PROJECT SPECIAL PROVISIONS
Roadway Lighting

1.00 DESCRIPTION

The work covered by this section consists of relocating one 45' twin-arm light standard in conflict with construction. This section also consists of troubleshooting and repairing of the existing lighting system served from Control System "M", at the I-40/Guilford College Road interchange.

All work shall be performed 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.

2.00 WIRING METHODS

2.10 DESCRIPTION

Amend Section 1400-4(F) of the *Standard Specifications* 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 of the *Standard Specifications* to include the following:

Provide the personnel and equipment necessary for removing and replacing fuseholders and 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 of the *Standard Specifications* to include the following:

Provide a calibrated MegOhmMeter, with certification that calibration was done 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 will not be considered a repair. Water in the conduit allows current to flow between skinned places in the conductor's 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 of the *Standard Specifications* 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 RELOCATE LIGHT STANDARDS

6.10 DESCRIPTION

The work covered by this section consists of providing all equipment, labor and materials necessary to move an existing twin-arm (TA) light standard on the I-40 median barrier to a new foundation located inside the transition barrier as shown on the plans. It does not include construction of the new foundation inside the transition barrier.

6.20 MATERIALS

Reuse existing materials, including the light standard, luminaire, and arm. Shims and washers may be reused, but new connecting bolts will be required. Replace materials that are to be reused, if they are damaged during relocation. Damaged materials shall be replaced with new materials, at no additional cost to the Department.

The Contractor shall be responsible for the storage and protection of the reused materials against loss or damage.

6.30 CONSTRUCTION METHODS

Dismount the TA light standard from the median barrier. Reassemble and reinstall the light standard on a new foundation. Replace the attachment hardware for the standard-to-arm connection. Use rope or web slings when hoisting or lifting the light standard, to prevent damage or marking. If the light standard is to be stored between dismounting and reinstalling, provide proper transportation and supports to prevent warping. Provide protection against the elements.

Abandon or remove the conductors and conduit as required by construction. Refer to Section 1400-10 of the *Standard Specifications*. Install new circuitry inside the standard, and install new feeder circuitry as shown on the plans.

Make all reasonable efforts to maintain lighting system operation for circuits not in conflict with construction.

6.40 MEASUREMENT AND PAYMENT

Relocate light standard will be measured and paid for at the contract unit price per each for the actual number installed at proposed locations in a satisfactory manner and accepted by the Engineer. Such price and payment will be full compensation for disconnecting circuitry, disassembly, transporting, storing, reassembly, installing new connecting bolts, connecting of new circuitry, removing of foundation, disposing of concrete, backfilling, compacting and all incidentals necessary to complete the work.

New circuitry to serve the relocated TA light standard will be measured and paid for in accordance with Section 7.40 of these Special Provisions.

Payment will be made under:

Pay Item	**Pay Unit**
Relocate Light Standard	Each

7.00 TROUBLESHOOT & REPAIR EXISTING LIGHTING SYSTEM

7.10 DESCRIPTION

The work covered by this section consists of finding and repairing faults with the existing lighting system served from Control System "M", at the I-40/Guilford College Road interchange.

7.20 MATERIALS

Use Meg Tester, Digital Multi-Meter, and other applicable test equipment and tools for *Fault Troubleshoot and Locate*.

Refer to Division 14:

Item	**Section**
High Mount Luminaires (1kW, HPS).	1403-2
Light Standard Luminaires (400W, HPS)	1406-2
2 #1 w/G Feeder Circuit	1410-2
2 #1 w/G Feeder Circuit in 1.5" Conduit.	1410-2
2 #2 w/G Feeder Circuit	1410-2
2 #2 w/G Feeder Circuit in 1.5" Conduit	1410-2
2 #4 w/G Feeder Circuit	1410-2
2 #4 w/G Feeder Circuit in 1.5" Conduit	1410-2
2 #6 w/G Feeder Circuit in 1.5" Conduit	1410-2
High Pressure Sodium lamp (1kW)	1403-2
High Pressure Sodium lamp (400W)	1406-2
Electrical Junction Boxes,	1411-2
Electrical Duct	1409-2

7.30 CONSTRUCTION METHODS

Troubleshoot and replace faulty electrical components, faulty lighting components, and faulty circuitry with new materials to make the existing lighting system fully operational.

