

ALABAMA DEPARTMENT OF TRANSPORTATION

DATE: July 2, 2012

Special Provision No. 12-0268

EFFECTIVE DATE: November 1, 2012

SUBJECT: Roadway Lighting.

Alabama Standard Specifications, 2012 Edition, shall be amended by replacing SECTION 750 and modifying SECTION 889 as follows:

SECTION 750 ROADWAY LIGHTING

750.01 Description.

This work shall consist of furnishing and installing roadway lighting systems, or the modification of roadway lighting.

The structural requirements (design and materials) for roadway lighting are addressed in Section 718.

750.02 Materials.

Materials shall meet the requirements given in Section 889.

Prior to purchasing materials, and within 30 days after the issuance of the "Notice to Proceed", the Contractor shall submit seven copies of a complete descriptive list of all materials (wiring, conduits, boxes, mounting hardware, power control devices, luminaires, luminaire poles, etc.) to the Engineer for approval. (The requirement for the submittal of structural designs and details is given in Section 718.) This information shall be submitted on the Department's Material Submittal Form furnished to the Contractor for this purpose. The submittal shall also include seven copies of "catalog cutouts" or published data sheets for each item on the list. Incomplete or inaccurate submittals will be returned to the Contractor for revision and resubmittal. Partial lists may be considered if prior approval for the submittal of a partial list is approved in writing by the Engineer.

Materials shall not be installed prior to approval. The Department will not be liable for materials purchased, work performed, or any delay incurred due to the failure of the Contractor to secure prior approval.

Failure of the Engineer to note unsatisfactory material as received at the job site will not relieve the Contractor of the responsibility of furnishing the required material.

750.03 Construction Requirements.

(a) CODE.

All work shall be done in accordance with the requirements given in the current edition of the National Fire Protection Association "NFPA 70, "National Electrical Code" (NEC) and the regulations and standards of the power company providing service.

(b) LICENSE.

The Contractor responsible for the performance of the work shall be licensed as a General Contractor authorized to perform electrical work by the Alabama State Licensing Board for General Contractors

At least one out of every three persons in each work crew shall be a Journeyman licensed by the Alabama Electrical Contractors Board. Journeymen shall be present and shall have direct involvement with all work required for the installation and operational testing of electrical materials and equipment. The Journeymen shall also possess an IMSA (International Municipal Signal Association) Roadway Lighting Level 1 Certification.

The Contractor shall submit copies of the **General Contractor license**, Journeyman licenses and IMSA certifications to the Engineer as a part of the submittal of the list of materials proposed for installation. Work shall not begin on the installation of electrical materials or equipment until copies of the licenses and certifications have been approved by the Engineer.

(c) ELECTRICAL POWER.

The entity (City, County, State, etc.) that will be responsible for the eventual operation and maintenance of the roadway lighting system will make application for electrical service upon notification that power service will be required. The Contractor shall inform the Engineer when power service is required at least 30 calendar days prior to the need of the power service. This same entity will be responsible for the cost of the service connection and the monthly service billings thereafter.

Electrical power shall be the power system shown on the plans which will usually be a single phase, 3-wire, 480 Volt-AC system. Power shall be provided by a transformer that does not provide power to any other equipment.

(d) GENERAL CONDUIT SYSTEM INSTALLATION REQUIREMENTS.

Conduit shall be installed in accordance with the details shown on the plans or as directed by the Engineer. Rigid Nonmetallic Conduit (RNC) may be installed as a substitute for Nonmetallic Underground Conduit with Conductors (NUCC) if it is the same size and schedule as the NUCC. Conduit routing shown on the plans is diagrammatic only. Actual routing shall be in the most prudent manner as approved by the Engineer.

Underground conduit depth shall be 24 inches {600 mm}, minimum, unless shown otherwise on the plans.

