

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT****SPECIAL PROVISION****JOB BB0602****AUTOMATED WORK ZONE INFORMATION SYSTEM**

This item shall consist of furnishing, installing, operating, maintaining, and moving from one location to another an Automated Work Zone Information System (AWIS) in accordance with the plans and these specifications. The AWIS components will be located both in and near the limits of the project.

The system shall consist of all hardware, software, and other equipment necessary to collect, process, and display traffic condition data. The data will be used to provide motorists with up-to-the-minute real-time visual traffic information verification, operating speed, and advisory messages via [www.idrivearkansas.com](http://www.idrivearkansas.com), closed circuit television (CCTV), e-mail, and Public Notification System (PNS). All of these items shall be considered part of the AWIS.

The Automated Work Zone Information System shall consist of variable message signs (VMS), vehicle detection sensors (VDS), closed circuit television cameras (CCTV), and a Public Notification System (PNS) equipped to communicate with a monitoring system to provide traveler information through preset messages selected based upon real-time traffic information. The AWIS shall be capable of communicating by cellular data modems to the PNS. CCTV shall be available to monitor and verify traffic conditions at specified locations. The various messages and scenarios used by this system will be the responsibility of the Contractor and approved by the Engineer.

AWIS output shall push data to the Department's [idrivearkansas.com](http://www.idrivearkansas.com) website for use by the public for the viewing of all information being relayed to motorists in the construction and affected areas as well as any speed or congestion information from individual traffic sensors. The Contractor shall coordinate with the Department's Public Information Office and their duly appointed representative (i.e. website consultant) to integrate the data onto existing map(s) on the [idrivearkansas.com](http://www.idrivearkansas.com) website. The data shall be displayed as part of map layers with icons depicting all devices and at an accurate location based on the latitude and longitude of the device. When a device is relocated, the new position should be updated on the data output. Each icon, when activated, shall display the information supplied or displayed by that traffic control sensor/device. The information linked to or displayed with each icon shall be in real-time. This shall occur by the system polling each device a minimum of once every 60 seconds.

The AWIS shall include a Public Notification System in accordance with these specifications. This system shall consist of highway advisory radio (HAR), HAR alert signs, and electronic communications equipment required to disperse credible traffic information to the traveling public. The HAR alert signs shall be designed for activation by authorized Contractor personnel utilizing the communication hardware and software supplied with the HAR. The PNS shall be fully operational at all times from the day the AWIS is installed until the roadway construction in the project area has been considered substantially complete.

**System Requirements.**

**AWIS:** The Automated Work Zone Information System shall be fully operational, as defined in the Operational Test requirements of this special provision, before payment/s will

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT****SPECIAL PROVISION****JOB BB0602****AUTOMATED WORK ZONE INFORMATION SYSTEM**

be made for any of the AWIS components. **Main lane closures will not be permitted until the AWIS is fully operational.** After approval of the Operational Test report by the Engineer, the Contractor shall maintain the AWIS as fully operational for 24 hours a day, 7 days a week, 365 days per year until the project is substantially complete. The AWIS shall utilize sufficient equipment to collect, monitor, and disseminate accurate and timely information about traffic and travel conditions in and near the work zone. Additional equipment deemed necessary by the Engineer in order to accomplish this shall be measured and paid for under the applicable portions of this Special Provision. All equipment will be required to communicate with the central server and software. All equipment will be portable. The central server and software shall be maintained offsite in a secure environment.

