SUBSTATION CONSTRUCTION SPECIFICATIONS - CIVIL

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SECTION II - TECHNICAL SPECIFICATIONS - CIVIL

This is a general specification that covers the civil work requirements for substation construction. Any equipment, material or methods listed which does not apply to this particular project shall be disregarded. The Drawings shall be used to determine the type of work, along with these associated specifications intended for use on this project. These specification sometimes refer to the FDOT Standard Specifications which the latest version can be found online at the following website:

(http://www.dot.state.fl.us/programmanagement/Implemented/SpecBooks/July2015/Files/715eBook_Revised.pdf)

Related JEA Specifications: Specific Instructions, Technical Specifications, JEA Overhead Electric Distribution Standard (JEA OH) (www.jea.com), JEA Underground Electric Distribution Standards (JEA UG) (www.jea.com)

1. SITE PREPARATION AND EARTHWORK

1.1. SCOPE

This Section shall govern site preparation and all earthwork required to accomplish the work of this contract. The Contractor shall erect silt fences around the entire substation site in accordance with the applicable DEP requirements and the construction drawing requirements. The Contractor shall develop a Maintenance of Traffic (MOT) plan where entrance/access from public roads and sidewalks occur.

1.2. FAMILIARIZATION

Prior to all work of this Section, Contractor shall become thoroughly familiar with the site, the site conditions and all portions of the work falling within this section.

1.3. SURVEYING

The Contractor SHALL engage the services of a State of Florida Registered Land Surveyor to perform the limits of construction, total clearing, and the structure staking. The accuracy of this operation is critical to the success of this project. Therefore, prior to any clearing on this project, the Contractors' Construction Superintendent Chief shall be prepared to meet on the jobsite with the Project Engineer (JEA) and Consulting Engineer to discuss and exchange data for the staking operation and thereby ensure effective communication has occurred.

As-Builts: The Contractor shall provide coordinates on As Built Drawings in the appropriate State Plane Coordinate System (SPCS) and Zone (latest adjustment), for all new structures. The Contractor shall also provide ground rod resistance measurements for each structure.

1.3.1. Survey Datum: The horizontal and vertical datum(s) shall be the North American Datum (NAD) 1983 and North American Vertical Datum (NAVD) 1988 respectively. Any exceptions must be approved by JEA prior to the commencement of work. All work will be required to adhere to the following standards.

1.3.1.1. Vertical: Work shall be Third Order, as outlined in the Federal Geographic Data Committee (FGDC) Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C) and Facility Management.

1.3.1.2. Horizontal: Work shall be done using either standard surveying techniques or Global Positioning Satellite (GPS) system. If standard surveying techniques are used, all horizontal work shall comply with Third Order Class II, as outlined in the Federal Geographic Data Committee (FGDC) Geospatial Positioning Accuracy Standards, Part 4: Standards for Architecture, Engineering, Construction (A/E/C) and Facility Management.

If GPS is used, the relative horizontal accuracy shall conform to the Federal Geographic Data Committee (FGDC) Geospatial Positioning Accuracy Standards, Part 2: National Standard for Spatial Data Accuracy.

1.4. PERMITS

1.4.1. Contractor shall comply with all permit requirements accompanying these specifications and shall obtain additional permits, if required, at no additional cost to the JEA.

1.5. CLEARING AND GRUBBING

1.5.1. Total Clearing and Grubbing: Total clearing and grubbing shall consist of:

1.5.1.1. Complete removal and disposal in accordance with the provisions of this specification and associated drawings, of all standing trees including their root systems along with all brush, bushes, shrubs, stumps, vines and their associated root systems, as well as other logs, trees cut by others, wood fencing, wood structures, debris, rubbish and all other obstructions to the work. In accordance with the project drawings, the Contractor shall stake every 50' along the boundary of the areas to be cleared. The Contractor shall obtain JEA approval of the stake out prior to the removal of any trees or shrubs.

Certain trees within the property have been designated to remain. Protect these trees by providing a fence or barricade around each tree of sufficient distance away and of sufficient height to prevent damage to the tree in any way as part of this work; see Clearing Plan Drawings. The Contractor shall obtain JEA approval prior to the proposed removal of any trees or shrubs located on a boundary between areas to be cleared and those that are to remain. The JEA project representative may make adjustments to the tree and shrub locations depicted on the drawings depending on actual site conditions at the time.

1.5.1.2. Total clearing and grubbing shall be accomplished within the areas designated on the plans and other areas, if/as required for construction or landscaping.

1.5.1.3. All rubbish such as tires, roofing materials, concrete, etc., resulting from clearing shall be considered to be property of the Contractor and shall be removed from the job site for proper disposal. All fees for disposal of rubbish and/or other items related to clearing shall be paid by the Contractor.

1.5.1.3.1. The Contractor shall dispose of the following solid wastes if found on the property: anti-freeze containers, aerosol lubricant and solvent cans, rusted 55 gallon drums, automobile gasoline tanks and batteries, domestic trash, oil filters and containers, appliances, demolition debris, tires, concrete, roofing materials, boards, metal, soil piles, etc.

All solid wastes shall be disposed in accordance with FAC 62-701 (Solid Waste/Construction and Demolition Debris), 62-710 (Used Oil and Used Oil Filters), 62-711 (Tires) and 62-730 (Hazardous Waste). Several of these materials (whole tires, appliances, batteries, oil filters, non-empty containers) are prohibited from disposal in permitted, non-hazardous solid waste landfills.

Any liquids discovered on-site must be properly screened (sampled and analyzed) before developing a disposal plan. Containers may be required to be crushed or cut open to demonstrate that they are empty.

If asbestos is determined to be present, proper precautions shall be followed when removing and transporting the material (wet material, use Type C

respirators, and transport in covered vehicle).

The JEA has approved the following facilities for disposal of non-hazardous solid waste:

Trail Ridge (Waste Management), Baldwin, FL

Pecan Row (GeoWaste), Valdosta, GA

Okeechobee Farms (Chambers), Okeechobee, FL

Springhill Regional (Waste Management) Graceville, FL

Use of any other landfills is subject to approval by JEA staff.

1.5.2. Stump Removal

All stumps and roots larger than 2 inches in diameter shall be removed to a depth at least 2 feet below the existing ground surface, or new final grade, whichever is lower.

1.5.3. Description of Services:

1.5.3.1. Contractor shall remove all timber by logging and/or chipping.

1.5.3.2. Contractor may employ any practical means for performing the work, including such equipment as tractors and chains, bulldozers with brush hooks and rakes, or axe and chain saw, such that the specified requirements for clearing and grubbing are accomplished to the satisfaction of the Field Representative.

1.5.3.3. In areas to be cleared and grubbed that are accessible to bulldozers, Contractor shall, wherever possible, push or pull trees extracting roots all in one piece, and push out with the bulldozer blade the stumps of trees cut by others.

1.6. Disposal of Materials

1.6.1. Clearing and Grubbing: Disposal of materials resulting from clearing and grubbing shall consist of:

1.6.1.1. All trees, stumps, roots, root mat, branches, brush, shrubs, logs, vines, wood fencing, wood structures and other debris or obstructions that are the products of the clearing and grubbing work shall be completely removed from Owner's property.

1.6.1.2. No Burning will be permitted on the site.

1.6.2. Excavation: Any surplus excavated materials shall become the property of the Contractor and are to be disposed of by him to the satisfaction of the Field Representative and in compliance with the requirements for solid waste disposal for Duval County.

A. All rubbish such as tires, roofing materials, concrete, etc., resulting from clearing shall be considered to be property of the Contractor and shall be removed from the job site for proper disposal. All fees for disposal of rubbish and/or other items related to clearing shall be paid by the Contractor.

B. The Contractor shall dispose of the following solid wastes if found on the property: anti-freeze containers, aerosol lubricant and solvent cans, rusted 55 gallon drums, automobile gasoline tanks and batteries, domestic trash, oil filters and containers, appliances, demolition debris, tires, concrete, roofing materials, boards, metal, soil piles, etc.

C. All solid wastes shall be disposed in accordance with FAC 62-701 (Solid Waste/Construction and Demolition Debris), 62-710 (Used Oil and Used Oil Filters), 62-711 (Tires) and 62-730 (Hazardous Waste). Several of these materials (whole tires, appliances, batteries, oil filters, non-empty containers) are prohibited from disposal in permitted, non-hazardous solid waste landfills.

D. Any liquids discovered on-site must be properly screened (sampled and analyzed) before developing a disposal plan. Containers may be required to be crushed or cut open to demonstrate that they are empty.

E. If asbestos is determined to be present, proper precautions should be followed when removing and transporting the material (wet material, use Type C respirators, and transport in covered vehicle).

F. The JEA has approved the following facilities for disposal of non-hazardous solid waste:

- Trail Ridge (Waste Management), Baldwin, FL
- Evergreen Landfill (Advanced Disposal), Valdosta, GA
- Chesser Island Road (Waste Management), Folkston, GA
- Boradhurst Landfill (Republic Services), Screven, GA
- Use of any other landfills is subject to approval by JEA staff.

1.7. SITE EXCAVATION

1.7.1. Perform excavation of every type of material encountered within the limits of the work to the lines, grades and elevations indicated on the drawings, and/or as required for foundation or other subsurface construction.

1.7.2. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.1 foot, unless over-excavation is required. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, installing services and other construction, and for inspections.

1.7.3. Soil stockpiles should be located, constructed, and maintained to minimize unwanted changes in the natural moisture content of the excavated soils, i.e.: protect soils near optimum moisture from becoming too wet to be readily reused for backfill, or prevent soils drier than optimum from further drying. Stockpiles can be protected from saturation by sloping and compacting the surface and side slopes to promote rainfall runoff. If additional protection is required, cover stockpile with plastic membranes. Failure to protect stockpiled soil shall not be accepted as a reason to replace the material with imported fill materials at the Owner's cost.

1.7.4. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials and obstructions. If excavated materials intended for fill and backfill include unsatisfactory materials and rock, replace with satisfactory soil materials as described herein.

1.7.5. Conduct excavation operations so that material outside the excavation limits is not disturbed or loosened. Restore material disturbed or loosened to its original condition.

1.8. EXCAVATION PRECAUTIONS

1.8.1. Excavation Safety: Contractor shall comply with all requirements of all applicable OSHA excavation safety standards and regulations. Contractor shall comply with all applicable trench safety standards. Contractor shall adhere to special shoring requirements, if any, of the state or

other political subdivisions, which may be applicable to this project scope. For any project that contains a trench excavation deeper than four feet, the Contractor shall submit with his bid the cost of compliance with the applicable trench safety standards.

1.8.2. Sheeting and Shoring: The stability of previously constructed structures and facilities shall not be impaired or endangered by excavation work. Previously constructed structures and facilities include both structures and facilities existing when the work under these specifications begins and structures and facilities already provided under these specifications.

Adequate sheeting and shoring in accordance with OSHA regulations 29 CFR Part 1926 shall be provided to protect and maintain the stability of previously constructed structures and facilities and the sides of excavations and trenches until they are backfilled. Sheeting, bracing, and shoring shall be designed and built to withstand all loads that might be caused by earth movement or pressure and shall maintain the shape of the excavation under all circumstances. Certified/stamped drawings prepared by a registered professional engineer of all shoring details as required by OSHA shall be furnished to the Project Engineer before any excavation begins. When "sloping" of the sides of the excavation or trench is used in lieu of sheeting or shoring the name of the "Competent Person" in charge for the Contractor shall be submitted in writing to the Contract Administrator before any excavation begins.

1.8.3. Depressions: Where depressions result from, or have resulted from, the removal of surface or subsurface obstructions, remove all debris and soft material as directed by the Field Representative.

1.8.4. Over-excavation: Backfill and compact all over-excavated areas as specified for fill below, and at no additional cost to the Owner.

1.8.5. Protection of In-Place Structures: Excavation likely to misalign, damage or impair the strength of structures already in place shall be made only after adequate protection has been provided. The Contractor shall repair any damage that occurs as a result of insufficient protection at no cost to the Owner. It is the responsibility of the Contractor to coordinate with the utility owners to adjust any utilities conflicting with the work under this contract at no additional cost to JEA. It is the Contractor's responsibility to locate all underground utilities prior to digging.

1.8.6. Underground Utilities: The Contractor shall determine the location of underground piping, conduit and cable before proceeding with the work. Should any utilities be encountered that were not expected, work in the area shall be halted and the Engineer notified immediately.

1.8.7. Classification: All material shall be unclassified and considered as excavation regardless of the material encountered and no additional compensation will be allowed because of difficulties met in removing such materials.

1.8.8. Muck and/or Organic Removal: Where muck or other soft material occurs, the Contractor shall remove such material by excavation to suitable foundation soil or to a depth designated by the Engineer and backfill in accordance with Section VIII. The Contractor is responsible for removal of a maximum of one (1) foot of the muck. Where the Engineer directs the removal of such material to a depth in excess of one (1) foot, an adjustment in the contract price will be allowed.

1.8.9. Contaminated Soils: No hazardous materials or contaminated soil are expected to be encountered during excavation. However, in the event contaminants are found, the Contractor shall dispose of them in accordance with Chapters 62-780, and 777, Florida Administrative Code (F.A.C.), the Florida Department oif Environmental Protection (FDEP) "Mineral Oil Dielectric Fluid Emergency Response Protocol (April 2007)", and any other applicable federal, state, or local rules or regulations. The Contractor shall notify the JEA Contractor Administrator immediately upon contaminant discovery.

1.9. SITE FILL

1.9.1. Material: All soil for fill (if required) shall be of a quality acceptable to the Engineer and shall be free from roots, rubbish or other extraneous material. The fill material for areas outside the rock yard to be compacted shall be sand similar to materials classified in the A-3 group as shown in AASHTO M145. The fill material for rocked areas shall be sand with less than 5% fines similar to materials classified in the A-3 group as shown in AASHTO M145. At least the top underlying twelve(12) inches of the rock yard shall be compacted to 98% of maximum density as per ASTM D-1557. All fill areas outside the rock yard shall be compacted to 95% of the maximum density as per ASTM D-1557. Borrow, where necessary, shall be provided from sources off the site in areas provided by the Contractor. The borrow pit shall be available for inspection by the Engineer.

1.9.2. Placement: Embankments shall be constructed true to lines, grades and cross sections shown on the plans. Fill shall be placed in successive layers of not more than twelve (12) inches in thickness, loose measure. Each layer shall be compacted to a density of at least 95% of the maximum density as determined by AASHTO T99 except that the final 9 inches of stabilized fill shall be compacted to maximum density as per AASHTO T99. Elevations after final grading shall be within 0.1 foot above or below plan dimensions.

No fill material for the rock yard shall be placed until receipt of a Letter of Certification from an independent testing company stating that the fill material is in compliance with the A-3 group of AASHTO M145 containing less than 5% fines.

1.10. EXCAVATION FOR STRUCTURES

1.10.1. General: All excavations shall be carried to foundation materials satisfactory to the Engineer, regardless of the elevation shown on the plans. In the event unsuitable soil is encountered at the required elevation, the Engineer shall determine the depth of removal of such soil. Unless otherwise specified, the bottoms of all excavations shall be compacted to at least 100% of maximum density per ASTM D 698 or 95% of maximum density per AASHTO T180. Prior to such compaction, the ground water shall be lowered to a depth of at least 2.0 foot below the bottom of the excavation.

Should ground water be encountered, Contractor shall be responsible for utilizing a dewatering system(s) to remove water from the excavations. JEA Environmental will obtain any necessary FDEP Dewatering Permit for the project. Contractor shall ensure that permit is onsite and comply with all monitoring requirements with documentation listed in FDEP Dewatering Permit for the entire time dewatering occurs on this project site. Additionally, prior to any dewatering, Contractor shall apply for a St. Johns River Water Management District (SJRWMD) Generic Permit for Short Term Dewatering, and comply with all SJRWMD requirements listed in Form No. 40C-22-0590-1.

