APPENDIX A – TECHNICAL SPECIFICATION

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1. Scope

1.1. Background

The Circuit Breaker Replacement program is a preventative maintenance initiative to replace multiple substation-class circuit breakers determined to be close to failure or at end of life.

1.2. Location of Program

This program will include multiple locations at various substations within JEA's service territory. The Breaker Replacement Schedule lists the multiple substation sites.

1.3. Schedule of Work

An overall list of breakers that are to be replaced by fiscal year is provided in section VI. The list is intended to provide the contractor with an expected work load. Actual construction dates will be determined by outage availability and system needs.

1.4. General Description of Project

In general, the Scope of Work for this program is to replace various substation class circuit breakers in JEA's transmission system with new circuit breakers. The following tasks will be typical for each circuit breaker:

1.4.1. JEA Program Manager issues construction drawings and supporting documents to the Contractor.

1.4.2. JEA Program Manager and Contractor coordinate outage and construction timeframes.

1.4.3. The Contractor surveys and benchmarks the site as need.

1.4.4. The Contractor removes and transports existing circuit breakers to JEA's Westside Service Center. The Contractor transports (if required) and offloads the new circuit breaker at the site.

1.4.5. The Contractor installs poured-in-place foundations, circuit breakers, jumpers, grounding, conduits, and any other relevant items typical for that job.

1.4.6. The Contractor pulls and terminates the control and power cables, except at energized relay panels.

1.4.7. The Contractor may be required to complete other tasks including electrical panel modifications, laying additional aggregate fill (rock), grassing, landscaping, and applying herbicides.

1.4.8. The Contractor completes cleanup, punch list items, and as-built.

1.5. Engineers of Record

The Project Manager for this work is:

Michael Short
Project Design 20410
JEA Tower, 9th Floor
21 West Church Street
Jacksonville, Florida 32202
Phone: (904) 665-7048
Cell: (904) 236-9665

Email: shorml@jea.com

The Project Representative for this work is:

Greg Couture
Project Design 20410
JEA Tower, 9th Floor
21 West Church Street
Jacksonville, Florida 32202
Cell: (904) 502-5925
Fax: (904) 665-7950

2. Sequence of Work

In order to provide an orderly progression of work, the Contractor will be required to coordinate the Work Schedule with other entities performing work in connection with this Project. The installation of the breakers will require the coordination of schedules among the Contractor, Program Manager and other JEA Forces.

The following is a general representation of a possible Sequence of Work, provided only as an example of one such possible sequence. The Contractor shall be responsible for all work coordination, timing, sequencing, and scheduling that is necessary to assure timely project completion even while working with material suppliers and prevailing circumstances (labor, weather, etc.) that are not unusual for this locale and time of year.

2.1. Substation Sequence of Work

2.1.1. Mobilize.

2.1.2. Site surveying and establish baselines. Setting of monuments.

2.1.3. Site preparation.

2.1.4. Removal of old breaker and foundation.

2.1.5. Install foundations for breakers, including power and control conduit stub-outs as required.

2.1.6. Install conduits from the cable trench to breaker.

2.1.7. Backfill and compact site as necessary.

2.1.8. Receive, offload, and install power circuit breakers.

2.1.9. Install equipment jumpers and ground connections.

2.1.10. Pull control cable and terminate at yard equipment and into the control house cabinets.

2.1.11. Complete backfilling, compaction, and stabilization of the substation site.

2.1.12. Install substation rock.

2.1.13. Completion of equipment and relay commissioning testing by JEA Forces.

2.1.14. Energization of the breakers.

2.1.15. Site clean-up and disposal of debris.

2.1.16. General inspection of the project by JEA Forces.

2.1.17. Completion of all punch list items and final adjustments as necessary after Owner inspection.

2.1.18. Upon JEA commencing the serving of load but not more than ninety (90) days beyond punch list completion, the Contractor shall inspect all electrical connections for hot spots.

2.1.19. Correction of all hot spot locations by the Contractor.

2.1.20. Demobilize.

3. Construction Drawings

All Technical Specifications and Drawings that have been provided to the Bidder to allow the Bidder to estimate the Bid for the type, kind, and quantity of work to be performed, as well as the type, qualities, and quantities of materials that must be furnished as a part of this Bid, and are provided solely for Bidding purposes. These Technical Specifications and Drawings are not intended to be used for Construction. Actual Technical Specifications and Drawings for Construction shall be provided not later than the pre-construction conference, at which time if the Contractor can show, in an explicit, formulary way, any direct cost differences between the requirements of the Construction set and the Bid set, JEA will entertain a change order only for that (those) difference(s).

Actual Construction Technical Specifications and Drawings, equipment instruction books, and environmental permits, if applicable, will be furnished to the Contractor as described in the following paragraphs. Furnishing any additional copies that may be required by the Contractor, subcontractor, construction personnel, including copies necessary for securing permits, is the responsibility of the Contractor.

3.1. The Owner shall furnish the Contractor two (2) complete sets of Construction Drawings, Specifications, equipment instruction books, and environmental permits, if applicable, for the completion of the work. These two (2) sets will be provided at the Pre-Construction Conference. One (1) set is intended for the Contractor's home office and one (1) set is intended for the Contractor's field office.

3.2. The Contractor shall be responsible for the accurate reproduction of the Drawings and Specifications for use by the Contractor, subcontractor, and construction personnel in the completion of this Work, including the securing of necessary permits to perform the work. The Contractor shall be responsible for all costs incurred in the reproduction of the Construction Drawings and Specifications.

4. Shop Drawings

The Contractor shall submit Shop Drawings through the Project Representative to the Project Engineer for approval of any Contractor-furnished materials, equipment, or their installation methods. These Shop Drawings may be submitted in the form of drawings, diagrams, illustrations, schedules, or any other form deemed best to convey or illustrate the material, equipment, or installation method to the Project Engineer. The data submitted shall be complete with respect to dimensions, design criteria, materials of construction, etc., to enable the Project Engineer to properly and completely review and evaluate the submittal without unnecessary delays.

4.1. The Contractor shall submit a minimum of two (2) copies of all Shop Drawings or one electronically. Each submittal must be accompanied by a transmittal letter. One (1) copy will be returned to the Contractor with appropriate action taken. Should the Contractor require more than one (1) returned copy, the Contractor shall increase the submittal quantity by the additional required amount.

5. As-Built Drawings

The Contractor is required to provide the Owner with a complete set of "As Built" Drawings within 30 days of project completion. The Contractor's "As Built" field markings shall be accurately transferred to a clean set of Drawings provided by the Contractor. The "As Built" Drawings shall be marked as follows:

Red - Add
Yellow - Delete
Green - Notes to the Engineer

6. Substation Access and Security

It is the responsibility of the Contractor to request JEA contractor badges for employees. Badges may take up to two weeks before they're ready. Refer to "JEA Security Responsibilities Controls" for use of JEA badges.

7. Dewatering

Should groundwater be encountered, the Contractor shall be responsible for utilizing a dewatering system(s) to remove the water from excavations. Prior to any dewatering, the 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 on Form No. 40C-22-0590-1.

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

8. Laydown, site Access, & Noise Control

The Contractor shall propose and JEA shall review for approval any area located within the substation fence that shall function as a material laydown area. The laydown area shall be maintained and returned to the original condition by the Contractor immediately after use.

8.1. The Contractor is required to minimize noise from pumps and other sources and to maintain dust control throughout Construction.

9. Temporary Power

All substation sites have access to electrical services for the Contractor to use. Service voltages vary per substation, but all include 120 VAC. Where JEA electrical services are unavailable, the Contractor shall provide their own temporary power.

10. Contractor's Sanitary Facilities

Sanitary facilities are <u>not</u> available for contractor use at substation sites.

11. Explanation of Bid Items

<u>Group I – Foundations</u>

Bid Item(s)	Bid Description
101-104	<u>28kV Breaker Pad, 72kV Breaker Pad, 145kV Breaker Pad, 245kV Breaker Pad</u>

a) These items shall consist of a complete “package”, which shall include furnishing concrete and rebar, excavation, installation and backfilling in accordance with the bid drawings and Section II – Civil Specification.

b) The Contractor shall do all the excavating of every description of whatever substance encountered, backfill, and compact the excavation to the required densities. The Contractor shall provide such dewatering, well-pointing, sheeting and shoring as may be required to support the sides of the excavation. Labor, equipment and material to provide such support as well as the cost of required compaction tests shall be paid by the Contractor and included in the Unit Price.

c) The Contractor is responsible for returning the substation rock to its original condition after backfill is complete. The Contractor can wash the excavated rock or install new rock of the same description.

105-108 Remove 28kV Pad, Remove 72kV Pad, Remove 145kV Pad, Remove 245kV Pad

a) These items shall consist of a complete “package”, which shall include removal and disposal of concrete and rebar in accordance with the bid drawings and Section II – Civil Specification.

b) The Contractor shall do all the excavating of every description of whatever substance encountered, backfill, and compact the excavation to the required densities. The Contractor shall provide such dewatering, well-pointing, sheeting and shoring as may be required to support the sides of the excavation. Labor, equipment and material to provide such support as well as the cost of required compaction tests shall be paid by the Contractor and included in the Unit Price.

c) The Contractor is responsible for returning the substation rock to its original condition after backfill is complete. The Contractor can wash the excavated rock or install new rock of the same description.

Group II – Conduit

Bid Item(s) Bid Description

201-204 1”, 1.5”, 2” and 3” Conduit

a) These items shall consist of a complete “package”, which shall include furnishing conduit and elbows, excavation, installation and backfilling in accordance with the bid drawings and Section II – Civil Specification.

b) The Contractor shall do all the excavating of every description of whatever substance encountered, backfill, and compact the excavation to the required densities. The Contractor shall provide such dewatering, well-pointing, sheeting and shoring as may be required to support the sides of the excavation. Labor, equipment and material to provide such support as well as the cost of required compaction tests shall be paid by the Contractor and included in the Unit Price.

c) The Contractor is responsible for returning the substation rock to its original condition after backfill is complete. The Contractor can wash the excavated rock or install new rock of the same description.

Group III – Wire, Control Cable and Connectors

Bid Item(s)	Bid Description
301-302	350-749 MCM Conductor, 750-1,000 MCM Conductor

a) These items shall consist of pick up from JEA Storeroom, delivery, offloading, storing (at site) and installation of aluminum/copper wire in accordance with the bid drawings and Section III – Electrical Specification.

310-311	MV and HV Conductor Termination, MV and HV Conductor Spacer

a) These items shall consist of pick up from JEA Storeroom, delivery, offloading, storing (at site) and installation of wire accessories in accordance with the bid drawings and Section III – Electrical Specification.

320-322	4#10, 8#10, 21#10 Control Cable

a) These items shall consist of pick up from JEA Storeroom, delivery, offloading, storing (at site) and installation of control cable in accordance with the bid drawings and Section III – Electrical Specification.

323	3#8 Power Cable

a) This item shall consist of furnishing, storing (at site) and installation of AC cable in accordance with the bid drawings and Section III – Electrical Specification.

324	Low Voltage Breaker 1P or 2P

a) This item shall consist of furnishing, storing (at site) and installation of 120 VAC breaker in yard panel where necessary.

325	Low Voltage Cable Termination

a) This item shall consist of furnishing and installation of cable terminations for cables described in bid items 320-323.

326	Low Voltage Cable Removal

b) This item shall cover the labor and equipment required to remove and dispose all low voltage cables in accordance with the bid drawings and Section III – Electrical Specification.

a) The Owner shall determinate all control cables.

Group IV – Electrical Equipment

Bid Item(s)	Bid Description
401-402	Set 28 kV Breaker, Set 72 kV Breaker

a) This item shall consist of pick up from JEA Storeroom, delivery, offloading, storing (at site) and installation of breaker (with anchor bolts) in accordance with the bid drawings and Section III – Electrical Specification.

403-404 Set 145 kV Breaker, Set 245 kV Breaker

a) This item shall consist of receiving, offloading, storing (at site) and installation of breaker (with anchor bolts) in accordance with the bid drawings and Section III – Electrical Specification.

410-413 Remove 28 kV, 72 kV, 145 kV, 245 kV Breaker

a) This item shall consist of removal of breaker jumpers, grounding, and breaker. Contractor shall deliver and unload existing breaker to JEA's Westside Service Center.

Group V – Grounding

Bid Item(s) Bid Description

501-502 7#5 Copperweld, 19#8 Copperweld

a) These items shall consist of a complete "package", which shall include furnishing, excavation, installation and backfilling in accordance with the bid drawings and Section III – Electrical Specification.

b) The Contractor shall do all the excavating of every description of whatever substance encountered, backfill, and compact the excavation to the required densities. The Contractor shall provide such dewatering, well-pointing, sheeting and shoring as may be required to support the sides of the excavation. Labor, equipment and material to provide such support as well as the cost of required compaction tests shall be paid by the Contractor and included in the Unit Price.

c) The Contractor is responsible for returning the substation rock to its original condition after backfill is complete. The Contractor can wash the excavated rock or install new rock of the same description.

510 Ground Connection to Ground Grid

a) These items shall consist of a complete "package", which shall include furnishing, excavation, installation and backfilling in accordance with the bid drawings and Section III – Electrical Specification.

Group VI – Labor, Equipment and Material

Bid Item(s) Bid Description

601-605 Labor – General Forman, Foreman, Equipment Operator, Substation Tech, Laborer

a) These items shall include labor rates for work completed by the contractor that is not covered by units. These items should only be used in special circumstances where work is required that is not typical for a breaker replacement.
b) LEM time sheets shall be filled out daily and signed by the project representative.

610-616 Equipment – Pickup Truck, Flatbed Truck, Dump Truck, Bucket Truck, Crane (up to 40 Ton), Crane (up to 120 Ton) and Backhoe

a) These items shall include Equipment rates for work completed by the contractor that is not covered by units. These items should only be used in special circumstances where work is required that is not typical for a breaker replacement.

b) LEM time sheets shall be filled out daily and signed by the project representative.

620 Material

a) This item shall include material reimbursement for work completed by the contractor that is not covered by units. This items should only be used in special circumstances where work is required that is not typical for a breaker replacement.

b) LEM time sheets shall be filled out daily and signed by the project representative.

Group VII – Miscellaneous

Bid Item(s) Bid Description

701 Mobilization

c) Mobilization shall consist of obtaining all required insurance, bonds and permits; preparatory work and operations necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; preparation of a construction schedule; and any facilities necessary for work on the project; badging and training of employees; and all other work which must be performed or cost incurred prior to beginning work on the various contract items at each project site.

702 Demobilization

a) Demobilization shall include removal of construction facilities, including all utilities, and equipment off the Site and final cleanup of the Site after completion of the Project.

710 Set Relay Panels

c) This item shall consist of picking up picking up, loading, delivery, storing (at site) and setting of 36" relay panels inside the control house at each site.

SECTION II - TECHNICAL 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	(904) 767-5500
	or	
	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°F or is likely to fall below 40°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°F. When placed in forms, the concrete shall have a temperature of between 50°F and 90°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°F or is likely to fall below 40°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°F. When placed in forms, the concrete shall have a temperature of between 50°F and 90°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. <u>Scope</u>

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. <u>Steel Honeycomb Core Doors and Frames</u>

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:

Outside Walls	SW6133 – Muslin
Inside Walls	SW6126 – Navajo White
Doors	SW6129 – Restrained Gold

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° 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.

SECTION III - TECHNICAL SPECIFICATIONS - ELECTRICAL

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SECTION III - TECHNICAL SPECIFICATIONS - ELECTRICAL

1. SWITCHYARD ELECTRICAL EQUIPMENT

GENERAL

This is a general specification and covers the equipment required for substation construction. Separate Sections of these Specifications provide further information for High Voltage Transmission Systems, Distribution-class Duct Bank Systems, and Metal-Clad Switchgear, where applicable. Any equipment listed which does not apply to this particular project shall be disregarded. The Drawings shall be used to determine the exact quantity and type of equipment intended for use on this project. In case of discrepancy, the Drawings shall be taken in all cases.

1.1. SCOPE

This Section covers labor, equipment, and material requirements for the installation of the switchyard electrical equipment. The Contractor shall erect in place, test, and leave ready for service, the facilities shown on the Drawings and herein specified. The Contractor shall also have responsibilities for receiving, off-loading, and transporting certain structures, equipment, and miscellaneous materials as called for in this Specification. The Contractor shall furnish and install materials and equipment only as specified or approved by the Project Engineer.

1.2. STANDARDS

The installation covered by these Specifications shall conform to the practices set forth in the latest edition of the National Electrical Code (NEC) and the National Electrical Safety Code (NESC), unless otherwise specified in these Plans and Specifications.

1.3. MATERIALS

1.3.1. All Contractor furnished materials, unless otherwise indicated, shall be new, of the first quality and of the proper type for use intended. When applicable, all material will be in accordance with the latest published NEMA Standards and/or carry the approval of the Underwriter's Laboratories.

1.3.2. The use of a manufacturer's trade name and catalog number is intended to indicate preference. Products of reputable manufacture, equal quality, and functional type may be used only after stamped approval by the Project Engineer.

1.3.3. Owner furnished items, with a general description of the items and their storage location, are listed in the Attachments at the end of this Specification. The Contractor shall coordinate the receiving of the items with the Project Representative. It is the Contractor's responsibility, unless otherwise specified, to furnish labor and equipment for loading, for transporting, and for off-loading the items at the job site.

1.3.4. All material and equipment stored on the substation site or other areas including Owner furnished material and equipment, shall be in the care, custody, and control of the Contractor. The Contractor shall be responsible for any necessary repairs or replacement of materials and equipment damaged, lost, or stolen while in the care and custody of the Contractor.

2. OUTDOOR SWITCHYARD STRUCTURES

The Contractor shall install all substation structures as indicated on the Drawings. Assembly of the structures shall be in accordance with the Manufacturer’s assembly drawings, unless otherwise specified.

2.1. The Owner's Supplier shall furnish the substation structures as a part of the "Structures and Materials" package. It is the Contractor's responsibility, unless otherwise specified in the Appendix, to furnish labor and equipment for receiving, off-loading, and storing these structures at the job site.

2.2. It shall be the Contractor's responsibility to notify the Owner of any damage to the structures and errors in the structure fabrication before and during the installation, so that the Owner may coordinate with the Manufacturer and make good any such damage to the equipment.

2.3. Detailed structural assembly drawings may be inspected at the JEA office in Jacksonville, Florida, by contacting the Project Engineer.

2.4. The steel structures, as shown on the Drawings, will be furnished by the Owner and are fabricated for bolted field assembly. Mounting holes for equipment have been included in the fabrication of the structures.

2.5. The Contractor shall include in the bid and be responsible for the correction of minor errors and minor modifications in the structures in order to provide for a complete installation as indicated on the Drawings. Corrections shall include but not be limited to the following: reaming misaligned holes, punching new holes, and clipping or punching support angles as required. Approximately 100 punched holes shall be considered minor modifications. All modifications shall be cold galvanized to resist corrosion.

2.6. Any equipment mounted on the structures by the Contractor (e.g. AC panels, outlet boxes, etc.) shall be mounted utilizing galvanized or stainless steel materials and hardware. Whenever practical, the Contractor shall mount miscellaneous equipment to the structures using non-penetrating methods such as back-to-back unistrut. All holes drilled to mount such equipment shall be cold galvanized to resist corrosion.

2.7. The Contractor shall provide and install a bit-u-mastic coating for the bases of all aluminum structures which come into direct contact with concrete foundations.

2.8. The Contractor shall install lighting fixtures mounted on the lightning probe poles and on the takeoff structures complete with conduit, wiring, light fixtures, and switches, in locations as shown on the Drawings. Conduit, switches, and wiring as specified on the Drawings shall be furnished by the Contractor.

2.9. Erection of the lightning probe poles shall be in accordance with the Manufacturer's assembly drawings.

2.10. The Contractor shall install perimeter lighting poles complete with anchor bases, arms, conduit, wiring, light fixtures, and photocells in locations as shown on the Drawings. Lighting poles and anchor bases will be furnished by the Owner, as indicated in the Attachments at the end of these Specifications.

2.11. All substation structures and equipment are stored at the Substation Packager's facility. The Contractor shall plan and make provisions for receiving, unloading, and storing on site all related structures and equipment.

2.12. The Contractor shall provide dry storage containers, as required, for all items (including but not limited to cardboard boxes, fragile items, etc.) requiring inside storage until assembly and installation by the Contractor. Tarps and/or covers placed on top of the material and stored outdoors do not qualify as dry storage in this Contract.

3. POWER TRANSFORMERS

3.1. The Owner will be responsible for delivery and offloading the power transformer(s) onto the foundations unless the Contractor fails to have the transformer foundations ready as per Section VII. The Owner will provide the Contractor the desired delivery date when available. The Contractor shall prepare the site and foundations as directed to facilitate off-loading (see Section VII for additional transformer installation requirements). An approximate delivery date for the transformer is listed in Section VII of these Specifications. Crane and Rigging in Jacksonville, Florida, is the only company approved to lift, transport, and set power transformers for JEA.

3.2. The Contractor shall schedule the installation of the transformer foundation to allow for a minimum two (2) week curing time prior to the receipt and installation of the transformer. This will require the Contractor to schedule the installation of the transformer foundation well in advance of the estimated delivery date of the transformer, due to the inherent uncertainties involved in shipping large transformers. Early foundation construction times, and the corresponding longer curing times are strongly recommended.

3.3. The Owner, the Equipment Manufacturer's Contractor, or representative acting as an agent for the Owner, will be responsible for assembly of the power transformer and will furnish and operate the filtering equipment, vacuum drying equipment, provide the insulating oil, and fill the transformer. The Contractor shall provide adequate working space and access to temporary construction power to allow assembly and vacuum oil filling of the power transformers.

3.4. In no instance is a Contractor's employee or agent to enter a transformer manhole unless accompanied by the Owner's representative and only after suitable oxygen analysis has been conducted on the internal equipment environment.

3.5. The power transformers shall be under the care and custody of the Contractor while on the substation site. The Contractor shall be responsible for any minor repairs, as deemed necessary by the Project Engineer, to the finish of the power transformers that may have been damaged while in the care and custody of the Contractor.

3.6. Connections to the power transformers by means of bus or conductor will be the responsibility of the Contractor.

3.7. The foundation, conduit, control and power cabling, grounding, and associated work will be the responsibility of the Contractor.

3.8. All associated primary wiring, secondary wiring, control wiring, and grounding connections shall be furnished and installed by the Contractor in accordance with the Manufacturer's assembly instructions and JEA substation equipment interconnection drawings.

4. CIRCUIT BREAKERS

4.1. The Contractor shall be responsible for either transporting the circuit breakers to the substation site from their storage location at an arbitrary location within Duval County, Florida, or receiving all circuit breakers directly from the Manufacturer at the job site at the discretion of JEA.

4.2. The following tasks must be performed if the breaker is being shipped directly to the job site:

4.2.1. The Contractor may assume that the Owner's Manufacturer shall have the breakers available for shipping in time to meet the scheduled circuit breaker shipping dates which are shown in the Project Schedule in the Attachments of these Specifications.

4.2.2. As the project progresses, the Contractor shall notify the Project Engineer in writing (or by electronic mail) at least two (2) weeks in advance of the date of the Contractor's readiness for the breakers. This should be at the time of foundation pouring, to assure sufficient time for curing, and should conform to the breaker delivery dates listed in the Project Schedule in the Attachments of these Specifications.

4.2.3. The Owner's Manufacturer will then ship the breakers directly to the job site and deliver it on the date specified by the Contractor, +/- five (5) business days.

4.2.4. The Contractor shall then have employees and equipment on-site during business hours, throughout this five day window, to off-load the breaker within one (1) hour of the shipper's arrival. The Contractor shall then take responsibility of the breaker, and may choose whether to set the breaker directly onto

the pad or to set the breaker in an approved storage area. Approved storage areas shall mean any storage location approved by the Project Representative for this specific purpose.

4.2.5. The Contractor shall be responsible to ground the circuit breaker (including each high-voltage bushing) immediately upon arrival at the job site. This may be done by means of a temporary attachment to the ground grid, when approved by the Project Representative. The Contractor shall also run temporary AC power to the heater in the control panel of each breaker.

4.3. The Contractor shall be responsible for some minor assembly of the breaker at the job site. This assembly, which shall be supervised by JEA personnel, shall include such things as assembly of supports, attachments of control panel doors, etc. The Owner shall supply the Contractor with one (1) copy of the Manufacturer's assembly instructions. The Contractor shall closely follow these instructions.

4.4. The Owner, the Equipment Manufacturer's Contractor, or representative acting as an agent for the Owner, will furnish and operate the filtering equipment, vacuum drying equipment or SF-6 gas handling equipment, and provide the insulating oil or SF-6 gas. The Owner will be responsible for filling and final adjustment of the circuit breakers.

4.5. The Contractor shall be responsible for the placement of the circuit breakers on the foundations. The Contractor shall install the circuit breakers such that the lowest point of any energized parts is not less than the appropriate above grade clearance for personnel safety (NESC) above the foundation elevation.

4.6. Connections to the circuit breakers, by means of bus or conductor, will be the responsibility of the Contractor.

4.7. The foundation, conduit, control and power cabling, grounding, and associated work will be the responsibility of the Contractor.

4.8. All associated primary wiring, secondary wiring, and control wiring, and grounding connections shall be installed by the Contractor in accordance with the Manufacturer's assembly instructions, unless directed otherwise on the construction drawings.

5. CIRCUIT SWITCHERS, SWITCHES, & LOAD BREAK DEVICES

5.1. The Contractor shall install circuit switchers, group-operated switches, ground switches, load break devices, hookstick disconnect switches, and fuse disconnect switches as indicated on the Drawings.

5.2. The circuit switchers, group-operated switches, ground switches, load break devices, hookstick disconnect switches, and fuse disconnect switches will be furnished by the Owner's Supplier as a part of the "Structure and Materials" package. The Contractor shall receive, off-load, and store these switches in the same manner as described for the "Structures and Materials" package, unless otherwise directed.

5.3. The Contractor shall adjust and align all switch blades and contacts according to the Manufacturer's recommendations.

5.4. All load break devices shall be installed according to the Manufacturer's recommendations. The Contractor shall be responsible for the re-alignment of switch blades and contacts.

5.5. All operating handles shall be aligned such that the mechanism may be locked in the "OPEN" or "CLOSED" position.

5.6. The minimum clearance between contacts of each pole in the open position shall be adjusted to meet the requirements of NESC and NEMA standards.

5.7. The Owner's responsibility will be limited to inspection and acceptance of switch and operator alignment. Final alignment or adjustment shall be by the Contractor.

5.8. The Contractor shall assist and provide equipment required for the factory servicemen to perform testing, final checkout, and approval of placing the circuit switcher in service.

5.9. The Contractor shall ensure that all control and power (AC and DC) cables are installed and in service prior to the requesting that JEA perform testing and final checkout.

6. MOTOR OPERATING MECHANISM

Motor operating mechanisms shall be furnished by the Owner's Supplier as a part of the "Structures and Materials" package and installed by the Contractor in accordance with the Manufacturer's assembly instructions. The Contractor shall receive, off-load, and store these switches and mechanisms in the same manner as described for the "Structures and Materials" package, unless otherwise directed.

7. INSULATORS, BUSWORK, & CONNECTORS

7.1. The station type insulators, bus, conductor, and connectors shall be furnished by the Owner's Supplier as listed in the Bill of Materials as a part of the "Structures and Materials" package and installed by the Contractor in accordance with the Manufacturer's assembly instructions. The Contractor shall receive, off-load, and store this equipment in the same manner as described for the "Structures and Materials" package, unless otherwise directed. That includes providing dry storage for the material, boxes, crates, cartons, etc. not suited for outdoor storage.

7.2. The Contractor shall install station type insulators, bus, conductor, and connectors as indicated on the Drawings.

7.3. Any chipped or damaged insulators shall be brought to the Owner's attention prior to installation. The Contractor shall repair minor insulator damage after review of the damage and approval of the Contractor's proposed repair process is made by the Project Engineer.

7.4. The minimum clearance between bus and overhead conductors of different phases and from conductors to ground shall be as indicated on the Drawings. Where not specifically indicated, the minimum clearances shall be as indicated on the General Notes Drawing.

7.5. The Contractor shall install all bus, conductors, and connectors as indicated on the Drawings. All items on the substation structures, including hardware, will be furnished by the Owner's Supplier unless noted otherwise on the Bill of Materials or on the Drawings.

7.6. The welding of aluminum bus shall adhere to the following requirements:

7.6.1. The welding process and all welding operators shall be qualified in accordance with the Aluminum Association Aluminum Construction Manual, "Specifications for Aluminum Structures", Section 7/2/4 (Qualification of Welding Procedure and Welding Operators).

7.6.2. All joints to be welded shall be free of moisture and hydrocarbons. Degreasing shall be done with a non-toxic solvent. Sufficient time must be allowed for the evaporation of the solvent prior to welding. Wire brushing with a stainless steel wire brush should be employed after solvent cleaning to remove all oxide films, water stains, etc.

7.6.3. All aluminum welds shall be by the gas metal-arc (MIG) or the gas tungsten-arc (TIG) welding process.

7.6.4. The working area should be substantially draft-free and protected from atmospheric contamination.

7.6.5. All welds shall be made with clean metal and the completed weld shall have a smooth finish and shall indicate good fusion with the parent metal.

7.6.6. All connections shall be checked for the proper edge penetration and alignment before, during, and after the weld is made. The cross sectional area of the weld should not be less than that of the smallest member being joined.

7.6.7. To repair a defective weld, the defective portion must be entirely removed. The area to be repaired should be re-cleaned as in Paragraph 7.6.2 above and the weld made in a manner similar to the original.

7.6.8. Tackwelding should be used to prevent misalignment of the members being joined during the welding process.

7.7. Tinned connectors shall be installed when a copper to aluminum connection is made. The tinned connectors shall be furnished by the Owner.

8. INSTRUMENT TRANSFORMERS, POTENTIAL TRANSFORMERS, & LIGHTNING ARRESTORS

8.1. The instrument transformers, potential transformers, and lightning arrestors will be furnished by the Owner's Supplier as a part of the "Structures and Materials" package. The Contractor shall receive, off-load, and store these materials in the same manner as described for the "Structures and Materials" package, unless otherwise directed.

8.2. The Contractor shall install outdoor instrument transformers and potential transformers as indicated on the Drawings. All wiring shall be as listed in the Cable Schedule and Conduit Schedule.

8.3. The Owner will furnish, operate, and supervise the filtering equipment and oil for the instrument transformers as required.

8.4. The Contractor shall install lightning arrestors as indicated on the Drawings.

8.5. All associated primary wiring, secondary wiring, instrument and control wiring, and grounding connections shall be installed by the Contractor in accordance with the Manufacturer's instructions, unless stated otherwise in the Drawings.

8.6. Tinned connectors shall be installed when a copper to aluminum connection is made. The tinned connectors shall be furnished by the Owner.

