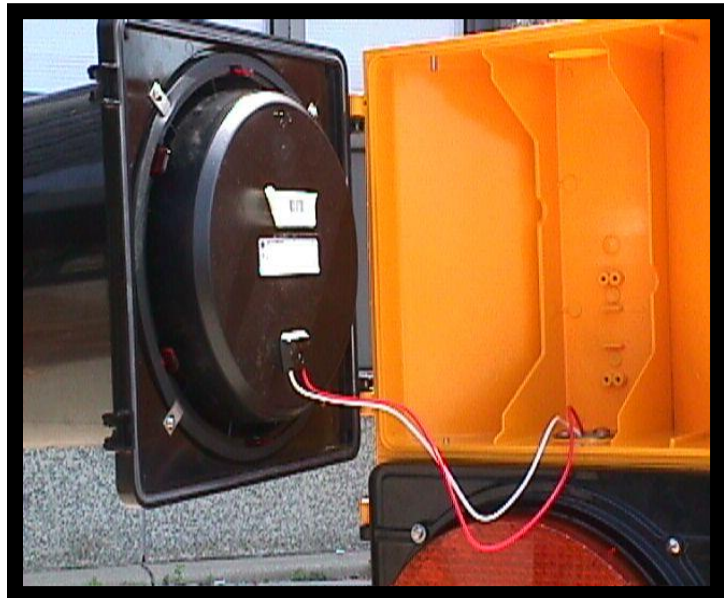


SIGNAL HEADS

All signal heads must be Standard ITE poly-carbonate signal heads. Standard ITE vehicle signal heads must utilize Light Emitting Diodes (LED) units. The vehicle signal heads and LED units must be listed on the Mn/DOT Approved Products List for Signals. All the signal heads furnished at one intersection must be made by the same manufacturer.

The electrical and optical system of each signal head must operate on a nominal 120 volt power supply.





A background shield (or backplate) must be dull non-reflective black and attached to a vehicle signal face as specified in the contract documents. The bottom of a background shield that is attached to a vehicle signal face mounted directly above a pedestrian signal head must not be cut.

The visors must be of the tunnel type, finished dull non-reflective black and enclose approximately 80 percent of the lens circumference.

