

**PART E**  
**SPECIFICATIONS**

## **PART E - SPECIFICATIONS**

### **GENERAL**

#### **E1. GENERAL**

- E1.1 These Specifications shall apply to the Work and describe the minimum requirements of a Radar Vehicle Detector (RVD).
- (a) The RVD shall be easy to install and remove, and shall be fully programmable to support a variety of applications.
  - (b) All Equipment and component parts furnished shall be new, be of the latest design and manufacture, and be in an operable condition at the time of delivery and installation. All parts shall be of high quality workmanship, and no part or attachment shall be substituted or applied contrary to the manufacturer's recommendations and standard practices.
  - (c) The design shall be such as to prevent reversed assembly or improper installation of connectors, fasteners, etc. Each item of equipment shall be designed to protect personnel from exposure to high voltage during equipment operation, adjustments, and maintenance.
  - (d) The designed Mean Time Between Failures (MTBF) of the RVD unit, operating continuously in their application, shall be 10 years or longer.
  - (e) The manufacturer of the RVD shall provide at least three (3) references to show that the RVD product has been deployed in operational systems of similar scope and size for over three (3) years. The contractor shall be responsible for providing all materials to install and place the equipment into operation (Mounting brackets, connector backshells) which will be part of the bid price of the unit item.

#### **E2. ENVIRONMENTAL CONDITIONS**

- E2.1 Except as stated otherwise herein, the equipment shall meet all its specified requirements during and after subjecting to any combination of the following:
- (a) Ambient temperature range of -37 to +74 degrees C (Per TS2-1998, sect.2.1.5)
  - (b) Relative humidity from 5 to 95 percent, non-condensing
  - (c) Power surge of  $\pm 1$ kV surge (rise time = 1.2 msec, hold = 50msec) applied in differential mode to all lines, power and output, as defined by IEC 1000-4-5 and EN 61000-4-5 standards and/or NEMA standard TS2-1998, sects. 2.1.7, 2.1.8. TransZorb surge protectors shall be used on all input lines (power, contacts and serial ports).
  - (d) The RVD design shall be inherently temperature compensated to prevent abnormal operation. The circuit design shall include such compensation as is necessary to overcome adverse effects due to temperature in the specified environmental range.
  - (e) To protect against humidity condensation failure and damage, all circuit boards in the RVD shall be conformally-coated and the RVD shall not include any humidity absorbing materials such as foams or other porous materials.
  - (f) Except as may be otherwise stated herein for a particular item, no item, component, or subassembly shall emit a noise level exceeding the peak level of 55 dBA when measured at a distance of one meter away from its surface.
  - (g) The RVD shall be resistant to vibration in accordance with IEC 68-2-30 (test Fc), NEMA TS-1 (Section 2.1.12), or approved equivalent.
  - (h) The RVD shall be resistant to shock in accordance with IEC 68-2-27 (test Ea), NEMA TS-1 (Section 2.1.13), or approved equivalent.

## FUNCTIONAL CHARACTERISTICS

### E3. CAPABILITIES

- E3.1 The RVD shall be a true presence detector, which can provide presence, volume, lane occupancy, and average speed information on a minimum of eight (8) discrete detection zones. This information shall be available to existing controllers via contact closure pairs and to other systems via serial communications lines.
- E3.2 The RVD shall be capable of simultaneously providing the contact closure pairs and the serial communications data from within the RVD unit. It must be capable of providing a real time display of vehicles through an attached personal computer.
- E3.3 As an option, the RVD shall be capable of operating through an internal IP addressable micro server.
- E3.4 As an option, the RVD shall be capable of wireless operation via an internal RF modem whose range shall be at least 1 mile dependent upon the antenna used with the RVD and the line of sight afforded by the installation site.
- E3.5 The RVD shall have a software-based utility that provides the option of both manual and automatic setup and calibration.
- E3.6 The RVD shall emulate inductive loop detector outputs by providing presence indications and be capable of tuning out objects in detection zone after approximately 30 minutes of presence in zone.

### E4. MODE OF OPERATION

- E4.1 The RVD shall be capable of operating in 'side-fired' or 'forward-looking' modes. All RVD units supplied shall be capable of operating in both modes by adjustment in software configuration by the user.

### E5. TRANSMISSION

- E5.1 Each RVD shall transmit on a frequency band of 10.525 GHz +/-25 MHz or another approved spectral band. The RVD shall comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules or the appropriate Spectrum Management Authority. The RVD shall not interfere with any known equipment. RVD transmitter power shall not exceed 10 milliwatts.

