

**ADVERTISEMENT TO BIDDERS  
FOR  
WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM**

**STREETS & TRANSPORTATION DIVISION  
CITY OF GRAND ISLAND, NEBRASKA**

Sealed bids, including one original and two copies, will be received at the office of the **City Clerk, 100 East First Street, P.O. Box 1968, Grand Island, Nebraska, 68802, until 2 p.m. (local time) Tuesday, September 17<sup>th</sup>, 2013 for WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM**, FOB the City of Grand Island. Bids will be publicly opened at this time in the City Council Conference Room #1, located on the first floor of City Hall. Bids received after the specified time will be returned unopened to sender.

Specifications are on file in the office of the Public Works Department, 100 East First Street, Grand Island, Nebraska 68801. Bids shall be submitted on forms which will be furnished by the Street and Transportation Division Office.

Bids will be evaluated by the purchaser based on price, conformance with specifications, availability, and quality. The Purchaser reserves the right to reject any or all bids, to waive technicalities, and to accept whichever bid that may be in the best interest of the City.

No bidder may withdraw said bid for a period of sixty (60) days after date of bid opening.

RaNae Edwards  
City Clerk

**CITY OF GRAND ISLAND  
BID REQUEST INSTRUCTIONS**

The City of Grand Island, Nebraska, Public Works Department,  
Street & Transportation Division,  
respectively requests sealed bids for the following:

**WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM**

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As part of the Bid Request, the following items are attached:

- Advertisement to Bidders
- Bid Request Instructions
- General Specifications
- Minimum Specifications
- Bid Sheet
- Attachment 1 – Intersection Layout
- Attachment 2 – Texas Department of Transportation Special Specification TO-8010

Sealed bids must be received by 2 p.m. (local time) Tues., September 17th, 2013 and be addressed to:

City Clerk  
City of Grand Island  
RE: WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM  
100 East First Street  
P.O. Box 1968  
Grand Island, NE 68802-1968

Bids must include the following:

- One (1) original, completed bid sheet(s)
- Two (2) copies of completed bid sheet(s)
- Envelope containing the above, clearly marked as the bid for:  
WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM

All information required in specifications must be included with the bid.

Supplementary material that the bidder wishes to include will be appreciated, but is not required.

**Please return one original and two (2) copies of bid sheet(s). Failure to submit the correct number of copies will result in the bid being considered nonconforming and therefore not considered.**

Please direct bid questions in writing to:  
Shannon Callahan, Street Superintendent  
shannonc@grand-island.com or FAX (308) 385-5373

**CITY OF GRAND ISLAND**  
**MINIMUM BID SPECIFICATIONS**  
FOR  
**WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM**

**SCOPE**

Wireless vehicle detection system capable of stop bar detection, data collection, advance detection, and phase extension. This system will be used at a traffic signal controlled intersection with four approaching directions of traffic and is currently equipped with: TS2 Type 2 Cabinet, M-50 controller, loop detectors, and 35 MPH design speed. See Attachment 1 for intersection layout and approximate location of advanced and stop bar detection.

**GENERAL**

Shall be in accordance with the Texas Department of Transportation Special Specification TO-8010, Rev. 4-2011, WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM, Section 1.0 GENERAL.

Purchasing Agency shall mean the City of Grand Island, Nebraska.

All components shall be from one (1) manufacturer and shall be new/unused.

**FUNCTIONAL CAPABILITIES**

Shall be in accordance with the Texas Department of Transportation Special Specification TO-8010, Rev. 4-2011, WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM, Section 2.0 FUNCTIONAL CAPABILITIES.

**DETECTION PERFORMANCE**

Shall be in accordance with the Texas Department of Transportation Special Specification TO-8010, Rev. 4-2011, WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM, Section 3.0 DETECTION PERFORMANCE.

**IN-PAVEMENT SENSOR**

Shall be in accordance with the Texas Department of Transportation Special Specification TO-8010, Rev. 4-2011, WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM, Section 4.0 IN-PAVEMENT SENSOR.