If the above requirements are not followed, the Contractor shall be held liable for any fines and/or violations incurred by JEA.

1.10.2. Footings: To minimize differential settlement, it is essential that earth surfaces upon which footings will be placed be compacted to the approval of the Field Representative and in accordance with the compaction requirements established in this section of these specifications. Excavate to the established lines and grades. Cut off bottoms of excavations level, and remove all loose soil. Where soft spots are encountered, remove all defective material and replace with lean concrete (flowable fill) or suitable backfill at no additional cost to the Owner.

1.10.3. Slabs: When undercutting of slabs is required in order to remove unsuitable material, the excavation shall be backfilled to the required elevation and compacted in accordance with Section VIII.

1.10.4. Trenches:

1.10.4.1 The trench shall be of sufficient width and depth below the proposed final grade to ensure that all conduit spacing is maintained per the details on the Drawings.

1.10.4.2 Trench excavation shall be accomplished so as to ensure the conduit may be laid on a firm, undisturbed, native earth bed. In the event excavation below the required elevation is made, bedding material is to be placed and compacted so as to bring the excavation to grade.

1.10.4.3 Accurately shape trench bottoms so that the pipe or utilities are in continuous and uniform contact with either undisturbed soil or bedding material as shown on the Drawings. Do not backfill any trenches until all joints are made, required tests are performed, pipe encased as necessary, and Owner approval is granted to proceed.

1.10.5. Payment: If extra excavation is authorized due to unforeseen, unsatisfactory soil conditions, an adjustment in contract price will be allowed. Extra depth of footings or fill due to error in excavation shall be at the Contractor's expense.

1.11. BACKFILL FOR STRUCTURES

Backfill shall be deposited in layers not exceeding six (6) inches in thickness and shall be compacted to a density of not less than 100% of the maximum density per ASTM D 698 or 95% of maximum density per AASHTO T180. No backfill shall be placed against masonry or concrete walls and piers until the structure has been in place five days or until permission has been given by the Engineer. When backfilling against masonry walls, each side shall be backfilled simultaneously to prevent excessive stress.

1.12. TESTING FOR SOILS

The Contractor shall employ an approved independent laboratory to do all testing. Two copies of test reports shall be submitted to the Engineer.

1.12.1. Soil Properties: The Contractor shall submit an analysis of borrow material proposed for site fill including the following tests: Particle Size Analysis of Soils (per AASHTO T88) and Permeability of Granular Soils - Constant Head (per AASHTO T215).

Three (3) additional Particle Size and Permeability tests shall be performed on truck loads of fill material randomly selected by the Field Representative. If any of the truck loads tested does not comply with the A-3 group of AASHTO M145 containing less than 5% fines, the material shall be rejected, and the Contractor shall perform six (6) additional sets of tests on material in place. Any material in place that does not comply with the A-3 group of AASHTO M145 containing less than 5% fines shall be removed and replaced with acceptable material at no additional cost to the Owner. The Contractor shall pay for all of the above testing.

1.12.2. Compaction: In-place density tests shall be made in accordance with AASHTO T191-61, ASTM D1556-74, ASTM D2167-77, or ASTM D2922-78 at the following locations:

1.12.2.1. Ten (10) tests per layer of site fill at locations determined by the Field Representative for site compaction.

1.12.2.2. One (1) test under each of ten (10) foundations as selected by the Field Representative.

Compaction tests shall be made no sooner than one day before the placing of a succeeding layer of fill or the pouring of a foundation, as the case may be. The intent of the time stipulation is to minimize the loss of compaction due to moisture loss after the compaction test has been made.

1.13. SOILS INVESTIGATION

The Owner has obtained a representative number of core borings; the boring logs are included in Appendix

"A". Investigations conducted by the Owner of subsurface conditions are for the purpose of study and design only. The Owner does not assume any responsibility with respect to the sufficiency or accuracy of the borings, or of the interpretations made thereof. There is no warranty or guarantee, either expressed or implied, that the conditions indicated by such investigations are representative of those existing throughout the site, or any part thereof, or that unforeseen developments may not occur. After the contract has been awarded, the Contractor shall make an inspection of the site to determine the conditions under which the work is to be performed and may obtain additional core borings, if deemed necessary.

1.14. AGGREGATE FILL

Aggregate fill (rock) shall be blue/gray limestone or granite (natural). All rock shall be a gradation equal to Size #5, as shown in AASHTO M43 or ASTM D448 (**Note: Size #57 will not be acceptable)**. The Contractor shall submit a sample and sieve analysis of the aggregate for approval before proceeding with the rocking. Before placement of the aggregate, the subgrade shall be dressed and compacted.

A representative list of suppliers is:

Company	Location	Telephone
Conrad Yelvington	Daytona Beach, FL or	(904) 767-5500
	Jacksonville, FL	(904) 358-6740
Vulcan Materials	Birmingham, AL	(205) 877-3086

1.15. HERBICIDE (GOUND STERILIZATION)

Prior to spreading aggregate in the substation area, the Contractor shall have the area treated with DuPont Krovar I DF for selective control of weeds. Substation area shall be defined as the structure area and areas between the pavement and the fence. Areas **outside** of the fence where rock is to be installed shall **not** be treated. Application shall be by a licensed pesticide applicator in accordance with the manufacturer's instructions and precautionary statements. Personal protective equipment recommendations on the MSDS shall be strictly followed. Federal, State and local regulations regarding handling, transportation and spills shall be observed by the applicator.

1.16. EROSION CONTROL PLAN

Contractor shall provide erosion and sediment control measures conforming to current Land Development Procedures of the City of Jacksonville, Florida, for all land-disturbing construction activities.

1.17. TRIAX GEOGRID AND FILTER FABRIC SYSTEM

Tensar TriAx TX140 geogrid shall be placed over filter fabric on all areas to be rocked and SHALL develop the structural support previously attained with limerock stabilization which is now only allowed under impervious surfaces.

1.17.1. Filter Fabric and TriAx TX140 Geogrid: The exposed subgrade soils shall be lined with a soil stabilization geotextile nonwoven filter fabric. The filter fabric shall be Mirafi 140N or approved equal, which shall be installed as per manufacturer's instructions and precautionary statements. Once the filter fabric is in place on all areas to be rocked, Tensar TriAx TX140 Geogrid shall be placed on top of the filter fabric as detailed in the plan drawings. After the filter fabric and TX140 geogrid are in place and secured per manufacturer requirements, then the rock can be placed as directed in the plan drawings.

1.18. DRAINAGE AND DEWATERING

1.8.1. Prevent surface water and groundwater from entering excavations, from ponding on prepared subgrades, and from flooding construction site and surrounding areas. Provide for the collection and disposal of surface and subsurface water encountered during construction. Dispose of water as approved by the Owner.

1.18.2. Protect subgrades from softening, undermining, washout, and damage by surface or groundwater accumulation. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. Provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein.

1.8.3. Dewatering

A. During Construction, provide and maintain at all times during construction, ample means and devices with which to remove promptly and dispose of all water from every source entering the excavations or other parts of the work. The Contractor shall utilize quiet pumps and socks, with noise deflectors installed around the pumps, to comply with all allowable night time local noise ordinances. Dewater by means which will ensure dry excavations and the preservation of the final lines and grades of bottoms of excavations. If dewatering is performed by use of a sock system, Contractor shall completely grout fill the abandoned sock(s) upon completion of dewatering activities. Locations of all abandoned socks shall be indicated on Contractor submitted “as-built’ drawings.

B. Control groundwater and surface runoff flowing toward or into excavations to prevent sloughing of excavation slopes and walls, boils, and excavation uplift and heave to eliminate all interference with orderly progress of construction. Remove water by pumping or other suitable methods. Use filters on dewatering devices to avoid removal of fines from soil. Provide erosion protection at discharge locations to avoid erosion. Install dewatering system prior to the excavation reaching the groundwater in order to maintain the integrity of the in-situ material.

C. Verify the groundwater level prior to excavation. While the excavation is open, maintain the water level continuously, at least two (2) feet below the working level. Submit a dewatering work plan, as necessary.

D. Operate the dewatering system continuously until dewatering is no longer required and construction work is complete within two (2) feet of the water level.

E. Should ground water be encountered, the Contractor shall be responsible for utilizing a dewatering system(s) to remove water from the excavations. Prior to any dewatering, Contractor is responsible for applying for all applicable dewatering permits.

F. Should the above requirements not be followed, the Contractor shall be held liable for any fines and/or violations incurred by JEA.

2. CONCRETE

2.1. SCOPE:

All concrete work shall be governed by this Subsection unless modified by other Sections of these specifications.

2.2. APPLICABLE STANDARDS

All concrete work shall be in accordance with the following standards of the American Concrete Institute (ACI), except as may be modified by these specifications:

2.2.1. ACI 318 (latest revision) "Building Code Requirements for Reinforced Concrete."

2.2.2. ACI 301 (latest revision) "Building Code Requirements for Structural Concrete."

2.2.3. ACI 306 (latest revision) "Recommended Practice for Cold Weather Concreting."

2.2.4. ACI 305 (latest revision) "Recommended Practice for Hot Weather Concreting."

2.2.5. ACI 613 (latest revision) "Recommended Practice for Selecting Proportions for Concrete."

2.3. MATERIALS

2.3.1. Cement: Cement shall be Portland cement conforming to ASTM C150,Type I.

2.3.2. Fine Aggregate: Sand for concrete shall conform to ASTM C33.

2.3.3. Coarse Aggregate: Coarse aggregate shall be natural gravel, crushed stone or slag conforming to ASTM C33.

2.3.4. Water: Mixing water for concrete shall be potable water, clean and free from injurious amounts of oils, acids, alkalis, organic materials or other deleterious substances.

2.4. CONCRETE PROPORTIONING

The concrete mix design for the class of concrete specified for use under this contract shall be prepared and submitted to the Engineer for approval. No concrete shall be placed without prior approval of the mix design.

2.4.1. Composition: The concrete shall be composed of Portland cement, fine aggregate, coarse aggregate and water. The ingredients shall be proportioned to produce a dense, workable concrete, free from voids. The concrete shall be designed in accordance with applicable ACI standards to attain the properties of strength, slump and rate of hardening required by these specifications.

2.4.2. Maximum Size of Coarse Aggregate: Maximum size of coarse aggregate shall not be larger than 3/4 the minimum clear spacing between the reinforcing bars.

2.4.3. Strength and Slump: The following are the minimum compressive strength and slump ranges for the various types of concrete construction:

Type of Construction	Compressive Strength 28 Days, psi	Slump, in.
Footings, slabs on grade, bond beam and lintel	As noted on plans	3±1
Headwalls and drop inlets	3000	5±1
Paving	3000	3±1
Curb and gutter, ditch pavement	2500	3±1

2.4.4. Air Content: The air content in the concrete shall be maintained in accordance with the following requirements:

Maximum Size Coarse Aggregate, in.	Air Content Percent by Volume
1 1/2	3±1
3/4 or 1	4±1
3/8 or 1/2	5±1

2.4.5. Admixtures: Air entrainment shall be produced by the addition of an air-entraining admixture meeting the requirements of ASTM C260. Air entraining cement will not be permitted. If required, an approved water reducing retarder may be used in the proportions recommended by the manufacturer.

2.4.6. Proportioning of Ingredients: Proportions, including water-cement ratio, shall be established on the basis either of laboratory trial batches or of field experience with the materials to be employed. The mix design together with supporting data shall be submitted to the Engineer for approval. The Engineer may, at his discretion, require only a letter from the concrete supplier indicating compliance with the specifications in lieu of submission of a mix design.

2.5. REINFORCING STEEL

2.5.1. Reinforcing Bars: Reinforcing bars shall conform to ASTM A615, ASTM A616 or ASTM A617, Grade 60.

2.5.2. Welded Wire Fabric: Welded wire fabric shall conform to ASTM A185.

2.5.3. Shop Drawings: Shop drawings for fabrication and placing of the reinforcing steel and accessories shall be submitted to the Engineer for approval.

2.5.4. Cleaning and Bending: Metal reinforcement at the time concrete is placed shall be free from loose, flaky rust, loose scale, mud, oil or other coatings that will destroy or reduce the bond. All bars shall be bent cold. Details of hooks and bends for reinforcement shall be in accordance with ACI 318. No metal reinforcement shall be placed within the FDOT Right-of-Way.

2.5.5. Placing Reinforcement: Metal reinforcement shall be accurately placed and adequately secured in position by concrete or metal chairs and spacers. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete. Reinforcing steel shall be handled and placed in accordance with ACI 318. No metal reinforcement shall be placed within the FDOT Right-of-Way.

2.6. EMBEDDED ITEMS

All sleeves, inserts, anchors, ground rods and other embedded items shall be placed prior to concreting. Anchor bolts shall be set to the exact horizontal dimensions shown. The Contractor shall provide adequate protection for all threaded sections of the anchor bolts above the surface of the concrete. Any threaded section of the anchor bolts above the surface of the concrete which becomes damaged or encrusted with concrete during and/or after pouring shall be returned to their original threaded condition at no cost to the Owner. Apply cold galvanizing after re-threading and again after setting structures in their final position.

2.7. MIXING AND DELIVERY OF CONCRETE

2.7.1. Mixer: Unless otherwise authorized, the mixing of concrete shall be done in a batch mixer of approved AGC type or in ready-mix equipment conforming to ASTM C94. The volume of the mixed material for each batch shall not exceed the manufacturer's rated capacity of the mixer.

2.7.2. Mixing Time: The concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged. For job-mixed concrete, the mixer shall be rotated at the speed recommended by the manufacturer and mixing shall be continued for at least one and one-half (1-1/2) minutes after all materials are in the mixer. For mixers larger than one cubic yard capacity, the minimum mixing time shall be increased 15 seconds for each additional 1/2 cubic yard of concrete or fraction thereof.

2.7.3. Delivery: Each batch of concrete shall be delivered to the site of the work and discharged completely within 90 minutes after addition of the cement to the aggregates. Exceptions to this 90 minute time limit will be permitted only upon special permission from the Engineer. A ticket or time slip shall accompany each batch, showing the time of the batching of the cement. The production and delivery of ready-mixed concrete shall be such that not more than 20 minutes shall elapse between the depositing of successive batches of concrete in any monolithic unit of concrete.

2.7.4. Cold Weather Batching: When the temperature is below 40^{O}F or is likely to fall below 40^{O}F during the 24-hour period after placing, adequate equipment shall be provided for heating the concrete materials. No frozen material or materials containing ice shall be used. Temperatures of the separate materials, including the mixing water, when placed in the mixer, shall not exceed 140^{O}F. When placed in forms, the concrete shall have a temperature of between 50^{O}F and 90^{O}F.

2.7.5. Addition of Water: Indiscriminate addition of water to increase slump is prohibited. When concrete arrives at the site with slump below that suitable for placing, water may be added only if neither the maximum water-cement ratio nor the maximum slump is exceeded. The concrete supplier must submit, at the time of delivery of each batch of concrete, a signed letter stating the maximum amount of water that may be added to the **entire** load of concrete in the truck. This will be a **one time** addition of water. The letter must also state that addition of the specified amount of water will not affect the design requirements of the approved concrete mix design. Acceptance of this by JEA does not relieve the Contractor from meeting the design specifications required herein. If addition of water results in a failure of any test of any kind of the concrete placed, the Contractor shall remove and replace the concrete at no cost to JEA.

