

Special Specification 6254

Work Zone Intelligent Transportation System



1. DESCRIPTION

The Work Zone Intelligent Transportation System (WZITS) is a portable, real-time, automated, solar powered system that calculates and displays travel time through work zones and provides video surveillance of the roadway to the District Traffic Management Center (TMC). The goal of this system is to provide advance traffic condition information to motorists at key decision points due to construction activity. The information reported to the public will include an accurate drive time through the work zone. This system must be in operation 24 hr. per day, 7 days per week, during the construction period.

This item consists of submittal and approval of a Work Zone Intelligent Transportation System Plan, meeting the deployment requirements in the plans, furnishing, installing, relocating, and operating a portable, automated, solar powered real-time work zone system (WZITS) meeting the requirements, and providing a system manager to maintain the system during the duration of the project. Assume responsibility for any damaged equipment due to crashes, vandalism, adverse weather, etc. that may occur during the system's deployment.

Furnish and maintain this system for gathering traffic data and displaying real-time messages for the work zone. Coordinate any work with adjacent roadway construction projects. Assume responsibility for all charges for communications required to support operation and reporting of the work zone system for the duration of the project. Relocate the devices as directed and when the equipment is no longer required for this project, remove it and retain ownership.

2. MATERIALS

- 2.1. **Changeable Message Signs.** Provide a WZITS that utilizes approved Portable Changeable Message Signs (PCMS) integrated into, and mounted on, each WZITS mobile platform with the other WZITS devices. Provide PCMS capable of displaying 8 characters on each of 3 rows. Properly size each PCMS power supply to allow continuous operation for up to 10 days during periods of darkness and inclement weather.

Integrate each PCMS with a radio/modem, CCTV, and a traffic sensor or other equipment (e.g. controller) mounted on a common trailer and that act as a single "device" for the purpose of communicating with similarly integrated "devices" and displaying real-time traffic condition information. Each device must be capable of communicating through radios/modems with other devices at upstream or downstream locations. Provide Department District staff the ability to override messages displayed on any PCMS in the system. Protect this feature with a password on a website separate from the Department's public website.

- 2.2. **Portable Non-Intrusive Traffic Sensors.** The Smart Work Zone System traffic sensors must be side-fired microwave radar type whose accuracy is not degraded by inclement weather and visibility conditions including precipitation, fog, frost, ice, darkness, excessive dust, and road debris. These sensors must be capable of acquiring traffic data from up to 8 lanes of traffic on a lane-by-lane basis. Properly size each traffic sensor power supply to allow continuous operation for up to 10 days during periods of darkness and inclement weather.
- 2.3. **CCTV.** The Smart Work Zone System CCTVs must be MPEG4 pan, tilt, and zoom cameras located on each Smart Work Zone System mobile platform. They must be remotely controlled from the District TMC and must provide MJPEG images to the District TMC for viewing. Properly size each CCTV power supply to allow continuous operation for up to 10 days during periods of darkness and inclement weather
- 2.4. **Central Computer.** Provide a central computer that has the functionality described below:

2.4.1. **General.** Provide a Graphical User Interface that is compliant with Windows standards. Communication between the central computer and any device must be independent and non-reliant upon communications with any other PCMS or sensor. Alerts to the District TMC or District staff and the Engineer may be provided via SMS text messages, pagers, or e-mail. Alerts must be sent in the event of device failure or traffic delays over 15 min.

2.4.2. **Data Processing Software.** Provide Data Processing Software that has the following capabilities:

- to collect and store sensor data;
- to compare traffic data collected from sensors to user-defined thresholds and automatically update one or more PCMS;
- to estimate travel times and automatically update one or more PCMS consistent with user-defined thresholds; and
- to display alternate route messages consistent with user-defined thresholds.

Data Management. The Data Management must provide storage of speed, volume, occupancy, PCMS message history, and travel times as well as appropriate sensor status for each day.

Ensure the radar detectors provide accurate, real-time volume, average speed, and occupancy data.

Provide radar detectors with user configurable settings for a collection interval from 20 sec. to 15 min. and polling intervals from 20 sec. to 1 hr.

Ensure the radar detector unit or accompanying field equipment provides a minimum of 3 hr. of local storage for detection interval settings of 20 sec. to 15 min. in local storage to reduce data loss during communications outages.

Ensure the radar detector transfers locally stored data to the Transportation Sensor System (TSS) at the District TMS when communication is restored.

Transportation Sensor System (TSS) Protocol Document (TSS-Protocol) is available through the "TSS Tools" link on the Department's website, URL: <http://www.txdot.gov/business/resources/information-technology/engineering-software.html>.

3. CONSTRUCTION

3.1. **System Requirements.** Install the WZITS on the project as shown in the plans. Each Work Zone Intelligent Transportation System mobile platform must consist of the following as a minimum:

- Portable changeable message sign;
- Portable non-intrusive traffic sensor;
- Pan/tilt/zoom MPEG 4 CCTV camera;
- Radio/Modem;
- Solar platform power supply and batteries for devices on the platform; and
- The mobile platform must be capable of being leveled and secured to the ground to prevent theft and physical displacement due to winds during operation.

