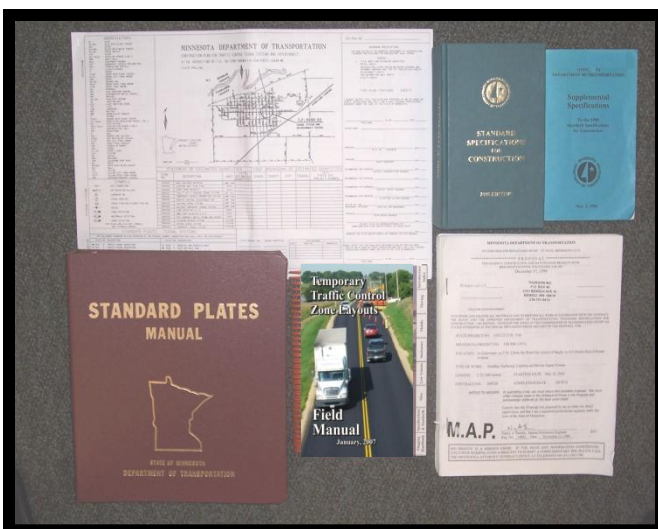


VEHICLE DETECTION

Vehicle detectors act as the “eyes” of the traffic signal controller thereby allowing it to become “traffic responsive”. The loss of even one vehicle detector could greatly disrupt the timing of the signal and result in traffic backup. Because this is a vital part of the signal system, great care must be exerted when installing vehicle detectors. The location of vehicle detectors range from: at or near the stop line to up to 750 feet (230 meters) back from the stop line.

It is necessary to locate lane markings and crosswalks to correctly locate vehicle detectors that are in the pavement. Mark vehicle detectors after pavement markings have been determined or placed.

Other types of detector units (Video, Microwave, Sonic) will need to be located per the Contract documents, Manufacturer’s instructions, and/or as directed by the Engineer.



Note: Vehicle Loop detector materials, installation requirements, approved loop detector conductors, test reports, requirements for inductance, and number of turns will be identified within the contract documents

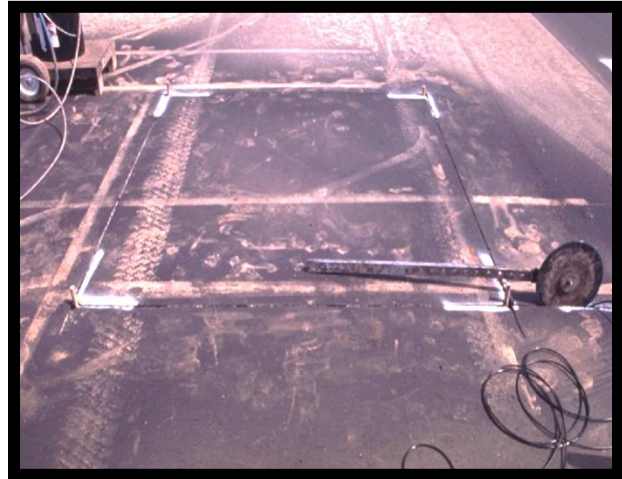
Mn/DOT approved loop sealants and Mn/DOT approved spliced kits are listed on the Mn/DOT Approved Products List (APL).

There are four different types of vehicle detection used by Mn/DOT on signal system projects:

Preformed Rigid PVC Conduit Loop Detectors



Saw Cut Loop Detectors



Video Detectors



Microwave and Sonic Detectors



The Contractor must refer to the Contract documents for the type of vehicle detection system that is required for the specific traffic signal project.

