

819.832	Microloop Installed in Roadway	Meter
819.850	Pedestrian Push Button	Each
819.851	Push Button for Green Light (Sign)	Each
819.852	Push Button for Walk Signal (Sign)	Each

SECTION 820

HIGHWAY LIGHTING

DESCRIPTION

820.20 General.

This work shall consist of furnishing and installing or modifying highway lighting.

Included in the work is the furnishing and installing or modifying of electrical conduit, electric manholes, handholes, pull or junction boxes, concrete foundations, wire and cable, equipment grounding, ground rods, service connection, lighting poles or towers, luminaries, control equipment, load center assemblies, photoelectric control switches, contactors, time clocks, and all incidental materials necessary for operating and controlling highway lighting systems as indicated on the plans. All systems and/or components shall be complete in every respect, fully wired, thoroughly tested, and ready for use.

The locations of highway lighting equipment shown on the plan are approximate and the exact locations will be established by the Engineer in the field with the exception of Lighting Poles or Towers. The locations of Lighting Poles or Towers may not be altered more than 3 meters (\pm) without the written permission of the Engineer if obstructions are encountered during installation.

TRAFFIC CONTROL DEVICES

All electrical equipment shall be designed, manufactured and tested in accordance with the applicable standards of the ANSI, EIA, FSS, IMSA, ITE, NEMA and UL and these specifications.

Unless otherwise designated on the plans, on the Standard Drawings for Highway Lighting, as set forth in the Special Provisions, and as specified herein, all work and materials shall conform to the requirements of the NEC as amended by the MEC, herein referred to as the electrical code.

Wherever reference is made to codes or standards mentioned above, the reference shall be construed to mean the code or standard that is in effect on the date of advertising of the project.

All electrical connections, splicing, grounding, resistance tests, service connections and circuit identification shall be done by a licensed electrician holding "Certificate B" issued by the State Examiners of Electricians.

Standard symbols and construction details for highway lighting installations are shown on the current Traffic Signal and Highway Lighting Standard Drawings.

Within 30 days following execution of the Contract, the Contractor shall submit to the Engineer for approval, a list of equipment which he/she proposes to install. The submission shall include all equipment identified on the plans or in the specifications by the name of the manufacturer, model or identifying number of each item. The list shall be supplemented by catalog cuts and such other data as may be required, including wiring diagrams of any special equipment and of any proposed minor deviation from the plans. All of the above data shall be submitted in triplicate for checking. Following checking, correction and review, not less than five (5) complete approved sets shall be resubmitted to the Engineer for distribution. The Department shall not be liable for any material purchased, labor performed, or delay to the work prior to such review and approval.

The warranties that the Contractor receives from each manufacturer of equipment and materials pertinent to the complete and satisfactory operation of highway lighting installation shall be turned over to the Department at the time of acceptance of the project, at no cost to the Department. Each warranty so furnished shall indicate its expiration date, and be in effect for a minimum period of one year from the date the highway lighting was placed in continuous operation.

The contractor shall replace at his/her own expense any part of the lighting equipment found to be defective in workmanship, material or manner of functioning within six months from the date of final acceptance of all the installations.

If within one year from the date the highway lighting system is placed on continuous operation the equipment and materials do not meet the warrants specified above and the Engineer notifies the manufacturer or his/her authorized representative promptly, the manufacturer or his/her authorized representative thereupon shall correct any defect either by

repairing or replacing any defective part or parts, at no cost to the Department.

It is the intent of the Plans, Specifications and Special Provisions to provide a complete highway lighting system through the project.

It is not intended that every fitting, minor detail or feature be shown and described, as the assumption is made that either the Prime Contractor or his/her Subcontractor is an expert in the particular area of responsibility and is capable of interpreting the plans. Specifications and Special Provisions so that the bid shall include all items required and that they shall be provided and installed in a neat and workmanlike manner.

820.21 Definitions.

A. Highway Lighting Poles – An aluminum or galvanized steel structure providing a 9.0 to 15 meter mounting height for luminaries mounted on truss type (0.6 - 4.5 meters) bracket arm.

B. Area Lighting Pole or High Mast Tower – A steel structure providing a 12 meter to 60 meter mounting height for luminaries and equipped with a lowering device to permit luminaire maintenance at ground level.

