

Herbicide                      product data  
 Staking/Guying              for alternate to details: send product data, detail

B. Plant materials

- a. Plant species and size shall conform to those indicated on the drawings. Nomenclature shall conform to standardized plant names, 1942 edition. All nursery stock shall be in accordance with grades and standards for nursery plants, latest edition, published by the Florida department of agriculture and consumer services. All plants shall be Florida grade no. 1 or better as determined by the Florida division of plant industry. All plants shall be healthy, vigorous, sound, well-branched, and free of disease and insects, insect eggs and larvae and shall have adequate root systems. Trees for planting in rows shall be uniform in size and shape. All materials shall be subject to approval by the owner. Where any requirements are omitted from the plant list, the plants furnished shall be normal for the variety. Plants shall be pruned prior to delivery only with approval from owner or owner's representative. No substitutions shall be made without written permission from the owner's representative
- b. Measurements: the height and/or width of trees shall be measured from the ground or across the normal spread of branches with the plants in their normal position. This measurement shall not include the immediate terminal growth. Plants larger in size than those specified in the plant list may be used if approved by the owner. If the use of larger plants is approved, the ball of earth or spread of roots shall be increased in proportion to the size of the plant.
- c. Inspection: plants shall be subject to inspection and approval at the place of growth, or upon delivery to the site, as determined by the owner, for quality, size, and variety; such approval shall not impair the right of inspection and rejection at the site during progress of the work or after completion for size and condition of root balls or roots, latent defects or injuries. Rejected plants shall be removed immediately from the site. Notice requesting inspection shall be submitted in writing by the contractor at least one (1) week prior to anticipated date.

1.05 SOIL MIXTURE (PLANTING MEDIUM, PLANTING MIX, TOPSOIL MIX)

- A. Soil mixture (planting medium for plant pits) shall consist of 20% clean Florida muck and 80% clean sand. It shall contain three (3) to five (5) percent decomposed organic matter and a PH between 5.5 and 7.0 - submit sample and PH testing results for approval.
- B. Muck (or mucky peat) for use in preparing soil mixture for backfilling plant pits muck shall be fertile, and of a very high organic content derived from Florida sources; reasonably free of subsoil, clay lumps, brush weeds and other litter; free of roots, stumps, stones larger than 2" in any direction, and other extraneous or toxic matter harmful to plant growth. For use in preparing soil mixture shall be coarse, clean, and well-draining.

- C. Sand. Contractor shall submit results of soil tests for topsoil and sand proposed for use under this contract for approval by the owner.
- D. Trees shall be planted in the existing native soil on site, unless determined to be unsuitable - at which point the contractor shall contact landscape architect to prior to planting. Discuss alternate recommendation
- E. Contractor to submit samples of soil mixture for owner's representative approval prior to plant installation operations commence. F. Water necessary for planting and maintenance shall be of satisfactory quality to sustain an adequate plant growth and shall not contain harmful, natural or man-made elements detrimental to plants.

#### 1.06 WATER

- A. Water meeting the above standard shall be obtained on the site from the owner, if available, and the contractor shall be responsible to make arrangements for its use by his tanks, hoses, sprinklers, etc. If such water is not available at the site, the contractor shall provide satisfactory water from sources off the site at no additional cost to the owner.  
\*watering/irrigation restrictions may apply - refer to property's jurisdictional authority.
- B. Contractor shall provide fertilizer application schedule to owner, as applicable to soil type, plant installation type, and site's proposed use. Suggested fertilizer types shall be organic or otherwise naturally-derived.
- C. Fertilizer restrictions may apply - refer to property's jurisdictional authority.

#### 1.07 MULCH

- A. Mulch material shall be moistened at the time of application to prevent wind displacement, and applied at a minimum depth of 3 inches. Clear mulch from each plant's crown (base). Type of material: "florimulch" or shredded, sterile eucalyptus mulch

#### 1.08 DIGGING AND HANDLING

- A. Protect roots or root balls of plants at all times from sun, drying winds, water and freezing, as necessary until planting. Plant materials shall be adequately packed to prevent damage during transit. Trees transported more than ten (10) miles or which are not planted within three (3) days of delivery to site shall be sprayed with an antitranspirant product ("Wiltpruf" or equal) to minimize transpiration water loss.
- B. Balled and burlapped plants (B&B) shall be dug with firm, natural balls of soil of sufficient size to encompass the fibrous and feeding roots of the plants. No plants moved with a root ball shall be planted if the ball is cracked or broken. Plants balled and burlapped or container grown shall not be handled by stems.

- C. Plants marked "BR" in the plant list shall be dug with bare roots, complying with, and current edition. Care shall be Florida grades and standards for nursery plants exercised that the roots do not dry out during transportation and prior to planting.
- D. Protection of palms (if applicable): only a minimum of fronds shall be removed from the crown of the palm trees to facilitate moving and handling. Clear trunk (CT) shall be as specified after the minimum of fronds have been removed. All palms shall be braced per palm planting detail 5
- E. Excavation of tree pits shall be performed using extreme care to avoid damage to surface and subsurface elements such as utilities or hardscape elements, footers and prepared sub- bases.

#### 1.09 CONTAINER GROWN STOCK

- A. All container grown material shall be healthy, vigorous, well-rooted plants established in the container in which they are sold. The plants shall have tops which are of good quality and are in a healthy growing condition, Florida #1 or better.
- B. An established container grown plant shall be transplanted into a container and grown in that container sufficiently long for the new fibrous roots to have developed so that the root mass will retain its shape and hold together when removed from the container. Container grown stock shall not be handled by their stems.
- C. Plant roots bound in containers are not acceptable.
- D. Substitution of non-container grown material for material explicitly specified to be container grown will not be permitted without written approval is obtained from the owner or owner's representative.

#### 1.10 COLLECTED STOCK

- A. When the use of collected stock is permitted as indicated by the owner or owner's representative, the minimum sizes of rootballs shall be equal to that specified for the next larger size of nursery grown stock of the same variety.

#### 1.11 NATIVE STOCK

- A. Plants collected from wild or native stands shall be considered nursery grown when they have been successfully re-established in a nursery row and grown under regular nursery cultural practices for a minimum of two (2) growing seasons and have attained adequate root and top growth to indicate full recovery from transplanting into the nursery row.

#### 1.12 MATERIALS LIST

- A. Quantities necessary to complete the work on the drawings shall be furnished by the contractor. Quantity estimates have been made carefully, but the landscape architect or owner assumes no liability for omissions or errors. Should a discrepancy occur between the plans and the plant list quantity, the landscape architect shall be notified for clarification prior to bidding or installation. All dimensions and/or sizes specified shall be the minimum acceptable size

#### 1.13 FINE GRADING

- A. Fine grading under this contract shall consist of final finished grading of lawn and planting areas that have been rough graded by others. Berming as shown on the drawings shall be the responsibility of the contractor, unless otherwise noted.
- B. The contractor shall fine grade the lawn and planting areas to bring the rough grade up to final finished grade allowing for thickness of sod and/or mulch depth. This contractor shall fine grade by hand and/or with all equipment necessary including a grading tractor with front-end loader for transporting soil within the site.
- C. All planting areas shall be graded and maintained for positive drainage to surface/subsurface storm drain systems. Areas adjacent to buildings shall slope away from the buildings. Refer to civil engineer's plans for final grades.

#### 1.14 PLANTING PROCEDURES

- A. Cleaning up before commencing work: the contractor shall clean work and surrounding areas of all rubbish or objectionable matter. All mortar, cement, and toxic material shall be removed from the surface of all plant beds. These materials shall not be mixed with the soil. Should the contractor find such soil conditions beneath the soil which will in any way adversely affect the plant growth, he shall immediately call it to the attention of the owner's representative. Failure to do so before planting shall make the corrective measures the responsibility of the contractor.
- B. Verify locations of all utilities, conduits, supply lines and cables, including but not limited to: electric, gas (lines and tanks), water, sanitary sewer, storm water systems, cable, and telephone. Properly maintain and protect existing utilities. Call national one call - 811 - to locate utilities.
- C. Subgrade excavation: contractor is responsible to remove all existing and imported limerock and limerock sub-base from all landscape planting areas to a minimum depth of 36". Contractor is responsible to backfill these planting areas to rough finished grade with clean topsoil from an on-site source or an imported source. If limerock or other adverse conditions occur in planted areas after 36" deep excavation by the contractor, and adequate percolation cannot be achieved, contractor shall utilize planting detail that addresses poor drainage.

