

ARCH LIGHTING

****From Middlebury RS 0174(8)**

- xx. DESCRIPTION. This work shall consist of furnishing and installing light fixtures at the locations indicated in the Plans and as directed by the Engineer.

The work under these provisions shall be performed in accordance with these provisions, the Plans, and Section 679 of the Standard Specifications.

- xx. CONSTRUCTION REQUIREMENTS. Provide nonmetallic conduit, non-energized wiring with junction boxes accepting generator plugins, and lights so as to enable VTrans to use generators to adequately light for access and safe passage inside of the precast arch. The Contractor shall determine the necessary details regarding the type of plugins, lights, etc. to ensure safe passage. Lighting sufficient for inspection purposes is not required. Ensure design and installation meets all requirement of the latest edition of the National Electrical Code. At a minimum, provide the following:

- (a) Two luminaires mounted on each abutment (four luminaires total), approximately 2'-0" below the bridge seat, at third points along the face of the abutment.
- (b) Non-metallic electrical outlet on each abutment adjacent to each ingress and egress opening.

Provide connection to an external electrical source to energize the interior lighting and electrical outlets. Electrical connection shall be made to the bridge without external attachment to the bridge components. Ensure design and installation meets all requirements of the latest edition of the National Electrical Code.

- xx. REFERENCE STANDARDS.

- (a) American National Standards Institute (ANSI).
 - (1) C62.41 - Characterization of Surges in Low-Voltage (1000V and Less) AC Power Circuits
 - (2) C78.377 - Specifications for the Chromaticity of Solid State Lighting Products
 - (3) C82.SSL-1 - Operational Characteristics and Electrical Safety of SSL Power Supplies and Drivers
 - (4) C83.77 - Harmonic Emission Limits - Related Power Quality Requirements for Lighting
 - (5) C136.2 - Roadway and Area Lighting Equipment - Luminaire Voltage Classifications

- (6) C136-10 - Standard for Roadway Lighting Equipment, Locking-Type Photo Control Devices
- (7) C136-14 - Standard for Roadway Lighting, Enclosed Side-Mounted Luminaires for Horizontal Burning High Intensity Discharge Lamps
- (8) C136-22 - Standard for Roadway Lighting, Internal Labeling of Luminaires
- (9) C136-31 - Standard for Roadway Lighting Equipment Luminaire Vibration

(b) American Society for Testing and Materials (ASTM).

- (1) B117-03 - Standard Practice for Operating Salt Spray (Fog) Apparatus
- (2) D522-93a - Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
- (3) D714-87(94) - Standard Test Method for Evaluating Degree of Blistering of Paints
- (4) D1654-92 - Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
- (5) D3359-97 - Standard Test Methods for Measuring Adhesion by Tape Test
- (6) G7-05 - Standard Practice for Atmospheric Environmental Exposure Testing of Nonmetallic Materials: Testing for UV Resistance

(c) International Electro-technical Commission (IEC).

- (1) IEC 60598 - Degrees of Protection Provided by Enclosures (IP Code)

(d) Illuminating Engineering Society of North America (IESNA).

- (1) HB-93-2000 - IESNA Lighting Handbook - 9th Edition
- (2) RP-8-00 - American National Standard Practice for Roadway Lighting
- (3) RP-16-96 - Nomenclature and Definition
- (4) LM-31-95 - Photometric Testing of Roadway Luminaires Using Incandescent Filament and High Intensity Discharge Lamps
- (5) LM-50-99 - Photometric Measurements for Roadway Lighting Installations
- (6) LM-63-95 - Standard file format for Electronic Transfer of Photometric Data

- (e) National Fire Protection Association (NFPA).
 - (1) 70 - National Electrical Code
 - (2) 502 - Standards for Road Tunnels, Bridges, and Other Limited Access Highways, 2004
- (f) National Electrical Manufacturers Association (NEMA).
 - (1) 250 - Enclosures for Electrical Equipment
- (g) Underwriter's Laboratories Inc. (UL) Publications.
 - (1) 467 - Grounding and Bonding Equipment
 - (2) 1029 - High Intensity Discharge Lamp Ballasts
 - (3) 1598 - Standard for Luminaires
 - (4) 8750 - Light-Emitting Diode (LED) Equipment for Use in Lighting Products
 - (5) IEUR - Guide Information for Luminaire Poles

xx. SUBMITTALS.

- (a) Product Data. For each luminaire include data on features, accessories, finishes, and the following:
 - (1) Physical description of fixture, including dimensions and verification of indicated parameters.
 - (2) Luminaire weight, effective projected area, details of attaching luminaires, accessories, and installation and construction details.
 - (3) Manufacturer's recommended replacement parts list.
 - (4) Driver/Power Supply. Description, operating characteristics, electrical data, component/capacitor temperature rating, and reliability testing report from an independent laboratory including mean-time-between-failure (MTBF).
 - (5) All components shall be submitted with a list of all standards to which the product conforms.
 - (6) Fabrication Drawings. Catalog cuts and manufacturer's drawings. Mounting bolt templates keyed to specific arms and certified by manufacturer.
 - (7) Wiring Diagrams. Power, and control wiring.
 - (8) Coordination drawings including mounting and connection details, drawn to scale, for exterior luminaries, weight of the fixture, and mounting and

installation details drawn to scale illustrating the requirements for the ballast installation in the transformer base.

