Section 16

Water and Wastewater Treatment Plants

Section16

Water and Wastewater Treatment Plants

16.01 General

This section sets forth the general requirements for design and installation of water and wastewater treatment plants to be constructed within Indian River County, hereinafter referred to as the “County”.

16.02 Design Standards

Facilities shall comply with the design and installation requirements as established by the Florida Department of Environmental Protection and additional specific requirements stated in these standards. The criteria set forth in the “Ten State Standards-Recommended Standards for Water Works”, latest edition, should be used as a design guide for water treatment facilities. The criteria set forth in the “Ten State Standards-Recommended Standards for Wastewater Facilities”, latest edition, shall be used as a design guide for sewage treatment facilities.

16.03 Standard Requirements

A. Building and Structure Sites

1. Clear and remove obstructions within building sites only as necessary to provide adequate workspace and/or facilitate the specified construction. The removal of trees or permanent structures within the specified construction areas shall be done only as approved or directed by the County. Should the removal of valuable trees or shrubs be required, this work shall be done in cooperation with the local communities in which the work takes place in order that they may be replanted, if so desired.

2. Grubbing shall be performed where required, including, but not limited to, areas where fill will be placed, structures erected, or where other installation is required. It shall include the complete removal of all obstructions resting on or protruding through the surface of the existing ground to a depth of three feet below finished grade. Where excavation is done, all stumps, roots and deleterious material thereby exposed shall be removed to a depth of three feet minimum below the excavated surface.

3. All refuse from clearing and grubbing operations shall be disposed of either by burning or removal to a dump area approved by the County. Burning shall be done at locations, and at times as directed, in a manner that will avoid all hazards. Permits shall be obtained from all applicable authorities for burning and burning shall be kept under constant attendance until the fires have burned out or have been extinguished. Burning operations shall be done in compliance with all applicable regulations.

4. All muck or other unsuitable material within the limits of building sites, or other designated areas, shall be excavated and removed. Depth of removal shall be that required to reach an approved suitable material. Removal and subsequent backfilling shall be maintained within the limits of the designated construction area unless specifically approved otherwise by the County. Sheeting shall be installed and left in place along the site boundary, where required, in order to preclude infringement on adjacent property and prevent damage by future de-mucking. The Contractor shall dispose of muck or other unsuitable material.

5. Suitable fill material shall be placed and compacted where muck or other unsuitable material has been removed and as required to elevate the site to finished grade. Fill material shall conform to the Florida Department of Transportation and as approved by a testing laboratory and the Indian River County Public Works Division. Fill shall be placed in successive layers of not more than 12 inches, loose measure, and suitably compacted to 95% minimum of maximum density, as determined by AASHTO Specifications T-180, unless higher percentage is necessary in specific locations, especially under structure sites where a minimum of 98% of maximum density is required. Side slopes shall not exceed 3 horizontal to 1 vertical, unless otherwise approved by IRCDUS, and shall be protected from erosion by staggered solid grass sodding, or other approved method. An approved, Florida State Certified testing laboratory shall make density tests for determination of the specified compaction.

6. All building sites shall be properly graded, including all cutting and filling necessary for the construction. Finish building site elevations shall be as required to preclude flooding and shall receive prior approval from IRCDUS. Filling shall be accomplished, if necessary, to provide acceptable site elevations. Finish surface grades shall eliminate potholes, abrupt changes in grade and bring the ground to an even surface, and shall provide adequate drainage for the complete site. The grade shall be sloped evenly to provide drainage away from the building walls in all directions at ¼ inch per foot minimum (2%) for at least 10 feet from the building walls. Drainage swales shall have a minimum flow-line grade of not less than 1/8 inch per foot (1%). Rounding shall be provided at top and bottom of banks and at other breaks in grade.

7. Driveways, parking locations and other vehicular traffic areas at building sites shall be paved with an asphaltic concrete surface course of a 1 inch minimum thickness, Type II, having a prime coat of RC-70 or RC-250 (rapid curing cutback asphalt) applied at a rate of 0.10 gallons per square yard. The dimensions for said surfacing shall be in accordance with good engineering practice and suitable for the designated service. Roadbed stabilization

shall be 6 inch minimum below the base course and shall have a minimum Limerock Bearing Ratio of 100 pounds per square inch. Base course shall be limerock or soil-cement, placed to 6-inch minimum thickness.