9. STATION SERVICE, AUTOMATIC TRANSFER SWITCH, & ELECTRICAL PANELS

9.1. The Contractor shall be responsible for transporting and installing the Owner furnished distribution type transformers in the locations as shown on the Drawings. The transformers are located at the JEA Commonwealth Service Center and will be taken out of stock.

9.2. The Contractor shall be responsible for transporting and installing the automatic transfer switch if specified on the Station Service Drawing. The transfer switch shall be ASCO Type 940 or 7000 and be furnished by the Owner complete with a NEMA 3R enclosure. The Contractor shall furnish and install galvanized unistrut channels and stainless steel mounting hardware as required to mount the transfer switch to the structure mounting brackets.

9.3. The Contractor shall be responsible for installing three phase CTs and Meter in accordance with JEA electric service standards and as shown on the Drawings.

9.3.1. The Owner will furnish three (3) CTs (item# METCT001) and one (1) meter socket (item # METSO007). The Contractor shall supply all other materials needed to complete the service metering.

9.3.2. The CTs, CT cabinet and meter socket/enclosure shall be grounded in accordance with the NEC and local inspection authority requirements. Cabinet shall be capable of being sealed and/or locked by the JEA meter shop activity.

9.3.3. Conduits entering CT cabinet from point of service shall be marked “Line” and conduits leaving CT cabinet to Main Breaker Panel (MBP) “Load”.

9.3.4. CT#3 to contain the high leg, marked with orange phasing tape and be the right-most CT in the CT cabinet.

9.4. The Contractor shall furnish and install all new AC electrical panels on the load side of the automatic transfer switch as shown on the Drawings, unless directed otherwise. The Contractor shall also furnish and install the internal circuit breakers, ground bus, and associated hardware (as required) to complete the wiring shown on the panel drawing. The Contractor shall also furnish and install the galvanized unistrut channel and stainless steel mounting hardware as required to mount the panel to the structure mounting brackets.

9.5. The Contractor shall be responsible for furnishing the necessary terminals, connectors, etc., to terminate cables at the transformers, ATS, and splices (as required).

9.6. The Contractor shall be responsible for furnishing and installing the switchyard electrical panels, cabinets, and junction boxes. The exact quantity, locations and sizes of the panels, cabinets, and junction boxes shall be as shown on the Drawings. All switchyard AC panels shall be enclosed in stainless steel enclosures.

9.7. The AC power panelboards shall be Square D Co. Type NQOD. All panelboards shall be enclosed in a NEMA 3R enclosure and shall also include housings with a lockable cover and/or door.

9.8. The Contractor shall be responsible for furnishing and installing the main and branch circuit breakers in all yard panels. The main breakers and branch circuit breakers shall be conventional bolt-on type circuit breakers rated in accordance with the Drawings. The wiring and labeling of each panel breaker shall be as shown on the Drawings and in accordance with other applicable Sections of these Specifications.

9.9. The Contractor shall be responsible for securely mounting switchyard electrical panels to the substation structures. Mounting brackets may have been incorporated into the structure design. The Contractor shall furnish and install galvanized unistrut channels and stainless steel mounting hardware as required to mount the electrical panels, cabinets, and junction boxes to the structure mounting brackets. Should any alteration or modification be necessary for the mounting of electrical panels, the Contractor shall submit details of the proposed alteration to the Project Engineer in writing for approval prior to installation.

10. SWITCHYARD RECEPTACLES

10.1. The switchyard receptacles shall be furnished by the Contractor.

10.2. The Contractor shall be responsible for installing the yard receptacles and the vacuum pump receptacles. Installation and wiring of each receptacle shall be in accordance with the Drawings. Details for mounting the switchyard receptacles (if applicable) are included in the Drawings.

10.3. The 120V (single phase) yard receptacles shall be standard grounding type duplex receptacles mounted in a weatherproof outlet box with a weatherproof cover, Crouse-Hinds catalog number WLRD-1 or approved equal.

10.4. The 240V (single phase) truck receptacles shall be Thomas & Betts/Russellstoll Type SCA, catalog number 3323-78 or approved equal.

10.5. The 240V (three phase) vacuum pump receptacles shall be Thomas & Betts/Russellstoll Type SCA, catalog number 3324-78 or approved equal.

10.6. All above grade conduit to the receptacles shall be either rigid galvanized steel or UV resistant PVC, Schedule 40.

11. SWITCHYARD RELAY BOXES

11.1. The Contractor shall be responsible for furnishing and installing the bus differential boxes, potential transformer fuse boxes, terminal blocks, fuse blocks, test switches, and heaters (as specified). The exact quantities, locations, sizes, and types of boxes, blocks, switches, and heaters shall be as shown on the Drawings. The bus differential and PT fuse boxes shall be stainless steel.

11.2. The Contractor shall be responsible for securely mounting the switchyard relay boxes to the substation structures. Mounting brackets may have been incorporated into the structure design for most of these boxes. The Contractor shall furnish and install galvanized unistrut channels and stainless steel mounting hardware as required to mount the relay boxes to the structure mounting brackets. Details for mounting and wiring the switchyard relay boxes (if applicable) are included in the Drawings. Should any alteration or modification be necessary for mounting the relay boxes, the Contractor shall submit details of the proposed alteration to the Project Engineer for approval prior to installation.

11.3. All above grade conduit to the relay boxes shall be either rigid galvanized steel or UV resistant PVC, Schedule 40. Installation and termination of control and instrument wiring shall be in accordance with the Specifications and Drawings.

12. CONSTRUCTION STATION SERVICE

The Contractor shall be responsible for installing and maintaining a temporary station service facility for new construction and additions to existing stations where adequate facilities are not available.

12.1. The Contractor shall be responsible for following standard permitting and application procedures to obtain the construction service. Where the installation of a power transformer or autotransformer is required, the construction service shall be 3-phase. The Contractor's service is to be metered and shall comply with JEA requirements for meter can, weatherhead, and disconnect.

12.2. The Contractor shall provide the necessary conduit, cable, entrance head, meter, disconnect switch, panels, outlets, etc. to sufficiently supply electric service to the field office, construction outlets, and permanent low-voltage receptacles for station check-out.

12.3. The Owner will provide the distribution lateral, temporary span poles and distribution transformers as required for the construction station service. The Contractor shall be responsible for furnishing and installing secondary conductors and raceway to the transformers as required.

12.4. The Owner will be responsible for the total metered electric charges of the construction service during the term of the Construction Contract.

12.5. The Contractor shall provide a 200A disconnect in a NEMA 3R enclosure to run conduit and cables to the permanent station service facilities for use in equipment check-out by the Owner. The Contractor shall furnish and install conduit to the cable trench, or permanent facilities, and install single conductor 4/0 RHW cable to the

ATS or AC panels (as required). This requirement is in addition to the Contractor's service and shall be provided as soon as the low-voltage equipment is in place (see Section VII, Subsection 2, for Sequence of Work).

NOTE: Termination of the permanent station service transformers to the ATS or low-voltage electrical panels shall not be performed until after the temporary service has been disconnected.

12.6. The Contractor will be required to remove any temporary construction service poles and the construction service once the substation is energized and the permanent station service is in operation. Additionally, the Contractor shall apply for removal of the service drop and transformer bank.

12.7. Where there is existing station service available, and JEA service requirements are met, the Contractor shall be allowed to utilize the station service for construction A.C. at no cost.

13. GROUND GRID SYSTEM

13.1. GENERAL

13.1.1. This is a general specification and covers the requirements and procedures for the installation of, or addition to, the station ground grid system. Any material or equipment listed which does not apply to this particular project shall be disregarded. The Drawings shall be referenced for specific requirements concerning the quantity, type, and installation of the material to complete the station ground grid system.

13.1.2. The Contractor shall be responsible for providing the Owner with an accurate "As Built" drawing of the station ground grid (as specified in Section VII, Subsection 5).

13.2. SCOPE

This Section covers the labor, equipment, and material requirements for the installation of, or addition to, the station ground grid system. The Contractor shall install the ground grid, ground rods, and ground wells as shown on the Drawings and herein specified. The Contractor shall also be responsible for the connection of all switchyard electrical equipment, control house electrical equipment, substation structures, fences and gates to the station ground grid system as shown on the Drawings and herein specified.

13.3. MATERIALS

The Contractor shall refer to the Drawings for material requirements to complete the station ground grid system. The Contractor shall furnish materials and equipment only as specified or approved by the Project Engineer.

13.3.1. All Contractor furnished materials, unless otherwise specified, shall be new, of first quality and of the proper type for the use intended.

13.3.2. The Owner shall furnish above grade structure and equipment grounding connectors, unless otherwise indicated. The above grade structure and equipment grounding connectors will be furnished by the Owner's Supplier as a part of the "Structures and Materials" package. The Contractor shall receive, off-load, and store these items in the same manner as described for the "Structures and Materials" package. The Contractor shall furnish the below and above grade ground grid conductor; below grade connectors; the equipment, structures, manhole, and fence grounding conductor; and all fence grounding connectors. The Contractor shall also furnish the grounding system as shown on the Drawings for any "sliding-type" main entrance gate.

13.4. GROUND GRID

13.4.1. The Contractor shall furnish the required amount of 19#8 and 7#5 Copperweld conductor and the 500MCM copper conductor for the ground grid, unless otherwise specified. The Contractor shall purchase the grounding material which meets or exceeds JEA material requirements. The 19#8 conductor (JEA #COBCW015) shall be Copperweld, 19-strand #8, .0643" diameter, 40% conductivity as per ASTM B-227 and B-228, high strength – 27,548 lbs. The 7#5 conductor (JEA #COBCW016) shall be Copperweld, 7-strand #5, .0546" diameter, 40% conductivity as per ASTM B-227 and B-228, high strength – 17,949 lbs.

13.4.2. The Contractor shall install the ground conductor in the locations indicated on the Drawings and at the depth specified. The Contractor shall install the conductor in an open trench to facilitate proper installation and inspection of the ground grid connections.

13.4.3. The Contractor shall notify the Owner of any damaged ground grid conductor before, during, and after installation so the conductor may be replaced.

13.4.4. The Contractor shall furnish material (as required) and install all ground rods, ground wells, and grounding connections to complete the ground grid system, as specified.

13.5. GROUND RODS AND GROUND WELLS

13.5.1. The Contractor shall furnish and install ground rods and ground wells (as specified) in the locations shown on the Drawings. Rods and wells shall be specified by either the depth or resistance required. Details for ground rod connections (if applicable) are included in the Drawings.

13.5.2. Where the installation of ground rods and ground wells is specified by depth or where driving rods in soil of high resistivity, it may be necessary to use casing in the well holes. The Contractor shall make a resistance reading of each ground rod and/or ground well prior to its connection to the station ground grid and report these readings to the Project Engineer for verification of the ground grid design. Connection of the rod to the station ground grid shall be made, only after Owner approval, utilizing the exothermic process. The Contractor shall also include these readings on the "As Built" Drawings.

13.5.3. Where the installation of ground rods and ground wells is specified by resistance, the Contractor shall install the ground rods and ground wells to a minimum, base bid depth of fifty (50') feet, unless otherwise specified. The Contractor shall continue until the specified resistance is achieved. A unit price of $3.75 per foot installed will be used for adjusting the contract price from the base bid depth.

13.5.4. All ground rods and ground wells shall maintain a minimum earth cover as specified on the drawings.

13.5.5. Where the installation of ground rods is not specified by resistance or depth, the Contractor shall install ground rods twenty-four (24') feet deep at all locations as shown on the substation grounding drawing. No ground rods or wells shall be installed under paved roadway areas.

13.6. GROUND GRID CONNECTIONS

13.6.1. Ground grid connections (including connections to ground rods and ground wells) shall be made by approved an exothermic process utilizing Cadweld Plus molds and materials manufactured by Cadweld. The Contractor shall use the Cadweld Plus System with the corresponding molds and electronic control unit for weld metal ignition. Molds for each type of connection are to be replaced after a maximum use of fifty (50) welds.

13.6.2. Ground grid connections shall be of the type that avoids cutting and/or splicing of the main grid conductor.

13.6.3. A Manufacturer's representative is required to demonstrate the proper installation procedures of the exothermic system being used prior to installation of any ground grid connection. The Contractor shall be responsible for arranging the demonstration. Any Contractor representative that may install the ground grid connections and the Project Representative shall be present at the demonstration.

13.6.4. The Contractor shall strictly follow the Manufacturer's installation procedures.

13.6.5. All surfaces to be joined by the weld shall be thoroughly cleaned and dried prior to final placement of the mold. Worn, damaged, or incorrectly sized molds which in the opinion of the Project Representative do not make satisfactory welds shall be removed from the job site.

13.6.6. All welded connections made by the exothermic process shall encompass 100% of the end of the material being welded. Welds which do not meet this requirement shall be remade at the Contractor's expense.

13.6.7. All welded connections made by the exothermic process shall be visually inspected by the Project Representative and may be subjected to testing. Testing shall be in the form of moderate hammer blows, from which a properly formed connection will easily resist any visible damage. Any connection which fails such a test or which, upon visual inspection, indicates a porous or deformed weld shall be remade at the Contractor's expense. Should different molds or materials be required to facilitate the corrected connection of a failed weld, such material shall be furnished at the Contractor's expense. The use of molds and materials other than specified must be approved for use by the Project Engineer.

13.7. TRANSFORMER GROUNDING

13.7.1. The Contractor shall connect the neutral bushing of any power transformer or autotransformer directly to the station ground grid using 500MCM copper conductor. The neutral ground conductor shall extend continuously and be connected to the station ground grid in two (2) places using the connection process specified. The two (2) connections shall be made to the same ground grid run and shall be placed approximately three (3') feet apart.

13.7.2. The Contractor shall connect the transformer tank to the ground grid in two (2) locations as shown on the Drawings using 7#5 Copperweld conductor and the connection process specified.

13.7.3. The Owner shall furnish the above grade grounding connectors to be used in connecting the power transformers to the ground grid. The Contractor shall furnish the 500MCM copper and the 7#5 Copperweld grounding conductor to be used in connecting the power transformers to the ground grid system.

13.8. SWITCH GROUNDING

13.8.1. All group operated switches shall be furnished by the Owner complete with an operator platform. The operator platform shall be located on the rocked surface as indicated by the Drawings and be connected on one side to the station ground grid. A continuous grounding conductor shall extend from the other side of the operator platform through the parallel ground clamp, provided for structure grounding, to the operating mechanism. This conductor shall be connected to the operating pipe by means of a flexible copper braid. The remaining groove of the parallel grounding clamp shall contain a conductor connected directly to the station ground grid. All mechanical connectors used in this installation shall be furnished by the Owner. Details for grounding the operator platform (if applicable) are included in the Drawings.

13.8.2. Every switch structure shall be connected to the station ground grid in at least two (2) locations, as shown on the Drawings. One (1) switch structure ground conductor shall be installed as specified above.

13.8.3. Grounding switches shall have a continuous ground conductor from the blades to the station ground grid. This conductor shall be routed on the structure column opposite of the operating mechanism to facilitate complete grounding of the switch structure. The operating pipes for both the line and ground switches shall be connected by flexible copper braid as specified above.

13.9. EQUIPMENT GROUNDING

13.9.1. The Contractor shall be responsible for connecting electrical equipment such as circuit breakers, station service transformers, potential transformers, instrument transformers, lightning arrestors, etc., directly to the station ground grid as shown on the Drawings.

13.9.2. Electrical equipment shall be furnished by the Owner, unless otherwise specified. The Contractor shall be responsible for installing the equipment ground conductor on the side of the structure designed to accommodate the ground conductor.

13.9.3. The Owner shall furnish all above grade ground connectors necessary to connect the equipment to the station ground grid, unless otherwise specified. The Contractor shall furnish the 7#5 Copperweld grounding conductor and all other material, equipment, and labor necessary to complete the connection of the electrical equipment to the station ground grid.

13.9.4. The Contractor shall install the equipment ground conductor such that the continuity of the conductor from the equipment to the station ground grid is maintained as much as practical.

13.9.5. The ground conductor installed on the equipment structures shall be sufficient in meeting the requirements of structure grounding.

13.9.6. Free standing electrical equipment, such as circuit breakers, shall be connected directly to the station ground grid. The Contractor shall install ground conductors as shown on the Drawings. More than one (1) ground conductor installation may be required in the grounding of free standing electrical equipment.

13.10. STRUCTURE GROUNDING

13.10.1. The Contractor shall be responsible for connecting all steel structures directly to the station ground grid as shown on the Drawings.

13.10.2. The structures are furnished by the Owner and are designed to accept the ground connectors provided. The Contractor shall be responsible for installing the structure ground conductor on the proper side of the structure to facilitate the connection of the structure to the station ground grid.

13.10.3. The Owner shall furnish all above grade ground connectors necessary to connect the structures to the station ground grid, unless otherwise specified. The Contractor shall furnish the 7#5 Copperweld grounding conductor and all other material, equipment, and labor necessary to complete the connection of the steel structures to the station ground grid.

13.10.4. The Contractor shall install all structure ground conductors such that they conform to the structure and foundation. Ground conductors on structures with grounded equipment shall conform to the requirements of this Section IX and all relevant paragraphs.

13.10.5. Structures must be grounded to the station grid within the same working day the structure is erected.

13.11. CABLE TRENCH AND CONTROL HOUSE GROUNDING

13.11.1. The Contractor shall install the cable trench and control house grounding as specified and shown on the Drawings. The Contractor shall furnish the 7#5 Copperweld conductor necessary to ground the

cable trench and control house to the station ground grid and all other required material and labor to complete the installation.

13.11.2. The Contractor shall install the cable trench and control house ground conductors. The ground conductor shall run the entire length of the cable trench and connect to the station ground grid at all points of intersection. Two (2) ground conductors shall be brought into the control house through the cable trench and attached to the outside of the cable tray. The Contractor shall furnish and install 7#5 Copperweld cable clips on one side of the cable trench to support the ground conductor.

13.11.3. Connection of the ground conductor to the cable tray shall be made utilizing Burndy Type GC2929CT connection or approved equal. The ground conductor shall be secured to the cable tray at each cable tray fitting or at intervals not exceeding four (4') feet throughout the length of the tray. Provide ground wire lugs and hardware (as required). The cable tray shall NOT be used as a ground path.

13.11.4. Control house equipment, including electrical panels shall be connected to the control house ground by means of Anderson Type K3 connector or approved equal.

13.11.5. Where a reinforced concrete floor is installed in the control house, the Contractor shall bond the control house slab reinforcement to the ground grid to provide equipotential surfacing as shown on the drawings. Metal floor decking within modular buildings should be bonded internally by the manufacturer, with connections to the grid on the exterior of the building at the points designated.

13.12. CHAIN LINK FENCE AND GATE GROUNDING

13.12.1. The Contractor shall furnish the material and connect the chain link fences to the station ground grid as specified and as shown on the Drawings. Details for grounding the fence and fence gates, if applicable, are included in the Drawings.

13.12.2. The Contractor shall connect the fence to the station ground grid at every gate post, every corner post, and intermediate posts at convenient intervals, no more than forty (40') feet apart. The fence and gate posts shall be connected to the station ground grid using 7#5 Copperweld conductors.

13.12.3. The Contractor shall furnish #2 AWG copperweld conductor and connectors as required to complete the fence grounding. The conductor shall attach to the post with a minimum of three (3) clamp connections and be woven into the fence fabric between these connections to terminate on each strand of barbed wire.

13.12.4. Each personnel and equipment swing gate shall have a perimeter ground conductor of 19#8 Copperweld connected to the station ground grid. This conductor shall extend approximately three (3') feet beyond the gate swing, both inward and outward, unless property restrictions prevent the exterior extension.

13.12.5. Each swing gate leaf shall be connected to the gate post with a copper welding cable, as specified on the Drawings. The copper welding cable and exothermic weld connections shall be furnished by the Contractor. The Contractor shall connect the welding cable directly to the post and the post grounding conductor.

13.12.6. The Contractor shall furnish and install the grounding system as shown on the Drawings for the substation lift and/or sliding entrance gates.

14. CONDUITS, CABLE TRENCHES, & CABLE TRAYS

14.1. GENERAL

14.1.1. This is a general specification and covers the requirements and procedures for the installation of conduits, wireways, cable trenches, and cable trays used to distribute power and control cables to the equipment in the switchyard and control building. Any material or equipment listed which does not apply to this particular project shall be disregarded. The Drawings shall be referenced for specific requirements concerning the quantity, type, and installation of material to complete this work.

14.1.2. The Contractor shall be responsible for providing the Owner with accurate "As Built" drawings of the conduit, cable trench, and cable tray systems installed (as specified in Section VII, Paragraph 5).

14.2. SCOPE

This Section covers the labor, equipment, and material requirements for the installation of conduits, wireways, cable trenches, and cable trays in the switchyard and control building. The Contractor shall furnish all materials necessary and install the conduits, wireways, cable trenches, and cable trays as shown on the Drawings and specified herein.

14.3. MATERIALS

The Contractor shall refer to the Drawings for material requirements to complete the installation of the conduits, wireways, cable trenches, and cable trays as required for the substations raceway system. The Contractor shall furnish materials and equipment only as specified or approved by the Project Engineer.

14.3.1. All Contractor furnished materials, unless otherwise specified, shall be new, of first quality, and of the proper type for the use intended.

14.3.2. The Contractor shall refer to the "Conduit Schedule" for specific material requirements of individual raceway runs.

14.3.3. Unless otherwise specified, UV resistant Schedule 40 PVC shall be permitted for underground conduit runs. All above grade conduit shall be either rigid galvanized steel or UV resistant Schedule 40 PVC, unless otherwise specified or as shown on the Drawings.

14.4. CONDUIT AND WIREWAY

14.4.1. The Contractor shall furnish and install the conduits, as listed in the "Conduit Schedule" and as shown on the Drawings.

14.4.2. The Contractor is responsible for all hardware necessary to complete the installation of the conduit system.

14.4.3. When installing conduit in an existing switchyard, the Contractor shall remove and dispose of the existing rock. The Contractor shall not use this rock to cover the completed work-in-place, but shall place new, clean rock onto the work surfaces. Such rock and its placement shall meet the requirements of Section VIII of these Specifications.

14.4.4. When installing conduit in an existing switchyard, the Contractor shall compact the area to the same density, and with similar material, as with the adjacent undisturbed materials. In every such case, the resultant soils will be re-poisoned to eradicate future plant growth, using the herbicide specified in Section VIII of these Specifications. The Contractor shall furnish these herbicides.

14.4.5. Conduits shall be installed at the depth shown on the Drawings, with the area backfilled and compacted to same density as surrounding areas.

14.4.6. The Contractor shall form all above grade conduits to conform to the surfaces of the foundations and structures. Rigid galvanized steel conduit shall be formed using a pipe bender. UV resistant Schedule 40 PVC shall be shaped with a Therm-o-Tools Company combo type, Hotbox bender, or approved equal.

14.4.7. The Contractor shall furnish and install all indoor conduits, junction boxes, switches, and receptacles as specified in the "Conduit Schedule" and as shown on the Control House Drawings. All conduits less 2" shall be concealed within block walls.

14.4.8. The Contractor shall furnish and install the wireway as specified in the "Conduit Schedule" and as shown on the Control House Drawings. The wireway shall be NEMA 1 square wireway, smooth, seam free, without knockouts, and shall have removable covers. The wireway and associated fittings shall be finished with baked satin ANSI 61 gray enamel over phosphatized surface. The wireway shall be manufactured from steel not less than 16 gauge and shall conform to NEMA standards.

14.4.9. The Contractor shall install the wireway in accordance with the Manufacturer instructions and as indicated on the drawings. All field cuts shall be made with a hacksaw and grounded smooth. Terminations of the wireway run into the cable tray, electrical panels, or electrical equipment shall utilize a panel adapter. Wireway sweeps consisting of two (2) 45 degree bends shall be used in lieu of one (1) 90 degree bend.

14.4.10. The Contractor will be responsible for labeling all conduits as listed in the "Conduit Schedule". For details, see Subsection "Labeling" of this Section.

14.5. PRE-CAST CABLE TRENCH

The trench system shall consist of precast concrete or fiber reinforced precast concrete framing members, side sections, and removable polymer cover sections assembled to form a completely enclosed trench, except with open earth bottom having a 4" bedding of sand. Polymer modified concrete trench lids are not acceptable.

14.5.1. The Contractor shall furnish and install a precast concrete frame with FIBRELITE lids manufactured by TRENWA, or PLASTIBETON lids manufactured by OLDCASTLE, or similar products.

14.5.2. The installation of the cable trench shall be in strict accordance with the Drawings, these Specifications, and the Manufacturer assembly drawings.

14.5.3. The trench shall be dimensioned as shown on the Drawings. A sixteen (16") inch nominal depth shall be furnished, unless otherwise specified.

14.5.4. One-piece trench system with 10'-0" standard lengths shall be furnished.

14.5.5. Precast polymer trench covers shall be furnished in sections, sized to permit removal by a single person, and each shall have slots for lifting tools.

14.5.6. The trench system shall be designed to support at least 200# per square foot live load. The road crossing sections shall be precast with galvanized steel or aluminum lids and designed for H-20 loading.

14.5.7. Precast trench members shall be cast in steel forms using 3000# or greater high early strength concrete. Members shall be cured for a period of at least fourteen (14) days.

14.5.8. The Contractor shall furnish and install all necessary special fittings, offsets, terminations, or other designated fittings (as required).

14.5.9. The Contractor shall furnish and install the cable transition ladder assembly with covers for the trench in the length shown on the Drawings for the entrance to the control house.

14.5.10. Install the concrete trench system in earth trenches with covers extending above the surrounding crushed rock surfacing approximately three (3") inches. See Site Plan for top of trench elevations.

14.5.11. Excavate trenches to a minimum width consistent with the stability of the sides. Excavate completely to the bottom of the framing members and correct any points of over-excavation by returning to grade with mechanically compacted fine earth backfill to form a smooth trench bottom. Remove all excess excavated material as required for proper alignment and elevation of work.

14.5.12. Excavation shall conform to other requirements as set forth in Civil Specifications, Subsection 1 on Site Preparation and Earthwork. Grounding of the cable trench shall conform to the requirements of the Electrical Specifications, Subsection 13.

14.5.13. Component members shall be set only on firm, compacted earth, sand, or gravel mix, at an elevation such that the top of the sidewall will be two (2") inches above the final grade (top of crushed rock) for the substation. Prior to setting the trench section, place geotextile fabric the full length of the trench excavation, overlapping a minimum of two (2') feet at each joint of the fabric. The width of the fabric shall be sufficient to cover the bottom and both sides of the cable trench to finish grade. Geotextile fabric shall be Mirafi 140N, a non-woven water permeable fabric as distributed by:

H. Moore & Associates, Inc.
Maislin Drive, Bldg. E
Tampa, Florida 33637
or approved equal.

14.5.14. After setting the component trench sections, back fill along sides with the geotextile fabric flush against the sides. Place a minimum four (4") inches of bedding sand in the trench to form a level bottom, just covering the bottom of the section members.

14.5.15. Hand tamp the backfill along the outside walls of the trench. Backfill shall conform to other requirements as set forth in the Civil Specifications.

14.5.16. At the trench entrance to the control house, set trench section bottom members on the control house foundation support for trench as provided in the foundation construction. Adjust the end elevation of the section to meet that shown on the Drawing details.

14.5.17. The Contractor shall furnish and install the cable tray transition compartment as designed for the trench as shown on the Drawings. The cable tray transition compartment shall be sealed to the control house wall.

14.5.18. The Contractor shall protect the trench against entrance of construction debris, rock, and earth during the construction and after placing of the sand bedding. The trench shall be cleaned out of any such foreign material prior to placing control cables and just before final placing of covers.

14.5.19. The Contractor shall provide the Owner with a new set of Manufacturer's cover removal tools as well as the tools used during construction. The Contractor shall deliver these tools to the Project Representative.

14.6. CABLE TRAY

The Contractor shall furnish and install the cable tray system located in the switchboard room. The Contractor shall submit a description and/or shop drawings of the proposed cable tray system for approval. The shop drawings submitted shall include certified flexural and loading data with the Manufacturer's recommendation of maximum span for the design load.

14.6.1. Indoor cable trays shall be fabricated from extrusions of aluminum alloy 6063-T5 or 6063-T6. Application shall be in accordance with the ASCE Specifications and AWS Standards. The trays shall be furnished with a six (6") inch depth or four (4") inch depth, as indicated on the Drawings and in nominal twelve (12') foot lengths. Splices shall be of the high pressure bolted type. The design load for the tray installation shall be a minimum 200 lbs. per linear foot for the maximum tray width of thirty-

six (36”) inches or nine (9”) inches, as described on the Drawings, when supported on twelve (12’) foot centers.

14.6.2. Indoor cable trays shall be of the aluminum ladder type with cross rungs spaced six (6”) inches maximum center to center.

14.6.3. All rungs, dropouts and other metal surfaces in contact with the cable shall have smooth, rounded edges. The rungs shall be joined to the sides by a homogeneous union method, weld on swage.

14.6.4. Cable tray supports shall be provided at intervals not to exceed the Manufacturer's recommendations for maximum span for the design load and type of tray being supported. In no case shall the spans exceed that shown on the Drawings.

14.6.5. All necessary splice plates, bolts, nuts, lock washers, etc., shall be furnished compatible for use with the type metal tray provided.

14.6.6. Provide ground wire lugs and hardware as required. The cable tray shall NOT be used as a ground path. Grounding of the cable tray shall conform to the requirements of Section IX, Subsection 13, Paragraph 12.

15. CONTROL CABLE & LOW-VOLTAGE ELECTRICAL CABLE

15.1. CABLE SCHEDULE

15.1.1. The Contractor shall pull and terminate all cables as listed in the Cable Schedule. All control cable, shielded control cable, and instrument cable will be provided by Owner. All other cables listed shall be provided by the Contractor.

15.1.2. Cable lengths listed in the Cable Schedule are approximate and based on engineering estimates that may differ due to field routing or other factors. The total quantities required for the project may also affected by factors such as waste, cable reel sizes and optimization (or lack thereof). The Contractor shall be responsible for the actual quantities required and for verification of all cable lengths prior to cutting.

15.1.3. The Contractor is responsible for providing the Owner with accurate "As Built" revisions of the Cable Schedule, Conduit Schedule, and related Drawings, as specified in Section VII, Subsection 5.

15.1.4. All low-voltage electrical cable furnished by the Contractor shall be as specified in the Cable Schedule. Where multiple conductor cable is specified, the Contractor shall furnish and install multiple conductor cable. Cable lengths listed in the Cable Schedule are approximate. The Contractor shall supply cable as necessary to complete the work.

15.1.5. The Contractor will be responsible for labeling all cables as listed in the Cable Schedule. For details, see Subsection “Labeling” of this Section IX.

15.2. SHIELDED CONTROL CABLE SPECIFICATIONS

15.2.1.