All conduit ends (except NUCC and HDPE) shall be put together in couplings to form a smooth raceway for cables. Bushings and duct sealant shall be installed at all conduit terminations to protect the insulation of the conductors and to prevent debris from entering the conduit. Conduits shall be joined by approved methods prescribed by the manufacturer of the conduit. When conduit is installed for future use, the ends of the conduit shall be capped with a fitting listed for this purpose to prevent water and other foreign matter from entering the conduit system.

The Contractor shall seed and mulch disturbed areas as directed by the Engineer. The seeding and mulching of disturbed areas shall be a subsidiary obligation of the conduit installation.

Before beginning excavation, the Contractor shall determine the location of all utilities in the vicinity. Utilities shall not be damaged during construction.

Conduit shall be located to avoid potential conflict with the future installation of guardrail, signposts, and other equipment and devices. A minimum of 12 inches {300 mm} clearance shall be provided between the finished lines of conduit runs and existing underground utilities. Where the underground conduit run is adjacent to concrete walls, piers, footings, etc., a minimum of 4 inches {100 mm} of undisturbed earth or firmly compacted soil shall be maintained between the conduit and the adjacent concrete.

Unless shown otherwise on the plans, trenches shall not be excavated in existing pavement or paved shoulders to install conduit. When it is necessary to place conduit under an existing pavement, the conduit shall be installed in accordance with the requirements given in Section 756. Unless approved otherwise by the Engineer, trenches shall not remain open after normal work hours each day.

Liquid Tight Flexible Metal Conduit (LFMC) or Liquid Tight Flexible Non-metallic Conduit (LFNC) as shown on the plans or directed by the Engineer shall be installed where conduits cross an expansion or open joint on bridges, barrier rails or structure. The LFMC or LFNC shall be 36 inches {900 mm} in length and shall have a sag of not more than 3 inches {75 mm} between the fixed ends of the rigid conduit.

(e) JUNCTION BOXES.

The types of junction box shall be:

TYPE	INSTALLATION LOCATION	BOX MATERIAL
Type 1	Installed flush with grade.	Non-Metallic
Type 2	Installed on the surface of a structure.	Metal
Type 3	Installed flush with surface of a structure.	Non-Metallic
Type 4	As Shown on the Plans	As Shown on the Plans

(f) NONMETALLIC UNDERGROUND CONDUIT WITH CONDUCTORS.

Nonmetallic Underground Conduit with Conductors (NUCC) shall be installed in accordance with the manufacturer's recommendations.

If plowing is proposed for the installation of the NUCC, the manufacturer's recommended installation practices shall be submitted to the Engineer prior to beginning the installation. If the Engineer is not satisfied with the Contractor's performance and knowledge once installation begins, the Contractor shall arrange for a manufacturer's representative experienced in plowing methods to be at the jobsite until the Engineer determines that the Contractor is capable of properly installing the NUCC. If rock or other obstructions hinder plowing operations, the Engineer may require that conductor routes be pre-ripped to locate rock or hidden obstructions. Obstructions may be removed or the conductors routed around them as approved by the Engineer.

If the "Plow Pulling" method is used, the plow operator shall have an acceptable method to insure that the manufacturer's recommended maximum tensile force on the NUCC is not exceeded.

If at any time the Engineer determines the installation is not in full compliance with the intent of the manufacturer's recommended practices, the operation shall stop until a manufacturer's representative can further instruct the Contractor's personnel in the deficient areas.

If the "Chute Plowing" method is used, special attention shall be given to the conductor feed chute dimensions.

(g) CONDUCTOR INSTALLATION.

1. SPLICES AND TAPS IN CONDUCTORS.

Splices and taps in conductors shall only be made in junction boxes and pole bases. They shall be made with solderless split bolt connectors.

Splices and taps shall be protected in sealed in silicone gel filled enclosures to provide a waterproof connection and to ensure the required electrical insulation.