8. In order to provide an all-weather surface for foot traffic ways, concrete walks shall be provided between points of frequent travel. Walks shall be minimum 4 feet wide by 4 inches thick. The base material shall be thoroughly compacted to 95% of maximum density per AASHTO Specification T-180. Walks shall be provided with expansion joints at structures and/or intervals not exceeding 18 feet, with dummy groove joints at 6-feet intervals. A broom finish shall be provided. Concrete shall be a minimum compressive strength of 2500 psi with fiber mesh reinforcement.

9. Fencing

   a. All building sites shall be totally enclosed by protective fencing, unless specifically excluded from this requirement by the County. Said fence shall consist of 6 feet high chain link fabric. Fence shall be fabricated and installed in accordance with good standard practices and shall be complete, including top rail; stretcher bars and clips; all end, corner, pull and gate posts; post braces; ornamental post tops; and other necessary items. All fencing materials shall be hot dipped galvanized as specified below in 9b. The fence shall include a minimal of one gate opening 12 feet in width, consisting of two 6 feet wide locking, 180 degree, swing gates, with total height equal to the fence.

   b. Fencing shall be fabricated in compliance with the following minimum material standards:

      Chain Link Fabric – 2” mesh woven from 9 gage steel wire.

      End, Corner and Pull posts – 2-½” Schedule 40 steel pipe.

      Gate Posts – 6” maximum width: 2-½” Schedule 40 steel pipe; and, 6’ to 12’ width; 3-½” Schedule 40 steel pipe.

      Gate Frames and Intermediate Posts – 1.875” outside diameter (O.D.), 2.71 pounds per foot (Lb./Ft.) steel tube.

      Post Braces and Top Rails – 1.625” O.D., 2.27 Lb./Ft. steel tube.

      Accessories – Steel.

      Coatings – Hot dip galvanized with 1.2 ounces of zinc per square foot, applied after weaving for fabric and following fabrication for all other ferrous metal items.

Concrete – 2,500 pounds per square inch compressive strength.

c. The fencing shall be installed to proper grade, alignment and plumb, with corner posts and bracing provided at all angles in alignment. Posts shall be set 2 feet deep in concrete footings: 1 foot 4 inches in diameter for line posts and 2 feet in diameter for gate and corner posts.

10. Landscaping and Grassing

a. Building sites shall be suitably landscaped in order to be harmonious with the existing or projected adjacent development, provide screening plants and, in general, present a pleasing appearance. Plants shall equal or exceed Standards for Florida No. 1, as given in "Grades and Standards for Nursery Plants," Part I (1963) and Part II, State of Florida Department of Agriculture. The landscaper shall install the approved planting (grass, trees and shrubbery) in accordance with Indian River County Code Type A buffer and maintain said items until hardy growth has been established.

1 The Contractor shall provide IRCDUS with landscaping plans for approval prior to installation. Said plan shall be prepared by an experienced landscaping company and shall include only such plants which are established for the area of construction and which require minimal maintenance.

2 The Contractor shall place solid sod, where not covered by structures or surfacing, over the total area of small facility sites (pumping stations, etc.) and over the prime area of large sites (Treatment Facilities), with additional placement, as required for erosion control. Where not solid-sodded, balance of the site area shall be totally grassed by plugging. Unless approved otherwise by the IRCDUS, the grass shall be Argentine Bahia. Sod and plugs shall be fresh and uninjured to time of installation, and sod shall be clean, have a well-matted root system, and have a minimum thickness of 2 inches.

11. Buildings and Structures

a. Excavation shall not proceed until building lines have been surveyed and staked. The Contractor shall remove and dispose of all unwanted material, supply all fill material, and install all dewatering facilities, shoring and/or bracing needed.

Bearing capacity of surfaces in excavations or on compacted fill shall be adequate to support the building or structure to be placed thereon. IRCDUS shall require testing by an independent testing laboratory to verify adequacy of the foundation design and/or to require special foundation features, such as larger footings, piles, increased compactions, etc.