2.8. FORMS

2.8.1. Installation: Forms shall conform to the shape, lines and dimensions of the members as called for on the plans, shall be substantially free from surface defects and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together to maintain position and shape.

2.8.2. Removal: Forms shall be removed in such a manner and at such a time as to insure the complete safety of the structure. In no case shall the supporting forms or shoring be removed until the members have acquired sufficient strength to safely support their own weight and the load thereon.

2.8.3. Footings: Earth cuts may be utilized for forms provided the sides are stable at time of placing.

2.8.4. Chamfers: Exposed corners of columns, beams and piers shall be chamfered ¾" unless otherwise noted on construction drawings.

2.9. PLACING OF CONCRETE

2.9.1. Preparation of Equipment and Place of Deposit: Before placing concrete, all equipment for mixing and transporting the concrete shall be cleaned; all debris and ice shall be removed from the spaces to be occupied by the concrete and all reinforcement shall be thoroughly cleaned of ice or other coatings. Water shall be removed from the place of deposit before concrete is placed unless otherwise permitted by the Engineer.

All reinforcement, forms, fillers and ground with which the concrete is to come in contact shall be free from frost. Concrete shall not be deposited during rain unless adequately protected and, in any case, preparations shall be on hand to protect newly placed concrete from rain until it has hardened sufficiently so that it will not be damaged.

2.9.2. Conveying: Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of the materials. Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end and without separation of the materials.

2.9.3. Placing: No concrete shall be placed until the Engineer or his authorized representative has inspected forms, reinforcing and conditions incidental to the pour. Concrete shall be deposited as nearly as practicable in its final position to avoid separation due to re-handling or flowing.

All concrete shall be thoroughly consolidated by suitable means during placement and shall be thoroughly worked around the reinforcement and embedded items and into the corners of forms.

2.10. FINISHING

2.10.1. Patching: Immediately after stripping forms, all defective areas shall be patched with mortar similar to the concrete mix. Proprietary compounds for patching may be used provided they are used in accordance with the manufacturer's recommendations.

2.10.1.1. Major defective areas, including those resulting from leakage of forms, excessive honeycomb, large bulges and large offsets at form joints shall be chipped away to expose sound material and the surfaces that are to be patched shall be coated with an epoxy-polysulfide adhesive. The patching mortar shall be pressed in for a complete bond and finished to match adjacent areas.

2.10.1.2. Minor defective areas, including honeycomb, air bubbles, holes resulting from removal of ties and those resulting from leakage of forms shall be patched with grout without resorting to chipping.

2.10.2. Finishing: After patching, finish exposed-to-view surfaces as follows:

2.10.2.1. Standard Finish - Trim remaining bulges and offsets to remove fins and form blemishes, and dress rough edges. Rub with carborundum and water as necessary to achieve this finish. The result should be a solid concrete surface in a true and accurate plane.

2.10.2.2. Rubbed Finish: In addition to the work required for a "standard finish," rub all the surfaces with carborundum and water to provide the hereinafter specified results. Wood grain pattern from wood forms need not be removed but shall be rubbed to provide uniformity of surface. Smooth surfaces resulting from overlaid plywood and metal shall be rubbed to remove the glaze. The result should be a solid concrete surface in a true and accurate plane, having a uniformly rubbed finish and free of glazed areas.

2.10.2.3. Areas to be finished as described above:

2.10.2.3.1. Rubbed Finish: Control house bond beam surfaces.

2.10.2.3.2. Standard Finish: All other exposed-to-view surfaces.

2.11. FINISHING OF UNFORMED SURFACES

2.11.1. General: Grade and screed the surfaces to the exact elevation or slope shown or required. After screeding, tamp the mixture thoroughly to drive the coarse aggregate down from the surfaces and apply the finish below.

2.11.2. Float Finish: Finish the surface with a wood or machine float to a true and uniform plane with no coarse aggregate visible. Dusting to absorb surface water will not be permitted.

2.11.3. Broom Finish: Finish the surface with a wood or machine float to a true and uniform plane with no coarse aggregate visible. In addition, lightly broom the surface to make skid resistant. Dusting to absorb water will not be permitted.

2.11.4. 2.11.4 Finish Schedule: Apply indicated finish as scheduled below:

	Trowel	Broom	Float
Control House	X		
Transformer Foundation		X	
Circuit Breaker Foundation		X	
All Other Foundations			X

2.12. JOINTS

2.12.1. Construction Joints: Construction joints shall not be permitted except in the locations shown on the plans. All reinforcing steel and welded wire fabric shall be continued across joints. Bond shall be obtained by either the use of an approved adhesive or by roughening the surface of the concrete in an approved manner.

2.12.2. Isolation Joints shall be provided to separate concrete slabs from columns, footings or walls. There shall be no connection across the joint by reinforcement, keyways or bond. Joints shall be filled with preformed joint filler material conforming to ASTM D994 and sealed with a material compatible to the joint filler.

2.12.3. Control Joints made of premolded joint material shall be installed in floor slabs to allow for contraction caused by drying/shrinkage. Joints shall be spaced at a maximum of 20 feet with the joint spacing chosen so that the panels are approximately square. Depths of control joints shall be one-fifth the slab depth.

2.13. CURING AND PROTECTION

Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete. The approved practices of cold weather and hot weather concreting are those outlined in ACI 306 and ACI 305, respectively.

2.14. TESTING

2.14.1. Testing Laboratory: The Contractor shall, at his expense, employ an approved independent laboratory to prepare cylinders and perform all concrete testing. Two (2) copies of all test reports shall be submitted to the Engineer.

2.14.2. Tests: Each truckload or partial truckload of concrete shall be tested for air content, slump and compressive strength.

2.14.2.1. Air Content: Tests for air content shall be made in accordance with ASTM C173 or ASTM C231.

2.14.2.2. Slump: Tests for slump shall be made in accordance with ASTM C143.

2.14.2.3. Compressive Strength: For each compressive test, one set of four (4) cylinders shall be made. Test cylinders shall be prepared in accordance with ASTM C31 and ASTM C172. One cylinder shall be tested at 7 days, two at 28 days and the fourth held in reserve. The 28-day strength shall be the average of the two cylinders tested. The strength level of the concrete will be considered satisfactory if the average equals or exceeds the required f'c. Compressive strength tests shall be made in accordance with ASTM C39.

2.14.3. Core Test: If compressive tests do not conform to the requirements of these specifications, approval may be given by the Engineer for the Contractor to have alternate strength tests made, provided that the concrete satisfies all other requirements of these specifications. Alternate strength tests shall be made on specimens secured from the structure in accordance with ASTM C42 (Core Test). These alternate tests shall be made at the Contractor's expense. If the concrete does not meet the required specifications, the concrete so represented or the entire structure, if concrete not meeting these specifications is a part thereof, shall be removed and replaced by the Contractor at his expense. In structure elements for which the strength of the concrete is not critical and the structural integrity is not affected, the Engineer may, at his discretion, allow the concrete to remain in place.

2.15. GROUT FOR STRUCTURE FOUNDATIONS

It is the intent of the foundation detail drawings that all structure foundations be poured true and level to the proper elevation without the use of grout; also, that all structure columns be set plumb without the use of leveling nuts or shims. However, if this cannot be accomplished, the Contractor may use shims and a maximum of 1-1/2" of non-metallic, non-shrinking, premixed, inorganic grout. The grout shall be Masterflow 713 (Master Builders) or F-100 (Sauereisen) or an approved equal. The Contractor shall install the grout in strict accordance with the manufacturer's specifications and/or instructions.

2.16. VAPOR BARRIER

All floor slabs on grade or fill shall be waterproofed with one ply of polyvinyl chloride (PVC) 6 mils thick. The PVC sheet shall be laid on the subgrade after it has been dressed and compacted. Joints shall be lapped six inches and sealed continuously with a pressure-sensitive tape, especially made for this purpose, or with an approved water-resistant adhesive. PVC sheets shall be turned up four (4) inches at walls, columns, and all other items projecting above the slab. Before concrete is placed, the sheets shall be carefully inspected and all punctures shall be patched with the pressure-sensitive tape or additional plies of strips of PVC sheeting laid down on approved adhesive.

2.17. CONCRETE SEALER

Interior concrete floor slab in Control House shall be dustproofed and sealed with a sealer similar or equal to Sherwin Williams Tru-Glaze 4508. Color shall be gray. The sealer shall be installed and finished in strict accordance with the manufacturer's directions. The JEA Field Representative shall be present during application.

2.17.1. Interior concrete floor slab in Control House Battery Room shall be given two (2) coats of “Sonoplex” floor sealer. Prior to application, all surfaces shall be cleaned and free of soil, dust, loose material, oil, grease, paint, parting, and curing compounds and all other foreign matter. All dirty or contaminated floors shall be cleansed with hot TSP solution (trisodium phosphate) and rinsed thoroughly with clean water. The floor shall be acid etched with a one-to-one solution by volume 18-20 Baume commercial muriatic acid and water. The floor shall be thoroughly rinsed with clean water and a squeegee and allowed to dry thoroughly before coating with “Sonoplex”. The floor sealer shall be applied in strict accordance with the manufacturer’s recommendations. The JEA Field Representative shall be present during application.

3. DRILLED PIER CONSTRUCTION

3.1. SCOPE

3.1.1. This section presents the general technical provisions and requirements for installation of drilled pier foundations. For purposes of these specifications, a drilled pier shall be defined as a foundation element constructed by excavating a circular shaft in the soil which subsequently is filled with concrete, reinforcing steel and anchor bolt cage as required.

3.1.2. It is not the intent of these specifications to unnecessarily restrict the contractor in his construction methods, techniques or equipment. However, methods, techniques or equipment herein specified are considered necessary to provide adequate pier installation. Deviations from these techniques or equipment may be made only if approved by the Engineer in advance. All work shall be done and completed in an acceptable manner in accordance with best modern practices for construction of drilled pier foundations, notwithstanding any omissions from the specifications or drawings.

3.2. FAMILIARIZATION

Prior to all work of this section, Contractor shall become thoroughly familiar with the site, the site conditions, and accessibility to all drilled pier locations.

3.3. INSTALLATION PERSONNEL

The Contractor shall have a minimum of four (4) years experience in reinforced concrete drilled pier installation. A resume indicating this experience shall be included with the bid. Drilled piers shall be installed by personnel experienced in this rotary excavation and pouring operation. In addition to the familiarity which the contractor may have with the process, the key operating personnel must have had prior experience in drilled pier installations, preferably relevant to anticipated subsurface materials, water conditions, shaft sizes and special techniques required.

3.4. PIER ALIGNMENT AND DIMENSIONS

All drilled piers shall be installed from the ground surface as existing. The maximum variation of the center of any pier from its design location shall be three inches (3"), and no pier shall be out of plumb more than one percent (1%) of its length. All piers shall be at least as large in diameter as shown on the drawings. Tolerance of top elevation shall be plus one inch (1"), minus three inches (3"). If these tolerances are exceeded, proper additional construction (including costs of engineering and redesign) as required by the Engineer shall be provided without additional cost to the Owner.

3.5. EXCAVATION

3.5.1. Shafts for piers shall be either drilled or augured by the use of a combination of power driven rotary type rig and bits or augers of a size and type to excavate the required diameter and depth as specified on the drawings.

3.5.2. Removal of materials from the shaft shall be by the use of the auger or a drilling mud slurry re-circulated from a sump through the hollow drill stem back up the open shaft and into the sump. Excavated material shall be disposed of in a manner subject to the approval of the Owner.

3.6. DRILLING MUD

Commercially produced drilling mud should be compatible with existing soil conditions at the construction location. If salt or brackish water is used to mix the drilling fluid, or if a salt or brackish formation is to be penetrated by the drilled shaft, an attapulgite clay or "salt-gel" shall be used as the mineral additive.

In an acid environment, it may be necessary to neutralize the drilling fluid and/or use bentonite as the mineral additive. Bentonite shall not be left in the excavated shaft longer than 8 hours

The drilling fluid must be maintained above the natural water table at all times and must have a viscosity or consistency capable of maintaining a stable excavation. Shaft depth should be measured upon completion of the initial cleaning process and again immediately prior to pouring concrete. If there is six inches (6") or more difference, the shaft must be re-cleaned. In addition to measuring the hole depth just prior to placing concrete, a sample of the drill fluid, two feet (2') above the bottom of the shaft should be obtained. If the concrete pouring time will be less than 45 minutes, the fluid density may be a maximum of 85 pcf as measured by a mud density balance. If the concrete pouring time exceeds 45 minutes, the fluid density shall be 80 pcf or less. If it can be demonstrated that there is no sand precipitation from the 85 pcf fluid after 45 minutes, the heavier fluid density will be allowed.

The responsibility for obtaining the sample of drilling fluid and determining the specific gravity will be the Contractor's and will be observed by the Owner's representative. The method of obtaining the sample and determining the fluid specific gravity or density will be subject to approval by the owner.

3.7. TEMPORARY CASINGS

Temporary casings will be required at locations where the soil will not stand without support, or where, because of ground water conditions, sloughing of the sides of the piers may seriously delay or endanger the satisfactory completion of excavation and placement of concrete. The Contractor shall have immediately available for use on the job an ample supply of casings for each size which may be required and shall provide additional amounts, if required, to ensure orderly progress of the work. The casings shall be of such strength and rigidity as to maintain the required excavation lines and to resist crushing due to hydrostatic and/or earth pressure. All temporary casings shall be removed as concrete is placed or immediately thereafter, and in such a manner as to prevent sloughing material from dropping to the bottoms of the piers or falling on top of freshly placed concrete.

3.8. PERMANENT CASINGS

When piers penetrate very soft strata, the contractor may use corrugated metal pipe as forms to maintain the shape of the pier through these layers. The inside diameter of the casing shall be at least the nominal shaft diameter. Insertion into the excavated hole shall not unduly disturb side walls. When such casings are utilized, they shall not be removed, but shall remain in place.

3.9. REINFORCING

3.9.1. Reinforcing steel shall be the lengths and sizes shown on the drawings and shall conform to the requirements of the section "Concrete for Drilled Piers," except as modified below.

3.9.2. The pier reinforcement shall be assembled as a cage above ground and sufficiently braced to enable placing of the cage into the pier hole as a unit, without deforming, twisting or bending.

3.9.3. The contractor shall provide guides on the outside of the reinforcing cage to allow the cage to be centered in the open shaft. The guides shall be of such size and design as to be able to furnish the concrete cover for the reinforcing steel as shown on the drawings. Guides shall be placed in sufficient quantities to stabilize the reinforcing cage during concrete placement. A sample of the guide shall be submitted for approval.

3.10. CONCRETE

3.10.1. Except as modified below, concrete shall conform to the requirements of the section "Concrete for Drilled Piers."

3.10.2. Concrete shall be placed as soon as practicable after completion of excavation and installation of reinforcing and in a manner that will not cause segregation of materials.

3.10.3. When holes cannot be kept free of groundwater, concrete shall be placed by the use of a tremie pipe. The diameter of the tremie pipe should be as large as possible, but not greater than 1/3 the diameter of the shaft being poured. Drilled shafts less than thirty (30) feet deep may be poured with either a bottom sealed or traveling plug tremie. The traveling plug must be sufficiently tight so as to prevent the mixing of the drill fluid and concrete. The reinforcing steel cage shall be in place before any concrete is placed in the tremie. With the tremie on the bottom of the shaft, the tube shall be filled to the top extending above the ground. The filled tremie shall be picked up approximately one (1) foot off the bottom of the shaft to allow the weight of the concrete to displace the seal at the bottom of the tremie.