Silicone gel filled enclosures shall be re-enterable; shall be UV resistant, listed for temperatures from -40 °C to 90 °C; and shall be impact and abrasion resistant. The enclosure shall be sized as shown in the following table:

Conductor Size	Gel Enclosure Size
#4 AWG and smaller	#2
#2 AWG	#2.5 or Miniwedge
Larger than #2 AWG	#3

2. PULLING CONDUCTORS INTO CONDUIT.

Conductors shall not be pulled into a conduit until the installation of the conduit is complete. Conductors in conduits shall be carefully pulled into place using approved methods so that the conductors will not be damaged. Powdered soapstone, talc, or other inert lubricant specifically designed for the purpose shall be used when pulling conductors through the conduit. All conductors within a single conduit shall be pulled at the same time and shall be handled and installed in such a manner as to prevent kinks, bends or other distortion which could damage the conductor and outer covering. When conductors are pulled through hand holes, pole shafts, etc., a pad of firm rubber or other suitable materials shall be placed between the conductors and the edges of the opening to prevent damage to the conductors.

(h) GROUNDING.

All metal poles and metal enclosures containing electric wires and/or equipment shall be grounded. Exothermic welds or other approved connectors shall be used to connect the grounding conductor to the ground rods.

A continuous grounding conductor, either bare or having a green colored insulation, shall be extended from the service ground to all equipment and shall be used for grounding purposes only.

(i) LIGHTNING PROTECTION.

Lightning protection shall be installed as shown on the plans at all poles greater than or equal to 75 feet {22.8 m} in height.

(j) FOUNDATIONS.

For bidding purposes, the size and configuration of reinforced concrete foundations will be shown on the plans for the designated ranges of pole heights

The Engineer will inform the Contractor if changes are required to the depth of concrete foundation required at each pole. Changes in the depth of foundations may be made based on a review of the Contractor's design submittal. The Contractor will be notified of any such changes upon completion of this review. If no changes are required, the Contractor shall install the as-bid sizes of foundations.

Care shall be taken to properly orient the anchor bolts of concrete foundations so that the luminaire assembly will be in proper alignment with the roadway.

Conduits shall be accurately placed, oriented in the proper direction to accommodate future extension, and securely held in place to prevent movement.

Concrete shall then be placed in the excavated area against undisturbed earth below the finished ground line. The concrete shall be placed in an approved form above ground line to the top of the foundation. All exposed edges of the concrete shall have a 3/4 inch {19 mm} chamfer.

The top of the foundation shall be level and shall be placed to properly orient the luminaire assembly with the roadway. For breakaway poles, the finished foundation shall have a maximum 4 inch {100 mm} "Breakaway Support Stub Height Measurement" as defined in the AASHTO Roadside Design Guide, Chapter 4.2.

(k) INSTALLATION OF LUMINAIRE POLES.

Luminaire poles shall be installed in a vertical position. Erection shall be accomplished carefully to prevent marring the finish or otherwise damaging the pole.

When lighting is to be installed on a bridge, the Contractor shall, before ordering the poles, examine the bridge plans or the completed bridge, whichever is applicable, to determine the exact nature of the proposed or existing details which will accommodate the luminaire poles. Any discrepancies between the plans and an existing bridge structure shall be immediately reported to the Engineer.

The Contractor shall verify that the pole anchor bolts, base plate bolt pattern, and pole assembly (including tenon mounting holes, multiple pole sections, and hand-hole orientation) are coordinated for proper orientation of lowering devices and luminaires to the roadway as shown on the plans.

A screen made from 1/4 inch {6.4 mm} mesh galvanized wire cloth shall be fabricated and inserted in the pole base to prevent rodents, etc. from entering the pole.

Backfill for direct burial fiberglass poles shall be as recommended by the pole manufacturer.

Care shall be taken to assure the bracket arm is properly aligned.

(l) INSTALLATION OF LUMINAIRES.

The light control surfaces and glassware shall be cleaned after installation. Cleaning shall be performed in accordance with the luminaire manufacturer's recommendations. Luminaires shall be leveled, plumbed, and installed as per the manufacturer's recommendations to achieve the most suitable light pattern.