Preformed Rigid PVC Conduit Loop Detectors

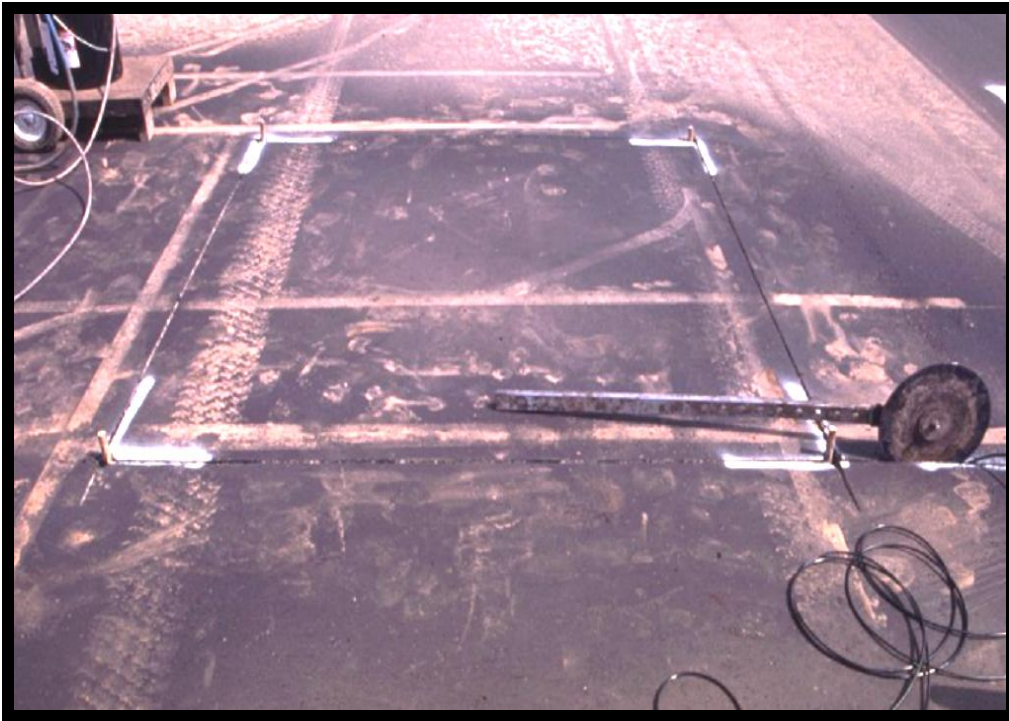
Preformed rigid PVC conduit loop detectors are the most common type that Mn/DOT currently uses on a typical signal system project. Standard Plate No. 8132 will have all the requirements for a complete installation of this type of detector.



These types of detectors are either placed in the base before pavement installation or they may be required to be milled into the existing pavement.



Saw Cut Loop Detectors



When saw cut loop detectors are required, the requirements are on Standard Plate No. 8130.

Mark loop detectors and loop conduit locations on the pavement. If necessary, adjust the location of the loops to avoid cracks and joints in the pavement.

If cracks or pavement joints are encountered, refer to the Sawcut Loop Detail for complete details of installation requirements.

Install loop detectors in the roadway before bituminous wearing course is placed.

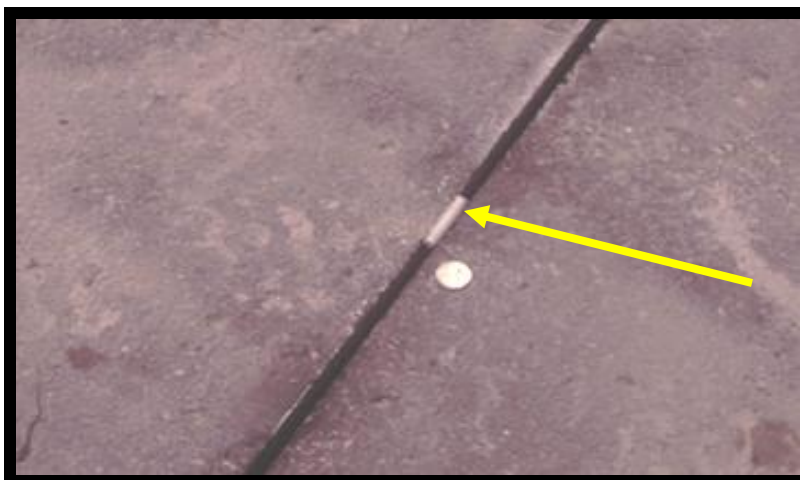
It is essential to maintain required depth of trench or saw cut thru out, including the corners of the loop, to insure the loops will survive future roadway milling operations.



After all sawing and drilling is complete, clean and all foreign materials from loop detector saw cuts.

Dry sawing does not require water flushing

Before installation of loop detector conductors, a bead of Mn/DOT approved loop detector sealant must be placed in the saw cut. Install clear, dry, continuous loop detector conductor wound in a clockwise direction allowing 6 feet (2 meters) extra of conductors within the handhole. Lay the loop detector wire in the saw cut and push them to the bottom of the saw cut with a blunt instrument to avoid damaging the tubing or conductors.



Install 1/2 inch (15 millimeters) diameter by 1 inch (25 millimeters) backer rods at 24 inch (600 millimeters) intervals to ensure that the conductors remain at the bottom of the saw cut.

To run the loop wire to the handhole it is necessary to install a conduit from the road surface to the handhole. Drilling a hole a minimum of 18 inches (450 millimeters) from the curb apron or edge of pavement or joint between the road and the shoulder at an approximate 45 degree angle at the intersection of the loop saw cuts. The hole must be large enough to install 1-1/4 inch (35 millimeters) non-metallic conduit (NMC) or rigid steel conduit (RSC). A 3/4 inch (21 millimeters) NMC or RSC is acceptable when installing a single loop.