C. The term load center assemblies, as used herein, shall constitute assemblage of parts, equipment and miscellaneous items, forming a complete and independent load center and circuit protector system, housed in a weatherproof trunk cabinet or building as specified.

D. Luminaries shall consist of a housing, reflector, refractor or door glass, refractor holder or door glass holder, lamp socket, mounting device, ballast components, photoelectric control when specified and light source.

MATERIALS

820.40 General.

All materials shall be new. Luminaries shall incorporate the latest photometric and design standards of IES, NEMA and UL.

Where existing systems are to be modified, the existing equipment and material shall be incorporated in the revised system, salvaged or abandoned as directed.

All equipment and materials shall meet the requirements specified in applicable provisions of Section 800.

820.41 Design Requirements.

The complete structures with all luminaries and appurtenances attached thereto shall be designed and constructed in accordance with the requirements of AASHTO “Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals” (Current Edition) for a wind speed at 150 kilometers per hour.

820.42 Equipment.

A. Highway Lighting Poles (Transformer Base).

1. Poles from 9 to 15 meters unless otherwise specified may be made of aluminum or galvanized steel. All poles over 15 meters shall be made of galvanized or weathering steel. All aluminum poles over 12 meters may be in two (2) sections telescoped together and lapped not less than two (2) times the pole diameter at the lapped-joint. Each pole shall be fabricated in a manner that will accommodate a truss type bracket arm (0.6 - 4.5 meters) in length.

2. Bracket arms shall be designed for 50 millimeter slipfitter mounted 35 kilogram luminaries with a projected area of 0.30 square meters.

3. Poles shall have a handhole with a reinforced frame and cover. The opening shall be approximately 100 millimeters x 150 millimeters located approximately 300 millimeters from the bottom of the pole and placed 90 degrees to the bracket arm. Shaft cap shall be aluminum, weatherproof and arranged to be held securely in place on the shaft by a set screw or screws or stamped cap.

4. A bonding means shall be provided in the transformer base and at handhole of each pole.

5. Transformer base for all poles shall be aluminum of the frangible type. The base shall be approximately 500 millimeters high and be provided with a door having a minimum opening of 200 millimeters x 300 millimeters. Four (4) hex head connection bolts with four (4) hex nuts, eight (8) flat washers and four (4) lock washers, galvanized to ASTM A 153 requirements, shall be provided with each transformer base.

6. Anchor bolts for poles with mounting heights of 11 meters or less shall be minimum

25 millimeters x 1 meter with a 100 millimeter "L" bend at the unthreaded end; bolts for poles with mounting heights in excess of 11 meters shall be minimum 30 millimeters by 1.2 meters with a 150 millimeter "L" bend at the unthreaded end.

Each anchor bolt shall have two (2) hex nuts, one for the top and one for the bottom of the base plate, to facilitate leveling of the pole, two (2) flat washers and one (1) lock washer.

7. The bracket arms shall be furnished with a finish similar to that of the shaft to insure uniformity of appearance. The exterior of the pole and bracket arm shall be free of protuberances, dents, cracks, discolorations and other imperfections marring their appearance.

8. For shipping purposes, the shaft and bracket arm shall be protected to preserve the finish.

9. The dead load deflection at the top of the shaft caused by the mass of the arm, luminaries and all appurtenances attached thereto shall not exceed 2% of the shaft length.

10. All aluminum poles over 6 meters in length shall have internal dampers installed to reduce vibrations.

B. Area Lighting Poles or High Mast Tower.

Where area lighting poles or high mast towers are required, plans and Special Provisions will be prepared for the project. In general, requirements will be similar to those specified in Subsection 820.41.

Anchorage shall consist of four (4) or more high strength steel bolts, having two (2) heavy duty hex nuts, and fabricated from high strength low alloy steel having a minimum yield of 345 megaPascals positioned and designed to withstand the forces corresponding to the moment which will cause failure to the shaft.

Anchor bolts shall be furnished with a template and a prefabricated reinforcing cage welded to the bolts.

C. Highway Luminaries.

The luminaire shall be of the horizontal burning gaseous discharge lamp type with IES Type II, III or IV lateral light distribution, as indicated on the plans, with medium vertical light distribution and semi-cutoff vertical light control.