15.3. SPLICES

15.3.1. All runs of control cable shall be continuous. Splices in control cable shall NOT be permitted.

15.3.2. Splices made in low-voltage electrical cable should be avoided. When necessary, splices in low-voltage electrical cable shall conform to all applicable NEC and NESC standards.

15.4. INTERCONNECTION DRAWINGS

The control cable Interconnection Drawings will be supplied at a later date by the Owner to show all terminations of the cables as listed on the Conduit and Cable Schedules.

15.4.1. The Contractor shall be responsible for terminating all cables listed on the Conduit and Cable Schedules. The Contractor shall also be responsible for the termination of any jumpers on terminal blocks in the equipment or on the control panels that may be shown on the Interconnection Drawings.

15.4.2. The Bid shall be based on the assumption of a termination at both ends of every conductor in each cable of the Cable Schedule and an additional fifty (50) #10 cables with 500 total terminations between panels and/or control house equipment. These jumpers may be Class B multi-conductor cables running between panels, including termination.

15.4.3. The Owner shall terminate all cables to existing control panels which are energized. The Contractor shall pull cables to these panels, fan ends, install terminals, and leave ample cable for making terminations.

15.5. CONTROL CABLE TERMINALS

Ring type compression terminals, which shall be furnished by the Contractor, shall be used at both ends of all control cables and wiring. The ring terminals used shall be non-insulated, tin plated, barrel type with brazed seam and sized for the wire being terminated.

15.6. GROUNDING OF SHIELDED CONTROL CABLE

A terminal block has been provided at the top of each relay control panel for terminating the ground conductor of each shielded control cable. Each ground conductor from the shielded cables will land individually on a terminal space, and be identified with its appropriate cable name. The Contractor shall provide amp type Termi-foil connectors for jumper connections between the control cable shields to the panel ground terminal block. The jumper wire size shall be a stranded #10 AWG.

15.7. LENGTH OF CABLES FOR CONTROL PANELS

All cables pulled to the control panels shall be sized to reach the floor of the panel and back to the top of the relay panel or RTU. The insulation jacket shall then be stripped back to the top of the panel and all cables terminated without cutting individual wires.

16. CONTROL HOUSE ELECTRICAL

16.1. SCOPE

This Section covers the equipment, installation, and wiring necessary for the control house.

16.2. GENERAL

The Contractor shall furnish and install the low-voltage equipment in locations as shown on the Drawings. The installation of low-voltage wiring of this equipment shall conform to the practices set forth in the latest edition of the NEC, unless otherwise specified in these Plans and Specifications. It shall be the Contractor's responsibility to furnish the required quantity of conduit and cable necessary to complete the installation.

16.3. EQUIPMENT AND MATERIALS

16.3.1. All materials, unless otherwise indicated, shall be new, of the first quality, and of the proper type for the use intended. Where applicable, all material shall be in accordance with the latest published NEMA Standards and/or carry the approval of the Underwriters' Laboratories.

16.3.2. The use of a manufacturer's trade name and catalog number is not intended to indicate preference, but only the type and quality of the product desired. Products of reputable manufacturers of equal quality and functional type will be acceptable upon approval of the Project Engineer. Substitutes which tend to lower the quality of the work will not be permitted.

16.4. PLACING EQUIPMENT IN SERVICE

Equipment and electrical circuits shall be checked and tested prior to energization. Notification of the Contract Administrator is to be made before energization of the low-voltage electrical equipment so a representative of the Contract Administrator will be present.

16.5. CONTROL HOUSE ELECTRICAL PANELS

16.5.1. The Contractor shall be responsible for furnishing and installing the control house electrical panels. The exact quantity, locations, and sizes of the panels shall be as shown on the Drawings.

16.5.2. The AC panel shall be Square-D Company Type "NQOD" or an approved equal. The panelboard shall be enclosed in a NEMA 1 enclosure and include lightning protection. The panels shall include a lockable cover and/or door.

16.5.3. The DC panel shall be Square-D Company I-Line Type "HCN" or an approved equal. The panelboard shall be enclosed in a NEMA 1 enclosure. The panels shall include a lockable cover and/or door.

16.5.4. The main breakers and branch circuit breakers shall be conventional bolt on type circuit breakers rated in accordance with the Drawings. The wiring and labeling of each panel breaker shall be as shown on the Drawings.

16.6. CONTROL HOUSE LIGHTING AND OUTLETS

16.6.1. The Contractor shall furnish and install the lighting fixtures for the control house; see Drawings for quantities, types and locations. NOTE: All lighting shall operate at line voltage of 120 volts.

16.6.2. Each exterior lighting circuit shall be dawn-dusk controlled by a single photocell mounted on the exterior of the control house.

16.6.3. The Contractor shall furnish and install the following items as needed to complete the Control House Electrical as shown on the Drawings:

A. Receptacle, ground-type duplex, surface mounted.

B. Receptacle, ground fault circuit-interrupter, duplex, surface mounted.

C. Three way switch, surface mounted.

D. Four way switch, surface mounted.

E. Single pole switch, surface mounted.

F. Junction boxes.

G. Conduit, EMT, PVC, and aluminum, as required.

H. Weatherproof covers for all outdoor switches and receptacles.

I. Smoke detector GE Type 350CX with Form A and C output relays.

16.7. CONTROL HOUSE HVAC EQUIPMENT

16.7.1. The Contractor shall furnish and install, as shown on the Drawings, Trane 2.5 ton packaged split system heat pump with heat strips as follows:

(2) Trane 2/4TEC3F30B1000A Air Handler Unit
(2) Trane 2TWB3030A1000A Condensing Unit
(2) Trane BAYHTR1405000A, 4.8kW Electric Heater
(2) Single Stage Heating/Cooling Programmable Thermostat
(2) Trane TAYPLNM100 Plenum Pedestal Upflow

NOTE: Refer to the Control House Electrical drawing for exact number and locations of the condensers and air handlers. For further details or contact information about this equipment, contact the Project Engineer.

A. The Contractor shall furnish and install ducting, return and supply air grills, and permanent type filters associated with the heat pumps above. The Contractor shall also furnish and install a turning vane to efficiently project air into the control house.

B. For each heat pump specified above, the Contractor shall furnish and install two (2) non-fusible, 2-pole heavy duty disconnect safety switches, 60A, 240VAC, one (1) shall use an indoor NEMA 1 enclosure and one (1) shall use a rain tight NEMA 3R enclosure, the disconnect safety switches shall be manufactured by Square-D Company. After the Contractor has installed each heat pump specified above, the Contractor shall complete the conduit run from the disconnect safety switches to the heat pump units, utilizing a section of liquid-tight flexible conduit sized appropriately for connection to the heat pump units. The Contractor shall then complete the power wiring from the disconnect safety switches to the heat pump units.

16.7.2. The Contractor shall furnish and install one (1) wall mounted exhaust fan (Nutone Model #8070SA with Model #834 washable permanent aluminum-mesh filter, or approved equal) in the bathroom.

16.7.3. The Contractor shall furnish and install one (1) wall mounted exhaust fan, explosion-proof, having a capacity of 100 cfm at 0.375 inch wg static pressure with backdraft damper and wall cap in the battery room. Return register with opposed blade dampers shall be provided and adjusted to balance exhaust airflow to 100 cfm. The Contractor shall submit for approval the battery room exhaust fan and associated equipment. Both wall mounted exhaust fan motors shall be suitable for 120V, single phase, 60Hz operation.

16.8. BATTERY BANK, CONTROL SWITCHBOARD PANELS, & SCADA RTU CABINET

16.8.1. The Owner will furnish two (2) battery banks, two (2) tier battery racks and two (2) battery chargers. The Contractor shall transport the above material from the JEA Commonwealth Service Center warehouse to the jobsite, unload, and store them indoors until assembly by the Manufacturer. The Contractor shall move the material to the control house battery room, upon completion of the battery room, for installation by the Manufacturer.

16.8.2. The Contractor shall install the battery chargers, conduits, AC and DC cables, and grounding conductors as required by the Plans and Drawings prior to requesting assembly of the battery banks. The Contractor shall provide a four (4) week notice before requesting the assembly of the battery banks by the Manufacturer. The Manufacturer shall install, float charge, test, and approve the battery bank for in-service operation.

16.8.3. The Contractor shall request delivery schedule, unload, and install the control switchboard panels (quantity as indicated on the Drawings), and pickup, transport, and install one (1) SCADA RTU cabinet in the locations as shown on the Drawings. The Contractor shall install these panels into the Control House only after the Control House is substantially complete, including installation of the floor sealant. The Contractor shall be responsible for properly leveling the panels and ensuring that all access doors are operable.

16.8.4. The Owner will furnish and install all communications, network, and security switchboard panels within the control house.

16.8.5. The Contractor shall be responsible for all additional incurred cost by JEA if the Contractor is unable to unload and place the relay panels into the control house upon delivery from the Manufacturer.

17. RECEIVING AND OFF-LOADING OF STRUCTURES AND MATERIALS

The Contractor shall be responsible for taking delivery of all Substation Structures and Materials directly from the Manufacturer at the job site. This will require that the Contractor perform the following tasks regarding Substation Structures and Materials delivery as the project progresses:

17.1 The Contractor may assume that the Owner's Manufacturer shall have the Substation Structures and Materials available for shipping in time to meet the scheduled Structures and Materials shipping date which is shown in the Project Schedule in the Attachments of these Specifications.

17.2 As the site work progresses, the Contractor shall notify the Project Engineer in writing (or by electronic mail) at least two (2) weeks in advance of the date of the Contractor's readiness for all Structures and Materials. However, this scheduled delivery date must be within two (2) weeks of the scheduled Structures and Materials shipping date which is listed in the Project Schedule in the Attachments of these Specifications.

17.3 The Owner's Manufacturer will then set an approximate schedule for the shipment of all Substation Structures and Materials directly to the job site and deliver on the date specified by the Contractor, +/- five (5) business days (two week window).

17.4 When the shipper of each shipment is within 48 hours of the Substation site, the shipper will contact the Project Representative to schedule a delivery appointment. The Contractor, shipper, and Project Representative shall then coordinate a firm appointment.

17.5 The Contractor shall then have employees and equipment on-site, throughout normal business hours of that day, to off-load all Substation Structures and Materials within two (2) hours of the shipper's arrival. The Contractor shall then take responsibility of all Substation Structures and Materials, and may store the Structures and Materials on-site in an approved storage area. Approved storage area shall mean any storage location approved by the Project Representative for this specific purpose.

17.6 The JEA Project Representative and the Contractor shall then count, examine, and sign for all Structures and Materials.

18. LABELING

The Contractor shall be responsible for labeling the following newly-installed substation facilities at the job site. This will require that the Contractor perform the following tasks:

18.1. LABELING OF LARGE TRANSFORMERS AND BREAKERS

The Contractor shall provide and install all labeling of all newly-installed large transformers and high-voltage circuit breakers in the switchyard as specified below.

18.1.1. The Contractor shall label the transformers and breakers using spray paint and a block stencil with six (6") inch high letters. The equipment designations to be used are shown on the "SINGLE LINE DIAGRAM" Drawing.

18.1.2. The Contractor shall prepare the surface of the transformers and breakers prior to painting, in a manner approved by the Project Representative. The paint shall be Rust-oleum spray on #7776-830, flat black, or equal as approved by the Project Representative.

18.1.3. The labeling shall be applied, at approximately eye level, in two (2) places: on the right hand side of the cabinet door and another location as specified by the Project Representative.

18.2. LABELING OF HIGH-VOLTAGE SWITCHES

JEA shall provide and the Contractor shall install labeling on all newly-installed high-voltage substation switches at the job site. These switches include high-voltage hook switches, group-operated switches, circuit switchers, and fused disconnect switches which interconnect to the buswork. The labeling of these switches will require that the Contractor perform the following tasks:

18.2.1. The Contractor shall apply labels on the switch support structures as enumerated on the Drawing titled "SINGLE LINE DIAGRAM".

18.2.2. The Contractor shall label the switches using reflective labeling to be provided by JEA through the Project Representative. Note that the Contractor must notify the Project Representative in writing (or by electronic mail) when the Contractor is approximately two (2) weeks away from needing these labels. The Project Representative will then pick up the labels from the JEA storeroom and deliver to the Contractor at the job site.

18.2.3. The labeling shall be applied at a location to be field located by the Project Representative, or a JEA employee who is directed by the Project Representative.

18.3. LABELING OF LOW-VOLTAGE PANELS

The Contractor shall provide and install all labeling of all other low-voltage panels installed in the switchyard as well as low-voltage AC/DC power panels in the control house, as specified below:

18.3.1. The Contractor shall label the cover of every newly installed junction box, AC low-voltage supply panels, DC low-voltage supply panels, and others as labeled on the "CONDUIT PLAN" and the "STATION SERVICE AND YARD PANELS" Drawings. This shall also include the AC low-voltage supply panels and DC low-voltage supply panels in the control house.

18.3.2. The Contractor shall label the covers using a block stencil with three (3") high letters.

18.3.3. The Contractor shall prepare a reasonable portion of the surface of such covers and paint the characters onto the surface. Paint shall be Rust-oleum spray on #7776-830, flat black, or equal as approved by the Project Representative.

18.3.4. The labeling shall be applied, at approximately eye level, centered on the cover, or other location if approved by the Project Representative.

18.3.5. The labeling shall also be hand-written inside the panel, to the panel box itself, in a conspicuous location, using a permanent marker. Sharpie Fine Point Series 30000 Black, or approved equal.

18.4. LABELING OF LOW-VOLTAGE AC/DC SUPPLY BRANCHES

The Contractor shall be responsible for labeling of all newly-installed low-voltage AC/DC supply branches at the job site. This will require that the Contractor perform the following tasks:

18.4.1. The Contractor shall label the branch circuits of each AC/DC supply branch to agree with the designations as shown on the "STATION SERVICE AND YARD PANELS" Drawing.

18.4.2. The Contractor shall label the branch circuits of each AC/DC supply branch in two (2) locations; the panel front surface adjacent to the protection device (breaker) and the branch index sheet provided with the cover of the cabinet.

18.4.3. The branch index sheet shall be neatly typed (or clearly printed in ball-point pen) with the branch names shown on the Drawings for these panels. Two (2) copies of this sheet will be produced by the Contractor and provided to either the Project Representative or the Project Engineer at the final checkout / inspection.

18.4.4. The Contractor shall provide and install labels of each branch on the panel front surface adjacent to the protection device (breaker). The Contractor shall refer to the Project Representative for approval of a labeling system for this purpose.

18.5. LABELING OF SWITCHYARD RECEPTACLES

The Contractor shall provide and install labels on all newly-installed switchyard receptacles at the job site. This will require that the Contractor perform the following tasks:

18.5.1. The Contractor shall apply labels on the switchyard receptacle structures as labeled on the "CONDUIT PLAN" Drawing.

18.5.2. The Contractor shall label the switchyard receptacle structures using a block stencil with three (3") high letters.

18.5.3. The Contractor shall prepare a reasonable portion of the surface of such structures and paint the characters onto the surface. Paint shall be Rust-oleum spray on #7776-830, flat black, or equal as approved by the Project Representative.

18.5.4. The labeling shall be applied at a location to be field located by the Project Representative.

18.5.5. Additionally, the Contractor shall label each receptacle on the inside of the receptacle faceplate or cover using a permanent fine-tip black marker. Sharpie Fine Point Series 30000 Black, or approved equal.

18.6. LABELING OF CONDUITS

The Contractor shall provide and install labels on all newly-installed conduits as a part of this work.
This shall require that the Contractor perform each of the following:

18.6.1. Where conduits enter an electrical panel (AC/DC service panel, control panel, junction box, etc.), the Contractor shall label the conduit in two (2) places:

A. The Contractor shall label the conduit circumferentially, about two (2") inches outside of the box, using a permanent fine-tip black marker. The markings shall be positioned and sized so that a person working on the cabinet may readily see the markings.

B. The Contractor shall also apply the same labels, using a permanent fine-tip black marker, on the interior of the box, conspicuously near the conduit entry points.

18.6.2. Where conduits enter a cable trench, the Contractor shall label the conduit along the axis of the conduit, about two (2") inches below the conduit opening, using a permanent large-tip black marker. The markings shall be positioned and sized so that a person looking downward onto the conduit may readily see the markings.

18.6.3. Where a conduit terminates other than as mentioned above, the Contractor shall label the conduit along the axis of the conduit, about two (2") inches below the conduit termination, using a permanent large-tip black marker.

18.6.4. All conduit identifications shall be those taken from the Conduit Schedule which is attached to these Specifications.

18.7. LABELING OF CABLE

The Contractor shall provide and install labels on all newly-installed cables as a part of this work. This shall require that the Contractor perform each of the following:

18.7.1. All cables are to be labeled:

A. At both ends.

B. Where entering and leaving the cable trench.

C. Where exiting station electrical equipment, to include all AC/DC power panels, power circuit breakers, power transformers, junction boxes, fiber optic, video, and station control panels, etc.

18.7.2. Cable identification tags will be attached to the cable in a manner approved by the Project Representative. The Contractor shall prevent galvanic corrosion and not intermix dissimilar metals (Aluminum-Copper, Stainless Steel-Aluminum) when attaching tags to cables. Plastic cable ties shall not be permitted for exterior applications. Examples of exterior connection methods are lockable beaded chain and metal wire.

18.7.3. Outdoor cable identification tags shall be 1/2" wide stainless steel, Dymo M1011 system, unless otherwise approved by the Project Representative. Indoor cable identification tags shall be RhinoPRO 1/2" flexible nylon labels - black on white, Manufacturer part# 18488, unless otherwise approved by the Project Representative. Indoor labels shall be secured with no less than two plastic cable ties.

18.7.4. All cable identification tags will have the appropriate cable number clearly stamped in no less than 1/4" high characters. Cable numbers are specified on the Cable Schedule attached to these Specifications.

19. SUBSTATION SIGNAGE

The Contractor shall install the following signage on the substation fence, wall, or partitions, and control house entry point(s) as a part of this Work. The signage shall consist of four (4) components, the signs which shall be used on the Perimeter Security Boundary (which shall normally be a fence or a wall), the Perimeter Entry Points (gates, doors, etc.), the Control House Entry Points (typically doors) and inside substation perimeter road (near live equipment, bus, switches etc.).

19.1. Perimeter Signage: The perimeter signage shall consist of signs labeled "WARNING HAZARDOUS VOLTAGE KEEP OUT", placed at approximately Forty (40') foot spacing around the entire perimeter boundary (fence, wall, etc.) and at a conspicuous height, approximately Six (6') feet.

19.1.1. "Warning Hazardous Voltage Keep Out" (JEA Item ID# sigda010),

19.2. Substation Entry Points Signage: Each entryway shall have signage in addition to the requirements of the perimeter signage. Entryways include the fence gates and wall entryways. The entryways shall each have the following four (4) signs:

19.2.1. "WARNING HAZARDOUS VOLTAGE KEEP OUT" (JEA Item ID# SIGDA003)

19.2.2. "SAFETY INSTRUCTIONS / PPE" (JEA Item ID# SIGDA004)

19.2.3. "NOTICE CONTACT SYSTEM DISPATCH BEFORE ENTERING/AFTER SECURING" (JEA Item ID# SIGDA005)

19.2.4. "NOTICE PRIVATE PROPERTY NO TRESPASSING" (JEA ITEM ID# SIGDA012)

19.3. Control House Entry Point Signage: Each Control House Entry Point (door, roll up doors, or any other appurtenance for the admission of persons under reasonable conditions) shall have signage in addition to the requirements mentioned above. For this paragraph, the "Control House" shall be any and every humanly-accessible building within or adjoining to the substation property that contains any electrical apparatus that monitors, controls, or otherwise is essential to the operation of the substation, and is not otherwise designed for novice/public entry and occupancy. Each Control House Entry Point shall each have the following sign:

19.3.1. "NOTICE CONTACT SYSTEM DISPATCH BEFORE ENTERING/AFTER SECURING" (JEA Item ID# SIGDA005)

19.4. Interior Substation Signage: Danger signs to be placed inside substation (at inner perimeter of road, by side of switchgear, near transformers, breakers, capacitor banks, bus, and feeders. The following sign and fiberglass post shall be used:

19.4.1. DANGER HAZARDOUS VOLTAGE KEEP OUT (JEA Item ID# SIGDA011)

19.4.2. FIBERGLASS POST (JEA Item ID# SIGPO014)

19.5. Exact location of the signage may be reviewed and modified with the concurrence of the on-site Project Representative.

19.6. All signs for this Work shall be provided by JEA. The Contractor shall request the signage indicating type and quantity, in writing (by email or other typewritten instrument) from the Project Representative approximately two (2) weeks in advance of need.

19.7. The Contractor may assume that all signs for this Work shall include corner holes riveted with a non-corroding grommet or eyelet. The Contractor shall fasten the signs to the perimeter fence or wall, or control house door, in a manner that is to be submitted in writing (by email or other typewritten instrument) to, and approved by, the Project Representative.

Building Community

PROJECT DESIGN SEGMENT 20410
Substation Breaker Replacement Program
MATERIALS FURNISHED BY OWNER

GENERAL NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRANSPORTING THE CIRCUIT BREAKERS TO THE SUBSTATION SITE, THE CONTRACTOR'S RESPONSIBLITIES IN REGARDS TO SITE ACCESS, FOUNDATIONS AND ASSEMBLY OF THE HIGH VOLTAGE CIRCUIT BREAKERS ARE OUTLINED IN SECTION III OF THESE SPECIFICATIONS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ORDERING THE JEA STOCK MATERIAL THROUGH THE JEA PROJECT REPRESENTATIVE AT LEAST TWO WEEKS IN ADVANCE OF NEED, RECEIVING AND LOADING THE MATERIAL AT AN ARBITRARY JEA LOCATION WITHIN DUVAL COUNTY, FLORIDA, TRANSPORTING THE MATERIAL TO THE SUBSTATION SITE, AND THEN OFFLOADING AND INSTALLING THE MATERIAL AT THE JOBSITE.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRANSPORTING, OFFLOADING AND INSTALLING THE RELAY / CONTROL SWITCHBOARD PANELS INTO THE CONTROL HOUSE AT EACH SITE, FROM AN ARBITRARY JEA LOCATION WITHIN DUVAL COUNTY, FL.
4. ALL MATERIALS PICKED UP OR RECEIVED BY THE CONTRACTOR SHALL REMAIN IN THE CARE, CUSTODY, AND CONTROL OF THE CONTRACTOR UNIL FINAL ACCEPTANCE. CONTRACTOR WILL BE RESPONSIBLE FOR ANY LOSS OR DAMAGE TO SAID MATERIAL.
5. THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING MISCELLANEOUS ITEMS NOT LISTED IN THIS MATERIAL LIST, AS WELL AS ADDITIONAL MATERIALS LISTED ON THE DRAWINGS AND IN THE SPECIFICATIONS. THESE ITEMS INCLUDE, BUT ARE NOT LIMITED TO CONDUIT, CONDUIT FITTINGS AND HARDWARE, GROUNDING CONDUCTOR AND CONNECTORS, CLAMPS, UNISTRUT, FASTENERS, CONNECTORS, POWER CABLE, FITTINGS, ALL LABELING MATERIALS, ETC.

MATERIALS FURNISHED BY OWNER

Substation Breaker Replacement Program

DESCRIPTION	MANUFACTURER	COMMENTS	DELIVERED TO / PICKUP FROM	RESPONSIBILITY FOR TRANSPORT / OFF-LOAD
Aluminum or Copper Conductor	JEA STORE ROOM		SEE NOTE 2	Contractor from JEA Storeroom
Conductor Termination	JEA STORE ROOM		SEE NOTE 2	Contractor from JEA Storeroom
Conductor Spacer	JEA STORE ROOM		SEE NOTE 2	Contractor from JEA Storeroom
5000 FT. SPOOL, SHIELDED CONTROL CABLE, #10, FOUR CONDUCTOR	STORE ROOM STOCK # CAICN016		SEE NOTE 2	Contractor from JEA Storeroom
2500 FT. SPOOL, SHIELDED CONTROL CABLE, #10, EIGHT CONDUCTOR	STORE ROOM STOCK # CAICN017		SEE NOTE 2	Contractor from JEA Storeroom
2500 FT. SPOOL, SHIELDED CONTROL CABLE, #10, TWENTY ONE CONDUCTOR	STORE ROOM STOCK # CAICN018		SEE NOTE 2	Contractor from JEA Storeroom
230 KV POWER CIRCUIT BREAKERS	TBD		SEE NOTE 2	TRANSPORTATION BY JEA OFF-LOAD BY CONTRACTOR
138 KV POWER CIRCUIT BREAKERS	TBD		SEE NOTE 2	TRANSPORTATION BY JEA OFF-LOAD BY CONTRACTOR
69 KV POWER CIRCUIT BREAKERS	MITSUBISHI		SEE NOTE 2	Contractor from JEA Storeroom
28.4 KV POWER CIRCUIT BREAKERS	MITSUBISHI (MEPPI)		SEE NOTE 2	Contractor from JEA Storeroom
Relay Panel	TBD		SEE NOTE 2	Contractor from JEA Storeroom

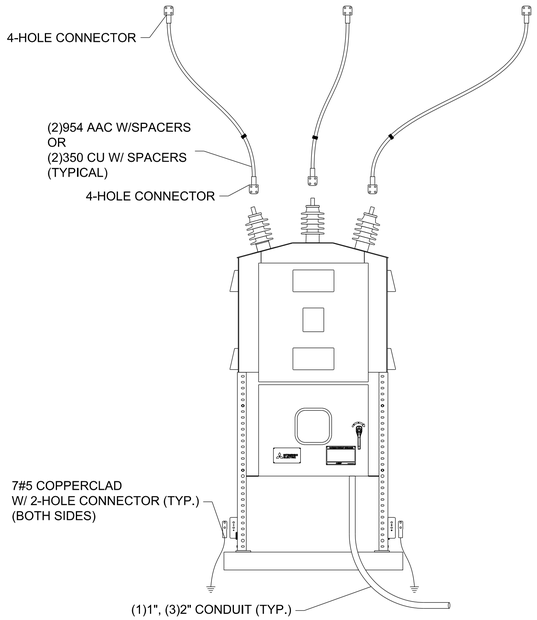
SECTION V - TECHNICAL SPECIFICATIONS – EXAMPLE DRAWINGS

SECTION

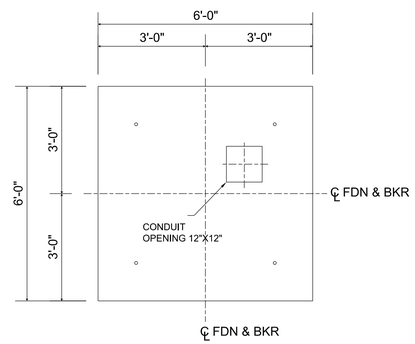
I. TYPICAL BREAKER FOUNDATIONS FOR 28 KV, 72 KV, 145 KV AND 245 KV

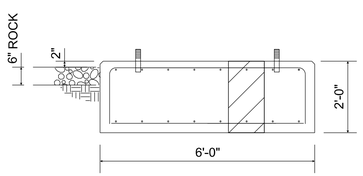
II. EXAMPLE DRAWING PACKAGE FOR 28 KV BREAKER REPLACEMENTS

III. EXAMPLE DRAWING PACKAGE FOR 245 KV BREAKER REPLACEMENTS



FRONT VIEW

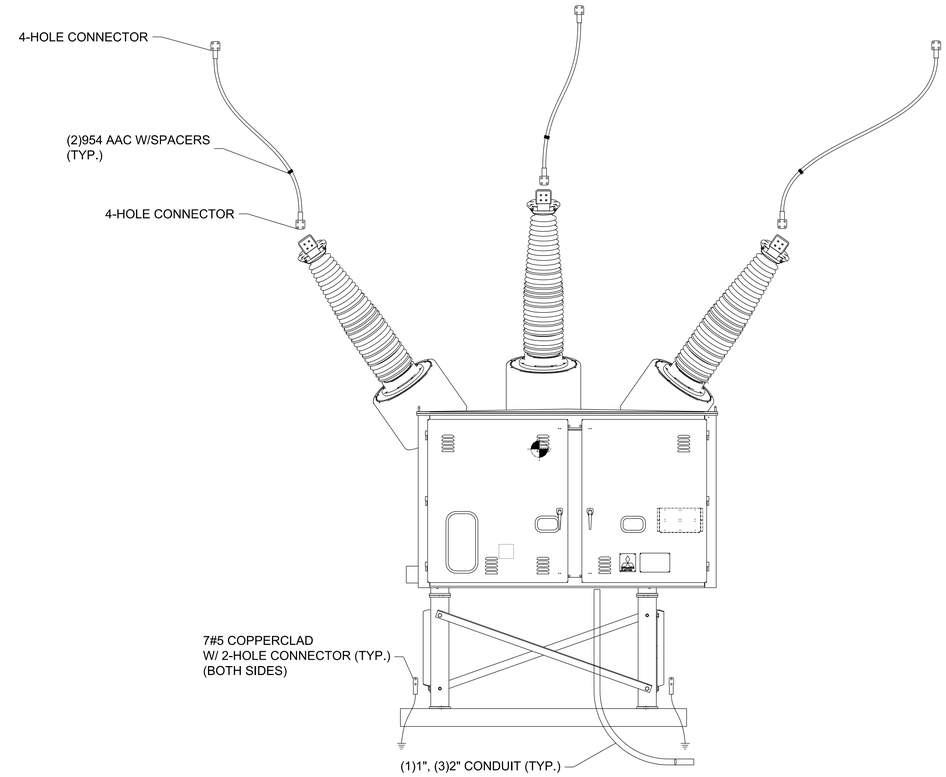




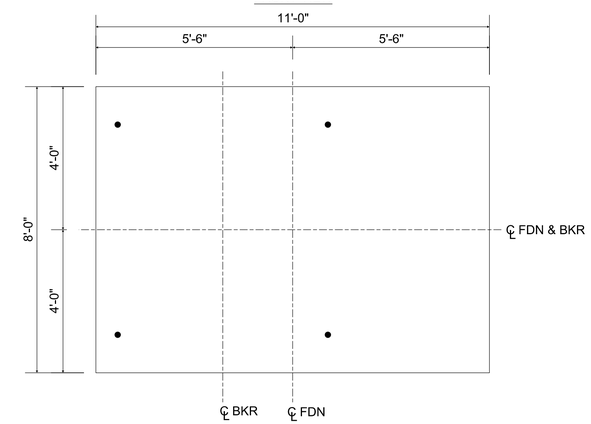
ANCHOR BOLTS:
RED HEAD TRUEBOLT #WW-10090, 303/304
STAINLESS STEEL, 1" x 9" SIZE, W/ (1) FLAT & (1) HEX
NUT

REBAR:
#6 @ 10" O.C. TOP & BOT, BOTH WAYS

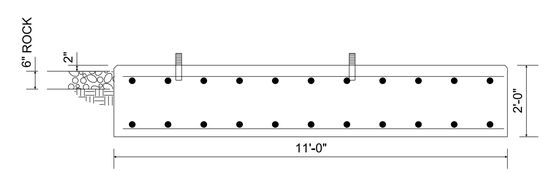
BR1 — 28KV CIRCUIT BREAKER (TYP.)
SCALE: 1/2"=1'-0"



