



**SPECIAL PROVISIONS  
FOR  
ROADWAY ELECTRICAL**

**Polk County  
NHSX-U-1945(408)--8S-77**

**Effective Date  
March 19, 2013**

**THE STANDARD SPECIFICATIONS, SERIES 2012, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A.** Low voltage wire and connectors.
- B.** Grounding and bonding.
- C.** Conduit and fittings.
- D.** Electrical pull and junction boxes.
- E.** Labels and markers.
- F.** Lighting and control cabinets.
- G.** Fuses and fuseholders.

**1.02 MEASUREMENT AND PAYMENT**

All work of this Special Provision is incidental to the lump sum Roadway Electrical bid item.

**PART A – LOW VOLTAGE WIRE AND CONNECTORS.**

**A.1 GENERAL**

**A.1.01 SECTION INCLUDES**

- A.** Wire and cable for 600 volts and less.
- B.** Wiring connectors and connections.

### **A.1.02 REFERENCES**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2005.

### **A.2 PRODUCTS**

#### **A.2.01 WIRING REQUIREMENTS**

- A. Above Grade Exterior Locations: Use only building wire with Type THWN insulation in raceway.
- B. Underground and Below Grade Installations: Use only building wire with Type XHHW insulation in raceway.
- C. Use solid conductor for feeders and branch circuits 10 AWG and smaller.
- D. Use stranded conductors for control circuits.

#### **A.2.02 WIRING CONNECTORS**

- A. Spring Wire Connectors: Use Spring Wire Connectors only on #10 AWG and smaller wiring in completely enclosed above grade applications
- B. Compression Connectors: Use Insulated Copper Compression connectors, for all insulated wire below grade applications. Use Uninsulated Copper Compression connectors, for all bare copper wire below grade applications. Make all crimps with the Manufacturer specified tool and dies using the specified number of crimps.

### **A.3 EXECUTION**

#### **A.3.01 INSTALLATION**

- A. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Route wire and cable as required to meet project conditions.
- C. Use wiring methods indicated.
- D. Pull all conductors into raceway at same time.
- E. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- F. Neatly train and lace wiring inside boxes, equipment, and supply cabinets.
- G. Clean conductor surfaces before installing lugs and connectors.
- H. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- I. Identify and color code wire and cable under provisions of Special Provisions Section Labels and Markers. Identify each conductor with its circuit number or other designation indicated.

## **PART B – GROUNDING AND BONDING**

### **B.1 GENERAL**

### **B.1.01 SECTION INCLUDES**

- A. Grounding and bonding components.
- B. Provide all components necessary to complete the grounding system(s) consisting of:
  - 1. Rod electrodes.
  - 2. Conduit bushings with Ground Lugs for all RGC conduit sections installed for lighting conduits.
  - 3. Copper grounding electrode conductor.

### **B.1.02 SUBMITTALS**

Submit product data sheets for Rod electrodes, connectors, and conductor.

### **B.1.03 PERFORMANCE REQUIREMENTS**

Grounding System Resistance: 5 ohms maximum.

## **B.2 PRODUCTS**

### **B.2.01 ELECTRODES**

- A. Rod Electrodes: Copper.
- B. Diameter: 5/8 inch.
- C. Length: 10 feet.

### **B.2.02 CONNECTORS AND ACCESSORIES**

- A. Mechanical Connectors: Bronze.
- B. Grounding Electrode Conductor: #6 Solid Bare copper.
- C. Equipment Grounding Conductor: #6 Stranded Bare Copper

## **B.3 EXECUTION**

### **B.3.01 INSTALLATION**

- A. Install ground electrodes at each in-grade handhole and at each Electrical Supply Cabinet as indicated on the Drawings.
- B. Provide grounding electrode conductor, #6 bare copper minimum, in each lighting circuit conduit and connect to each ground bushing with a minimum #6 bare copper tap on each RGC conduit section.

## **PART C – CONDUIT AND FITTINGS**

### **C.1 GENERAL**

#### **C.1.01 SECTION INCLUDES**

Conduit, fittings and conduit bodies.

