



PROJECT SPECIAL PROVISIONS  
LIGHTING

1.00 DESCRIPTION

The work covered by this Section consists of furnishing, installing, connecting, and placing into satisfactory operating condition roadway lighting at locations shown on the plans. Perform all work in accordance with these Special Provisions, the Plans, the National Electrical Code, and North Carolina Department of Transportation "Standard Specifications for Roads and Structures" (Standard Specifications).

Perform all work in conformance with Division 14 of the Standard Specifications except as modified or added to by these Special Provisions. Install all bore pits outside the clear zone, as defined in the AASHTO Roadside Design Guide or as directed by the Engineer.

In addition to the requirements of Division 1400, other specific Sections of the Standard Specifications applicable to the work on this project are listed below.

Section 1401	High Mount Standard and Portable Drive Unit
Section 1402	High Mount Foundation
Section 1403	High Mount Luminaires
Section 1407	Electric Service Pole and Lateral
Section 1408	Light Control System
Section 1409	Electrical Duct
Section 1410	Feeder Circuits
Section 1411	Electrical Junction Boxes
Section 1412	Underpass Lighting
Section 1413	Portable Construction Lighting

2.00 WIRING METHODS

2.10 DESCRIPTION

Amend Section 1400-4(F) to include the following:

Pull conductors by hand, or use motorized cable-pulling equipment designed for pulling multiple cables into conduit. Use sheaves or rollers, as required to prevent damage to conductor insulation. Do not use an automobile to generate cable pulling forces. Use equipment similar to the Greenlee model UT2 cable pulling system, or Engineer approved equal.

### 3.00 INSPECTIONS

#### 3.10 DESCRIPTION

Amend Section 1400-5 to include the following:

Provide the personnel and equipment necessary for removing and replacing fuseholders and/ or operating circuit breakers, to facilitate the insulation resistance test described elsewhere in the Special Provisions.

A "LIGHTING SYSTEM INSPECTION CHECKLIST" is included at the back of these Special Provisions. Coordinate with the project inspector, to have the checklist items inspected as work progresses and at the end of the project, to prevent delays in preparing the final inspection punch list.

### 4.00 PERFORMANCE TESTS

#### 4.10 DESCRIPTION

Amend Section 1400-6 to include the following:

Provide a calibrated MegOhmMeter, with certification that calibration was done recently (within one year of use). Provide a meter manufactured by Fluke, Amprobe, Biddle, or Engineer approved equal. Present the meter for inspection, at the pre-lighting-work meeting described elsewhere in these Special Provisions.

Removing water from the conduit of a faulty circuit is not considered a repair. Water in the conduit allows current to flow between skinned places in the conductors insulation. If a circuit fails the insulation resistance test, and removing water allows the circuit to pass, replace the conductors and re-test the new circuit.

### 5.00 HIGH MOUNT LUMINAIRES

#### 5.10 DESCRIPTION

Provide and install High Mount Luminaires in accordance with Section 1403 of the 2006 *NCDOT Standard Specifications for Roads and Structures*, except as amended below:

#### 5.20 MATERIALS

Provide ballast capable of operating at 400-watt high pressure sodium lamp from source with nominal voltage as shown on plans with a tolerance of 10%. Provide luminaires with IES Distribution Type V and Cutoff. NCDOT will evaluate photometric data for submitted luminaire to ensure adequate light output from the fixture.

#### 5.30 MEASUREMENT AND PAYMENT

Same as Section 1403-4.

## 6.00 HIGH MOUNT STANDARD

### 6.10 DESCRIPTION

Same as Section 1401-1.

### 6.20 MATERIALS

Amend paragraph five (5) of Section 1401-2 of the Standard Specifications as follows:

Have the design of the support including base plate and anchorage conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, and the Interim Specifications valid at the time of letting. Fatigue Category II shall be used in design. The welding design and fabrication shall be in accordance with Article 1072-20. The support is to be deigned for the wind velocity shown on the plans.

### 6.30 CONSTRUCTION METHODS

Same as Section 1401-3 except as amended below.

#### **Anchor Rod Nut Tightening Requirements for Metal Poles**

**(9/4/08)**

Prior to installation

Protect the anchor rod threads from damage prior to installation and during installation.

Prior to installation of the rods in the foundation, turn nuts onto and off the rods, well past the elevation of the bottom of the leveling nuts. Turn by the effort of one worker using an ordinary wrench without a cheater bar. Report to the Engineer thread damage requiring unusually large effort.