FRONT VIEW



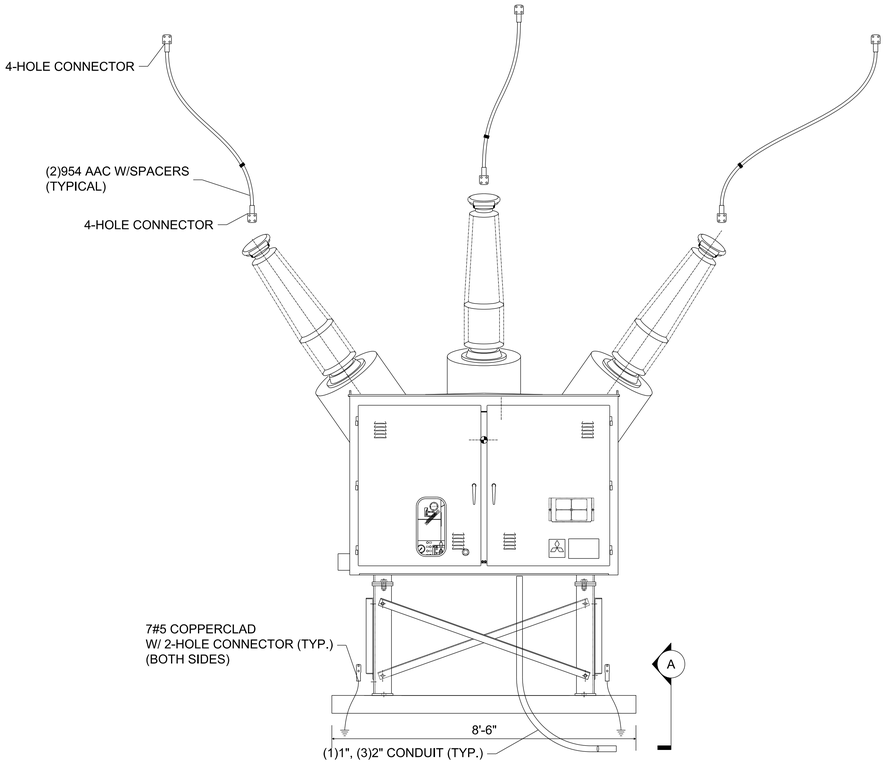
SECTION A



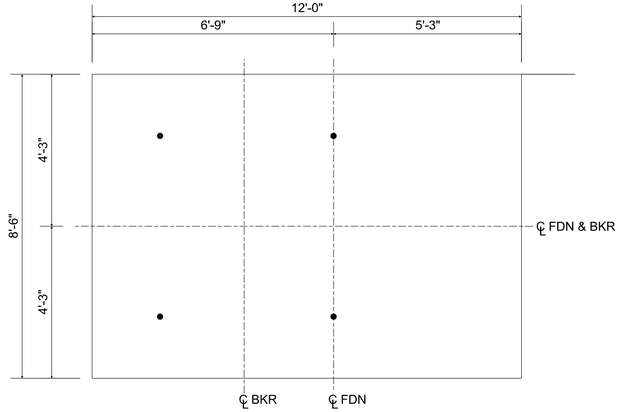
ANCHOR BOLTS:
RED HEAD TRUEBOLT #WW-10090, 303/304
STAINLESS STEEL, 1" x 9" SIZE, W/ (1) FLAT & (1) HEX
NUT

REBAR:
#6 @ 12" O.C. TOP & BOT, BOTH WAYS

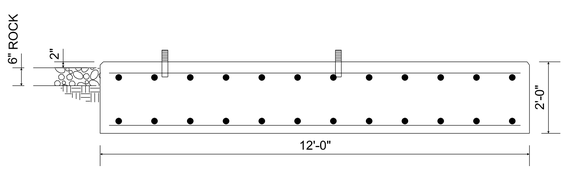
BR2 — 72KV CIRCUIT BREAKER (TYP.)
SCALE: 1/2"=1'-0"



FRONT VIEW



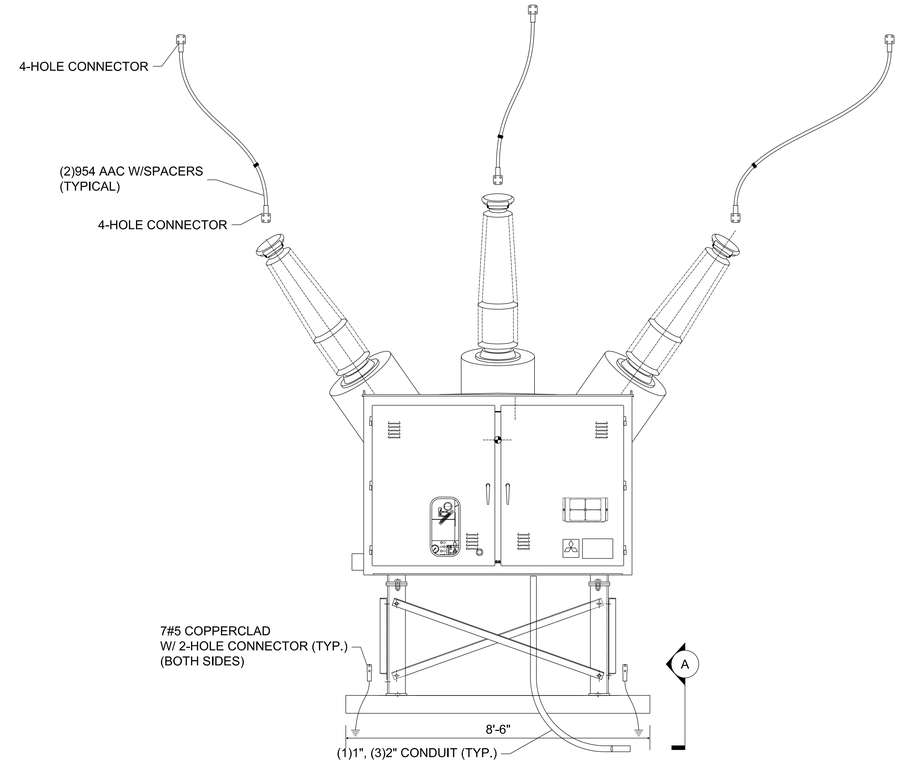
SECTION A



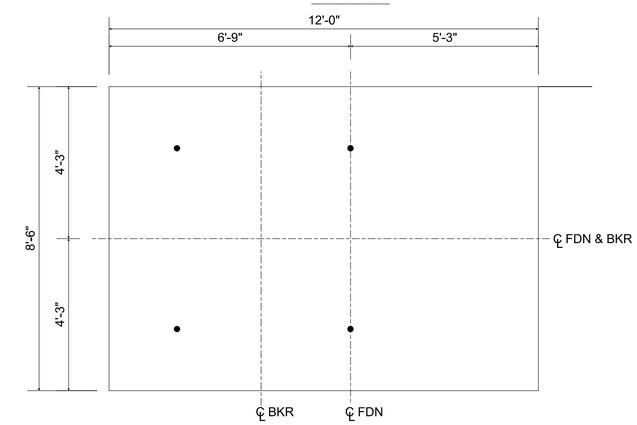
ANCHOR BOLTS:
RED HEAD TRUEBOLT #WW-10090, 303/304
STAINLESS STEEL, 1" x 9" SIZE, W/ (1) FLAT & (1) HEX
NUT

REBAR:
#6 @ 10" O.C. TOP & BOT, BOTH WAYS

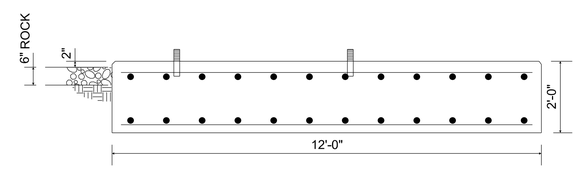
BR3 145KV CIRCUIT BREAKER (TYP.)
SCALE: 1/2"=1'-0"



FRONT VIEW



SECTION A



ANCHOR BOLTS:
RED HEAD TRUEBOLT #WW-10090, 303/304
STAINLESS STEEL, 1" x 9" SIZE, W/ (1) FLAT & (1) HEX
NUT

REBAR:
#6 @ 10" O.C. TOP & BOT, BOTH WAYS

BR4 245KV CIRCUIT BREAKER (TYP.)
SCALE: 1/2"=1'-0"

VICINITY MAP

N.T.S.

LOCATION: 3919 HARTLEY ROAD, JACKSONVILLE, FL 32257

N

INDEX TO DRAWINGS			
DWG #	DRAWING NAME	TOTAL SHEETS	DRAWING TITLE
01	OV2019-CV	1	COVER SHEET
02	OV2019-FP	1	FOUNDATION PLAN
03	OV2019-SL	1	SINGLE LINE DIAGRAM
04	OV2019-ED	1	ELECTRICAL DETAILS
05	OV2019-GP	1	GROUNDING PLAN
06	OV2019-CP	1	CONDUIT PLAN VIEW
07	OV2019-CS	1	CONDUIT SCHEDULE
08	OV2019-CT	1	CABLE SCHEDULE
09	OV2019-LV	1	LOW VOLTAGE

CONSTRUCTION DRAWINGS

FOR THE

OAKWOOD VILLA SUBSTATION BREAKER 25T1 REPLACEMENT

BUILDING COMMUNITY

SUBSTATION & TRANSMISSION PROJECTS 20410

PROJECT # 8005239

JEA.ARCHD.24X36 (02/17) , HR172CVI.dgn 2017-4-22 - 14:32

JEA
BUILDING COMMUNITY
21 W CHURCH ST.
JACKSONVILLE, FLORIDA 32202

ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER'S SEAL

LATEST REVISION ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF

PE: -

LIC. NO.: -

STATE: -

DATE: -

REV	DATE	PROJ #	REVISION DESCRIPTION	BY	REVIEW
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

ENGINEERING	
DATE	5-23-19
BY	BLS
REVIEW	-
DRAFTING	
DATE	5-23-19
BY	BLS
REVIEW	-

BREAKER 25T1 REPLACEMENT

COVER SHEET

OAKWOOD VILLA SUBSTATION

SCALE: -

SUBSTATION & TRANSMISSION PROJECTS 20410

PROJ #: 8005239

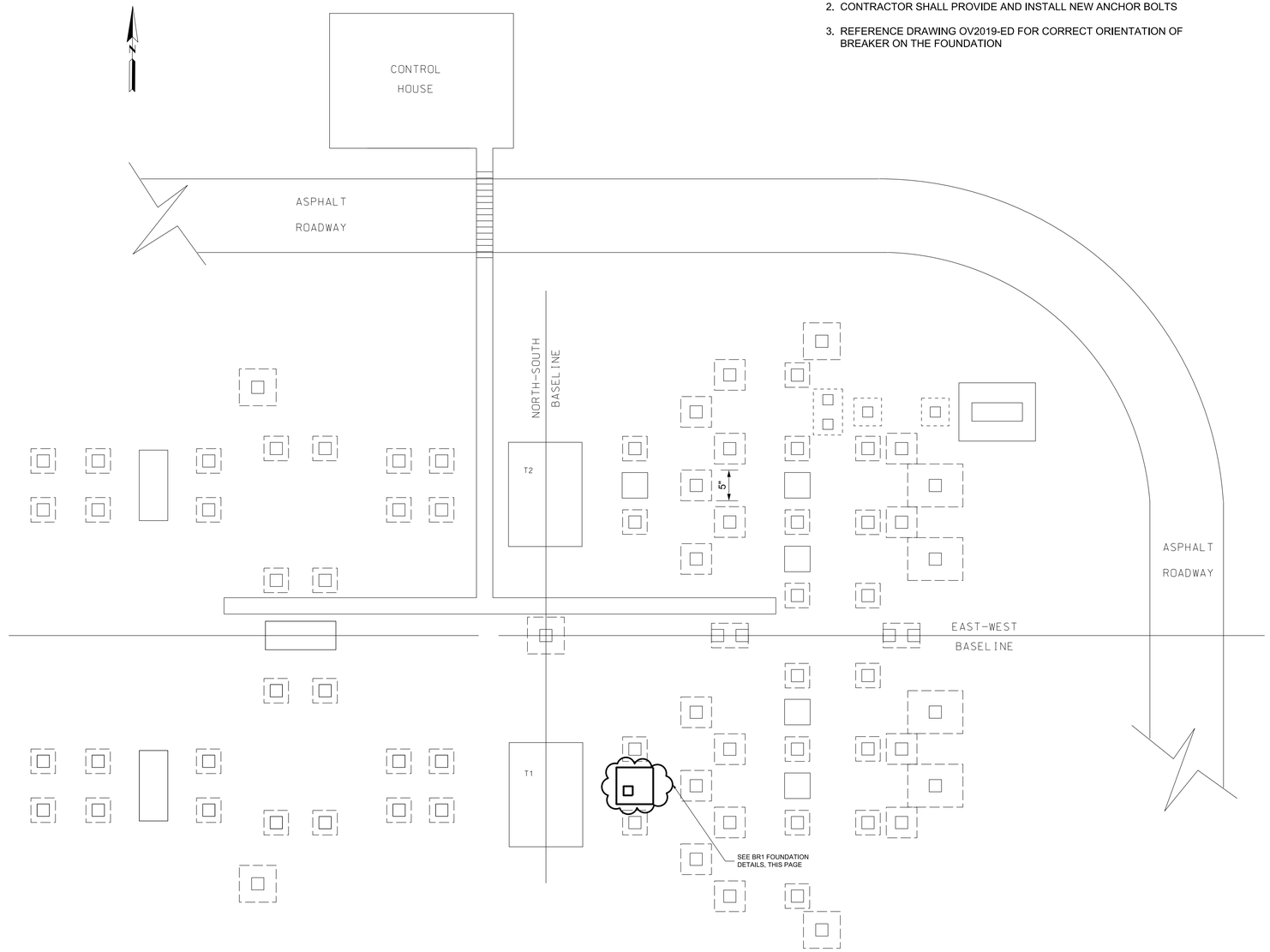
DRAWING NAME: OV2019-CV

DRAWING SET: OV2019

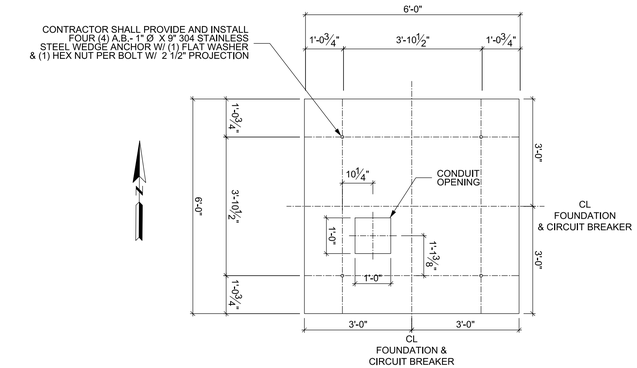
DRAWING #: 01 OF 09

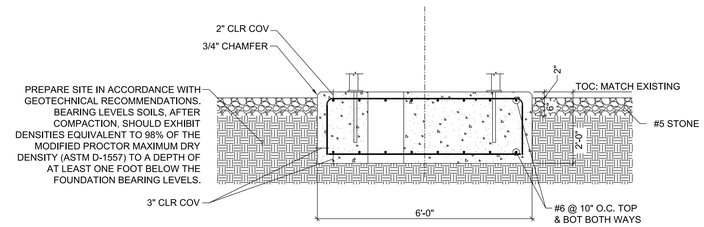
CONSTRUCTION NOTES

1. CONTRACTOR SHALL REMOVE EXISTING FOUNDATION & INSTALL NEW FOUNDATION AS SHOWN ON THIS DRAWING
2. CONTRACTOR SHALL PROVIDE AND INSTALL NEW ANCHOR BOLTS
3. REFERENCE DRAWING OV2019-ED FOR CORRECT ORIENTATION OF BREAKER ON THE FOUNDATION



PLAN VIEW — FOUNDATION PLAN
SCALE: 1" = 10' - 0"





BR1 — FOUNDATION "BR1"
SCALE: 1" = 2' - 0"

GENERAL NOTES:

1. CONCRETE CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF THE AMERICAN CONCRETE INSTITUTE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318) AND ACI STANDARD SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS (ACI 301).

2. UNLESS OTHERWISE NOTED, ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4".

3. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 P.S.I. IN 28 DAYS.

4. REINFORCING BARS SHALL CONFORM TO A.S.T.M. A615, A616 OR A617 GRADE 60 AS AMENDED TO DATE.

5. UNLESS OTHERWISE SHOWN ON DRAWINGS, MINIMUM COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS:

CAST-IN-PLACE CONCRETE: MIN COVER:
CAST AGAINST AND PERMANENTLY
EXPOSED TO EARTH.....3"
AFTER REMOVAL OF FORMS:
#6 THRU #8 BARS.....2"
#5 AND SMALLER.....1 1/2"

6. ALL REINFORCEMENT SHALL BE HELD SECURELY IN PLACE WITH STANDARD ACCESSORIES DURING PLACEMENT OF CONCRETE.

7. SPLICES IN REINFORCING WHERE PERMITTED SHALL BE AS FOLLOWS:
TEMPERATURE REINFORCING---------- 12"
ALL OTHERS---------- 24 X BAR DIA.
WELDED WIRE FABRIC---------- 6"

8. THE CONTRACTOR SHALL FURNISH ALL ANCHOR BOLTS INDICATED, ANCHOR BOLTS FURNISHED SHALL BE IN ACCORDANCE WITH A.S.T.M. A307.

9. ALL EXPOSED ANCHOR BOLT THREADS SHALL BE TAPED BEFORE FOUNDATIONS ARE POURED.

10. THE BOTTOM OF EACH EXCAVATION SHALL BE INSPECTED BY THE PROJECT REPRESENTATIVE BEFORE THE PLACEMENT OF ANY REINFORCING TO DETERMINE IF SOIL WITH ADEQUATE BEARING CAPACITY IS PRESENT. UNSUITABLE SOIL SUCH AS MUCK, PEAT OR SILT SHALL BE REMOVED. THE ENGINEER SHALL BE CONSULTED TO DETERMINE THE DEPTH OF REMOVAL

11. THE BOTTOMS OF ALL EXCAVATIONS SHALL BE COMPACTED TO AT LEAST 97 % OF MAXIMUM DENSITY PER AASHTO T99. PRIOR TO SUCH COMPACTION, THE GROUND WATER SHALL BE LOWERED TO A DEPTH OF AT LEAST 1.0 FOOT BELOW THE BOTTOM OF EXCAVATION. COMPACTION TESTS SHALL BE PERFORMED AS PER SECTION, SUBSECTION 1 OF THE CIVIL SPECIFICATIONS.

12. FILL AROUND FOUNDATIONS SHALL BE COMPACTED IN 6" LAYERS UP TO FINISHED GRADE BEFORE ERECTION OF STEEL IS BEGUN. BACKFILL TO BE SOUND CLEAN SOIL, FREE OF ORGANIC MATERIALS.

13. ALL STRUCTURAL OPENINGS AROUND OR AFFECTED BY MECHANICAL OR ELECTRICAL EQUIPMENT SHALL BE VERIFIED WITH EQUIPMENT PURCHASED BEFORE PROCEEDING

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DATE: -

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1	6-06-19	8005239	CORRECTED NOTES AND ADDED PROJECTION ON ANCHOR BOLTS	BLS	-
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DATE	5-23-19
BY	BLS
REVIEW	-
DRAFTING	
DATE	5-23-19
BY	BLS
REVIEW	-

BREAKER 25T1 REPLACEMENT

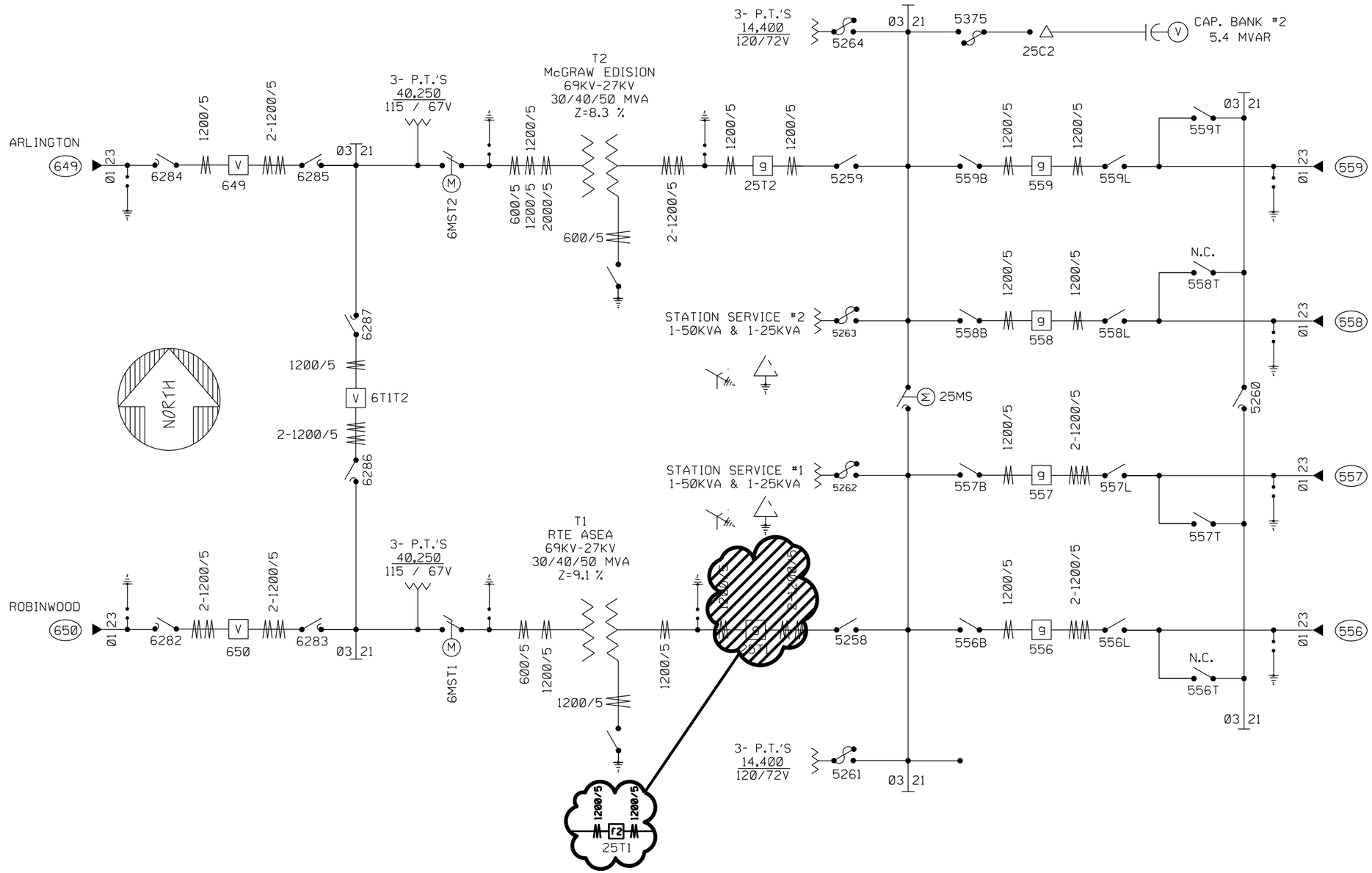
FOUNDATION PLAN

OAKWOOD VILLA SUBSTATION

SCALE: AS SHOWN
SUBSTATION & TRANSMISSION PROJECTS 20410
PROJ #: 8005239

DRAWING NAME: OV2019-FP
DRAWING SET: OV2019
DRAWING #: 02 OF 09

JEA ARCHD (ANSI) (02/17) HRITZEDI.dgn 2017-6-23 - 16:05



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BREAKER 25T1 REPLACEMENT

SINGLE LINE DIAGRAM

OAKWOOD VILLA SUBSTATION

SCALE: -

SUBSTATION & TRANSMISSION PROJECTS 20410

PROJ #: 8005239

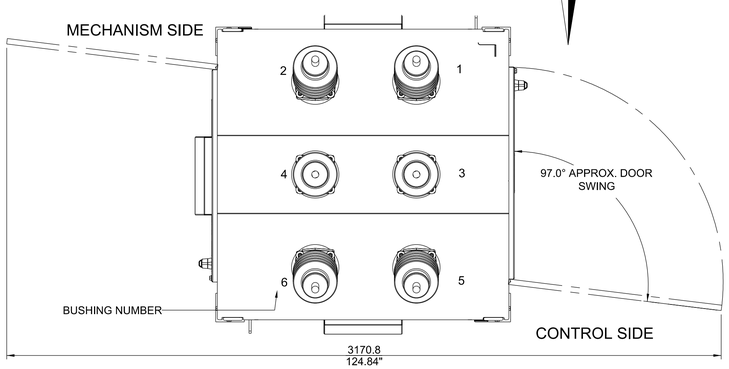
DRAWING NAME: OV2019-SL

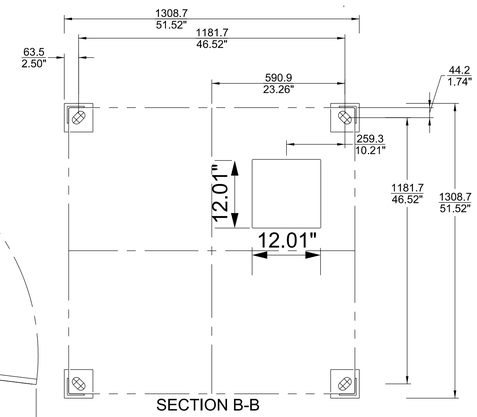
DRAWING SET: OV2019

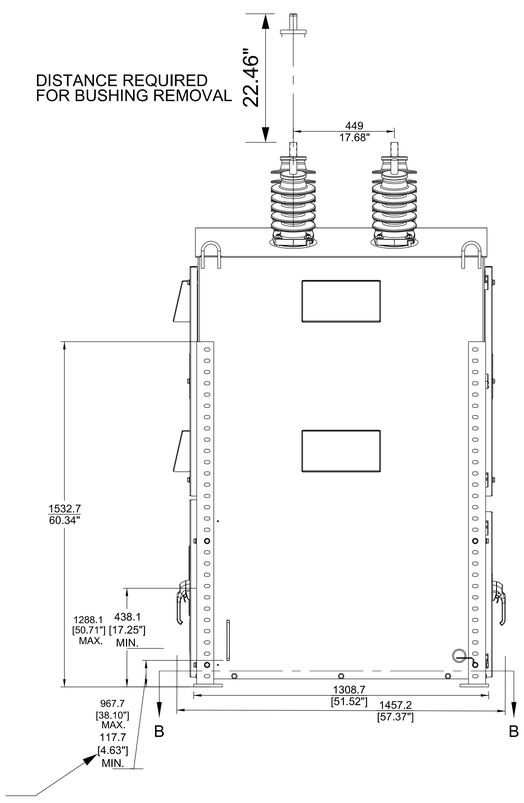
DRAWING #: 03 OF 09

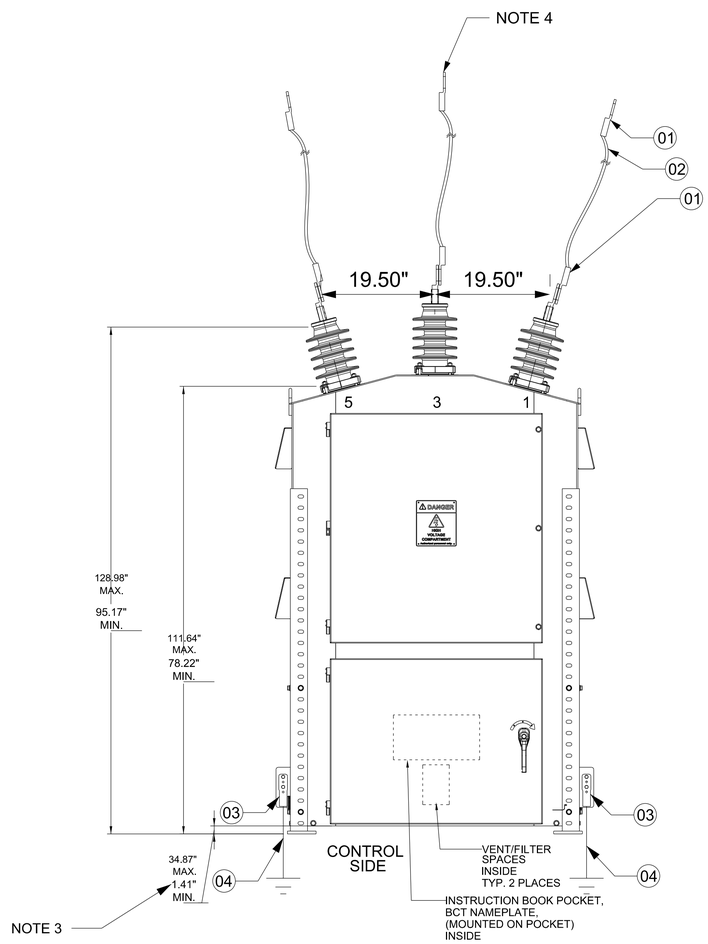
432"

ITEM #	QTY	UNIT	DESCRIPTION	JEA PART #	COMMENTS	REV
1	12	EA	2 CABLE-TO-FLAT 4 HOLE, BOLTED	CNNTL774	use for switch/breaker bushing terminations	
2	75	LF	(2 PER PHASE) 350 KCM, 37 STRAND, MEDIUM HARD DRAWN, BARE COPPER	COBCO036	length is approximate (contractor to verify)	
3	2	EA	CABLE-TO-FLAT 2 HOLE, BOLTED STRAIGHT, TIN PLATED BRONZE	CNNTL730	for grounding	
4	75	LF	7 # 5 COPPERWELD	COBCW016	length is approximate (contractor to verify)	
5	50	EA	BOLT KIT FOR CONNECTORS	BOLTE001		









BREAKER INFORMATION:

NOTES:

1. **RATINGS:**
   - RATED MAXIMUM VOLTAGE ..... 28.4 kV
   - RATED CONTINUOUS CURRENT 1200A
   - RATED SHORT CIRCUIT CURRENT ..... 25 kA
   - RATED DRY WITHSTAND VOLTAGE (60 Hz) ..... 60 kV
   - RATED FULL WAVE IMPULSE WITHSTAND VOLTAGE (PEAK) ..... 150 kV
2. **WEIGHT:**
   - TOTAL & SHIPPING WEIGHT (APPROX.) ..... 1292 kg [2850 lbs]
3. **INSULATOR:**
   - TYPE ..... PORCELAIN
   - MINIMUM CREEPAGE DISTANCE ALONG SURFACE ..... 673 [26.5"]
4. **SURFACE TEATMENT:**
   - SUPPORT STRUCTURE ..... HOT DIPPED GALVANIZED
   - HOUSING ..... PAINT ANSI 70 LIGHT GRAY INSIDE AND OUTSIDE
5. **DYNAMIC LOADING:**
   - HORIZONTAL – (ACTING ALONG TANK CENTER LINE) ..... 0.33kN [74-lb]
   - VERTICAL UP – (ACTING THROUGH CG) ..... 1.62kN [365-lb]
   - VERTICAL DOWN – (ACTING THROUGH CG) ..... 2.10kN [472-lb]
   - VERTICAL FORCES ADD TO OR SUBTRACT FROM BREAKER WEIGHT.
6. **INSTALLATION NOTE:**
   LEVEL THE BREAKER BY INSERTING SHIMS BETWEEN THE BREAKER STRUCTURE AND THE FOUNDATION.
7. **HEIGHT DIMENSIONS:**
   INCREMENTALLY CHANGE BY 50mm (1.96 in) RELATIVE TO LEG ADJUSTMENT.

