SCOPE: This specification covers a portable Level-Velocity Logger as manufactured by Pulsar Measurement, Malvern, UK / Largo, FL / Long Sault, Ontario. The instrument shall provide for measurement and data logging of level, velocity and temperature readings from flow in open channels and partially filled or surcharged pipes.

1. GENERAL

1.1 Level-Velocity Logger to consist of a submersible ultrasonic sensor, connecting cable, and a remote enclosure with electronics and display. System shall have no moving parts.

1.2 Level measurement accuracy shall be ±0.25% of Level. Velocity measurement accuracy shall be ±2% of reading.

2. SENSOR

2.1 Ultrasonic sensor shall be rated IP68 for continuous submersion in liquids.

2.2 Using the ultrasonic Doppler principle, the sensor shall measure fluid velocities from 0.1 to 2.5 ft/sec (0.03 to 8 1 3. m/sec).

2.3 Using ultrasonic echo-ranging principle, the submerged sensor shall measure liquid level from 1" to 15 ft. (25.4 mm to 4.57 m) above the bottom of the pipe or channel. Minimum detectable level shall not be greater than 1" (25.4 mm). Level sensing circuitry shall include a temperature sensor for automatic temperature compensation.

2.4 Sensor shall be constructed of 316 stainless steel and epoxy resin.

2.5 Sensor operating temperature shall be from 5°F to 175°F (-15°C to 80°C).

3. SENSOR CONNECTING CABLE

3.1 Provide minimum length 25 ft (7.6 m) tri-coaxial cable with potted bond to the Sensor head. Sensor cable shall be waterproof and electrically shielded. Exposed material shall be polyurethane only.

3.2 Sensor shall include a watertight plug for connection to the instrument electronics.

4. LOGGER ELECTRONICS

4.1 No calibration shall be required. The Level-Velocity Logger shall measure liquid level from the bottom of the pipe or channel, and flow velocity.

4.2 Logger electronics operating temperature shall be from –5° to 140°F (–20° to 60°C).

4.3 Shall have USB output to transfer log files to a Windows ™ computer or laptop.

4.4 Provide an LCD bar graph display to indicate level, velocity and temperature readings, plus remaining battery and logger storage capacity.

4.5 Shall be housed in a watertight IP67 enclosure with hinged, latching cover and watertight sensor cable entry.

4.6 Logger capacity shall be 130,000 data points. Each data point includes level, velocity and temperature reading.

4.7 Logger sample rate shall be user-selectable from 10 or 30 seconds, 1, 2, 5, 10 or 20 minutes.

4.8 Logger shall be powered by 4 D-cell Alkaline batteries. Battery life shall be matched to Logger storage capacity: 15 days at 10 second sample rate up to 4 years at 60 minute sample rate.

5. SOFTWARE

5.1 Shall include Windows software to retrieve, display, save and export log files from the Level-Velocity Logger. Shall support Windows versions including XP, Vista, 7, 8, and 10.

5.2 Shall convert level-velocity readings to flow for channel shapes including round pipes, rectangular, trapezoid and eggshaped channels. Shall convert level readings to flow for flumes and weirs.

5.3 Shall provide 'real-time' communication with the levelvelocity logger to display readings with a refresh rate of 10 seconds or less.

5.4 Shall permit the operator to set logging rate of the levelvelocity instrument from 10 or 30 seconds, 1, 2, 5, 10, 15, 30 or 60 minutes.

5.5 Shall display battery life remaining and logger capacity remaining.

5.6 Shall display, save, output to a printer and export levelvelocity log files in graph and tabular format. Export log files shall be delimited for import to spreadsheet or database programs.

5.7 Shall permit conversion of linear and volume units.

6. OPTIONAL FEATURES FOR INSERTION AS REQUIRED

6.1 Shall include 50 ft / 15 m length sensor cable extension with watertight connector plugs to permit sensor installation total distance of 75 ft / 23 m from the electronics enclosure. Cable extension shall be shielded, submersible with a durable polyurethane coating.

7. MANUFACTURER

7.1 Level-Velocity Logger shall be Greyline Stingray 2.0 model by Pulsar Measurement and warranted against defects in materials and workmanship for two years.