- D. Furnish nursery's certificate of compliance with all requirements as herein specified and required. Inspect and select plant materials before plants are dug at nursery or growing site.
- E. General: comply with applicable federal, state, county, and local regulations governing landscape materials and work. Conform to accepted horticultural practices as used in the trade. Upon arrival at the site, plants shall be thoroughly watered and properly maintained until planted. Plants stored on-site shall not remain unplanted for a period exceeding twenty-four (24) hours. At all times, methods customary in good horticultural practices shall be exercised.
- F. The work shall be coordinated with other trades to prevent conflicts. Coordinate planting with irrigation work to assure availability of water and proper location of irrigation appurtenances and plants.
- G. All planting pits shall be excavated to size and depth in accordance with the USA standard for nursery stock 260.1, unless shown otherwise on the drawings, and backfilled with the prepared planting soil mixture as specified in section e. Test all tree pits with water before planting to assure proper drainage percolation is available. No allowance will be made for lost plants due to improper percolation. If poor percolation exists, utilize "poor drainage condition" planting detail. Trees shall be set plumb and held in position until the planting mixture has been flushed into place with a slow, full hose stream. All planting shall be performed by personnel familiar with planting procedures and under the supervision of a qualified landscape foreman. Proper "jetting in" shall be assured to eliminate air pockets around the roots. "Jet stick" or equal is recommended.
- H. Take all necessary precautions to avoid damage to buildings and building structures while installing trees.
- I. Soil mixture shall be as specified in section e of these specifications.
- J. Trees and shrubs shall be set straight at an elevation that, after settlement, the plant crown will stand one (1) to two (2) inches above grade. Each plant shall be set in the center of the pit. Planting soil mixture shall be backfilled, thoroughly tamped around the ball, and settled by water (after tamping).
- K. Amend pine and oak plant pits with ectomycorrhizal soil application per manufacturer's recommendation. All other plant pits shall be amended with endomycorrhizal soil application per manufacturer's recommendation. Provide product information submittal prior to inoculation.
- L. Fill hole with soil mixture, making certain all soil is saturated. To do this, fill hole with water and allow to soak minimum twenty (20) minutes, stirring if necessary to get soil thoroughly wet. Pack lightly with feet. Add more wet soil mixture. Do not cover top of ball with soil mixture, only with mulch. All burlap, rope, wires, baskets, etc., shall be removed from the sides and tops of balls, but no burlap shall be pulled from underneath.

- M. Pruning: trees shall be pruned, at the direction of the owner or owner's representative, to preserve the natural character of the plant. All soft wood or sucker growth and all broken or badly damaged branches shall be removed with a clean cut. All pruning to be performed by licensed arborist, in accordance with ANSI A-300.
- N. Shrubs and ground cover plants shall be evenly spaced in accordance with the drawings and as indicated on the plant list. Cultivate all planting areas to a minimum depth of 6", remove and dispose all debris. Mix top 4" to achieve soil mixture as specified in section. Thoroughly water all plants after installation.
- O. Tree guying and bracing shall be installed by the contractor in accordance with the plans to insure stability and maintain trees in an upright position. If the contractor and owner decide to waive the tree guying and bracing, the owner shall notify the landscape architect in writing and agree to indemnify and hold harmless the landscape architect in the event unsupported trees planted under this contract fall and damage person or property.
- P. Mulching: provide a three inch (minimum) layer of specified mulch over the entire area of each shrub bed, ground cover, vine bed, and tree pit planted under this contract.
- Q. Herbicide weed control: all plant beds shall be kept free of noxious weeds until final acceptance of work. If directed by the owner, "round-up" shall be applied for weed control by qualified personnel to all planting areas in spot applications per manufacturer's precautions and specifications. Prior to final inspection, treat all planting beds with an approved pre-emergent herbicide at an application rate recommended by the manufacturer. (as allowed by jurisdictional authority)

#### 1.15 LAWN SODDING

- A. The work consists of lawn bed preparation, soil preparation, and sodding complete, in strict accordance with the specifications and the applicable drawings to produce a turf grass lawn acceptable to the owner.
- B. Lawn bed preparation: all areas that are to be sodded shall be cleared of any rough grass, weeds, and debris and the ground brought to an even grade. The entire surface shall be rolled with a roller weighing not more than one-hundred (100) pounds per foot of width. During the rolling, all depressions caused by settlement shall be filled with additional soil, and the surface shall be regarded and rolled until presenting a smooth and even finish to the required grade.
- C. Soil preparation: prepare loose bed four (4) inches deep. Hand rake until all bumps and depressions are removed. Wet prepared area thoroughly.
- D. Sodding

- a. The contractor shall sod all areas that are not paved or a. Planted as designated on the drawings within the contract limits, unless specifically noted otherwise.
  - b. The sod shall be certified to meet Florida state plant board specifications, absolutely true to varietal type, and free from weeds, fungus, insects and disease of any kind. Sod panels shall be laid tightly together so as to make a solid sodded lawn area.
  - c. Sod shall be laid uniformly against the edges of all curbs and other hardscape elements, paved and planted areas. Adjacent to buildings, a 24 inch stone mulch strip shall be provided - refer to details. Immediately following sod laying, the lawn areas shall be rolled with a lawn roller customarily used for such purposes, and then thoroughly irrigated. If, in the opinion of the owner, top-dressing is necessary after rolling to fill the voids between the sod panels and to even out inconsistencies in the sod, clean sand, as approved by the owner's representative, shall be uniformly spread over the entire surface of the sod and thoroughly watered in. Fertilize installed sod as allowed by property's jurisdictional authority.
- E. During delivery, prior to, and during the planting of the lawn areas, the sod panels shall at all times be protected from excessive drying and unnecessary exposure of the roots to the sun. All sod shall be stacked so as not to be damaged by sweating or excessive heat and moisture. 6.
- F. Lawn maintenance:
- a. Within the contract limits, the contractor shall produce a dense, well established lawn. The contractor shall be responsible for the repair and re-sodding of all eroded, sunken or bare spots (larger than 12"x12") until certification of acceptability by the owner's representative. Repaired sodding shall be accomplished as in the original work (including re-grading if necessary).
  - b. Contractor responsible for establishing and maintaining sod/lawn until acceptance by the owner's representative. Prior to and upon acceptance, contractor to provide watering/irrigation schedule to owner. Observe all applicable watering restrictions as set forth by the property's jurisdictional authority.

#### 1.16 CLEANUP

- A. Upon completion of all planting work and before final acceptance, the contractor shall remove all material, equipment, and debris resulting from his work. All paved areas shall be broom-cleaned and the site left in a neat and acceptable condition as approved by the owner's authorized representative.

#### 1.17 PLANT MATERIAL MAINTENANCE

- A. All plants and planting included under this contract shall be maintained by watering, cultivating, spraying, and all other operations (such as re-staking or repairing guy

supports) necessary to insure a healthy plant condition by the contractor until certification of acceptability by the owner's representative. Maintenance after the certification of acceptability shall be in accordance with the specifications in this section. Contractors are requested to provide a bid estimate to cover landscape and irrigation maintenance for a period of 90 calendar days commencing after acceptance.

1.18 MAINTENANCE

- A. Contractors are requested to provide a bid estimate for maintenance following the initial 90-day maintenance period on a cost-per-month basis.

1.19 FINAL INSPECTION AND ACCEPTANCE OF WORK

- A. Final inspection at the end of the warranty period shall be on planting, construction and all other incidental work pertaining to this contract. Any replacement at this time shall be subject to the same one (1) year warranty (or as specified by the landscape architect or owner in writing) beginning with the time of replacement and ending with the same inspection and acceptance herein described.

1.20 WARRANTY

- A. The life and satisfactory condition of all 7 gallon and larger plant material installed by the landscape contractor shall be warranted by the contractor for a minimum of one (1) calendar year commencing at the time of certification of acceptability by the owner's representative.
- B. The life and satisfactory condition of all other plant material (including sod) installed by the landscape contractor shall be warranted by the contractor for a minimum of one (1) calendar year commencing at the time of certification of acceptability by the owner's representative.
- C. Replacement: any plant not found in a healthy growing condition at the end of the warranty period shall be removed from the site and replaced as soon as weather conditions permit. All replacements shall be plants of the same kind and size as specified in the plant list. They shall be furnished planted and mulched as specified under "planting", at no additional cost to the owner.
- D. In the event the owner does not contract with the contractor for landscape (and irrigation) maintenance, the contractor is encouraged to visit the project site periodically during the one year warranty period to evaluate maintenance procedures being performed by the owner, and shall notify the owner in writing of maintenance procedures or conditions which threaten vigorous and healthy plant growth. It is suggested such site visits shall be conducted a minimum of once per month for a period of twelve (12) months from the date of acceptance.