Ream the end of the conduit so that the insulation on the wires is not damaged during installation. The conduit must be inserted far enough into the hole so that the bottom is 1 inch (25 millimeters) below the bottom of the saw cut.

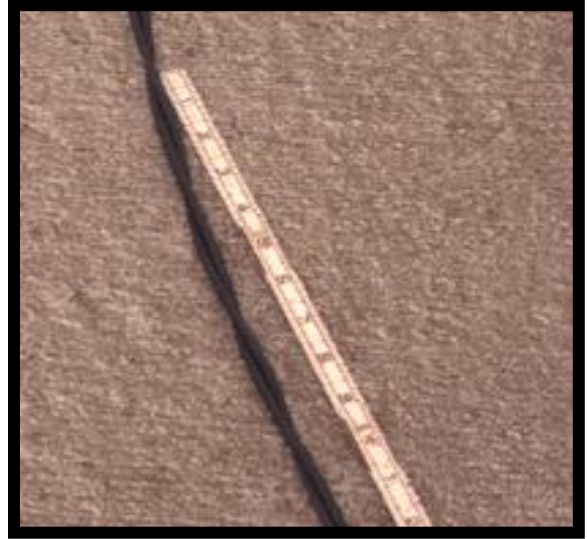
When installing NMC loops, the conduit must be continuous from the loop to the handhole. Install a conduit bushing on the handhole

end of the conduit. If non metallic conduit is used it will be necessary to place a 1 inch (25 millimeters) metallic washer over the roadway end of the lead-in conduit so that the lead-in conduit can be found if the loop goes dead.

After all sawing and drilling is complete, clean and flush all foreign materials from loop detector saw cuts and general area of loop detector using a high-pressure air and water mix. Dry all loop detector saw cuts and general loop area prior to installation of sealant and conductors. Loop wire must be clean when it is installed. If necessary place loop wire in a plastic bag to ensure it remains clean.



Twist the loop conductor pairs for the entire length of the loop detector lead-in conduit at a minimum rate of 3 turns per foot (300 millimeters).



Seal the loop detector conduit at the roadway end with duct seal to prevent loop sealant from entering the conduit. Test the loop before the sealant is placed in the saw cut.

Seal saw cut loop conductors with an approved loop detector sealant (see the Mn/DOT Approved Products List) as per manufacturer's recommended procedures. Do not over fill the saw cut with sealant.

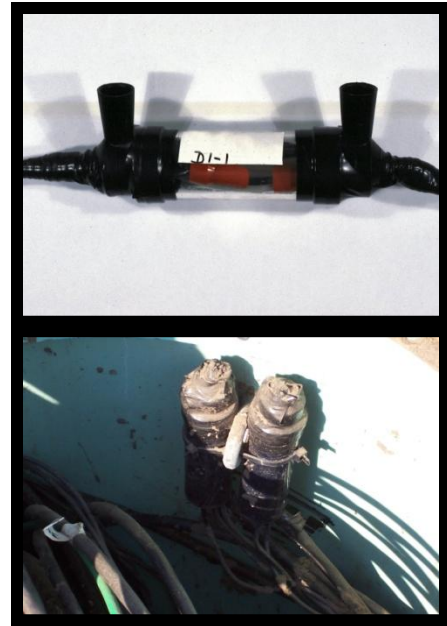


PVC and Saw Cut Loop Detector Splicing

Properly prepare and clean the loop detector conductors.

The ends of the roadway loop detector conductors are to be soldered to the loop detector lead-in cable. After being soldered, install an appropriate sized wire nut before splice kit installation.

Splice the loop detector conductors according to the approved method and approved splice kit. (see Contract documents for approved splice kit and splicing method).



Loop Detector splice kits must be installed in a manner to ensure that they are suspended and secured near the top of the handhole so that they are accessible if water freezes in the handhole.