CONSTRUCTION NOTES:

1. CONTRACTOR SHALL REMOVE FROM FOUNDATION AND PROPERLY DISPOSE OF EXISTING BREAKER DURING A CONTRACTOR COORDINATED OUTAGE WITH SOCC AND SUB/RELAY O&M.
2. INSTALL BREAKER TO MATCH BUSHING NUMBERS RELATIVE TO NORTH ARROW. BREAKER SHALL BE SET AT CENTER OF NEW FOUNDATION.
3. SET BOTTOM OF BREAKER CABINET TO HEIGHT OF ~29" FROM TOP OF FOUNDATION (3RD POSITION FROM TOP). THIS IS THE RECOMMENDED HEIGHT, BUT MAY NEED TO BE ADJUSTED FOR LOCATIONS WHERE CLEARANCES ARE AN ISSUE.
4. INSTALL JUMPERS AND TERMINALS AS SHOWN.
5. BOND EXISTING COPPER FROM GROUND GRID TO EQUIPMENT ON EACH SIDE OF THE BREAKER AS SHOWN
   - IF EXISTING GROUND TAIL CANNOT REACH EQUIPMENT, THEN A NEW 7#5 COPPERWELD SHALL BE INSTALLED FROM THE GROUND GRID USING APPROVED EXOTHERMIC CADWELD PLUS MOLDS MANUFACTURED BY CADWELD. INSTALLATION SHALL STRICTLY FOLLOW MANUFACTURER'S INSTRUCTIONS.
6. CONTRACTOR SHALL LABEL THE NEW BREAKER.

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BREAKER 25T1 REPLACEMENT

ELECTRICAL DETAILS

OAKWOOD VILLA SUBSTATION

SCALE: N.T.S.

SUBSTATION & TRANSMISSION PROJECTS 20410

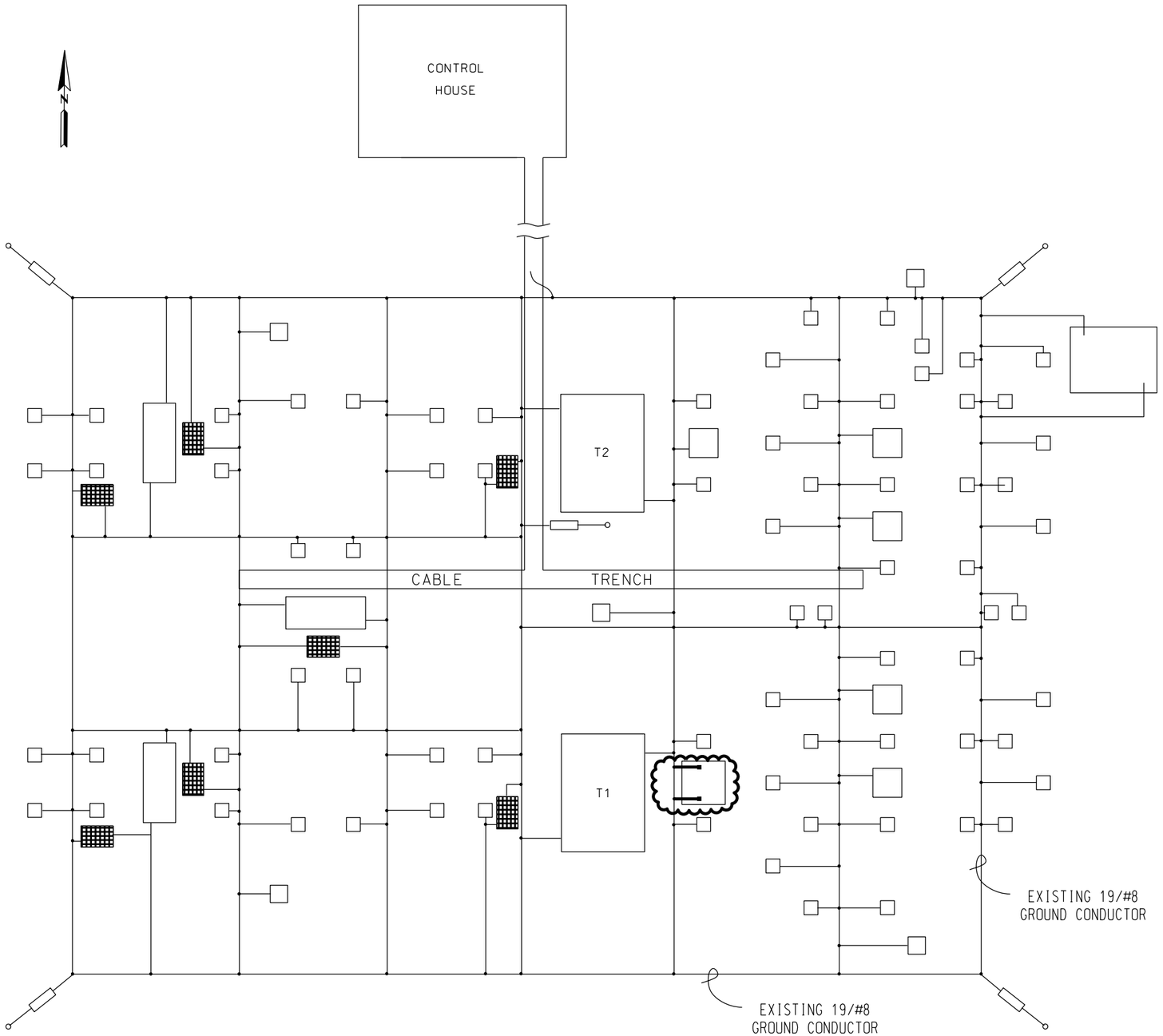
PROJ #: 8005239

DRAWING NAME: OV2019-ED

DRAWING SET: OV2019

DRAWING #: 04 OF 09

JEA ARCH-D 24X36 (00177) HR172ED1.dgn 2017-6-23 - 16:05



GENERAL NOTES:

1. THE EXISTING STATION MAIN GROUND GRID IS CONSTRUCTED OF 19/#8 COPPERWELD. CONTRACTOR SHALL INSTALL 7#5 COPPERWELD FOR TWO (2) NEW TAPS TO GROUND GRID.
2. ALL EXCAVATION WORK FOR CONDUIT AND GROUND GRID SHALL BE PERFORMED VIA HAND DIGGING. GRID SHOWN IN APPROXIMATE LOCATION. CONTRACTOR SHALL HAND EXCAVATE AND LOCATE EXISTING GROUND GRID
3. ALL REQUIRED MATERIAL FOR CADWELD CONNECTIONS TO BE FURNISHED AND INSTALLED BY CONTRACTOR. OWNER WILL SUPPLY COPPERWELD, BUT CONTRACTOR WILL TRANSPORT FROM JEA STOREOOM.
4. ALL GROUND GRID CONDUCTOR AND TAPS SHALL HAVE A MINIMUM EARTH COVER OF EIGHTEEN (18) INCHES EXCEPT WHERE CONNECTED TO STRUCTURES AND EQUIPMENT ABOVE GRADE.
5. REFERENCE DRAWING OV2019-ED FOR GROUND PAD LOCATIONS ON BREAKER

LEGEND:

- INDICATES EXISTING GROUNDING GRID (LOCATIONS SHOWN ARE APPROXIMATE)
- INDICATES GROUND GRID TO BE ADDED
- ● NEW GROUND CONNECTION BY EXOTHERMIS PROCESS (BY CONTRACTOR)
- ■ NEW MECHANICAL GROUND CONNECTION (BY CONTRACTOR)

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BREAKER 25T1 REPLACEMENT

GROUNDING PLAN

OAKWOOD VILLA SUBSTATION

SCALE: 1" = 8'-0"

SUBSTATION & TRANSMISSION PROJECTS 20410

PROJ #: 8005239

DRAWING NAME: OV2019-GP

DRAWING SET: OV2019

DRAWING #: 05 OF 08

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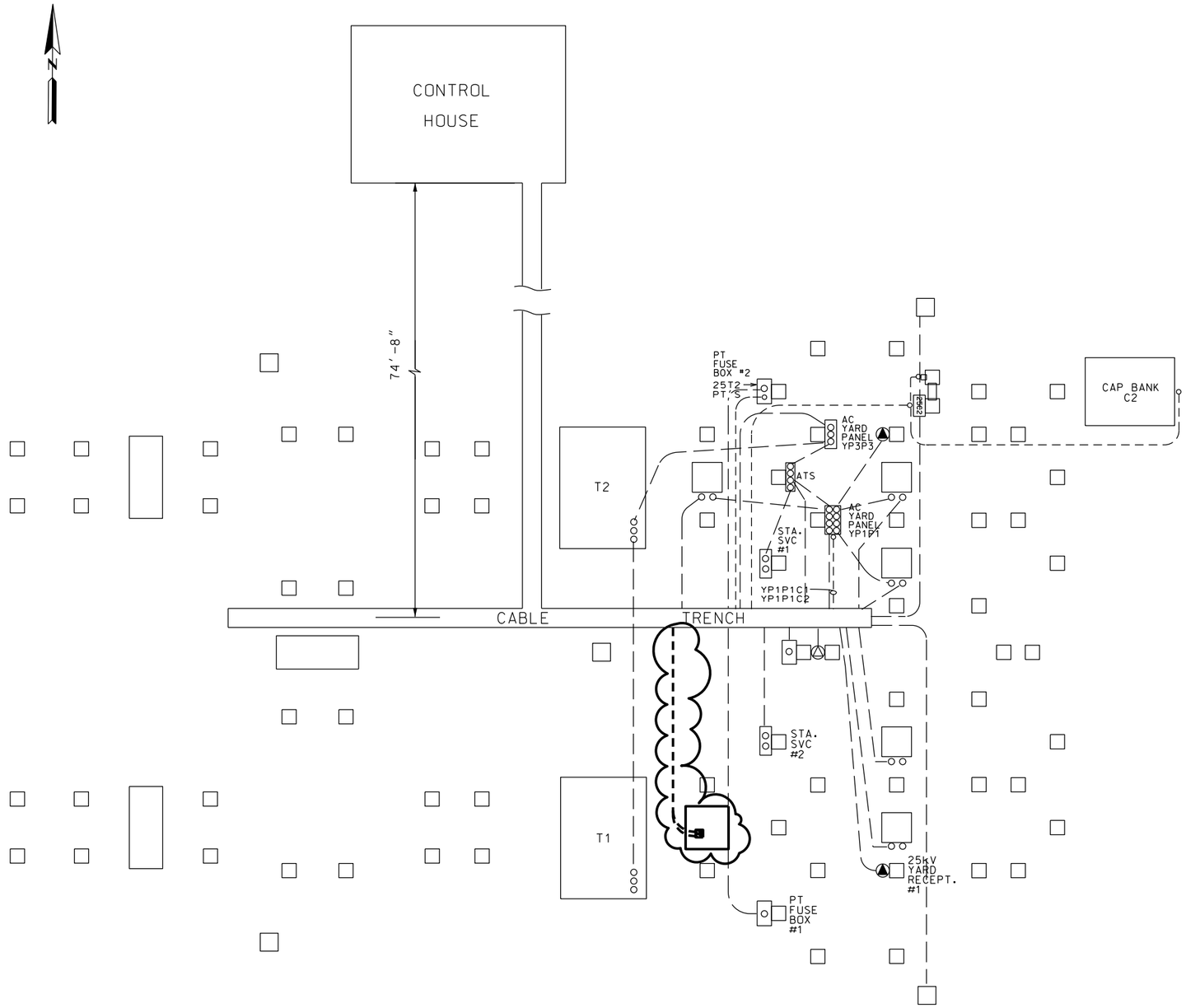

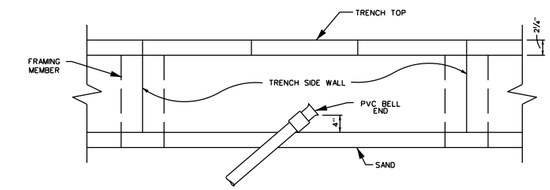

CONDUIT ENTRANCE TO CABLE TRENCH DETAIL
N.T.S.

CONDUIT PLAN NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING AND INSTALLING ALL CONDUIT, AS LISTED IN THE CONDUIT SCHEDULE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PULLING ALL CABLES LISTED IN THE CABLE SCHEDULE. THE CONTRACTOR SHALL NOT TERMINATE CABLES, UNLESS SPECIFIED BY THE RELAY ENGINEER OF THE PROJECT.
2. THE CONDUIT LOCATIONS SHOWN ON THIS DRAWING ARE APPROXIMATE ONLY. CONDUIT SHALL BE INSTALLED 18" MINIMUM BELOW FINISHED SUBGRADE ELEVATION WHICH WILL PROVIDE A COVER OF 22" MINIMUM BELOW ROCK SURFACING.
3. ALL ABOVE GRADE CONDUIT SHALL BE EITHER RIGID GALVANIZED STEEL OR ULTRA-VIOLET RESISTANT PVC, SCHEDULE 40. ABOVE GRADE CONDUIT SHALL BE INSTALLED TO CLOSELY CONFORM TO THE FOUNDATION AND STRUCTURE TO WHICH IT IS TO BE MOUNTED.
4. ELBOW RADIUS FOR 2" NON-FIBER OPTIC CONDUITS SHALL BE 24" UNLESS OTHERWISE NOTED.
5. ALL CABLES SHALL BE CLEARLY LABELED AT BOTH ENDS AND AT ALL ENTRANCE AND EXIT POINTS TO THE CABLE TRENCH. ALL CONDUIT RUNS SHALL ALSO BE CLEARLY LABELED AT BOTH ENDS. REFER TO SPECIFICATION SECTION IX FOR LABELING DETAILS.
6. CONTRACTOR SHALL INSTALL STRING THROUGH SPARE CONDUIT(S).
7. AFTER THE INSTALLATION AND BACKFILLING OF THE UNDERGROUND CONDUITS, THE CONTRACTOR SHALL COMPACT THE AREA TO THE SAME DENSITY, AND WITH SIMILAR MATERIAL, AS THE ADJACENT UNDISTURBED MATERIALS.
8. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL CONDUIT AND CABLE LENGTHS AND LOCATIONS.
9. PULLBOX(ES) MAY BE FLOODED WITH WATER AND MAY NEED TO BE PUMPED PRIOR TO BEGINNING WORK.

LEGEND:

- EXISTING CONDUIT (LOCATIONS SHOWN ARE APPROXIMATE)
- NEW CONDUIT (LOCATIONS SHOWN ARE APPROXIMATE)
- EXISTING FOUNDATION
- NEW FOUNDATION

CONDUIT AND CABLE TRENCH PLAN - 26KV YARD

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BREAKER 25T1 REPLACEMENT

CONDUIT PLAN VIEW

OAKWOOD VILLA SUBSTATION

SCALE: 1" = 8'-0"

SUBSTATION & TRANSMISSION PROJECTS 20410

PROJ #: 8005239

DRAWING NAME: OV2019-CP

DRAWING SET: OV2019

DRAWING #: 06 OF 09

JEA ARCHD ANSI (22.0IN) MR17251.dgn 25-Oct-21 16:05

CONDUIT SCHEDULE

CONDUIT NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY CONDUIT MATERIALS, INCLUDING FITTINGS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL CONDUIT LENGTHS. CONDUIT LENGTHS ARE APPROXIMATE.
3. CONTROL HOUSE CONDUIT EXPOSED RUNS SHALL BE EMT. CONTRACTOR MAY CONCEAL CONTROL HOUSE CONDUIT WITHIN BLOCK WALLS UNLESS STATED OTHERWISE IN THE DRAWINGS. CONTRACTOR SHALL NOT CONCEAL ALUMINUM CONDUIT RUNS.
4. ALL RUNS WITHIN BATTERY ROOM SHALL UTILIZE ALUMINUM CONDUIT. PENETRATIONS THROUGH THE BLOCK WALL SHALL UTILIZE PVC COATED ALUMINUM TO PROVIDE SUFFICIENT ALKALI CORROSION PROTECTION, WITH PENETRATION PROPERLY SEALED.

CONDUIT LEGEND:

UV	UV RESISTANT PVC CONDUIT, SCH 40
EMT	ELECTRICAL METALLIC TUBING
RMC	RIGID METALLIC (GALVANIZED STEEL) CONDUIT
IMC	INTERMEDIATE METALLIC CONDUIT
LFM	LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT
WW	SQAURE WIREWAY

CONDUIT #	FROM	TO	SIZE (IN)	TYPE	LENGTH (FT)	CABLE IN CONDUIT	REMARKS	REV
25T1C1	BKR 25T1	CABLE TRENCH	3	UV	40	25T1/C1, 25T1/PH	NEW 3" CONDUIT	0
25T1C2	BKR 25T1	EXISTING CONDUIT	3	UV	10	25T1/C2, 25T1/T1PR	INTERCEPT EXISTING CONDUIT NEAR BKR	0
25T1C3	BKR 25T1	EXISTING CONDUIT	2.5	UV	10	SPARE	INTERCEPT EXISTING CONDUIT NEAR BKR (VERIFY SIZE)	0
25T1C4	BKR 25T1	EXISTING CONDUIT	1.5	UV	10	25T1/AC	INTERCEPT EXISTING CONDUIT NEAR BKR (VERIFY SIZE)	0

USE EXISTING CONDUIT WHERE NOTED; INSTALL LB AND/OR FLEX TO NEW BREAKER CONDUIT OPENING

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BREAKER 25T1 REPLACEMENT

CONDUIT SCHEDULE

OAKWOOD VILLA SUBSTATION

SCALE: -

SUBSTATION & TRANSMISSION PROJECTS 20410

PROJ #: 8005239

DRAWING NAME: OV2019-CS

DRAWING SET: OV2019

DRAWING #: 07 OF 09

JEA ARCH-D (ANSI) (22X17) HR1720V1.dgn 2017-5-22 - 14:32

CABLE SCHEDULE

CABLE NOTES:

1. TYPE B, BS, F, AND FO CABLE SHALL BE FURNISHED BY THE OWNER, UNLESS OTHERWISE SPECIFIED.
2. THE CONTRACTOR SHALL FURNISH ALL OTHER CABLE, AS SPECIFIED.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL CABLE LENGTHS. CABLE LENGTHS ARE APPROXIMATE.

CABLE LEGEND:

A	THHN INSULATED COPPER CONDUCTOR
B	CONTROL CABLE
BS	SHIELDED CONTROL CABLE
C	RHW, THHW, OR THWN INSULATED COPPER CONDUCTOR
F	INSTRUMENT CABLE
FO	FIBER OPTIC CABLE
M	MULTIPLE CONDUCTOR
S	SINGLE CONDUCTOR
TRAY	CONTROL HOUSE CABLE TRAY
TRENCH	CABLE TRENCH

CABLE #	FROM	TO	VOLT (V)	SIZE	#C	S/M	TYPE	LENGTH (FT)	CONDUIT ROUTE	REMARKS	REV
DA 25T1/ C1	*Breaker 25T1*	*Rack 1*							*REMOVE THIS CABLE*	*Breaker 25T1 Controls*	
130A	*Breaker 25T1*	*69kV Panel 5*							*REMOVE THIS CABLE*	*Breaker 25T1 Controls*	
130B	*Breaker 25T1*	*69kV Panel 5*							*REMOVE THIS CABLE*	*Breaker 25T1 Controls*	
131	*Breaker 25T1*	*69kV Panel 5*							*REMOVE THIS CABLE*	*T1 Diff*	
132	*Breaker 25T1*	*AC Yard Pnl*							*REMOVE THIS CABLE*	*120 VAC*	
DA 25T1/C2	*Breaker 25T1*	*Rack 1*							*REMOVE THIS CABLE*	*Breaker 25T1 Protection*	
25T1/C1	Breaker 25T1	Rack 1	600	10	21	M	BS	250	25T1C1, TRENCH, TRAY	Breaker 25T1 Control	
25T1/C2	Breaker 25T1	69kV Panel 5	600	10	21	M	BS	265	25T1C2, TRENCH, TRAY	Breaker 25T1 Control	
25T1/PH	Breaker 25T1	Rack 1	600	10	4	M	BS	250	25T1C1, TRENCH, TRAY	Breaker 25T1 Relaying	
25T1/T1PR	Breaker 25T1	69kV Panel 5	600	10	4	M	BS	265	25T1C2, TRENCH, TRAY	T1 Diff	
25T1/AC	Breaker 25T1	AC Yard Panel	600	8	3	S	C	175	25T1C4, TRENCH, EXIST. CONDUIT		

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BREAKER 25T1 REPLACEMENT

CABLE SCHEDULE

OAKWOOD VILLA SUBSTATION

SCALE: -

SUBSTATION & TRANSMISSION PROJECTS 20410

PROJ #: 8005239

DRAWING NAME: OV2019-CT

DRAWING SET: OV2019

DRAWING #: 08 OF 09

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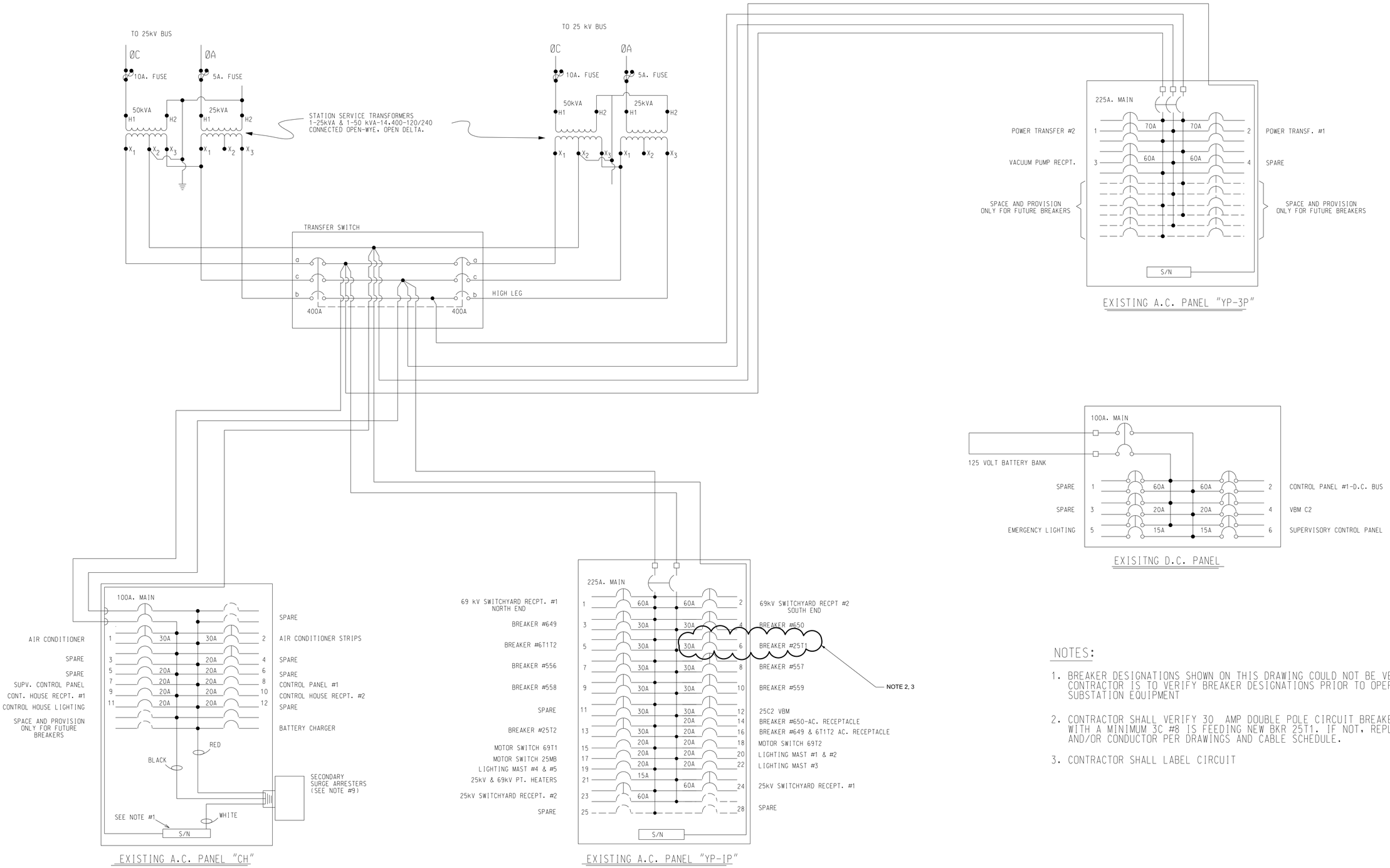


NOTES:

1. BREAKER DESIGNATIONS SHOWN ON THIS DRAWING COULD NOT BE VERIFIED. CONTRACTOR IS TO VERIFY BREAKER DESIGNATIONS PRIOR TO OPERATING ANY SUBSTATION EQUIPMENT
2. CONTRACTOR SHALL VERIFY 30 AMP DOUBLE POLE CIRCUIT BREAKER WITH A MINIMUM 3C #8 IS FEEDING NEW BKR 25T1. IF NOT, REPLACE BKR AND/OR CONDUCTOR PER DRAWINGS AND CABLE SCHEDULE.
3. CONTRACTOR SHALL LABEL CIRCUIT

JEA
BUILDING COMMUNITY
21 W CHURCH ST.
JACKSONVILLE, FLORIDA 32202

ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER'S SEAL

LATEST REVISION ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: -
LIC. NO.: -
STATE: -
DATE: -

REV	DATE	PROJ #	REVISION DESCRIPTION	BY	REVIEW
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

ENGINEERING	
DATE	5-23-19
BY	BLS
REVIEW	-
DRAFTING	
DATE	5-23-19
BY	BLS
REVIEW	-

BREAKER 25T1 REPLACEMENT

LOW VOLTAGE

OAKWOOD VILLA SUBSTATION

SCALE: -

SUBSTATION & TRANSMISSION PROJECTS 20410

PROJ #: 8005239

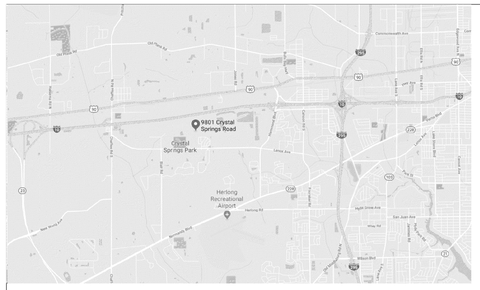
DRAWING NAME: OV2019-LV

DRAWING SET: OV2019

DRAWING #: 09 OF 09

JEA ARCH-D 24X36 (02/17) HR1726D1.dgn 2017-4-23 - 16:05

432"



N

VICINITY MAP
N.T.S.