END OF SECTION



**SECTION 09 9150****TRAFFIC STRIPING PAINT****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes traffic coatings for the following applications:
  - 1. Pavement Markings: Stall striping and cross-hatching
  - 2. Concrete Curbs
- B. Related Sections include the following:
  - 1. Division 03 Section "Cast-in-Place Concrete" for concrete substrates.

**1.3 SUBMITTALS**

- A. Product Data: For each product indicated.
- B. Traffic Striping Layout: According to the contract drawings and existing conditions.
- C. Warranty: Include sample warranty, as applicable.

**1.4 QUALITY ASSURANCE**

- A. Contractor's Quality Control Responsibilities: Contractor is solely responsible for quality control of the Work.
- B. Installer (Applicator) Qualifications: An experienced applicator, approved by the paint manufacturer, who is specialized in installing work similar in material, design, and extent to that indicated for this Project.
- C. Source Limitations: Obtain traffic striping paint from a single manufacturer.
- D. Warranty: Provide material with a minimum of one (1) year manufacturer warranty.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "General Requirements."

1. Before installing traffic coatings, meet with representatives of authorities having jurisdiction, manufacturer's technical representative, Owner, Architect, consultants, independent testing agency, and other concerned entities. Review requirements for traffic coatings. Notify participants at least seven days before conference.
- F. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels showing the following information:
1. Manufacturer's brand name.
  2. Type of material.
  3. Directions for storage.
  4. Date of manufacture and shelf life.
  5. Lot or batch number.
  6. Mixing and application instructions.
  7. Color.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue. Protect from freezing. Keep storage area neat and orderly.

#### 1.6 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

#### 1.7 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
1. Quantity: 3 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. VOC Content: Provide waterproofing and traffic paint materials that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Pavement-Marking Paint: 150 g/L.

### **2.2 PAVEMENT MARKINGS**

- A. Pavement-Marking Paint: Waterborne acrylic, ready mixed, complying with FS TT-P-1952B, with drying time of less than 45 minutes.

1. Available Products:
  - a. ICI Devoe Paint Centers; Acrylic Traffic Paint DV850XX.
  - b. Sherwin-Williams Co.; Setfast Acrylic Waterborne Traffic Paint TM226/TM227.

- B. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than 45 minutes.

1. Available Products:
  - a. Benjamin Moore & Co.; Safety & Zone Marking Latex M58.
  - b. PPG Industries, Inc. (Pittsburgh Paints); Speedhide Traffic and Zone Marking Latex 11-23.
  - c. Sherwin Williams; Set Fast Acrylic Latex Traffic Marking Paint (G2 New Green 6 for Electric Vehicle Charging Stations)

- C. Color: Coordinate color of all standard striping, curbs, and cross-hatch with construction plans.

- D. Glass Beads: Beads (Glass Spheres) shall be used in all pavement markings except stall striping lines and shall conform to FS TT-B-1325, Type I or AASHTO M247, Type I. Glass beads used in all pavement marking shall be a minimum of 80% true spheres when tested according to ASTM-D-1155.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verification of Conditions: Examine the areas to receive the Work and the conditions under which the Work would be performed. Remedy conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Comply with procedures specified in PDCA P4 for inspection and acceptance of surfaces to be painted.

### **3.2 PREPARATION**

- A. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

B. Material Preparation:

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

### 3.3 APPLICATION

- A. Do not apply traffic paint for striping and other markings until traffic coating has cured according to manufacturer's written recommendations (see Division 07 "Traffic Coatings").
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
  1. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to Manufacturer's written instructions.
- D. Minimum Coating Thickness: Paint face of curb and top 6" of curb. Apply paint materials minimum 15 mil in two equal coats. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Glass Beads: Glass beads shall be distributed upon the marked areas immediately after application of the paint. A dispenser shall be furnished which is properly designed for attachment to the marking machine and suitable for dispensing glass beads.
  1. Glass beads shall be applied at the manufacturer's specified rate (but not less than 6lbs/gal of paint) and evenly distributed while the liquid marking is still fluid.
  2. Bead dispensers shall be calibrated at the beginning of the project to the proper flow rate and monitored throughout the course of the project to ensure proper bead coverage.
  3. Glass beads shall adhere to and be properly embedded in the cured paint or all marking operations shall cease until corrections are made.
  4. A night inspection of the markings is advisable to check for uniform reflectivity of the markings.
- F. Striping, Cross-Hatching, and Concrete Curbs:
  1. Traffic and Zone Marking Paint: Two coats.
    - a. Finish Coat: Traffic and Zone Marking Paint.

### 3.4 PROTECTING AND CLEANING

- A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

- B. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Engineer.
- C. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
  - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION 09 9150

## **SECTION – 16010 (ES)**

### **ELECTRICAL GENERAL PROVISIONS**

#### **PART 1 - GENERAL**

##### **1.01 SCOPE OF WORK:**

This Section includes the electrical provisions for all of Division 16, electrical and related work.

##### **1.02 RELATED WORK SPECIFIED ELSEWHERE:**

General Requirements Division 1

##### **1.03 DEFINITIONS:**

Provide means to furnish and install.

##### **1.04 SUBMITTALS:**

- A. Submit Shop Drawings for review as indicated. Shop Drawings shall be submitted in complete groups, loose-leaf bound, and indexed, including descriptive data, catalog cuts, diagrams, connection details, wiring dimensions, material and finishes.
- B. Submit manuals for review as indicated. Manuals shall include operating and maintenance instructions, parts lists, manufacturers and local suppliers addresses and pertinent descriptive data. Manuals shall be loose-leaf bound and indexed in three ring hardcover binder.
- C. Submit a minimum of 6 sets of Shop Drawings and 3 sets of manuals. One full set will be kept by the Project Consultant.

##### **1.05 DRAWINGS:**

- A. The drawings are schematic showing relative locations and connections and shall not be scaled for exact locations. Unless specific dimensions are shown, the structural, architectural and site conditions shall govern the exact locations. Should any difficulty occur in the running of conduits, setting of cabinets, outlets, fixtures, or any other devices or connections at the points shown, provide necessary minor deviations therefrom as approved without additional cost.

##### **1.06 RECORD DRAWINGS AND RECORDS:**

- A. Maintain a complete set of electrical prints for indicating all changes including Addendas executed, R.F.I.'s, Response to R.F.I.'s, Deviations, Cross References, etc. Use colored pencil or pen to mark changes at the time of execution. Deliver the set to the Owner's Representative upon completion. The As-Built will be checked each month for compliance prior to release of any progress payments. Elevations and dimensioned locations of underground work shall be indicated. Dimension to permanent references.

- B. Submit Xeroxed copies of all typed panel directories for approval prior to placing in panels and switchboards. Submittal shall be in loose-leaf 3-ring binder, 8-1/2" x 11".

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS:**

Materials and equipment shall be new, standard current products of manufacturers regularly engaged in the production of such equipment, and shall be the manufacturer's latest design. All materials shall bear the label of the Underwriters' Laboratory for the intended use or shall be materials approved by the code enforcing authorities and the Project Consultant.

### **2.02 HARDWARE:**

All hardware and accessory fittings shall be of a type designed, intended or appropriate for the use, and complement the items with which they are used, and shall have corrosion protection suitable for the atmosphere in which they are installed. All such hardware shall be U.S. Standard sizes.

### **2.03 EQUIPMENT:**

Equipment of a similar nature shall be identical.

Example: All panelboards shall be of the same manufacturer and of the same style.

### **2.04 MATERIAL PROTECTION:**

Store and protect all materials from injury prior to installation. Materials shall not be stored directly on the ground or floor and shall be kept as clean and dry as possible and free from damage or deteriorating elements. Damaged materials shall not be installed.

### **2.05 SHOP DRAWINGS:**

Submit coordinated shop drawings at 1/2 inch scale, not reduced, using actual sizes and weights of vendors equipment. Drawings shall consist of floor plan and elevations of each significant wall. Ducts or foreign pipes may not encroach over panels and switchboards. Show NEC required clearances. Upon completion of the project the drawings shall be updated with incidental items such as relays, time clocks, contactors, etc. The following shall be submitted:

Main Switchroom - - Electric Room.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION:**

- A. The electrical installation shall conform to the Florida Building Code, 2007, the NFPA Standards indicated, and the applicable standards, codes, regulations, and specifications listed therein and with these specifications and the standards, codes and regulations listed therein.

- B. All equipment shall be set level, properly aligned and bolted together where in sections. Secure all materials and equipment firmly in place. All screws, bolts, nuts, clamps, fittings or other fastening devices shall be made up tight. All materials and equipment shall be installed complete including screws or bolts, covers, plates, fittings, etc. Follow the installation directions and recommendations of the material and equipment manufacturers.
- C. Follow the installation directions and recommendations of the material and equipment manufacturers.
- D. Materials damaged during installation shall be repaired to a new condition or shall be replaced. Finishes on equipment which have been scratched or marred shall be touched up to match the original finish or shall be completely refinished.
- E. All enclosures, panels, cabinets, relays safety switches, fixtures and other exposed equipment or accessories shall be factory painted or finished except as indicated otherwise. Group mounted items shall be similar in finish and color.