During this initial pouring operation, the tremie is not to be pulled to such a height so as to clear the surface of the concrete already placed in the shaft. All concrete shall be poured through the now open tremie, with care taken to maintain a sufficient head of concrete to completely displace all drilling mud and suspended cuttings of material and to provide sufficient pressure so as to prevent reduction in pier diameter by earth pressure on the fresh concrete. The concrete in each pier shall be overpoured sufficiently to assure that clean, uncontaminated concrete is present at the top of the shaft.

3.10.4. During concrete pouring operations through the tremie, should the surface of the concrete in the pier be breached by the tremie, the tremie tube shall immediately be withdrawn from the hole, resealed and inserted below the surface of the concrete and pouring operations resumed. It may be necessary during large pours to replace the original long tremie with a shorter one. The replacement tremie should be sealed and inserted at least one hole diameter. Should the Engineer deem it necessary, when a breach occurs (and contamination is suspected), the Contractor shall retrieve the reinforcing steel cage, re-drill the shaft to reopen the hole, and begin the concreting operations from the bottom of the pier shaft.

3.10.5. Temporary casings shall be withdrawn as the concrete is deposited. A sufficient head of concrete shall be maintained to insure that no extraneous material enters the concrete and that necking has not occurred. An initial jerk of 2 to 4 inches will be permitted to start the lift; thereafter, while being removed from the pier hole, the casing must be kept plumb and must be pulled with a smooth vertical motion, without jerks.

3.10.6. The concrete along the full length of the anchor bolts shall be vibrated if the Engineer so directs.

3.10.7. Under certain circumstances, construction joints in pier shafts may be permitted. Prior approval must be obtained from the Engineer. Any such construction must be accomplished under dewatered conditions using approved ACI procedures, and must be properly recorded in the drilled pier report.

3.11. CHECKING COMPLETED PIERS

If the engineer has reason to suspect that the concrete was breached by the tremie, or that the pier, for any other reason, may contain extraneous material or otherwise fail the specifications, he may order the pier cored for inspection and/or testing. If the core recovery and/or test results indicate non-compliance with the specifications, the Contractor shall bear the expense of the investigation and/or testing and shall also, at no cost to the Owner, install proper additional construction as required by the Owner. Should the investigation and/or testing indicate compliance with the specifications, the Owner shall bear the cost of such investigation and/or testing.

3.12. REPORTS

A complete report of each pier installed shall be made for the Engineer. This report shall contain all

dimensions, location of pier, elevation of bottom and top as actually poured, measured amount of concrete placed in each pier hole, and any other pertinent data. All cavities encountered should be clearly indicated. All lengths of permanent and/or temporary casings should be clearly shown. All unusual conditions shall be clearly described. This information shall be forwarded as soon as possible for review of conditions encountered.

3.13. EXTRA COMPENSATION

It is the Contractor's responsibility to familiarize himself with the site and subsurface conditions before submitting his proposal. Ignorance of conditions will not be accepted as the basis of a claim for additional compensation. Payment for extra concrete due to overdrilling will not be made.

4. CONCRETE FOR DRILLED PIERS

4.1. SCOPE

All concrete work shall be governed by this Section unless modified by other sections of these Specifications.

4.2. APPLICABLE STANDARDS

All concrete work shall be in accordance with the following standards of the American Concrete Institute (ACI), except as may be modified by these Specifications:

4.2.1. ACI 318 (latest revision) "Building Code Requirements for Reinforced Concrete".

4.2.2. ACI 301 (latest revision) "Specifications for Structural Concrete for Buildings".

4.2.3. ACI 306 (latest revision) "Recommended Practice for Cold Weather Concreting".

4.2.4. ACI 305 (latest revision) "Recommended Practice for Hot Weather Concreting".

4.2.5. ACI 613 (latest revision) "Recommended Practice for Selecting Proportions for Concrete".

4.3. MATERIALS

4.3.1. Cement: Low alkali cement (maximum of 0.6 percent equivalent Na_2O) shall be used in all concrete. The cement shall be Portland cement conforming to ASTM C150, Type 1.

4.3.2. Fine Aggregate: Sand for concrete shall conform to ASTM C33.

4.3.3. Coarse Aggregate: The coarse aggregate shall be gravel, crushed stone or slag conforming to ASTM C33. Coarse aggregate shall be tested for potential alkali reactivity according to ASTM C-289; reactive aggregate will not be permitted.

4.3.4. Water: Mixing water for concrete shall be clean and free from injurious amounts of oils, acids, alkalis, organic materials or other deleterious substances.

4.4. CONCRETE PROPORTIONING

The concrete mix design for the class of concrete specified for use under this contract shall be prepared and submitted to the Engineer for approval. No concrete shall be placed without prior approval of the mix design.

4.4.1. Composition: The concrete shall be composed of Portland cement, fine aggregate, coarse aggregate and water. The ingredients shall be proportioned to produce a dense, workable concrete, free from voids. The concrete shall be designed in accordance with applicable ACI

standards to attain the properties of strength, slump and rate of hardening required by these specifications.

4.4.2. Maximum Size of Coarse Aggregate: The maximum size of coarse aggregate shall not be larger than 3/4 the minimum clear spacing between the reinforcing bars.

4.4.3. 4.4.3 Strength and Slump: The following is the minimum compressive strength and slump range. All slump tests shall be in accordance with ASTM C143 and shall be performed by the Contractor as directed by the Owner's field representative.

Type of Construction	Compressive Strength 28 days, psi	Slump, in
Drilled Piers	4000	7 - 9

4.4.4. Air Content: The air content in the concrete shall be maintained in accordance with the following requirements:

Maximum Size Coarse Aggregate, in.	Air Content Percent by Volume
1 1/2	3 ± 1
3/4 or 1	4 ± 1
3/8 or 1/2	5 ± 1

4.4.5. Admixtures: Air entrainment shall be produced by the addition of an air entraining admixture meeting the requirements of ASTM C260. Air-entraining cement will not be permitted. If required, an approved water reducing retarder may be used in the proportions recommended by the manufacturer.

4.4.6. Proportioning of Ingredients: Proportions, including water-cement ratio shall be established on the basis either of laboratory trial batches or of field experience with the materials to be employed. The mix design together with supporting data shall be submitted to the Engineer for approval. The Engineer may, at his discretion, require only a letter from the concrete supplier indicating compliance with the Specifications in lieu of submission of a mix design.

4.5. REINFORCING STEEL

4.5.1. General: Reinforcing bars shall conform to ASTM A615, ASTM A616 or ASTM A617, Grade 60 for #6 bars and larger and Grade 40 for #5 bars and smaller.

4.5.2. Shop Drawings: Shop drawings for fabrication and placing of the reinforcing steel and accessories, shall be submitted to the Engineer for approval.

4.5.3. Cleaning and Bending: Metal reinforcement at the time concrete is placed shall be free from loose, flaky rust, loose scale, mud, oil or other coatings that will destroy or reduce the bond. All bars shall be bent cold. Details of hooks and bends for reinforcement shall be in accordance with ACI 318.

4.5.4. Placing Reinforcement: Metal reinforcement shall be accurately placed and adequately secured in position by concrete or metal chairs and spacers. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete. Reinforcing steel shall be handled and placed in accordance with ACI 318.

4.6. EMBEDDED ITEMS

All sleeves, inserts, anchors, ground rods and other embedded items shall be positioned prior to concreting (except where the concrete is being placed with a tremie). Anchor bolts shall be set to the exact horizontal

dimensions shown. The Contractor shall provide adequate protection for all threaded sections of the anchor bolts above the surface of the concrete. Any threaded sections of the anchor bolts above the surface of the concrete which become damaged or encrusted with concrete during and/or after pouring shall be returned to their original threaded condition at no cost to the Owner.

4.7. MIXING AND DELIVERY OF CONCRETE

4.7.1. Mixer: Unless otherwise authorized, the mixing of concrete shall be done in a batch mixer of approved AGC type or in ready-mix equipment conforming to ASTM C94. The volume of the mixed material for each batch shall not exceed the manufacturer's rated capacity of the mixer.

4.7.2. Mixing Time: The concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged. For job-mixed concrete, the mixer shall be rotated at the speed recommended by the manufacturer and mixing shall be continued for at least one and one-half (1 l/2) minutes after all materials are in the mixer. For mixers larger than one cubic yard capacity, the minimum mixing time shall be increased 15 seconds for each additional l/2 cubic yard of concrete or fraction thereof.

4.7.3. Delivery: Each batch of concrete shall be delivered to the site of the work and discharged completely within 90 minutes after addition of the cement to the aggregates. Exceptions to this 90 minute time limit will be permitted only upon special permission from the Engineer. A ticket or time slip shall accompany each batch, showing the time of the batching of the cement.

The production and delivery of ready-mixed concrete shall be such that not more than 20 minutes shall elapse between the depositing of successive batches of concrete in any monolithic unit of concrete.

4.7.4. Cold Weather Batching: When the temperature is below 40^{O}F or is likely to fall below 40^{O}F during the 24-hour period after placing, adequate equipment shall be provided for heating the concrete materials. No frozen material or materials containing ice shall be used. Temperatures of the separate materials, including the mixing water, when placed in the mixer, shall not exceed 140^{O}F. When placed in forms, the concrete shall have a temperature of between 50^{O}F and 90^{O}F.

4.7.5. Addition of Water: Indiscriminate addition of water to increase slump shall be prohibited. When concrete arrives at the site with slump below that suitable for placing, water may be added only if neither the maximum water-cement ratio nor the maximum slump is exceeded. Any addition of water above that permitted by the limitation on water-cement ratio must be accompanied by a quantity of cement sufficient to maintain the proper water-cement ratio.

4.8. FORMS

4.8.1. Installation: Forms shall conform to the shape, lines and dimensions of the members as called for on the plans, shall be substantially free from surface defects and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together to maintain position and shape.

4.8.2. Removal: Forms shall be removed in such a manner and at such a time to insure the complete safety of the structure. Form work for drilled piers and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.

4.8.3. Chamfers: Exposed edges of drilled piers shall be chamfered ¾".

4.9. PLACING OF CONCRETE

4.9.1. Preparation of Equipment and Place of Deposit: Before placing concrete, all equipment for mixing

and transporting the concrete shall be cleaned; all debris and ice shall be removed from the spaces to be occupied by the concrete and all reinforcement shall be thoroughly cleaned of ice or other coatings. Water shall be removed from the place of deposit before concrete is placed unless otherwise permitted by the Engineer.

All reinforcement, forms, fillers and ground with which the concrete is to come in contact shall be free from frost. Concrete shall not be deposited during rain unless adequately protected, and in any case, preparations shall be on hand to protect newly placed concrete from rain until it has hardened sufficiently so that it will not be damaged.

4.9.2. Conveying: Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of the materials. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end and without separation of the materials.

4.9.3. Placing: No concrete shall be placed until the Engineer or his authorized representative has inspected forms, reinforcing and conditions incidental to the pour. Concrete shall be deposited as nearly as practicable in its final position to avoid separation due to rehandling or flowing. All concrete shall be thoroughly consolidated by suitable means during placement and shall be thoroughly worked around the reinforcement and embedded items and into the corners of forms.

4.10. FINISHING

4.10.1. Patching: Immediately after stripping forms, all defective areas shall be patched with mortar similar to the concrete mix. Proprietary compounds for patching may be used provided they are used in accordance with the manufacturer's recommendations.

4.10.1.1. Major defective areas, including those resulting from leakage of forms, excessive honeycomb, large bulges and large offsets at form joints shall be chipped away to expose sound material and the surfaces that are to be patched shall be coated with an epoxy-polysulfide adhesive. The patching mortar shall be pressed in for a complete bond and finished to match adjacent areas.

4.10.1.2. Minor defective areas, including honeycomb, air bubbles, holes resulting from removal of ties and those resulting from leakage of forms shall be patched with grout without resorting to chipping.

4.10.2. Finishing: After patching, finish exposed-to-view surfaces by one of the following methods:

4.10.2.1. Standard Finish: Trim remaining bulges and offsets to remove fins and form blemishes, and dress rough edges. Rub with carborundum and water as necessary to achieve this finish. The result should be a solid concrete surface in a true and accurate plane.

4.10.2.2. Rubbed Finish: In addition to the work required for a "standard finish," rub all the surfaces with carborundum and water to provide the hereinafter specified results. Wood grain pattern from wood forms need not be removed but shall be rubbed to provide uniformity of surface. Smooth surfaces resulting from overlaid plywood and metal shall be rubbed to remove the glaze. The result should be a solid concrete surface in a true and accurate plane, having a uniformly rubbed finish and free of glazed areas.

4.11. CURING AND PROTECTION

Freshly deposited concrete shall be protected from premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete. The approved practices of cold weather and hot weather concreting are those outlined in ACI 306 and ACI 305,

respectively.

4.12. TESTING

4.12.1. Testing Laboratory: The Contractor shall, at his expense, employ an approved independent laboratory to prepare cylinders and do all testing. Two (2) copies of all test reports shall be transmitted to the Engineer.

4.12.2. Tests: Each truckload or partial truckload of concrete shall be tested for air content, slump and compressive strength. Test cylinders shall be made in accordance with ASTM C172 and ASTM C31.

4.12.3. Compressive Tests: For each compressive test, one set of four (4) cylinders shall be made. One cylinder shall be tested at 7 days, two at 28 days and the fourth held in reserve. The 28-day strength shall be the average of the two cylinders tested. The strength level of the concrete will be considered satisfactory if the average equals or exceeds the required f'_c. Compressive strength tests shall be made in accordance with ASTM C39.

4.12.4. Core Test: If specimen strength tests do not conform with the requirements of these Specifications, approval may be given by the Engineer for the Contractor to have alternate strength tests made on specimens secured from the structure in accordance with ASTM C42 (Core Test). These alternate tests shall be made at the Contractor's expense. If the concrete does not meet the required specifications, the concrete so represented or the entire structure, if concrete not meeting these Specifications is a part thereof, shall be removed and replaced by the Contractor at his expense. In structure elements for which the strength of the concrete is not critical and the structural integrity is not affected, the Engineer may, at his discretion, allow the concrete to remain in place.

5. CONTROL HOUSE MASONRY CONSTRUCTION

5.1. SCOPE

This Subsection covers all masonry work required in construction of the Control House shown on the drawings. Concrete work accomplished in conjunction with masonry construction, such as concrete lintels, shall be governed by Section VIII, Subsection 2 of these specifications.

5.2. DESIGN AND CONSTRUCTION

The design and construction of concrete masonry structures shall be in accordance with "Building Code Requirements for Masonry Structures" (ACI 530-88/ASCE 5-88, latest revision) and "Standard Building Code" of the Southern Building Code Congress International (1997 Edition, latest revision).

5.3. MATERIALS

5.3.1. The materials used in masonry construction shall meet the following specifications unless otherwise noted.

5.3.2. Concrete Masonry Units: Block shall conform to ASTM C90 Grade N-I. Moisture content at time of installation shall not exceed 35% of total absorption. All units shall be uniform in color and texture, of standard sizes, and of the shapes required for the construction intended. All units shall be kept dry during storage on the job and shall be dry when laid in the walls and partitions.

5.3.3. Cementitious Materials

5.3.3.1. Portland Cement - Type I, II, or III of ASTM C150

5.3.3.2. Masonry Cement - ASTM C91

5.3.3.3. Hydrated Lime - Type S of ASTM C207

5.3.3.4. Quicklime - ASTM C5

5.3.4. Aggregates

5.3.4.1. Fine aggregates for grout and mortar: ASTM C144

5.3.4.2. Coarse aggregate for grout, maximum size No. 8 of ASTM C404

5.3.5. Water: Water used shall be clear and free from injurious amounts of oils, acids, alkalies, salts, organic materials, or other substances that may be deleterious to mortar, grout and any metal in the wall.

