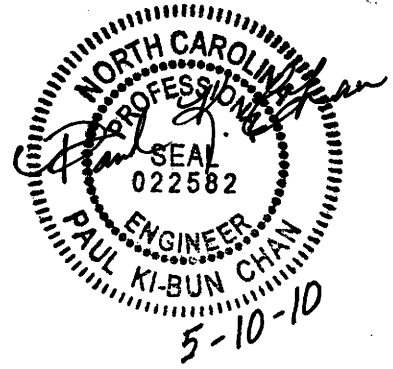


PROJECT SPECIAL PROVISIONS
LIGHTING

1.00 DESCRIPTION

The work covered by this Section consists of furnishing, installing, connecting, and placing roadway lighting system(s) into satisfactory operating condition 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).

Install all bore pits outside clear zone, as defined in 2002 AASHTO Roadside Design Guide or as directed by the Engineer.

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 CONSTRUCTION PHASING

5.10 DESCRIPTION

Amend Section 1400-11 to include the following:

Schedule a pre-lighting-work meeting before beginning work on the lighting system. Include staff members from the prime contractor, electrical sub-contractor, Resident Engineer's office, and the Lighting/ Electrical squad in the Roadway Design Unit in Raleigh.

6.00 LIGHT CONTROL SYSTEM

6.10 DESCRIPTION

Same as Section 1408-1.

6.20 MATERIALS

Amend Section 1408-2 of the Standard Specifications as follows:

The completed light control system shall be marked "Suitable for Use as Service Equipment", in a prominent location in the enclosure, in accordance with NEC article 409.110.

Provide a polymer concrete (PC) junction box measuring 36"L x 24"W x 18"H (PC36) and meeting the requirements of Section 1411 of the Standard Specifications.

6.30 CONSTRUCTION METHODS

Same as Section 1408-3, except amend to locate PC36 junction box within two feet of control system foundation.

6.40 MEASUREMENT AND PAYMENT

Measurement will be in accordance with Section 1408-4.

Payment will be made under:

Light Control Equipment, RW, 240/480V, 150A Each

7.00 HIGH MOUNT STANDARD

7.10 DESCRIPTION

Same as Section 1401-1.

7.20 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.

The two criteria listed below shall apply to 60-ft, 80-ft, 100-ft and 120-ft high mount light poles.

- 1. Provide 8 or more anchor rods for each pole.
- 2. Provide base plate thickness of at least 2.5 inches.

7.30 CONSTRUCTION METHODS

Amend Section 1401-3 to include the following 9/4/08 anchor nut tightening procedure.

Anchor Rod Nut Tightening Requirements for Metal Poles

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.

7.40 MEASUREMENT AND PAYMENT

Measurement will be in accordance with Section 1408-4.

Payment will be made under:

120' HIGH MOUNT STANDARD	Each
100' HIGH MOUNT STANDARD	Each
80' HIGH MOUNT STANDARD.....	Each
60' HIGH MOUNT STANDARD.....	Each

8.00 PORTABLE CONSTRUCTION LIGHTING

8.10 DESCRIPTION

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

8.20 MATERIALS

Use materials as specified in Section 1413-2.

8.30 TOWER LIGHT

Use tower lights as specified in Section 1413-3.

8.40 MACHINE LIGHTS

Amend Section 1413-4 to include the following:

Balloon lights are an acceptable alternate luminaire for machine lights.

8.50 CONSTRUCTION METHODS

Use construction methods as specified in Section 1413-5.

8.60 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: ϕ_A -G _____ ϕ_B -G _____ ϕ_A - ϕ_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 ϕ_A -G _____ #2 ϕ_A -G _____ #3 ϕ_A -G _____
 ϕ_B -G _____ ϕ_B -G _____ ϕ_B -G _____
 ϕ_A - ϕ_B _____ ϕ_A - ϕ_B _____ ϕ_A - ϕ_B _____
 #4 ϕ_A -G _____ #5 ϕ_A -G _____ #6 ϕ_A -G _____
 ϕ_B -G _____ ϕ_B -G _____ ϕ_B -G _____
 ϕ_A - ϕ_B _____ ϕ_A - ϕ_B _____ ϕ_A - ϕ_B _____
15. Amperage: #1 ϕ_A _____ ϕ_B _____ #2 ϕ_A _____ ϕ_B _____ #3 ϕ_A _____ ϕ_B _____
 #4 ϕ_A _____ ϕ_B _____ #5 ϕ_A _____ ϕ_B _____ #6 ϕ_A _____ ϕ_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 _____