During installation

1. Place leveling nuts (bottom nuts) on the anchor rods.
2. Place leveling nut washers on top of the anchor rod leveling nuts.
3. Place a rigid template on top of the leveling nuts to check the level of the nuts. If the anchor nut and washer cannot be brought into firm contact with the template, then beveled washers shall be used.
4. Verify that the distance between the bottom of the leveling nut and the top of the concrete foundation is no more than one anchor rod diameter. If an upright is required to be back-raked, then the distance between the bottom of the leveling nut and the top of the concrete foundation should be no more than one anchor rod diameter, averaged over the anchor rod group.

5. Place the base plate and structural element to which it is attached. However, do not attach to the upright element, during tightening of the anchor nuts, cantilever beams or arms with span in excess of 10 feet. Luminaire arms and fixtures may be attached prior to standing the pole on the foundation.
6. Place top nut washers.
7. Do not use lock washers.
8. Lubricate threads and bearing surfaces of top nuts. Lubricant shall be beeswax, stick paraffin, or other approved lubricant.
9. Place top nuts. If the anchor nut and washer cannot be brought into firm contact with the base plate, then beveled washers shall be used.
10. Tighten top nuts to snug tight. A snug-tight condition is defined as the washer and nut being in full contact with the base plate, and the application of the full effort of a workman on a 12-inch wrench. Turn top nuts in increments following a star pattern (using at least two full tightening cycles).
11. To ensure proper pretensioning, after all top nuts have been brought to snug-tight condition, repeat the procedure on the leveling nuts. Turn leveling nuts in increments following a star pattern (using at least two full tightening cycles).
12. At this point, verify if beveled washers are required. Beveled washers are necessary under the leveling nut or top nut if any face of the base plate has a slope greater than 1:20 and / or any nut can not be brought into firm contact with the base plate.
13. Before further nut turning, mark the reference position of the nut in the snug-tight condition with a suitable marking (ink or paint that is not water-soluble). Mark on the corner at the intersection of two flats with a corresponding reference mark on the base plate at each nut. After tightening, verify the nut rotation.
14. Achieve pretensioning by turn-of-nut method. Turn the top nuts to 1/6 of a turn. Do so in a star pattern using at least two full-tightening cycles.
15. After installation, ensure that firm contact exists between the anchor rod nuts, washers, and base plate on any anchor rod installed.
16. For overhead sign assemblies: The span type truss or the cantilever truss may be placed on the uprights or attached to the upright at this time. For signal support structures: The span wires or mast arms may be attached to the upright at this time.
17. After a period of no less than 4 days, and no more than 2 weeks, and in the presence of the Engineer, use a torque wrench to verify that a torque at least equal to 600 foot-pounds is provided on each top nut. For cantilever structures, verify the torque after erection of the remainder of the structure and any heavy attachments to the structure.
18. If any top nut torque reveals less than 600 foot-pounds of effort is required to move the nut, then tighten the nut to no less than 600 foot-pounds.
19. Calibrate, at least annually, the torque indicator on the wrench used for tightening the nuts. Provide the Engineer a certification of such calibration.
20. Because inspection or re-tightening of the leveling nuts would be prevented, and to reduce moisture retention and associated corrosion, do not place grout under the base plate.

#### 6.40 MEASUREMENT AND PAYMENT

Same as Section 1401-4.

## 7.00 PORTABLE CONSTRUCTION LIGHTING **118**

### 7.10 DESCRIPTION

Work covered by this section shall be in accordance with Section 1413 of the Standard Specifications except as modified below.

### 7.20 MATERIALS

Use materials as specified in Section 1413-2.

### 7.30 TOWER LIGHT

Use tower lights as specified in Section 1413-3.

### 7.40 MACHINE LIGHTS

Amend Section 1413-4 to include the following:

Balloon lights are an acceptable alternate luminaire for machine lights.

### 7.50 CONSTRUCTION METHODS

Use construction methods as specified in Section 1413-5.

### 7.60 MEASUREMENT AND PAYMENT

Measurement and payment for Portable Construction Lighting shall be in accordance with Section 1413-6 of the Standard Specifications.

