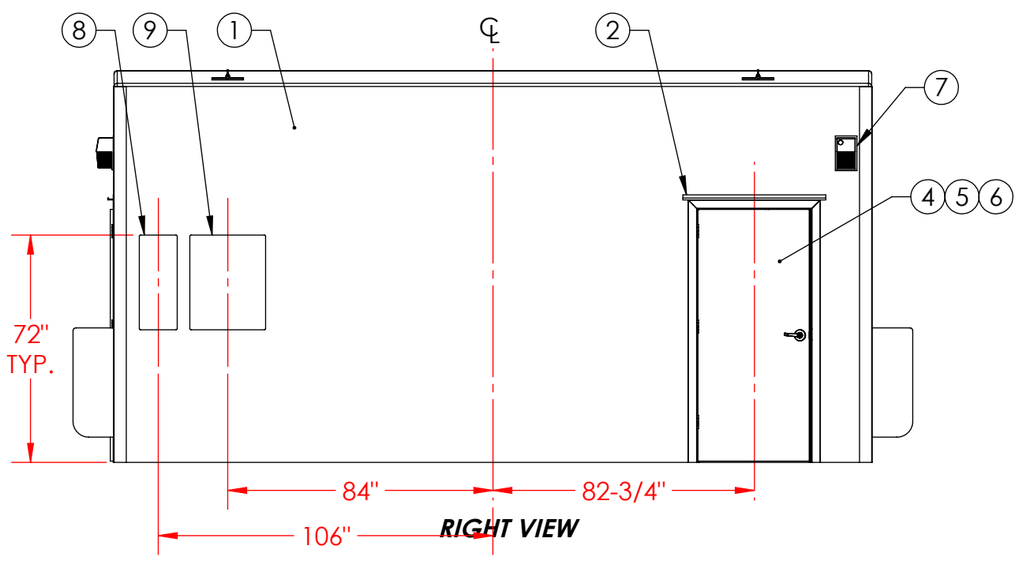
ITEM NO.	DESCRIPTION	QTY.
1	DURAFIBER BUILDING, 10'W x 10'H x 20'L x 4-3/8" WALL CONSTRUCTIONS, EXTERIOR COLOR TORQUE TAN, INTERIOR COLOR WHITE	1
2	FIBERGLASS RAIN DIVERTER FOR 3'-0" DOOR	2
3	FIBERGLASS DOOR AND TRIM, 3'-0" RIGHT HAND REVERSE, COLOR BRONZE TONE	1
4	FIBERGLASS DOOR AND TRIM, 3'-0" LEFT HAND REVERSE, COLOR BRONZE TONE	1
5	HYDRAULIC DOOR CLOSER, NORTON 8301H	2
6	DOOR HARDWARE, ENTRY LEVER WITH STAINLESS HARDWARE, KEYED, PANIC BAR, CORBIN RUSSWIN	2
7	LIGHTING, EXTERIOR: COMPACT LED, 120V, 19W, 1017 LUMENS, PHOTO SENSOR, LITHONIA TWS LED 1 50K 120PE	2
8	UTILITY METER (SUPPLIED BY OTHERS)	1
9	SW-1 (SUPPLIED BY OTHERS)	1
10	MITSUBISHI ELECTRIC WALL-MOUNTED AC OUTDOOR UNIT	2
11	LIFTING BRACKET & EYENUT - 4" BUILDING	4



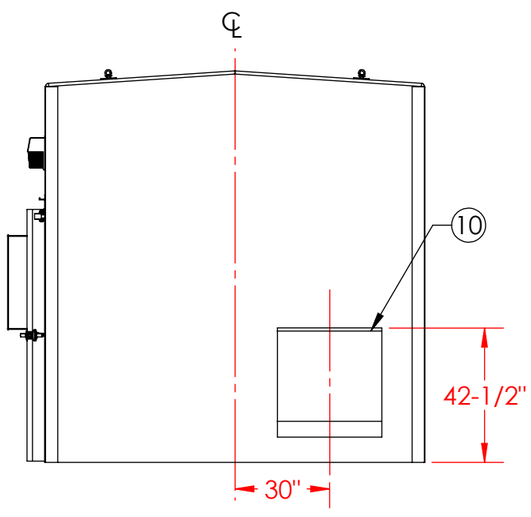
TOP VIEW



FRONT VIEW



RIGHT VIEW



LEFT VIEW

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IN PROGRESS

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TOLERANCES:
FRACTION: ± 1/16"
ANGULAR: ± .5°
DECIMAL: ± .02
CRITICAL: ± .005