The luminaire shall have a precision-case aluminum housing providing for slipfitter end mounting capable of adapting to 30 millimeter or 50 millimeter mounting brackets with provisions for vertical adjustments of not less than 3°. The reflector shall be of detachable snap-in design, manufactured of polished aluminum. The refractor shall be mounted in a door frame assembly and hinged with a safety catch to the luminaire at the house side and fastened at the street side by an automatic type latch. The refractor and door frame assembly shall be forced upward at the street side by spring pressure when latched against the gasket seat. Gaskets between the reflector and the refractor and the socket entry shall be made of a material capable of withstanding the temperatures involved and be held securely in place. Refractor shall be heat resisting glass with inner or outer prisms.

When stipulated, luminaries shall be furnished and installed with glare shields.

Luminaries shall have an internal ballast of the regulator type capable of operating from multiple circuit voltages indicated on the plans, at a power factor of not less than 95%. The ballast shall be pre-wired to the lamp socket and terminal board, requiring only connection of the power supply leads to the ballast primary terminals. The ballast shall provide regulation within 4% (8% for 1000 watt units) variation in center rated lamp watts with a $\pm 13\%$ variation in primary volts from the ballast voltage-design center. Ballast shall provide satisfactory lamp starting to $-30\text{ }^{\circ}\text{C}$ minimum over the recommended line voltage variation. Ballast and capacitor components shall be arranged so that their operating temperature is not exceeded.

Unless otherwise specified the luminaire shall include a photoelectric control device, as specified in Section 820.42-I, and locking type mounting receptacle in accordance with NEMA standards. The receptacle shall be pre-wired to the terminal board.

Lamps shall be of the gaseous discharge type and wattages indicated. They shall conform to ANSI requirements as listed in reputable lamp manufacturers catalogues. Lamps failing during the first 1000 hours shall be considered defective and be replaced at no cost to the Department.

D. Area Lighting Luminaries.

Area lighting luminaries are used mainly for special applications. Where this type of lighting is required, Special Provisions and Plans will be prepared for the particular project. In general, luminaries will be similar to luminaries specified in Subsection 820.42-C.

E. Flood Lighting Luminaries.

Flood lighting luminaries are used mainly for special applications. Where this type of lighting is required, Special Provisions and Plans will be prepared for the particular project. In general, luminaries will be similar to luminaries specified in Subsection 820.42-C and will have special mounting arrangements.

F. Underpass Lighting Luminaries.

Luminaries shall consist of a one or two lamp VHO/CW/RS fluorescent type with internally mounted ballast and recessed sockets. The housing shall be one piece aluminum with sufficient structural bracing for self support. The ends of

the luminaire shall be tapped for 20 millimeter conduit. The reflector shall be polished aluminum readily removable for access to the interior of the housing for wiring and servicing. The refractor shall be heavy plastic and hinged to allow the cover to swing open. Gaskets shall be provided to form a seal between the housing and refractor. Luminaire shall be watertight and capable of withstanding water pressures up to 700 kiloPascals with standard cleaning nozzles commonly used in cleaning tunnels. Luminaries shall be provided with adjustable aluminum or stainless steel brackets to allow a 90° minimum rotation of the luminaire through the longitudinal axis.

Luminaries shall have an internal ballast capable of operating from multiple circuit voltages indicated on the plans and capable of furnishing design voltages and current for the specified fluorescent lamp or lamps. It shall operate satisfactorily over a voltage range of $\pm 5\%$ of its nominal primary voltage rating. Line feed back from the lamp through the power line shall be corrected by means of a built-in interference suppressor incorporated in each ballast. Power factor correction shall be not less than 90% and each ballast shall be capable of starting its lamp or lamps at a temperature of -30 °C.

G. Sign Lighting Luminaries.

Sign lighting luminaries may be of the incandescent, gaseous discharge or fluorescent type. Where this type of lighting is required, Special Provisions and Plans will be prepared for the particular project. In general luminaries will be similar to luminaries specified in Subsection 820.42-C and 820.42-F.

H. External Ballasts.

The basic ballast housing shall be adaptable by brackets, lugs, or adapters for either pole-base, pole-side, pole-top, flat wall mounting or direct burial. The housing shall be of heavy gauge aluminum or fibre-glass. All assembled core windings and terminals shall be sealed within the housing by a high-melting point filling compound. The electrical characteristics shall conform to ballasts mounted integrally as specified in Subsections 820.42-C and 820.42-F. A manufacturer's name plate shall be an integral part of the housing. The name plate shall have the manufacturer's name, model number, serial number, hook-up diagram, power supply data and the load that the ballast is capable of operating.