Determine if all twin-arm light standards (TA), single-arm light standards (SA), and high mast light standards (HM) are fully operational. As-built plans will be provided to the Contractor. Currently, a number of TAs on the median barrier are not burning. Two luminaires on HM1 are not burning, and all 4 luminaires on HM 3 are burning dim.

Troubleshoot and replace faulty electrical components and luminaires. In the case of a faulty feeder circuit run in the median barrier, replace the conductors inside the conduit. In the case of a faulty circuit run in the shoulder, the Contractor can either replace the conductors inside the existing conduit; or abandon or remove the existing conductors and conduit of the faulty circuit run in accordance with Section 1400-10, and reinstall new conduit and new conductors for the run.

Upon project completion, the lighting system shall be fully operational. All the lights shall be burning at full brightness, with all circuits passing inspections and performance tests (meg test) in accordance with Section 3.00 and Section 4.00 of these Special Provisions.

The Contractor shall be responsible for the storage and protection of the reused materials against loss or damage. All removed faulty materials shall be disposed of in a manner acceptable to the Engineer.

7.40 MEASUREMENT AND PAYMENT

"Troubleshoot and Repair Existing Lighting System" will be measured and paid for at the contract unit bid price of each applicable pay item listed below. Such price and payment will be considered full compensation for troubleshooting, disconnecting circuitry, disassembly, transporting, storing, reassembly, installing new electrical or lighting components, connecting of new circuitry, meg testing, and all equipments and incidentals necessary to make the existing lighting system fully operational.

Estimated quantities shown in the "Itemized Proposal" are for obtaining bid prices only. Actual quantities will be paid for as measured below.

Fault Troubleshoot and Locate will be measured and paid for at the contract unit price for the actual number of hours spent in troubleshooting the existing lighting system, to determine the cause of non-functioning equipment that has been accepted by the Engineer.

High Mount Luminaires (1kW, HPS) will be measured and paid for in accordance with Section 1403-4.

Light Standard Luminaires (400W, HPS) will be measured and paid for in accordance with Section 1406-4.

2 #1 w/G Feeder Circuit will be measured and paid for in accordance with Section 1410-4.

2 #1 w/G Feeder Circuit in 1.5" Conduit will be measured and paid for in accordance with Section 1410-4.

2 #2 w/G Feeder Circuit will be measured and paid for in accordance with Section 1410-4.

2 #2 w/G Feeder Circuit in 1.5" Conduit will be measured and paid for in accordance with Section 1410-4.

2 #4 w/G Feeder Circuit will be measured and paid for in accordance with Section 1410-4.

2 #4 w G Feeder Circuit in 1.5" Conduit will be measured and paid for in accordance with Section 1410-4.

2 #6 w/G Feeder Circuit in 1.5" Conduit will be measured and paid for in accordance with Section 1410-4.

Furnish and Replace Lamps will be measured and paid for at the contract unit price per each for the actual number of lamp of the appropriate wattage, which have been installed in the appropriate luminaire at the specified light locations in a satisfactory manner and have been accepted by the Engineer.

Electrical Junction Boxes, (Size & Type) will be measured and paid for in accordance with Section 1411-4.

Electrical Duct, (Size & Type) will be measured and paid for in accordance with Section 1409-4.

Payment will be made under:

Pay Item	**Pay Unit**
Generic Lighting Item (Fault Troubleshoot and Locate)	Hour
Generic Lighting Item (1000W Lamp HPS)	Each
Generic Lighting Item (400W Lamp HPS)	Each

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 IDs_____
2. Breakaway Fuseholders, Proper Line/Load Connections_____
3. Foundation Elevations_____
4. Breakaway Bases_____
5. Conductor IDs in Base_____

HIGH MOUNT STANDARDS

1. Verify IDs_____
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 IDs_____
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_____