The WZITS must include 1 central computer.

3.2. **Smart Work Zone Submittal.**

3.2.1. **General.** Submit to the Engineer for approval a written and illustrated WZITS Submittal 3 weeks before mobilization of any component of the WZITS System. Include in the WZITS Submittal the items required in this specification. Do not start any construction activities that will affect traffic on the project until the WZITS Submittal is approved by the Engineer.

- 3.2.2. **Content of the WZITS Submittal.** The WZITS Submittal must include, as a minimum, the following items:
- A shop drawing of each type of WZITS unit with equipment description including make and model.
 - A drawing showing WZITS unit locations based on traffic control plan and approximate locations identified in the plans.
 - A description of the proposed thresholds and proposed PCMS messages to be implemented.
 - The name and contact information of the WZITS System Manager.
 - A detailed description of the proposed methods of communication between WZITS devices and the WZITS Central Computer and between the WZITS Central Computer and the District TMC.
 - Proposed corrective method procedures including response times and notification process.
- 3.2.3. **Approval of Submittal.** Obtain approval of the WZITS Submittal by the Engineer before placing any WZITS devices. Approval is conditional and will be predicated on satisfactory performance during construction. The Engineer reserves the right to require the Contractor to make changes in the WZITS Submittal and operations, at no additional cost to the Department, including removal of personnel, as necessary, to obtain the quality specified. The Contractor must notify the Engineer in writing a minimum of 7 calendar days before any proposed changes in the WZITS Submittal. Proposed changes are subject to approval by the Engineer.
- 3.3. **System Manager.** Employ a system manager for the WZITS. The system manager must be locally available to maintain system components, maintain the website data interface, move portable devices as necessary, and respond to emergency situations. The system manager must be responsible for coordinating the placement of devices in the project areas. It is the responsibility of the system manager to move system components that interfere with construction operations and relocate the components to another area. The system manager must supply a local phone number or a toll free number to the Engineer to contact the system manager or other system representative at any time. The system manager must not perform any other duties on the jobsite.
- 3.4. **Testing.** Once the WZITS is installed, it must undergo a 5-day operational test. The operational test must include a test of the system in operation during a lane closure to ensure that the WZITS equipment (including the changeable message signs, traffic sensors, central computer, communication devices, and website) is operating in a fully functional manner and in accordance with the Smart Work Zone Plan for a minimum duration of 5 calendar days. Provide for complete operations support from the vendor during the operational test, and provide verification that the reported drive time through the work zone accurately reflects actual field conditions. If any equipment malfunctions occur for a combined period of 4 hr. or more during this operational test on any day, no credit will be given for that day for the operational test period, and the five-day operational test will reset.
- Maintain records of equipment stoppages and resumptions during the 5-day operational test for submission to the Engineer. In the event that in 10% or more of the time, similar malfunctions occur that affect the proper operation of the WZITS, 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 5-day operational test must begin again after the defective equipment is replaced and the system is fully operational.
- 3.4.1. **Report.** Submit a report to the Engineer detailing the daily activity of the system during the operational test. The report must indicate the date and time of any activity necessary to maintain operation of the WZITS during the operational test period. Each entry must include the following information:
- Identity of the equipment on which work was performed;
 - Cause of equipment malfunction (if known);
 - A description of the type of work performed; and
 - Time required to repair equipment malfunction.

Once the operational test report is received and approved by the Engineer, the WZITS will be considered operational and the system will be accepted for use.

4. MEASUREMENT

Work Zone Intelligent Transportation System (WZITS) will be measured by one lump sum and will be divided into the following payment schedule:

- 35% will be paid when all of the WZITS equipment is delivered to the jobsite.
- 25% will be paid when the Engineer approves the Operational Test Report.
- 20% will be paid after 30 calendar days of full system operation.
- 20% will be paid after traffic is in its final position, the contractor's equipment has been removed from the project, and historical data has been provided to the Engineer.

- 4.1. **Deduction for Failed System.** A percentage of the lump sum will be deducted should the system malfunction for 3 or more consecutive calendar days or any total of 5 calendar days in any one calendar month after the approval of the operational test. This deduction will be based on a ratio of calendar days of unsuccessful operation to total calendar days of operation following the approval of the operational test. This deduction will not reduce the total system payment to less than 60% of the lump sum.

5. PAYMENT

The work performed and materials furnished in accordance with the Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Work Zone Intelligent Transportation System." This price is full compensation for furnishing, installing, relocating, operating, maintaining, testing, monitoring, providing a website, providing historical data, and removing the Work Zone Intelligent Transportation System (WZITS), including labor, tools, equipment, and incidentals required for proper operation of this installation.