

SECTION 02740

SIGNAL HEADS

02740.01 GENERAL

A. Description

This work shall consist of pickup, assembly and installation of MSHA furnished signal heads and mounting hardware or furnishing and installing signal heads and mounting hardware of the type and size shown on the Plans and in accordance with the Contract Documents or as directed by the County Engineer.

B. Related Work Included Elsewhere

1. General electrical work; Section 02730.
2. Electrical cable, wire, and connectors; Section 02735.
3. Miscellaneous metals; Section 05500.
4. Painting; Section 09900.

C. Quality Assurance

The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.

D. Submittals

The following shall apply only if the material is not furnished by the MSHA Office of Traffic and Safety;

1. Shop Drawings

Shop drawings shall be submitted as specified in the "General Provisions" for all signal heads. The shop drawings shall include general product information, dimensional data, mounting procedures, wiring diagrams, parts list, and such other information as is specified in Section 02730.01 or as may be required to verify compliance with these Specifications.

2. Certificates of Compliance

Certificates of compliance shall be submitted as specified in the "General Provisions" for all signal heads stating that the materials furnished meet the requirements of the latest Institute of Traffic Engineer's (ITE) specifications and standards.

02740.02 MATERIALS**A. Materials Furnished by the County**

The County will not furnish any material for signal heads. The contractor is responsible for the cost of MSHA furnished signal heads and mounting hardware.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

All hardware shall be corrosion resistant and compatible with the item being installed. Signal heads and all necessary mounting hardware shall be produced by the same manufacturer.

1. Electrical Cable

Electrical cable shall meet the requirements of Section 02735.02.

2. Signal Heads and Mounting Hardware

All traffic signal heads and mounting hardware shall be furnished by or as approved by the MSHA Office of Traffic and Safety.

02740.03 EXECUTION**A. General**

Traffic signal heads shall be installed as shown on the Plans or as directed by the County Engineer.

B. Signal Heads

Signal heads on poles or pedestals shall be setback a minimum of 2 feet behind the face of the curb.

C. Aiming

Signal heads shall be aimed in conformance with the MUTCD.

D. Repairing

The finish of the signal heads and mounting hardware damaged during transportation and erection shall be repaired to match the original finish by and at the contractor's expense. The repairs will be approved by the County Engineer.

02740.04 METHOD OF MEASUREMENT

RESERVED FOR FUTURE USE

SIGNAL HEADS

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02740.05 BASIS OF PAYMENT

RESERVED FOR FUTURE USE

SECTION 02741

TRAFFIC SIGNAL ELECTRICAL CONDUIT

02741.01 GENERAL

A. Description

Traffic signal electrical conduit installation shall include, but not necessary be limited to, furnishing and installing electrical conduit for traffic signals of the types and sizes specified at locations shown on the Plans and in accordance with the Contract Documents or as directed by the County Engineer.

B. Related Work Included Elsewhere

1. Trench excavation, backfill, and compaction; Section 02250.
2. Patching paving; Section 02680.
3. General electrical work; Section 02730.
4. Electrical conduit and fittings; Section 02731.
5. Precast electrical handboxes; Section 02732.
6. Electrical pull and junction boxes; Section 02733.
7. Concrete foundations; Section 02734.

C. Quality Assurance

The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.

D. Submittals

Certificates of compliance shall be submitted in accordance with the "General Provisions" for traffic signal electrical conduit stating that the conduit meets the requirements specified in Section 02741.02.

02741.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for traffic signal electrical conduit.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

Metallic conduit shall conform to Section 921.07.01 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

02741.03 EXECUTION

A. General

Unless otherwise shown, conduits shall be placed a minimum depth of 18 inches below grade and shall slope at a minimum rate of 6 inches per 100 feet of length.

B. Fittings

Change in direction of conduit shall be accomplished by use of standard bends, elbows, or by bending the rigid steel conduit. Steel conduit, if bent, shall have a uniform radius which will fit the location with a minimum radius of six times the internal diameter of the pipe. Sharp kinks in the conduit or the substitution of nonmetallic materials for rigid steel conduit will not be accepted.

Nipples shall be used to eliminate cutting and threading where short lengths of conduit are required. When it is necessary to cut and thread steel conduit, no exposed threads will be permitted. All conduit fittings shall be free from burrs and rough places, and all conduit runs shall be cleaned and swabbed before cables are installed.

Standard manufactured elbows, nipples, tees, reducers, bends, couplings, unions, etc. of the same materials and treatment as the straight conduit pipe shall be used throughout the conduit line. All fittings shall be tightly connected to the conduit. All conduit runs ending in a pull box, junction box, or handbox shall be provided with a bushing to protect the cable from abrasion. Open ends of conduit being placed for future use shall be capped.

C. Installation

Trenches for traffic signal conduit shall be excavated to the depth and at locations shown on the Plans. Trenching and backfill shall be in accordance with Sections 02250.03 and 02734.03.

All conduit to be placed under existing pavement shall be pushed. Pushed conduit shall be placed by jacking, boring, or other means approved by the County Engineer without cutting or removing pavement.