The Contractor shall verify that the lamp socket is in the proper position to produce the optimum lighting pattern for each luminaire not to just meet minimum. Each luminaire shall be adjusted to provide the most effective light pattern as directed by the Engineer after installation.

(m) TESTING INSULATION.

The insulation of all lighting circuits will be tested by the Engineer at the load side of the contactors or circuit breakers. These tests shall be made with a 500-volt DC Megger Tester. Any reading of 250,000 ohms to ground or higher is satisfactory. Any reading of less than 250,000 ohms to ground is unacceptable and shall be corrected. The Engineer may conduct additional insulation testing after the completion of the operational testing.

(n) GROUND RESISTANCE TESTING.

The resistance to ground will be tested by the Engineer at each lighting control center. The test will be conducted using a null balance earth tester with auxiliary ground rods placed 50 feet {15.24 m} and 100 feet {30.48 m}, respectively, from the tested ground rod. A reading of 25 ohms or less is satisfactory. Any reading over 25 ohms will require the installation of additional ground rods to be placed in a pattern as directed by the Engineer. The Engineer may conduct additional ground resistance testing after the completion of the operational testing.

(o) TESTING LUMINAIRE LOWERING DEVICES.

The Contractor shall perform a functional test on all luminaire lowering devices. Tests shall be performed in the presence of the Engineer. The test shall be performed on the final completed lighting assembly with all luminaires and other components installed. The test shall be performed as follows:

- Start with the device in the latched position on top of the pole.
- Unlatch and lower the device support to ground level for inspection.
- Raise device to top and latch.
- Unlatch and lower the device 5 to 10 feet {1.53 to 3.05 m}.
- Raise the device and confirm that secure latching has occurred.
- Repeat unlatching, lowering, raising and latching three times.

If latching or unlatching failures occur, or if any other problems occur during the test, the Contractor shall make corrections and repeat the complete test in the presence of the Engineer.

(p) OPERATIONAL TESTING OF THE SYSTEM.

The Contractor shall perform full operational testing of the completed lighting system after the completion of the installation of all equipment and materials, including all miscellaneous items of work required for the complete lighting system. The operational testing will not begin until the testing of the insulation, resistance to ground, and luminaire lowering devices has been completed and accepted by the Engineer.

The Engineer will set the date that the operational testing will begin. The Contractor shall provide all installation and operational instructions for all lowering devices before the operational testing of the system will be allowed to begin.

An operational test shall be the full operation of all components of the lighting system for a period of 30 calendar days. During this test period the Contractor shall perform all necessary adjustments (including re-aiming of luminaires) and replace all malfunctioning parts of the equipment required to place the system in a fully operational condition. Extra compensation will not be given for adjustments, maintenance, repairs and replacements during the test period. The initial test period will be suspended as directed by the Engineer during the time that the entire lighting system is not in full operation. The 30 calendar day operational test period shall be restarted or repeated if required by the Engineer due to repeated failure of the lighting system.

The Engineer will perform a final inspection of the lighting system at the completion of the operational testing. If all items of work in the contract have been completed, the Engineer will suspend contract time charges during the operational testing.

Upon completion of the operational testing, field tests may be conducted by the Engineer to verify that the required lighting levels and uniformity ratios are being provided. Any adjustments to the lighting system necessary to meet the design criteria shall be done at the Contractor's expense.

(q) WARRANTIES, GUARANTEE AND MAINTENANCE.

The State shall be protected from any defect in the lighting system by the following:

- The Contractor shall provide the manufacturer's warranties to the State for all electrical and mechanical equipment and;
- The Contractor warrants equipment and guarantees workmanship for satisfactory in-service operation of the electrical and mechanical equipment and related components for a period of one year following the date of completion of the operational check period. ,
- Maintenance repair work may be required for long duration contracts. In the case of long duration contracts the Contractor shall perform maintenance repair work on the lighting system (equipment, devices, structures and hardware) from the end of the one year warranty period until the

end of contract time charges. Maintenance repair work during this time period will be paid for as "Extra Work" in accordance with the requirements given in Article 109.04.