- (1) **Layout.** The Contractor shall submit a Final AWIS Layout Plan for approval that will include the location of VMS, VDS, HAR, HAR alert signs, and CCTV. The project plans shall be used as a guide in developing the Final AWIS Layout Plan. This plan will consider the placement of AWIS equipment and signs to avoid conflicts with construction or reducing the effectiveness of construction signing. The Engineer shall approve the Final AWIS Layout Plan before any AWIS equipment is deployed.
- (2) **Equipment.** All equipment components of the AWIS, including VMS, VDS, HAR transmitters, HAR alert signs, and CCTV, shall be in good working order and meet the product standards of the vendor. All equipment should be trailer mounted and solar powered. No prototype equipment will be used unless approved by the Engineer.
  - a. **Variable Message Sign.** Each VMS shall be capable of being remotely controlled by both the control server and software and by the Traffic Control Supervisor in the event of a system malfunction. The VMS used shall be a current model from the manufacturer.
  - b. **Vehicle Detection Sensors.** Each vehicle detection sensor shall be capable of monitoring traffic speed with a detection range of up to 250 feet and the ability to detect up to 10 lanes of traffic in multiple directions.
  - c. **Closed Circuit Television.** The portable CCTV shall be mounted on trailers capable of supporting the camera at a height of 30 ft. The CCTV shall include a solar powered Ethernet connection, 35X optical zoom and 12X digital zoom, IP66 rating and be capable of H.264/Motion JPEG video compression. The CCTV will allow viewing at a minimum of 1 frame per second. The CCTV system shall contain a camera system that automatically changes from color mode to black and white mode under low light conditions in order to render a more detailed image.

The images shall be shown on any computer with a browser capable of viewing JPEG format images.

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT****SPECIAL PROVISION****JOB BB0602****AUTOMATED WORK ZONE INFORMATION SYSTEM**

The vendor shall provide a CDN (Content Delivery Network) to aggregate the video data streams from any AWIS CCTV to a centralized location to reduce bandwidth consumption from each individual CCTV head to head end users and allow for separate controllable/configurable streams for the public and operators.

The CDN should be capable of allowing the Department to stop and start video feeds for public view while not interfering with the provided feeds for the Department's use.

- (3) Communications.** The AWIS shall be installed to provide constant communication to and from VDSs, VMSs, CCTVs, and PNS to the central server and software. The AWIS shall have a complete cycle time of less than 120 seconds that includes delivery of PNS and e-mail information. If the system is not able to operate within the 120-second cycle time, the system shall be considered inoperative. All communication platforms between the AWIS server, VMS, VDS, CCTV, and PNS shall be accomplished by digital cellular modem, radio frequency (FCC or FHWA band), or other means subject to approval by the Engineer.

The Contractor shall secure any necessary FCC and/or FHWA licenses for the operation of the Work Zone Information System, including all necessary license renewals.

Communications with the PNS shall be via digital cellular modems or wireless data interfaces as required. The AWIS shall be capable of changing the PNS broadcast automatically when preset traffic scenarios dictate an interruption in the normal broadcast information. The system shall also be capable of e-mailing information to a minimum of 10 locations, such as police agencies and broadcast media. The e-mail information shall include the scenario in effect and the message delivered to the public on the PNS.

- (4) Message Displays and Scenarios.** The Contractor shall submit to the Engineer for approval a Traveler Notification Plan detailing the messages broadcast along with the traffic scenarios used to activate the messages. The Contractor must have an approved plan to operate the AWIS. Modifications to this plan will be made and executed if the Engineer determines that any of the current messages or traffic scenarios in use is ineffective, that additional traffic scenarios and/or equipment are needed to adequately warn the public, or errors are found in the messages being given to the public. The term "Mile Marker" shall be displayed to the public in lieu of "Log Mile".

E-mails and/or SMS text messages shall be sent to the Engineer as well as the Contractor whenever the system detects a failure of any of the components or if the main power supply to the AWIS system controller or monitoring system is interrupted. Notification shall be sent within 10 minutes of the system detecting a

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT****SPECIAL PROVISION****JOB BB0602****AUTOMATED WORK ZONE INFORMATION SYSTEM**

problem as indicated above. This will provide notice to the Contractor of needed repairs. Failures shall be defined as any system component not checking in with the system controller as scheduled.

E-mails and/or SMS text messages shall be sent to the Engineer whenever the system detects a failure of a VMS, VDS, HAR transmitter, or a CCTV unit, or if the main power supply to the system controller or monitoring system is interrupted. This will provide notice to the Engineer that the system may not be functioning as intended and improper messages may be transmitted to the public.