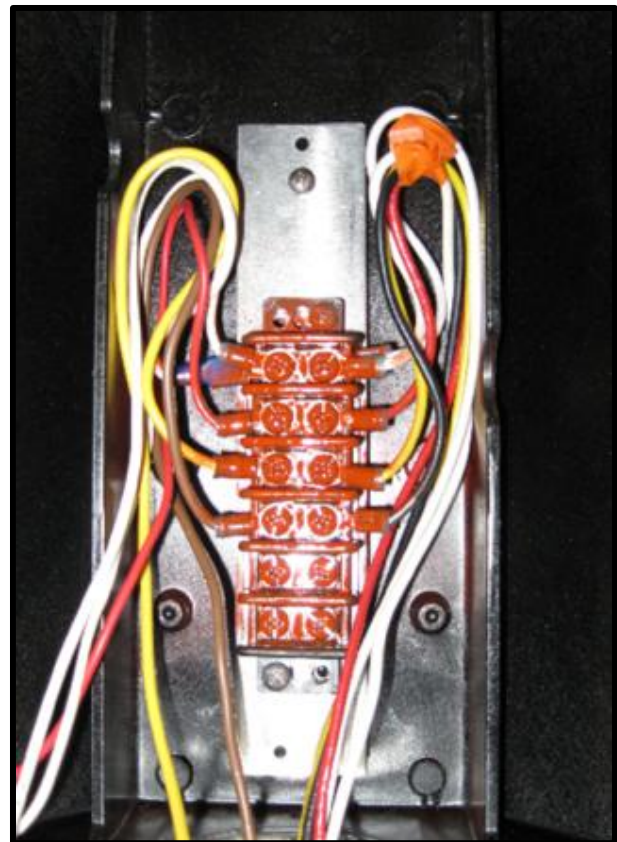


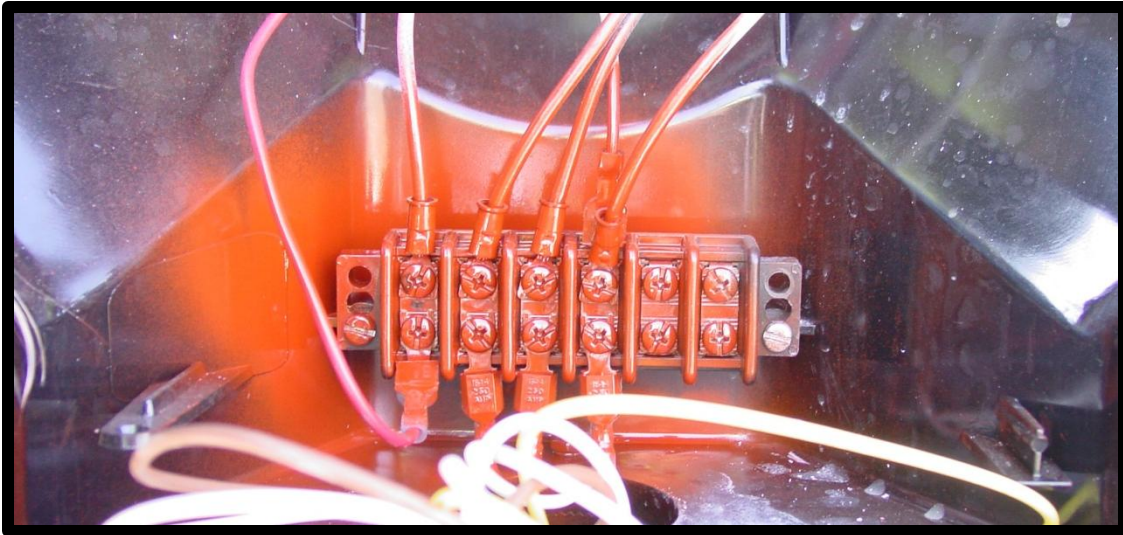


The LED unit must be a Mn/DOT approved LED unit as listed on the Mn/DOT Approved Products List for Signals.

A terminal block must be provided and securely fastened to the inside of one of the housings of the signal head for connecting the conductors. The conductors from each indication must be run independently to the terminal block and must not be bound together into a cable. The conductors must not be spliced from the indication to the terminal block in the signal head.

For vertically mounted terminal blocks termination of the signal control cable running from the pole base into signal face shall be terminated with the spade lug mounted horizontally and a loop of wire extending up from the terminal block at least 3 inches above the block and then a loop back down to exit the head for termination in the pole base.

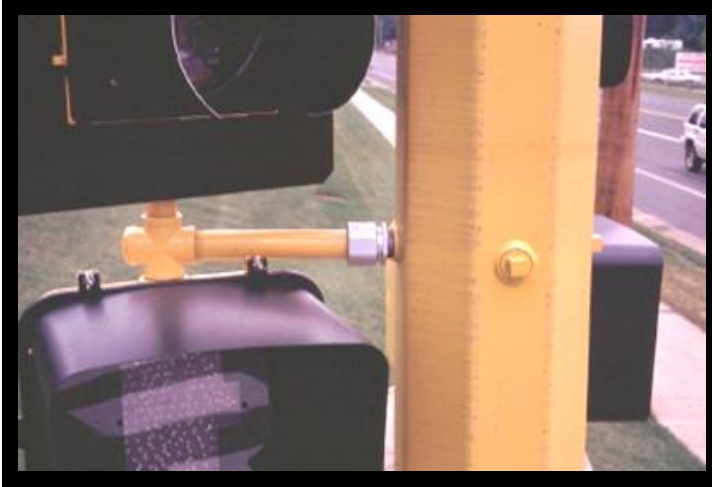




For horizontally mounted terminal blocks termination of the signal control cable running from the pole base into signal face shall be terminated with the forks of the spade lug pointing down.

After the conductors have been properly terminated the entire terminal block and the spade lugs shall be sprayed with a Mn/DOT approved pole base terminal block coating as listed on the Mn/DOT Approved Products List (APL).

EXISTING SIGNAL SYSTEMS



Pole mounted signal heads mounted on the mast arm pole must utilize a 1½ inch (38 millimeter) half coupling that is welded to the mast arm pole shaft (one on each side), 10 feet (3.5 meters) above the pole foundation. The supporting pipe may utilize a three piece coupling between the signal head and the pole shaft.

A support pipe, with an ornamental pole clamp, must be installed on the top of the pole. The clamp must be fastened to the shaft with 3/4 inch (19 mm) stainless steel banding and clip.