The Department will not make the final payment for work under this Section until the warranties, guaranties and contact information are furnished to the Engineer.

(r) MODIFICATION OF ROADWAY LIGHTING.

The modification of roadway lighting shall consist of any amount of preparation, restoration, relocation, rehabilitation, demolition or salvage work designated on the plans for modification. New materials shall be furnished when required for the modification work unless noted otherwise on the plans.

(s) LUMP SUM ROADWAY LIGHTING.

The work of furnishing and installing "lump sum" Roadway Lighting shall consist of the construction of partial or complete roadway lighting as shown to be required on the plans. It may be work that is limited to no more than the installation of lamps or fuses for luminaires to a complete roadway lighting system with multiple lighting structures, luminaires and lighting control equipment.

750.04 Method of Measurement.

Pay Items 750-A, B, C, D, H, I, and L will be measured per each item.

Pay Items 750-E, F and G will be measured in linear feet {meters}.

Pay Items 750-J, K and Z will be measured as lump sum units.

750.05 Basis of Payment.

(a) UNIT PRICE COVERAGE.

The contract unit price for each Pay Item shall be full compensation for all materials, tools, labor, equipment and miscellaneous items required to compete the item of work. This will include excavation, foundations, conduits, conductors, pole assemblies, luminaires, junction boxes, lighting control centers, power service equipment and materials as designated for each pay item.

Pay Items are as follows:

Item 750-A: High Mast Luminaire Assembly. A high mast luminaire assembly shall be the pole, lowering device, electric motor, pole wiring system, luminaires, lamps, fuses, circuit breaker, surge arrester, lightning protection system, pole numbers, equipment grounding system, and miscellaneous hardware.

Item 750-B: Roadway Luminaire Assembly. A roadway luminaire assembly shall be the pole, pole numbers, pole wiring system (State furnished when applicable), surge arrester, lightning protection system, Type 1 junction box, equipment and pole grounding systems, fuses, luminaires, lamps, and miscellaneous hardware. A breakaway device and luminaire lowering device shall be a part of this pay item when shown to be required on the plans. When a luminaire assembly is shown on the plans to be a breakaway assembly, the State will furnish pole wiring system which includes a surge arrester.

Item 750-C: Pole Foundation. A pole foundation shall be a reinforced concrete foundation including the excavation, disposal of excavated material, concrete, backfill, concrete pad, reinforcing steel, conduit and elbows, anchor bolts, and mulching and seeding the disturbed ground.

The compensation for a reinforced concrete foundation may be adjusted if the size of the foundation is required to be changed. Bid prices shall be given for the construction of a foundation to the depth and at the diameter shown on the plans. A deeper foundation may be required based on the results of the Department's review of the Contractor's submittal of the design of the pole structure.

The compensation for a foundation will be adjusted if changes are required to be made to the depth of the foundation. The adjustments shall be in accordance with the following requirements:

- 2'-0" {600 mm} Diameter: The compensation for 2'-0" {600 mm} diameter foundation shall be increased by \$50 for each foot {\$50.00 for each 300 mm} of depth that the foundation increases from what is shown on the plans.

- 2'-6" {760 mm} Diameter: The compensation for 2'-6" {760 mm} diameter foundation shall be increased by \$75 for each foot {\$75.00 for each 300 mm} of depth that the foundation increases from what is shown on the plans.

- 3'-0" {910 mm} Diameter: The compensation for 3'-0" {910 mm} diameter foundation shall be increased by \$100 for each foot {\$100.00 for each 300 mm} of depth that the foundation increases from what is shown on the plans.