If the current speed on an approaching roadway segment is at or above the speed limit, the upstream VMS will display either the following message or one approved by the Engineer:

WORK ZONE AHEAD

EXPECT XX MIN DELAY

If the current speed drops to less than 45 MPH but greater or equal to 20 MPH, then either the following message or one approved by the Engineer will be displayed:

SLOW TRAFFIC AHEAD

EXPECT XX MIN DELAY

If the current speed on the approaching roadway drops below 20 MPH then either the following message or one approved by the Engineer will be displayed:

STOPPED TRAFFIC AHEAD

PREPARE TO STOP

EXPECT XX MIN DELAY

**(5) Public Notification System.** The PNS shall include a sufficient quantity of portable highway advisory radio AM broadcast systems to transmit messages to motorists in both directions in and near the project areas regarding lane closures, accidents, and significant delays that may occur within the work zone.

**(a) Layout.** The location of the HAR systems shall be to alert drivers of conditions ahead. The HAR shall be so equipped to allow messages to be changed or transmitted by the AWIS server and software by authorized individuals. The PNS shall be capable of transmitting the messages immediately after contact is made by phone. The messages shall be in accordance with the Federal Communications Commission (FCC) Rules and Regulations Part/Section 90.242.

The Contractor shall provide for the Engineer's approval a Pre-installation Site Survey report that provides recommendations regarding the AM band radio frequency for use at each site and the estimated coverage area of the radio signal.

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT****SPECIAL PROVISION****JOB BB0602****AUTOMATED WORK ZONE INFORMATION SYSTEM**

If the location of the Highway Advisory Radios does not provide adequate coverage or provides overlapping coverage such that all the required messages are not relayed to the public, new locations or new frequencies must be selected. The Public Notification System shall not be installed at a site until the Pre-installation Site Survey report for that site has been approved.

- (b) PNS Equipment.** All equipment furnished under this special provision shall meet or exceed all applicable FCC requirements. The equipment furnished to operate the public notification system shall include all items necessary to operate separate advisory radio systems. Equipment shall include transmitters, antennae, antenna matching network, transmission lines, grounding systems, digital voice announcement unit, equipment cabinets, and power supplies.

All equipment specified herein shall be completely solid state.

All equipment shall have lightning protection on all input and output audio lines and antenna lines.

The equipment shall be capable of connection to the AWIS server and software for control of the transmitter and digital recorder/player. A security code or username and password shall be required to gain access to the control functions.

- (c) HAR Alert Signs with Beacons.** HAR alert signs shall be portable and meet the requirements of Subsection 604.02(b) and also be in accordance with the Manual on Uniform Traffic Control Devices. The message on the sign shall be approved by the Engineer prior to deployment.

**System Reports.** The system shall be capable of automatically creating a log of component failures the system encounters. This log shall be submitted on a weekly basis to the Engineer. The log shall indicate the time the component failed and the time it returned to normal operation. A system activity log showing the system device displays along with the time of the display or measurement shall also be recorded and submitted to the Engineer on a bi-weekly basis coinciding with the Department's bi-weekly estimate periods. Failure to submit the System Reports as specified can result in withholding of monthly operational line items for the weeks in question.

**Operational Test.** The AWIS shall be in fully operational during all phases of construction. Once installed, a five-day Operational Test shall be conducted before any time will be considered for payment. The Contractor shall provide for complete operations support from the vendor during the Operational Test. If any equipment malfunctions occur for a combined period of four hours or more during this Operational Test on any day, no credit will be given for that day for the Operational Test period. Applicable time charges (Working Days and/or Site Use Days) will be assessed during the AWIS Operational Test period. Standard Specification 108.07, Failure to Complete Work on Time, will not apply.

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT****SPECIAL PROVISION****JOB BB0602****AUTOMATED WORK ZONE INFORMATION SYSTEM**

The Contractor shall maintain records of equipment stoppages and resumptions during the five-day Operational Test for submission to the Engineer for his approval. In the event that 10 percent or more of the time similar equipment malfunctions occur that affect the proper operation of the AWIS, the Engineer may declare a system component defective and require replacement of the equipment at no additional cost to the Department. When a system component defect is declared, the five-day Operational Test shall resume after all defective equipment is replaced and the system is fully operational.