### 3.02 IDENTIFICATION:

- A. Tag all conductors and identify major conduits in or at home runs, wireways, panels, pull boxes, switchboards, motor controllers, cabinets and similar items to assist in future circuit tracing. Conductor tags shall be non-conductive. Identification shall correspond to the Contract Documents.
- B. All junction boxes shall have the type of system and voltage of contained conductors stenciled on both the inside and outside of the box cover.  
Examples: Power 277/480V                      Control 120V  
                 Telephone  
                 Sound & Intercom                      Clock 120V  
                 Lights 120/208V
- C. Identify all equipment as to its source, its use and what it serves, and characteristics. Equipment includes safety switches, starters, transformers, panels, terminal boxes, motors, special outlets, relays. Identification shall correspond to the terminology on the Contract Documents.  
Examples: 1. Starter for AHU #1 - Fed from MCC-3  
                 2. Transformer T-3 - Fed from 2HPD-3 - Serves Panel 2LDP  
                 3. Emergency Stop Station  
                 4. Panel 3L -120/208V-3 Phase-4 Wire - Fed from 2LDP-7
- D. Use Brady markers on conductors. Use manufacturer's nameplates and directories where available. Use of Dymo Labels will not be permitted. Use of uniform painted stencils will be permitted. Submit other methods for approval. Provide plastic lamicaid engraved plates to properly cleaned surfaces for good adhesion or provide fastening screws.



- E. Color Coding - Conductor colors shall be in accordance with the NEC and NFPA requirements. Refer also to applicable sections of these specifications. Three phase feeders and branch circuits shall be identified as follows:

120/208	277/480V
A - Black	A - Brown
B - Red	B - Orange
C - Blue	C - Yellow
N - White	N - Gray

- F. Nameplates: The following items shall be equipped with nameplates: all motors, motor starters, motor control centers, pushbutton stations, control panels, time switches, disconnect switches, switchboards, panelboards, circuit breakers, contactors or relays in separate enclosures, receptacles, wall switches, high voltage boxes and cabinets. All light switches and outlets shall carry a phenolic plate with the supply circuit number. Special electrical systems shall be identified at junction and pullboxes, terminal cabinets and equipment racks.

Nameplates shall adequately describe the function of the particular equipment involved. Nameplates for panelboards and switchboards shall include the panel designation, voltage and phase of the supply. For example, "Panel A, 277/480V, 3 phase, 4 wire". The name of the machine on the motor nameplates for a particular machine shall be the same as the one used on all motor starters, disconnect and P.B. station nameplates for that machine.

Normal power nameplates shall be laminated phenolic plastic with lettering etched through the outer covering; white engraved letters on black background. All nameplates for emergency power equipment shall be red with white letters. Lettering shall be 3/16 inch high at pushbutton stations, thermal overload switches, receptacles, wall switches and similar devices, where the nameplate is attached to the device plate. At all other locations, lettering shall be 1/4 inch high, unless otherwise detailed on the drawings.

Nameplates shall be securely fastened to the equipment with No. 4 Phillips, round head, cadmium plated, steel self-tapping screws or nickel-plated brass bolts. Motor nameplates may be non ferrous metal not less than 0.03 inch thick, die stamped. In lieu of separate plastic nameplates, engraving directly on device plates is acceptable. Engraved lettering shall be filled with contrasting enamel. Equipment nameplate schedule for all equipment shall be submitted with shop drawing submittal for engineer's approval.

All junction and splice boxes shall be labeled using permanent shipping tags attached to boxes; not covers. Device plates including receptacles and toggle switches may be identified with adhesive tape units as manufactured by Brothers "P-Touch". Use suitable color, contrast, and sizes.

- G. Sign - Warning signs shall comply with OSHA requirements and reasonable safety precautions.

### 3.03 TOOLS & SPARE PARTS:

- A. Use only tools designed for the particular operation. Tools shall be kept in good condition. Worn or broken tools shall not be used. Wrench and vise teeth shall be sharp and clean to

prevent damage to the materials. Screw drivers and wrenches shall be of the proper size to prevent damage to the head or nuts. Special tools and spare parts provided with any equipment shall be turned over to an authorized person from the City and the Contractor shall obtain signed and dated receipts for them.

3.04 TESTS:

- A. Correct all defective materials and workmanship disclosed and as the result of the tests given herein. Show by demonstration in service that all circuits and devices are in good operating condition. Tests shall be such that each item of control equipment will function not less than five times. Test all circuits for grounds, shorts and continuity. Provide all materials and equipment necessary for testing.

3.05 DEMONSTRATION:

- A. Demonstrate the essential features of the following electrical systems upon completion of satisfactory testing:
  - Emergency System
  - Lighting System
  - Sound System
  - Main Switchboard
  - Contactors
- B. The demonstration shall be held by the Contractor in the presence of the Owner or his designated representatives and the Project Consultant to show functions, locations and relationships to the plans. Demonstrate how to "Start-Stop", reset, replace and emergency procedures. Demonstrate one system at a time.

3.06 BREAKDOWN:

- A. The Contractor shall submit to the Owner's Representative within a period not to exceed 15 days after the signing of the contract a systematic breakdown of the cost of each phase of the work for complete job.

END OF SECTION

## **SECTION – 16011 (ES) CODES & STANDARDS**

### **PART 1 - GENERAL**

- 1.01 This Section covers the Codes, Specifications, and Standards considered minimum requirements for materials, workmanship and safety for all Division 16 and related electrical work.

### **PART 2 - SPECIFICATIONS, CODES AND STANDARDS**

- 2.01 Reference within this Specification to standards, codes or reference specifications implies that any item, product or material so identified must comply with all minimum requirements as stated therein, except packaging and shipping, unless indicated otherwise. Only the latest revised editions are applicable.

Some of the references used in this Division are as follows:

NFPA National Fire Protective Association

NEC National Electric Code

NEMA National Electrical Manufacturers' Association

U.L. Underwriters' Laboratories, Inc.

ANSI American National Standards Institute

FS Federal Specification

- 2.02 The Specifications, codes and standards indicated below and in other Sections, including the current addenda, amendments and errata, referred to by basic designation only, form a part of this specification.

NFPA-70	2008	National Electric Code
NFPA-101	2003	Code for Safety to Life
F.B.C.	2007	Florida Building Code, 2009 Revisions
IESNA 9 <sup>th</sup> Edition		Illuminating Engineering Society, North America

### **PART 3 - NATIONAL RECOGNIZED TESTING LABORATORY - NRTL**

- 3.01 Where materials and equipment are available under the continuing inspection and labeling service of U.L.; provide such material and equipment.
- 3.02 Listing by Underwriters' Laboratories shall be evidenced by the label or: U.L. - Electrical Construction Materials List (Green Book)  
U.L. - Electrical Appliance and Utilization Equipment List  
U.L. - Building Materials List
- 3.03 Listing by National Recognized Testing Laboratory (NRTL).

END OF SECTION

## **SECTION – 16110 (ES) RACEWAY AND BOXES**

### **PART 1 - GENERAL**

#### **1.01 SCOPE:**

This Section includes basic materials and electrical methods for all of Division 16, electrical and related work.

### **PART 2 - PRODUCTS**

#### **2.01 RACEWAYS AND FITTINGS:**

- A. Rigid Metal Conduit: Rigid steel conduit shall be hot dip galvanized.
- B. Electrical Metallic Tubing (EMT): EMT shall be galvanized and fittings shall be concrete tight or rolled steel, not cast type. Non-ferrous cast type fittings are not acceptable.
- C. Flexible Metal Conduit: Flexible steel conduit (Greenfield) shall be galvanized. Liquid tight flexible conduit shall conform to NEC Article 351 as manufactured by Appleton, Robroy, or Anaconda. Fittings shall be as manufactured by Midwest or Robroy.
- D. Rigid Non-Metallic Conduit: Polyvinyl chloride (PVC) conduit, boxes and fittings shall conform to NEMA TC-2, Schedule 40.
- E. Wireways and Auxiliary Gutters: Galvanized steel with removable covers unless indicated as hinged. Components shall be as manufactured by Square 'D', Hoffman, Keystone or General Electric.

#### **2.02 BOXES & ACCESSORIES:**

- A. Sheet steel boxes and accessories shall be as manufactured by Appleton, Steel City or Raco.
- B. Cast metal ferrous outlets shall be as manufactured by Appleton, Pyle-National or Crouse-Hinds.
- C. Pull boxes and junction boxes larger than 4-11/16" shall be constructed of galvanized steel in accordance with NFPA-70, Articles #370 and #373. Boxes shall be as manufactured by Hoffman, Boss or Keystone.

