

## 600 INCIDENTALS

### ITEM 613 - SIGN LIGHTING AND ELECTRICAL SIGNS

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**613.01 Description.** This work shall consist of furnishing and installing sign lighting or electrical sign equipment, complete, tested, and ready for service, in conformance with the specified material quality and dimensions, and at the locations shown in the plans. Installations shall be in accordance with the National Electrical Safety Code.

**613.02 Materials.** All equipment and materials furnished shall be new, of first quality, of current design, and free from defects. The equipment and materials shall comply with the National Electrical Safety Code and local codes for the area of installation. No materials furnished under this specification shall contain polychlorinated biphenyls.

All electrical parts, wire, switches and other elements of the installations shall be of ample capacity to carry the required current without excessive heating or drop of potential.

Each item of equipment shall bear a nameplate, indelible marking or brand that shall identify it as to type, model, catalog number and manufacturer.

Materials shall conform to the following:

Power service .....	713.19
Conduit, rigid .....	713.04
Conduit, flexible .....	731.08
Cable and wire.....	713.02 600 Volt
Ground rod.....	625.10
Sealing, conduit.....	625.13 Par. 7
Disconnect switch.....	713.19
Switch enclosure .....	713.19
Mercury vapor ballast .....	713.11
Photoelectric control .....	713.20
Mercury vapor luminaire.....	731.01
Mercury vapor lamp.....	713.14
Changeable message sign, lamp type.....	731.03
Changeable message sign, drum type .....	731.04
Internally illuminated sign .....	731.05
Sign flasher assembly.....	731.06
School speed limit sign assembly.....	731.07
Ballast wiring enclosure .....	731.09
Timer with enclosure .....	731.10

**613.03 Working Drawings.** The requirements in Section 625.04 for working drawings shall apply.

**613.04 General, Sign Lighting.** Overhead sign lighting shall be by mercury vapor luminaires, and electric power shall be integrated with roadway lighting circuits.

Wire and cable shall be protected by installation entirely within support structure interiors, enclosures, junction boxes, and rigid or flexible conduit. Methods, materials and locations of splicing and methods of connecting and identification of wire and cable shall conform to the requirements of Items 625, 713 and the plans. Grounding systems shall be provided in accordance with Section 625.10 and will be paid for separately.

**613.05 Power Service.** Power service shall be furnished and installed when specified. Power service shall include all necessary equipment, devices and material to provide a complete service unit conforming to Sections 625.18, 713.19 and plan details. Power service shall be furnished and paid for under Item 625.

**613.06 Sign Service.** Sign service shall consist of all cable and other equipment to provide a complete electrical service from either an underground or overhead source to the disconnect switch.

Sign service cable from a pullbox shall be routed to the switch enclosure for overhead supported signs by means of underground conduit, foundation conduit ell, and the interior of the structural member supporting the enclosure. Service for overpass structure mounted signs shall be routed through underground and structure attached conduit terminating at a switch enclosure. The conduit shall be attached by 0.02 inch (0.5 mm) thick by 3/4 inch (19 mm) wide passivated stainless steel straps spaced at intervals of not more than 5 feet (1.5 m) and attached with machine bolts and double wedge type expansion anchors or studs set in the structure concrete with epoxy. Sign service shall include trenching, conduit, fittings, backfilling, and cable.

Sign service cable from a distribution system direct drop shall be routed to the switch enclosure by means of a conduit riser with weatherhead. The sign service shall include cable, conduit riser and fittings, weatherhead, and other hardware necessary to complete the installation. A drip loop shall be formed into the cable. The weatherhead shall be of cast aluminum or galvanized ferrous metal and shall be of threaded design. The conduit shall be attached by straps as described in the foregoing paragraph.

Cable for sign service shall be single conductor stranded copper. When the connection is to highway lighting distribution and circuit cable, the cable for sign service shall be the same. In other applications, sign service cable shall be rated at 600 volts minimum and not smaller than Number 4 AWG.

**613.07 Signs Wired.** Signs wired shall complete the electrical system from the disconnect switch to the luminaires and the remote located ballast wiring enclosure, and shall consist of wiring, connectors, junction boxes, rigid or flexible conduit, conduits, conduit clamps and miscellaneous hardware.