5.3.6. Admixtures: Accelerators, retarders, and other admixture materials shall not be used in mortar or grout unless reliable data are provided to demonstrate that the admixture has no adverse effect on the properties of the mortar. Any admixtures used shall conform to ASTM C494.

5.3.7. Masonry Anchors and Reinforcements: All wall reinforcing and tie system shall be Dur-O-Wal truss or approved equal. Rods shall be minimum 9 gauge and hot-dip galvanized after fabrication in accordance with ASTM A116 Class 3 coating (0.8 oz./s.f.).

5.4. MORTAR AND GROUT

5.4.1. Proportioning: Grout shall be proportioned to meet the requirements of ASTM C476. Mortar shall be proportioned in accordance with ASTM C270 for Type N mortar.

5.4.2. Mixing: All materials should be mixed in a mechanical mixer for a minimum period of 5 minutes, after all the materials are in the mixer, with the amount of water required to produce the desired workability. Mortar that has stiffened from evaporation may be retempered to workable consistency by adding water and remixing thoroughly. All mortar shall be used within 2-1/2 hours of the initial mixing.

5.5. LAYING CONCRETE BLOCK UNITS

5.5.1. Workmanship: All masonry work shall be laid out carefully and accurately. All work shall be performed by first-class masons thoroughly experienced in the trade. All lines, vertical and horizontal, shall be straight and true and all walls shall be plumb, true, clean and smooth.

5.5.2. Laying: All units shall be laid in running bond with the vertical joints occurring at mid-points of the units above and below, and aligned vertically. Concrete block must not be wetted before laying, but must be kept dry to prevent shrinkage. Horizontal and vertical mortar joints shall be uniform and not wider than 3/8 inch thick. All exposed joints shall be tooled concave.

5.5.3. Cold Weather: No masonry construction shall be permitted in freezing weather unless suitable means are provided to heat materials. No antifreeze ingredients shall be used. Masonry shall be protected against freezing for at least 48 hours.

5.5.4. Intersecting Walls and Corners: At corners, walls shall be tied together in masonry bond. When masonry bond is not practical at intersecting walls and partitions, ties shall be provided as specified below.

5.6. MASONRY REINFORCING AND ANCHORAGE

Horizontal reinforcing shall be built into every other block course starting 16 inches above the footing or slab and ending with the last mortar joint. In addition, reinforcing shall be installed in the first 2 mortar joints above and below all openings, extending at least 24 inches beyond each side of the opening. Anchors for intersecting partitions shall be factory made "T" sections placed at 16 inch intervals vertically. Reinforcement shall be so placed as to assure a 5/8 inch mortar cover on the exterior face of walls and 1/2 inch cover on interior faces. Side rods shall be lapped at least 6 inches at splices.

5.7. SETTING OF METAL WORK

All flashing, anchors, ties, bearing plates, bolts, etc., shall be set at the correct elevation, true and level, in full beds of mortar. Masonry shall be brought to bear against anchors to prevent slippage. Anchors and similar work shall be completely covered with mortar or grout. Pressed steel frames shall be filled with mortar as the work progresses.

5.8. CLEANING

All exposed masonry shall be cleaned with solvents of a brand and mixture recommended by the concrete block manufacturer. The cleaning shall be done in accordance with the solvent manufacturer's printed directions. Exposed concrete block may be cleaned without solvents provided the resulting surfaces are suitable for painting and the original texture of the units is not altered.

5.9. LINTELS

All openings wider than 16 inches shall have lintels. Lintels shall bear a minimum of 8 inches at each end. Where masonry lintel blocks are used, units shall be filled with 3,000 psi concrete and reinforced with a minimum of 2 No. 4 bars. Concrete and reinforcing shall meet the requirements of Section VIII, Subsection 2.

6. CONTROL HOUSE – ROOF

6.1. SCOPE

This Subsection covers construction of the Control House roof system composed of precast prestressed concrete hollow core slabs, rigid insulation and modified bitumen roofing.

6.2. HOLLOW CORE SLABS

Manufacturer shall be a firm specializing in providing prestressed concrete products and services of the types specified herein and on the plans. The manufacturer shall have at least three (3) years experience in manufacturing, transporting and erecting precast/prestressed concrete decks. The manufacturer's plant shall be a member of the Prestressed Concrete Institute's Plant Certification Program. Design of the precast/prestressed hollow core slabs shall be performed by a Professional Engineer registered in the State of Florida, and qualified by education and/or experience to perform the design.

6.2.1. Materials

6.2.1.1. Portland cement, Type I, II or III, shall conform to ASTM C-150.

6.2.1.2. Lightweight aggregates shall conform to ASTM C-330.

6.2.1.3. Concrete shall be zero slump.

6.2.1.4. All concrete shall be produced by the prestressed concrete manufacturer at a central batching plant.

6.2.1.5. Prestressing steel wire shall be high tensile, three strand, 5/16" diameter stress relieved wire (250 ksi) in accordance with ASTM A-416.

6.2.2. Fabrication

6.2.2.1. Prestressed concrete slabs with a 4'-0" nominal width shall be machine extruded using zero slump concrete.

6.2.2.2. Prestressed concrete slabs shall be manufactured in one single operation with a smooth top and bottom.

6.2.2.3. Prestressed concrete slabs shall be free of honeycombing. Chamfers shall be uniform in size.

6.2.2.4. Tolerances:

Width	
Full width units	± ¼"
Saw cut units	± ½"
Length	± 1"
Thickness	± ¼"
Deviation from square	± 1"

6.2.2.5. Testing

6.2.2.5.1. At least four (4) test cylinders shall be made for each day's production.

6.2.2.5.2. Testing shall conform to the applicable provisions of PCI MNL-116, Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products.

6.2.3. Submittals: Shop drawings shall be submitted for approval, showing identifying marks of each unit, holes over 100 square inches and anchorage details.

6.2.4. Erection

6.2.4.1. Prestressed concrete units shall be erected into final position under the supervision of a representative of the manufacturer.

6.2.4.2. Prestressed concrete units shall be aligned, leveled and anchored prior to grouting keyway joints.

6.2.5. Grouting

6.2.5.1. Keyways between units shall be cleaned and filled with grout. Grout that may have seeped through keyways to areas below shall be removed before hardening.

6.2.5.2. Tops of grouted joints shall be screeded adequately smooth to prevent any unevenness that might interfere with the placing of roofing.

6.3. WOOD NAILERS

Continuous wood nailing strips shall be provided at all locations such as eaves and roof edges for nailing of flashings and the like and to act as a stop for the insulation. Nailers shall be pressure treated with a water-borne preservative such as Wolman salts or with penta applied in a liquified petroleum gas carrier such as the Cellon Process. Oil based preservatives such as creosote are not acceptable.

6.4. BUILT-UP ROOF

Built-up roof system, to include insulation, flashing and sheet metal and modified bitumen roofing, shall be in accordance with The Johns Manville Company. A Johns Manville 2FID SBS Modified Bitumin roofing system with a 20-year NDL warranty shall be installed. JEA has standardized on this system and will not accept other alternatives. Installation shall be by a Johns Manville Company approved roofing contractor. All required procedures and inspections shall be closely followed.

6.5. GUTTERS AND DOWNSPOUTS

All gutters and downspouts, where shown on the drawings, shall be 24 gauge aluminum. Gutter and downspouts are to be 5" x 5" with 6" cover plates at splices. All splices and ends are to be soldered. Provide aluminum ferrules and aluminum spikes at 4'0" o.c. for mounting gutter to wood blocking. Aluminum flashing is to run down into gutter. Provide aluminum straps 8'0" apart attached into masonry for mounting of downspouts. Gutters are to be installed per The Johns Manville Company specifications and details.

7. CONTROL HOUSE - MISCELLANEOUS CONSTRUCTION

7.1. SCOPE

This Subsection covers furnishing and installing doors and hardware, windows, painting and other incidental finishing operations. Mechanical and electrical work is specified or scheduled on the drawings or other sections of these specifications.

7.2. HOLLOW METAL DOORS AND FRAMES

7.2.1. Scope

7.2.1.1. The Contractor shall furnish and install:

7.2.1.1.1. All doors along with frames and hardware as called for on the drawings.

7.2.1.1.2. Hangers, bars, plates, angles, nuts, screws, clips, cushions, brackets, lugs, fastenings, and all other required parts and accessories for complete units which may be required to complete the work in this Subsection.

7.2.1.2. The Contractor shall furnish all hardware as specified in the Hardware Schedule. The Contractor shall supply one locking cylinder to allow him access to the Control House during construction. Upon completion of construction, the Contractor will remove his locking cylinder and replace with Owner furnished cylinder.

7.2.2. Steel Honeycomb Core Doors and Frames

7.2.2.1. Steel honeycomb doors shall be as manufactured by Steelcraft, 9017 Blue Ash Road, Cincinnati, Ohio, 45242, and distributed by George P. Coyle & Sons, 2351 Dennis Street, Jacksonville, Florida, 32204. Doors shall be flush seamless entrance doors, fabricated of galvanized steel, and designated as LF-18F. Doors shall be phosphatized, and shall receive one coat of baked-on primer and one finish coat of baked-on enamel (Desert Sand #11049). Doors shall be internally reinforced with 12 gauge steel for mounting of surface closers, and shall be furnished with top caps for weather protection.

7.2.2.2. Door frames shall be as manufactured by Steelcraft and designated as F16-4. Frames shall be fabricated of galvanized steel. Frames shall be bonderized, and shall receive one coat of baked-on primer and one finish coat of baked-on enamel (Desert Sand

(#11049). Frames shall be reinforced for closers. Weatherstripping shall be Pemko #303AV or equal.

7.2.3. Metals (General): Metals used in this section shall be free from defects impairing strength, durability or appearance, and shall be of best commercial grade for their particular function and situation in structure and location.

7.2.4. Erection and Workmanship

7.2.4.1. Frames shall be installed by the Contractor in correctly prepared openings according to the manufacturer's recommended installation instructions. They shall be set plumb, square and level in correct alignment with floors, ceilings, walls and other work. They shall be securely anchored and completely ready for operation. To produce a watertight job, all joints between frames and masonry shall be tightly caulked and neatly painted. Excess caulking materials shall be removed. It shall be the Contractor's responsibility to protect frame members from harm during construction.

7.2.4.2. All doors are to remain in original cartons until ready for installation. This will protect the finish and facings from the pitting corrosion action of plaster, concrete, cement, or other highly alkaline materials.

7.2.4.3. Like metals in contact or metals in contact with unlike metals, where necessary to prevent corrosion by electrolytic action and other causes, shall be effectively insulated.

7.2.4.4. Anchors, bolts, and other fastenings into masonry shall be as per manufacturer's recommendations.

7.2.4.5. Except as detailed, no member shall project beyond the normal face or planes of wall line.

7.2.5. Adjustments Upon Completion: Upon substantial completion of the work of this Subsection, the Contractor shall go over all his work and put it in first-class condition. He shall adjust and condition all movable and fixed parts and make good any loose or damaged work and put hardware in proper operating condition.

7.2.6. Templates: The door manufacturer shall be furnished templates by the hardware supplier and extreme care and precision shall be used in the hardware layout and mortising so as to assure an accurate fit to frames.

7.2.7. Shop Drawings

7.2.7.1. When laying out shop drawings, the Contractor shall carefully verify all conditions at the site of operations, and shall promptly report to the JEA field representative any variation or digression from contract document affecting his work, that proper and prompt adjustment may be made on the shop drawings or otherwise.

7.2.7.2. Provide necessary symbol key seating plans for easily and quickly identifying units and parts and assigning to their proper locations in the building.

7.3. FINISH HARDWARE

7.3.1. General: Hardware shall be free from defects affecting appearance and serviceability. Working parts shall be well fitted and smooth working without unnecessary play. All items of hardware shall be delivered to the building site in sufficient time in advance of its requirement for use for inspection prior to installation. All items of finishing hardware shall be placed in separate packages and definitely numbered and marked for each opening for which it is intended. Hardware for

application to metal shall be made to standard templates. Template information shall be furnished to door and frame fabricators and all other trades requiring same, in order that they may cut, reinforce or otherwise prepare in the shop, materials for the reception of hardware.

7.3.2. Installation: Install finishing hardware and adjust for intended operation. Cover doorknobs and other surfaces while the area is being finished. Clean paint from all exposed surfaces thoroughly before the building is turned over to the Owner. Hinges shall be located 10 inches from the top of the door, 10 inches from the bottom of the door and other hinge(s) centered between the top and bottom hinges. Where locations of knobs are not indicated on the drawings, they shall center 39 inches above the floor.

7.3.3. Hardware Schedule: Furnish and install the following hardware for each door. Set numbers are assigned to doors shown on door schedule as follows:

7.3.3.1. Door E-1:

7.3.3.1.1. 2-1/2 pairs butts – FBB191 – 4-1/2"x 4-1/2" – NRP- 32D (Stanley)

7.3.3.1.2. 1 butt – CEFBB191 – 4-1/2"x4-1/2" – 32D (Stanley)

7.3.3.1.3. 1 – 8500 Concealed Vertical Rod Device (Adams-Rite)

7.3.3.1.4. 1 – EL8500 Concealed Vertical Rod Device x Model 3001 pull (Adams-Rite)

7.3.3.1.5. 1 – Power Supply (Adams-Rite PS-LR)

7.3.3.1.6. 1 – 8650 Key Override (Adams-Rite)

7.3.3.1.7. 2 closers – DC2210A1 (Russwin)

7.3.3.1.8. 2 kickplates - 8" x DWL – 32D

7.3.3.1.9. 1 threshold No. 155 AV

7.3.3.1.10. weatherstripping – 312CR

7.3.3.1.11. door sweep – 315CN

7.3.3.1.12. 1 lock guard

7.3.3.2. Doors E-2 and E-6:

7.3.3.2.1. 1-1/2 pairs butts – FBB191 - 4-1/2" x 4-1/2" – NRP 32D (Stanley)

7.3.3.2.2. 1 butt CEFBB191 –4-1/2"x4-1/2" 32D (Stanley)

7.3.3.2.3. 1 – EL8500 Concealed Vertical Rod Device x Model 3001 pull (Adams-Rite)

7.3.3.2.4. 1 –Power Supply (Adams-Rite PS-LR)

7.3.3.2.5. 1 – 8650 Key Override (Adams-Rite)

7.3.3.2.6. 1 closer - DC2210A1

7.3.3.2.7. 1 kickplate - 8" x DWL – 32D

7.3.3.2.8. 1 threshold No. 155 AV

7.3.3.2.9. weatherstripping – 312CR

7.3.3.2.10. door sweep – 315CN

7.3.3.2.11. 1 lock guard

7.3.3.3. Door E-3:

7.3.3.3.1. 1-1/2 pairs butts - SSBB - 4-1/2" x 4-1/2" - US26D

7.3.3.3.2. 1 closer - DC2210A1

7.3.3.3.3. 1 kickplate - 8" x DWL – 32D

7.3.3.3.4. 1 threshold No. 155 AV

7.3.3.3.5. 1 pull plate – 8302 – 32D

7.3.3.3.6. 1 push plate – 8200 – 32D (8x16)

7.3.3.4. Door E-4:

7.3.3.4.1. 1-1/2 pairs butts - SSBB - 4-1/2" x 4-1/2" - US26D

7.3.3.4.2. 1 closer - DC2210A1

7.3.3.4.3. 1 kickplate - 8" x DWL – 32D

7.3.3.4.4. 1 lockset – 4352 Austin 32D

7.3.3.5. Door E-5:

7.3.3.5.1. 1-1/2 pairs butts - SSBB - 4-1/2" x 4-1/2" - US26D

7.3.3.5.2. 1 closer - DC2210A1

7.3.3.5.3. 1 kickplate - 8" x DWL – 32D

7.3.3.5.4. 1 lockset – 4352 Austin 32D

7.3.3.5.5. weatherstripping – 312CR

7.3.3.5.6. door sweep – 315CN

7.3.3.5.7. 1 lock guard

7.3.4. Lock Guards: Stainless steel lock guards shall be installed on Doors E-1, E-2, E-5 and E-6 . Lock guards shall be manufactured by Lock Guard Manufacturing Company and available from George P. Coyle & Sons , Inc., Jacksonville, Florida (904- 356-4821).