When existing field conditions will not permit conduit to be pushed under existing pavement, an item for slotting the pavement and paved shoulders will be provided. The slot shall be constructed to the dimensions shown on the Plans. The slot shall be constructed to neat lines, and the bottom shall be smooth. After the excavation has been approved by the County Engineer, the conduit shall be placed and the trench backfilled with materials matching those existing in place, or as shown on the Plans, and then finished to a smooth surface matching existing grade in accordance with Section 02250.03.

02741.04 METHOD OF MEASUREMENT

RESERVED FOR FUTURE USE

02741.05 BASIS OF PAYMENT

A. General

RESERVED FOR FUTURE USE

B. Traffic Signal Electrical Conduit

RESERVED FOR FUTURE USE

SECTION 02742
LOOP DETECTORS

02742.01 GENERAL

A. Description

Loop detector installation shall include, but not necessarily be limited to, furnishing and installing loop detector wires and leads , including saw cuts and sealer, within and alongside the roadway, between the detector location and the nearest terminal point as shown on the Plans and in accordance with the Contract Documents or as directed by the County Engineer.

B. Related Work Included Elsewhere

1. General electrical work; Section 02730.
2. Electrical cable, wire, and connectors; Section 02735.

C. Quality Assurance

1. The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.
2. All loops shall be tested for continuity by a method approved by the County Engineer before sealing.

D. Submittals

1. Shop Drawings

Shop drawings shall be submitted as specified in the "General Provisions" for all loop detector wire which shall include general product information.

2. Certified Test Results

Certified test results shall be submitted for the loop detector sealer showing that the material meets the requirements specified in Section 02742.02.

02742.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for loop detectors.

B. Contractor's Options

None.

C. Detailed Material Requirements**1. Loop Detector Lead-In Cable**

Loop detector lead-in cable shall be two conductor, No. 14 AWG, PE jacketed conforming to IMSA specifications 50-2.

2. Loop Detector Wire

Loop detector wire shall be single conductor, 600 Volts, No. 14 AWG, 19 strand wire in a flexible PE tubing.

3. Sealer for Loop Detector

Sealer material to seal saw cuts for loop detector wires shall conform to Section 911.06 of the "MSHA Standard Specifications for Construction and Materials, (1993)".

02742.03 EXECUTION**A. Saw Cuts**

The detector loop shall be installed in a sawed slot 3/8" Wide x 1 3/4" to 2" Deep cut in the roadway surface. A 1 1/4" diameter drilled hole shall be made in the pavement at each intersection of saw cuts to prevent sharp bends of the wire. The intersection of saw cut shall overlap so that the slots have full depth and a smooth bottom. When installing the detector loop, the weather shall be clear and dry and the sawed slot shall be completely clean of dust and debris and thoroughly dried. Saw cutting of curbs and gutters will not be permitted.

B. Loop Detector Wire and Loop Detector Lead-in

Prior to installation of loop wires, the road surface shall be free of any saw cut debris and be dry.

Loop detector wire cable, shall be twisted five turns per foot from the loop itself to the terminal point as shown.

Loop Lead-in wire shall be installed in conduit as shown on the Plans, between the roadway edge and the terminal point.

Loop wire shall be installed at the bottom of the saw cut. A blunt instrument shall be used to seat the loop detector wire at the bottom of the saw cut. No sharp tools shall be used for this purpose. The wire shall have no kinks or curls and no straining or stretching of the insulation around the corner of the slot or in the handbox or pole base.

Wire with cuts, breaks, or nicks in the insulation will not be accepted. All loops shall be wound in a counterclockwise direction.

After placing the wire, it shall be rechecked for slack, raised portions, and tightness.

C. Sealer

The sealer shall be applied according to the manufacturer's directions and specifications.

The sealer shall not be poured into clean, dry saw cuts when the roadway surface temperature is below 35^of. The sealer shall not be poured during precipitation of any kind. The saw cut shall not be sealed until electrical testing is performed as specified in Section 02730.

In applying the sealer, the Contractor shall ensure that there is minimum spillover on the roadway along the saw cut.

When the sealer hardens, there shall be a smooth surface with no bulges or depressions.

The Contractor shall make certain that the sealer is hardened before allowing traffic to move over the area.

02742.04 METHOD OF MEASUREMENT**A. Loop Detector Cable**

RESERVED FOR FUTURE USE

B. Saw Cuts

RESERVED FOR FUTURE USE

02742.05 BASIS OF PAYMENT**A. General**

RESERVED FOR FUTURE USE

B. Loop Detector Cable

RESERVED FOR FUTURE USE

C. Saw Cuts

RESERVED FOR FUTURE USE

SECTION 02743

LOOP DETECTOR AMPLIFIERS

02743.01 GENERAL

A. Description

Loop detector amplifiers shall include, but not necessarily be limited to, furnishing and installing loop detector amplifiers in base and/or pole mounted cabinets as shown on the Plans and in accordance with the Contract Documents or as directed by the County Engineer. All loop detector amplifiers shall be capable of delay output, and all amplifier wiring harnesses shall be wired to accommodate the delay function.