Wiring shall be continuous from the disconnect switch to a junction box mounted on the sign support or overpass structure. Installation of the junction box shall permit sign removal as a unit by the disconnection of the wires and the removal of sign attachment hardware. A junction box shall be installed for each sign. Wiring shall be continuous from the junction box to the first luminaire and continuous between additional luminaires.

Wire shall be 600 volts rated, single conductor and not smaller than Number 10 AWG.

Wire routing on overhead sign supports shall be from the disconnect switch enclosure through structural member interiors. Wire hanging within the interior of steel vertical members shall be supported by looping over the J-hook provided. After completion of wiring in the disconnect switch enclosure, the nipple in the enclosure back shall be sealed in accordance with Section 625.13.

Flexible or rigid conduit on the sign structure or lighting support arms shall be assembled with conduits and attached to structure by clamps located within 6 inches (152 mm) of each conduit end and separated by not more than 24 inches (610 mm).

**613.08 Disconnect Switch with Enclosure.** Lighted signs shall be provided with a disconnect switch within a lockable, weatherproof enclosure. The switch shall be a two-pole (minimum), single-throw, fused safety disconnect type, rated at 600 volts, 30 amperes with the fuse size as specified. A solid neutral bar shall be provided. The enclosure shall be stainless steel NEMA ICS 1-110.15 Type 4. Space for a chase nipple shall be available in the enclosure back. The hole for the nipple shall be field drilled through the enclosure and the nipple installed. Enclosures shall also have a 1/4 inch (6.4 mm) diameter weep hole located in the bottom surface.

Each enclosure shall be furnished with at least one padlock. Padlocks shall have a bronze or brass lock body and a corrosion protected steel shackle. All padlocks for a project shall be keyed alike to use a master 2396 key.

Each enclosure shall also conform to Ohio Department of Transportation Standard Drawing TC-32.10, Switch Enclosure, Type X.

**613.09 Switch Enclosure Mounting Bracket Assembly.** Bracket assemblies when separately specified shall be furnished and installed on existing overhead sign supports or on concrete structure and shall consist of all parts necessary for mounting an enclosure. Bracket assemblies shall be of steel galvanized in accordance with Section 711.02 or aluminum, and shall include two brackets, necessary field drilling and hardware.

**613.11 Ballast.** Ballasts shall be located integral with the luminaire. When remote ballasts are called for on the plan, they shall be located on a wiring enclosure on the support pole or end frame. Ballast housings shall be weatherproof and of corrosion resistant materials.

Ballast types shall also conform to Ohio Department of Transportation Standard Drawing TC-31.21.

**613.111 Ballast Wiring Enclosure.** A ballast wiring enclosure shall be provided to mount ballasts for luminaires. Ballasts shall be mounted on the enclosure in the same relative position as their associated luminaire on the sign support.

Ballast wiring enclosures shall also conform to Ohio Department of Transportation Standard Drawing TC-32.10.

**613.112 Ballast Wiring Enclosure Mounting Bracket.** Brackets shall be furnished and installed on existing overhead supports and concrete structures and shall include necessary attachment work and hardware. Brackets shall be steel, galvanized in accordance with Section 711.02, or aluminum.

**613.12 Photoelectric Control.** Photoelectric controls shall be furnished when sign lighting is fed by uncontrolled circuits.

**613.121 Timer with Enclosure.** The timer with enclosure shall be furnished and installed to provide automatic school speed limit sign operation and shall conform to Section 731.10.

**613.13 Mercury Vapor Luminaire.** Mercury vapor luminaires shall include a lamp of the wattage specified.

**613.15 Electrical Signs.**

(a) Changeable message signs shall consist of the following designs unless otherwise specified:

- (1) lamp type,
- (2) light emitting diode type,
- (3) fiber optic type,
- (4) light reflecting type,
- (5) hybrid type,
- (6) drum type.

Line units of these types may be used as inserts in a panel sign, used singly, or grouped to provide a multi-line sign.

(b) Internally illuminated signs shall be of the single or double faced type. The signs may be mounted by span wire, mast arm, pedestal top or pole type bracket arms. Suspended signs shall hang plumb and shall be properly oriented and locked in place.