Fill and backfill shall be compacted to a minimum of 98% of maximum density at optimum moisture, as determined by ASTM D-1557, Method D, or AASHTO Specification Method T-180.

Building site shall be kept clear of rubble and any material, which may be hazardous to persons or impede construction progress.

b. When structures are to be constructed of, or are to contain, any wood or wood products, soil treatment shall be required for termite control.

Chemicals shall be one of the following water-based emulsions, uniform in composition, containing a dye that will be readily seen to the naked eye after application to the soil, and containing in concentration by weight:

1 Dieldrin, 0.5 percent
2 Aldrin, 0.5 percent
3 Heptochlor, 0.5 percent
4 Or equal

Application of chemical selected shall be made to all areas along foundation walls, around piers and under all concrete slabs at the following rates:

5 Foundation walls and piers, all sides, 4 gallons per 10 linear feet, mixed with backfill, to a depth of one foot below finished grade for concrete; for masonry, increase application rate proportionately by depth of foundation or piers.
6 Within voids of masonry foundation walls or piers, apply to void at or near bottom of foundation at rate of 2 gallons for each 10 linear feet.
7 Under all concrete slabs less than 6 feet below finish grade, one gallon per 10 square feet.

c. Design, material, workmanship and practices shall conform to American Concrete Institute Manual of Standard Practice (ACI 315) and the Code of Standard Practice of the Concrete Reinforcing Steel Institute (CRSI).

Field and laboratory tests shall be conducted by independent testing laboratory on structural concrete pours for buildings to ascertain that concrete design slumps and strengths are attained.

Applicable standards shall include latest editions of the following:

1 Southern Standard Building Code
2 Building Code Requirements for Reinforced Concrete – ACI 318
3 Concrete proportions and placing – ACI 211.1 and ACI 301
4 Concrete design for sanitary engineering structures – ACI Committee 350 Report 68-50
5 Formwork – ACI 347
6 Reinforcing bars – ASTM A-615, Grade 60
7 Stirrups and ties – ASTM A-615, Grade 40
8 Welded wire fabric – ASTM A-185
9 Cement for concrete not exposed to sewage – ASTM C-150, Type I
10 Cement for concrete exposed to sewage – ASTM C-150, Type II, or ASTM C-150, Type I, with sulfate resistant properties equal to Type II if Type II is not available and the design engineer affirms the acceptability of Type I
11 Watertight and chemical resistant concrete – ACI 614
12 Aggregate – ASTM C-33, salt free
13 Water – potable (free from oil, alkali, acid, salt, organic matter, etc.)
14 Ready-mix – ASTM C-94
15 Slump test – ASTM C-143
16 Compression Test – ASTM C-39, at cylinder ages of 7 days, 28 days and finally, if indicated and directed by design engineer, at extended time period, not to exceed 45 days
17 Test Cylinders-ASTM C-31 minimum of 3 per 50 cubic yard of pour or fraction thereof.

Water stops and vapor barriers shall be provided as follows:

18 Water stops shall be installed at all construction joints in concrete structures retaining liquid and at all construction joints at or below ground level in concrete structures required to remain dry.
19 Damp check or waterproof membranes shall be installed under and around all concrete slabs to be placed against soil, with joints lapped a minimum of 6 inches.

d. Concrete masonry units shall be of a modular design and conform to ASTM C-90, Grade U-1.

Brick masonry units shall be clay and conform to ASTM C-216, Grade SW for below groundwork and grade MW for the above groundwork.

Reinforcement of all masonry unit walls shall be provided at alternate courses with “Dur-O-Wall,” “Wal-lock,” “Block-Lok” or approved equal.

Anchors and ties shall be of ferrous metal, with zinc coating conforming to ASTM A-153, Class B-1, B-2, or B-3, as appropriate, and as follows:

1 Rigid steel: 1 inch x ¼ inch x 24 inch, with ends turned down 3 inches
2 Wire mesh: 16 gage, ½-inch mesh, 3 inches x 16 inches
3 Veneer ties: No. 6 W & M gage wire bent 90 degrees to form 2 inch hook for mortar embedment, or 22 U.S. gage corrugated sheet metal.
4 Spacing of ties shall be such that each tie shall not support more than 3 square feet of wall area with vertical spacing not more than 24 inches, and with additional ties at wall openings.