9801 CRYSTAL SPRINGS RD
JACKSONVILLE FL 32221

INDEX TO DRAWINGS			
DWG #	DRAWING NAME	TOTAL SHEETS	DRAWING TITLE
1	NM2019-CV	1	COVER SHEET
2	NM2019-FP	1	FOUNDATION PLAN
3	NM2019-FD	1	FOUNDATION DETAILS
4	NM2019-SL	1	SINGLE LINE
5	NM2019-EP	1	ELECTRICAL PLAN
6	NM2019-GD	1	GROUNDING DETAILS
7	NM2019-CH	1	CONTROL HOUSE LAYOUT
8	NM2019-CP	1	CONDUIT PLAN
9	NM2019-CS	1	CONDUIT SCHEDULE
10	NM2019-CT	1	CABLE SCHEDULE
11	NM2019-LV	1	LOW VOLTAGE
12	HS245A5D0185	1	BREAKER OUTLINE

CONSTRUCTION DRAWINGS

FOR THE

NORMANDY SUBSTATION
BREAKER 94147 AND 947N REPLACEMENT

BUILDING COMMUNITY

PROJECT DESIGN SEGMENT 20410

TRANSMISSION AND SUBSTATION ENGINEERING

PROJECT # 8005248

JEA
BUILDING COMMUNITY
21 W CHURCH ST.
JACKSONVILLE, FLORIDA 32202

ISSUED FOR CONSTRUCTION

CONSULTANT INFORMATION

PROFESSIONAL ENGINEER'S SEAL

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF

PE: _____

LIC. NO.: _____

STATE: _____

DATE: _____

REV	DATE	PROJ #	REVISION DESCRIPTION	BY	REVIEW

ENGINEERING	
DATE	7-01-2019
BY	BLS
REVIEW	
DRAFTING	
DATE	7-01-2019
BY	BLS
REVIEW	

BREAKER 94147 AND 947N REPLACEMENT

COVER SHEET

NORMANDY SUBSTATION

SCALE:

SUBSTATION & TRANSMISSION PROJECTS 20410

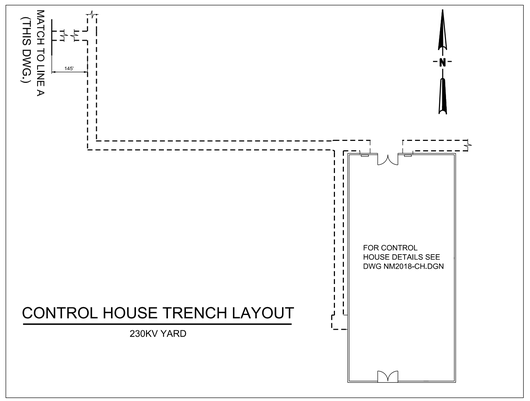
PROJ #: 8005248

DRAWING NAME: NM2019-CV.DGN

DRAWING SET: NM2019

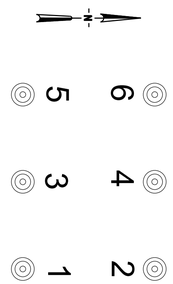
DRAWING #: 01 OF 12

SHEET #: 01 OF 01



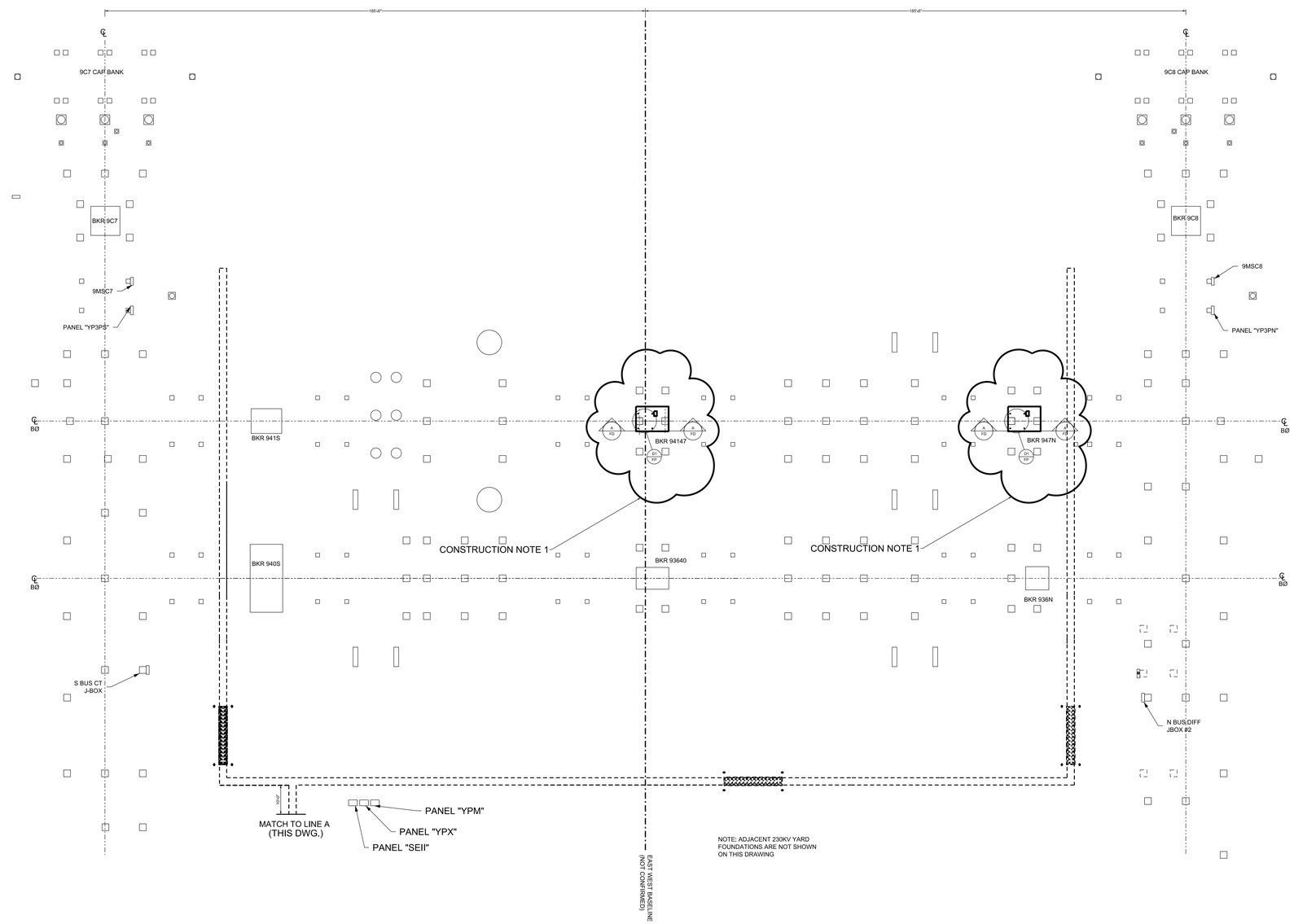
CONTROL HOUSE TRENCH LAYOUT

230KV YARD



D1 **DETAIL 1**

BUSHING ORIENTATION



PARTIAL FOUNDATION PLAN

230KV YARD

GENERAL NOTES:

1) ALL FOUNDATIONS SHOWN, INCLUDING BASELINES, WERE REPRODUCED BASED OFF OF EXISTING DRAWINGS AS OF MAY 2018. THIS SITE WAS NOT SURVEYED.

2) ONLY ABOVE-GRADE FOUNDATIONS ARE SHOWN FOR CLARITY.

CONSTRUCTION NOTES:

1) BREAKERS SHALL BE PLACED ON CONTRACTOR-MODIFIED FOUNDATIONS, CENTERED ON B-PHASE WITH BUSHINGS ORIENTED AS SHOWN IN DETAIL 1. REFERENCE DWG NM2019-FD.DGN FOR FOUNDATION MODIFICATION DWGS.

2) CONTRACTOR SHALL VERIFY ALL DISTANCES, DIMENSIONS, AND EQUIPMENT LOCATIONS PRIOR TO BEGINNING CONSTRUCTION.

0 20' 40'

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ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF

PE:
LIC. NO.:
STATE:
DATE:

REV	DATE	PROJ #	REVISION DESCRIPTION	BY	REVIEW

ENGINEERING	
DATE	7-01-2019
BY	BLS
REVIEW	
DRAFTING	
DATE	7-01-2019
BY	BLS
REVIEW	

BREAKER 94147 AND 947N REPLACEMENT

FOUNDATION PLAN

NORMANDY SUBSTATION

SCALE: 1"=20'-0"

SUBSTATION & TRANSMISSION PROJECTS 20410

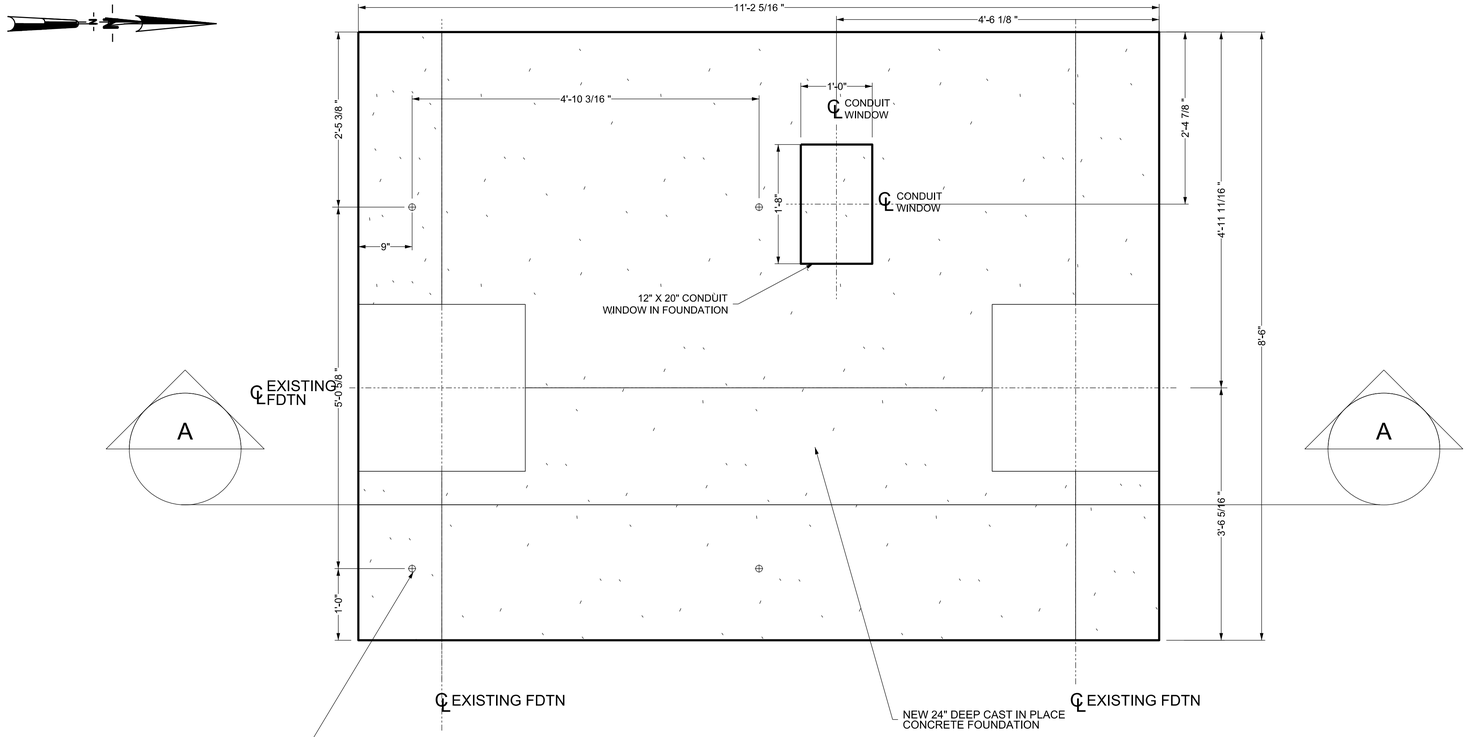
PROJ #: 8005248

DRAWING NAME: NM2019-FP.DGN

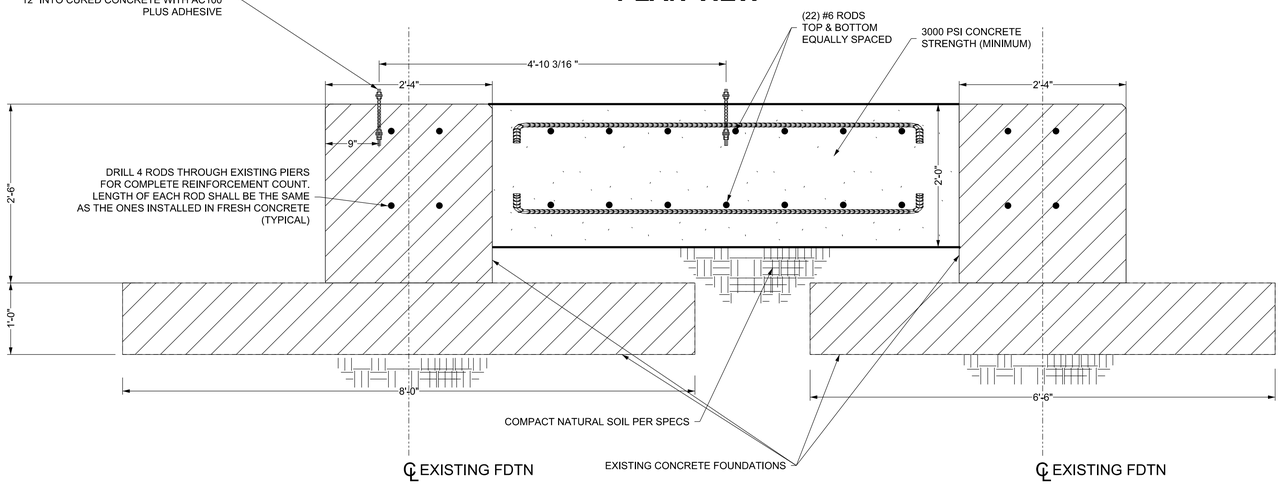
DRAWING SET: NM2019

DRAWING #: 02 OF 12

SHEET #: 01 OF 01



BREAKER 94147 & 947N FOUNDATION MODIFICATIONS
PLAN VIEW



A SECTION DETAIL
BREAKER 94147 & 947N FOUNDATION SIDE VIEW

CONSTRUCTION NOTES:

1. CONTRACTOR SHALL POUR NEW FOUNDATIONS FOR BRKRS 94147 & 947N AS SHOWN ON THIS DRAWING. CONTRACTOR SHALL CUT OFF ALL EXISTING ANCHOR BOLTS INCLUDING FOUNDATIONS THAT ARE ABANDONED/NOT USED, GRIND FLUSH WITH CONCRETE SURFACE & PAINT WITH EPOXY COATING.

2. ANCHOR BOLT PATTERN IS THE SAME FOR BOTH BREAKERS. REFERENCE MANUFACTURER DRAWING HS245A5D0185 (SHEET 12 OF 12) FOR DETAILS.

3. BREAKERS SHALL BE CENTERED ON BØ

GENERAL NOTES:

1. CONCRETE CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF THE AMERICAN CONCRETE INSTITUTE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318) AND ACI STANDARD SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS (ACI 301).

2. UNLESS OTHERWISE NOTED, ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4".

3. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 P.S.I. IN 28 DAYS.

4. REINFORCING BARS SHALL CONFORM TO A.S.T.M. A615, A616 OR A617 GRADE 60 AS AMENDED TO DATE.

5. UNLESS OTHERWISE SHOWN ON DRAWINGS, MINIMUM COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS:

CAST-IN-PLACE CONCRETE: MIN. COVER
CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH ------ 3"

AFTER REMOVAL OF FORMS
6 THRU # 18 BARS ---------- 2"
5 AND SMALLER ---------- 1 1/2"

6. ALL REINFORCEMENT SHALL BE HELD SECURELY IN PLACE WITH STANDARD ACCESSORIES DURING PLACEMENT OF CONCRETE.

7. SPLICES IN REINFORCING WHERE PERMITTED SHALL BE AS FOLLOWS:
TEMPERATURE REINFORCING ---------- 12"
ALL OTHERS ---------- 24 x BAR DIA.
WELDED WIRE FABRIC ---------- 6"

8. THE CONTRACTOR SHALL FURNISH ALL ANCHOR BOLTS INDICATED, ANCHOR BOLTS FURNISHED SHALL BE IN ACCORDANCE WITH A.S.T.M. A307.

9. ALL EXPOSED ANCHOR BOLT THREADS SHALL BE TAPED BEFORE FOUNDATIONS ARE POURED.

10. THE BOTTOM OF EACH EXCAVATION SHALL BE INSPECTED BY THE PROJECT REPRESENTATIVE BEFORE THE PLACEMENT OF ANY REINFORCING TO DETERMINE IF SOIL WITH ADEQUATE BEARING CAPACITY IS PRESENT. UNSUITABLE SOIL SUCH AS MUCK, PEAT OR SILT SHALL BE REMOVED. THE ENGINEER SHALL BE CONSULTED TO DETERMINE THE DEPTH OF REMOVAL

11. THE BOTTOMS OF ALL EXCAVATIONS SHALL BE COMPACTED TO AT LEAST 100 F MAXIMUM DENSITY PER AASHTO T99. PRIOR TO SUCH COMPACTION, THE GROUND WATER SHALL BE LOWERED TO A DEPTH OF AT LEAST 1.0 FOOT BELOW THE BOTTOM OF EXCAVATION. COMPACTION TESTS SHALL BE PERFORMED AS PER SECTION VIII, SUBSECTION 1 OF THE SPECIFICATIONS.

12. FILL AROUND FOUNDATIONS SHALL BE COMPACTED IN 6" LAYERS UP TO FINISHED GRADE BEFORE ERECTION OF STEEL IS BEGUN. BACKFILL TO BE SOUND CLEAN SOIL, FREE OF ORGANIC MATERIALS.

13. ALL STRUCTURAL OPENINGS AROUND OR AFFECTED BY MECHANICAL OR ELECTRICAL EQUIPMENT SHALL BE VERIFIED WITH EQUIPMENT PURCHASED BEFORE PROCEEDING WITH WORK.

14. EPOXY ADHESIVE SHALL BE HILTI HIT-HY 150 MAX. CARTRIDGE SYSTEM, AN APPROVED EQUAL WILL BE CONSIDERED IF SUBMITTED.

0 1' 2'

JEA
BUILDING COMMUNITY
21 W CHURCH ST.
JACKSONVILLE, FLORIDA 32202

ISSUED FOR CONSTRUCTION

CONSULTANT INFORMATION

PROFESSIONAL ENGINEER'S SEAL
ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: _____
LIC. NO.: _____
STATE: _____
DATE: _____

REV	DATE	PROJ #	REVISION DESCRIPTION	BY	REVIEW

ENGINEERING	
DATE	7-01-2019
BY	BLS
REVIEW	
DRAFTING	
DATE	7-01-2019
BY	BLS
REVIEW	

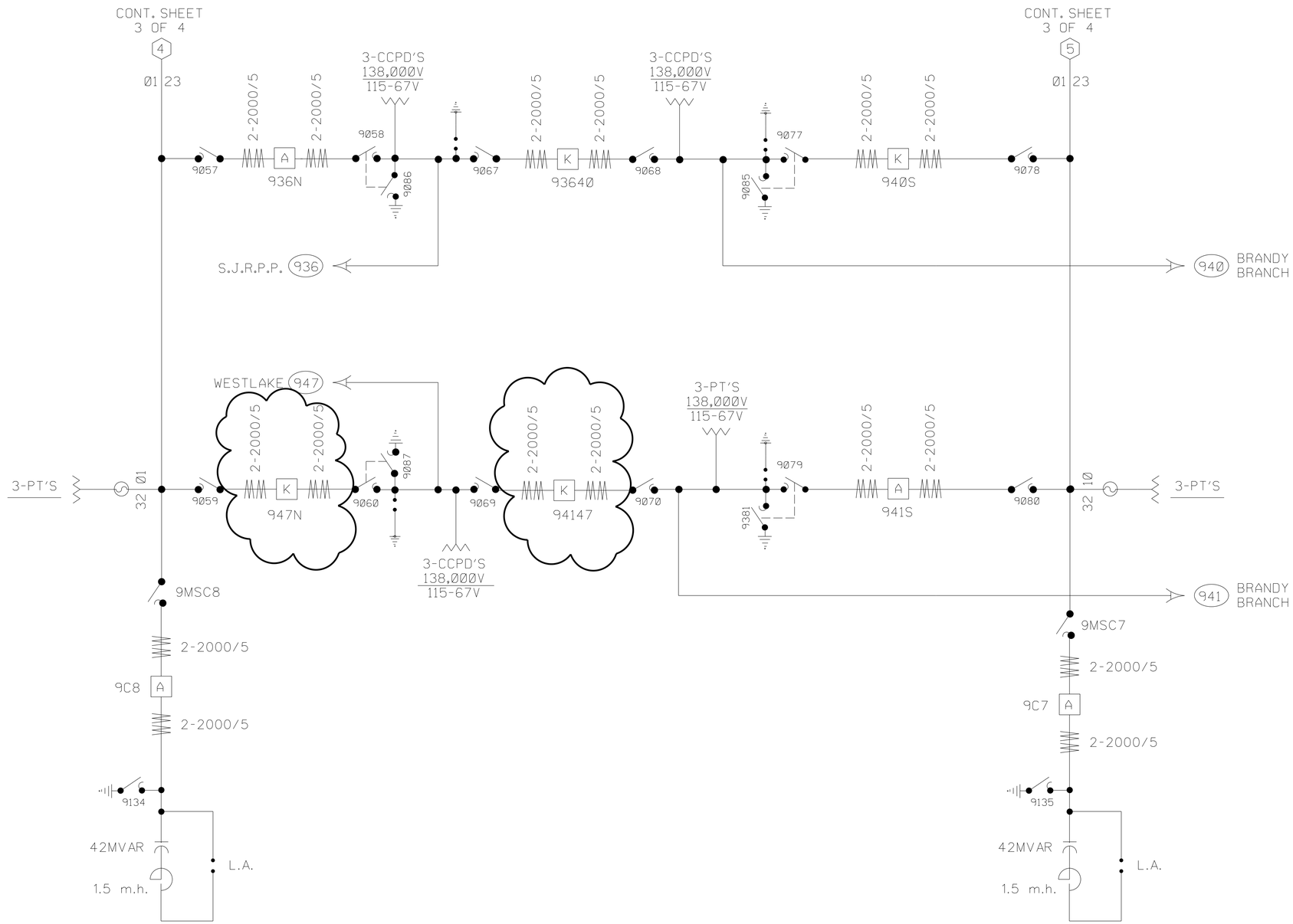
BREAKER 94147 AND 947N REPLACEMENT

FOUNDATION DETAILS

NORMANDY SUBSTATION

SUBSTATION & TRANSMISSION PROJECTS 20410

SCALE: 1"=1'-0"
PROJ #: 8005248
DRAWING NAME: NM2019-FD.DGN
DRAWING SET: NM2019
DRAWING #: 03 OF 12
SHEET #: 01 OF 01



JEA
BUILDING COMMUNITY
21 W CHURCH ST.
JACKSONVILLE, FLORIDA 32202

ISSUED FOR CONSTRUCTION

CONSULTANT INFORMATION

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PE: _____
LIC. NO.: _____
STATE: _____
DATE: _____

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ENGINEERING	
DATE	7-01-2019
BY	BLS
REVIEW	
DRAFTING	
DATE	7-01-2019
BY	BLS
REVIEW	

BREAKER 94147 AND 947N REPLACEMENT

PARTIAL SINGLE LINE

NORMANDY SUBSTATION

SCALE: N.T.S.

SUBSTATION & TRANSMISSION PROJECTS 20410

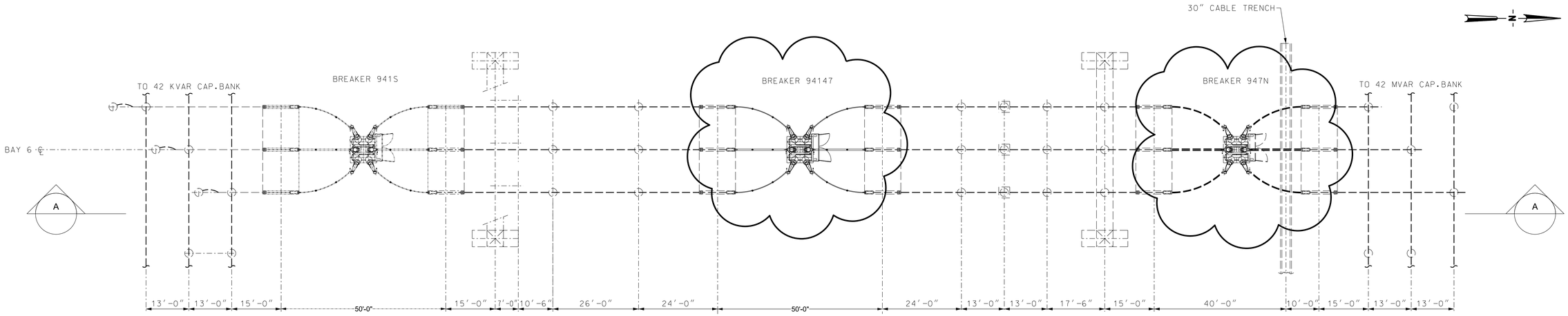
PROJ #: 8005248

DRAWING NAME: NM2019-SL.DGN

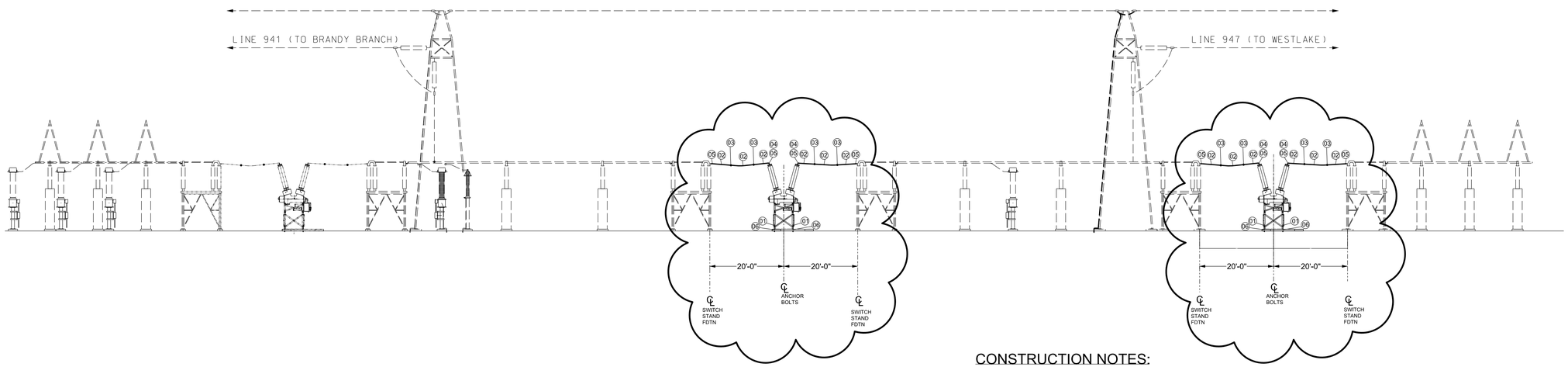
DRAWING SET: NM2019

DRAWING #: 04 OF 12

SHEET #: 01 OF 01



PARTIAL 230KV YARD PLAN VIEW



A **SECTION DETAIL**
BREAKER 94147 AND BREAKER 947N ELEVATION

ITEM #	QTY	UNIT	DESCRIPTION	JEA PART #	COMMENTS	REV
01	4	EA	CABLE-TO-FLAT 2 HOLE, BOLTED STRAIGHT	CNNTL730	MECHANICAL GROUND CONNECTORS	
02	600	LF	(2 PER PHASE) 954 KCM (AAC) ALL ALUMINUM CONDUCTOR	COBAA027	JUMPERS	
03	24	EA	CABLE SPACER - 4"	CNNPA613	CABLE SPACERS	
04	4	EA	WELDED ALUMINUM TERMINAL - 2 CABLE TO 90 DEG.	CNNWE454	USE ON B PHASE BUSHINGS ONLY	
05	20	EA	WELDED ALUMINUM TERMINAL - 2 CABLE TO FLAT	CNNWE442	USE ON A & C PHASEBUSHINGS AND SWITCHES	
06	200	LF	7 # 5 COPPERWELD	COBCW016	COPPERWELD TO EXISTING GROUND GRID	
-	48	EA	BOLT KIT FOR CONNECTORS	BOLTE001	FOR EXISTING SWITCH TERMINATIONS	
-	48	EA	1/2" X 3" S.S. BOLT	SCWHI521	FOR BREAKER BUSHING TERMINATIONS	
-	48	EA	1/2" S.S. BELLEVILLE WASHER	WASBA500	FOR BREAKER BUSHING TERMINATIONS	
-	96	EA	1/2" S.S. FLAT WASHER	WASFG500	FOR BREAKER BUSHING TERMINATIONS	
-	48	EA	1/2" S.S. SI BRONZE NUT	NUTBC500	FOR BREAKER BUSHING TERMINATIONS	
-	1	EA	COMPOUND INHIBITOR, 4 OZ BOTTLE	ADCMI007		

0 15' 30'

CONSTRUCTION NOTES:

1. THE EXISTING 94147 AND 947N CIRCUIT BREAKERS, INCLUDING CTS, SHALL BE SCRAPPED IN PLACE BY JEA INVESTMENT RECOVERY. IF NEEDED, CONTRACTOR SHALL COORDINATE THE REMOVAL/DISPOSAL WITH SUBSTATION O&M.
2. CONTRACTOR SHALL COORDINATE ANY PRE-OUTAGE REQUIREMENTS AND PRE-WORK WITH JEA SOCC AND SUBSTATION O&M/RELAY.
3. CONTRACTOR SHALL COORDINATE THE OFFLOADING AND TEMPORARY PLACEMENT, VIA CRIBBING (SO CONTROL CABINET IS AT LEAST 1' OFF GROUND LEVEL), OF THE NEW 947N AND 94147 CIRCUIT BREAKERS, (~9,200 LBS. EACH) WITH THE JEA PROJECT MANAGER.
4. THE EXISTING CABLES SHALL BE REMOVED. EXISTING CONDUIT SHALL BE CUT BACK TO GROUND.
5. CONTRACTOR SHALL INSTALL NEW CONNECTORS AND JUMPERS PER THE MATERIAL LIST AND DWGS.

Voltage (kV)	BIL (kV)	Min. Phase-Phase (in)	Min. Phase-Phase (ft-in)	Min. Phase-Ground (in)	Min. Phase-Ground (ft-in)	Phase Spacing (ft-in)	Min. Above Grade Personnel (ft-in)	Min. Above Grade Roadway (ft)	Min. to Fence Horizontal (ft)
13.2	110	12"	1'-0"	7"	0'-7"	2'-0"	9'-0"	21'	10'
34.5	200	18"	1'-6"	13"	1'-1"	3'-0"	9'-6"	22'	10'
69	350	31"	2'-7"	25"	2'-1"	5'-0"	10'-5"	23'	12'
138	650	63"	5'-3"	50"	4'-2"	8'-0"	12'-2"	25'	14'
230	900	89"	7'-5"	71"	5'-11"	11'-0"	14'-10"	27'	16'

Reference RUS Bulletin 1724E-300 (2001), & NESC (2007)

LEGEND :
NEW
EXISTING

JEA
BUILDING COMMUNITY
21 W CHURCH ST.
JACKSONVILLE, FLORIDA 32202

ISSUED FOR CONSTRUCTION

CONSULTANT INFORMATION

PROFESSIONAL ENGINEER'S SEAL
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STATE:
DATE:

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DATE	7-01-2019
BY	BLS
REVIEW	
DRAFTING	
DATE	7-01-2019
BY	BLS
REVIEW	

BREAKER 94147 AND 947N REPLACEMENT

PARTIAL ELECTRICAL PLAN & ELEVATION

NORMANDY SUBSTATION

SCALE: 1"=15'

SUBSTATION & TRANSMISSION PROJECTS 20410

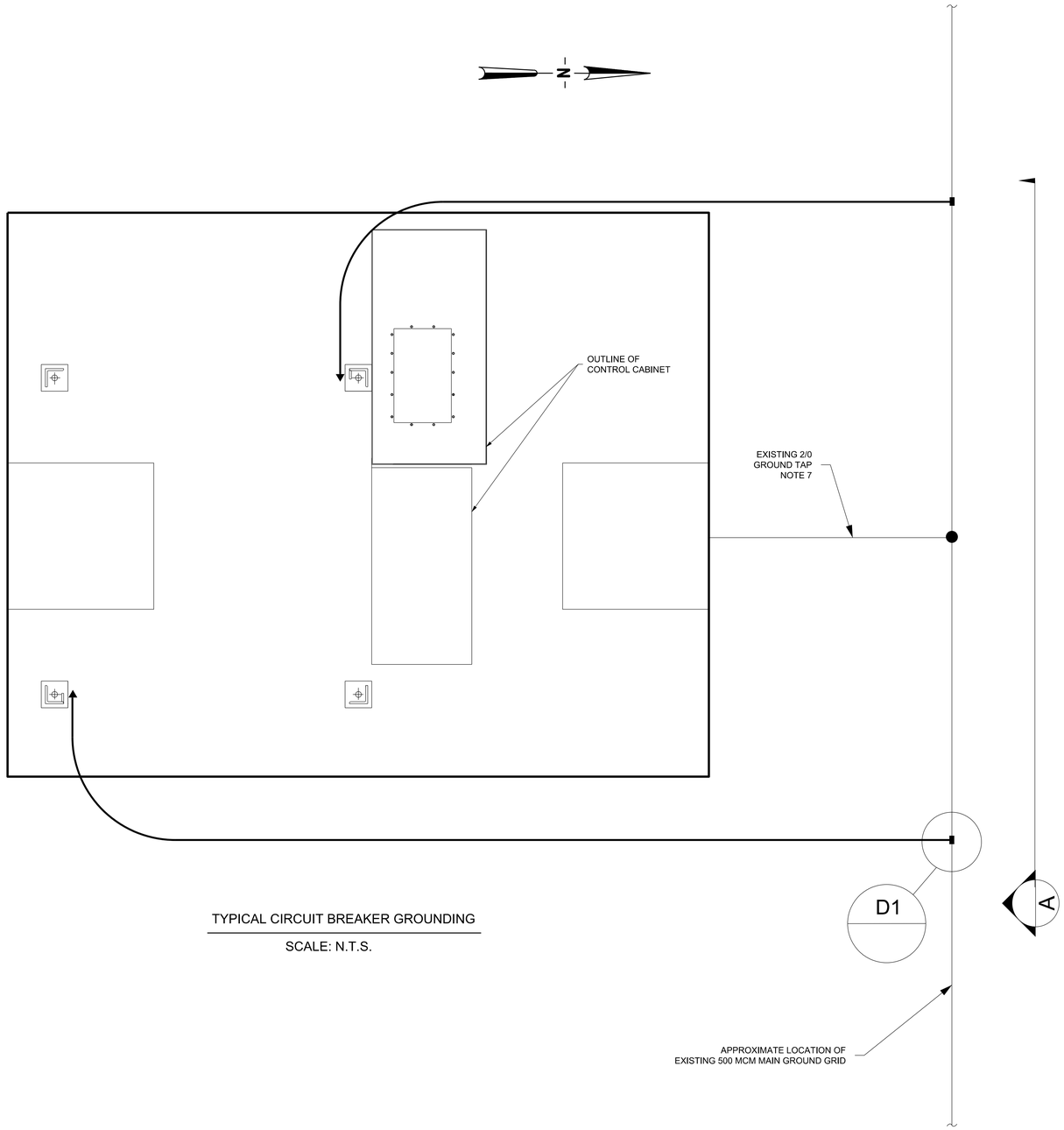
PROJ #: 8005248

DRAWING NAME: NM2019-EP.DGN

DRAWING SET: NM2019

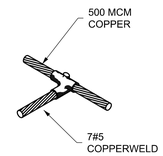
DRAWING #: 05 OF 12

SHEET #: 01 OF 01



TYPICAL CIRCUIT BREAKER GROUNDING

SCALE: N.T.S.

