

STATE**OF****TENNESSEE**

(Rev. 11-6-17)

January 1, 2021

(Rev. XX-XX-XX)**State Proj No: XXXXX-XXXX-XX****Fed. Proj. No: XXXX****County:XXXXX****SPECIAL PROVISION****REGARDING****PORTABLE QUEUE WARNING SYSTEM****Description**

This work consists of providing a Portable Queue Warning System that shall be utilized to provide protection of traffic queues caused by construction operations. The system shall consist of portable radar sensors, a portable changeable message sign (PCMS), and appropriate software that will monitor and control its operation. The deployment of the system shall clearly alert motorists to slowed or stopped traffic ahead and be capable of indicating varying distance to the slowed or stopped condition. of speed differentials ahead. Maintain and update the system as required throughout the duration of the project.

Equipment

Provide the following equipment as specified.

1. **XXXX (X) portable microwave radar sensors** to include cellular communication capabilities, battery life of 20 consecutive days and provide queue warning in advance of the hazard. Radar sensors shall be installed as per manufacturer's recommendations at locations specified by the Engineer.
2. **XXXX (X) full matrix portable changeable message sign PCMS** capable of communicating with the microwave radar sensors, and able to function as an early detection system. The PCMS shall have a minimum panel size of 72" W x 35" H mounted as per manufacturer specifications and in accordance with Sections 2L.04 and 6F.60 of the MUTCD for Portable Changeable Message. PCMS shall be installed at the direction of the Engineer in advance of the work zone.
3. Radar sensors shall be capable of collecting traffic volume and speed data. The processed data shall be user configurable and used to trigger pre-programmed messages to the PCMS advising motorists of impending traffic delays or stopped traffic conditions.

4. Smart Work Zone system shall provide dynamic and varying messages based on real time traffic conditions. PCMS shall alert drivers to Slowed or Stopped traffic downstream, as well as the relative distance from each PCMS to the nearest radar sensor detecting the slowed or stopped condition.
5. All Portable Smart Work Zone equipment shall utilize proven cellular modems with major service communications providers. Ensure that all devices are provided with reliable communication networks to minimize communication malfunctions
6. Weekly traffic data reports shall be provided to the Engineer and should include speed data per sensor location and queue lengths in both graphical and numerical formats. Real time data shall also be made available upon request of the Engineer.
7. Periodic adjustments to locations of sensors and/or message boards may be made at request of the Engineer and will be considered incidental to the operation of the system.

Maintenance of Traffic

The following procedures will be followed until free flow traffic conditions are present: (“free flow” is defined as the absence of a temporary lane or shoulder closure or absence of a temporary shift of traffic lanes with no queue present).

1. The Portable Queue Warning system equipment shall be utilized during planned lane closures and other project activities expected to cause a queue.
2. The PCMS and radar sensors shall be installed per plan or as directed by the Engineer. Variable messages and relative distances shall change in real time pertinent to traffic conditions.
3. PCMS messages and speed thresholds for changing messages shall be determined by the Engineer at the Preconstruction Conference.
4. Queue length estimates and traffic conditions shall be reported to the Engineer or designee at the following periods:
 - a. At 30 minute intervals
 - b. At significant changes
 - c. Duration of work is complete
 - d. When free flow traffic is achieved

The Portable Queue Warning System shall be mobilized when lane or shoulder restrictions exist. The system is intended to remain in place for the duration of lane or shoulder restrictions and may be de-mobilized when all lane and shoulder restrictions are removed. If the Engineer deems necessary, the portable queue warning system may be deployed at any time.

Method of Measurement

The Department will measure, by the day, the Portable Queue Warning System complete in place and accepted for queue warning protection. Systems that are left in place for the duration of the project shall not be paid for time when work is not being performed. A day is defined as one full calendar day.

Basis of Payment

The Department will pay for accepted quantities, complete in place, at the contract prices as follows:

Item No.	Description	Unit
712-08.14	PORTABLE QUEUE WARNING SYSTEM	DAY

Such payment will be full compensation for all work specified including radar sensors, message boards, labor, materials, equipment, tools, and incidentals to complete the work.