Mortar shall conform to ASTM C-270 (except that slag cements shall not be used), Type M or S. Type N may be used for non-bearing interior walls and partitions above grade.

e. Waterproofing

Waterproofing shall be provided in two coats on all exterior surfaces of subgrade concrete or masonry walls, with outside lap of vapor barriers, damp checks or waterproof membranes thoroughly sealed into the sidewall waterproofing material.

Waterproofing material shall be an asphalt base coating applied in accordance with manufacturers’’ recommendations – Tnemec Co. No. 461, “Foundation Coating” (black) or approved equal.

Minimum film thickness when dry after application shall be 8.0 mils for the first coat and 6.0 mils for the second coat.

f. Complete architecture plans and specifications for building shall be submitted for approval by the County prior to construction. In no case shall a structure be planned or designed without regard to aesthetic appearance and maintenance costs.

Exterior wall finishes for permanent above-grade buildings or structures shall comply with one or more of the following selection of materials:

1 Stucco/stucco brick
2 Rubbed concrete
3 Brick, over masonry or sturdy wood frame
4 Stone aggregate on masonry
5 Stone
6 Asbestos-cement on masonry substrate

g. Steel or other ferrous materials shall conform to the following:

1 Structural shapes and plates – ASTM A-36
2 Pipe – ASTM A-53
3 Bolts, machine – ASTM A-307
4 Bolts, high tensile – ASTM A-325
5 Galvanizing – ASTM A-123 or A-153, as applicable
6 Iron castings – ASTM A-48, Class 25
7 Abrasive cast iron (nosings) – American Abrasive Metals Co. “Feralun,” or approved equal.
8 Cast steel – ASTM A-27, Grade N2
9 Stainless steel – Type 304, unless otherwise required or specified
10 Fabrication and erection – AISC Manual of Steel Construction.

Aluminum materials shall conform to the following:

11 Rolled shapes, smooth or checkered plates and extruded pipe – ALCOA 6061-T6 or approved equal
12 Other extruded shapes – ALCOA 6063-T5 or approved equal
13 Sheets -- ALCOA 3003 or approved equal
14 Pipe hand railing – ASTM B-429

h. Natural light is preferred for all buildings, and use of common sizes, spaced for adequate natural lighting of interiors is encouraged.

Windows and frames shall conform to quality standards ANSI A-34 and AAMS 30 for high performance series.

Frames shall be basic aluminum 6063-T5 with fasteners of aluminum or stainless steel.

Plate glass shall be a minimum thickness of 7/32” and set in vinyl glazing material.

All windows shall be sealed all around, both sides, with a non-shrink silicone-base caulk.

i. Door frames shall be a combination buck and frame type, with adjustable anchors for masonry applications. Frames shall be filled with sand-cement grout when installed.

Doors shall be constructed of honeycomb material with metal laminated facing. Minimum door thickness is 1 ¾". Height is 6'–8".

All doors and frames shall be mortised and reinforced to receive hardware. Non-ferrous metal should be used at all areas exposed to corrosive atmosphere.

All door frames shall be sealed all around, both sides, with a non-shrink silicone base caulk.

j. Finished Hardware shall be heavy duty type with non-magnetic accessories and compatible with door and frame materials.

Panic exit devices shall be provided in all areas of corrosive or hazardous atmosphere that may be encountered by occupants.

Finished hardware shall include:

1 Locksets – cylinder type with dead latch, suitable for master keying
2 Butt hinges – 1 ½ pairs per door, ball bearing type preferred
3 Door closers, holders and silencers
4 Thresholds – aluminum
5 Flush bolts
6 Panic exit devices, as indicated

k. All carpentry components shall be of high quality, with galvanized fasteners and treated wood where in contact with all masonry, metal or exposed to weather.