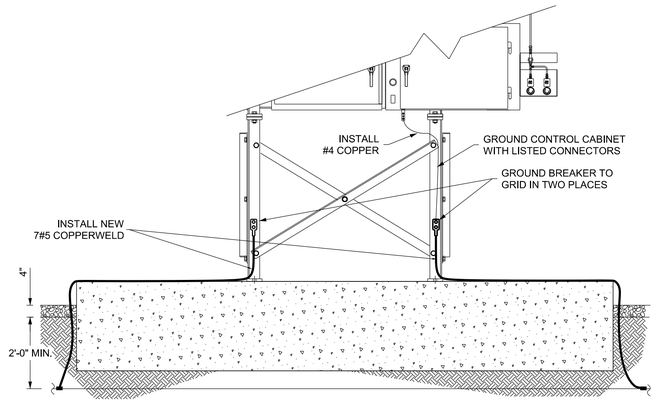


D1 **DETAIL 1**

TYPICAL GROUND CONNECTION

GROUNDING NOTES

1. ALL #4 COPPER CONDUCTORS SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR; ALL COPPERWELD CONDUCTOR SHALL BE PROVIDED BY THE OWNER AND INSTALLED BY THE CONTRACTOR. ALL GROUND GRID CONDUCTORS AND TAPS SHALL BE CONNECTED USING CADWELD EXOTHERMIC CONNECTIONS AND SHALL BE INSTALLED 24" BELOW GRADE (28" BELOW ROCK SURFACE) EXCEPT WHERE CONNECTION TO STRUCTURES AND EQUIPMENT IS ABOVE GRADE.
2. THIS DRAWING MAKES NO REPRESENTATION AS TO THE EXISTENCE OF UNDERLYING FACILITIES. THE CONTRACTOR IS TO HAND DIG NEW TRENCHING TO DETERMINE ACTUAL LOCATIONS OF EXISTING GRID COMPONENTS, CAREFUL NOT TO DISTURB ANY EXISTING UNDERLYING FACILITIES.
3. THE CONTRACTOR WILL BE RESPONSIBLE FOR LEAVING EXISTING MAIN GRID CONDUCTOR INTACT AND UNDAMAGED. AS PART OF THIS WORK, THE CONTRACTOR WILL BE RESPONSIBLE FOR RELOCATING EXISTING MAIN GRID COMPONENTS IN LOCATIONS WHERE INTERFERENCE OF THE GRID CONDUCTOR MAY OCCUR. ANY RELOCATION SHOULD BE PERFORMED AS WORK ON A LIVE SUBSTATION, AND IN ACCORDANCE WITH SECTION IX OF THE TECHNICAL SPECIFICATIONS. UNDER NO CIRCUMSTANCE SHALL THE CONTRACTOR CUT ANY EXISTING GROUND GRID FACILITIES PRIOR TO A REPLACEMENT FACILITY BEING PLACED INTO SERVICE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING THE EXISTING MAIN GROUND GRID CONDUCTOR TO PROVIDE THE NECESSARY TAPS TO THE EQUIPMENT IN THE LOCATIONS SHOWN ON THIS DRAWING. THE GRID CONDUCTORS SHALL BE INSTALLED IN MAXIMUM LENGTH CONTINUOUS RUNS AND CONNECTED AT ALL INTERSECTIONS USING CADWELD PLUS TYPE XB CROSS CONNECTION OR OTHER CADWELD PLUS PARALLEL/TEE CONNECTIONS TO AVOID CUTTING THE GRID CONDUCTOR. THE CONTRACTOR SHALL VERIFY THE FINAL LOCATION OF THE GROUND TAP CONNECTIONS TO THE STRUCTURES AND EQUIPMENT USING THE MANUFACTURER'S SHOP DRAWINGS, THE LOCATIONS OF GROUND TAPS SHOWN ON THIS DRAWING ARE REPRESENTATIVE ONLY.
5. ALL ABOVE GRADE CONNECTIONS OF GROUND CONDUCTOR TO STRUCTURES AND EQUIPMENT, SUCH AS TRANSFORMERS, BREAKERS, LIGHTNING ARRESTERS, ETC., SHALL BE CONNECTED USING OWNER FURNISHED MECHANICAL CONNECTORS. ALL EQUIPMENT AND STRUCTURES ERECTED IN THE SUBSTATION SHALL BE GROUNDED TO THE MAIN GRID WITHIN SAME WORKING DAY.
6. ALL ABOVE GRADE CONNECTIONS OF GROUND CONDUCTOR TO EXISTING RGS CONDUITS, JUNCTION BOXES AND CONTROL CABINETS SHALL BE MADE USING #4 SOFT DRAWN COPPER AND LISTED GROUNDING CONNECTORS INTENDED FOR THE CONNECTION PURPOSE. THE CONTRACTOR SHALL FURNISH ALL MATERIALS NECESSARY TO COMPLETE THE GROUNDING.
7. ANY GROUND GRID COMPONENTS NO LONGER IN USE ARE TO BE REMOVED BY THE CONTRACTOR. ANY UNUSED GROUND GRID TAPS SHALL BE SEVERED A MINIMUM OF SIX (6) INCHES BELOW COMPACTED EARTH GRADE.



SECTION DETAIL **A**

CIRCUIT BREAKER GROUNDING

LEGEND

- NEW GROUND CONDUCTOR - 7#5 COPPERWELD CONDUCTOR. FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR
- EXISTING GROUND CONDUCTOR 500 MCM COPPER (MAIN) 2/0 (TAPS)
- BOLTED GROUND CONNECTOR TO BREAKER. FURNISHED BY OWNER AND INSTALLED BY CONTRACTOR.
- NEW CADWELD BY CONTRACTOR

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BY	BLS
REVIEW	
DRAFTING	
DATE	7-01-2019
BY	BLS
REVIEW	

BREAKER 94147 AND 947N REPLACEMENT

GROUNDING DETAILS

NORMANDY SUBSTATION

SCALE: N.T.S.

SUBSTATION & TRANSMISSION PROJECTS 20410

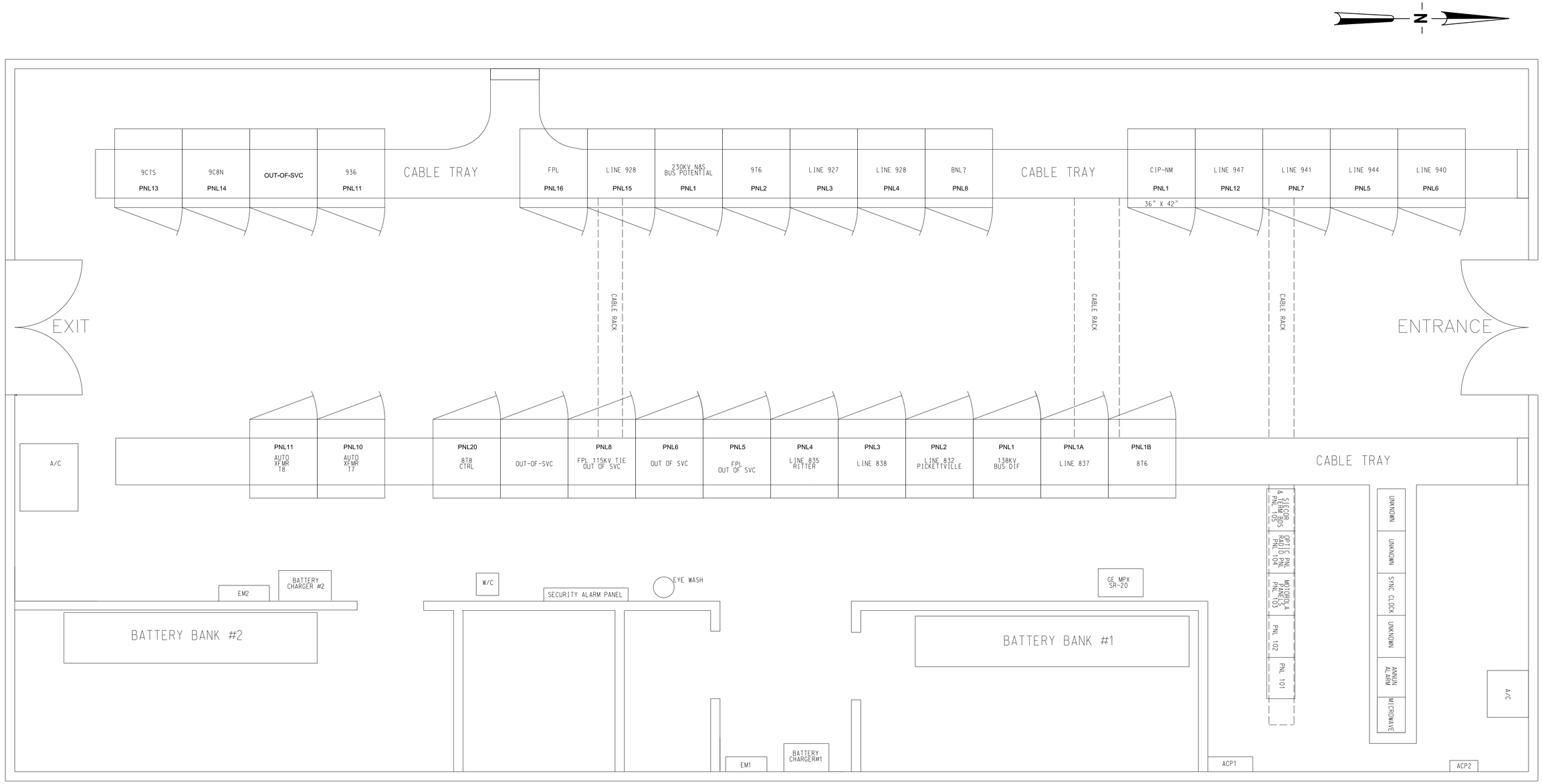
PROJ #: 8005248

DRAWING NAME: NM2019-GD.DGN

DRAWING SET: NM2019

DRAWING #: 06 OF 12

SHEET #: 01 OF 01



CONTROL HOUSE LAYOUT

230KV YARD
(N.T.S.)

GENERAL NOTES:

1. EQUIPMENT LOCATIONS ARE APPROXIMATE.

JEA
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CONSULTANT INFORMATION

PROFESSIONAL ENGINEER'S SEAL

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF

PE: _____

LIC. NO.: _____

STATE: _____

DATE: _____

REV	DATE	PROJ #	REVISION DESCRIPTION	BY	REVIEW

ENGINEERING	
DATE	7-01-2019
BY	BLS
REVIEW	
DRAFTING	
DATE	7-01-2019
BY	BLS
REVIEW	

BREAKER 94147 AND 947N REPLACEMENT

CONTROL HOUSE LAYOUT

NORMANDY SUBSTATION

SCALE: N/A

SUBSTATION & TRANSMISSION PROJECTS 20410

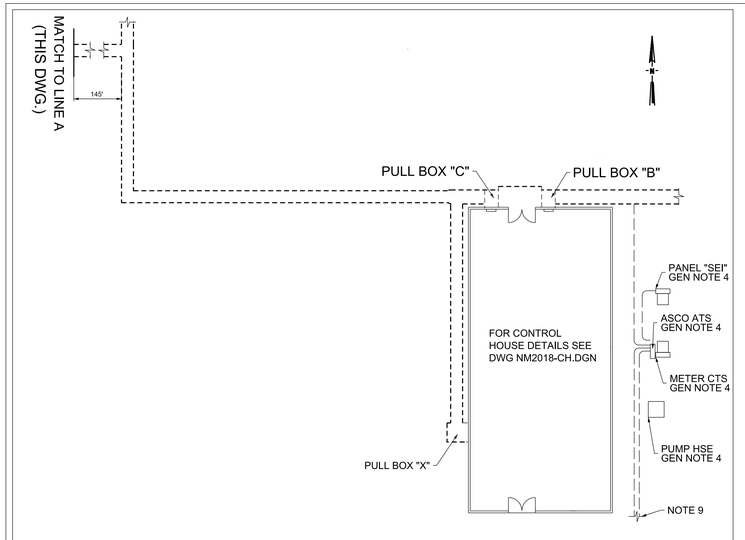
PROJ #: 8005248

DRAWING NAME: NM2019-CH.DGN

DRAWING SET: NM2019

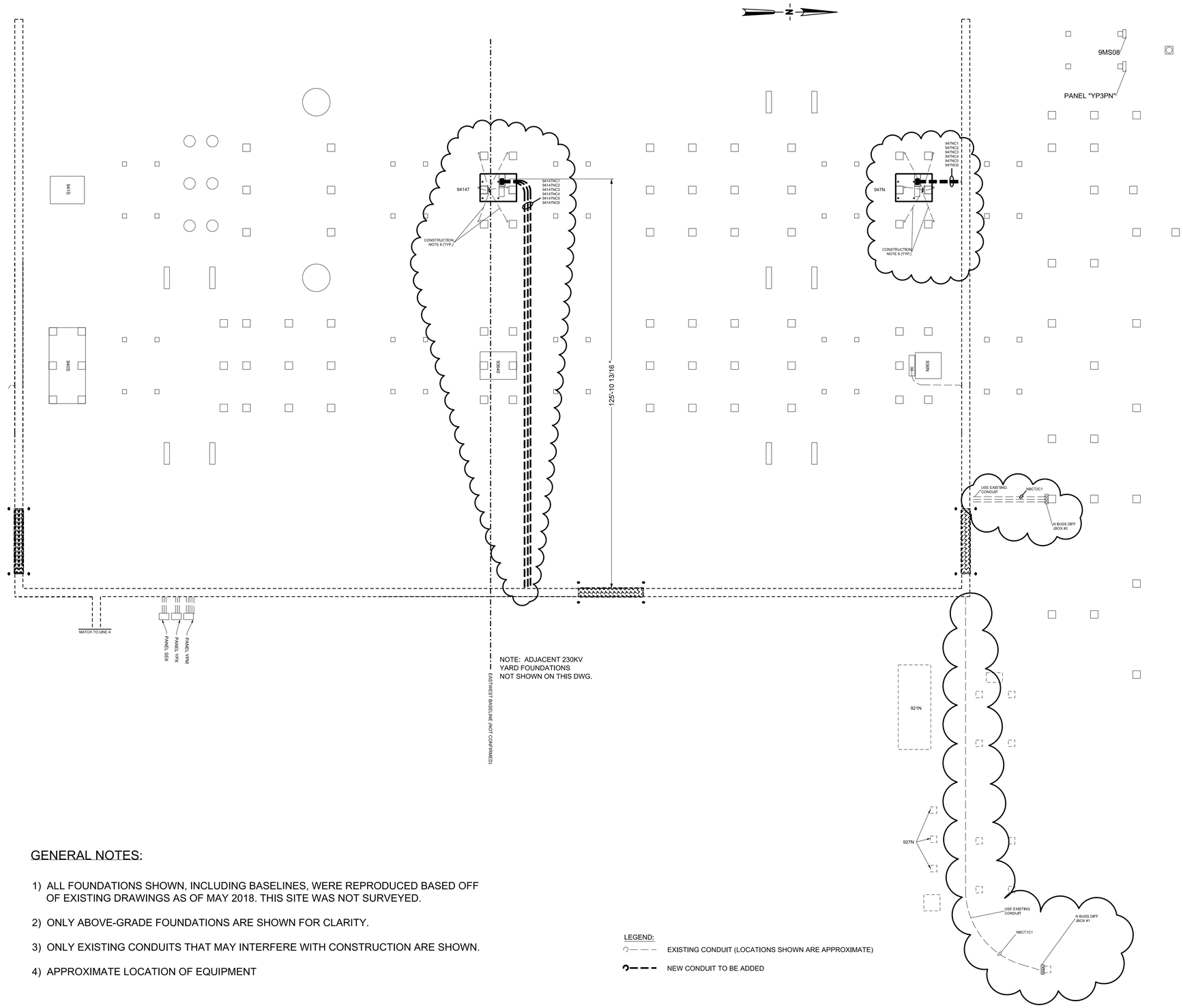
DRAWING #: 07 OF 12

SHEET #: 01 OF 01



CABLE TRENCH LAYOUT

CONTROL HOUSE



CONSTRUCTION NOTES:

1. THE CONTRACTOR IS TO INSTALL NEW CONDUIT AS SHOWN ON THIS DRAWING AND ON THE CONDUIT SCHEDULE. CONDUIT AT THE CIRCUIT BREAKER FOUNDATIONS IS TO BE INSTALLED TO MINIMIZE TRIPPING HAZARD WHILE WORKING IN THE CONTROL PANEL. ANY CONDUIT ROUTE OR SIZE CHANGES SHALL BE NOTED ON THE AS-BUILT DRAWINGS.

2.THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING AND INSTALLING ALL CONDUIT AND CABLE, AS LISTED IN THE CONDUIT AND CABLE SCHEDULES. THE CONDUIT LOCATIONS SHOWN ON THIS DRAWING ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL VERIFY THE FINAL CONDUIT RISER LOCATION USING THE EQUIPMENT MANUFACTURER'S SHOP DRAWINGS. CONDUIT SHALL BE INSTALLED 18" MINIMUM BELOW FINISHED SUBGRADE ELEVATION WHICH WILL PROVIDE A COVER OF 22" MINIMUM BELOW ROCK SURFACING. THE OWNER SHALL SUPPLY ALL TYPE B AND TYPE F CABLE.

3. ALL CABLES SHALL BE CLEARLY LABELED AT BOTH ENDS AND AT ALL ENTRANCE AND EXIT POINTS TO THE CABLE TRENCH. ALL CONDUIT RUNS SHALL ALSO BE CLEARLY LABELED AT BOTH ENDS. REFER TO SPECIFICATION SECTION IX FOR LABELING DETAILS

4. ALL CONDUIT ENDS SHALL BE SEALED WITH AN EXPANDING WATERPROOF FOAM SPRAY TO KEEP THE CONDUIT FREE FROM DIRT AND OTHER FOREIGN MATERIAL. ALL CONDUIT MATERIALS SHALL BE THOSE SPECIFIED IN THE CONDUIT SCHEDULE. ABOVE GRADE CONDUIT SHALL BE INSTALLED TO CLOSELY CONFORM TO THE FOUNDATION AND STRUCTURE TO WHICH IT IS TO BE MOUNTED. AFTER THE INSTALLATION AND BACKFILLING OF THE UNDERGROUND CONDUITS, THE CONTRACTOR SHALL COMPACT THE AREA TO THE SAME DENSITY, AND WITH SIMILAR MATERIAL, AS THE ADJACENT UNDISTURBED MATERIALS.

5. ELBOW RADIUS FOR 2", 3" & 4" CONDUITS TO BE 24", UNLESS OTHER WISE NOTED.

6. A PULL CORD SHALL BE PULLED IN ALL SPARE CONDUITS.

7. REUSE EXISTING CONDUIT IF POSSIBLE.

8. ALL CONDUIT THAT IS NOT BEING USED SHALL BE CUT BACK AND/OR REMOVED SO IT DOES NOT INTERFERE WITH FOUNDATION OR NEW BREAKER PLACEMENT.

9. HORIZONTAL CABLE DISTANCE FROM:
ATS TO SEC SSXF 3Ø 120/208V PAD-MOUNT IS APPROX. 145 FT.
ATS TO PRI SSXF 3-POT BANK 3Ø 120/208V POLE-MOUNT IS APPROX. 410 FT.

GENERAL NOTES:

1) ALL FOUNDATIONS SHOWN, INCLUDING BASELINES, WERE REPRODUCED BASED OFF OF EXISTING DRAWINGS AS OF MAY 2018. THIS SITE WAS NOT SURVEYED.

2) ONLY ABOVE-GRADE FOUNDATIONS ARE SHOWN FOR CLARITY.

3) ONLY EXISTING CONDUITS THAT MAY INTERFERE WITH CONSTRUCTION ARE SHOWN.

4) APPROXIMATE LOCATION OF EQUIPMENT

LEGEND:

EXISTING CONDUIT (LOCATIONS SHOWN ARE APPROXIMATE)

NEW CONDUIT TO BE ADDED

15' 7.5' 0 15' 30'

JEA
BUILDING COMMUNITY
21 W CHURCH ST.
JACKSONVILLE, FLORIDA 32202

ISSUED FOR CONSTRUCTION

CONSULTANT INFORMATION

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ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF

PE: _____
LIC. NO.: _____
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DATE: _____

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REVIEW	

BREAKER 94147 AND 947N REPLACEMENT

CONDUIT PLAN

NORMANDY SUBSTATION

SCALE: 1"=15'

SUBSTATION & TRANSMISSION PROJECTS 20410

PROJ #: 8005248

DRAWING NAME: NM2019-CP.DGN

DRAWING SET: NM2019

DRAWING #: 08 OF 12

SHEET #: 01 OF 01

CONDUIT SCHEDULE

CONDUIT NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY CONDUIT MATERIALS, INCLUDING FITTINGS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL CONDUIT LENGTHS. CONDUIT LENGTHS ARE APPROXIMATE.
3. CONTROL HOUSE CONDUIT EXPOSED RUNS SHALL BE EMT. CONTRACTOR MAY CONCEAL CONTROL HOUSE CONDUIT WITHIN BLOCK WALLS UNLESS STATED OTHERWISE IN THE DRAWINGS. CONTRACTOR SHALL NOT CONCEAL ALUMINUM CONDUIT RUNS.
4. ALL RUNS WITHIN BATTERY ROOM SHALL UTILIZE ALUMINUM CONDUIT. PENETRATIONS THROUGH THE BLOCK WALL SHALL UTILIZE PVC COATED ALUMINUM TO PROVIDE SUFFICIENT ALKALI CORROSION PROTECTION, WITH PENETRATION PROPERLY SEALED.

CONDUIT LEGEND:

UV	UV RESISTANT PVC CONDUIT, SCH 40
EMT	ELECTRICAL METALLIC TUBING
RMC	RIGID METALLIC (GALVANIZED STEEL) CONDUIT
IMC	INTERMEDIATE METALLIC CONDUIT
LFM	LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT
WW	SQAURE WIREWAY

BREAKER 947N

CONDUIT #	FROM	TO	SIZE (IN)	TYPE	LENGTH (FT)	CABLE IN CONDUIT	REMARKS
947NC1	BREAKER 947N	CABLE TRENCH	2	UV	25	947N/C1	CONTROL
947NC2	BREAKER 947N	CABLE TRENCH	2	UV	25	947N/C2	CONTROL
947NC3	BREAKER 947N	CABLE TRENCH	2	UV	25	947N/947PR-1, 947N/947PR-2, 947N/NBD1,	947/230KV N BUS PRIMARY
947NC4	BREAKER 947N	CABLE TRENCH	2	UV	25	947N/947SC-1, 947N/947SC-2, 947N/BD2	947/230KV N BUS SECONDARY
947NC5	BREAKER 947N	CABLE TRENCH	1	UV	25	947N/AC	AC POWER
947NC6	BREAKER 947N	CABLE TRENCH	3	UV	25	-	SPARE

BREAKER 94147

CONDUIT #	FROM	TO	SIZE (IN)	TYPE	LENGTH (FT)	CABLE IN CONDUIT	REMARKS
94147C1	BREAKER 94147	CABLE TRENCH	2	UV	150	94147/C1	CONTROL
94147C2	BREAKER 94147	CABLE TRENCH	2	UV	150	94147/C2	CONTROL
94147C3	BREAKER 94147	CABLE TRENCH	3	UV	150	94147/947PR-1, 94147/947PRI-2, 94147/941PR-1, 94147/941PR-2	94147/947 & 94147/941 PRIMARY
94147C4	BREAKER 94147	CABLE TRENCH	3	UV	150	94147/947SC-1, 94147/947SC-2, 94147/941SC-1, 94147/941SC-2	94147/947 & 94147/941 SECONDARY
94147C5	BREAKER 94147	CABLE TRENCH	1	UV	150	93640/AC	AC POWER
94147C6	BREAKER 94147	CABLE TRENCH	3	UV	150	-	SPARE

JEA
BUILDING COMMUNITY
21 W CHURCH ST.
JACKSONVILLE, FLORIDA 32202

ISSUED FOR CONSTRUCTION

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BY	BLS
REVIEW	

BREAKER 947N AND 94147 REPLACEMENT

CONDUIT SCHEDULE

NORMANDY SUBSTATION

SCALE: N/A

SUBSTATION & TRANSMISSION PROJECTS 20410

PROJ #: 8005248

DRAWING NAME: NM2019-CS.DGN

DRAWING SET: NM2019

DRAWING #: 09 OF 12

SHEET #: 01 OF 01

CABLE SCHEDULE

CABLE NOTES:

1. TYPE B, BS, F, AND FO CABLE SHALL BE FURNISHED BY THE OWNER, UNLESS OTHERWISE SPECIFIED.
2. THE CONTRACTOR SHALL FURNISH ALL OTHER CABLE, AS SPECIFIED.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL CABLE LENGTHS. CABLE LENGTHS ARE APPROXIMATE.

CABLE LEGEND:

A	THHN INSULATED COPPER CONDUCTOR
B	CONTROL CABLE
BS	SHIELDED CONTROL CABLE
C	RHW, THHW, OR THWN INSULATED COPPER CONDUCTOR
F	INSTRUMENT CABLE
FO	FIBER OPTIC CABLE
M	MULTIPLE CONDUCTOR
S	SINGLE CONDUCTOR
TRAY	CONTROL HOUSE CABLE TRAY
TRENCH	CONTROL HOUSE CABLE TRENCH

BREAKER 947N

BREAKER 947N

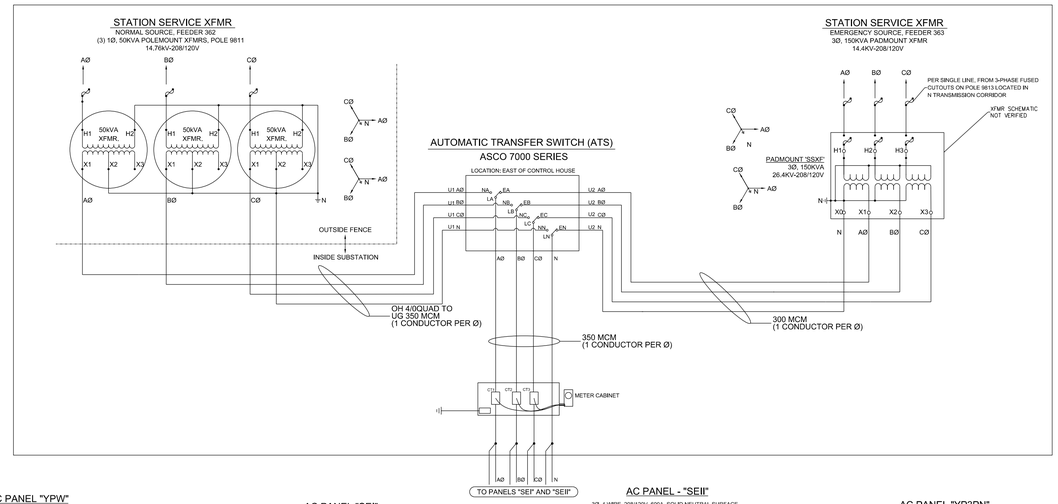
CABLE #	FROM	TO	VOLT (V)	SIZE	#C	S/M	TYPE	LENGTH (FT)	CONDUIT ROUTE	USAGE	REMARKS	REV
912	Breaker 947N	AC Yard Panel "UNKNOWN"									REMOVE CABLE;	
974	Breaker 947N	AC Yard Panel "UNKNOWN"									REMOVE CABLE	
911	Breaker 947N	Panel 12									REMOVE CABLE	
909	Breaker 947N	Panel 12									REMOVE CABLE	
910	Breaker 947N	Panel 12									REMOVE CABLE	
905	Breaker 947N	Panel 12									REMOVE CABLE	
903	Breaker 947N	230kV North Bus Diff Junction Box #1									REMOVE CABLE	
900	Breaker 947N	Panel 12									REMOVE CABLE	
901	Breaker 947N	Panel 12									REMOVE CABLE	
902	Breaker 947N	230kV North Bus Diff Junction Box #2									REMOVE CABLE	
947N/C1	Breaker 947N	Panel 12	600	10	21	M	BS	900	947NC1, TRENCH, PB "C", TRAY	BKR 947N CONTROL		
947N/C2	Breaker 947N	Panel 12	600	10	21	M	BS	900	947NC2, TRENCH, PB "C", TRAY	BKR 947N CONTROL		
947N/947PR-1	Breaker 947N	Panel 12	600	10	4	M	BS	900	947NC3, TRENCH, PB "C", TRAY	947 PRI. PROT		
947N/947PR-2	Breaker 947N	Panel 12	600	10	4	M	BS	900	947NC3, TRENCH, PB "C", TRAY	947 PRI. PROT		
947N/947SC-1	Breaker 947N	Panel 12	600	10	4	M	BS	900	947NC4, TRENCH, PB "C", TRAY	947 SEC. PROT		
947N/947SC-2	Breaker 947N	Panel 12	600	10	4	M	BS	900	947NC4, TRENCH, PB "C", TRAY	947 SEC. PROT		
947N/NBD1	Breaker 947N	230kV North Bus Diff Junction Box #1	600	10	4	M	BS	400	947NC3, TRENCH, PB "C", EXIST CONDUIT NBCT1C1	230KV NBUS PRI. PROT.		
947N/NBD2	Breaker 947N	230kV North Bus Diff Junction Box #2	600	10	4	M	BS	220	947NC4, TRENCH, EXIST CONDUIT NBCT2C1	230KV NBUS SEC. PROT.		
947N/AC	Breaker 947N	AC Yard Panel *	600	8	3	S	C	TBD	947NC5, TRENCH, EXISTING CONDUIT	AC POWER	*SEE NOTE 2	

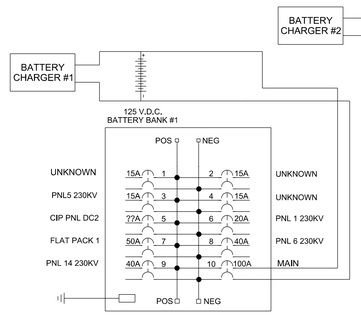
CONSTRUCTION NOTES:

1. DUE TO FUTURE MODIFICATIONS TO THE CONTROL HOUSE AND PANELS, LEAVE EXTRA SLACK IN THE CABLES FOR THE UPCOMING NORMANDY APSTF PROJECT
2. SOURCE UNKNOWN; CONTRACTOR SHALL TRACE EXISTING LV CIRCUITS BACK TO YARD PANEL(S) AND REMOVE CONDUCTORS. IF BRANCH CIRCUIT BKRS ARE SUFFICIENT SIZE PER LV DRAWING AND IN GOOD CONDITION, THEY MAY BE REUSED. CONTRACTOR SHALL PROVIDE AND INSTALL NEW BKR IF NEEDED. IF THERE IS NO ROOM IN LV PANEL (I.E. OLD CIRCUIT IS 1 POLE), NOTIFY ENGINEER FOR APPROPRIATE LV PANEL SOURCE.