### **C.1.02 RELATED SECTIONS**

- A. Grounding and Bonding for Electrical Systems.
- B. Hangers and Supports for Electrical Systems.
- C. Identification for Electrical Systems.
- D. Boxes.

### **C.1.03 REFERENCES**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.
- B. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- C. NECA 101 - Standard for Installing Steel Conduit (Rigid, IMC, EMT); National Electrical Contractors Association; 2006.
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2003.
- E. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit; National Electrical Manufacturers Association; 2003.
- F. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; 2004.
- G. NFPA 70 - National Electrical Code; National Fire Protection Association; 2005.

### **C.1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Accept conduit on site. Inspect for damage.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

## **C.2 PRODUCTS**

### **C.2.01 CONDUIT REQUIREMENTS**

- A. Conduit Size: As shown on Drawings. Comply with NFPA 70.
- B. The minimum bending radius of conduit for secondary (600V or less) wiring is six times the inside diameter of the conduit.

### **C.2.04 NONMETALLIC CONDUIT**

- A. Description: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

**C.3 EXECUTION****C.3.01 INSTALLATION**

- A. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Cut conduit square using saw or pipecutter; de-burr cut ends.
- E. Bring conduit to shoulder of fittings; fasten securely.
- F. Provide suitable fittings to accommodate expansion and deflection where conduit crosses expansion joints.
- G. Provide suitable pull string in each empty conduit except sleeves and nipples.
- H. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- I. Ground and bond all RGC lighting conduit sections under provisions Grounding and Bonding.

**PART D – ELECTRICAL PULL AND JUNCTION BOXES****D.1 GENERAL****D.1.01 SECTION INCLUDES**

Pull and junction boxes.

**D.1.02 REFERENCES**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2005.

**D.1.03 SUBMITTALS**

Submit box data sheet including size, Manufacturer's testing reports, and color information.

**D.1.04 QUALITY ASSURANCE**

Conform to requirements of NFPA 70.

**D.2 PRODUCTS****D.2.01 PULL AND JUNCTION BOXES**

- A. In-ground pullboxes shall be pre-cast polymer concrete, open bottom, ANSI Tier 15, minimum. Gray in color. 24 inches x 36 inches x 18 inches deep, (Quazite PG2436BA18 or equivalent). With Covers, ANSI Tier 15, marked "ELECTRIC", to fit boxes, (Quazite PG2436HH00, or equivalent), Gray in color. Installed in accordance with the Manufacturer's directions and the Drawings.
- B. Junction boxes mounted under existing bridge deck shall be fiberglass 8 inchesx6 inchesx4 inches NEMA 4X flanged box with gasketed, overlapping screw-cover. (Hoffman HJ806WLG or

equivalent), Light gray in color.

### **D.3 EXECUTION**

#### **D.3.01 INSTALLATION**

- A. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.

#### **D.3.02 ADJUSTING**

Adjust boxes flush with finished grade.

### **PART E – LABELS AND MARKERS**

#### **E.1 GENERAL**

##### **E.1.01 SECTION INCLUDES**

- A. Nameplates and labels.
- B. Wire and cable markers.

##### **E.1.02 SUBMITTALS**

Submit material and installation data for nameplates and warning tape.

#### **E.2 PRODUCTS**

##### **E.2.01 NAMEPLATES AND LABELS**

- A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- B. Locations: Each electrical distribution and control equipment enclosure.
- C. Letter Size: Use 1/8 inch letters for identifying individual equipment and loads.

##### **E.2.02 WIRE MARKERS**

- A. Locations: Each conductor at panelboard gutters, pull boxes, outlet boxes, and junction boxes and each load connection.
- B. Each lighting circuit at the load side of the fuseholder for that circuit.
- C. Power and Lighting Circuits Legend: Branch circuit or feeder number indicated on drawings.

##### **E.2.03 UNDERGROUND WARNING TAPE**

4 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

#### **E.3 EXECUTION**

##### **E.3.01 INSTALLATION**

- A. Install nameplates and labels parallel to equipment lines.
- B. Secure nameplates to equipment front using screws.
- C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches below finished grade.