If a pedestrian signal head is mounted on the bottom side of the signal head a cross fitting and another supporting pipe with tee and ornamental pole clamp must be used and the clamp banded to the shaft.

NEW SIGNAL SYSTEMS

New signal systems will require that the Contractor furnish and install angle mounts for the installation of vehicle and pedestrian signal faces on mast arm pole standards.



New signal systems will require the Contractor to furnish and install straight mounts for the installation of vehicle and pedestrian signal heads onto pedestal shafts.



The Contractor must utilize a manufactures specific installation tool to install one way mounts onto pedestal shafts.

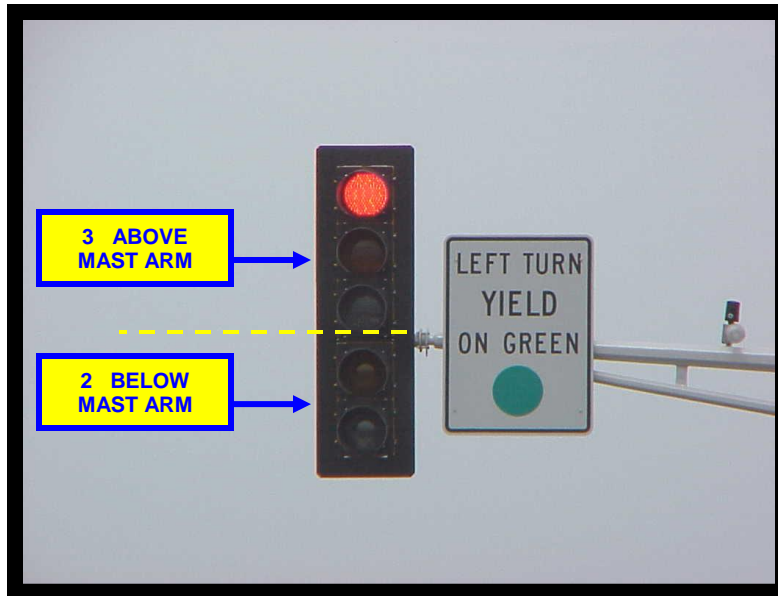
New signal system Contracts will include details for installing one way mounts onto mast arm pole standards and pedestal shafts.

All wiring must be internal to the one way mounts, the signal bracketing pipes, and signal heads, and the wires must terminate on the terminal strip provided inside the signal head.



Pedestal caps must be either steel or cast aluminum based on the material of the pedestal shaft. The pedestal cap must be the same color as the pedestal shaft

Mast Arm Mounted Heads



Signal heads mounted on the mast arm must have two indications mounted below the one way mount and the rest above. For example, in a five section head, two indications are mounted below the one way mount and three above it. The Contractor must utilize signal head mounting spacers as specified in the contract.



The signal heads are fastened to the mast arm straight mount and the one way mount is bolted to the mast arm as indicated in the Contract documents.

All vehicle and pedestrian signal heads must be bagged immediately after installation and must remain so until the signal system is placed into operation.





The **access openings** are located on the back side of the vertical mast arm pole standard, backside of the luminaire extension, under the mast arm truss near the point of attachment of the mast arm, and back side of truss at each mid-arm location to facilitate pulling the wires from the signal heads mounted on the mast arm.



All wiring must be internal to the mast arm and terminated on the terminal blocks in the signal heads.

Pedestal Mounted Heads

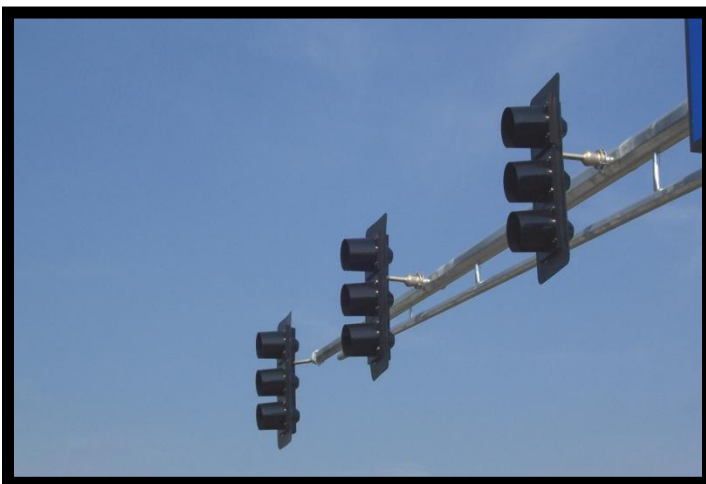
A traffic signal pedestal consists of the base, the shaft, slipfitter collar (bracket systems), re-inforcing collar, and appropriate signal heads.





