

## **SPECIAL PROVISION**

### **SPECIFICATION 938 – LIGHTING FOR NIGHTTIME CONSTRUCTION**

#### **938-1 DESCRIPTION**

**938-1.01 Scope** - This work shall consist of furnishing, installing, operating, maintaining, moving and removing all necessary lighting equipment and materials for the execution of nighttime operations on the contract. Night time operations consist of work specifically scheduled during the hours of darkness. All work shall be done according to the “Standard Specifications for Road and Bridge Construction” and as further defined herein.

#### **938-2 MATERIALS**

**938-2.01** Lighting equipment to be furnished shall include fixed and/or mobile lighting systems. Fixed lighting systems shall consist of portable lighting supports and luminaries and may take the form of roadway luminaries on temporary poles. Mobile lighting systems shall consist of luminaries attached to mobile construction equipment. Other lighting systems, such as balloon lighting, may be adapted to both fixed and mobile lighting. All lighting equipment shall be in good operating condition and in compliance with applicable safety and design codes to the satisfaction of the Engineer and shall meet the glare requirements.

#### **938-3 CONSTRUCTION REQUIREMENTS**

**938-3.01** Whenever the Contractor’s operations are being conducted at night, the Contractor shall provide such artificial lighting as determined by the Engineer to ensure safety on and around the worksite, quality of construction, and adequate conditions for inspection of the work by the Engineer. If multiple operations are underway simultaneously at various locations throughout the jobsite, lighting meeting the specifications herein shall be provided at each separate operation site.

**938-3.02** Lighting requirements in this specification are not intended to be a substitute for other required safety measures, including: safety vests, traffic control devices, warning lights, barricades, cones, and signs. All vehicles in the work zone shall have properly functioning vehicle headlights and all Contractor’s vehicles and construction equipment shall have amber flashing or strobe lights. Lighting shall also be provided for flag person stations according to the requirements set forth in the Standard Specifications 638 – Maintenance and Protection of Traffic and by providing trailer mounted light plants placed near the flag person. Lights shall illuminate the flag person from above so they do not create a glare for approaching vehicles or the flag person, or create shadows such that the flag person is not positively illuminated.

## **SPECIAL PROVISION**

### **SPECIFICATION 938 – LIGHTING FOR NIGHTTIME CONSTRUCTION**

**938-3.03** Extreme care shall be taken to avoid contact with any overhead wires or facilities crossing the roadway. If such contact occurs, the Contractor shall be solely responsible for any resulting damage or expenses.

**938-3.04 Lighting Levels** - Unless specified otherwise within this specification, the contractor shall provide minimum lighting levels of 54 lux (5fc) through out the work area. The work area for mobile operations shall be defined as an area 9 m (30ft) in front of and behind moving equipment and 9m (30ft) in front of and behind any workers performing construction operations. For stationary operations the work area shall consist of the entire area where work operations are being performed. Lighting levels will be measured in a horizontal plane 3 ft. above the pavement.

**938-3.05 Glare Control** - All provided lighting shall be designed and operated so as to avoid glare which interferes with traffic on the roadway. The use of any light fixture that is capable of being rotated on its support such that a direct light could be aimed that would produce unacceptable levels of glare for motorist from any direction or for the workers shall not be used. Large point source lighting with diffuse optics, such as balloon lighting and other similar types of lighting devices meets the glare requirements. When in the Engineer's judgment the lighting is producing glare that exceeds the acceptable glare levels, the lighting shall be replaced with acceptable lighting devices.

**938-3.06 Light Trespass** - Lighting shall be provided and maintained so as not to cause annoyance for properties adjoining the worksite. If any complaints are received by the Engineer and/or the Contractor from proprietors adjoining the worksite, the Contractor shall respond immediately and modify lighting arrangement or add any necessary hardware to shield light trespass to adjoining properties. These modifications should not affect the Contractor's compliance with other requirements in this specification.