7.4. PAINTING AND FINISHING

7.4.1. Materials: All paint materials shall be delivered to the job in their original unbroken packages. For the various paints to be used, the Contractor shall submit for approval specification data in accordance with the paragraph for same, both as covered in "General Conditions." All paint shall be applied in strict accordance with the manufacturer's printed instructions. All paint materials shall be the manufacturer's first quality for the type specified. Approved manufacturers are:

Devoe
Pittsburgh
Glidden
Sherwin Williams

7.4.2. Colors: The color code has been selected (based on Sherwin Williams color charts) as follows:

Interior Ceilings	White
Outside Walls	SW6133 – Muslin
Inside Walls	SW6126 – Navajo White
Doors	SW6129 – Restrained Gold
Epoxy Floors	Haze Gray

7.4.3. Workmanship: All finish surfaces shall be smooth, even and free from defects and shall show even coatings. Paint shall be applied to dry surfaces only and no succeeding coat of paint shall be applied until the preceding coat is thoroughly dry. Paint shall be thoroughly worked into all joints, crevices and open spaces. There shall be a perceptible difference in the shades of successive coats of paint. All freshly painted surfaces shall be adequately protected.

7.4.4. Preparation of Surfaces: All rust, loose or disintegrated paint, grease and scale shall be removed from metalwork before priming or field coats are applied. All wood or other surfaces shall be free from dirt, grease and dust, and shall be in condition necessary to provide for a proper paint finish. All nail holes, cracks or open joints shall be puttied with pure linseed oil putty, or caulked. Putty, where necessary, shall be applied with a knife after priming coats have been applied.

7.4.5. Finish Painting - Control House

7.4.5.1. Exterior Wall : Exposed surfaces, including entryway ceiling, shall receive a paint application as follows:

7.4.5.1.1. Two (2) coats of Sherwin Williams BLOXFIL 4000 to which has been added one (1) quart of Sherwin Williams Exterior Masonry Paint color SW6133 per gallon of Blox Fill.

7.4.5.1.2. Two (2) finish coats of Sherwin Williams Acrylic Exterior Flat Masonry Paint No. 2210 Wonder-Guard color No. SW6133.

7.4.5.2. Interior Wall Surfaces: Exposed surfaces shall receive a paint application as follows:

7.4.5.2.1. Two (2) coats of Sherwin Williams BLOXFIL 4000 to which has been added one (1) quart of Sherwin Williams Interior Vinyl No. 506 color No. SW6126 per gallon.

7.4.5.2.2. One (1) coat of Sherwin Williams ULTRA-HIDE PVA Interior primer-sealer 1030 tinted to color No. SW6126.

7.4.5.2.3. One (1) coat of Sherwin Williams DEVSHIELD 4328 color No. SW6126.

7.4.5.3. Interior Ceiling: Interior ceiling of Control House (underside of concrete roof slabs) shall receive a paint application as follows:

7.4.5.3.1. One (1) coat of Sherwin Williams BOND-PREP Interior/Exterior Waterborne Pigmented Bonding Primer 3030 (White).

7.4.5.3.2. One (1) coat of acrylic white.

7.4.6. Caulking: Caulking compound shall be furnished and applied at all locations indicated on the drawings and where required to close joints and similar openings. The compound shall be silicone or polysulfide type produced by a manufacturer regularly engaged in the manufacture of caulking compounds.

7.4.7. Cleaning: Upon completion of the work, paint, caulking compound, etc., shall be cleaned from all surfaces for which the material was not intended for application. All damaged places shall be touched up and the job shall be left in a first-class workmanlike condition. Particular attention shall be given to surface areas which have been sprayed with paint to see that all dust from spraying operation is thoroughly removed.

7.4.8. Touch-up Paint: Provide one (1) extra gallon of each color to be used for touch-up. The extra gallon must come from the same batch as the original paint.

7.5. AIR-CONDITIONING SYSTEM:

The Contractor shall furnish and install three (3) split system heat pumps as specified in Section IX of these specifications.

7.5.1. Indoor Unit: The blower coil shall be wall mounted inside the Control House in the location shown on the drawings and at a distance of two (2) feet above the floor. The Contractor shall furnish and install all structural steel supporting members, as well as all fasteners necessary for a secure mounting of the unit. The Contractor shall install the indoor unit including all piping, control thermostat, and control wiring. The Contractor shall then complete the electrical conduit connections between the unit and the disconnect safety switch and complete the power wiring to the unit. All electrical and mechanical connections between the indoor unit and the outdoor unit shall go through the wall. The Contractor shall furnish and install an insulated sheet metal duct, with grille, to direct air flow toward the center of the Control House.

7.5.2. Outdoor Unit: The Contractor shall furnish and install the outdoor unit. The unit shall be mounted on a contractor furnished and installed concrete pad of the size and in the location shown on the drawing. The pad shall be installed level. After the Contractor has completed installing the outdoor unit the Contractor shall then complete the electrical conduit connections between the unit and the disconnect safety switch and complete the power wiring to the unit.

7.6. TOILET ROOM ACCESSORIES: Furnish and install accessories as specified:

7.6.1. Paper Towel Dispenser: Bobrick B-263

7.6.2. Toilet Paper Dispenser: Bobrick B-6867

7.6.3. Mirror: Bobrick B-165 1622

7.6.4. Waste Paper Basket: Bobrick B-2270

7.7. BATTERY BANK EXHAUST FAN:
The contractor furnished and installed wall mounted explosion-proof fan above the battery bank shall be as specified in Section IX. The contractor shall install the fan in accordance with the manufacturer's instructions.

7.8. BATTERY BANK SAFETY SIGN

7.8.1. Safety signs inside and outside of battery room (both sides of battery room door), prohibiting smoking, sparks, or flame shall be provided. Signs shall be in accordance with ANSI Z535.1-1998, ANSI Z535.2-1998, ANSI Z535.3-1998, ANSI Z535.4-1998, and ANSI Z535.5-1998.

7.9. BATTERY CART CABLE ENTRANCE

The Contractor shall furnish and install a 6 inch diameter PVC pipe protruding through the Control House wall to be used as a battery cart cable entrance. The pipe shall be located 2 feet above the Control House floor, in a field-located position convenient to the D.C. panel. The pipe shall be caulked on both sides of the wall for weatherproofing and shall be capped with a clean-out plug on each end.

7.10. FIRE EXTINGUISHER

The Contractor shall furnish and install three (3) Class 123 (ABC) dry chemical fire extinguishers, 10 lbs. in the Control House. Fire extinguishers shall be wall-mounted at a location to be field determined.

7.11. WINDOW

7.11.1. The Contractor shall furnish and install one (1) fixed-pane window as manufactured by Kawneer Products, and distributed by All Purpose Glass and Mirror, 5555 W. Beaver Street, Jacksonville, Florida. Window shall be Model designation IR501; with 1-5/16" overall glass, which is impact resistant, laminated insulated and tinted. Window frame shall be Bronze in color.

8. WATER SUPPLY AND SEWAGE DISPOSAL FACILITIES

8.1. GENERAL REQUIREMENTS

The work of this section includes construction of water supply and sewage disposal facilities to serve the substation.

8.2. WATER SUPPLY

Water supply will be by means of a tap to the existing water main as shown on the plans. Contractor shall install necessary fittings and equipment to attach to water main for a complete water service to the site.

8.3. WATER PIPING

8.3.1. Underground Supply Line: Underground supply line to Control House shall be PVC 1120, Schedule 80, conforming to the latest edition of the following standards:

8.3.1.1. Pipe: ASTM D1785

8.3.1.2. Fittings: ASTM D2466

8.3.1.3. Solvent Cements: ASTM D2564

8.3.1.4. The supply line shall have a minimum cover of 2'6" unless shown otherwise on the drawings.

8.3.2. Riser at Control House: Riser pipe at Control House shall be copper tubing, Type K, in accordance with ASTM B88.

8.3.3. Interior Piping at Control House: Water distribution piping inside the Control House shall be copper tubing, Type L, in accordance with ASTM B88.

8.4. SANITARY SYSTEM PIPING

8.4.1. Drain, Waste and Vent Piping: Drainage piping and fittings within the Control House shall be PVC plastic drain, waste and vent pipe and fittings, Schedule 40, in accordance with ASTM D2665, and shall be NSF-DWV approved. Applicable commercial standard is CS-272-65.

8.4.2. Sewer Piping: Sewer piping shall be PVC pipe and fittings, in accordance with ASTM D3034, SDR 35.

8.5. INSTALLATION OF COPPER WATER PIPING

Copper water tubing shall be installed using soldered or sweated joints, which shall be made with approved fittings. Surfaces to be soldered or sweated shall be cleaned bright. The joints shall be properly fluxed and made with lead free approved solder. Joints in copper water tubing shall be made with the appropriate use of brass or wrought copper water fittings, properly soldered or sweated together. Joints shall be watertight for the pressure required by test.

8.6. WATER VALVES

Water valves shall be installed in accessible places and shall be located as follows: (1) main shut-off valve just outside the building on the service branch; (2) on the supply line as shown on the drawings; (3) shut-off valve on each supply to each fixture not provided with compression stop or with other auxiliary shut-off valve. All shut-off valves shall be bronze with soldered ends and shall be Class A, and Type I, II or III in accordance with Federal Specification No. WW-V-54b. Angle, check and globe valves, if used, shall be bronze valves, Class A, in accordance with Federal Specification No. WW-V-51b; check valves shall be Type IV.

8.7. DRAIN, WASTE AND VENT PIPE INSTALLATION

Drain, waste and vent piping shall be installed according to Appendix A1 of ASTM D2665 for PVC DWV Pipe and Fittings. Plumbing vents exposed to sunlight shall be protected by shielding or lightweight insulation.

8.8. UNDERGROUND SERVICE LINE AND SEWER PIPE INSTALLATION

Underground service line and sewer pipe shall be laid on an unyielding foundation after suitable excavation has been accomplished for uniform bearing under the full length of the barrel of the pipe and not by wedging up or blocking any portion of the pipe. Final grade shall conform accurately to that shown on the drawings. Just before jointing the pipes, the mating ends shall be thoroughly cleaned. Trenches shall be kept free of water until the pipe jointing material has set. The Contractor shall take all necessary precautions to prevent floatation of the pipe cause by flooding of the trench.

Installation of underground water and sewer lines shall conform to all Duval County Public Health Unit regulations.

8.8.1. TESTS: The following tests shall be made by the Contractor, and all defects indicated by the tests shall be corrected by the Contractor.

8.8.1.1. Sanitary Piping: Before the installation of any fixture, the ends of the system shall be capped and all lines filled with water to the roof and allowed to stand for sufficient time to inspect the joints. After the fixtures are set, a smoke or equivalent test shall be made using an approved apparatus.

8.9. WATER PIPING STERILIZATION

All water pipe shall be thoroughly sterilized prior to being placed in service. Sterilization shall be in accordance with Specification AWWA C601 (latest revision), "Standard for Disinfecting Water Mains."

8.10. PLUMBING FIXTURES

8.10.1. Lavatory: Lavatory shall be Crane Westmont 1320V Vitreous China, modified to omit hot water trim and furnish with C.P. hole cover.

8.10.2. Water Closet: Water closet shall be Crane Deluxe Radcliffe 3944, with Beneke 523 SS NCH white solid plastic open front seat with self-sustaining check hinge.

8.10.3. Eye/Face Wash Head: Eye/Face Wash Head (wall mounted) shall be installed in the location shown on the drawings. Unit shall be Model SE-490-PT, with p-trap as manufactured by the Speakman Co. Contractor shall furnish and install a sign, mounted on the wall above the eye/face wash head. The sign shall be plastic, with one-inch white letters on a red background, and shall read "Eye Wash - Emergency Use Only."

8.10.4. Wall Hydrants (hose bibs): Wall hydrant shall be Wade W-8604-L__ 3/4", nickel bronze finish with loose key stop and vacuum breaker.

8.11. SEWAGE DISPOSAL FACILITIES

Sewage disposal shall consist of a septic tank, dosing tank and drainfield. Sewage system shall include all associated piping and equipment for a complete installation as shown and detailed on the plans. The Sewage Disposal System shall conform to all Duval County Public Health Unit regulations.

8.12. PERMITS, CERTIFICATES AND LAWS

The Contractor shall, at his own expense, procure all permits and licenses required by County, State, and Federal laws for lawful performances of the required work in connection with the water supply and sewage disposal facilities of these documents.

9. PAVING AND DRAINAGE

9.1. SCOPE

The work specified in this Subsection consists of constructing a substation roadway with 1-1/2 inch asphaltic concrete surface on a 6 inch limerock or granite base and stabilized subgrade. The work also includes installation of drainage facilities.

9.2. FAMILIARIZATION

Prior to bidding the work of this Subsection, the Contractor shall become thoroughly familiar with the site conditions and all portions of the work falling within this Subsection.

9.3. PAVING: All workmanship, materials, equipment and plant shall be in accordance with the applicable sections of the Florida DOT Standard Specifications for Road and Bridge Construction, Latest Edition, and referred to hereinafter as Standard Specifications. The sections of the above mentioned specifications which are applicable are listed below. Additional compensation for adjustment of quantities due to extra thickness of base construction or extra application of materials will not be made.

9.3.1. Muck Removal: Muck or other unsuitable material shall be removed and the excavated area backfilled in accordance with the applicable requirements of Section VIII, Subsection 1 of these specifications.

9.3.2. Stabilization: The top 12 inches of the subgrade shall be stabilized (Type B) to a Granite or Limerock Bearing Ratio (LBR) of 40 in accordance with Section 160 of the Standard Specifications. The stabilized area shall be compacted to 98% of the maximum density as determined by FM 1-T 180, Method D (FDOT 2014 Spec Book (Standard Specifications), Page 206, Section 200-7.2.1).

Base Course: A granite (preferred) or limerock base course shall be constructed in accordance with Section 200 of the Standard Specifications and shall be compacted to 98 percent of maximum density as determined by FM 1-T 180, Method D (FDOT 2014 Spec Book (Standard Specifications), Page 206, Section 200-7.2.1). Note: JEA will not allow the Contractor to use a CFB Hydrated Ash (EZBase) for base course construction.

9.3.3. Prime Coat: Materials and method of application for the prime coat shall conform to Section 300 of the Standard Specifications.

9.3.4. Asphaltic Concrete Surface: The surface course shall be FDOT Type S-P-12.5 asphaltic concrete structural course for Traffic Level A in accordance with Section 320,330 and 334 of the Standard Specifications.

9.3.5. Plant, Methods and Equipment: The plant and methods of operations for preparing all plant-mixed hot bituminous mixtures for surface courses and bases, and the requirements for the equipment to be used in the construction of the pavements and bases shall be in accordance with Section 320 of the Standard Specifications.

9.3.6. General Construction Requirements: The general construction requirements for all plant-mixed hot bituminous pavements and bases shall be in accordance with Section 330 of the Standard Specifications.

