

## **ITEM 17551.97 M - SINGLEHOLE SONIC LOGGING (SSL) OF BORED-IN PILES**

### **DESCRIPTION**

Conduct Singlehole Sonic Logging (SSL) on bored-in piles where indicated on the plans or where ordered by the Engineer and report the results. The selection of the testing organization is subject to the approval of the Deputy Chief Engineer of Technical Services. The SSL test is used to evaluate the integrity of the pile grout by measuring the response of an ultrasonic pulse traveling from a signal source to a receiver in the access pipe.

### **MATERIALS**

Provide threaded flush fit schedule 40 PVC access pipes with an I.D. of 25 mm. Provide pipes with a round and constant internal diameter free of defects or obstructions, including any at pipe joints. Use watertight pipes with clean internal and external surfaces. Equip each pipe with a watertight threaded cap on the bottom and a removable threaded cap on the top.

Provide cement or sand-cement grout for filling access pipes. The Contractor's proposed grouting methods and grout mixes are subject to the approval of the Engineer. All grout constituents must meet the material requirements of Section 700.

Provide water that meets the requirements of Subsection 712-01.

### **CONSTRUCTION DETAILS**

#### **EQUIPMENT**

Provide SSL equipment which consists of the following components:

- A microprocessor based SSL system for display of individual SSL records, analog-digital conversion and recording of SSL data, analysis of receiver responses and printing of SSL logs.
- Ultrasonic source and receiver probes for 25 mm I.D. pipe.
- An ultrasonic voltage pulser to excite the source with a synchronized triggering system to start the recording system.
- A measurement device to determine the depth of records.
- Appropriate filter/amplification and cable systems for SSL testing.

#### **PROCEDURE**

Install the access pipe in each bored-in pile specified to be tested as per the contract plans. Locate the access pipe down the center of the pile as detailed on the plans. If bar reinforcement is used, secure the pipe to the reinforcement prior to the placement of the reinforcement in the pile.

If permanent casing is used as reinforcement, use centralizers as approved by the D.C.E.T.S., to maintain proper alignment of the access pipe. The centralizers will be placed at the top and bottom of the pipe and spaced no more than 2 m along its entire length.

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After placement of the reinforcement, fill the pipe with water before or immediately after concrete placement and cap the pipe top. Maintain the water level inside the access pipes at a level at the pipe top. The pipe shall be parallel to the longitudinal axis of the pile. Exercise care in the removal of the cap from the pipe after installation of the pile grout so as not to apply excess stress that may break the bond between the pipe and the grout.

Provide the pile toe and top elevations, along with construction dates to the testing organization prior to the SSL testing. Conduct SSL tests for the full length of pile at locations shown on the plans. Additional tests may be conducted in the event any anomalies are detected in the specified logs.

Conduct the SSL testing with the source probe above the receiver probe in the same vertical plane. Remove slack from the cables prior to raising the probes to provide for accurate depth measurement in the SSL records. Raise the probes simultaneously, starting from the bottom of the access pipe. Take SSL measurements from the toe to the top of each pile at intervals of 60 mm. Report anomalies/defects indicated by longer pulse arrival times and significantly lower energy/amplitude signals to the Engineer at the time of testing.

Provide a preliminary report to the D.C.E.T.S. within two working days and final report within five working days of completion of the testing at each substructure.

Include in the test results SSL logs with analyses of:

- Initial pulse arrival time or compression wave velocity versus depth.
- Pulse energy/amplitude versus depth.

Present a SSL log for each pile tested and discuss any anomaly/defect zones in the report as appropriate.

If the SSL test reveals defects in the grout, the defects will be repaired. The repair procedure is subject to the approval of the Engineer. Additional SSL testing will be conducted at the Contractor's expense to verify the repair of the defects.

Upon completion of the SSL testing and acceptance of the piles by the D.C.E.T.S., remove the water from the access pipes and fill the pipes to the top of the piles with a cement or sand-cement grout. Cut off the pipes flush with the top of the pile.

### **METHOD OF MEASUREMENT**

The work is measured by each pile on which SSL testing is performed and found to be free of defects which require repair as deemed by the D.C.E.T.S. in accordance with the specification.

### **BASIS OF PAYMENT**

The unit price bid for the SSL testing on each pile includes the cost of all labor, materials and equipment necessary to perform SSL testing and report the results. The cost of repairing possible defects and additional SSL testing to verify the effectiveness of the repairs is at the Contractor's expense.