**INTERFACE MODULE**

Shall be in accordance with the Texas Department of Transportation Special Specification TO-8010, Rev. 4-2011, WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM, Section 5.0 INTERFACE MODULE.

**COMMUNICATION REQUIREMENTS**

Shall be in accordance with the Texas Department of Transportation Special Specification TO-8010, Rev. 4-2011, WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM, Section 6.0 COMMUNICATION REQUIREMENTS.

**CITY OF GRAND ISLAND  
MINIMUM BID SPECIFICATIONS  
FOR  
WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM**

**SOFTWARE**

Shall be in accordance with the Texas Department of Transportation Special Specification TO-8010, Rev. 4-2011, WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM, Section 7.0 SOFTWARE.

**INSTALLATION AND TRAINING**

Shall be in accordance with the Texas Department of Transportation Special Specification TO-8010, Rev. 4-2011, WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM, Section 8.0 INSTALLATION AND TRAINING.

**WARRANTY, MAINTENANCE, AND SUPPORT**

Shall be in accordance with the Texas Department of Transportation Special Specification TO-8010, Rev. 4-2011, WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM, Section 9.0 WARRANTY, MAINTENANCE, AND SUPPORT.

**CITY OF GRAND ISLAND  
 BID SHEET  
 FOR  
 WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM**

The undersigned bidder, having examined all specifications and other bidding documents, and all addenda thereto, and being acquainted with and fully understanding all conditions relative to the furnishing of the specified material to the City of Grand Island, Nebraska, hereby proposes to furnish material(s) at the following price:

Line Item #	Description	Product Number	Approx Quantity	Unit Price	Total Price
1	Access Point (including hardware for installation)		1		
2	Repeater Unit		4		
3	Mounting Bracket		4		
4	Interface Module (if multiple components, please list as separate items on lines 8,9,and/or 10)		1		
5	In-Pavement Wireless Sensor – Traffic Signal Control		20		
6	In-Pavement Wireless Sensor – Advanced Detection & Data Collection		8		
7	Epoxy for Installation		28		
8	<i>(Other, please indicate description and quantity)</i>				
9	<i>(Other, please indicate description and quantity)</i>				
10	<i>(Other, please indicate description and quantity)</i>				
	<b>Total</b>				
Option 1	Software				

\*The Street & Transportation Division of the Public Works Department for the City of Grand Island does not pay Federal, State, or City tax; do not include tax in your pricing.

Manufacturer:	
Are the products listed above approved by any Department of Transportation agency?	Y or N
If yes, please list which state(s):	

**CITY OF GRAND ISLAND  
BID SHEET  
FOR  
WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM**

Bid of \_\_\_\_\_,  
hereinafter called "Bidder," organized and existing under the laws of the State of \_\_\_\_\_,  
to the City of Grand Island, Nebraska, hereinafter called "City" to provide:

**WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM**

In compliance with the City's advertisement for bids, bidder hereby agrees to provide the previously mentioned services, materials, and/or equipment, at the price stated on the bid sheet, in compliance with all requirements and specifications contained in the Bid Request, and further agrees that the language of this document shall govern in the event of a conflict with the bid.

The City reserves the right to accept or reject any or all bids, and to waive any informality and to enter into such contract as it shall deem to be in the City's best interest.