(c) Sign flasher assemblies shall consist of a pair of flashing beacons and source of illumination for a sign face. Incandescent lamps shall be included. The sign, support and foundation are furnished under other items.

(d) School speed limit sign assemblies shall consist of a reflectorized sign fitted with a pair of flashing beacons and an internally illuminated speed limit display unit and shall include equipment to operate and control the sign. Mounting parts and incandescent lamps shall also be included.

**613.16 Removal, Storage or Re-erection of Sign Lighting Equipment and Electrical Signs.** Sign lighting equipment (such as luminaires, disconnect switches, or ballasts) and electrical signs shall be carefully removed and stored on the project for salvage by the City or shall be reerected elsewhere on the project. Luminaires to be reerected shall be cleaned and restored to an operating condition, fitted with new lamp boots, relamped with the proper type and size lamp and provided with new hardware.

**613.17 Inspection and Testing.** Sign lighting systems and electrical signs shall meet all requirements of the ground, cable insulation, and performance tests specified in Section 1000.18. Failure of lamps, ballasts and transformers during the performance test shall be corrected by replacement of the faulty component but will not require restart of the entire test period.

During the performance test, final adjustment shall be made to sign lateral position and aiming angles of luminaires to eliminate excessive brightness and glare, and to obtain optimum sign face reflected brightness, uniformity of illumination, visibility and legibility, to the satisfaction of the Engineer.

**613.18 Method of Measurement.** Measurement will be made for specific items, furnished and in place, complete and accepted, in accordance with the following:

Sign service shall be measured as complete units for each support, and will include conduit, fittings, cables, trenching and backfilling.

Signs wired will be measured as complete units of wiring for each individual sign, and will include junction boxes, rigid or flexible conduit, conduits, clamps, wires and miscellaneous hardware.

Disconnect switches with enclosure will be measured as the number of each, and will include field drilling, mounting hardware and padlocks.

Switch enclosure mounting bracket assemblies will be measure as the number of each, including two brackets, field drilling and hardware.

Mercury vapor luminaires will be measured as the number of each, and will include lamps and luminaire attachment hardware.

Changeable message signs will be measured as the number of each, and will include displays, controls and auxiliary components.

Internally illuminated signs will be measured as the number of each, and will include lamps, ballasts and support hardware.

Sign flasher assemblies will be measured as the number of each, and will include sign lighting fixtures, beacons, flasher control unit with enclosure, lamps, and mounting hardware.

School speed limit sign assemblies will be measured as the number of each, and will include sign, speed limit display, beacons, flasher control unit with enclosure, lamps and attachment members. Timer with enclosure will be measured as the number of each and will include field drilling, mounting hardware and padlocks.

Ballasts, ballast wiring enclosures, ballast enclosure mounting brackets, and photoelectric controls will be measured as the number of each.

Removal and storage or removal and re-erection of sign lighting equipment or electrical signs will be measured as the number of like items removed and stored or re-erected.

**613.19 Basis of Payment.** Quantities of specific items measured as provided above, in place, complete, tested and accepted will be paid for under:

<b>Item</b>	<b>Unit</b>	<b>Description</b>
613	Each	Sign Service
613	Each	Signs Wired
613	Each	Signs Wired, Overpass Structure Mounted
613	Each	Disconnect Switch with Enclosure, Type x
613	Each	Switch Enclosure Mounting Bracket Assembly
613	Each	Ballast (Integral or Remote), Type ____
613	Each	Ballast Wiring Enclosure, Type ____
613	Each	Ballast Wiring Enclosure Mounting Bracket
613	Each	Photoelectric Control
613	Each	Mercury Vapor Luminaire, Type _____, With _____ -Watt Lamp
613	Each	Changeable Message Sign, Electrical Type (Limited Message, Unlimited Message)
613	Each	Changeable Message Sign, Drum Type.
613	Each	Internally Illuminated Fixed Message Sign, Type _____
613	Each	Sign Flasher Assembly
613	Each	School Speed Limit Sign Assembly, _____ Inches x _____ Inches
613	Each	Timer with Enclosure
613	Each	Removal of (Luminaire, Disconnect Switch, Ballast, etc.) and (Storage or Re-Erection)