

Continually operate each PCMS at maximum legibility. Many factors, such as mechanical problems, insufficient charging, incorrect intensity settings, or other factors can degrade performance. Place the PCMS off the shoulder. In the event the Engineer approves PCMS placement on the shoulder, delineate it in accordance with the Field Manual.

All PCMS system components including the onboard computer, communication devices, solar panels, batteries, and charge controller shall be trailer-mounted. The equipment cabinet(s) shall be locked. Electronic access to the onboard computer shall be protected by a unique username and password that is not the manufacturer's default username and password. **The username and password shall not be recorded on any part of the trailer.** The power supply shall be capable of providing continuous service for 7 days without recharging. The trailer shall be capable of supporting the system in any typical roadside environment including concrete, asphalt, granular or turf. When deployed, the trailer shall present a level appearance. The message panel shall be mounted at a height of at least 7 feet, measured from the bottom of the sign to the ground directly below.

(C) Equipment Control Units

Provide sufficient Equipment Control Units (ECU) to maintain continuous, dynamic communication to deliver appropriate messaging to the PCMS, and to provide remote access to the system for operation, malfunction detection, and data collection.

(D) Detectors

Data communications from field detectors to a data collection server shall be the responsibility of the Contractor. Power for the field detectors shall be the responsibility of the Contractor. Updated data must be available every 30 seconds, 24 hours per day, 7 days per week for polling from MnDOT's IRIS Traffic Management Software. This data must not exceed a latency of 3 seconds.

Data polling and integration testing shall be available to the data collection server ten (10) business days before field data is needed based. This test period is to allow MnDOT staff and Contractor staff to proof the data server connectivity and integration into MnDOT's IRIS software.

Data that is not passing accuracy and reliability requirements will be reported to the RTMC as null. Data shall not be averaged or smoothed over time periods exceeding 30 seconds. If communications to the sensor are interrupted for 30 seconds or more, data shall be reported as null.

The following detector types are required for this project:

(1) The volume/speed detectors shall report volume and speed per lane every 30 seconds. The detector shall detect and report a full range of traffic speeds, including stopped traffic, and shall be accurate to within ± 5 mph per lane. The detector shall detect and report and average volume per lane accurate to within $\pm 5\%$.

All detectors shall be capable of detecting a full range of traffic speeds, including stopped traffic, and be accurate to within ± 5 mph with ambient operating temperature -40°F to 165°F (-40°C to 74°C). The detector accuracy shall not be degraded by changing temperature, noncondensing humidity up to 95%, inclement weather, or low-visibility conditions including:

- Rain
- Freezing Rain
- Wind
- Fog
- Dust
- Snow
- Changing Lighting, including direct light on detector at dawn or dusk or darkness

The detector shall not require cleaning or adjustment to maintain performance. Once the sensor is calibrated, it shall not require recalibration to maintain performance unless the roadway configuration changes.

All detector equipment shall be trailer-mounted and include the detector and all components required to operate the detector including, but not limited to: communication devices, solar panels, batteries, and charge controllers. The equipment cabinet(s) shall be locked. Electronic access to the onboard computer shall be protected by a username and password. The power supply shall be capable of providing continuous service for 7 days without recharging. The trailer shall be capable of supporting the system in any typical roadside environment including concrete, asphalt, granular or turf. When deployed, the trailer shall present a level appearance. The trailer shall be capable of supporting the detector at variable heights above ground elevation to ensure proper operation of the IWZ system.

Place the detector trailer off the shoulder outside of the clear zone, unless otherwise approved by the Engineer. In the event the Engineer approves PCMS placement within the clear zone, delineate it in accordance with the Field Manual.

Current MnDOT traffic detection will be considered out of service when any of the following conditions occur:

1. Traffic is shifted to different lane configurations in the area of detection,
2. The traffic detectors can no longer read the traffic,
3. The traffic detectors can no longer read traffic in its designed direction of travel for all lanes

During construction, changes to the location of the detection to ensure accurate sensor data collection shall be performed by the Contractor within 24 hours of changes to traffic location.

S-75.4 INTELLIGENT WORK ZONE SYSTEMS TRAINING

Host an education and training session at or near the time and place of the construction kick-off meeting. The training shall include at least one representative from each of the following entities:

- Local State Patrol
- Prime Contractor
- Persons responsible for traffic control under Section S-10 (MAINTENANCE OF TRAFFIC AND TRAFFIC CONTROL) of these Special Provisions.
- Department of Transportation
- Others as requested by the Engineer

The training shall consist of (at least) the following:

- Data Sheets indicating what messages will be conveyed.
- In the event of an emergency, instructions on how to override system messages.
- In the event of a power failure, instructions detailing how to power cycle the system.
- Basic listing of what to monitor, and what causes messages to change.
- List of telephone numbers to request technical support.
- Data logging, printing reports, and graphing results.

S-75.5 SYSTEM WARRANTY, MAINTENANCE, AND SUPPORT

The IWZ System components shall be maintained, supported, and warranted against material defects by its supplier through the duration of the deployment. The Contractor shall assign a manager for the system deployment and to respond to system failures. Provide the Engineer name, address and phone number for the IWZ System Manager.

The Contractor is responsible for monitoring the operational status of the Intelligent Work Zone System components.

Performance of the detectors, signs, and other system components will be monitored by MnDOT personnel during the course of the project for accuracy.