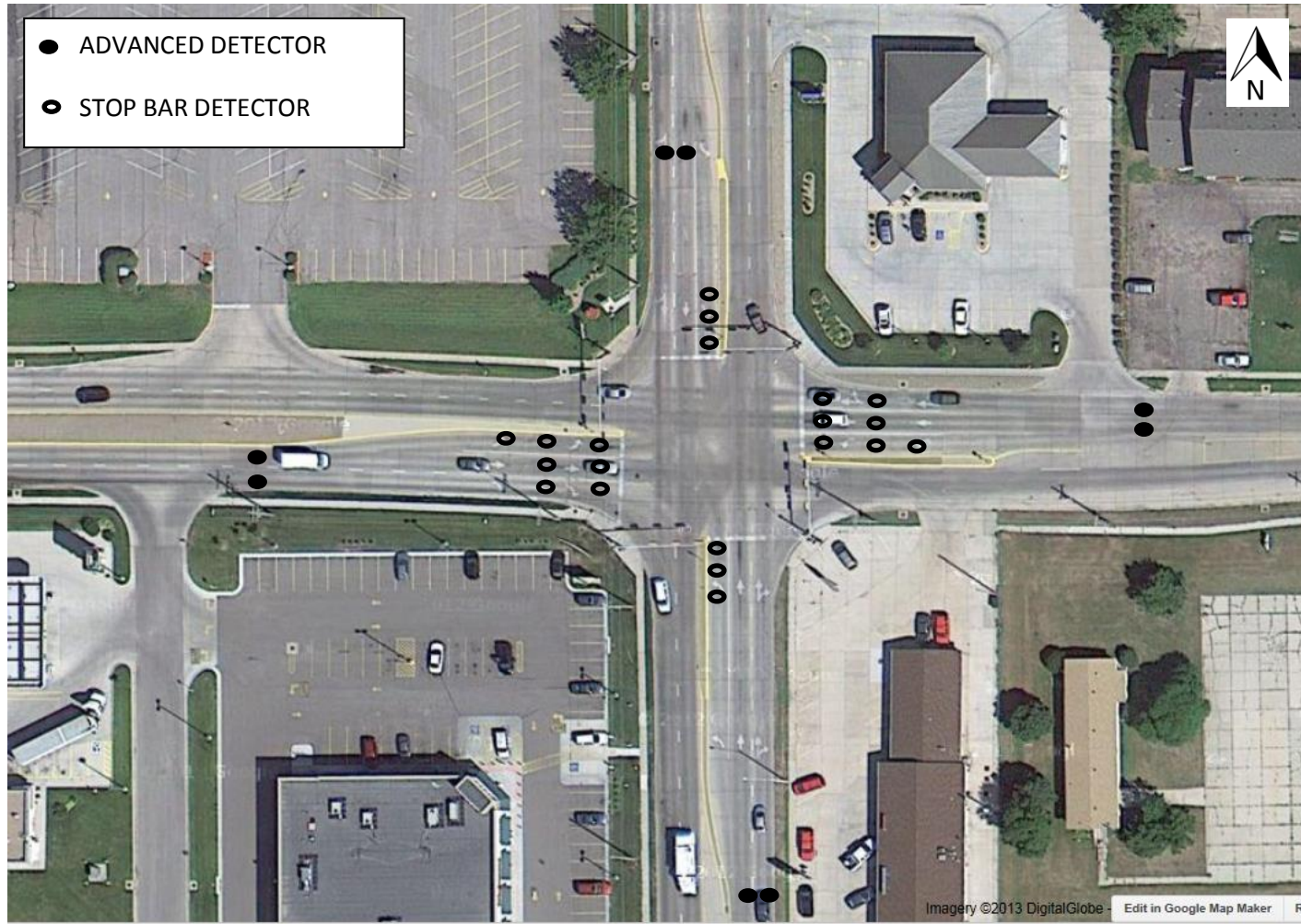
**Please return one original and two (2) copies of each bid sheet.**

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 2013.

Respectfully submitted,

_____ Company	_____ Address
_____ Signature of Bidder	_____ Telephone Number
_____ Name (Print or Type)	_____ Fax Number
_____ Title	_____ E-mail Address

**CITY OF GRAND ISLAND  
ATTACHMENT 1 – INTERSECTION LAYOUT  
FOR  
WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM**



*\*LOCATIONS ARE APPROXIMATE. LAYOUT ABOVE IS FOR GENERAL GUIDANCE ON INTERSECTION GEOMETRICS AND QUANTITY/TYPE OF DETECTORS.*

CITY OF GRAND ISLAND  
ATTACHMENT 2  
FOR  
WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM

Traffic Operations  
Division

Traffic  
Management  
Section

**TEXAS DEPARTMENT OF TRANSPORTATION  
SPECIAL SPECIFICATION TO-8010  
WIRELESS MAGNETOMETER VEHICLE DETECTION SYSTEM**

**1.0 GENERAL**

This special specification sets forth the minimum requirements for a wireless magnetometer vehicle detection system (WMVDS) that detects vehicles on a roadway via changes to the earth's magnetic field. When a change is detected the WMVDS provides contact closure to a traffic controller or similar device.

