Special Specification 6424
High Water Warning System

1. DESCRIPTION

Furnish and install a High Water Warning System (HWWS) to monitor high water condition locations as shown on the project plans. The HWWS will include a flashing beacon controller, solar panel, water level sensors, batteries, and a microprocessor based controller system. The system will be specifically designed for monitoring high water level conditions.

The information from the HWWS sites will be transmitted to the local District Transportation Management Center (TMC) via the Department's Intelligent Transportation System (ITS) network, where the data will be presented to the operations staff via vendor supplied software. The 2-Way ALERT2 software will be capable of being monitored in real time from coordinating agencies.

The HWWS will include hardware, software, and license to operate as follows:

- 2-Way Alert2 Base Station Transceiver;
- data logger or controller;
- radio – VHF 135 to 174 MHz / UHF 406 to 470 MHz (up to 8 independent TX or RX pre-programmed frequencies, switch selectable);
- solar panel;
- remote unit capabilities – 2-Way ALERT2;
- LED flashing beacons;
- sensors – radar;
- ethernet connector;
- antenna (GPS) connector – SMA (F); and
- microprocessor based controller system.

Data transfer between the HWWS server will be compliant with the most current Federal standard NTCIP Environmental Sensor Station (ESS) protocols. Ensure the HWWS meets command requirements of the 2-Way ALERT2, such as remote solar power flashing beacon stations capable of communicating with the base station. Ensure the HWWS is capable of receiving data from the radar water level sensors and sending commands to the remote stations to turn on or turn off the flashing beacons.

2. MATERIALS

2.1. **HWWS Remote Processing Unit (RPU).** Furnish and install a controller RPU at locations as shown on the project plans.

Ensure the RPU will gather, process, and store data from the connected water level sensors. Ensure the data is transmitted to the operating base station such as the Emergency Management Center, the Transportation Management Center, and the Intelligent Transportation Center upon polled request via NTCIP ESS protocols. Ensure the RPU uses a modular design consisting of a main data processing unit and secondary communications unit that are used to power and connect sensors at the HWWS site. Ensure the main data processing unit uses a Reduced Instruction Set Computing (RISC) type processor and run a Linux based operating system capable of multi-tasking operations to optimize data acquisition from the connected devices. Ensure the RPU includes in-GPS for real-time clock synchronization and location definition.

Ensure the RPU supports standardized communication protocols for sensors from various manufactures.

Ensure the RPU facilitates communication within the 2-way ALERT2 network and is capable of receiving and transmitting messages by new, advanced technology. Ensure the communication is an internal based Ethernet to ensure more reliable and faster communication.

Ensure the RPU includes Ethernet ports and serial ports. Ensure the RPU is designed and tested to provide voltage inputs, sensor inputs, and communication ports.

Ensure the RPU has a minimum of 5 W output power.

The RPU will gather data from the high water level sensors and transmit this data to the HWWS server upon polled request. The RPU will be capable of collecting data from the radar water level sensor:

RPU communication with the server will use the most current published Federal Standard NTCIP-ESS protocol, with the 2-Way ALERT2 manufacturer specifications. The server will poll the RPU via one of the following communication modes: ethernet, PMPP leased line, PMPP, and spread spectrum radio.

The RPU will have the capability of being modified to use solar power or other power sources in place of conventional commercial electrical power. Solar power RPU sites will operate 5 days without sunlight or solar charging of the batteries.

2.2. **RPU Capabilities.** Ensure the RPU can be accessed remotely by the 2-Way ALERT2 Base Stations sent remotely by the base station transceiver and transmitted data or command messages via ALERT2. Ensure the RPU is capable of gathering information from the ethernet connection and have the capabilities to download the latest version via FTP connections and USB ports. Ensure the RPU is capable to receive alert information through e-mail and text message. Ensure the RPU has the capabilities to send commands to the HWWS flash beacons by the 2-Way ALERT Transceiver or Decoder.

2.3. **RPU Mounting Requirements.** The RPU panel will be enclosed inside a HWWS specific communication cabinet, traffic signal controller cabinet, or communications building as shown on the plans.

2.4. **RPU Sensor Requirements.** Ensure sensor selection is consistent with the mounting configuration selected and proximity to the nominal water level to be measured. The following items represent prospective Sensor technology.

- **Contact Type**. Stainless steel strip, attached to bridge or tower structure, oriented vertically to measure water level by direct contact with the water.
- **Non-contact Type.** Device mounted to bridge, aimed vertically downward, using radar or sonar technology to measure distance to water surface.

3. CONSTRUCTION

Install the HWWS in accordance with the HWWS vendor's recommendations, plans, Standard Specifications, federal, state, and local codes and requirements. The Contractor is responsible for providing traffic control and safety work zones for the installation of the high-water sensors and associated hardware in accordance with Department traffic control requirements.

3.1. **HWWS System Commissioning.** Upon completion of the HWWS system equipment installation, ensure the system vendor provides an on-site field Engineer to commission the entire system. This vendor field Engineer will make the final sensor connections to the RPU, perform final system checks, sensor alignments, software setup, and software configuration to provide a fully operational HWWS system.

3.2. **HWWS System Vendor.** Furnish a detailed description or technical cut sheets of the HWWS to be supplied by the Contractor and the expense of the vendor or manufacturer in supplying such HWWS to other like agencies.

Before awarding, the Department may require the Contractor to demonstrate the proposed HWWS can provide interoperability and connectivity to the existing HWWS system. The HWWS equipment vendor, chosen by the Contractor, must have at least 10 successful HWWS system installations in North America. As part of the equipment approval process, the Department may ask the Contractor to provide the names of at least 5 agencies with names, telephone numbers, and contact information to verify said HWWS installation were successful.

3.3. **HWWS Qualified Personnel.** Ensure the Contractor has a manufacturer's technical representative on site to assist the Contractor's technical personnel, at each installation site, with HWWS equipment installation and communication system configuration. Ensure initial power-up of HWWS is executed with permission of manufacturer's representative.

4. WARRANTY

Furnish and install HWWS system equipment for this project which will be state of the art and in current manufacture at the time of purchase. Ensure the vendor factory warranties the RPU for a minimum of 36 mon. Guarantee that the equipment, furnished and installed for this project, will perform according to the Manufacturer's published specifications. Warrant equipment against defects and failure in design, materials, and workmanship in accordance with the Manufacturer's standard warranty. Assign to the Department the Manufacturers' normal warranties or guarantees on electronic, electrical, and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Repair or replace defective equipment, at the Manufacturer's option, during the warranty period at no cost to the Department. Include software and firmware updates as part of the warranty. Provide equipment with 95% of the Manufacturer's standard warranty remaining on date of final acceptance by the Engineer.

4.1. **Training.** Provide a minimum of 16 hr. of instruction to 10 personnel designated by the Department on procedures of installation, operations, programming hardware setting, testing, maintenance, integration, troubleshooting, and repair of equipment specified within this Specification. Ensure the training includes practical demonstrations, seminars, and other related technical procedures. Provide the training within the local area facilities unless otherwise authorized by the Engineer.

5. MEASUREMENT

This Item will be measured by each complete HWWS installed, tested, and accepted in accordance with this Special Specification.

6. PAYMENT

The work performed and material furnished, in accordance with this Item and measured as provided under "Measurement," will be paid for at the unit price bid for "High Water Warning System." This price is full compensation for furnishing, placing, testing materials and equipment, software licensing, tools, labor, supplies, and incidents. Incidental items, including costs associated with arranging for the Manufacturer's representative to be on-site, will not be paid for separately but are subsidiary to this Item.