DRAWN BY: SBILLINGS
DATE: 8/15/2017

APRVD BY:
DATE APRVD:

APRVD BY:
DATE APRVD:

NAME: UFL-MANATEE_CO

DESCRIPTION: FIBERGLASS BUILDING, 10' X 10' X 20'

REVISION:

SHEET(S): 2 OF 4

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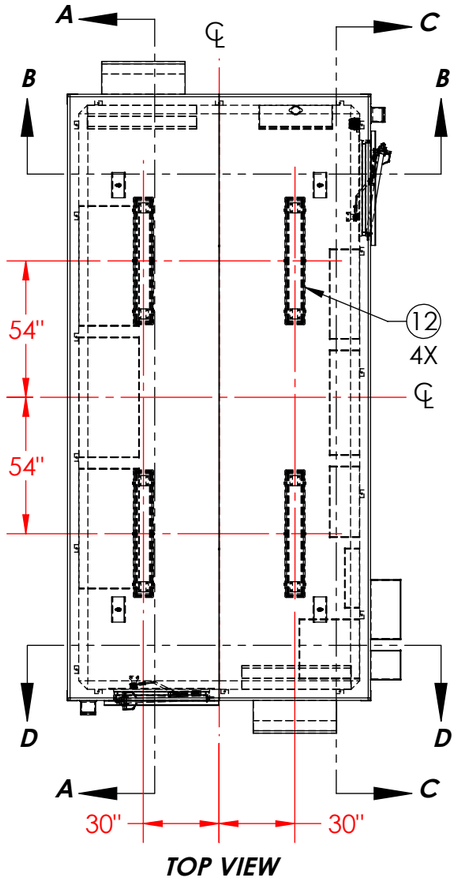
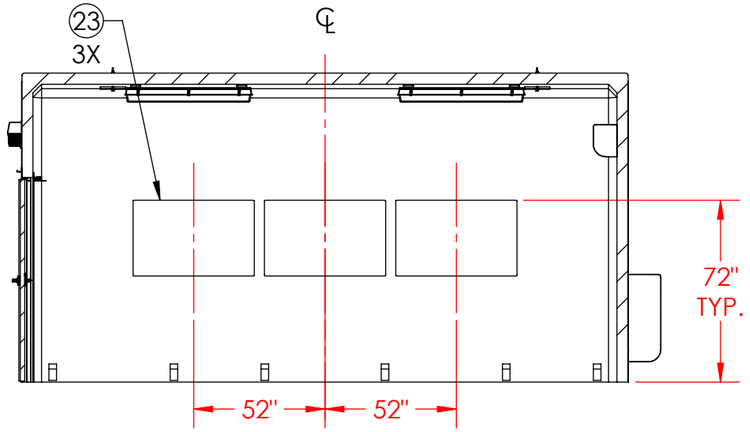
Orenco COMPOSITES

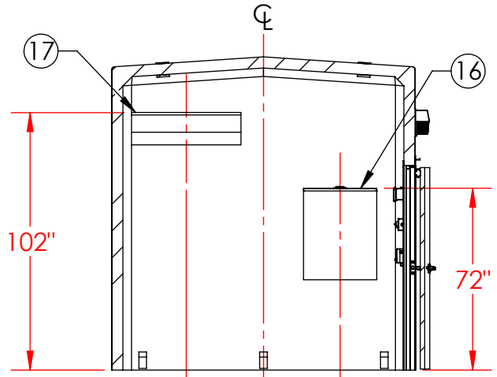
ITEM NO.	DESCRIPTION	QTY.
12	LIGHTING, INTERIOR: 4' LED, VAPOR TIGHT FIXTURE, MAXLITE LSV4806SU50	4
13	TIMER FOR VENTILATION FAN; INTERMATIC ST01	1
14	2-GANG, WEATHERPROOF LIGHT SWITCH	1
15	THERMOSTAT, DAYTON 4LZ94A	1
16	LOAD CENTER, EATON P48G28T15P	1
17	MITSUBISHI ELECTRIC WALL-MOUNTED AC INDOOR UNIT	2
18	ATS-1 (SUPPLIED BY OTHERS)	1
19	PP-1 (SUPPLIED BY OTHERS)	1
20	MPC-1 (SUPPLIED BY OTHERS)	1
21	CP-1 (SUPPLIED BY OTHERS)	1
22	ODOR CONTROL (SUPPLIED BY OTHERS)	1
23	VFD (SUPPLIED BY OTHERS)	3



