

APPENDIX A
Special Provision
Description of Materials and/or Equipment
for a Project and Related Work
and
Schedule of Items

Contractor _____

SCHEDULE OF ITEMS

- The Bid must be Delivered to the precise location and by the precise time set forth in the Notice to Contractors or any applicable Bid Amendment.
- Required unit prices, lump sum prices and/or bid amounts must be provided and legible.
- Do not make handwritten changes to the bid documents.

Bidder is required to bid all Items.

Item Description	Approximate Quantity and Units	Unit Price	Bid Amount
Radar Vehicle Sensing Detector (RVSD) Complete System	12 Each		
Repairs to include all materials and labor not covered under warranty	5 Each		
Total Bid			

- By signing below, the Bidder (1) represents that the Bidder has examined the Contract Agreement contained in the Bid Documents, the Contract, all documents referenced in said Contract, and the site and scope of work, (2) does hereby bid and offer to enter into this contract to construct and/or perform the Work in strict accordance with the terms and conditions of this Contract at the unit prices bid in the attached "Schedule of Items", (3) represents that the Bidder has given the Department notice of any errors or ambiguities related to the documents or the work that have been discovered by the Bidder, (4) represents that the above-named organization is the legal entity entering into the resulting contract with the Department if they are awarded the contract and, (5) represents that the undersigned is authorized to enter contractual obligations on behalf of the above-named organization.
- Bidder acknowledges that the properly completed and signed Schedule of Items provided with the Bid constitutes the Bidder's offer and that this offer shall remain open for 30 calendar days after the date of opening of bids.
- The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

- Use pen and ink to complete paper bids. Signatures shall be original. Stamped and copied signatures will not be accepted.

Signature

Date

(Print Bidder's Name and Title)

- Bids are not accepted by email or FAX. If a paper Bid is to be sent express, please take note that overnight services do not always arrive in time. Packages using express services should be sent to Maine Department of Transportation, 24 Child Street, Augusta, Maine.

**Electronic bidding will NOT be
available
for this bid.**

**Bids will NOT be accepted
by email or fax.**

**SIGNED PAPER BIDS ARE REQUIRED
and may be
mailed, sent express or hand delivered.**

**For further information, see “BIDDING INSTRUCTIONS”
which are located near the front of the bid book.**

**Description, Specifications and Scope of Materials,
Work, Equipment and Supplies**

**Material Specifications
Radar Vehicle Sensing Detector**

Description. This item shall consist of furnishing a Radar Vehicle Sensing Detector (RVSD) including all necessary fittings, mounting hardware and appurtenances necessary to provide for a fully operational system at the locations shown on the plans or as indicated by the Maine Department of Transportation (MaineDOT). The RVSD shall be a Wavetronix Model Smart Sensor HD or approved equivalent. If approved equivalent item is supplied a sample unit and certification testing documents from an independent source stating that the item meets or exceeds all items listed within shall be provided to the Department within 7 calendar days for testing.

Materials. The Radar Vehicle Sensing Detector (RVSD) shall include a stand-alone, radar-based detector and a Microsoft Windows based configuration software that provides for configuring the RVSD. The Contractor shall furnish only each RVSD with the following equipment: RVSD manufacturer cabling, RVSD manufacturer surge equipment, RVSD manufacturer AC/DC power supply, RVSD manufacturer mounting equipment and ancillary equipment to make for a complete installation. The Contractor shall also make available to MaineDOT technical support from the RVSD manufacturer Monday to Friday between the hours of 8:00 AM to 5:00 PM EST.