9.4. TESTING

The stabilized subgrade shall be tested for density and LBR, and the base course tested for density at approximately 200 foot intervals. Density tests may be performed using AASHTO T191-61 or ASTM D2922. The Contractor shall employ, at his expense, an independent testing laboratory to do all testing for pavement.

Two (2) copies of all test reports shall be submitted to the Engineer.

9.5. INVERTED CROWN

As part of the stormwater management design, the outer paved substation roadways have been designed with an inverted crown for the purpose of conveying stormwater runoff to catch basins. It is imperative that the roadway paving meets the inverted crown slopes as shown on the plans. The interior paved access roads will have a normal crown peaking in the middle of the paved interior access roads. The Contractor shall use proper paving equipment to accomplish all of the above.

Culverts: Contractor to obtain the Engineer's approval of the method of controlling line and grade during culvert installation. Use a method that allows rapid checking of the previously laid sections. Maintain line and grade on sections previously set. The Engineer will consider sections which do not retain the plan line within 0.10 foot or grade within 0.10 foot during laying of subsequent sections, as not having been laid to line and grade. Take up and relay sections not to line and grade without additional compensation.

9.6. DRAINAGE FACILITIES

All drainage facilities shall be constructed in accordance with the plans, City Standard Specifications and City Standard Details or FDOT Design Standards of the most current year for any index number referenced. The JEA will obtain the Stormwater Management Permit from St. Johns River Water Management District. All

drainage facilities are to be placed to the nearest tenth of a foot except for the stormwater control structure which by law has to be accurate to the hundredth of a foot.

9.6.1. Drain Pipe: Storm Drain pipes shall be Class V Reinforced Concrete Pipe or PVC DR-18, bell and spigot, in accordance with AWWA Standard C-900 can be used for pipes 12 inches or smaller, as indicated on the plans.

9.6.1 PVC: PVC pipe shall conform to ASTM D1785, Schedule 80.

9.6.2. Inlets: Reinforced concrete storm inlets shall be Types "C", "D", "E" or "H" as indicated on the drawings, and shall be constructed in accordance with Plates D-207, D-208 and D-209 of the City Standard Details.

9.6.3. Inlet Grates: Grates for storm inlets shall be traffic bearing in accordance with Plate D-304 of the City Standard Details.

9.6.4. Mitered End Sections: Reinforced concrete mitered end sections shall be constructed in accordance with Plate D-435 of the City Standard Details or as shown on the plans.

10. CHAIN-LINK FENCING

10.1. GENERAL

All materials and installation required shall conform to the following specifications:

10.1.1. Tolerance: Standard mill tolerances shall be used for all framework members and chain-link fabric.

10.1.2. Height: The total height of the substation perimeter fence shall be nine (9) feet above grade when erected. In the case of installations of additional fence components to existing substations, the height of the new fence components shall match existing, unless directed otherwise by the project engineer or field representative.

10.1.3. Style: The substation perimeter fence shall be the three-barb wire style in strict accordance with the specifications. Any suggested change or deviation from the specifications or any detail in which the product or service of any bidder differs from that specified shall be fully covered in a letter accompanying the bids.

10.1.4. Zinc Coating (Galvanizing): All fabric, posts, and fittings used in the construction of this fence shall be hot-dipped galvanized according to the following ASTM Standards:

10.1.4.1. Fabric: ASTM A392, Class 2. (minimum of 2.0 oz. coating per square foot of surface).

10.1.4.2. Posts, Rails and Gate Frames: ASTM F1083. (minimum of 1.8 oz. coating per square foot of surface).

10.1.4.3. Fittings: ASTM F626, pressed steel type. (minimum of 1.2 oz. coating per square foot of surface).

10.2. FENCING

10.2.1. Fabric: The fabric shall be galvanized steel chain-link 96 inches high, No. 9 gauge wire woven in a 2 inch mesh. Selvages of the fabric shall have a twisted and barbed finish.

10.2.2. Fabric Connections: The chain link fabric shall be securely fastened to all terminal posts using 3/16" x 3/4" tension bars and heavy 11 gauge tension bands. There shall be one band for each

foot in the height of the fence. The fabric shall be fastened to all intermediate posts with 9 gauge tie wires, spacing not to exceed fourteen (14) inches; ties to top rail not to exceed 24 inch spacing.

10.2.3. Bottom Tension Wire: The bottom tension wire shall be No. 7 gauge galvanized spring coil or crimped wire stretched taut from terminal post and securely fastened to each intermediate post six (6) inches above the grade line. Tension wire shall be attached to the fence fabric with galvanized hog rings every twenty-four (24) inches.

10.2.4. Barbed Wire: Furnish three lines of high strength galvanized steel barbed wire which is to be of the four-point pattern composed of two strands of 15-1/2 gauge line wires with barbs spaced on approximately 5-inch centers.

10.2.5. PVT Slats: Dark green PVT slats shall be installed for full height of all fence fabric along the entire perimeter fence line unless indicated otherwise. PVT slats shall be 1-1/8" wide, 9 gauge, flat tubular plastic extrusions as manufactured by Patrician Products, 100 Frank Road, Hicksville, NY 11801, Telephone: (516) 937-3580.

10.3. FRAMEWORK

10.3.1. Intermediate Posts: The intermediate posts shall be 2-1/2" o.d. hot-dipped galvanized steel pipe weighing 3.65 pounds per lineal foot or heavier.

10.3.2. Terminal Posts: All end, corner, and pull posts shall be hot-dipped galvanized steel pipe three (3) inches o.d. standard weight pipe, nominal weight 5.79 pounds per lineal foot.

10.3.3. Gateposts: Posts for swing gates shall be hot-dipped galvanized standard weight pipe of the following nominal sizes and weights for each leaf:

10.3.3.1. Gate leaf up to six (6) feet wide: 2-7/8 inches o.d., weight 5.79 pounds per lineal foot.

10.3.3.2. Gate leaf over six (6) feet to thirteen (13) feet wide: four (4) inches o.d., weight 9.1 pounds per lineal foot.

10.3.3.3. Gateposts shall be equipped with tops so designed to exclude moisture from the post.

10.3.4. Post Spacing: Posts shall be evenly spread in the line of fence no farther apart than ten (10) feet on center.

10.3.5. Post Settings: The perimeter fence posts shall be of sufficient length to extend thirty-six (36) inches into concrete footings.

10.3.6. Top Rail: The top rail shall be 1-5/8" o.d., standard weight pipe, weighing 2.27 pounds per lineal foot, hot-dipped galvanized, provided with couplings approximately every twenty (20) feet. Couplings are to be outside sleeve type at least seven (7) inches long. The top rail is to pass through the line post tops and form a continuous brace from end to end of each stretch of fence. The top rail shall be securely fastened to the terminal posts by heavy pressed steel brace bands and malleable rail end connections.

10.3.7. Braces: Brace pipe shall be the same as top rail and shall be installed midway between the top rail and the ground and extend from the terminal post to the first adjacent line post. Braces shall be securely fastened to posts by heavy pressed steel and malleable fittings, then securely trussed from line post to base of terminal post with a 3/8" truss rod and tightener.

10.3.8. Intermediate Post Tops: Intermediate post tops shall be of pressed steel or malleable iron base. When barb wire is specified, the base is to include pressed steel extension arms to accommodate the number of barbs specified. The three-barb style is to extend at a 45^{o} angle outward from the

fence line. The barb wire arms shall support a minimum of 400 pounds vertical dead load from tip of arm.

10.3.9. Gate frames shall be two (2) inches o.d. standard weight pipe, weight 2.72 pounds per lineal foot. Gates may be fabricated using welded construction of heavy pressed steel or malleable corner fittings securely riveted. All construction shall be in a workmanlike manner performed by personnel experienced in the trade. Gates shall be properly braced to eliminate any possible sagging condition. Hinges shall be of sufficient strength and design to permit easy and trouble-free operation. All gates shall be equipped with a positive type latching device with a means for padlocking. All drive gates shall be equipped with center plunger rods, catch and semi-automatic outer catches to secure gates in open position. Gates shall be surmounted by three (3) strands of barbed wire, supported vertically one above the other. Top strand to match adjacent barbed wire. All cantilever gates shall have gate rollers UHMW with stainless steel shafts with roller guards. All cantilever gates shall have hard rubber nose wheel carriers ASM-DB-IND 12 inches x 8 inches with gate latch/catch. Contractor shall submit details for all proposed gates to Project Engineer or field representative for approval.

10.4. INSTALLATION

Installation shall be made in a workmanlike manner by skilled mechanics experienced in erection of this type fence. The fence shall be erected on line and to grade as provided by Owner.

10.4.1. All posts are either cast in top of the retaining wall or shall be set in concrete foundations at a minimum depth of thirty-six (36) inches below rock. Diameter of the foundation shall be a minimum of nine (9) inches, except for gateposts on which the minimum diameter shall be three times the outside diameter of the gatepost. Concrete shall have a minimum strength of 2500 psi. All foundations shall extend approximately one (1) inch above grade and shall slope away from the post to provide for proper drainage. The fabric and barb wire shall be stretched to proper tension between terminal posts and securely fastened to the framework members. The bottom of the fabric shall be held as uniformly as possible at a height not exceeding 1-1/2" to finished grade.

10.5. GROUNDING

For fence grounding, see Section IX.

10.6. CLEAN-UP

Upon the completion of the installation, all debris created by the installation shall be removed from the premises of the Owner or disposed of as directed by his agents.

11. GRASSING

11.1. SCOPE

A stand of grass shall be established on all areas as shown on the drawings plus any other areas where the existing grass is disturbed by construction activity exclusive of paved or rocked areas. Grass shall be established by seeding, seeding and mulching or by sodding as noted on the drawings. The work shall include maintaining the grassed areas until final acceptance of the project.

11.2. MATERIALS AND CONSTRUCTION METHODS

11.2.1. The following section of the most current edition of Florida DOT Standard Specifications shall govern the materials and construction methods used by the Contractor for Grassing.

11.2.1.1. Performance Turf: 570

11.2.2. In lieu of the type of fertilizer called for in the Standard Specifications, the fertilizer shall be 6-6-6, fifty (50) percent organic applied at the rate of 20 pounds per 1000 square feet.

11.3. MAINTENANCE

The Contractor shall, at his expense, maintain the grassed areas in a satisfactory condition until final acceptance of the project.

11.3.1. Work Included:

11.3.1.1. Watering, weeding, cultivating, spraying and mowing necessary to keep the grassed areas in a healthy growing condition and to keep these areas neat and attractive throughout the maintenance period.

11.3.1.2. Provide equipment and means for proper application of water to those areas not equipped with an irrigation system.

11.3.1.3. Filling, leveling and repairing of any washed or eroded areas, as may be necessary.

11.3.2. Replacements:

11.3.2.1. At the end of the maintenance period, all grassed areas shall be in a healthy growing condition.

11.3.2.2. During the maintenance period, should the appearance of any grass indicate weakness and probability of dying, immediately replace that area of grass without additional cost to the Owner.

11.3.2.3. Replacements required because of vandalism or other causes beyond control of the Contractor shall be paid for by the Owner.

11.4. RESTORATION

11.4.1. The Contractor shall, at his expense, restore any vegetative areas damaged during construction to conditions that existed prior to the project. The Contractor will be required to restore area to proper grade, properly amend soil and install vegetation that matches surrounding and/or pre-existing conditions. Contractor shall water area as necessary to permanently establish new vegetation.

12. TRANSMISSION RIGHT OF WAY CLEARING

12.1. Survey: The Contractor's Surveyor shall stake out the clearing limits of the JEA right-of-way. This shall include setting iron pipes at any right-of-way corners where monumentation does not exist. The accuracy of this operation is critical to the success of this project.

12.2. Total Clearing: Total clearing of the JEA right-of-way shall be accomplished within the areas designated on the construction drawings where the new patrol road and/or transmission line is to be installed. Contractor shall remove all brush, scrub growth, trees, debris, rubbish and other obstructions. All trees standing 20 feet tall and higher, and existing tree stumps if present, shall be cut to ground level. All smaller trees, brush, and scrub growth shall also be cut at the ground line. Prior to cutting any trees contractor shall remove any metal tags, which are attached to protected trees, and deliver the tags to the JEA field Representative. Complete removal and disposal in accordance with the provisions of this specification, of all standing trees including their root systems along with all brush, bushes, shrubs, stumps, vines, as well as other logs, trees cut by others, wood fencing, wood structures, debris, rubbish and all other obstructions to the work.

12.3. Stump Removal: All stumps and roots larger than 2 inches in diameter shall be removed to a depth at least 2 feet below the existing ground surface within the areas designated for Patrol Road construction

and roadside ditches. Stumps outside the patrol road ditches, but within the limits of construction, shall be ground down to ground level and all wood chips and debris removed from the project by the contractor.

12.4. Trimming: All branches overhanging more than 3 feet into the total clearing zone shall be trimmed to a line drawn vertically at the limit of total cleaning and all trimmings removed by the contractor.

12.5. Mowing: All upland grassy areas of the new rights-of-way shall be mowed.

12.6. Protection of Existing Improvements: Contractor shall exercise proper care not to destroy or otherwise damage those existing improvements which are to remain. Any damage to such improvements shall be immediately repaired by the Contractor at no additional cost to the JEA.

12.7. Disposal of Materials: Disposal of materials resulting from right-of-way clearing and from demolition of designated improvements shall consist of:

12.7.1. All trees, stumps, roots, root mat, branches, brush, slash, shrubs, logs, vines, wood fencing, wood structures and other debris or obstructions that are the products of the clearing or demolition work shall be completely removed from the Owner's property.

12.7.2. Any saleable timber that is cleared may be sold by the Contractor for his own benefit.

12.7.3. In the event a chipper is used, the residue shall be completely removed from the Owner's property.

12.7.4. Burning of materials is not permitted.

13. TRANSMISSION PATROL ROAD

13.1. Survey: The Contractor SHALL engage the services of a State of Florida Registered Land Surveyor to stake out the baseline of patrol road construction.

13.2. Patrol Road Construction: New patrol road shall be constructed in areas as shown on the drawings and as per the requirements of these specifications and the construction plans.

13.3. Alignment: Generally, the patrol road alignment shall be as shown on the plans; however, minor variations will be allowed in order to minimize stump or muck removal and/or cutting or filling. Such changes shall require prior approval of the Project Engineer. Typical cross sections of the patrol road are shown on the plans.

13.4. Soil Borings: Soils information is provided in Attachment 3, Soil Boring Reports, of this specification; however, it is the responsibility of the Contractor to make such examination of the site of the work as may be necessary to become informed of the conditions under with the work is to be performed and to obtain additional core borings, if deemed necessary.

13.5. Excavation of unsuitable material:

13.5.1. De-Mucking: Wetland areas where muck was located by the geotechnical exploration have been called out in the plans for Tensar TriAx TX140 geogrid stabilization by stationing along the centerline of Patrol Road. The Contractor will excavate a two feet deep by fourteen feet wide trench along the entire length of Patrol Road construction and backfill with suitable borrow material. As an alternative to excavation of muck below this two foot by fourteen foot wide trench, the Contractor may surcharge sufficient embankment material to displace the muck. If the JEA Field representative deems it necessary, the contractor will remove more muck at the unit price set up in the schedule of values prior to award. JEA will not pay for extra de-mucking without prior approval.

13.5.1.1. The extent and depth of muck (if any) along the right-of-way is not fully known, however, see Attachment 3 - Soil Boring Reports. It shall be the responsibility of the

Contractor to make such investigation as necessary to determine the scope of muck removal operations which might be required.