TOP VIEW



SECTION A-A



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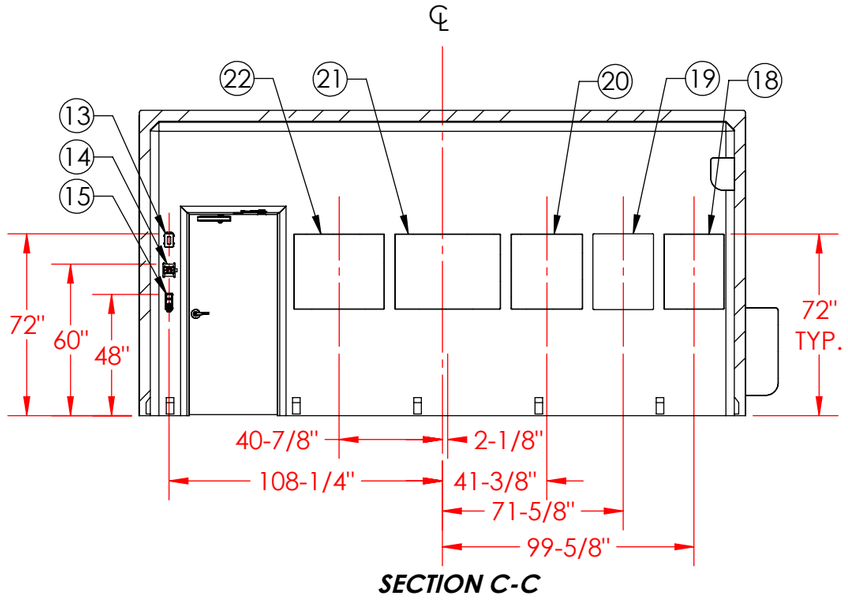
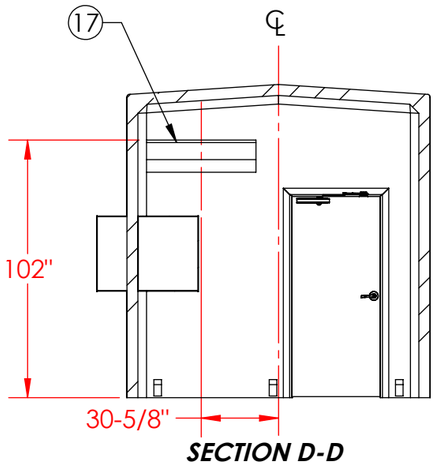


SECTION C-C



SECTION D-D

CUSTOMER APPROVAL:_____DATE:_____

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IN PROGRESS

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TOLERANCES:
FRACTION: ± 1/16"
ANGULAR: ± .5°
DECIMAL: ± .02
CRITICAL: ± .005

DATE: 8/15/2017
DATE APRVD:
DATE APRVD:

DRAWN BY: SBILLINGS
APRVD BY:
APRVD BY:

NAME: UFL-MANATEE_CO

DESCRIPTION: FIBERGLASS BUILDING, 10' X 10' X 20'

REVISION:

