

Appendix F: Special Specifications for Microwave Sensors

**TEXAS DEPARTMENT OF TRANSPORTATION
SPECIAL SPECIFICATION
MICROWAVE VEHICLE PRESENCE DETECTION**

1.0 General

- 1.1 This item shall govern for the minimum acceptable design and installation requirements for an overhead/side-mounted microwave vehicle presence detector. All equipment required to interface with a traffic signal controller will be subsidiary to this pay item.
- 1.2 In side-mount, the unit shall detect the continuous presence, volume, occupancy and average speed of every type of vehicle that is licensed to date in at least five detection zones.
- 1.3 The horizontal range for detection shall be from a minimum of 3 m (10 ft) to a maximum of 60 m (200 ft) for a detector unit mounted at a height of 5 m (17 ft).
- 1.4 The sensor shall be able to hold the detection until the zone is cleared. Additionally, the sensor shall be able to tune-out stationary targets that remain within the detection zone for a minimum of 15 minutes.
- 1.5 The sensor shall self-tune to its detection zone with no external adjustments other than physical alignment. There will be no external tuning controls of any kind, which will require an operator.
- 1.6 The detector output must be directly compatible with the controller cabinet detector input.
- 1.7 The operator shall be able to set up, monitor lane status and retrieve data from the detector through the RS 232 serial port with any IBM compatible laptop or desktop computer. Also, the detector shall be compatible with a standard phone modem for remote data retrieval.
- 1.8 The detector shall be capable of continuous operation over a temperature range of -37 to 74 degrees Celsius and relative humidity of 95 percent non-condensing.

2.0 Functional Requirements

- 2.1 The microwave unit must have Federal Communications Commission (FCC) certification. The FCC-ID number must be displayed on an external label. The detector will operate at a frequency, as allowed under the FCC rules, part 15.
- 2.2 Cabinet power utilized by a detector power supply will range from 95 to 135 VAC as per NEMA TS-1. The detector will be self-contained. If an external power supply is necessary, it shall be supplied as part of the detector system and shall be considered subsidiary to the unit cost of the detector system.

- 2.3 The unit will have an optically isolated relay contact pair for each detection zone to send a signal to the controller.
- 2.4 No component shall be of such design, fabrication, nomenclature or other identification as to preclude the purchase of said component from any wholesale electronic distributor.
- 2.5 The unit must employ a circuit for power failure to put the relay to a fail-safe position (recall) during a power failure.
- 2.6 The detector must have a monitoring circuit for the transceiver that will change the output relay to the fail-safe position in the event of a component failure.
- 2.7 The detector shall work either as a side of the pole mounted detector for multiple zones or as an overhead mounted detector for a single zone at a height range of 5 m (17 ft) to 10 m (33 ft).
- 2.8 All setup, controller program and diagnostic software shall be provided and run on the latest version of DOS- or Windows based-operating systems. Software updates shall be provided free of charge during the warranty period.

3.0 Functional Accuracy Requirements

- 3.1 The detector shall meet overall accuracy requirements specified herein under the following environmental and installed location conditions:
 - under all weather conditions normally experienced in the local area, and
 - installed in overhead (forward-mounted single lane) or side-mounted (side-mounted multiple lane) position on a sign bridge.
- 3.2 Presence accuracy from overhead mount shall be at least 95 percent in a single detection zone. Accuracy in detection and magnitude of speed shall be at least 95 percent from an overhead mount.
- 3.3 Presence accuracy from side-mounted position shall be at least 90 percent in a multiple detection zones. Accuracy in detection, volume, occupancy and magnitude of speed shall be at least 85 percent from a side-mounted position.

4.0 Mechanical Requirements

- 4.1 Each sensor shall be enclosed in a finished fabricated plastic and aluminum chassis with a minimum 4-inch square high impact plastic opening in front of the antenna.
- 4.2 Each detector chassis shall be water resistant without the use of silicone gels or any other material that will deteriorate under prolonged exposure to ultraviolet rays.
- 4.3 The printed circuit board shall be coated with a clear coat moisture and fungus resistant material (conformal coated).

- 4.4 The sensor shall be furnished with a bracket or band designed to mount directly to a pole or overhead mast-arm or other structure.
- 4.5 The sensor shall interface with the controller program via a RS-232 port.
- 4.6 The maximum size of the detector shall be:
- Height: 12 inches
 - Width: 18 inches
 - Depth: 12 inches
- 4.7 The sensor shall have a single military style multi-pin connector to provide power and output signals for RS-232 and all contact pairs.

5.0 Functional Tests

- 5.1 The manufacturer will test all microwave units to ensure compliance to all FCC and department specifications.
- 5.2 The manufacturer will be required to supply a medical statement as to the safety of the unit to the general public (example: pacemakers, etc.).

6.0 Measurement

Each overhead/side-mounted microwave presence vehicle detector in place will measure presence, volume, occupancy and average speed in each detection zone.