1.1 The WMVDS shall consist of the following components: In-pavement sensors, all wireless communication equipment needed to establish communication links to the controller cabinet, interface modules compatible with NEMA TS-2 V2.06b cabinet detector rack, surge protection for the WMVDS and system software for set-up and monitoring of the WMVDS.

1.2 Supplier or manufacturer must provide all system software and materials necessary for installation and maintenance of the WMVDS. Supplier must provide documentation for the use of software, installation instructions, and maintenance of the system.

1.4 Definitions

1.4.1 3-Axis Magnetometer: Instrument used for measuring the magnitude and direction of the earth's magnetic field. Device used to detect changes in the earth's magnetic field within the vicinity of the instrument. The 3-axis magnetometer measures the height, width and length of the magnetic field around the instrument referenced as the X, Y, and Z axis.

1.4.2 Interface Module: Module used to plug into the detector rack of a NEMA TS-2 traffic controller cabinet or input file 170/2070 traffic controller cabinet. Provides contact closure to the assigned detector channel when vehicle detection is achieved by the in-pavement sensor.

1.4.3 Wireless Communications Link: data communications channel connecting to nodes of a communications link using a radio frequency (RF) to connect the nodes. Wireless links to connect nodes such as: access point to the sensor and/or access point to repeater.

1.4.4 Access Point: Wireless communications device used as the connecting node to establish a data communications link from the sensor to the interface module.

1.4.5 Repeater: Wireless node used to receive/ transmit data with the access point. Repeater is typically located near the sensor and may be used in tandem with another repeater for longer distances or to communicate around obstructions.

1.4.6 In-pavement Sensor: Device placed in the roadway and used to detect a change in the earth's magnetic field when a vehicle passes over its measured area of influence. In-pavement sensor houses the 3-axis magnetometer used to sense the change in the earth's magnetic field. Sensor acts as a data communications device to an access point to transmit contact closure when detection is achieved by the 3-axis magnetometer.



- 1.4.7 System software: Computer software used for set-up and monitoring of the WVMDS. Software allows the user to assign sensors to detector channels and to select sensitivity levels needed for the application.
- 1.4.9 Detection zone: Area of measured magnetic lines of flux by the in-pavement sensor.
- 1.4.10 Presence Detection: The ability of a vehicle detector to sense that a vehicle, whether moving or stopped, has appeared in its zone of detection.
- 1.4.11 Passage Detection: The ability of a vehicle detector to detect the passage of a vehicle moving through its zone of detection and to ignore the presence of a vehicle stopped within its zone of detection.
- 1.4.13 Detection Accuracy: The measure of the basic operation of a detection system (shows detection when a vehicle is in the detection zone and shows no detection when there is not a vehicle in the detection zone).
- 1.4.14 Delay Timing: When selected, applies delayed contact closure to the associated detector channel input. When a vehicle is detected by the WMVDS, the delay timing must time out before contact closure can occur to the detector channel.
- 1.4.15 Extension Timing: When selected, applies additional contact closure to the associated detector channel input. When a vehicle is no longer detected within a detection zone, extension timing must time out before contact closure is removed from the associated detector channel.
- 1.4.16 Hysteresis: The lagging of an effect behind its cause; especially the phenomenon in which the magnetic induction of a ferromagnetic material lags behind the changing magnetic field

## 2.0 FUNCTIONAL CAPABILITIES

- 2.1 The WMVDS must be capable of detecting a variety of vehicle types including bicycles, motorcycles, automobiles, large trucks and light rail trains. The system must allow the user to select sensitivity levels that adjust the amount of hysteresis to the magnetic field needed to achieve contact closure to the assigned detector channel. Magnetometer sensitivity level adjustments must allow for different levels of vehicle detection. Sensitivity level settings to the magnetometer must be accomplished using WMVDS software via wireless communication.
- 2.2 The WMVDS must be able to perform presence or passage detection as described in this specification.
- 2.2 The WMVDS must be able to perform delay and extension timing as described in this specification.
- 2.3 Equipment failure such as: the sensor, communications link, access point radio, repeater radio (if used) or interface module, shall result in constant vehicle call "fault state" on the affected detector channel to the traffic controller.