- D. Cast outlet boxes shall have threaded conduit entrances and gasketed covers. Aluminum type not permitted. Boxes shall have a minimum of two hubs on the bottom. Appleton or Crouse-Hinds.

2.03 IN-GROUND PULL BOXES:

- A. Shall be as manufactured by Quazite or equal; UL Listed, open bottom type.

2.04 EXPANSION FITTINGS:

Expansion fitting shall be as manufactured by O-Z Electrical Mfg. Company as follows:  
Rigid Metal Conduit - Type AX  
Electrical Metallic Tubing - Type TX

2.05 MISCELLANEOUS:

Coatings - Koppers #50 bitumastic.

**PART 3 - EXECUTION**

3.01 RACEWAYS:

- A. Paint metal conduit in or below ground floor slab or in the ground with 2 coats of bitumastic.
- B. Use flexible conduit for all connections to vibrating equipment such as motors, valves, and devices on piping and ductwork. Flexible conduit may be used for short connections to control devices, recessed fixtures, and similar items. The connection between the structure and the first point of attachment to vibrating equipment shall be flexible.
- C. Use liquid-tight flexible conduit connections to all equipment in damp locations and all motors. Provide a separate bond wire for all flexible conduits.
- D. Install exposed conduit parallel with or at right angles to the building lines. Conduit at suspended ceilings shall be located, when practicable, between the slab and the ceiling. Conduit larger than 1", except as indicated, in reinforced concrete slabs shall be parallel with or at right angles to the main reinforcement; when at right angles to the supports of the slab. Conduit in concrete shall be located so as not to affect the structural strength of the slabs. Conceal all conduits in walls, above ceilings, in or under slabs or in furring, except in mechanical and electrical rooms and as indicated.
- F. Route feeders, home runs and conduits where indicated, except that minor deviations as approved will be permitted.

3.02 BOXES AND ACCESSORIES:

- A. Minimum size outlet box shall be 4" square by 1-1/2" deep unless approved or indicated otherwise.
- B. Use cast ferrous metal outlets with gasketed covers for all exterior and for all damp locations.
- C. All boxes shall be set plumb, square and level. Crossbrace boxes in metal studs.
- D. Use 10/32 screw to ground all boxes.

3.03 MISCELLANEOUS:

- A. Provide approved fire stopping materials at all chases to prevent drafts.
- B. Provide cable supports as indicated and in accordance with Article 300-10.
- C. Provide expansion fittings in conduit runs crossing expansion joints in the structure.
- D. Provide Jet Line #232 in all empty conduits.

END OF SECTION

## **SECTION – 16120 (ES) CONDUCTORS**

### **PART 1 - GENERAL**

This Section includes basic materials and methods for all of Division 16, electrical and related work.

#### **1.01 APPLICABLE REQUIREMENTS:**

NEC Article 310 and 400  
F.S. J-C-30  
F.S. W-S-6106

### **PART 2 - PRODUCTS**

#### **2.01 CONDUCTORS:**

- A. Conductors shall conform to Federal Specification J-C-30 for 600 volt. Types THWN or THHN. Sizes are AWG unless noted and all stranded copper.
- B. Grounding conductors shall be insulated copper and identified green.
- C. Control conductors for 100 to 600 volt shall be size #14 copper, stranded, and color coded unless indicated otherwise.
- D. Control conductors for 50 volt and under shall be plastic jacketed thermostat cable, size #18 single conductor, copper, multi-conductor as required.

#### **2.02 PORTABLE CORDS:**

- A. Portable cord shall be stranded copper, UL Listed, and resistant to water, acid and alkalies.
- B. Each cord shall have one green covered conductor and it shall be used as a grounding conductor.

#### **2.03 SPLICES AND TERMINATIONS:**

- A. Connections shall comply with Federal Specification W-S-610b. Connectors for temperatures to 105 degree C shall be Ideal Wing Nut or 3M-Scotchloc.
- B. Tape shall be Scotch 33 or slip-knot gray. Voids shall be filled with rubber tape or Scotchfill.

- C. Heat shrink for all splices outdoors. Insulating and sealing of all 600 volt, in-line, cable splices from #16AWG through 1000MCM shall be done in accordance with the instructions provided with the Shrink-Kon heat shrinkable insulators, catalog series HS as manufactured by Thomas & Betts.

### **PART 3 - EXECUTION**

#### **3.01 CONDUCTORS:**

- A. Conductors size #10 and smaller shall be copper and have insulation colored for phases A, B, C and N respectively as follows for 3 phase systems:  
120/208 volts, black, red, blue, and white  
277/480 volts, brown, orange, yellow and gray
- B. Bonding conductors size #10 and smaller shall have a green covering and shall be the same size as the circuit conductors unless otherwise indicated. Provide bonding conductors in all power and lighting conduits and bond all light fixtures and receptacles.
- C. Installation of conductors shall be made only in completed raceway systems and all conductors in any conduit shall be pulled in together
- D. Use wire pulling compounds or lubricants as listed by Underwriters' Laboratories or talc, graphite or soapstone.

#### **3.02 SPLICES AND TERMINATIONS:**

- A. Use solderless terminal lugs on all stranded conductors. Use approved solderless connectors for all splices. Keep splices to a minimum.
- B. Splice all neutrals and grounds (bonds) prior to connection to wiring devices. Splices other than pre-insulated connectors shall be covered neatly with insulation type equivalent in value to the conductor insulation. Use minimum of 2 layers of tape.
- C. Splices outdoors and underground shall be epoxy encapsulated or heat shrink (no wire nuts or red head type allowed).

#### **3.03 PHASING AND IDENTIFICATION:**

- A. The phase designation of all secondary conductors shall be the same and shall be indicated in or on all 3 phase outlets, transformers panelboards, and disconnect switches, and they shall be connected with uniform phase sequence.

#### **3.04 NUMBER OF CONDUCTORS:**



- A. For convenience and simplicity wire ties are shown only on home runs other than power circuits. The Contractor shall determine the correct combination of wires to be run in all raceways including home runs, branch circuit wiring and switch legs.
- B. A green ground wire must be included in all runs including to lighting fixtures in the ceilings. Neutral wires shall be determined by the load and proper phasing on multiwire branch circuits.
- C. The following schedule shall be followed including ground wires and neutrals:

	<u>MAX</u>
3/4"C	5 #12
1"C	10 #12

3.05 Wire:

- A. Type THWN stranded copper wire shall be used in all locations with one exception, where the conduit or wire is subjected to undue heat condition, type THHN should be used. Under no condition will wire smaller than #12 AWG be used. Wiring for fixtures where undue heat conditions prevail shall be with 150 degrees C. wire. (Stranded conductors only)
- B. Minimum conductor sizes shall be Branch Circuit - #12 CU., Control Circuits - #14 CU, Thermostat - #16 CU.

END OF SECTION

## **SECTION – 16140 (ES) WIRING DEVICES**

### **PART 1 - GENERAL**

#### **1.01 APPLICABLE DOCUMENTS:**

- NEMA WD-1 - Wiring Devices - non-locking
- NEMA WD-5 - Wiring Devices - locking type

### **PART 2 - PRODUCTS**

#### **2.01 ACCEPTABLE MANUFACTURERS & MATERIALS**

Provide, where indicated, specification grade wiring devices conforming to NEMA requirements.

#### **2.02 RECEPTACLES:**

All receptacles shall be specification grade of the grounding type, unless noted, and shall conform to applicable portions of NEMA Standards WD-1 and WD-5.

- A. NEMA Configuration #5-30  
Single, Ivory, 30 amp, 125 volt, 2-pole, 3-wire Bryant - #9530-FR Receptacle and 9530 ANP Plug General Electric - #4138-3 and 4337-9  
Leviton - #5371
- B. Duplex Receptacles 20 Amp  
Hubbell #5362-1  
Leviton #5896-1  
P & S #5362-1
- C. Single Receptacles 20 Amp  
Hubbell #5351-1  
Leviton #5891-1  
P & S #5361-1
- D. Ground Fault Interrupter 20 Amp  
Hubbell #GF5362-1  
Leviton #6398-HG1  
P & S #2091-FI; SHG
- E. Combined switch and receptacles shall be two separate devices utilizing a two-gang box and single cover plate.

