* **Embedded strain gauges - Geokon Model 4911**

Vibrating wire strain gauge comes attached to 36” #4 “sister” rebar and is installed by tying it alongside an existing length of rebar in the rebar cage. It has a standard range of 3000 micro-strain and a resolution of 0.4 micro-strain.

* **Deck surface mounted strain gauges – Geokon Model 4000**

Vibrating-wire strain gauge features mounting stud anchors for mounting to concrete. These are grouted into predrilled holes with epoxy or fast-setting hydraulic cement. The gauge has a six-inch gauge length, a standard range of 3000 micro-strain and a resolution of 1.0 micro-strain.

* **Steel surface strain gauges – Geokon Model 4100**

Vibrating Wire spot weldable strain gage. Comes with plucking coil, integral thermistor and pre-mounted on weldable shims. The gauge has a two-inch gauge length, a standard range of 3000 micro-strain and a resolution of 0.4 micro-strain.

* **Girder displacement gauges – Celesco PT8510**

Cable-extension transducer with base magnets for easy mounting to steel members. The gauge has a full-stroke range of 5 inches.

* **Joint displacement gauges – TML CDP-25**

Displacement transducer with 25mm (1in) full-stroke range.

* **Accelerometers – PCB Model 393A03**

Ceramic shear piezoelectric accelerometers with a measurement range of ±5 g and a frequency range of 0.5 to 2000 Hz. Magnetic base provides easy mounting to steel members.

* **Embedded humidity sensors**

The Embedded Moisture Sensor (EMS) is an indirect moisture measurement device also known as a Duff Gauge, Surrogate Moisture Sensor or Wood Resistance Humidity Sensor. The EMS sensor is used to perform an indirect measurement of moisture levels in materials not compatible with standard measurement techniques, such as gypsum, concrete, masonry and insulation.

* **Acceleration DAQ – National Instruments cRIO**

Compact controller with a processor and user-programmable FPGA outfitted with NI-9234 input modules to provide direct connectivity to IEPE sensors.

* **Long-term monitoring DAQ – Campbell Datalogger**

CR6 datalogger paired with multiple vibrating-wire analyzers (CDM VW-305) and an analog input module (CDM-A116) provide sufficient connectivity to all strain gauges and displacement transducers.

* **Humidity sensor DAQ – Campbell Datalogger**

CR1000 datalogger paired with a 16-channel multiplexer (AM16/32) will used to sample the embedded humidity sensors. Synchronization between data loggers will be provided with ethernet connection.