- (9) Operation and Maintenance Data. For luminaires to include in maintenance manuals.
- (10) Calculation(s) to be completed using the design drawings as the basis for the luminaire placement and mounting height. Calculations are to include average, maximum, minimum, maximum/minimum, and average/minimum for both initial and maintained luminance. Included with these calculations provide the veiling luminance ratio for each calculation.

xx. QUALITY ASSURANCE.

- (a) Electrical Components, Devices, and Accessories. Listed and labeled as defined in NFPA-70, Article-100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- (b) Luminaires shall be Wet Location listed.
- (c) Luminaires including power supply shall be RoHS compliant and lead/mercury-free.

xx. DELIVERY, STORAGE, AND HANDLING. Inspect equipment as received. Return for replacement any equipment damaged in shipment. Equipment shall be stored in a clean, dry, protected area. Retain packing as received from the factory until it is to be installed. Check and seal luminaire openings against rodents and water as necessary.

xx. MANUFACTURE. Luminaire for this project shall be similar to the Holophane (Module 600) series product line. Alternate manufacturers are the Hubbell (PGM2 Class I, Division 2 wall pack) and Lithonia (TWR Wall Pack). Other similar manufacturer's units may be submitted for approval.

Luminaires shall include the following options as defined. Finite catalog numbers to be developed by the manufacturer and submitted with the Fabrication Drawing review process to ensure all options defined are properly incorporated into the product. Manufacturers indicated above are provided for sourcing purposes only. Products failing to meet specification requirements will not be accepted.

- (a) Luminaire shall be UL listed for installation in wet locations.
- (b) Installation Environment. The luminaire shall be designed to be applicable to the location and environment where fixture is installed (i.e. on a bridge structure, high humidity, etc.).
- (c) Metal Parts. Free of burrs and sharp corners and edges.

- (d) Sheet Metal Components. All materials shall be corrosion-resistant aluminum, unless otherwise indicated. Each component shall be formed or supported to prevent warping and sagging.
 - (e) Housings. Rigidly formed, weather and light-tight enclosures that will not warp, sag, or deform in use. All surfaces shall be protected with an electrostatically applied polyester powder coating inside and out; corrosion-resistant passing 3000 hour salt spray test; the luminaire as a complete assembly shall be rated IP66. The EPA shall be less than 0.08 square meters (0.9 square feet). Provide filter/breather for enclosed luminaries.
 - (f) Construction. The luminaire shall be modular to the extent that the optics package and power supply are separate and removable from the housing and that failure of any part thereof would not require total replacement of the luminaire. The optics package and the power supply shall be sealed against the entry of moisture and dirt where the branch circuit enters the housing.
 - (g) Mounting. The housing shall be designed for wall mounting to a concrete surface.
 - (h) Hardware Material. Unless otherwise noted, all hardware shall be stainless steel with nylon inserts for all nuts, etc.
 - (i) Wiring shall be secured inside the luminaire with an integral wire clamp to prevent movement and abrasion.
 - (j) Grounding lug connected to the housing shall be provided.
 - (k) Luminaires shall be rated for operation over the range - 40°C to +60°C (-40°F to +140°F).
 - (l) Plastic Parts. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - (m) Non-ornamental luminaires shall be classified with a maximum BUG rating of B2-U0-G2.
 - (n) Lenses and Refractors Gaskets. Use heat and aging-resistant gaskets to seal and cushion lenses in luminaire doors.
- xx. FACTORY FINISHES. Manufacturer's standard paint applied to factory-assembled and factory-tested luminaire before shipping.
- xx. CONNECTIONS. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

Use a thread-locking agent in all fasteners before installation.

xx. FIELD QUALITY CONTROL.

- (a) Inspect each installed fixture for damage. Replace damaged fixtures and components.
- (b) Tests and Observations. The contractor is responsible to verify normal operation of lighting units after installing luminaries and energizing circuits with a generator power source.
- (c) The Contractor shall prepare a written report illustrating that the proposed fixtures meet the above requirements. Report shall include a review of the tests completed, all inspections, observations, and verifications indicating interpreted results. If adjustments are made to lighting system, retest to demonstrate compliance with standard.
- (d) Contractor to provide all manpower, equipment, lane closures, etc. at no additional cost to demonstrate the installation complies with the Contract Documents.

xx. METHOD OF MEASUREMENT. The quantity of Special Provision (Arch Lighting) to be measured for payment will be on a lump sum basis in the complete and accepted work.

xx. BASIS OF PAYMENT. The accepted quantity of Special Provision (Arch Lighting) will be paid for at the Contract lump sum price. Payment will be full compensation for furnishing, transporting, handling, and installing the materials specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Arch Lighting)	Lump Sum