I. Photo Electric Control.

The controls shall be twist-lock plug-in devices to be used with highway lighting equipment conforming to NEMA standards. They shall be of the tubeless type rated for 50 or 60 hertz, alternating current, at the following voltages and load capacity with inrush current rating not less than 100 amperes:

1. 105-285 volts, 1800 volt-amperes
2. 120 volts, 1800 volt-amperes
3. 208 volts, 1800 volt-amperes
4. 240 volts, 1800 volt-amperes
5. 277 volts, 1800 volt-amperes
6. 480 volts, 1800 volt-amperes

Controls shall have a turn-on range of 5 to 30 lux and shall be factory adjusted to turn on at 10 lux. The turn off level shall be between 10 and 25 lux higher than turn on levels. It shall be possible, by means of simple hand tools or by a calibrated adjustment knob, to adjust the turn on time of the lights when the north sky illumination falls within the range of values specified herein.

Normal operation of the photo electric control shall not be affected by line voltage variations of $\pm 10\%$. Minimum operating temperature range shall be from -30 °C to 65 °C. The unit shall have a built-in surge protective device for protection from induced high voltage and follow through currents.

A time delay feature shall be incorporated as a part of the control circuit to prevent false turn-offs by transient light. The controlled lighting load shall remain on or become energized in the event of any functional failure of the photoelectric control circuit.

J. Multiple Control Switch.

The switch shall be equipped for either pole or wall mounting with all components (relays, etc.) housed in a weatherproof enclosure and designed for controlling loads up to 6000 watts. The switch shall be pre-wired complete with NEMA twist-lock receptacle for an integrally mounted photoelectric control, as specified in Subsection 820.42-I or controlled remotely by a switch. Photo electric control voltage must match multiple control switch voltage.

K. Multiple Circuit Contactor.

The contactor shall be an unenclosed single phase, two-pole open type magnetic contactor of the rating indicated. Contactors shall be constructed for surface mounting on a false back. The contactor coil shall be remotely operated by a multiple control switch as specified in Subsection 820.42-J and a photo electric control as specified in Subsection 820.42-I or controlled remotely by a switch as specified in Subsection 820.42-L, or controlled remotely by a time clock as specified in Subsection 820.42-M, as shown on the plans or specified in the Special Provisions.

L. Remote or Test Switch.

A heavy duty, single-pole tumbler switch rated at 20 amperes, encased in a heavy duty metal weatherproof housing, shall be installed in the control cabinet or lighting pole bases as a highway lighting test switch. The switch shall be rated for operation on the voltage specified for the device it controls. The switch shall be wired so as to shunt the photo electric control, multiple control switch, multiple circuit contactor or time clock and energize the lighting circuits.

M. Astronomic Time Clock.

Astronomic time switches shall be 35 amperes, double pole, single throw, heavy duty, 42° 30' North Latitude, astronomic dial street light type with high torque synchronous motor and 10 hour main spring operation to provide accurate timing during power interruptions. When power is restored after any failure, the motor shall resume timing and automatically wind the main spring.

The motor shall be designed to operate on 120/240 volts, 60 hertz, alternating current at temperature ranging from -30 °C to 65 °C.

The time clock shall have a wall mounted pressed steel case with rain-tight gasketed door cover and mounted in the load center housing.

N. Service Riser Pipe.

Galvanized steel conduit shall meet the requirements of Subsection M5.07.1A.

O. Secondary Conductors.

Secondary conductors shall conform to the requirements of Section 813.63.

P. Service Cabinet or Housing.

The housing for load center assemblies shall be a trunk type cabinet as specified in Section 815 for vehicle-actuated traffic signal controllers, and of a size to house all equipment. The cabinet shall be the product of a manufacturer with an established reputation who has designed and produced similar cabinets.

Q. Circuit Protection.

The Contractor shall furnish and install on the rear wall of the trunk type cabinet a power distribution panel. A main bus shall be provided, protected by a main and branch circuit breakers. All equipment shall be designed for the amperage, voltage and phase designated. The general arrangement of circuit breakers shall be in accordance with the circuit diagram shown on the plans. Circuit breakers shall be unenclosed molded case bolt-on type with end conductor terminals, suitable for surface mounting on a metal false back. The Contractor shall provide a chart mounted on the cabinet door identifying circuit breakers and the circuits they control.