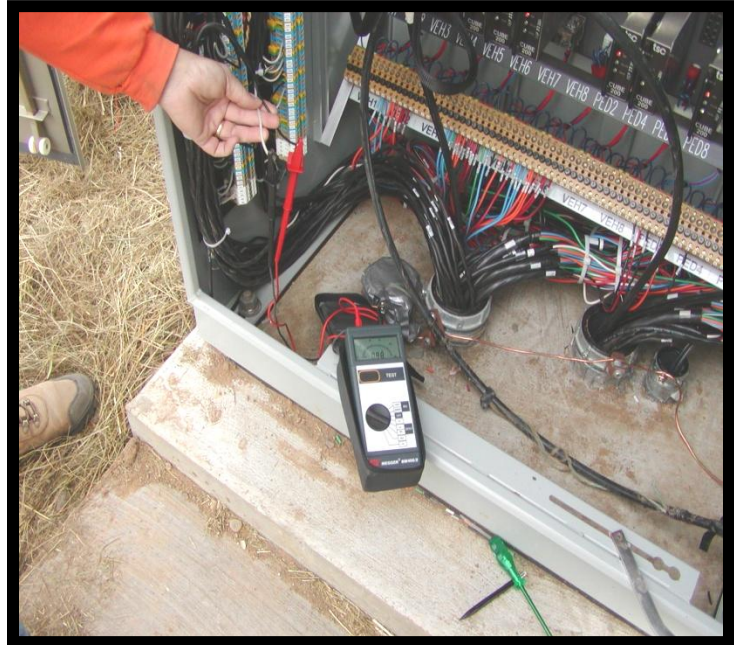
PVC and Saw Cut Loop Detector Testing

Test each loop detector in accordance with the Contract documents. Testing at the handhole or junction box must be done before installing sealant or hot mix (if installing a PVC loop).

The loops must be tested for resistance, inductance and a meg reading to ground at the signal cabinet. The test results must be recorded on a form similar to the one found in the APPENDIX of this manual. Three copies of the report must be given to the Project Engineer for distribution. (Signal cabinet, ESS, and the District Traffic Office)

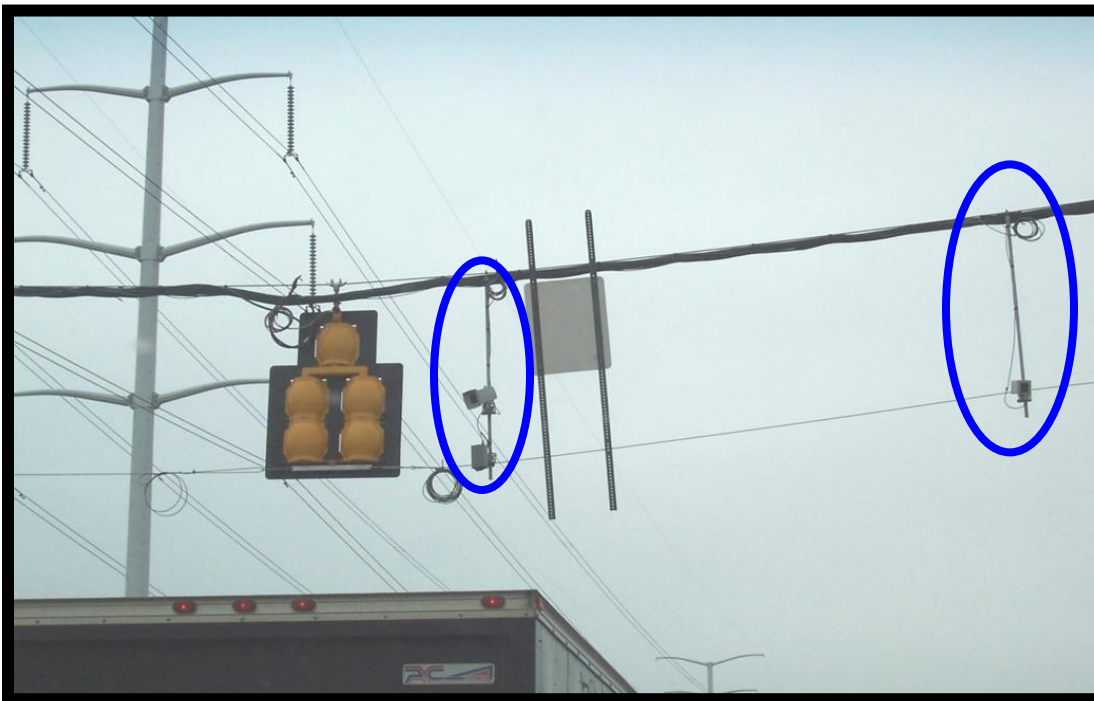
If the readings are not within the design parameters, there is a problem with the installation, or materials, and the loop will have to be reinstalled. These procedures will create a good functioning loop detector.

Refer to contract documents for complete details on loop materials, installation, and testing.



VIDEO DETECTION SYSTEMS

Some Mn/DOT projects will require video detection systems. All material and installation requirements for video detection systems are contained in the Contract documents.

Microwave and Sonic Detectors

Microwave and sonic detector units are mostly used on span wire type of signal systems. The Contractor must refer to the Contract documents for location and installation requirements for these type of vehicle detectors.