- RVSDs shall not be affected by normal weather and environmental conditions such as rain, wind, snow, dust, etc. They also do not require cleaning and can maintain performance over a wide range of ambient temperatures.
- The RVSD shall provide volume, average speed, occupancy, classification counts, 85th percentile speed, average headway, average gap, speed bin counts, and direction counts for user-configurable time intervals.
- The RVSD shall provide up to eight length-based classification bins.
- The RVSD shall provide up to 15 speed bins.
- The RVSD shall provide speed, length, class, lane assignment, and range data for each vehicle detection.
- The RVSD shall detect and report information in lanes located with the far boundary at 250 ft. from the base of the pole on which the RVSD is mounted.
- The RVSD shall simultaneously detect and report information from a lane located at the minimum offset and from a lane located at the maximum range.
- The RVSD shall allow any spacing of traffic lanes positioned from the minimum offset to the maximum range. Gore and unequally sized or spaced lanes shall be handled so that detections from the lanes meet all performance specifications.
- The RVSD shall have following Volume, Occupancy, Speed and Classification accuracies:

- Volume data shall be within 5% of truth for a direction of travel during nominal conditions. Individual lane volume data shall be within 10% of truth during nominal conditions.
- Average speed data shall be accurate to within 3 mph (5 kph) for any direction of travel when there are more than five cars per lane in an interval. Average speed data for any individual lane shall be accurate to within 3 mph (5 kph) when there are more than five cars per lane in an interval.
- Occupancy data shall be within 10% of truth for any direction of travel on a roadway during nominal conditions.
- The RVSD shall correctly determine classification for 80% of detected vehicles when the classification bins are at least 10 ft. wide and occupancy of all lanes is below 30%.
- The RVSD shall detect a minimum separation of 5.5 ft. between two vehicles depending on vehicle speed and range.
- The RVSD shall provide per-vehicle speed measurements in which 90% of the measurements are within 3 mph.
- The RVSD shall measure speed using a dual-radar speed trap that calculates the time delay between two different radar beams.
- The RVSD shall not require cleaning or adjustment to maintain performance.
- The RVSD shall not rely on internal battery backup to store configuration information.
- Once the RVSD is calibrated, it shall not require recalibration to maintain performance unless the roadway configuration changes.
- The RVSD shall be manufactured using techniques that will yield a mean time between failures of 10 years.
- The RVSD shall not exceed 5 lbs. in weight.
- The RVSD shall not exceed 14 in. by 12 in. by 4 in. in its physical dimensions.
- All external parts of the RVSD shall be ultraviolet-resistant, corrosion-resistant, and protected from fungus growth and moisture deterioration.
- The RVSD shall be enclosed in a Lexan polycarbonate.
 - The enclosure shall be classified “f1” outdoor weatherability in accordance with UL 746C and shall be IP66 rated.
 - The RVSD enclosure shall be classified as watertight according to the NEMA 250 standard.
 - The RVSD enclosure shall conform to test criteria set forth in the NEMA 250 standard for type 4X enclosures. Test results shall be provided for each of the following type 4X criteria:
 - External icing (NEMA 250 clause 5.6)
 - Hose-down (NEMA 250 clause 5.7)
 - 4X corrosion protection (NEMA 250 clause 5.10)
 - Gasket (NEMA 250 clause 5.14)
 - The RVSD shall be able to withstand a drop of up to 5 ft. (1.5 m) without compromising its functional and structural integrity.
 - The RVSD housing shall be able to withstand wind loads exceeding 120 miles per hour.