Rough Carpentry of construction grade lumber shall conform to standards as follows:

1 National Lumber Association – Specification for stress grade lumber and its fasteners
2 American Institute of Timber Construction - Uniform Specifications
3 Truss Plate Institute Specifications

Finish carpentry or millwork shall be of "B" or better yard grade seasoned lumber, conforming to applicable requirements of

the Architectural Woodwork Institute. Shelving, cabinet doors, tops and ends shall be a minimum of ¾" plywood with all exposed edges trimmed with hardwood. Joints shall be tight and formed to conceal shrinkage.

l. Moisture controls methods and materials for roofing shall be similar to Johns-Manville or Bird Specifications or approved equal for built-up and shingle roofs.

Flat roofs shall have a minimum slope of 1/16 inch per foot, with 5 ply built-up roofing meeting the requirements for a 20 year bond. All built-up roofs on concrete slabs or metal decking shall be applied to 1 inch rigid insulation board.

Pitched shingle roofs shall have a minimum pitch of 3-½ inches vertical to 12 inch horizontal, with seal down type asphalt or fiberglass shingles at 300 lb. per square on two) layers of 15 pound underlayment, meeting requirements for a minimum of 15 year warranty. As an alternative to shingle roofs, metal roofs are acceptable upon approval by IRCDUS and the County Building Department.

Fascia, gravel stops and soffits shall be of low maintenance materials, architectural metal or masonry preferred.

Flashing and trim shall be either galvanized steel, 24 gage minimum thickness, conforming to Fed. Spec. QQ-S775, Type I, Class C; or aluminum 0.019" minimum thickness.

Gutters and downspouts shall be provided on all permanent buildings. Screen protection from debris and concrete splash blocks are required for all downspouts. Materials shall be as follows:

1 Gutters shall be 24 gage galvanized steel or 0.032" anodized aluminum
2 Downspouts shall be 26 gage galvanized steel or 0.025" anodized aluminum
3 Hanger straps shall be the same material as gutters, and 3 feet on centers, with blocking behind downspouts

m. Stairs shall be of reinforced concrete or all-welded structural aluminum. Nosing and treads shall be non-skid. Tread widths and riser heights shall conform to applicable codes wherever possible. The use of ship-ladders or vertical ladders is discouraged.

Handrails shall be of all-welded 1 ½ inch outside diameter aluminum pipe, 42 inches high with intermediate rails. Rail

post spacing shall not exceed 8 feet. Kick plates shall be used on all areas above the first floor.

Grating and checkered plate shall be of aluminum, and designed to carry a uniform live load of 200 pounds per square foot with a safety factor of 5, based on ultimate strength. Reinforcing shall be utilized to preclude deflections greater than 1/160 of span. All grating and plates shall have non-skid surfaces.

Plumbing fixtures shall include, but not necessarily be limited to water closets and lavatories. IRCDUS may require shower, water heater and drinking fountain at larger facilities. Appropriate toilet partitions and stainless steel accessories shall be provided as indicated. Provide handicap facilities as required.

Fire extinguishers shall be 10 pound type ABC rechargeable units, provided and spaced as applicable in all buildings and structures.

Other safety equipment shall be provided wherever hazardous materials or equipment are utilized, such as eyewash fountains, gas masks, emergency lighting, etc.

16.04 Painting

A. General

This section includes the general requirements for painting materials and workmanship, as applicable to all sewer and water facilities.

Painting materials shall be delivered to the work site in the original and unbroken containers, marked with the manufacturer name, type of material and analysis of the product, and stored at one location. Special care shall be exercised in the handling and maintenance of painting materials, and all applicable safety regulations shall be followed.

Table 1 on page 16-14 shall be included in the project specifications for specific facility items and surfaces. Said schedule shall include, but not be limited to, the specific surface to be coated and specified painting system, with minimum dry mil thickness per coat required.

1. Materials

All paints and painting materials shall be high-grade products of manufacturers of established reputation and shall be "Approved" for the intended use.

To ensure a satisfactory end product, it is essential that paint coats be mutually compatible; both shop and field applications. To this end, insofar as possible, all paints applied to a given surface shall be the product of a single manufacturer.

The paint material set forth in Table 1 shall be the minimum acceptable type for the application indicated.