LIGHTING SYSTEM INSPECTION  
CHECKLIST

Date \_\_\_\_\_

PROJECT # \_\_\_\_\_  
CONTROL SYSTEM \_\_\_\_\_

1. Line Voltage:  $\phi_A$  -G \_\_\_\_\_  $\phi_B$  -G \_\_\_\_\_  $\phi_A$  -  $\phi_B$  \_\_\_\_\_
2. Control System ID \_\_\_\_\_
3. Conductors Numbered \_\_\_\_\_
4. Main CB Rating \_\_\_\_\_
5. Feeder CB Rating \_\_\_\_\_
6. Control CB Rating \_\_\_\_\_
7. Selector Switch Label and Operation \_\_\_\_\_
8. Damaged Galvanizing \_\_\_\_\_
9. Grounding Electrode Conductor \_\_\_\_\_
10. Main Bonding Jumper \_\_\_\_\_
11. Photocontrol Operation \_\_\_\_\_
12. Clean Enclosure \_\_\_\_\_
13. Certificate of Inspection \_\_\_\_\_
14. Meg Circuits: #1  $\phi_A$  -G \_\_\_\_\_ #2  $\phi_A$  -G \_\_\_\_\_ #3  $\phi_A$  -G \_\_\_\_\_  
 $\phi_B$  -G \_\_\_\_\_  $\phi_B$  -G \_\_\_\_\_  $\phi_B$  -G \_\_\_\_\_  
 $\phi_A$  -  $\phi_B$  \_\_\_\_\_  $\phi_A$  -  $\phi_B$  \_\_\_\_\_  $\phi_A$  -  $\phi_B$  \_\_\_\_\_  
  
#4  $\phi_A$  -G \_\_\_\_\_ #5  $\phi_A$  -G \_\_\_\_\_ #6  $\phi_A$  -G \_\_\_\_\_  
 $\phi_B$  -G \_\_\_\_\_  $\phi_B$  -G \_\_\_\_\_  $\phi_B$  -G \_\_\_\_\_  
 $\phi_A$  -  $\phi_B$  \_\_\_\_\_  $\phi_A$  -  $\phi_B$  \_\_\_\_\_  $\phi_A$  -  $\phi_B$  \_\_\_\_\_
15. Amperage: #1  $\phi_A$  \_\_\_\_\_  $\phi_B$  \_\_\_\_\_ #2  $\phi_A$  \_\_\_\_\_  $\phi_B$  \_\_\_\_\_ #3  $\phi_A$  \_\_\_\_\_  $\phi_B$  \_\_\_\_\_  
#4  $\phi_A$  \_\_\_\_\_  $\phi_B$  \_\_\_\_\_ #5  $\phi_A$  \_\_\_\_\_  $\phi_B$  \_\_\_\_\_ #6  $\phi_A$  \_\_\_\_\_  $\phi_B$  \_\_\_\_\_
16. Verify Wire Size \_\_\_\_\_
17. Verify Lights on Correct Circuits \_\_\_\_\_
18. Print Pocket With As-Built Plans in Panel \_\_\_\_\_

**LIGHT STANDARDS**

- 1. Proper ID's \_\_\_\_\_
- 2. Breakaway Fuseholders, Proper Line/Load Connections \_\_\_\_\_
- 3. Foundation Elevations \_\_\_\_\_
- 4. Breakaway Bases \_\_\_\_\_
- 5. Conductor ID's in Base \_\_\_\_\_

**HIGH MOUNT STANDARDS**

- 1. Verify ID's \_\_\_\_\_
- 2. Portable Drive and case Turned Over to Traffic Services \_\_\_\_\_
- 3. Operation of Lowering Device: HM1 \_\_\_ HM2 \_\_\_ HM3 \_\_\_ HM4 \_\_\_ HM5 \_\_\_ HM6 \_\_\_
- 4. Connection at Carrier Ring: HM1 \_\_\_ HM2 \_\_\_ HM3 \_\_\_ HM4 \_\_\_ HM5 \_\_\_ HM6 \_\_\_
- 5. Door Secure and Not Removable \_\_\_\_\_
- 6. Wire Mesh at Base \_\_\_\_\_
- 7. Lay of Cable on Winch \_\_\_\_\_
- 8. Luminaires Level and Secure \_\_\_\_\_
- 9. Grounding \_\_\_\_\_
- 10. Verify Rating of CB \_\_\_\_\_
- 11. Date Code on Lamps \_\_\_\_\_

**JUNCTION BOXES**

- 1. Verify Cleanness \_\_\_\_\_
- 2. Verify Conductor ID's \_\_\_\_\_
- 3. Verify Location, Elevation and Cover Secure \_\_\_\_\_
- 4. Ground Rod Connections \_\_\_\_\_
- 5. Insulation of Joints and Splices \_\_\_\_\_
- 6. Sealing of Conduits \_\_\_\_\_

**GENERAL: Two-week Test Period** \_\_\_\_\_