#### **2.03 SWITCHES:**

- A. Single Pole Switches 20 Amp, 120/277 Volts Hubbell #1121-1, 3 way & 4 way similar.  
Leviton #53521-1  
P & S #20AC1-1
- B. Key Switches (lock Switched), 20 amp, 120-277 Volt P&S #521-L, 522-L, 523-L
- C. ON/OFF motor switches, single phase  
20 Amp, 1 HP, 120 volt - P&S #20AC2-HP  
20 Amp, 2 HP, 208-240 volt - P&S #20AC2-HP  
30 Amp, 2 HP, 120-240 volt - P&S #30AC2-HP
- D. Spring wound interval timer switch, rotary 20A-125 volt/10A-277 Volt SPST 0-15  
Minute without hold Tork 515M 0-6 Hour without hold Tork 506H

2.04 CONTACTOR CONTROL SWITCHES:

- A. Provide a suitable remote switch to turn the mechanically held contactors "on" and "off" from the locations indicated. See Detail on Drawings.
- B. P & S #1251-1 or Leviton #1257, 20 amp, SPDT, 3 position, center off, momentary contact switch and identified plate "open" at bottom and "close" at top.

2.05 PLATES AND COVERS:

- A. General - Device plates shall be 0.040 inch minimum, with struck-up beveled edges, void of sharp corners and multigang as applicable. Finish of screws shall match plates.
- B. Wall plates for recessed devices shall be of Ivory color with matching screws unless indicated otherwise, and of the configuration required for the devices installed. Units shall be smooth high impact type, Nylon, self extinguishing thermoplastic conforming to NEMA and ANSI Standards.  
Pass & Seymour RP Series or Leviton 8000 Series.
- C. Surface (raised) covers for 4" square boxes shall be 1/2" deep. Surface covers shall be as manufactured by Steel City, Appleton or Raco of the configuration required. Others shall be similar.
- D. Cover plates indicated (WP) weatherproof shall be Intermatic Series WP1000 for the configuration required.
- E. Provide permanent ID on all plates/devices.

2.06 ATTACHMENT CAPS AND CONNECTORS:

- A. Caps shall be NEMA Standard mates to the receptacles and connectors used and shall be as manufactured by Hubbell.
- B. Provide one cap for each receptacle other than the duplex type, NEMA 5-15, 5-20, or 5-30.
- C. Electrical contractor shall connect all equipment furnished by Owner or other contractors, including caps and cords and materials required to complete the installation.

### **PART 3 - EXECUTION**

#### **3.01 OUTLETS & SWITCHES:**

- A. Install plates and covers on all outlets.  
Install all devices uniformly in each area.
- B. Use 20 ampere switches and receptacles everywhere except as noted.

#### **3.02 GROUNDING:**

- A. Grounding contacts of receptacles shall be connected to a system grounding conductor (not system neutral) by a copper wire not smaller than #12 AWG. Where symbol "G" is shown, the green grounding wire must be pulled and used throughout the branch circuit.

#### **3.03 CAPS:**

- A. Install a suitable cord and cap (male plug) on all equipment including: Equipment furnished under the contract.  
Equipment furnished by owner and installed by contractor.  
Equipment furnished by owner without a suitable cord and cap.

#### **3.04 MOUNTING: (See Section 16110)**

- A. Mounting heights (to center of box):  
Generally mount outlets 18" up unless noted.  
Mount switches and dimmers at 48" up.
- B. Test each socket of each outlet with a device intended for the purpose. Gang switches and dimmers where feasible.

#### **3.05 G.F.C.I. RECEPTACLES: (No downstream non-GFCI is allowed) Provide GFCI duplex receptacles as shown and at all the following locations.**

- A. Outdoors
- B. Toilet Rooms

END OF SECTION

## **SECTION – 16160 (ES) PANELBOARDS**

### **PART 1 - GENERAL**

#### **1.01 RELATED WORK SPECIFIED ELSEWHERE:**

Circuit Breakers, Switches	Section 16180
Starters	Section 16920
Contactors	Section 16917

#### **1.02 APPLICABLE DOCUMENTS:**

NEMA PB-1	Panelboards
S.F. W-P-115a	Panelboards
NFPA-70, 2005	Articles 110, 240, 384

#### **1.03 SUBMITTALS:**

- A. Submit Shop Drawings for review on each panelboard and terminal cabinet indicating cabinet dimensions, component arrangements, characteristics, and sizes.

### **PART 2 - PRODUCTS**

#### **2.01 PANELBOARDS:**

- A. Panelboards shall conform to Federal Specification W-P-115a, complete with cabinets and locks.
- B. Fronts shall be finished to resist corrosion with not less than one priming coat and one pearl gray finishing coat. Components shall be arranged approximately as indicated. Circuits shall be numbered serially from top to bottom with odd numbers on the left.
- C. Adjacent poles of single pole devices shall be of opposite polarity with split-phase bussing. Provide keys, each of which will operate all the panelboard cabinet locks. Provide a typewritten directory with a transparent protective cover on the inside of the panelboard cover.
- D. Panels shall be factory assembled and tested. Circuit breaker panelboards shall be Type I, Class I, bolt-on type. Fusible panelboards, where indicated shall be Type II, Class 1, and shall have fuses of the rating indicated. Panelboards shall be as manufactured by Square 'D', General Electric, Cutler-Hammer, or Siemens. Nominal width shall be 22". All bus must be copper. Provide grounding terminal bus for all panelboards

- E. Contactors mounted in panelboards shall be completely factory prewired and shall have suitable access door and control wiring and diagram.

### **PART 3 - EXECUTION**

- 3.01 Mount all panels with tops at 6' above the floor, except as noted or approved otherwise. Mount grouped equipment on backboards. Identify all panels and all devices. Nipple all adjacent panels together with minimum 1-1/2" conduit. Clean all debris out of cabinets prior to installing covers..
- 3.02 Where electric panels are located in rooms other than electric rooms, the clearances required by Code shall be guaranteed by a painted rectangle the width of the panel and the depth per NFPA-70, Table 110-16 (a). Stencil within the rectangle, "No Storage".

END OF SECTION

## **SECTION – 16180 (ES)**

### **SAFETY SWITCHES, CIRCUIT BREAKERS & FUSES**

#### **PART 1- GENERAL**

##### **1.01 RELATED WORK SPECIFIED ELSEWHERE:**

Panelboards	-	Section 16160
Motor Controls	-	Section 16920
Ballasts Fuses	-	Section 16500

##### **1.02 APPLICABLE DOCUMENTS:**

NEMA AB-1	-	Molded Case Circuit Breakers
NEMA IC-1	-	Industrial Control
F.S. W-S-865c	-	Enclosed Switches
F.S. W-C-375a	-	Circuit Breakers
U.L.-198	-	Fuses
NEMA FU-1	-	Fuses

##### **1.03 SUBMITTALS:**

Submit Shop Drawings for review including catalog cuts showing sizes, types and characteristics of all products.

#### **PART 2 - PRODUCTS**

##### **2.01 SAFETY SWITCHES/CIRCUIT BREAKER DISCONNECTS:**

- A. Safety switches shall conform to Federal Specifications W-S-865c, heavy duty type HD, fusible or non-fusible, with the poles, ampere, voltage and horsepower ratings indicated and shall have solid neutrals and Class R clips. Lugs shall be U.L. listed for copper-aluminum.
- B. Enclosures for safety switches shall be NEMA-1, general purpose, except that switches indicated (WP) weatherproof, shall be NEMA-3R unless marked NEMA-4. Provide hubs as required for NEMA-3R enclosures with suitable gaskets and bonding means.
- C. Switches and disconnects shall be as manufactured by Square 'D', General Electric, Cutler-Hammer or Siemens.



- D. Circuit breaker disconnects may be used in lieu of safety switches providing they comply with the safety switch requirements and are applied within their ratings and a schedule is submitted for approval.

2.02 CIRCUIT BREAKERS, MOLDED CASE:

- A. Circuit breakers shall conform to Fed. Spec. W-C-375a and NEMA Standard AB-1 unless indicated otherwise. Circuit breakers shall be of the ampere rating, voltage rating, number of poles and class or interrupting capacity (I.C.) as indicated. Interrupting ratings are given in root mean square (RMS), symmetrical amperes based on NEMA test procedures. Lugs and terminals shall be U.L. listed for copper-aluminum. Accessories shall be 120 volt.
- B. Each circuit breaker shall have a trip unit for each pole with elements providing inverse time delay under overload conditions and instantaneous magnetic trip for short circuit protection unless indicated as non automatic. Trip elements shall operate a common trip bar to open all elements.