## 3.0 Detection Performance

- 3.1 Detection accuracy must be comparable to properly operating inductive loops. Detection accuracy shall include the WMVDS ability to detect the presence of any vehicle within the sensors magnetic field and to communicate contact closure to the appropriate detector channel. If the WMVDS "false detects", (system applies contact closure when a vehicle is not present in the sensors magnetic field), this will count against the accuracy measured during performance testing. A minimum of 97% detection accuracy must be achieved by the WMVDS when measured in a 24 hour period.
- 3.2 The WMVDS shall provide real-time vehicle detection (within 150 milliseconds (ms) of vehicle arrival). Once detection is achieved by the sensor, the traffic controller must receive contact closure to the assigned detector channel within the 150 ms time frame.
- 3.3 Any deviation to hardware, software or accompanying elements without prior testing and approval from TxDOT, shall be grounds for automatic removal from the TxDOT Prequalified Products List (QPL) for an undetermined time.

#### **4.0 In-pavement Sensor**

- 4.1 The in-pavement sensor unit must be designed to operate reliably in adverse weather conditions and rated to operate from -40° F to +176° F.
- 4.2 In-pavement sensors must be capable of presence detection as defined in this specification. The in-pavement sensors as a minimum must create a 6 foot length x 6 foot width accurate area of detection when used for presence detection at an intersection.
- 4.3 In-pavement sensors must be capable of passage detection as defined in this specification. The in-pavement sensors as a minimum must create a 6 foot length x 4 foot width accurate area of detection when the sensors are set back from the intersection for passage detection on an arterial.
- 4.4 In-pavement sensors as a minimum must use a 3-axis magnetometer in the design and operation of the unit. The sensor must monitor the earth's magnetic field through out the course of the day and establish a baseline reference value for the X, Y, and Z axis. As a minimum the refresh rate on the magnetometer's processor will be 128 HZ, providing a sampling rate of 8 ms to the earth's magnetic field. As a minimum, during periods of no detection the X, Y, and Z axis will refresh the baseline reference value every 8 ms. The sensor must be able to detect a change in the magnetic field as referenced to the sensitivity setting selected by the user and the size of the vehicle passing over its detection zone.
- 4.5 The in-pavement sensor must operate on batteries without the need for underground power or communication cable connections to the unit.
- 4.6 The average operating life span of the sensor under battery power must be a minimum of 10 years.

#### **5.0 Interface Module**

- 5.1 The operating temperature range of the interface module, as a minimum must be -30° F to +165° F.
- 5.2 The interface module shall be designed to operate in a NEMA TS-2 detector rack or 170/2070 cabinet input file. The interface module must be capable of operating on 12V or 24V DC (detector racks may be wired for 12V or 24V DC).

- 5.3 The interface module must provide 2 or 4 detector channels. Sensors must be assignable to the available detector channels on the interface module using software provided with the WMVDS.
- 5.4 The front face of the module shall identify detector channel 1 and detector channel 2. Each must use an LED to indicate contact closure on the channel. When vehicle detection is achieved, the LED will be on and contact closure applied to the detector channel. During periods of no vehicle detection the LEDs will be in an off state and no contact closure will be applied to the detector channel.
- 5.5 The interface module will use an LED indication to indicate a "fault state" with the WMVDS. When the fault state is active contact closure will be applied to the appropriate detector channel.
- 5.6 A link light will be used to indicate a valid communications link is established between the interface module and access point. If no link is established between the two devices, the interface module will apply contact closure to all detector channels.