The Contractor shall submit a report to the Engineer detailing the daily activity of the system during the Operational Test. The Contractor shall indicate in the report the date and time of any activity necessary to maintain operation of the AWIS during the Operational Test period. Each entry shall include the following information:

- Identity of equipment on which work was performed
- Cause of equipment malfunction (if known)
- A description of the type of work performed
- Time required to repair equipment malfunction

Once the Operational Test Report is received and approved by the Engineer, the AWIS will be considered fully operational and time charges for the AWIS may commence.

After the Operational Test, the term “fully operational” will be defined as all components of the system functioning as designed. **If the system (which includes e-mails and data push to [www.idrivearkansas.com](http://www.idrivearkansas.com)) is discovered to be providing inaccurate information regarding traffic flow, it shall be shut down immediately upon discovery.** If the system is corrected within 4 hours of its malfunction, the system will be classified as “fully operational”. If the system fails to provide accurate information regarding traffic backups and is not corrected within 4 hours, the system will be classified as “not fully operational”. If a component or components fail and causes a “lockup” of the system resulting in inaccurate information being given to the public via PNS elements, the system shall be classified as “not fully operational” if the lockup is not resolved within 4 hours of the initial failure.

To ensure a prompt response to incidents involving the integrity of the Automated Work Zone Information System devices and VMSs, the Contractor shall be required to make all necessary corrections to the components of the system within 12 hours of notification by the Department. If all corrections are made within this 12-hour period and the system is brought back on-line, no pay reduction will occur. Components are the Variable Message Signs, Portable Closed Circuit Television Systems, speed and volume sensors, communications equipment, and all hardware and software required to operate the signs and the data connection to [www.idrivearkansas.com](http://www.idrivearkansas.com). The video feeds to [www.idrivearkansas.com](http://www.idrivearkansas.com) are included in this component listing. If the 12-hour time frame expires and the components are not fully restored

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT****SPECIAL PROVISION****JOB BB0602****AUTOMATED WORK ZONE INFORMATION SYSTEM**

to proper working order, no payment will be made from the time of initial notification until the system is returned to being fully operational.

**Failure to comply with these requirements after the 12 hours have expired will result in a charge calculated by dividing the Daily Road User Cost (shown in the “Site Use (A+C Method)” special provision) by 24 and rounded down to the nearest dollar. This charge will continue until all components of the AWIS are restored to a fully operational status. In assessing this charge, any portion of an hour will be counted as a full hour.**

If the components of the Automated Work Zone Information System are down for more than 10 days in a month, whether they are consecutive or cumulative, then no payment will be made for that month. The Department reserves the right to deactivate the Automated Work Zone Information System components at any time if the Engineer determines that the system is not performing in accordance with these specifications, in which no further payment will be made until the system is restored to a fully operational status.

If a component of the AWIS fails to operate properly on at least 4 calendar days in a 14-day estimate period, the Engineer may declare that component defective and require the Contractor to replace the component at no additional cost to the Department.

**Method of Measurement.**

- (a) **AWIS Mobilization.** The Automated Work Zone Information System Mobilization will be measured as a Lump Sum item.
- (b) **AWIS Operation.** The Automated Work Zone Information System Operational Costs will be measured by the Month. After the system undergoes the Operational Test and is accepted for use, operation and maintenance of the Automated Work Zone Information System will be measured for payment by the month based on the number of days the system is “fully operational” during the project. If the AWIS is “not fully operational” as defined above, no payment will be made for that portion of the month and the penalty as defined above will be assessed.
- (c) **Furnish and Install the Vehicle Detection System, Variable Message Signs, Closed Circuit Television System and the Public Notification System.** Furnish and Install the Vehicle Detection System, Variable Message Signs, Closed Circuit Television System, and the Public Notification System will be measured by the Each.
- (d) **Device Relocation.** After the Operational Test is complete and the system is accepted for use, Device Relocation will be measured for payment by the Each. A device relocation is defined as a 20-foot or more relocation of a VDS, VMS, CCTV Camera, or PNS System. Approval of the Engineer will be required prior to each move to be eligible for reimbursement. **Final removal of any device from the project will not be considered device relocation.**