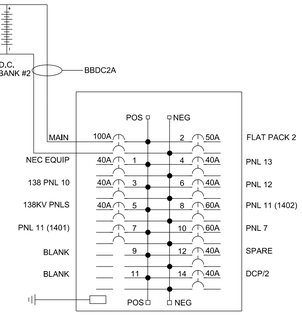
BREAKER 94147

CABLE #	FROM	TO	VOLT (V)	SIZE	#C	S/M	TYPE	LENGTH (FT)	CONDUIT ROUTE	USAGE	REMARKS	REV
932	Breaker 94147	AC Yard Panel									REMOVE CABLE	
933	Breaker 94147	AC Yard Panel									REMOVE CABLE	
931	Breaker 94147	Panel 12									REMOVE CABLE	
93741/C003	Breaker 94147	Panel 7									REMOVE CABLE	
929	Breaker 94147	Panel 12									REMOVE CABLE	
930	Breaker 94147	Panel 12									REMOVE CABLE	
925	Breaker 94147	Panel 12									REMOVE CABLE	
93741/C002	Breaker 94147	Panel 7									REMOVE CABLE	
93741/C001	Breaker 94147	Panel 7									REMOVE CABLE	
920	Breaker 94147	Panel 12									REMOVE CABLE	
921	Breaker 94147	Panel 12									REMOVE CABLE	
94147/C1	Breaker 94147	Panel 12	600	10	21	M	BS	900	94147C1, TRENCH, PB "C", TRAY	BKR 947N CONTROL		
94147/C2	Breaker 94147	Panel 12	600	10	21	M	BS	900	94147C2, TRENCH, PB "C", TRAY	BKR 947N CONTROL		
94147/947PR-1	Breaker 94147	Panel 12	600	10	4	M	BS	900	94147C3, TRENCH, PB "C", TRAY	947 PRI. PROT		
94147/947PR-2	Breaker 94147	Panel 12	600	10	4	M	BS	900	94147C3, TRENCH, PB "C", TRAY	947 PRI. PROT		
947N/947SC-1	Breaker 94147	Panel 12	600	10	4	M	BS	900	94147C4, TRENCH, PB "C", TRAY	947 SEC. PROT		
947N/947SC-2	Breaker 94147	Panel 12	600	10	4	M	BS	900	94147C4, TRENCH, PB "C", TRAY	947 SEC. PROT		
94147/941PR-1	Breaker 94147	Panel 7	600	10	4	M	BS	900	94147C3, TRENCH, PB "C", TRAY	941 PRI. PROT.		
94147/941PR-2	Breaker 94147	Panel 7	600	10	4	M	BS	900	94147C3, TRENCH, PB "C", TRAY	941 PRI. PROT.		
94147/941SC-1	Breaker 94147	Panel 7	600	10	4	M	BS	900	94147C4, TRENCH, PB "C", TRAY	941 SEC. PROT.		
94147/941SC-2	Breaker 94147	Panel 7	600	10	4	M	BS	900	94147C4, TRENCH, PB "C", TRAY	941 SEC. PROT.		
94147/AC	Breaker 94147	AC Yard Panel *	600	8	3	S	C	TBD	94147C5, TRENCH, EXISTING CONDUIT	AC POWER	*SEE NOTE 2	

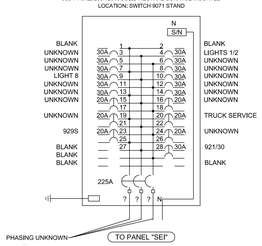




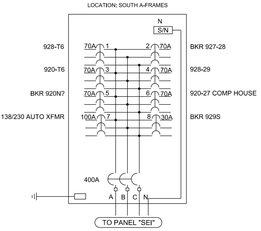
DC PANEL "EM1" (1 OF 2 DC PNLS)
1Ø 2W 125VDC, 225A GE TYPE NAB
LOCATION: E WALL BTWN BATT ROOMS



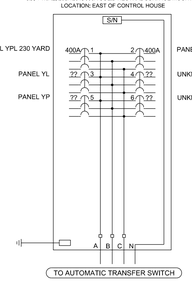
DC PANEL "EM2" (2 OF 2 DC PNLS)
1Ø 2W 125VDC, 100A SQUARE D TYPE HCN
I-LINE PANELBOARD
LOCATION: SE CNTRL HSE INSIDE WALL



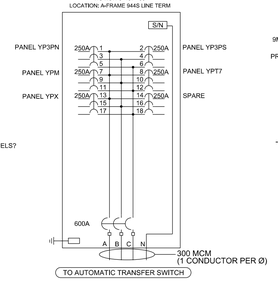
AC PANEL "YPL"
3Ø, 4 WIRE, 208/120V, SOLID NEUTRAL SURFACE MOUNTED
GE TYPE NAB PANELBOARD
LOCATION: SWITCH 9071 STAND



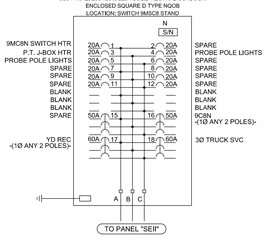
AC PANEL "YPW"
3Ø, 4 WIRE, 208/120V, 400A SOLID NEUTRAL SURFACE MOUNTED
GE TYPE NAB PANELBOARD
LOCATION: SOUTH A-FRAMES



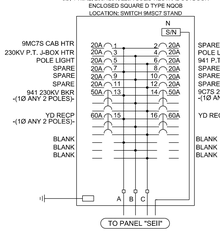
AC PANEL "SEI"
3Ø, 4 WIRE, 208/120V, 600A SOLID NEUTRAL SURFACE MOUNTED
LOCATION: EAST OF CONTROL HOUSE



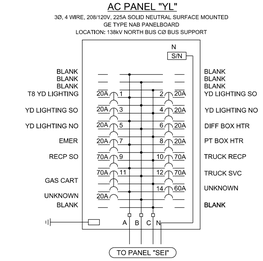
AC PANEL - "SEII"
3Ø, 4 WIRE, 208/120V, 600A, SOLID NEUTRAL SURFACE MOUNTED, SQUARE D TYPE I-LINE PANELBOARD CATALOGUE NO HCW 34197-495
LOCATION: A-FRAME 9443 LINE TERM



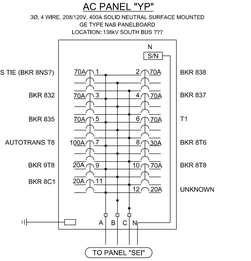
AC PANEL "YP3PN"
3Ø, 4 WIRE, 208/120V, 225A SOLID NEUTRAL, OUTDOOR
ENCLOSED SQUARE D TYPE NQOB
LOCATION: SWITCH 9MSCS STAND



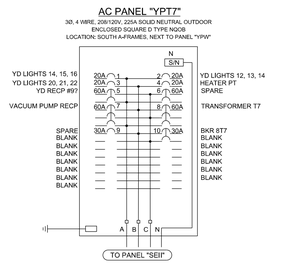
AC PANEL "YP3PS"
3Ø, 4 WIRE, 208/120V, 225A SOLID NEUTRAL, OUTDOOR
ENCLOSED SQUARE D TYPE NQOB
LOCATION: SWITCH 9MSCT STAND



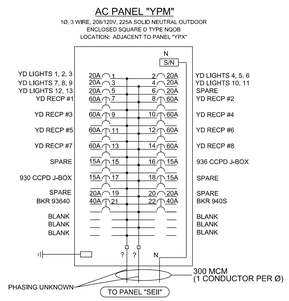
AC PANEL "YL"
3Ø, 4 WIRE, 208/120V, 225A SOLID NEUTRAL SURFACE MOUNTED
GE TYPE NAB PANELBOARD
LOCATION: 138kV NORTH BUS C0 BUS SUPPORT



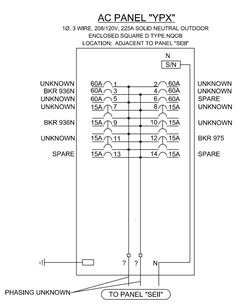
AC PANEL "YP"
3Ø, 4 WIRE, 208/120V, 400A SOLID NEUTRAL SURFACE MOUNTED
GE TYPE NAB PANELBOARD
LOCATION: 138kV SOUTH BUS ???



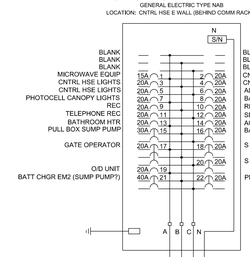
AC PANEL "YPT7"
3Ø, 4 WIRE, 208/120V, 225A SOLID NEUTRAL OUTDOOR
ENCLOSED SQUARE D TYPE NQOB
LOCATION: SOUTH A-FRAMES, NEXT TO PANEL "YPX"



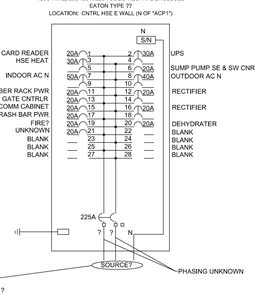
AC PANEL "YPM"
1Ø, 3 WIRE, 208/120V, 225A SOLID NEUTRAL OUTDOOR
ENCLOSED SQUARE D TYPE NQOB
LOCATION: ADJACENT TO PANEL "YPX"



AC PANEL "YPX"
1Ø, 3 WIRE, 208/120V, 225A SOLID NEUTRAL OUTDOOR
ENCLOSED SQUARE D TYPE NQOB
LOCATION: ADJACENT TO PANEL "SEII"



CONTROL HOUSE AC PANEL "LC" "ACP1"
3Ø, 4 WIRE, 208/120V, 225A SOLID NEUTRAL ENCLOSED
GENERAL ELECTRIC TYPE NAB
LOCATION: CNTRL HSE E WALL (BEHIND COMM RACKS)



CONTROL HOUSE AC PANEL 2 "ACP2"
1Ø, 3 WIRE, 208/120V, 225A SOLID NEUTRAL ENCLOSED
EATON TYPE ??
LOCATION: CNTRL HSE E WALL (N OF "ACP1")

LOW VOLTAGE ELECTRICAL NOTES:

1) ALL AC AND DC PANELS AND STATION SERVICE EQUIPMENT SHOWN ON THIS DRAWING WERE DERIVED FROM A COMBINATION OF EXISTING DRAWINGS AND FIELD INVESTIGATION. CONTRACTOR SHALL VERIFY ALL ELECTRICAL AND PHYSICAL CHARACTERISTICS OF PANEL PRIOR TO CONSTRUCTION AND MARK UP ON AS-BUILT DRAWINGS.

2) CONTRACTOR SHALL TRACE EXISTING LOW VOLTAGE AC CIRCUITS FROM BKRS 94147 & 947N TO APPLICABLE YARD PANEL AND REMOVE CABLE; RE-LABEL LV CIRCUIT BREAKERS AS "SPARE" UNLESS THEY ARE REUSED IN WHICH CASE, ENSURE CIRCUITS ARE LABELED APPROPRIATELY.

3) CONTRACTOR TO SUPPLY AND INSTALL TWO (2) NEW 1Ø 2-POLE 40A CIRCUIT BREAKERS IN EXISTING YARD PANELS AS NEEDED. LABEL AS "BKR 94147" AND "BKR 947N"

4) CONTRACTOR TO REMOVE ANY ABANDONED CABLES THAT ARE NOT IN USE.

JEA
BUILDING COMMUNITY
21 W CHURCH ST.
JACKSONVILLE, FLORIDA 32202

ISSUED FOR CONSTRUCTION

CONSULTANT INFORMATION

PROFESSIONAL ENGINEER'S SEAL

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF

PE: _____

LIC. NO.: _____

STATE: _____

DATE: _____

REV	DATE	PROJ #	REVISION DESCRIPTION	BY	REVIEW

ENGINEERING	
DATE	7-01-2019
BY	BLS
REVIEW	
DRAFTING	
DATE	7-01-2019
BY	BLS
REVIEW	

BREAKER 94147 & 947N REPLACEMENT

LOW VOLTAGE

NORMANDY SUBSTATION

SUBSTATION & TRANSMISSION PROJECTS 20410

SCALE: N/A

PROJ #: 8005248

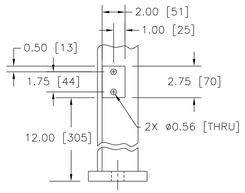
DRAWING NAME: NM2019-LV.DGN

DRAWING SET: NM2019

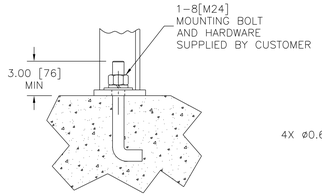
DRAWING #: 11 OF 12

SHEET #: 01 OF 01

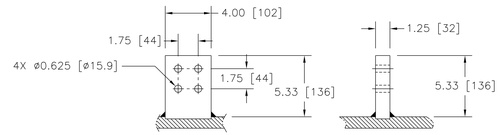
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



VIEW B–B
GROUND PAD

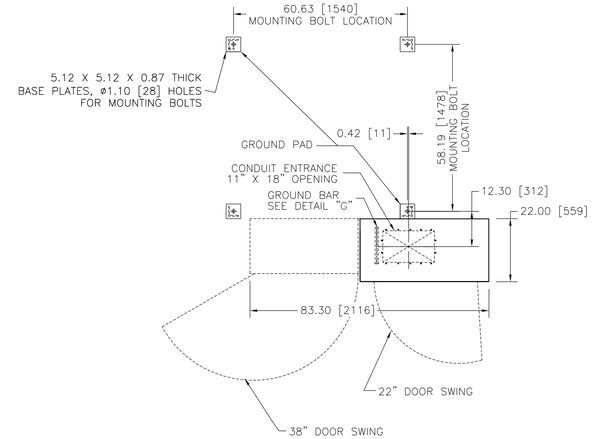


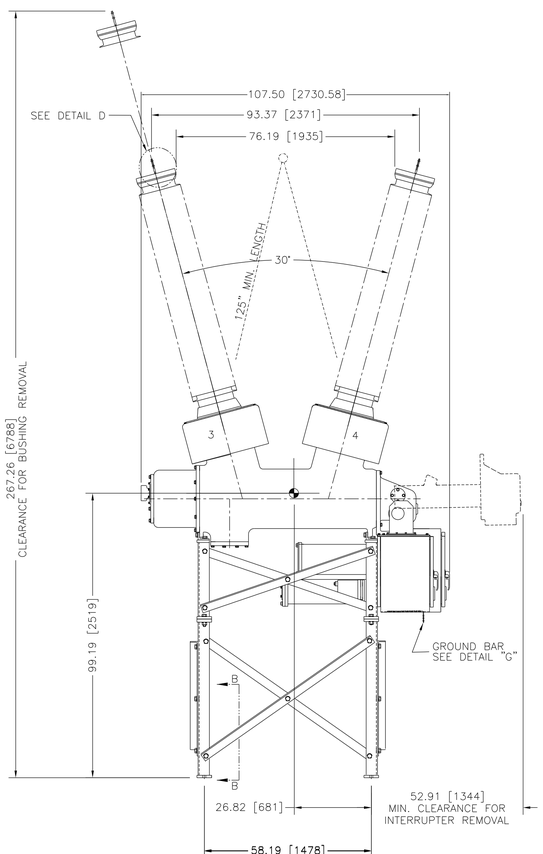
DETAIL C
TYP. (4) PLCS.

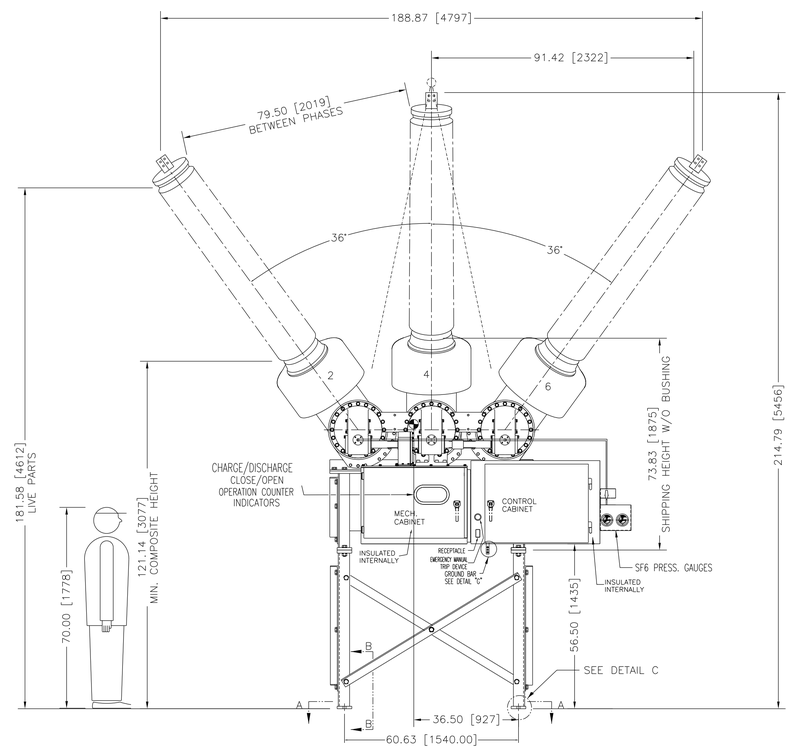


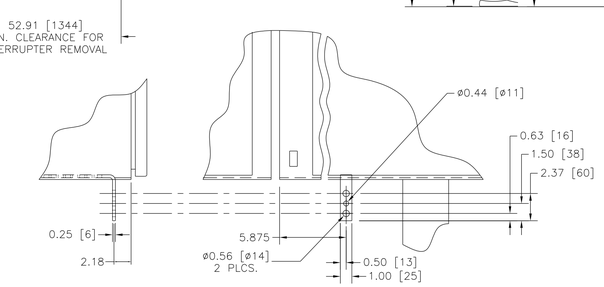
DETAIL D
BUSHING TERMINAL
MATERIAL: ALUMINIUM

SECTION A–A









DETAIL G
COPPER GRD. BAR

NOTES

1. TOTAL BREAKER WEIGHT: 9200 lbs [4173 kG]
2. TOTAL SF6 WEIGHT: 212 lbs [96.2 kG]
3. N/A
4. INDICATES CENTER OF GRAVITY.
5. RATINGS

RATED MAXIMUM VOLTAGE:	245 kV
RATED CONTINUOUS CURRENT:	3000 A
RATED SHORT–CIRCUIT CURRENT:	50 kA
RATED LOW FREQUENCY WITHSTAND VOLTAGE (60–50 Hz):	425 kV
RATED FULL WAVE IMPULSE WITHSTAND VOLTAGE:	1050 kV
RATED GAS PRESSURE AT 20°C [68°F]:	0.55 MPa [80 PSIG]

6. BUSHING DATA:
   TYPE = COMPOSITE
   FULL WAVE IMPULSE WITHSTAND VOLTAGE: 1050 KV
   CREEPAGE = MIN.307 in [7800 mm]
   STRIKE = 79.5 in [2020 mm]
   HEIGHT = 84.8 in [2155 mm]
7. SURFACE TREATMENTS
   SUPPORT STRUCTURE: HOT DIP GALVANIZED PER ASTM A123
   CONTROL CABINET: UNFINISHED ALUMINIUM
   MECH. CABINET: UNFINISHED ALUMINIUM
   MECHANISM COMPONENTS: PAINT ANSI 70 LIGHT GRAY
   SF_6 GAS ENCLOSURE: UNFINISHED ALUMINIUM
   BCT COVER: UNFINISHED ALUMINIUM
8. MECHANICAL LOADING
   WIND LOAD: ⩽ 120 MPH
   ICE LOAD: 0
   SEISMIC LOAD: 0
   TERMINAL LOAD:
   STATIC HORIZONTAL LONGITUDINAL FORCE: ⩽ 281 lb [127.5 kg]
   STATIC HORIZONTAL TRANSVERSE FORCE: ⩽ 225 lb [102 kg]
   STATIC VERTICAL FORCE: ⩽ 281 lb [127.5 kg]
9. FOUNDATION LOADS
   (INCLUDES OPERATIONAL LOADS, 300 lbs LINE LOADS AND 120 MPH WIND LOADS)
   OVERTURN MOMENT: 134104 lbf*ft [18540 kg*m]
   TOTAL SHEAR: 18890 lbf [8568 kgf]
   TOTAL COMPRESSION: 17175 lbf [7790 kgf]
10. MAXIMUM ANCHOR BOLT LOADS
   TENSION: 10480 lbf [4753 kgf]
   SHEAR: 4722 lbf [2141 kgf]
   PAD COMPRESSION: 655 PSI [46 kgf/cm²]

THIS GCB MEETS THE REQUIREMENTS OF IEEE, ANSI, IEC, NEMA AND NESC

HS 245
SPRING/SPRING MECHANISM
1050kV BIL COMPOSITE BUSHINGS

SIGNATURES		DATE
DRAWN BY:	S.FABRE	03/08/19
CHECKED:		
ENGRD BY:		
APPROVALS:		

Hitachi T&D Solutions, Inc.
Suwanee, GA

TITLE: OUTLINE
245kV/50kA/3000A

CUSTOMER: JEA
CUST. P.O: 180314
HTDS SO: 16462(SQ#)
SUBSTATION: NORMANDY 947N & NORMANDY 94147

SIZE	FSCM NO.	DWG. NO.	REV.
D		HS245A5D0185	0

SCALE: NTS
CONT. ON SHT. END SHT NO. 1

SECTION VI - TECHNICAL SPECIFICATIONS - BREAKER REPLACEMENT PLAN

1) Oct 19' to Sept 20'

a) 28 kV Breakers (30)

Substation	Breaker(s)
Garden City	497
Hartley Road	595, 596, 597
Ribault	450, 451
Powers	512, 513
Mandarin	510, 521
Northshore	407
San Souci	504, 506
Imeson	494, 495
Picketville	461, 462, 417
Orange Park	301
Cecil Field	390
Arlington	25T1, 25T2, 479, 480
Baymeadows	25T1, 25T2, 546, 547, 548, 549

b) 72 kV Breakers (3)

Substation	Breaker(s)
West Jax	6T2
Main Street	67172
Naval Air Station	669

c) 145 kV Breakers (1)

Substation	Breaker(s)
Hartley Road	828T6

d) 245 kV Breaker (5)

Substation	Breaker(s)
Normandy	944S,9T6N, 9T7S, 9T6T7, 928S

2) Oct 20' to Sept 21'

a) 28 kV Breakers (28)

Substation	Breaker(s)
Brooklyn	25T1, 473
Cecil Field	25T1
Fort Caroline	25T1, 570, 571

Garden City	25T1
Grand Park	25T2, 402
Hamilton	25T1, 25T2, 309
Hartley Road	25T1, 25T2
Herlong	25T1, 25T2, 331, 332
Hunter Road	25T1, 25T2, 468, 469, 587
Imeson	25T1
Lane Ave	25T2
Mandarin	25T2, 507, 508

b) 72 kV Breakers (3)

Substation	Breaker(s)
Orange Park	6T1T2
Mill Cove	6T2
Lane Ave	645

c) 145 kV Breakers (2)

Substation	Breaker(s)
Phillips Highway	827, 852

d) 245 kV Breaker (8)

Substation	Breaker(s)
Normandy	921N, 92144, 944S
Brandy Branch	9SS1N, 9SS1S, 9SS2N, 9SS240, 9T142

3) Oct 21' to Sept 22'

a) 28 kV Breakers (28)

Substation	Breaker(s)
Mayport	25T2, 592, 593
Merrill	25T2, 433, 434
Naval Air Station	25T1, 25T1T2, 25T2, 352
Neptune	25T1, 25T2, 564
Normandy	25T1, 362, 363, 364
Northside	415
Northwest Jax	445
Oakwood Villa	25T2, 556, 557, 558, 559
Orange Park	25T1, 302, 304, 305

b) 145 kV Breakers (1)

Substation	Breaker(s)
Mandarin	823

c) 245 kV Breaker (12)

Substation	Breaker(s)
Fort Caroline	93138, 931T6, 938T6,
West Jax	921
Brandy Branch	9G2N, 9G2S, 9G3N, 9G357, 9G1N, 9g141, 9G4N, 9G443

4) Oct 22' to Sept 23'

a) 28 kV Breakers (26)

Substation	Breaker(s)
Paxon	25T1, 482, 483
Phillips Highway	25T2, 523
Pickettville	25T1, 25T2
Powers	25T1, 25T2, 514
Randall St	25T1, 25T2, 413, 447
Ribault	25T1
Ritter Park	25T2, 429
Robinwood	441
San Pablo	25T1, 518, 566, 568
San Souci	25T1, 25T2, 502, 505

b) 145 kV Breakers (4)

Substation	Breaker(s)
Baymeadows	826, 843
Cecil Field	837, 849

c) 245 kV Breaker (5)

Substation	Breaker(s)
West Jax 920	920
Brandy Branch	957S, 941S, 940S, 942S

5) Oct 23' to Sept 24'

a) 28 kV Breakers (28)

Substation	Breaker(s)
Southeast Jax	25T1, 25T2, 572, 573, 574, 575
University	25T1, 25T2, 536, 537, 538

Baymeadows	545, 550
Center Park	200, 201, 205, 25T1
Craven Road	25T1, 588, 589
Firestone	25C1, 25T3
Fort Caroline	25T2, 579, 580
Garden City	25T2, 498, 499

b) 145 kV Breakers (4)

Substation	Breaker(s)
Powers	827, 845
Eastport	830
Mandarin	8T1T2

c) 245 kV Breaker (1)

Substation	Breaker(s)
Robinwood	9T6

SECTION VII - TECHNICAL SPECIFICATIONS – JEA SECURITY RESPONSIBILITIES CONTROLS

Security Responsibilities and Controls

Badge:

- Is to be worn in plain view at all times while on a JEA property.
- Do not borrow, loan, or otherwise use another individual's badge for any reason.
- Not be used to allow others into secured areas except in the case of serving as an escort.
- Badges not used within 90 calendar days will automatically deactivate. Contact your JEA representative to have the badge reactivated.

Escorting visitors:

- Continuously escort and remain within physical proximity of their visitor to ensure violations of JEA policies and procedures are not committed.
- Visitors that violate JEA policy may be restricted from future visitations.
- Should the person designated as the escort need to leave the site, the visitor(s) must also leave.
- **Escorting person(s) at a door** - badge at door, open door, enter space. Allow all you are escorting to piggyback. Escort co-workers, subs, etc.
- **Escorting vehicle(s) at a gate without gate arm** – stop at gate, badge at reader, gate opens, enter area. Allow all vehicles you are escorting to piggyback. Escort co-workers, subs, etc.
- **Escorting vehicle(s) at a gate with gate arm** – stop at gate, if security is present, instruct security officer of you escorting vehicle(s) behind you, badge at gate, gate and gate arm opens, enter area. Security officer will badge at reader for each vehicle you are escorting to allow area access. Escort co-workers, subs, etc.
- **Escorting vehicle(s) at a gate without gate arm** – stop at gate, pull to side, badge at gate reader allowing each vehicle you are escorting to access site and pull to the side. After all enter, badge at reader to allow you access. Escort co-workers, subs, etc.

Access Control:

- At no time or under any circumstances allow access to anyone you are not escorting.
- Do not damage, attempt to bypass or tamper with any part of the door hardware, its locking mechanism, access control or CCTV systems.
- Do not hold or prop open any door. If business requirements require a door to remain open, arrangements must be made with JEA Security (665-6200) in advance so that alternative protective measures may be implemented.
- **Tailgating is not permitted! This applies to doors AND vehicle gates**! You MUST stop at and present badge to reader to access the area, whether the door/gate is already open or not (Note: Gate arms close after each vehicle).

Site Security Procedures:

- Secure all access points and set alarms before exiting facilities.
- The last person out of a site must "arm" the site as they depart.
- Where safe to do so, all personnel should wait until the perimeter gate fully closes before departing the area.

Vehicles:

- Contractor marked, and contractor personal vehicles are not to be left unattended or overnight within JEA properties without JEA management approval.

Mechanical keys:

- Used by the authorized user only and may not be loaned.
- Mechanical keys may not be copied or otherwise reproduced.

Weapons:

- Weapons of any kind are not permitted to be carried or displayed on JEA property.

Searches:

- JEA reserves the right to conduct searches of person and property at any time while on JEA property.

Notify Security @ 665-6200 for:

- Lost or stolen badge/key.
- Door (exterior) or mechanical gate issues.
- Suspicious activity.

Everyone is a member of Security. See something, Say something. Violations of any of these responsibilities may result in immediate/permanent removal from JEA property with possible civil or criminal prosecution and fines.

JEA CONFIDENTIAL-SSI, NON-PUBLIC
All information contained within this document is considered to be security sensitive information and exempt from all forms of public records requests, per Florida Statute Section 119.071.