- The RVSD enclosure shall include a connector that meets the MIL-DTL-26482 specification. The MIL-DTL-26482 connector shall provide contacts for all data and power connections.
- The RVSD shall consume less than 8.5 W.
- The RVSD shall operate with a DC input between 10 VDC and 28 VDC.
- The RVSD shall have an RS-485 port and an RS-232 port, and both ports shall communicate independently and simultaneously.
 - The RS-232 port shall be full-duplex and shall support true RTS/ CTS hardware handshaking for interfacing with various communication devices.
 - The RVSD shall support the upload of new firmware into the RVSD's non-volatile memory over either communication port.
 - The RVSD shall support the user configuration of the following:
 - Baud rate
 - Response delay
 - Data push
 - RS-232 flow control (RTS/CTS or none)
 - The communication ports shall support all of the following baud rates: 9600, 19200, 38400, 57600, and 115200 bps.
- The RVSD shall support three different data protocols for all lanes being monitored: interval (bin) data, event (per vehicle) data, and real-time true presence data.
 - The interval (bin) data packet protocol shall support:
 - Sensor ID
 - A timestamp that records the year, month, day, hour, minute, and second of the end of time interval
 - Average speed values in either mph or kph
 - Occupancy in 0.1% increments
 - Volume in up to eight length-based user-defined vehicle classification bins
 - Volume in up to 15 user-defined speed bins (bin by speed)
 - Volume for both directions of traffic (bin by direction)
 - Average headway in seconds
 - Average gap in seconds
 - 85th percentile speed in either mph or kph
 - The event (per vehicle) data packet protocol shall support:
 - Sensor ID
 - A timestamp that records the year, month, day, hour, minute, second and millisecond of the time the vehicle left the detection zone
 - Lane assignment
 - Speed values in either mph or kph
 - Vehicle length
 - Classification using up to eight user-defined classes
 - Range
- The RVSD shall store, in non-volatile memory, at least 9,000 interval data packets with the maximum number of lanes and approaches configured and all interval fields enabled.
- The RVSD shall timestamp interval data using a real-time clock that maintains accurate time even when power is disconnected from the sensor for extended periods of time.

- The RVSD shall employ a dual radar design that includes two receive channels.
- The RVSD shall use frequency modulated continuous wave (FMCW) radar. All transmit modulated signals shall be generated by means of digital circuitry, such as a direct digital synthesizer, that is referenced to a frequency source that is at least 50 parts per million (ppm) stable over the specified temperature range, and ages less than 6 ppm per year.
- This specification ensures that, during operation, the RVSD strictly conforms to FCC requirements and that the radar signal quality is maintained for precise algorithmic quality. Analog and microwave components within an RVSD have characteristics that change with temperature variations and age. If the output transmit signal is not referenced to a stable frequency source, then the RVSD is likely to experience unacceptable frequency variations which may cause it to transmit out of its FCC allocated band and thus will be non-compliant with FCC regulations.
- The RVSD antennas shall be designed on printed circuit boards.
 - The vertical beam width of the RVSD at the 6 dB points of the two-way pattern shall be 65 degrees or greater.
 - The horizontal beam width of the RVSD at the 6 dB points of the two-way pattern shall be 6 degrees or less.
 - The sidelobes in the RVSD two-way antenna pattern shall be -40 dB or less.
- The RVSD shall transmit a signal with a bandwidth of at least 240 MHz.
- The RVSD shall provide at least 4 RF channels so that multiple units can be mounted in the same vicinity without causing interference between them.
- The RVSD shall have a method for automatically defining traffic lanes or detection zones without requiring user intervention. This auto-configuration process shall execute on a processor internal to the RVSD and shall not require an external PC or other processor.
- The RVSD shall include graphical user interface software that displays all configured lanes and the current traffic pattern using a graphical traffic history representing at least the last 1.5 seconds of detected traffic. This graphical traffic history shall also allow the option of displaying the measured speed or length of a detected vehicle.
 - The software shall support the following functionality:
 - Automatically find the correct baud rate
 - Automatically find the correct serial communication port
 - Operate over a TCP/IP connection
 - Shall be able to save/back up the RVSD configuration to a file or load/restore the RVSD configuration from a file
- The RVSD shall be capable of continuous operation over an ambient temperature range of -40°F to 165.2°F.
- The RVSD shall be capable of continuous operation over a relative humidity range of 5% to 95% (non-condensing).
- The RVSD shall be capable of recovering from a power outage and resuming vehicle detection within 6 seconds after resumption of power.

All Radar Vehicle Sensing Detector components shall be current production equipment produced by the same manufacturer as otherwise noted herein or approved in advance by MaineDOT.

The Radar Vehicle Sensing Detector must meet the National Electrical Manufacturers Association (NEMA) 250 Standards for the enclosure and the ability to simultaneously detect and track multiple vehicles.