2. Application

The Contractor shall do a complete painting job throughout the project in accordance with generally approved modern practice for work of high quality. Additionally, surface preparation and application shall be in strict compliance with the manufacturers'' recommendations, and paint shall not be extended or modified.

Factory finish coatings shall be inspected following installation and any mars or blemishes shall be touched up in the field with the original color and type of paint.

3. Painting Requirements

Table I, on page 16-14, specifies in general the surfaces to be painted; service conditions for the indicated surfaces; finish paint coating for the specific surface and service condition; and other special requirements. The total painting system (surface treatment, primer, finish coat and other necessary applications) and minimum dry mil thickness per coat required to achieve the specified finish for the specific surface and service condition shall be in strict compliance with the paint manufacturers'' recommendations.

For convenience of description and as a standard for a quality comparative reference, Table 1 indicates the finish coating by name, number, or both, for products manufactured by Tnemec Company, Inc. or an approved equal, for the subject manufacturer, and approved equal products are acceptable.

In addition to the data contained herein, painting for water storage tanks shall comply with AWWA Standard Specifications D102-97, or latest revision, “Coatings for Steel Water Storage Tanks.”

Unless specifically indicated under “Pipe Color Code”, the color for surfaces to be painted shall be as selected by the IRCDUS and in compliance with OSHA regulation. The finish paint color for exposed sewerage and water facilities piping shall be as follows for the specified service:

Pipe Color Code:

Sewage—Gray (Solid)

Sludge—Brown (Solid)
Potable Water—Blue (Solid)
Raw Water (water facilities)—Blue (with 2-inch bright orange bands spaced 24 inches apart)
Reclaim-Pantone Purple
Brine-Orange
Non-Potable Water (Plant)—(Bright Orange (Solid)
Gas or Fuel Oil—Red (Solid)
Compressed Air—Green (Solid)
Chlorine Gas—Yellow (Solid)
Chlorine or other chemical solutions—Yellow (with 24 inch red bands spaced 24 inches apart)
Other Services—As directed by the County
Note: Banding shall be accomplished by painting or approved durable plastic adhesive tape.

Surfaces which shall not require painting (unless service color coding, or other specific coatings are required), are as follows: exterior piping, below ground; factory finished equipment; galvanized fencing; stainless steel; aluminum and brass; plastic or rubber; concrete floors and stair treads; interior of concrete below grade dry pits; and exterior concrete surfaces.

Table 1

Paint Schedule

General Applications

Surface to be Painted	Service Conditions	Finish Paint Coating
Masonry and Concrete, Walls and Ceilings	Interior Above Grade Normal Conditions	Series 6 or 7
Masonry and Concrete, Buildings and Tanks	Exterior Above Grade Normal Conditions	Series 6 or Series 156/157
Wood	Interior Normal Conditions	Ponkote 300 Enamel Primer 36-601 Finish Series 66
Wood	Exterior Normal Conditions	Finish Series 73
Metal, Machinery, Piping, Systems, etc.	Interior, Normal Conditions Non-submerged	Primer 50-330 Finish Series 66
Metal, Machinery, Piping, Systems, etc.	Exterior, Normal Conditions	Primer 50-30 Finish Series 73
Metal, Machinery, Piping, Systems, etc.	Severe Moisture and Condensation	Primer 50-30 Finish Series 73
Metal, Large areas, Tank Structural Steel, etc.	Exterior- Moderate to Normal Conditions	Primer 66-1211 Finish Series 73

Wastewater Facilities

Surface to be Painted	Service Conditions	Finish Paint Coating
Concrete, Wet well,	Submerged or Severe Conditions	Series 46-413 Coal
Channels, etc.		Color-Rigortex 3324 Enamel Tar 104-Series 104
Metal, Equipment, Piping, Tanks, Etc.	Submerged, Intermittently Submerged	Primer 66-1211 Finish 46-413 (2 Coats, 8 mils each) or Finish 46H (1 coat 16 mils)
Metal, Moving parts Chains, Gates, etc.	Submerged Intermittently Submerged	Grease coating

Water Facilities

Surface to be Painted	Service Conditions	Finish Paint Coating
Concrete, Tanks, Troughs, Basins, etc.	Submerged Intermittently Submerged	Primer 20-1255 Beige 3-5 mils Filler Series 63-1500 Finish 20-BB82 4-6 mils
Metal, Tanks, Piping, Equipment, etc.	Submerged Intermittently Submerged	Primer 20-1255 Beige 3-5 mils Filler Series 63-1500 Finish 20-BB82 4-6 mils

Special Notes:

1. All galvanized or other nonferrous surfaces requiring painting shall be pretreated with an approved conditioner or passivator, as recommended by the paint manufacturer, prior to application of the painting system.