On pedestal installations with bracketing, a slipfitter collar is mounted on top of the shaft so that bracketing pipes can be threaded into it and allows the mounting of any variety of signal heads. All signal brackets and pipe fittings must be mounted plumb and level.

Aiming signal heads must be done in the presence of the District Traffic Office representative when the signal is flashing. This requires two people; one person must stand at the location from which the indications are to be seen and direct the second person adjusting the signal heads.



Signal heads must be made plumb in all directions.

Pedestrian Signal Heads - Pedestrian signal heads must be furnished and installed as specified in the Contract Documents and operate on nominal 120 volts. The signal heads must be the adjustable type that can be rotated 360 degrees about its vertical axis.



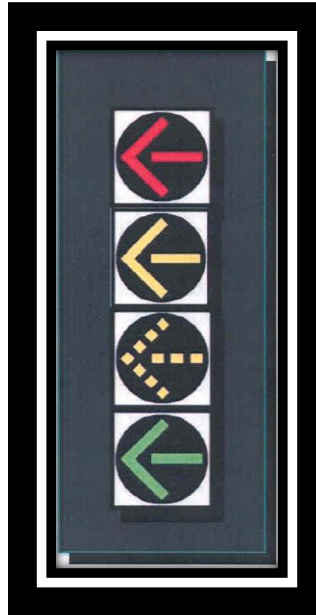
Nominal 16 inch by 18 inch (406 by 457 millimeter) pedestrian indications must be furnished by the Contractor as specified in the Contract documents. All pedestrian indications must utilize light emitting diode (LED) technology and must be on the Mn/DOT Approved Products List (APL) for Signals as indicated in the Contract documents.



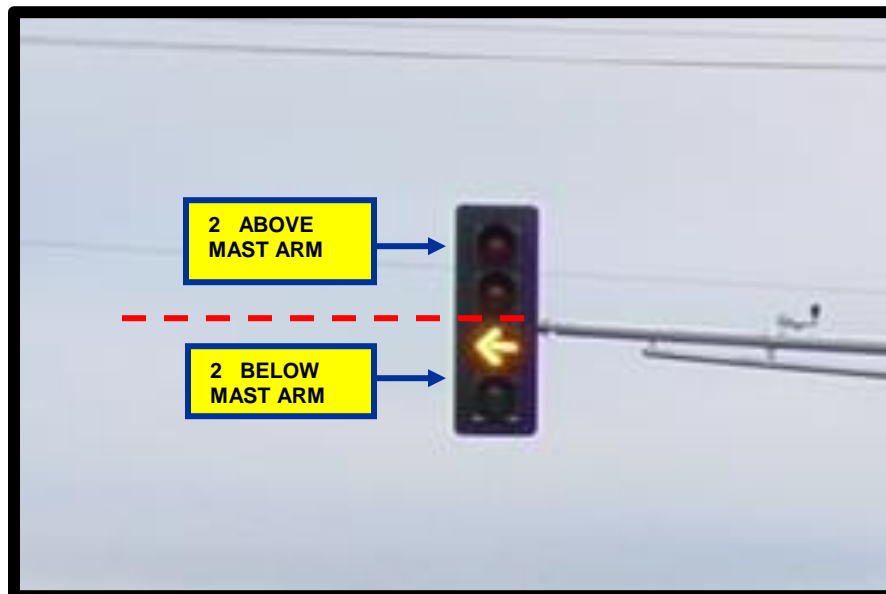
Ramp Meters and Advanced Warning Flashers - Unless otherwise specified in the Contract Documents, ramp meters and advance warning flashers must have nominal 8 inch (200 mm) indications. The visors must be of the cutaway type. Advance Warning Flashers must utilize background shields.

Flashing Yellow Arrow

Mn/DOT is now installing the Flashing Yellow Arrow traffic signal head at signalized intersections throughout the State. The flashing yellow arrow signal will make traffic signals more efficient without compromising safety.



INSTALLATION



Flashing yellow arrow signal heads must have two indications mounted above the mast arm and two indications mounted below the mast arm.