Circuit breakers shall be of the rating shown on the plans.

R. Load Center Concrete Foundation.

The Contractor shall construct the service cabinet foundation of reinforced cement concrete as shown on the standard drawings on a 300 millimeter gravel sub-base.

S. Meter Socket.

A 200 ampere meter socket approved by the serving utility shall be furnished and installed on the service cabinet or where directed by the serving utility.

CONSTRUCTION METHODS**820.60 General.**

Details of construction shall conform to all applicable provisions of Sections listed under Subsection 820.40 and the specifications set forth hereinafter.

Highway lighting poles, area lighting poles and high mast towers shall be handled in loading, unloading and erecting in such a manner that they will not be damaged. Any parts that are damaged due to the Contractor's operations shall be repaired or replaced at the Contractor's expense.

Unless otherwise directed by the Engineer, poles or towers shall not be erected on concrete foundations until the concrete has set for at least 28 days.

All surfaces of aluminum bases in contact with cement concrete shall be field coated with an aluminum impregnated caulking compound recommended by the manufacturer of the base.

Poles and towers shall be raked sufficiently to be plumb after all loads have been placed; poles shall be raked by adjusting the two (2) nuts supplied with each anchor bolt. The mounting height shall be measured from the light source to the roadway surface directly below. The bracket arm shall be securely attached to the shaft and the pole erected with the bracket arm perpendicular to the center line of the roadway.

The Contractor shall mark on each light pole or tower, 2 meters above the roadway suitable numbers and letters 50

millimeters minimum height displaying the pole number and circuit to which it is connected.

The luminaries shall be installed on the brackets specified, parallel to the road surface or aimed as indicated on the plans, securely fastened, lamped, connected, cleaned and ready for operation.

The service riser, the service cabinet, and the concrete mat shall be installed as shown on the plans and as required by the Code. The work under this item shall include all conduit to 1.2 meters beyond the load center. The service cabinet shall be installed on the concrete mat, complete with distribution panel mounted inside. The electrical components shall be mounted with machine screws and wired as shown on the plans or as directed. All conduits in the service cabinet shall be bonded together and grounded to the cabinet with not less than #8 AWG bare copper conductors. A 20 millimeter x 4.0 meter long ground rod shall be driven in accordance with Section 813.62 and stubbed 150 millimeters above the concrete foundation. Not less than a #2 AWG bare copper grounding conductor from the neutral bus shall be run continuously to the ground rod.

Photo electric control devices shall be mounted with the light sensitive unit facing toward the north sky. Method of mounting shall be as indicated or as specified in Section 820.42-I. Control switch contactors and time clocks shall be mounted as specified herein before.

Test switches shall be mounted as specified. When mounted in lighting pole base it shall be supported on an "L" shaped galvanized steel bracket secured by anchor bolt and nut.

820.61 Tests Required Before Acceptance.

The Contractor will be required to test the entire system for continuity, grounds, resistance to ground, insulation resistance, and make provisions for high voltage dielectric strength tests, before any equipment is connected. This shall be done by means of a 500 Volt megohm-meter test which will indicate the insulation of any circuit or group of circuits. When the insulation resistance is less than 100 megohms between insulated conductor and ground (system ground point at the load center), the Contractor shall locate the point or points at fault, make proper corrections and then demonstrate by further tests the elimination of such fault. With all equipment connected to the wiring system, a functional test shall be performed by the Contractor using the system power; if not available the Contractor shall provide temporary power where and as required. The tests shall be performed in the presence of the Engineer to demonstrate that the system as a whole, and all parts thereof, function as specified or intended. Any defective materials, equipment or faulty or improper installation shall be permanently corrected by repairs or replacements to be made by the Contractor. All tests and any necessary repairs which are indicated by the tests to produce a fault-free system shall be performed at the Contractor's expense.