2. Bituminous coated pipe shall be coated with Inertol Tar Stop or approved equal, as recommended prior to application of the painting system.

3. Metal surfaces, in contact with concrete or masonry, shall be protected with Tnemec46-413 Coal Tar coating or approved equal, as recommended. This provision shall not apply to concrete reinforcement, piping and fittings, or conduits and accessories.

16.05 Electric

A. General

The provisions of this Section, including other specific design considerations, shall be the minimum standards as applicable to all sewage and water facilities.

It shall be the responsibility of the Contractor to advise the Florida Power and Light Company or the City of Vero Beach regarding the proposed facility prior to installation and to make the necessary provisions for service thereto.

In accordance with the provisions of the General Conditions, complete shop drawings and technical data shall be submitted to IRCDUS including, but not limited to, motor control centers and control systems, with wiring diagrams and components; manufacturers'' data for switches, transformers, relays, lighting fixtures and other accessories; panel boards; and all other applicable information.

B. Materials, Equipment and Installation

General Requirements: Materials, equipment and workmanship shall conform to the applicable portions of the codes, specifications, standards and statutes listed below:

National Fire Protection Association:
NFPA No. 70 National Electrical Code

Local Codes:
At the place of the work, all applicable local codes, regulations and ordinances that are in effect will apply.

National Electrical Manufacturers Association:

AB 1	Circuit Breakers – Molded Case
FB 1	Conduit Fittings, Cable Fittings and Accessories
IC 1	Industrial Control
SGB 1	Connectors – Electric Power
KS 1	Enclosed Switches
PB 1	Panel boards
TR 1	Transformers
SG 8.2	Connectors for Copper Conductors
IC 4	Industrial Enclosures
WC 5	Thermoplastic – Insulated Wire & Cable

American National Standards Institute:

C80.1	Rigid Steel Conduit
C6.1	Terminal Markings for Electrical Apparatus

Underwriters' Laboratories, Inc.

Standards for Cabinets and Boxes
Standards for Service Equipment
Standard for Industrial Control Equipment
Standard for Thermoplastic-Insulated Wire

Illuminating Engineering Society:

IES Lighting Handbook

United States Federal Government:

Williams–Steiger Occupational Safety and Health Act of 1970 (OSHA)

C. Special Requirements:

Phase rotation of electrical service shall be: L1, L2, L3 (A, B, C) left to right when facing equipment.

Generator receptacles for portable emergency power connection shall be provided for all electrically operated facilities and shall be as described in the lift station portion of the standards. (Refer to Section 10.10 “B1” and Section 10.10 “C2d” and Drawing S-18).

Motors shall have enclosure types which provide safe protection from exposure to unusual environments such as chemical fumes, damp places, outdoors, poorly ventilated rooms or places with restricted air circulation. In general, enclosures shall be NEMA standardized motor types.

Motor insulation materials shall be Class F Systems.

Motors for non-submersible service shall be sized such that the nameplate horsepower rating shall not be less than 1.2 times the required shaft brake horsepower output. Appropriate NEMA design shall be used to provide torque and/or other load requirements.

Motor electrical rating shall be compatible with station electrical service.

Motor mounts shall be of standard NEMA design and shall be compatible with the driven apparatus.

Motors shall be controlled by NEMA standard controllers for all across the line or reduced voltage starting. Where variable speed pumping is required, the specifications or variable speed pumping is required, the specifications or variable speed control equipment shall be coordinated with the County. In general, motors shall be equipped with all necessary controls and devices for complete and operable systems.

END OF SECTION