- 4'-0" {1.22 m} Diameter: The compensation for 4'-0" {1.22 m} diameter foundation shall be increased by \$200 for each foot {\$200.00 for each 300 mm} of depth that the foundation increases from what is shown on the plans.

- Reinforcing Steel: The adjustments to compensation because of changes in foundation depth shall also cover compensation for providing the reinforcing steel shown on the plans for the deeper foundations. The number and size of longitudinal reinforcing steel and the size and spacing of hoops will be the same regardless of any change in depth.

Item 750-D: Electrical Junction Box. An electrical junction box shall be the junction box, concrete, and mounting hardware.

Item 750-E: Conduit. Conduit (RMC, LFMC, LFNC, or RNC) shall be the conduit tubing including fittings, trenching, backfilling, attachment to structure and miscellaneous hardware.

Item 750-F: Conductor. This shall be individual conductors and includes pulling, splicing, terminating, testing and miscellaneous hardware.

Item 750-G: Combined Duct and Conductors: Combined duct and conductors (NUCC) shall be the complete assembly of polyethylene duct and the size and number of required conductors. It shall include fittings, trenching, backfilling, splicing, terminating, testing and all miscellaneous hardware.

Item 750-H: Service Pole. A service pole shall consist of the pole, switch, fuses, ground rod, one-spool clevis, down guy and guy rod (if required) and miscellaneous hardware.

Item 750-I: Lighting Control Center. A lighting control center shall include switches, circuit breakers, contactors, fuses, enclosures, photocontrols, ground rods, incoming service conductors and conduit, concrete slab, anchor bolts, and miscellaneous hardware.

Item 750-J: Preparation Work for Utility Company Equipment. This work shall include the installation of concrete pads, pull boxes, conduit, grounding equipment, conductor vaults, and other equipment and materials as shown on the plans.

Item 750-K: Modification of Roadway Lighting. The modification of roadway lighting shall consist of the work shown on the plans to be included in this pay item. It may include any kind and amount of preparation, restoration, relocation, rehabilitation, demolition and salvage work detailed on the plans.

Item 750-L: Landscape Luminaire Assembly. Landscape luminaire assemblies shall be furnished and installed by the Contractor in accordance with the details shown on the plans. Each landscape luminaire shall be connected to the electrical power service to become a fully functional part of the required lighting system.

Item 750-Z: Roadway Lighting. Roadway Lighting (lump sum) shall include all equipment, materials, tools, labor, and miscellaneous items required for roadway lighting as shown to be required on the plans. This shall include all excavation, foundations, conduits, conductors, pole assemblies, luminaires, junction boxes, lighting control centers, power service equipment and materials, and all miscellaneous items required to complete the work shown on the plans that is included in this item of work.

(b) PAYMENT WILL BE MADE UNDER ITEM NO.:

750-A High Mast Luminaire Assembly with * - per each

750-B Roadway Luminaire Assembly with * - per each

750-C Pole Foundation, ** - per each

750-D Electrical Junction Box, Type ____ - per each

750-E Conduit, *** - per linear foot {meter}

750-F Conductor, **** - per linear foot {meter}

750-G Combined Duct and Conductors, ***** - per linear foot {meter}

750-H Service Pole - per each

750-I Lighting Control Center - per each

750-J Preparation Work for Utility Company Equipment - per lump sum

750-K Modification of Roadway Lighting - per lump sum

750-L Landscape Luminaire Assembly, ***** - per each

- 750-Z Roadway Lighting - per lump sum
 - * number, type, and wattage of luminaire(s) as required
 - ** either Roadway or High Mast
 - *** conduit size and type
 - **** size of conductors
 - ***** number and size of conductors
 - ***** either bollard, canopy, recessed light, up light or down light

SECTION 889
ROADWAY LIGHTING MATERIALS

889.06 Service Pole.

This Article (889.06) shall be replaced by the following:

889.06 Service Pole.

Service poles shall be treated in accordance with the requirements given in **Section 833**.

OBSOLETE