### E6. AREA COVERAGE

- E6.1 The RVD's field of view shall cover an area defined by an oval shaped beam and its maximum detection range shall be as follows:
- (a) Elevation Beam Width 40 degrees
  - (b) Azimuth Beam Width 15 degrees
  - (c) Range 10 to 200 feet

### E7. DETECTION ZONES

- E7.1 The maximum number of detection zones defined shall be no less than eight (8).
- E7.2 The range limits of each zone shall be user defined in 7-ft. resolution.

## **E8. MEASUREMENT ACCURACY**

E8.1 Under normal operating conditions the detector shall identify vehicle presence within each detection zone with a 95% accuracy or greater, independent of the vehicle's direction of travel through the detection zone. The maximum permissible error under normal conditions shall be 5% in the detection of the direction and magnitude of radial speed and 10% in the case of transverse speed.

## **E9. MECHANICAL**

E9.1 The microwave radar detector shall be enclosed in a rugged weatherproof box and sealed to protect the unit from wind up to 90 mph, dust and airborne particles, and exposure to moisture (NEMA type 3R enclosure).

E9.2 Max. RVD dimensions, including fittings shall not exceed 24x16x18.5 cm (9.5 x 6.25 x 7 in.)  
Max. Weight of the RVD assembly shall not exceed 2.2kg (5 pounds)

E9.3 The RVD mounting assembly shall have all coated steel, stainless steel, or aluminium construction, and shall support a load of 20 pounds. The RVD shall be easy to deploy without intruding on traffic flow when possible.

E9.4 The mounting bracket shall be constructed to allow replacement of the RVD without the need to re-aim it.

## **E10. ELECTRICAL**

E10.1 The RVD shall be operable from either 12 - 24 VAC/DC dissipating no more than 5.0W, or 95 - 135 VAC @ 60 Hz. Power supply shall be obtained from the power distribution assembly within the controller cabinet, or any convenient power source.

E10.2 The Interface consists of a single MS connector (part # MS3476W18-32S), which provides power to the unit, output contact closure wire pairs for each of the required detection zones (rated at 200V AC/DC 100 mA), and serial communication lines for programming, testing or modem interface at a programmable 2400 to 19200 Baud rate. Serial communication shall be available in RS232 or RS485 format. Dataformat of the serial port shall be standard binary NRZ 8 bits data, 1 stop bit, no parity. Power lines, contact closures and serial port are to be isolated. Power lines and serial port should be surge protected within the unit.

E10.3 The RVD shall include power management features, which enable:

E10.4 Remote reading of supply (battery) voltage through serial bus

E10.5 Remotely programmable ON/OFF sequence in which the RVD automatically goes into sleep mode

E10.6 A UV-resistant cable of multiple twisted pairs of stranded AWG #20 or #18 wires with a common shield rated at 300V with a temperature rating of 105o C (Belden #9516 or approved equal) will provide connection between the RVD and the cabinet equipment.

E10.7 The MS connector pins must be crimped to the cable conductors and assembled and tested prior to installation and pulling of cable on site. The junction box or cabinet to house the RS 232 connector must be located within sight of the desired detection zones in order to initially set up the sensor or to alter the set-up at a later date

## **E11. INSTALLATION**

- E11.1 The RVD shall be mounted in either Side-fired or Forward-looking configuration on poles or sign structures at the locations specified by the designer, using the supplied mounting brackets. The brackets shall be attached with approved 3/4-inch wide, .025 inch thick, stainless steel bands or to a concrete wall/bridge using 2 stainless steel expansion bolts of sufficient length and diameter to support 100 pounds.
- E11.2 The detector unit shall be designed to be installed on a pole at a height of 5 to 6 metres above the road surface so that the masking of vehicles is minimized and that all detection zones are contained within the specified elevation angle as suggested by the manufacturer.
- E11.3 In the Forward-look configurations the detector will be mounted over the centre of each lane.
- E11.4 The RVD detection zones shall be set up using software provided by the manufacturer and a Notebook PC.

## **E12. DELIVERY**

- E12.1 Goods shall be delivered f.o.b. destination, freight prepaid.
  - E12.1.1 Goods shall be delivered within twenty (20) Business Days of the placing of an order.
  - E12.1.2 The Contractor shall promptly report any delay or change to an agreed delivery date to the User.
- E12.2 Goods shall be delivered between 8:30 a.m. and 4:30 p.m. on Business Days.