Supply Requirements. The Contractor shall be responsible for furnishing all training, cables, connectors, equipment, shipping and incidental items necessary to provide for a complete RVSD. The supply of a complete Radar Vehicle Sensing Detector shall include all associated equipment including, but not limited to, the following:

- a. Sensor Power Supply. The Contractor shall furnish one RVSD manufacture AC/DC power supply per sensor.
- b. Detector Ethernet communications interface panel. The Contractor shall furnish one detector communications interface panel per cabinet.
- c. Surge Suppression. The Contractor shall furnish one RVSD manufacture surge suppression interface panel per cabinet.
- d. Detector Cable. The Contractor shall furnish the RVSD manufacture specified cable type, all connectors, sealing tape for the installation of the connector cable between the RVSD and the interface panel.
- e. Mounting Brackets and Ancillary Equipment. The Contractor shall furnish RVSD manufacture detector mounting brackets and all associated equipment, materials to attach the detector assemblies to a mast arm or extension bracket.

The Contractor shall supply the Radar Vehicle Sensing Detector as directed by the Engineer or MaineDOT.

Service and Repair Requirements. Any component of the system needing repair will be shipped to the Contractor by the Department at the Department's expense. The repaired or replacement components shall be shipped to the Department at the Contractors expense. Repairs shall include all materials and labor for damaged or faulty components not covered under warranty. A replacement component for use by the Department shall be furnished by the Contractor at no cost if the original equipment requires more than 60 days to repair and is still within the three year warranty period.

Method of Measurement. The Radar Vehicle Sensing Detector will be measured for payment as each for a fully supplied and operational Radar Vehicle Sensing Detector. The item shall be unconditionally warranted for a minimum of 3 years from the date of supply and certified to comply with the product's published specification by an independent laboratory. Repairs shall be measured for payment as each for damaged or faulty components.

Basis of Payment. Payment will be full compensation for furnishing, transporting, servicing, repairing and handling of each complete Radar Vehicle Sensing Detector System to the MaineDOT at the unit price supplied in Appendix A Schedule of Items.

Delivery. Delivery of finished product shall be on or before date shown in Section B. Time of the Contract. The Contractor shall notify MaineDOT, Deborah Morgan, Traffic Monitoring Supervisor, of Augusta Headquarters, 207-624-3606 or cell 207-592-0780 a minimum of 48 hours prior to delivery. Alternative contacts are Aaron Buotte at 207-215-8103 or Alex Hanscom at 207-592-0875. The Contractor shall deliver the materials only during the following times: Monday through Friday, 7:00 AM through 3:30 PM except for they may not deliver on Maine State Government holidays, or government closure days. The Department will not off-load the materials at the delivery site.

Contract Administrator

The contract administrator for this contract will be:

Name: Deborah Morgan (Deborah.Morgan@maine.gov)
Title: Traffic Monitoring Supervisor
Address: Maine Department of Transportation
16 State House Station Road, Augusta, ME 04333-0016

Invoices, Measurement and Payments The Contractor shall submit an itemized bill to the Department for materials following delivery for approval and payment. At a minimum, invoices shall include the following information:

Contractor name, address & Contract Number
Invoice Date & Number
Dates of Delivery
Items and Quantities at Bid Price
Sensor repair dates received and returned

The Department will pay based upon the materials delivered at the prices bid and the invoices approved. Payments to the Contractor shall be full compensation for furnishing all labor, equipment, materials, services, and incidentals used to supply and repair the materials under the Contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of any kind arising from the nature or prosecution of the Work. The Department may withhold payments claimed by the Contractor on account of incomplete or incorrect invoices or materials that are defective or not in conformance with the contract.

Material Quality. Materials and manufactured products shall be new unless otherwise specified, free from defect, and in conformity with the contract. If there is no applicable standard set forth in this Contract for a particular item, then the item shall be in accordance with industry standards prevailing at the time of bid. The Department has the authority to inspect all Materials and every detail of the Work. The Department may reject the finished product if any of the components do not comply with the specifications. The Department may reject materials not conforming to the Specifications at any time.