B. Related Work Included Elsewhere

1. General electrical work; Section 02730.
2. Loop detectors; Section 02742.

C. Quality Assurance

1. The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.
2. All equipment and material shall be covered by a manufacturer's warranty for a period of 2 years minimum.

D. Submittals

1. Shop Drawing

Shop drawings shall be submitted as specified in the "General Provisions" for all loop detector amplifiers. The shop drawings shall include general product information, parts lists, wiring diagrams, and installation instructions.

2. Certificates of Compliance

Certificates of compliance shall be submitted as specified in the "General Provisions" for all amplifiers stating that the units meet all the requirements specified in Section 02744.02.

02743.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for loop detector amplifiers.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

All sensor units, control units, and amplifiers shall meet the requirements of the National Electrical Manufacturers' Association.

02743.03 EXECUTION

A. General

Loop detector amplifiers shall be installed in controller cabinets at locations shown on the Plans in accordance with NEMA specifications and the manufacturer's recommendations.

02743.04 METHOD OF MEASUREMENT

RESERVED FOR FUTURE USE

02743.05 BASIS OF PAYMENT

RESERVED FOR FUTURE USE

SECTION 02744
SIGNAL HANDBOXES

02744.01 GENERAL

A. Description

Signal handboxes shall include, but not necessarily be limited to, furnishing and installing handboxes as shown on the Plan and in accordance with the Contract Documents or as directed by the County Engineer.

B. Related Work Included Elsewhere

1. Concrete foundations; Section 02734.
2. Portland cement concrete; Section 03310.

C. Quality Assurance

The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents and the following:

1. When the cover is pushed to its maximum sideways position, the resultant opening between frame and cover shall be less than 5/16 inch and greater than 1/8 inch.
2. Units shall not be accepted if the cover projects more than 1/16 inch above the frame or is recessed more than 1/16 inch below the frame for more than one third of the perimeter.

D. Submittals

Shop drawings shall be submitted as specified in the "General Provisions" for all signal handbox components. The shop drawings shall show the overall dimensions of the handboxes and shall include information and/or details on concrete, brick, block, and frames and covers.

02744.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any material for signal handboxes.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

Handboxes shall be traffic bearing and constructed of cast-in-place concrete, brick, precast concrete, or concrete block.

1. Portland Cement Concrete

Portland cement concrete for signal handboxes shall be Mix No. 2 as specified in Section 03310.

2. Frames and Covers

Frames and covers shall meet the requirements of AISC 1020 steel.

3. Bolts

Bolts shall meet the requirements of ASTM A276, Type 304.

4. Brick

Brick shall conform to AASHTO M91, Grade MS.

5. Precast Concrete

Precast concrete shall conform to AASHTO M199.

02744.03 EXECUTION

Handboxes shall be installed flush to drain with the finished grade. Concrete shall be mixed, placed, and tested in accordance with Section 03310. Excavation and backfill shall be in accordance with Section 02734.

When handboxes are installed in sidewalks, the sidewalk shall be removed and reinstalled to the nearest joint.

Any spaces between the conduit and the handbox wall shall be filled or patched with concrete or other sealer approved by the County Engineer. Handbox frames shall be set in a mortar or concrete bed as shown in the Contract Documents.

02744.04 METHOD OF MEASUREMENT

RESERVED FOR FUTURE USE

02744.05 BASIS OF PAYMENT

RESERVED FOR FUTURE USE

SECTION 02745

PUSH BUTTONS

02745.01 GENERAL

A. Description

Push buttons shall include, but not necessarily be limited to, furnishing and installing pedestrian push buttons and the installation of push button signs as shown on the Plans and in accordance with the Contract Documents or as directed by the County Engineer.

B. Related Work Included Elsewhere

1. General electrical work; Section 02730.
2. Signal structures; Section 02750.

C. Quality Assurance

The County Engineer will inspect all materials and work to ensure compliance with the Contract Documents.

D. Submittals

Shop drawings shall be submitted as specified in the "General Provisions" and Section 02730.01 for all hardware.

02745.02 MATERIALS

A. Materials Furnished by the County

The County will not furnish any materials for push button installation and push-button signs. The Contractor is responsible for the cost of the MSHA furnished push buttons and push button signs.

B. Contractor's Options

Not applicable.

C. Detailed Material Requirements

1. Hardware

All hardware shall be corrosion resistant material compatible to the item being installed.

PUSH BUTTONS

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2. Push-Button and Push Button Signs

Push-button and push button signs will be furnished and conform to the MSHA Office of Traffic and Safety.

02745.03 EXECUTION

Push buttons shall be installed where shown on the Plans or at other locations as directed by the County Engineer.

Push buttons shall be located in positions that clearly indicate to the pedestrian which crosswalks are actuated by each push button as shown on the plans.

The contractor shall drill holes to provide cable and wire entrances for cable and wire in conformance with Section 02735 and the Contract Documents.

Splicing of cable will not be permitted.

02745.04 METHOD OF MEASUREMENT

RESERVED FOR FUTURE USE

02745.05 BASIS OF PAYMENT

RESERVED FOR FUTURE USE