2.03 Fuses:

- A. Provide rejection fuses for all fusible equipment regardless of which section has furnished such equipment.
- B. Fuses shall be of the ratings shown on the drawings, U.L. listed and shall be Bussman Manufacturing Co., Gould-Shawmut Company, CEFCO or approved equal.
- C. All fuses shall be current limiting and have an interrupting capacity of at least 200,000 amperes RMS symmetrical.
- D. The time-current characteristics and ratings shall be such that positive selective coordination is assured.
- E. Fuses, 600 amperes and lower, where applied to general feeder and branch circuit protection, shall conform to U.L. Class RK-1 standards and be Bussmann Type LPN-RK-SP LPS-RK-SP, "Low Peak". Gould-Shawmut dual element "Amp-Trap."
- F. Fuses, where required for circuit breaker protection shall conform to U.L. Class RK-1 standards and be Bussmann Type LPN-RK-SP or LPS-RK-SP "Low Peak", or Gould-Shawmut Class RK1 "Amp-Trap."
- G. Coordination and current limitations or the protection of each part of the electrical system must be designed around the type and class and manufacturer selected for that type and class.

**PART 3 - EXECUTION****3.01 INSTALLATION:**

- A. Mount grouped switches, disconnects and controls on backboards or unistrut. Provide labels on or in all fusible equipment indicating the type and size replacement fuse required.
- B. Generally, mount switches and disconnects between 4' and 5' up, readily accessible.

**3.02 FUSES:**

- A. Install all fuses as required where indicated on the drawings and where required by the National Electrical Code, special attention shall be given to air conditioning equipment.
- B. Provide 10% spares (minimum of three) of each size and type of fuses furnished. Spare fuses shall be placed in a wall mounted cabinet equal to: Bussmann SFC which shall be located in the switchgear room.

END OF SECTION

**SECTION – 16190 (ES)**  
**ELECTRICAL SUPPORTING DEVICES**

## PART 1 - GENERAL

This Section includes basic materials and methods for all of Division 16.

### 1.01 SELECTION OF PRODUCTS:

- A. Devices, including fasteners, anchors, hangers and supports, shall be of a type designed or fabricated for the purpose, and shall adequately and safely secure the material and equipment and present a neat appearance.
- B. Make job fabricated hangers or supports from standard structural shapes and hardware.
- C. All bolts, screws, nuts and other threaded devices shall have U.S. Standard threads and heads as appropriate.
- D. Select devices using the following criteria:
  - 1. Amount & Type of Load:  
The weight of hangers or supports and of enclosed materials is part of the load. Devices shall be suitable for shear, straight pull, vibration, impact or external load as applicable.
  - 2. Safe Working Load:  
Determinations of safe working load of devices or job fabricated support assemblies shall be obtained from the published load data of the manufacturer.
  - 3. Atmosphere:  
Use devices with corrosion resistant characteristics for the atmospheric conditions in which they are installed. Steel hangers and supports protected by zinc (galvanized) may be used to support aluminum conduit in dry locations only. In damp or wet locations, insulate the aluminum and galvanized steel from each other with aluminum pigmented asphaltum or vinyl paint or insulating tape.

## PART 2 - PRODUCTS

## 2.01 HANGERS AND SUPPORTS:

- A. Use equipment as manufactured by:  
Unistrut Steel City - Kindorf

Powerstrut

Harveys - Alstrut

**PART 3 - EXECUTION****3.01 INSTALLATION:**

- A. Install equipment, including switches, controllers, fixtures and transformers such that removal or replacement may be readily accomplished without damage to equipment or fasteners.
- B. Drill holes for devices in accordance with the manufacturer's recommendations, including diameter and depth.
- C. All parts of hanger and support assemblies, including all accessory hardware, shall be of types designed to be used together.
- D. Internal and external threads of parts that are screwed or bolted together shall be of the same material including coatings and the method of applying coatings. For example, if the threads of bolts or rods are hot dipped galvanized, the nuts must also be galvanized. If they are electro-galvanized, the nuts must also be electro-galvanized. All threads shall be fully engaged. All parts so intended shall be made up tight using tools intended for the purpose.
- E. Use Galvanox on all cut, drilled or punched edges.

**3.02 FASTENING:**

- A. Fasten all materials and equipment with approved devices. Generally, fasteners shall be as follows:
  - 1. Wood:  
Fasten to wood with screws except nail may be used on wood partitions for outlet boxes and raceways up to 1" diameter.
  - 2. Masonry:  
Fasten to masonry with threaded metal inserts, metal expansion screws, toggle bolts, powder-actuated fasteners or other approved means.
  - 3. Use backboards for telecommunications terminal boards and for surface mounting grouped electrical equipment. Paint the wall side of the backboards with an asphaltum coating when the walls are constructed of masonry.

**3.03 STRAPS & TRAPEZES:**

- A. Use manufactured straps or clamps for single small conduit runs. Use trapezes of unistrut and threaded rods for multiple conduit runs and single runs of 1-1/4" or larger.

- B. All supports shall be independent of other trades. Galvanized tie wire may be used for tying off individual conduits, but not as their primary means of supports.

END OF SECTION

## **SECTION – 16401 (ES) ELECTRICAL SERVICE SYSTEM**

### **PART 1 - GENERAL**

#### **1.01 SCOPE OF WORK:**

This Section includes the work in the main transformer pad, metering, primary service duct banks.

#### **1.02 RELATED WORK SPECIFIED ELSEWHERE:**

Basic Materials & Methods  
Concrete

#### **1.03 REQUIREMENTS:**

All work directly related to the service system shall be in accordance with Florida Power & Light Co. requirements; NFPA 70, Article 450; and as indicated.

#### **1.04 UTILITY COMPANY WORK:**

The following work will be performed by Florida Power & Light Co. (FPLC):

- A. Provide conduit from the points located outside building lines to FPLC facilities. Provide primary cable from FPLC facilities to the F.P.L. transformers. Provide potheads to terminate primary cables.
- B. Provide ground wires and ground rods in sleeves and boxes provided by the contractor. Connect customers facilities to FPLC facilities in the vaults and pads including racking all cables in vaults.
- C. Provide meter wiring between plant meter cabinets and current transformers. Plant C.T.'s will be in the main vault/pad. Provide transformers and primary switches in the vault/pad.

### **PART 2 - EXECUTION**

#### **2.01 INSTALLATION:**

- A. Provide a 1-1/4" rigid steel conduit between plant meter can and the vault/pad and terminate it with a threaded bushing.

- B. Provide conduit sleeves in the floor of the vault/pad for ground rods to be installed by Florida Power and Light Company.
- C. Ductbank - Service duct lines shall be individual conduits of rigid steel conduit or PVC, and shall be concrete encased. Slope ducts downward toward manholes and away from the building with a pitch of not less than 3" per 100'. Terminate conduits with end bells. Use approved conduit separators. Use minimum 36" radius bends. Clean each duct line with a 12" test mandril with a diameter 1/4" less than the conduit size; after which, clean the conduit with a stiff bristled brush to clear all earth and gravel particles; and install conduit plugs immediately.
- D. Provide pulling eyes opposite the duct entrances indicated with a minimum pull rating of 2500 lbs.
- E. Provide meter can for the plant demand meter with 1-1/4" conduits to the current transformer locations.
- F. Provide empty conduits from the vault/pad to the points indicated. The utility company will provide the ducts and encasement beyond these points to their facilities. Maintain 36" of cover except as indicated. Seal around all conduits entering the main vaults and transformer rooms. No concrete shall be poured encasing ducts to be used by the utility company until the placement of conduits has been approved by the utility company.
- G. Provide 15' of cable in the main vaults/pad from all secondary entrances that are not bus stabs. Use rigid steel conduit flush with a threaded bushing or bus stabs, as indicated. Coordinate locations and work with the utility company.

END OF SECTION

## **SECTION – 16450 (ES) GROUNDING**

### **PART 1 - GENERAL**

#### **1.01 SCOPE:**

This Section includes basic materials and methods for all of Division 16 and related electrical work.

#### **1.02 APPLICABLE REQUIREMENTS:**

NEC Article 250

#### **1.03 RELATED WORK SPECIFIED ELSEWHERE:**

Transformers                      - Section 16460

### **PART 2 - PRODUCTS**

#### **2.01 GROUND RODS:**

- A. Ground rods shall be a minimum of 5/8" by 10', copperweld.
- B. Grounding accessories shall be as manufactured by Burndy, Erico or Thompson.

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION:**

- A. End-to-End fixtures shall be continuously bonded.
- B. Grounding contacts of receptacles and fixture grounds shall be connected to a solidly grounded conduit system or to a system grounding conductor (not the system neutral) by a copper wire not smaller than #12 AWG or shall be grounded in some other approved manner.
- C. Lighting Poles - Provide a ground rod driven through or near pole bases and Cadweld to #6TW wire to the top of the rod and extend the wire to a grounding lug in the base and bond to all metal parts. Locate ground rods in adjacent pullboxes for visual inspection. Maximum 2 feet from pole bases.