#### **938-3.07 Lighting Equipment**

a. All lighting equipment shall be furnished as required and retained by the Contractor after the work is completed. Material and/or equipment shall be in good operating condition. Before nighttime operations may begin all required lighting equipment and/or materials must be ready for operation to the satisfaction of the Engineer. Lighting shall be provided and maintained in conformity with the requirements of both the National Electrical Code (NEC) and the National Electrical Safety Code (NESC), and any applicable safety and design codes.

b. The Contractor shall provide sufficient fuel, spare lamps, generators, and personnel qualified to operate the lights to assure that they will be maintained in

## **SPECIAL PROVISION**

### **SPECIFICATION 938 – LIGHTING FOR NIGHTTIME CONSTRUCTION**

operation during night work. The Contractor shall provide backup lighting to replace failed lights and equipment during night work. The backup equipment shall be on the project and available for use at all times during night work.

**938-3.08 Requirements for Mobile Operations** - In a mobile lighting system, the additional light fixtures shall be mounted on construction equipment in such way that it does not obstruct the sight of the equipment operator. The Contractor shall not operate the standard headlights on the construction equipment when being in the work zone. When the construction equipment is outside the work zone, the Contractor shall not operate the additional mobile lights and will only utilize standard headlights.

a. **Milling and Paving Operations**

1. To provide the required lighting levels, the contractor shall mount a minimum of one luminarie on each piece of mobile construction equipment used in the construction zone. This would include the material transfer device, bituminous paving machine, bituminous rollers, milling machine, and any broom used in the milling process. Light trucks and semi-trucks used in the milling and paving process, shall be excluded from the lighting requirement.
2. A portable lighting device meeting the requirements of this specification shall also be provided for the person performing the straightedge test. The lighting levels shall be 54 lux (5fc) for a distance of 15 ft. in front and back of this individual.

b. **Patching Operations**

1. The Contractor shall be required to provide lighting at each patching location where active work is being performed.

c. **Pavement Markers and Pavement Markings Removal/Installation Operations**

1. Pavement marking operations using a paint striping trucks shall require additional lighting illuminating the back of the truck to provide the required lighting levels at the rear of the truck only. The paint striping truck shall use its normal headlights during the paint operations. Truck mounted attenuators with arrow boards used in this operation will not be required to have additional lighting. This work would not require workers to be outside any vehicles.

## **SPECIAL PROVISION**

### **SPECIFICATION 938 – LIGHTING FOR NIGHTTIME CONSTRUCTION**

2. For raised pavement marker removal and installation and other pavement marking operations, any motor driven vehicle used in the process shall be equipped with additional lighting to provide the required lighting levels. At any location where workers are outside the vehicle the required lighting levels will be provided.

d. Installation and Removal of Work Zone Traffic Control Signs and Devices

1. Any vehicle used during the installation and removal of work zone traffic control devices shall have additional lighting to provide the required lighting levels. This requirement applies to any vehicle used in the maintenance of the traffic control devices.

e. Materials Testing and Construction Inspection

1. The contractor shall provide one additional light and power source to be used by material testing crews. This light shall be capable of being mounted and transported in the back of a pickup truck.

f. Other Mobile Operations

1. For other mobile operations, a general guide shall be to provide the required lighting levels for any vehicle used in the operation and at any location where workers are outside the vehicle working on the pavement.

**938-3.09 Requirements for Stationary Operations** - For stationary operations the Contractor shall use lighting sources which meet the required specifications on articles 3.03 to 3.07 above.

**938-3.10 Inspection** - The Engineer and the Contractor shall have an on-site, after dark, meeting to inspect the conformity of provided lighting conditions on site to this specification. No work shall be permitted until all requirements are met. At any time during the course of nighttime work, should the lighting be deemed inadequate by the Engineer, the work shall be halted until adequate lighting is provided. This suspension of work shall be at no additional cost to the Department and the Contractor shall receive no time extension to complete the work.

**SPECIAL PROVISION**

**SPECIFICATION 938 – LIGHTING FOR NIGHTTIME CONSTRUCTION**

**938-4 METHOD OF MEASUREMENT**

**938-4.01** All the requirements stipulated in this specification will not be measured for direct payment.

**938-5 BASIS OF PAYMENT**

**938-5.01** No payment will be made for the furnishing and utilization of lighting equipment for nighttime construction as this work shall be a subsidiary obligation of the Contractor under the various pay items of the works being performed during nighttime.