SHEET(S): 3 OF 4

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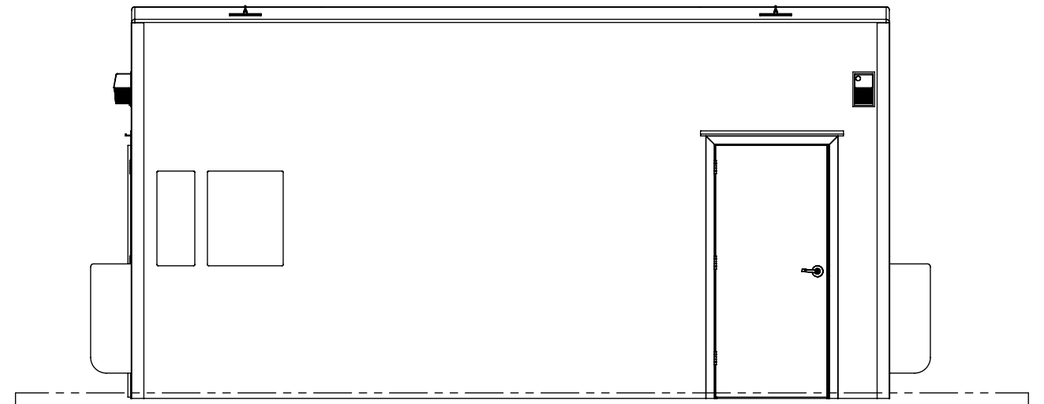
Orenco COMPOSITES



RIGHT VIEW

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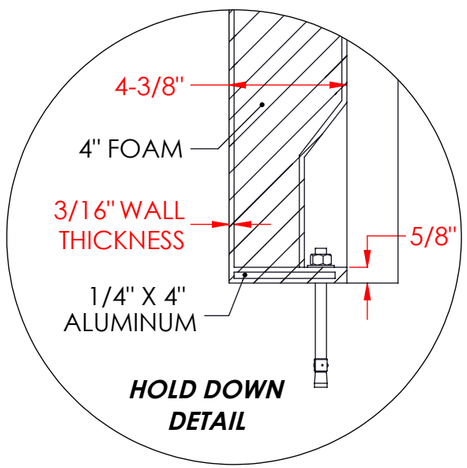
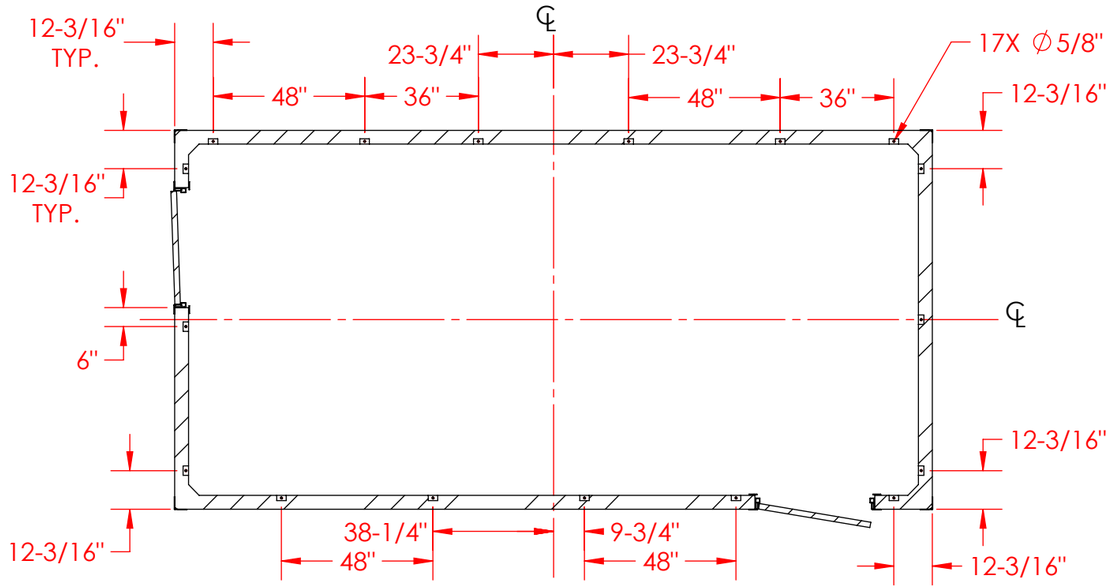


HOLD DOWN DETAIL



SECTION E-E

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DRAWN BY: SBILLINGS | DATE: 8/15/2017

APRVD BY: | DATE APRVD:

APRVD BY: | DATE APRVD:

NAME: UFL-MANATEE_CO

DESCRIPTION: FIBERGLASS BUILDING, 10' X 10' X 20'

REVISION:

SHEET(S): 4 OF 4

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Orenco COMPOSITES