- D. Bond all metal parts. Make equipment and bus connections with suitable lugs or clamps. Cadweld all wire-to-ground rod joints. Cadweld all wire-to-wire joints size #1/0 and over.
- E. Bond all conduits stubbing under switchboards, transformers and similar locations using bonding bushings. Bond each conduit separately.
- F. Provide a bond wire in all flexible metal conduits and connect to the boxes at each end in an approved manner. Bond to fixtures where they occur.
- G. Use PVC for sleeving grounding conductors, except that where sleeves are subject to extreme injury use rigid metal conduit bonded at both ends.
- H. Ground all separately derived sources such as transformers to adjacent cold water pipe or building steel in accordance with NEC.
- I. Provide a #6 TW copper ground to each telecommunications terminal cabinet or board from the cold water pipe or system ground.
- J. Provide bonding conductors in all power and lighting conduits; all clock and program conduits and to all power outlets, fixtures and connections to utilization equipment having electrical connections.
- K. Ground all cast iron covers on concrete pullboxes to the green ground wire with a corrosion resistant stud, lug and nut. Use minimum #8 stranded with a loop minimum 18" long.
- L. Provide Ground Collection Bus (GCB) at the locations shown as a common connection. Connect all local grounds as applicable to these points.
- M. All electric equipment (metallic conduit, motor frames, panelboards boxes, main switchboard shall be bonded together with a green insulated copper grounding conductor sized per NEC ( size #12 AWG). This bonding conductor shall be continuous through raceway system from main switch ground bus to panelboard bus and to each branch circuit outlet or switch. Equipment grounding conductors are required throughout project, regardless of whether or not shown on drawing.
- N. Equipment grounding conductors shall terminate on terminal bars, screws, lugs, etc., expressly designed for that purpose. Ground clamps shall be of same material as the metal or water pipe they connect to. Use factory made ground bars/terminations.
- O. Main Grounding Electrode Conductors shall be installed in an, approved raceway and properly bonded if metallic. All driven ground rods shall be copper-clad length of 10 feet long. Provide a grid type system if resistance exceeds NEC 25 ohms maximum.

- P. Provide ground rod access assemblies equal to Brooks 70 Series or equal; 7" Dia. x 9" deep at each ground rod for inspection purposes where not locked inside pullboxes or manholes.

END OF SECTION

## SECTION – 16502

### SITE LIGHTING

#### PART 1 – GENERAL

1.01 This section includes all outdoor/exterior lighting.

1.02 SUBMITTALS

Submit Shop Drawings, fixture cuts, photometrics, bases, wind load calculations, compliance.

1.03 COMPLIANCE

Comply with all local codes and lightning ordinances and zoning requirements, wind load requirements, and height requirements.

- A. Site lighting shall be installed as specified on the drawings. No fixture substitution will be accepted by this office. This will enable lighting certification letter to be done by our office.
- B. If any site lighting substitution is made, certification letter and test for lighting shall be signed and sealed by an independent professional engineer.
- C. Fixture/pole assemblies shall conform to Florida Building Code 2007 and 2009 revisions, especially Chapter 1609 HVHZ 1620 Dade County, 146 MPH with 3 second gusts, or Broward County, 140 MPH with 3 second gusts.

#### PART 2 – PRODUCTS

2.01 See fixture schedule and details on drawings.

#### PART 3 – EXECUTION

3.01 GROUNDING

Ground each pole to a 5/8" x 10 ft. ground rod. Ground all metal components.

3.02 FUSING

Provide fusing for each ungrounded line at the base of each pole; not in the fixture head.

3.03 SURGE PROTECTION

Provide surge protection at each pole connected to the ground rod. UL-1449-3

3.04 Set all bases and poles level.

END OF SECTION

**SECTION 16917****ELECTRIC SYSTEMS & CONTROLS****PART 1 - GENERAL****1.01 RELATED WORK SPECIFIED ELSEWHERE:**

Basic Materials & Methods Mechanical Controls Motor Controls

**1.02 APPLICABLE REQUIREMENTS:**

- A. Controls provided herein and controls furnished under other sections shall conform to NEMA IC-1.
- B. Controls for equipment utilizing a power source separate from the equipment shall be provided with a disconnect and identified and shall comply with NEC Article 430-113.

**1.03 SUBMITTALS:**

Submit shop drawings for review consisting of catalog cuts, wiring diagrams, descriptive data, and characteristics indicating the type or series of equipment.

**PART 2 - PRODUCTS****2.01 RELAYS:**

- A. Relays shall conform to NEMA IC-1 and shall be heavy duty type, U.L. listed, rated at 25 amps, 120 volts and mounted in NEMA 1 enclosures. Grouped units may be in a common enclosure with a plywood backboard.
- B. Relays shall be as manufactured by Potter & Brumfield of the type as follows:
  - Single pole double throw (SPDT) - #PR5AY
  - Double pole double throw (DPDT) - #PR11AY
  - Four pole double throw (4PDT) - #PM17AY

**2.02 CONTACTORS:**

- A. Contactors shall conform to NEMA Standard IC-1. Contactor size and ratings shall be based on tables in Part II of IC-1 for enclosed units. Coils shall be rated 120 volts.

- B. Contactor characteristics of size, number of poles, voltage and current shall be as required or indicated for the load served. Units shall be mounted in an individual NEMA 1 enclosure, except the units indicated shall be in the panelboards.
- C. Contactors shall be electrically operated and mechanically held unless indicated otherwise. Provide a local "open-close" control next to the contactor.
- D. Units shall be as manufactured by Square "D", General Electric, Cutler-Hammer or ASCO. Provide remote control switches with pilot light for each contactor.
- E. Contactors mounted in panelboards shall be completely factory prewired and shall have suitable access door and control wiring and diagram.

### **PART 3 - EXECUTION**

3.01 Use #14 stranded copper wiring for all controls unless noted otherwise.

3.02 TIME CLOCKS:

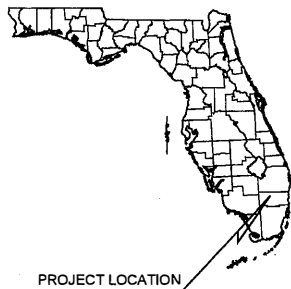
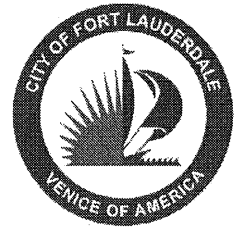
All time clocks shall have spring reserve carryover (10 hours) in event of power failure.

3.03 IRRIGATION:

Provide all conductors, regardless of voltage or insulation shall be run in an approved conduit system. This includes sprinkler control wiring and time clocks. Provide sleeves, 2" minimum, for all zone wiring under slabs, roadway crossings (low voltage zone wiring may be unexposed, attached to irrigation piping - confirm prior to bid through architect).

END OF SECTION

# NW 19TH AVE & SISTRUNK BLVD PARKING LOT IMPROVEMENTS FOR THE CITY OF FORT LAUDERDALE



LOCATION  
SECTION OF NW 19TH AVENUE & SISTRUNK BOULEVARD  
CITY OF FORT LAUDERDALE, FLORIDA



Sheet List Table	
Sheet Number	Sheet Title
00000	CITY OF FORT LAUDERDALE
00001	SECTION OF NW 19TH AVENUE & SISTRUNK BOULEVARD
00002	SECTION OF NW 19TH AVENUE & SISTRUNK BOULEVARD
00003	SECTION OF NW 19TH AVENUE & SISTRUNK BOULEVARD
00004	SECTION OF NW 19TH AVENUE & SISTRUNK BOULEVARD
00005	SECTION OF NW 19TH AVENUE & SISTRUNK BOULEVARD
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00049	SECTION OF NW 19TH AVENUE & SISTRUNK BOULEVARD
00050	SECTION OF NW 19TH AVENUE & SISTRUNK BOULEVARD

**PROJECT TEAM**

**PROJECT MANAGER:**  
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ATTENTION IS DIRECTED TO THE FACT THAT THESE PLANS  
MAY HAVE BEEN REDUCED IN SIZE BY REPRODUCTION.  
THIS MUST BE CONSIDERED WHEN OBTAINING SCALED DATA



LOCATION MAP  
SCALE 1" = 150'

PROJECT LOCATION

CITY COMMISSION

DEAN J. TRANTALIS, MAYOR  
HEATHER MORAITIS, COMMISSIONER - DISTRICT 1  
STEVEN GLASSMAN, VICE MAYOR/COMMISSIONER - DISTRICT 2  
ROBERT L. MCKINZIE - COMMISSIONER - DISTRICT 3  
BEN SORENSEN, COMMISSIONER - DISTRICT 4

PREPARED BY  
**Kimley»Horn**