## **PART F – LIGHTING AND CONTROL CABINETS**

### **F.1 GENERAL**

#### **F.1.01 SECTION INCLUDES**

Lighting and control cabinets.

#### **F.1.02 REFERENCES**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NEMA PB 1 - Panelboards; National Electrical Manufacturers Association; 2006.
- C. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; National Electrical Manufacturers Association; 2002.
- D. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2007.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association; 2005.

#### **F.1.03 SUBMITTALS**

Submit control cabinet data including physical size, ratings, internal controls, and installation details and instructions.

#### **F.1.04 MAINTENANCE MATERIALS**

Furnish two of each Control Cabinet key.

### **F.2 PRODUCTS**

#### **F.2.01 LIGHTING AND CONTROL CABINETS**

- A. Description: Panelboard, NEMA PB1, circuit breaker type, lighting and control cabinet.
- B. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard.
- C. Minimum Integrated Short Circuit Rating of 240 Volt Panelboards: 10,000 amperes rms symmetrical.
- D. Enclosure: NEMA Type 3R.
- E. Cabinets shall be of an internally metered, single cabinet type, with an internally contained panelboard, 200A Main Breaker and Branch circuit breakers as shown in the drawings. Cabinets shall include eight 4-pole Lighting Control Contactors, a Photocell control, a Lighting Control Timer,

and a Test Switch. Cabinet exterior shall be Anodized Aluminum, with a 3-point latching mechanism and locking provision. Submit Manufacturer data and shop drawings for prior approval.

### **F.3 EXECUTION**

#### **F.3.01 INSTALLATION**

- A. Install cabinets in accordance with NEMA PB 1.1, NECA 1, and the drawings.
- B. Install cabinets plumb.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- E. Ground and bond panelboard enclosure according to Grounding and Bonding provisions.

#### **F.3.02 FIELD QUALITY CONTROL**

Inspect and test each circuit and contactor and confirm operation of photocell and timer.

### **PART G – FUSES AND FUSEHOLDERS**

#### **G.1 GENERAL**

##### **G.1.01 SECTION INCLUDES**

- A. Fuses.
- B. Fuse holders.

##### **G.1.02 REFERENCES**

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association; 2002.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2005.

##### **G.1.03 SUBMITTALS**

Submit fuse and fuse-holder data including physical size, ratings, and installation details and instructions.

##### **G.1.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

##### **G.1.05 MAINTENANCE MATERIALS**

Furnish two spares of each size and type fuse installed.

#### **G.2 PRODUCTS**



### **G.2.01 FUSES - GENERAL**

- A.** Dimensions and Performance: NEMA FU 1, Class as specified or indicated. Sized to fit fuseholders provided. Ratings per Fuse Chart in drawings. 100,000A Minimum Interrupt rating.
- B.** Voltage: Rating suitable for circuit phase-to-phase voltage.

### **G.2.02 FUSE HOLDERS**

- A.** Loop Feed Fuseholders: Break-away, tap type fuseholders with two Line side compression connectors sized for #1/0 AWG wire and insulating cover, One Load side compression connector sized for #10 AWG wire and with insulating cover, separable insulated self-locking fuse container, suitable for use with the selected fuses. Refer to the Fuse Chart in the drawings for specific information.
- B.** Radial Feed Fuseholders: Break-away, tap type fuseholders with one Line side compression connector sized for #1/0 AWG wire and insulating cover, One Load side compression connector sized for #10 AWG wire and with insulating cover, separable insulated self-locking fuse container, suitable for use with the selected fuses. Refer to the Fuse Chart in the drawings for specific information.

## **G.3 EXECUTION**

### **G.3.01 EXAMINATION**

- A.** Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.
- B.** Verify that conditions are satisfactory for installation prior to starting work.

### **G.3.02 INSTALLATION**

- A.** Do not install fuses until circuits are ready to be energized.
- B.** Install fuses with label oriented such that manufacturer, type, and size are easily read.