ITEM 680.97970001 - QUARTZ PIEZOELECTRIC WIM SENSORS (EXTENDED PERFORMANCE PERIOD)

DESCRIPTION.
Under this item the Contractor shall furnish and install Quartz Piezoelectric Weigh In Motion (WIM) Sensor sets as shown in the contract documents or as directed by the Engineer.

MATERIALS.
The WIM sensor shall consist of a strip of Quartz Piezoelectric sensors embedded in an epoxy compound which is impervious to moisture and roadway de-icing chemicals. It shall have integral leads of the length required such that no splices occur between the sensor and the terminal strips in the traffic monitoring cabinet.

An epoxy grout compound shall be used for installation of the sensor and may be mixed to achieve a milkshake-like consistency that will not run out of the slot. The Contractor shall use the quartz piezoelectric manufacturer’s recommended grout for installation. The grout manufacturer’s directions for mixing and curing times shall be strictly followed. There shall be no air in the grout.

CONSTRUCTION DETAILS.
Prior to installation, the Contractor shall match the sensors by sensitivity to ensure the best WIM accuracy. Sensors shall be sensitivity matched onsite by sorting the boxes from highest to lowest sensitivity and using them in a sequence to assemble the WIM strip. The matching shall be performed with the Engineer present.

The Contractor shall provide for the presence of a vendor or manufacturer representative with sufficient knowledge and experience to be on site to direct and assist with the proper installation of sensors.

The sensor shall be installed in a square slot cut into the pavement at the location shown on the site layout. The dimension of the slot will be recommended by the sensor manufacturer, but will typically be 2 7/8 inches wide by 2 inches deep. Depending on the sensor, the length of the slots will typically be 71 inches for a half lane installation and 141 inches for full lane installation. The slot shall be smooth at the bottom and sides so that there are no projections that might damage the sensor. Dust and/or moisture shall be removed from the slot to promote adhesion of grout. The grout shall be firmly bonded to the edges of the slot and the sensor so that water cannot penetrate the installation. The grout shall be free of air. The sensor shall be installed in the slot according to the manufacturer’s instructions, with the top of the sensor flush with the pavement surface. A grinder may be used to ensure that the sensor is level with the roadway surface. Sensor leads shall be installed in separate slots ½ inch wide extending from the end of the sensor slot to the edge of pavement. This slot shall be at least 2 inches deep and shall be deep enough to ensure the top of the sensor cable does not protrude above the pavement surface. Leads from adjacent lanes shall be at least 6 inches apart. Lead wires shall be sealed in the pavement in the same manner as induction loop wires. Leads shall be encased in conduit from the edge of pavement to the pullbox. Leads from the pullbox to the traffic monitoring cabinet...
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shall also be encased in conduit. Splicing of lead wires is not allowed. Signal wires shall be connected to the terminal strip in the traffic monitoring cabinet.

Following installation of the sensor and curing of the encapsulation material, the testing of the complete installation shall be repeated at the terminal block in the traffic monitoring cabinet. Insulation resistance (IR) and capacitance shall be checked for each sensor. IR should be $5 \times 10^9$ ohms minimum and Capacitance is dependent on lead length but should be in the range of 4 to 10 nanofarads. The measurements shall be printed out and provided to the Engineer.

Post-installation acceptance testing shall be conducted by the Contractor with both the Engineer and a representative of either the Main Office or Regional Traffic Monitoring Group present. All test results shall be logged and include sensor serial number. A copy will be stored in the traffic monitoring cabinet. Performance of and satisfactory completion of the acceptance criteria shall be the “Work Phase”. The Contractor shall provide an extended performance period for each sensor installed until that sensor has experienced a full winter season of freeze-thaw cycles.

METHOD OF MEASUREMENT.
The work will be measured by the number of quartz piezoelectric sensor sets satisfactorily installed across a lane width. No payment will be made for individual components including multiple saw cuts necessary to fit the sensors.

BASIS OF PAYMENT.
The unit price bid for Quartz Piezoelectric WIM Sensor sets shall include the cost of all labor, materials, equipment necessary to satisfactorily perform the work, and the presence of a manufacturer’s representative, except that conduit excavation and backfill, conduit, pullboxes and work zone traffic control will be paid for separately. During the performance period, the Contractor shall perform any remedial or replacement work necessary to maintain satisfactory performance of the sensor.

Quartz Piezoelectric Sensors will be subject to a performance period that ends July 1st of the year following the year of installation. The Engineer will perform a final inspection within 15 days of the end of the performance period. The Engineer will provide 7 day advance notice of the final inspection date to afford the Contractor an opportunity to be present. Following the inspection, the Engineer will provide the Contractor a list of sensors to be replaced, if any (the “Work List”).

The contractor shall mobilize within 14 days of receiving the Work List. The contractor shall submit a maintenance and protection of traffic plan to the Engineer for approval, and revise the plan, if necessary, to meet the Engineer’s approval. The contractor shall not begin remedial work until the Engineer has approved the plan.

The contractor shall perform all work in accordance with the contract documents within 90 calendar days of receiving the Work List unless otherwise directed by the Engineer. Within 10 calendar days after the satisfactory completion of the Work List (or after the final performance
inspection if no remedial work is necessary), the Engineer will notify the Contractor in writing that any further performance responsibility has ended.

The work required during and upon completion of the performance period will not delay acceptance of the entire project and final payment due if the Contractor provides the Department with a “Faithful Performance Bond” and a “Labor and Material Bond” in the full amount of this item. These bonds shall conform to the requirements of §103-03 of the standard specifications and shall be in full force and effect until final performance acceptance for this work.

All insurance policies that are specified for the contract shall remain in effect during the performance period and remedial work, as required by §107-06, Insurance.

The bid price shall include the cost of all remedial repairs which are attributable to Contractor and sensor performance and any associated maintenance and protection of traffic.