## **6.0 Communication Requirements**

- 6.1 Access points and repeaters must be rated for outdoor use and housed in an appropriate NEMA enclosure. The operating temperature range of these devices, as a minimum, must be from -30° F to +140° F.
- 6.2 As a minimum, access points must be capable of handling data communications for up to 48 sensors. The access points must be able to communicate to sensors from a distance of 150 feet when mounted 20 feet above the road surface. As a minimum access points must be able to communicate to repeaters from a distance of 1,000 feet.
- 6.3 All communications equipment will operate in an unlicensed frequency range permitted by the FCC.
- 6.4 The communications system must have alternative frequency channels selectable by the user. Should interference occur on a frequency channel the user must be capable of switching to an alternative channel free of interference.
- 6.5 All communications equipment must meet all applicable IEEE standards and FCC standards as required for the frequency range used by the WMVDS.
- 6.6 Surge protection meeting GR 1089 standards must be used for devices receiving power over Ethernet.
- 6.7 Access points must be able to operate from power over Ethernet (48V DC) or under battery power with an average life span of 5 years. When operating from battery power, the use of a solar array to trickle charge batteries is optional as long as the design life of the system is 5 years.

## **7.0 Software**

- 7.1 Firmware for in-pavement sensors and access points must be upgradable via a wireless connection to the device.

- 7.2 The software must allow for sensitivity adjustments to the sensor detection algorithms used by the WMVDS. As a minimum the system will use 16 different sensitivity levels ranging from .12% to 25.6% of change in milli-gauss of the measured magnetic field. The sensitivity adjustments must be selectable by the user. Contact closure will be transmitted to the interface module when a change to the magnetic field is equal to or greater than the selected sensitivity setting.
- 7.3 The software must allow the user to program delay time as defined in this specification. As a minimum, the software must allow for a range 0 to 25 seconds of delay time.
- 7.4 The software must allow the user to program extension time as defined in this specification. As a minimum, software must allow for a range 0 to 5 seconds of extension time.
- 7.5 The software will allow the user to assign selected sensors to specific detector channels. In-pavement sensors must be assignable to detector channels via system software.

## **8.0 INSTALLATION AND TRAINING**

- 8.1 When requested by TXDOT personnel or purchasing agency, the supplier/manufacturer of the WMVDS shall supervise and assist in the installation and set-up of the equipment. A factory certified representative from the manufacturer shall be on-site during installation of the WMVDS.
- 8.2 If requested by TXDOT personnel or purchasing agency, up to two days of training shall be provided in the operation, setup and maintenance of the WMVDS. Instruction and materials shall be provided for a maximum of 20 persons and shall be conducted at a location selected by TXDOT or purchasing agency. TXDOT or purchasing agency shall be responsible for the cost of training.
- 8.3 Instruction personnel are required to be certified by the equipment manufacturer. The User's Guide is not an adequate substitute for practical, classroom training and formal certification by an approved agency.
- 8.4 Formal levels of factory authorized training are required for installers, contractors and system operators. All training must be certified by the manufacturer.

## **9.0 WARRANTY, MAINTENANCE AND SUPPORT**

- 9.1 The WMVDS must be warranted to be free of defects in material and workmanship for a period of 5 years from date of shipment from the supplier's facility. During the warranty period, the supplier shall repair with new or refurbished materials, or replace at no charge, any product containing a warranty defect provided the product is returned FOB to the supplier's factory or authorized repair site. Product repair or replaced under warranty by the supplier will be returned with transportation prepaid. This warranty does not apply to products damaged by accident, improper operation, abused, serviced by unauthorized personnel or unauthorized modification.
- 9.2 During the warranty period, technical support must be available from the supplier via telephone within 4 hours of the time a call is made by a user, and this support shall be available from factory certified personnel or factory certified installers.

- 9.3 Ongoing software support by the supplier shall include updates of the WMVDS processor unit and software. These updates shall be provided free of charge during the warranty period. The update of the WMVDS software shall be tested and approved by TxDOT before installation.
- 9.4 The supplier must maintain a program for technical support and software updates following expiration of the warranty period. This program shall be made available to TxDOT in the form of a separate agreement for continuing support.
- 9.5 The supplier must maintain an adequate inventory of parts to support maintenance and repair of the WMVDS.