Operation Tests – After satisfactory completion of the required tests, the system shall be placed in operation. Final acceptance will not be made until the system has operated satisfactorily, as designed, for a period of not less than 30 days from a date designated by the Engineer. This test period shall be included within the specified contract time. Operation of the system shall not in any way be construed as an acceptance of the system, or any part of it, or as a waiver of any of the provisions of the contract. The Contractor shall be responsible for the system during this period of operation and he/she shall make any adjustments or repairs that may be required and remedy defects or damages which may occur, at his/her own expense.

Any other incidental work or materials for which no basis of payment is provided will be considered as completely covered by the unit price bid.

COMPENSATION

820.80 Method of Measurement.

Highway lighting poles, area lighting poles and high mast towers, with the specified mounting heights, bracket arm of specified length and anchor bolts; luminaries of the size and type specified; photo electric control (including test switch); multiple control switch; multiple circuit contactor; time clock; and highway lighting load center, with all necessary nuts, bolts, connectors, clamps, equipment grounding connector, and incidental material to form a complete unit shall each be measured for payment as a unit.

Highway lighting shall be measured as a complete installation and paid at a contract lump sum price.

820.81 Basis of Payment.

The lump sum price for "Highway Lighting" and "Highway Lighting Load Center" shall be full compensation for all work necessary or incidental to the construction of the highway lighting installation, modifying existing installations, or both including excavation, backfilling, compaction, concrete foundations, conduit, wiring and salvaging existing materials.

All additional materials and labor required to complete the highway lighting installation shall be considered as incidental to the construction and be included in the respective lump sum contract price. All materials shall conform to Section 800 and Division III of these specifications.

The accepted quantities of highway lighting poles, area lighting poles, high mast towers, luminaries, photo electric control (including test switch), multiple control switch, multiple circuit contactor and time clock will be paid for at the contract unit price each, for the length, type and size specified, which price shall include full compensation for anchor bolts and miscellaneous hardware.

No direct payment will be made for the following incidental materials: conduit fittings, all bolts, nuts and washers and wiring.

820.82 Payment Items.

820.10	Highway Lighting - Roadway	Lump Sum
820.11	Highway Lighting - Underpass	Lump Sum
820.12	Highway Lighting - Area	Lump Sum
820.13	Highway Lighting - Sign	Lump Sum
821.10 to 821.15	Highway Lighting Pole (Anchor Base) (* meter Bracket)	Each
821.20 to 821.25	Highway Lighting Pole (Anchor Base) Twin (* meter Bracket) *(1.2 meters - 4.5 meters)	Each
822.10 to 822.15	Highway Lighting Pole (Transformer Base) (* meter Bracket)	Each
822.20 to 822.25	Highway Lighting Pole (Transformer Base) Twin (* meter Bracket) *(1.2 meters to 4.5 meters)	Each
822.80 to 822.82	Area Lighting Hinged Pole (* meters Mounting Height) *(12 - 15 meters)	Each
822.83 to 822.88	Area Lighting Mast Pole or Tower (* meters Mounting Height) *(12 - 30 meter)	Each
822.89 to 822.98	Area Lighting Mast Pole or Tower (* meters Mounting Height) *(33 - 60 meter)	Each
823.10 to 823.14	Highway Lighting Luminaire * ___ Watt * (175-1000 Watt)	Each
823.15 to 823.21	Area Lighting Luminaire * ___ Watt * (175 - 4000 Watt)	Each
823.22	Flood Lighting Luminaire Less than 500 Watt	Each
823.23	Flood Lighting Luminaire 500 Watt and Over	Each
823.30 to 823.32	Underpass Lighting Luminaire * ___ meters Fluorescent	Each
823.33 to 823.35	Sign Lighting Luminaire * ___ meters Fluorescent *(1.2 - 2.5 meters)	Each
823.40	Sign Lighting Luminaire 175 Watt	Each
823.41	Sign Lighting Luminaire 250 Watt	Each
823.50	Photo Electric Control	Each
823.51	Multiple Control Switch	Each
823.52	Multiple Circuit Contactor	Each
823.53	Time Clock	Each
823.60	Highway Lighting Load Center	Lump Sum
823.70	Highway Lighting Pole and Luminaire Removed and Reset	Each
823.71	Highway Lighting Pole and Luminaire Removed and Stacked	Each
823.72	Highway Lighting Pole and Luminaire Removed and Transported	Each

SECTION 824

FLASHING BEACONS, ILLUMINATED WARNING SIGNS, AND LIGHTED BARRIER ARROWS

DESCRIPTION