**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT****SPECIAL PROVISION****JOB BB0602****AUTOMATED WORK ZONE INFORMATION SYSTEM****Basis of Payment.**

- (a) **AWIS Mobilization.** Work completed and accepted and measured as provided above will be paid for at the contract unit price of Lump Sum, which price shall be full compensation for furnishing the server and software; for testing the AWIS; for testing of all VDS, VMS, CCTV cameras, and PNS; for integration of the AWIS data onto the [www.idrivearkansas.com](http://www.idrivearkansas.com) website; for obtaining all FCC and/or FHWA permits and licenses; for providing all required cellular and electrical services; and for all materials, labor, equipment, tools, and incidentals necessary to safely furnish and install this system.
- (b) **Furnish and Install Vehicle Detection System (VDS).** Work completed and accepted and measured as provided above will be paid for at the contract unit price of each, which price shall be full compensation for furnishing, installing, and testing the Vehicle Detection Systems; for obtaining all FCC and/or FHWA permits and licenses; for providing all required cellular and electrical services; and for all materials, labor, equipment, tools, and incidentals necessary to safely furnish and install this system.
- (c) **Furnish and Install Closed Circuit Television System (CCTV).** Work completed and accepted and measured as provided above will be paid for at the contract unit price of Each, which price shall be full compensation for furnishing, installing, and testing the Closed Circuit Television System; for obtaining all FCC and/or FHWA permits and licenses; for providing all required cellular and electrical services; and for all materials, labor, equipment, tools, and incidentals necessary to safely furnish and install this system.
- (d) **Furnish and Install Variable Message Sign (VMS).** Work completed and accepted and measured as provided above will be paid for at the contract unit price of Each, which price shall be full compensation for furnishing, installing, and testing the Variable Message Signs for obtaining all FCC and/or FHWA permits and licenses; for providing all required cellular and electrical services; and for all materials, labor, equipment, tools, and incidentals necessary to safely furnish and install this system.
- (e) **Furnish and Install Public Notification System (PNS).** Work completed and accepted and measured as provided above will be paid for at the contract unit price of Each, which price shall be full compensation for furnishing, installing, and testing the Public Notification System; for obtaining all FCC and/or FHWA permits and licenses; for providing all required cellular and electrical services; and for all materials, labor, equipment, tools, and incidentals necessary to safely furnish and install this system.
- (f) **AWIS Operation.** Work completed and accepted under the item Automated Work Zone Information System operation and measured as provided above will be paid for



**ARKANSAS STATE HIGHWAY AND TRANSPORTATION DEPARTMENT**

**SPECIAL PROVISION**

**JOB BB0602**

**AUTOMATED WORK ZONE INFORMATION SYSTEM**

at the contract unit price bid per Month, which price shall be full compensation for operating, maintaining, inspecting and removing all the components of the AWIS, including the Central Data server; all VMS, all VDS, all CCTV, and the PNS; for renewing all FCC and/or FHWA permits and licenses; for maintaining the data feed to [www.idrivearkansas.com](http://www.idrivearkansas.com); for providing 24-hour access to a system programmer; for maintaining all required cellular and electrical services; and for all materials, labor, equipment, tools, and incidentals necessary to safely maintain this system during construction.

- (g) Device Relocation.** Work completed and accepted under the item Device Relocation and measured as provided above will be paid for at the contract unit price bid per Each, which price shall be full compensation for approved 20-foot or more relocation of a VDS, VMS, CCTV, or the PNS.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
AWIS Mobilization	Lump Sum
Furnish and Install Vehicle Detection System	Each
Furnish and Install Closed Circuit Television System	Each
Furnish and Install Variable Message Sign	Each
Furnish and Install Public Notification System	Each
AWIS Operation	Month
Device Relocation	Each