

**403.00        TRAFFIC SIGNALS** (*SSHC Sections 409, 410, 411 and 1073*)

**403.01        GENERAL**

The following items should be emphasized during the construction of a typical traffic signal. Although most of these items are covered in the Plans, Special Plans, Special Provisions, and in Division 400 and Section 1073 of the Standard Specifications, they are sometimes overlooked, causing problems for the contractor and the Project Manager.

**403.02        PRE-CONSTRUCTION CONFERENCE**

**Remind Contractors**

Preformed loops **MUST** be under the pavement, sawed loops are not an alternative (per Detector Plan).

Submit wire samples to Materials & Tests early, get approval before installation.

Order the poles early, lead time is 11-15 weeks.

**403.03        PRELIMINARY STAKING**

Stake poles according to plan but avoid utilities. If poles are relocated, make sure mast arms are long enough to center signal heads in their appropriate lanes.

In urban areas there should be a minimum of 1.0 m (3 foot) clearance between the curb and the pole. In rural areas there should be a minimum of 2.0 m (6 foot) clearance between the edge of pavement and the pole.

Call Traffic Engineering (402-479-4594) if the poles must be moved more than 600 mm (2 feet).

**403.04        SAW CUT LOOP LOCATION**

Avoid crossing cracks and joints when locating loops. The exact size and shape of the loop is not critical. Keep the loops in the vehicle path and keep the spacing between the loops in a lane under 3.0 m (10 feet).

Call Traffic Engineering (402-479-4594) for locating the loops if there are any questions.

**403.05        TEMPORARY SIGNAL**

It is the contractor's duty to construct, maintain, and remove the signal.

If the project involves construction phasing which requires shifting traffic and moving heads and poles etc., the contractor shall do this at no additional cost. (per Special Provisions).

#### **403.06 ELECTRICAL POWER**

Arrange for electrical service early in the project, especially in larger cities like Lincoln and Omaha.

#### **403.07 STATE SUPPLIED MATERIAL**

Project Manager should check to make sure state supplied material has been shipped to the designated yard 4 weeks before construction. Check stock requisition for back ordered items. Call Traffic Engineering if anything is missing.

#### **403.08 SAFETY**

Make sure the contractor's vehicles and equipment are not blocking the view of motorists using the intersection during construction.

#### **403.09 ITEMS TO CHECK WHEN INSTALLING**

##### **POLE FOUNDATIONS**

The foundation must include a ground rod, a spare conduit and a conduit for lighting. (per Standard Plan 910)

##### **PULL BOXES (per Standard Plan 914)**

Conduit ends must have bell ends.

Gravel must be 300 mm (1 foot) deep in the bottom of the pull box.

Specified pull box lids must be grounded.

Splices in the pull box must be raised off the bottom of the pull box. (per Wiring Diagram)

##### **LOOPS, PREFORMED**

Remind the contractor to install preformed loops BEFORE paving. Sawing in the loops after paving will not be accepted. We will require the contractor to remove the pavement to a joint, place the loops in the subgrade and replace the pavement if they forget, NO EXCEPTIONS. (per Detector Plan)

Remind the contractor to protect and mark the leads to the preformed loops so they are not damaged during adjacent paving.

##### **LOOPS, SAWED**

The saw slot must be 9 mm (3/8 inch) wide, 19 mm (3/4 inch) wide at cracks and joints to allow for the joint tube. (per Detector Plan)

## MAGNETIC DETECTORS

Handle magnetic detector leads gently where they join the detector.

If the magnetic detector serves one lane, place the detector under the right wheel track. If the detector serves 2 lanes, center the detector between the two lanes.

The conduit housing the detector should slope to drain into the pull box. (per Detector Plan)

## POLES (per Standard Plan 912)

The pole bases must be double nutted so the pole can be plumbed.

The pole bases for towers should not be grouted. The pole bases for galvanized steel poles may be grouted at the Project Manager's discretion to prevent rodent damage to wires.

The ground wire must be attached to the nut in the pole behind the handhole and to the ground rod in the pole foundation.

## MAST ARMS (per Standard Plan 912)

Wait until the signal is turned on to install the set screw in the clamp of the mast arm, to allow for adjustment of the arm at the time of turn on. The minimum clear height under the signal head must be 5.33 m (17' 6") to the crown of the roadway.

## WIRING

Span wire signal installations shall be wired with stranded wire.

All splices must be made with the specified splice kit. (per Wiring Diagram)

Be sure wires are not damaged when they are stripped for splicing. Check several of the splices by bending the entire splice back and forth to see if the wire breaks, especially where the stripping of the wire starts. Check to make sure the wire insulation has not been cut where the cable sheathing has been removed. This can also be done by bending the wires.

Splices are not allowed in a cable from the controller to the cables final destination. Wire the loop detectors for an approach in series, not in parallel.

Holes in poles and mast arms must be protected with rubber grommets prior to pulling wire. Be sure wires are not skinned or damaged while being pulled. (per Standard Plan 912)

Do not use spade lugs on solid wire, use spade lugs on stranded wire.

## CONTROLLER

Wires must be labeled as shown on the wiring diagram using the specified method. Examples: Loop 20, NE Pole. (per Wiring Diagram)

All conductors pulled into the cabinet must extend 1.5 m (5 feet) beyond the end of the conduit housing them. (per Wiring Diagram)

Pole mounted cabinets should be mounted 1.83 m (6 feet) to 2.0 m (6.5 feet) to the top of the cabinet. (per Standard Plan 912)

The conduit LB fitting under a pole mounted cabinet must be 62 mm (2.5 inches) or larger.

A ground rod must be installed in the concrete pad of all pad mounted controllers.

Pad mounted controllers must contain one spare conduit.

Make sure the cabinet doors swing as shown on the installation plans.

### TRAFFIC SIGNAL HEADS

The minimum spacing between heads (center to center) must be at least 3.0 m (10 feet). (per Installation Details)

The backplates and heads must be mounted PLUMB, not aiming downward. Be sure the lenses are installed right side up.

The backplates must be one piece and vacuum formed.

Cover the signal heads with an opaque material prior to turn on so motorists are not confused.

The minimum clear height under the signal head must be 5.33 m (17' 6") to the crown of the roadway.

The bulbs must be of the specified wattage and type. The contractor should have spare bulbs on the job.

### PEDESTRIAN HEADS

Mount the pedestrian heads as shown on the plans, not on the street side of the pole.

The bulbs must be of the specified wattage and type. The contractor should have spare bulbs on the job.

Pedestrian heads must be mounted 3.0 m (10 feet) to the bottom of the head.

### PED PUSHBUTTONS

Pushbuttons must be mounted on the correct side of the pole as shown on the plans.

The pushbutton signs must be worded as shown on the shop drawings with the arrow pointing in the proper direction.

#### **403.10 FINAL SIGNAL TURN ON**

Call Traffic Engineering (402-479-4594) at least 2 days before turn on, try to avoid turning the signal on Fridays, signal failures usually occur in the first few days.

Prior to requesting a turn on:

The power service must be installed and energized.

Each signal head and ped head must be "flashed out" by the contractor to check for short circuits and to assure that each wire really does service the assigned signal head.

Check each loop wire in the cabinet for continuity.

Arrange with the District or local jurisdiction for STOP sign removal when the signal is turned on.

"Signal Ahead" signs must be installed.

Arrange for flagging by the police/State Patrol at turn on, if required.