



# High Sierra Electronics Inc.

155 Spring Hill Dr., Suite 106 • Grass Valley • CA • U.S.A. • 95945 • Phone: (530) 273-2080 • Fax: (530) 273-2089

## MDOT Superior Region RWIS Project

### General Product Information

#### 1. Description & Cost Information

High Sierra Electronics is a ISO9001:2000 Registered company. We strive for excellence in Service, Value, and Commitment through continuous improvement.

High Sierra Electronics' background is in Hydrological Monitoring and Advance Flood Warning Systems. Our background is in detection and reporting of standard environmental data such as precipitation, temperature, wind speed and direction, barometric pressure, humidity, visibility, frost depth, snow depth, water depth soil moisture, etc. Sites are typically solar powered with timed and even driven reporting.

Over the years our customers expressed interest in providing flood and high wind warnings for motorists. High Sierra Electronics responded with Advance Warning Site products that use lights and/or crossing gates to alert traffic to imminent unsafe conditions and to simultaneously alert emergency responders.

More recently customers have asked for similar notification of road surface conditions (icing) for the purposes of prevention and treatment. High Sierra Electronics responded with road ice detection products. We've been shipping that product for 5 years. Development continues, and we've now implemented NTCIP ESS communications for our ice detection products. Development continues with a complete NTCIP road weather station product slated for introduction in Q3 of 2007. A new 5 data point algorithm results in 8 road surface states and incorporates a wide variety of sensor inputs for ease of expansion. Development of NTCIP Advance Flood Warning Stations is slated for later in the year.

#### a. Product and Description

##### i. Road Sensor Station

HSE Road Sensor Stations are available using either ALERT format or NTCIP 1204 (Environmental Sensor Stations).

The ALERT (Automated Local Evaluation in Real Time) format, developed by the Nation Weather Service, is an established reliable technology in worldwide use. ALERT provides low cost real time data acquisition. Data processing is handled centrally by a Computer Management Station. The benefits of using ALERT technology include low power consumption, the use of available hydrological monitoring frequencies and the ease of system expansion. The VHF frequencies provide long distance reliable communications at a reasonable cost.

NTCIP protocol is available for HSE Road Sensor Stations. Our Model 5721-05 communicates via RS-232 at 9600 baud using the SNMP-Null-PMPP-Serial protocol stack (other stacks available). The controller board reads road temperature and surface wetness sensor inputs, determines road surface status and reports by responding to inquiries from the central database management program.

ii. Management Station Software

High Sierra Electronics equipment can be monitored and controlled by a number of commercial software products. DataWise, by DEC Data Systems of Grass Valley, CA is often used with our products.

DataWise is a general purpose, network ready, flexible data acquisition, database management, and display software package that runs under Windows operating systems. The software package displays graphical, animated, static and tabular data in real time. DataWise comes standard with the capability to acquire data from several dozen sources, including, but not limited to: and NTCIP 1204 sources, ALERT Data; GOES (all known DCP Manufacturers) and DOMSAT, Telephone and radio modem, Campbell Scientific data loggers, Sutron RTU's using dial up or ssp protocol, Steven's Water data logger, DataTaker; and Coastal Environmental Data Loggers.

The DataWise system included comprehensive multi-level alarms (visual, audible, text and email messaging, etc.

The DataWise platform uses an open database that can easily feed data to GIS and ATMS systems. Additionally, the database can easily be populated with data from non-owned local weather data sources via available NESDIS data.

b. Typical RWIS Equipment cost

- i. See Separate Confidential Price Sheet
- ii. Installation cost varies by installation.

c. Recurring Equipment cost

- i. Other than periodic backup battery replacement, no recurring equipment costs are required. Stocking of spares are recommended.

d. Communications Systems

i. Connectivity options

HSE products are generally configured to use RS-232 communications. The data can be transmitted in any variety of ways.

- ALERT/IFLOWS Transmitter operating at 170MHz Hydrological Monitoring Frequencies
- Fiber optic
- Spread spectrum radio
- Cellular modem (i.e., Cingular GSM Network)
- 4.9Ghz Public Safety band
- Ethernet

- e. Maintenance tasks on High Sierra Electronics equipment can be carried out by trained staff using common test equipment and tools. Routine maintenance includes site visits for the purpose of assuring the installation is sound, equipment is operating properly and sensors are intact and clean. Recommended maintenance interval is bi-annually. Recommended maintenance timing is prior to onset of weather season. On-site time is normally about 1 hour per site. No ongoing adjustments are required.

## 2. RWIS References

- o Customer References have been removed for confidentiality. References are available to qualified contacts upon request.

## 3. RWIS Input and Output components

- a. Advance Flood Warning Station input is generally from a Druck Pressure Transducer.
- b. Pavement sensors are passive in nature and of HSE's design and manufacture.
- c. Barometric pressure sensors are of HSE's design and manufacture.
- d. Temperature probes use platinum RTDs.
- e. Wind monitors are often provided by RM Young.
- f. RH sensors from various manufacturers.
- g. Capacitive Rain Sensors from Delta-Ohm are used to determine relative precipitation rates for use in determining road surface status.
- h. Solar panels and batteries from various manufacturers are used.
- i. STI (Lundahl) Ultrasonic sensors for water depth for distance to water surface.  
Other available sensors:
- j. Envirotech visibility sensors
- k. Laser Technology, Inc. Universal Laser Sensor for distance to water surface