13.5.1.2. In general, muck or other excavated materials unsuitable for patrol road construction shall become the property of the Contractor and shall be disposed of by him outside the right-of-way. However, when approved by the Field Representative, the Contractor may dispose of such material on the right-of-way, provided that:

- There is a clear distance of at least six (6) feet between the patrol road grading limits and the spoil material.
- The flow of any channel or drainage ditch is not impeded.
- Material is not deposited within one hundred (100) feet of the proposed location of any transmission structure.
- The material is so placed as to not exceed two (2) feet in height in upland areas but no material will be disposed of in the along wetlands along this project.

13.6. Embankment Material: Embankments shall be constructed of sand/clay material (A-2 to A-3) containing no muck, stumps, roots, brush, vegetable matter, rubbish or other material that will not compact into a suitable and enduring roadbed. All suitable material resulting from the excavation of roadside ditches may be used as far as practical in construction of the patrol road. When sufficient quantity of suitable material is not available from drainage excavation, the Contractor shall obtain additional material from outside the right-of-way in borrow areas furnished by him. The Contractor shall provide and maintain at his own expense all necessary roads for hauling fill material.

13.6.1. Embankment Construction: Embankments shall be constructed by placing suitable material in successive layers of not more than 12 inches in thickness, loose measure, for the full width of the patrol road. Each layer shall be compacted to such a degree that the soil will support heavy hauling equipment without creating permanent ruts or depressions. Where the material is deposited in water, or on low swampy ground that will not support the weight of hauling equipment; the fill shall be constructed by dumping successive loads in a uniformly distributed layer of thickness not greater than necessary to support the hauling equipment while placing subsequent layers.

13.7. Stabilization: The Contractor is responsible for the stabilization needed to perform his work on this project. After the completion of the clearing and transmission line construction, the patrol road grade shall have a tolerance of plus or minus one tenth (0.10') of a foot for final acceptance by JEA.

13.7.1. Geogrid Stabilization: Tensar TriAx TX140 geogrid has been specified in the plans and specs for stabilization in areas where the geotechnical exploration found muck. This stabilization will be provided in two layers as described here. The bottom layer of Tensar TriAx TX140 geogrid is to be placed on top of natural soil at the bottom of the two feet deep by fourteen foot wide excavation trench that extends below the entire length of the Patrol Road Construction. On top of this bottom layer of Tensar TriAx TX140, place eighteen inches of fill according to Section 4.6 and compact according to 4.6.1. On top of this eighteen inch layer of fill, place the top layer of Tensar TriAx TX140 geogrid. Continue embankment construction according to Sections 4.6 and 4.6.1 until the design elevation shown in the plans is reached. The excavation trench runs the entire length of the patrol road but this geogrid system of stabilization will be constructed as described by stationing shown in the patrol road plans along the centerline Patrol Road baseline. See also typical section shown on plans.

13.7.2. Bearing Value: The top six (6) inches of the roadway shall be stabilized to a Granite or Limerock Bearing Ratio (LBR) of 40 in accordance with Section 160 of the DOT Standard Specifications for Stabilization. It is the Contractor's responsibility that the finished roadbed meets the bearing value requirements regardless of the quantity (if any) of stabilizing material necessary to be added. In stabilized areas, the minimum density acceptable at any location will be 93% of the maximum density as determined by AASHTO T-180, Test Method C.

13.7.3. Density: Test for density and bearing value requirements shall be made at locations selected by the Field Representative at approximately 500 foot intervals by an independent testing laboratory. An under tolerance of 5 from the specified bearing value will be allowed; however, the average of 5 consecutive tests shall not be less than the specified value. All costs of testing or re-testing shall be borne by the Contractor. Three copies of test reports shall be submitted to the Contract Administrator.

13.7.4. The Contractor shall maintain all road construction throughout the life of the Contract, and shall take all reasonable precautions to prevent loss of material from the patrol road due to the action of wind or water. Any and all material migrating from construction activity to wetlands will be removed from the wetlands at the contractor's expense. He shall repair at his own expense any slides, washouts, settlement, subsidence, or other mishap which may occur prior to final acceptance of work. The patrol road will not be accepted before completion of the entire project including installation of the transmission line.

13.8 Testing for Soils: The Contractor shall employ an approved independent laboratory to do all testing. Two copies of test reports shall be submitted to the Engineer.

13.8.1. Soil Properties: The Contractor shall submit an analysis of borrow material proposed for site fill including the following tests:

13.8.1.1. Particle Size Analysis of Soils (per AASHTO T88) and Permeability of Granular Soils – Constant Head (per AASHTO T215).

Three (3) additional Particle Size and Permeability tests shall be performed on truck loads of fill material randomly selected by the Field Representative. If any of the truck loads tested does not comply with the A-3 group of AASHTO M145 containing less than 5% fines, the material shall be rejected, and the Contractor shall perform six (6) additional sets of tests on material in place. Any material in place that does not comply with the A-3 group of AASHTO M145 containing less than 5% fines shall be removed and replaced with acceptable material at no additional cost to the Owner. The Contractor shall pay for all of the above testing.

13.9. Grassing: A stand of grass shall be established on all areas of patrol road construction plus any other areas where the existing grass is disturbed by construction activity. Grass shall be established by seeding, seeding and mulching or by sodding as noted on the drawings. The work shall include maintaining the grassed areas until final acceptance of the project. Any slopes steeper than 3:1 that are not concrete or paved must be sodded.

13.9.1. Materials and Construction Methods: The following sections of the most current edition of Florida DOT Standard Specifications shall govern the materials and construction methods used by the Contractor. The year 2010 FDOT Standard Specifications can be found on the internet at http://www.dot.state.fl.us/specificationsoffice/Implemented/specbooks/2010bk.shtm

- Seeding: 570
- Seeding and mulching: 570
- Sodding: 575

In lieu of the type of fertilizer called for in the Standard Specifications, the fertilizer shall be 6-6-6, fifty (50) percent organic applied at the rate of 20 pounds per 1000 square feet. Disregard Section 570-3.2 about wild flowers and plant only grass seed.

13.9.2. Maintenance: The Contractor shall, at his expense, maintain the grassed areas in a satisfactory condition until final acceptance of the project. This will include but is not limited to:

- Watering, weeding, cultivating, spraying and mowing necessary to keep the grassed areas in a healthy growing condition and to keep these areas neat and attractive throughout the maintenance period.
- Provide equipment and means for proper application of water to those areas not equipped with an irrigation system.
- Filling, leveling and repairing of any washed or eroded areas, as may be necessary.

13.9.3. Replacements: At the end of the maintenance period, all grassed areas shall be in a healthy growing condition.

13.9.3.1. During the maintenance period, should the appearance of any grass indicate weakness and probability of dying, immediately replace that area of grass without additional cost to the Owner.

13.9.3.2. Replacements required because of vandalism or other causes beyond control of the Contractor shall be paid for by the Owner.

13.10. Restoration: The contractor shall, at his expense, restore any vegetative areas damaged during construction to conditions that existed prior to the project. The contractor will be required to restore area to proper grade, properly amend soil and install vegetation that matches surrounding and/or pre-existing conditions. Contractor shall water area as necessary to permanently establish new vegetation.

13.11. Drainage Features

13.11.1. Reinforced Concrete Pipe: The pipe culvert strength for the Patrol Road construction is to be ASTM (C76) Class V.

13.11.2. Culverts: Contractor to place all culverts to the nearest 0.1 foot of the design elevation. Contractor to maintain line and grade on sections previously set. The Engineer will consider sections which do not retain the plan line within 0.10 foot or grade within 0.10 foot during laying of subsequent sections, as not having been laid to line and grade. Take up and relay sections not to line and grade without additional compensation.

14. REFERENCE

14.1. Related Sections

14.1.1. Specific Instructions (Section VII)

14.1.2. Technical Specifications (Section IX) – Electrical

14.1.3. JEA Overhead Electric Distribution Standards (JEA OH) (www.jea.com)

14.1.4. JEA Underground Electric Distribution Standards (JEA UG) (www.jea.com)

14.2. Reference

14.2.1. The latest edition and published addenda of the referenced publications herein effect on the date of Contract Award are a part of this Section and, where referred to by title or by basic designation only, are applicable to the extent indicated by the specific reference:

A. American Association of State Highway and Transportation Officials (AASHTO):

1. M 43 - Standard Specification for Sizes of Aggregate for Road and Bridge Construction

2. M 145 - Standard Specification for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

3. T 99 – Moisture-Density Relations of Soils Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop

4. T 180 - Moisture-Density Relations of Soils Using a 10-lb Rammer and 18-inch Drop

5. T 191 - Standard Method of Test for Density of Soil In-Place by the Sand Cone Method

B. American Concrete Institute (ACI):

1. 117 – Specification for Tolerances for Concrete Construction and Materials

2. 229R - Report on Controlled Low-Strength Materials

3. 301 - Specifications for Structural Concrete

4. 304R - Guide for Measuring, Mixing, Transporting and Placing Concrete

5. 305R - Hot Weather Concreting

6. 306R - Cold Weather Concreting

7. 309R - Guide for Consolidation of Concrete

8. 318 - Building Code Requirements for Structural Concrete

9. 347 - Guide to Formwork for Concrete

10. 530/530.1 – Building Code Requirements and Specification for Masonry Structures

C. American Institute of Steel Construction (AISC):

1. 303 - Code of Standard Practice for Steel Buildings and Bridges

D. American National Standards Institute (ANSI):

1. A 185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

E. American Society for Testing and Materials (ASTM) International:

1. A 36 - Standard Specification for Carbon Structural Steel

2. A 53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

3. A 123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

4. A 153 - Specification for Zinc Coating (Hot-Dip) on iron and Steel Hardware

5. A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

6. A 370 - Standard Test Methods and Definitions for Mechanical Testing of Steel Products

7. A 497 - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.

8. A 563 - Standard Specification for Carbons and Alloy Steel Nuts

9. A 615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement

10. A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

11. A 706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

12. A 780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

13. A 924/A 924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

14. A 992 - Standard Specification for Structural Steel Shapes

15. B 695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

16. C 5 – Standard Specification for Quicklime for Structural Purposes

17. C 29 - Standard Test Method for Bulk Density (Unit Weight) and Voids in Aggregate

18. C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field

19. C 33 - Standard Specification for Concrete Aggregates

20. C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

21. C 40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete

22. C 42 - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

23. C 88 - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

24. C 90 – Standard Specification for Loadbearing Concrete Masonry Units

25. C 91 – Standard Specification for Masonry Cement

26. C 94 / C94M - Standard Specification for Ready Mixed Concrete

27. C 109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens)

28. C 117 - Standard Test Method for Materials Finer Than 75 µm (No. 200) Sieve in Mineral Aggregates by Washing

29. C 123 - Standard Test Method for Lightweight Particles in Aggregate

30. C 127 - Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate

31. C 128 - Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate

32. C 131 - Standard Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

33. C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

34. C 138 - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

35. C 142 - Standard Test Method for Clay Lumps and Friable Particles in Aggregates

36. C 143 - Standard Test Method for Slump of Hydraulic Cement Concrete

37. C 144 – Standard Specification for Aggregate for Masonry Mortar

38. C 150 - Standard Specification for Portland Cement

39. C 172 - Standard Practice for Sampling Freshly Mixed Concrete

40. C 173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

41. C 192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

42. C 207 – Standard Specification for Hydrated Lime for Masonry Purposes

43. C 231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

44. C 260 - Standard Specification for Air Entraining Admixtures for Concrete

45. C 270 – Standard Specification for Mortar for Unit Masonry

46. C 289 - Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)

47. C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

48. C 403 – Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance

49. C 404 – Standard Specification for Aggregates for Masonry Grout

50. C 451 - Standard Test Method for Early Stiffening of Hydraulic Cement (Paste Method)

51. C 470 - Standard Specification for Molds for Forming Concrete Test Cylinders Vertically

52. C 476 – Standard Specification for Grout for Masonry

53. C 494/C494M - Standard Specification for Chemical Admixtures for Concrete

54. C 535 - Standard Test Method for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

55. C 566 - Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying

56. C 617 - Standard Practice for Capping Cylindrical Concrete Specimens

57. C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

58. C 920 - Standard Specification for Elastomeric Joint Sealants

59. D 994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)

60. C 1064 – Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

61. C 1077 - Standard Practice for Laboratories Testing Concrete, and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

62. C 1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete

63. C 1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

64. D 422 - Standard Test Method for Particle-Size Analysis of Soils

65. D 448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction

66. D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))

67. D 854 – Standard Test Methods for Specific Gravity of Soil Solids by Water Pycnometer

68. D 994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)

69. D 1140 - Standard Test Methods for Determining the Amount of Material Finer Than 75 m (No. 200 Sieve) in Soils by Washing

70. D 1556 – Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method

71. D 1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))

72. D 1751 - Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

73. D 1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

74. D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

75. D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

76. D 2488 - Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)

77. D 2940 - Standard Specification Graded Aggregate Material for Bases or Subbases for Highways or Airports

78. D 3282 - Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

79. D 3740 – Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

80. D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

81. D 4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus

82. D 4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles

83. D 4595 - Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

84. D 4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

85. D 4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile

86. D 4832 – Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders

87. D 5199 – Standard Test Method for Measuring the Nominal Thickness of Geosynthetics

88. D 5261 – Standard Test Method for Measuring Mass per Unit Area of Geotextiles

89. D 6241 – Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

90. D 6938 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

91. E 4 - Standard Practices for Force Verification of Testing Machines

92. F 436 - Standard Specification for Hardened Steel Washers

93. F 1554 - Standard Specification for Anchor Rods, Steel, 36, 55, and 105-ksi Yield Strength

F. American Society of Civil Engineers (ASCE):

1. 5-11/6-11 - Building Code Requirements and Specifications for Masonry Structures.

2. 7-10 – Minimum Design Loads for Building and Other Structures

G. American Welding Society (AWS):

1. D1.1 - Structural Welding Code - Steel

H. Concrete Reinforcing Steel Institute (CRSI):

1. MSP-2-01 - Manual of Standard Practice

I. National Ready Mixed Concrete Association:

1. Certification of Ready-Mixed Concrete Production Facilities

J. The Society for Protective Coatings (SSPC):

1. PA-1 - Shop, Field, and Maintenance Painting of Steel

2. SP-6 - Commercial Blast Cleaning

K. U.S. Army Corps of Engineers:

1. CRD-C572 - Specifications for Polyvinyl Chloride Waterstops

L. U.S. Department of Labor, Occupational Safety and Health Administration Standards (OSHA):

1. 29 CFR, Part 1926, Safety and Health Regulations for Construction, Standard Number: 1926.652, Requirements for Protective Systems, Subpart P – Excavations

2. 29 CFR, Part 1926, Safety and Health Regulations for Construction, Standard Number: 1926.652, Requirements for Protective Systems, Subpart T – Demolition

M. 2010 Florida Building Code

N. City of Jacksonville, Florida (COJ)

1. Land Development Procedures Manual

2. City Standard Specifications, Department of Public Works

O. Florida Department of Environmental Protection:

1. Florida Stormwater Erosion and Sedimentation Control Inspector's Manual

2. State of Florida, Erosion and Sediment Control, Designer and Reviewer Manual

P. Florida Department of Transportation:

1. FM 5-515 - Florida Method of Test for Limerock Bearing Ratio (LBR)

2. Standard Specifications for Road and Bridge Construction

Q. Florida Administrative Code:

1. 62-621 – Generic Permits

2. 62-701 – Solid Waste Management Facilities

3. 62-710 – Used Oil Management

4. 62-711 – Waste Tire Rule

5. 62-730 – Hazardous Waste

14.2.2. Where the codes and standards referenced herein contain recommendations in addition to requirements, consider the recommendations as requirements and follow unless stated otherwise by this Specification.

14.2.3. In the event of any conflict between codes, or this Specification and codes, the more stringent requirement applies.