



**CUY-90-14.90**

**PID 77332/85531**

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**APPENDIX GE-12**

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**OGE Settlement Platform – Cells Details and Notes  
(Contract Document)**

State of Ohio  
Department of Transportation  
Jolene M. Molitoris, Director

**Innerbelt Bridge  
Construction Contract Group 1 (CCG1)**

## ITEM SPECIAL–SETTLEMENT CELLS

**Description:** This item consists of furnishing, installing, maintaining and protecting settlement cells and obtaining settlement readings as required by the plans or as directed by the Engineer. The DBT may install additional settlement cells at his expense at locations approved by the Engineer. Take settlement readings weekly during construction and during any specified waiting period. Plot the readings on a graph with settlement (on the negative y-axis) and fill height (on the positive y-axis) versus time (on the x-axis). Use the settlement cell spreadsheet located at [http://www.dot.state.oh.us/divisions/prodmgt/geotechnical/geotechnical\\_documents/Blank\\_Settle\\_Cell\\_Reading\\_Plots-English.xls](http://www.dot.state.oh.us/divisions/prodmgt/geotechnical/geotechnical_documents/Blank_Settle_Cell_Reading_Plots-English.xls) in the OGE website Publications and Documents section to create the graph. Fill out all the yellow spaces in the header as well as in columns B, D and F. In the first row of data (row 9), enter the elevation of the ground surface directly above the transducer just prior to the placement of any fill. This elevation should be the same as the value in cell J3 and the settlement should be 0. Once all the data is entered, clear the contents of all the cells below the bottom row of data in order to view the graph. Submit a copy of the settlement calculations, the calibration record and the graph to the Engineer, the District Geotechnical Engineer and the Office of Geotechnical Engineering after each settlement reading is taken.

Furnish instrumentation consisting of a settlement plate, a vented vibrating wire pressure transducer, vented signal cable, tubing, a desiccant chamber, a reservoir, a terminal box and a portable readout box. Furnish instrumentation from either Geokon, Incorporated, 48 Spencer Street, Lebanon, New Hampshire, 03766, phone 603-448-1562 or Slope Indicator, 12123 Harbour Reach Drive, Mukilteo, WA, 98275, phone 425-493-6200.

**Installation Methods:** Install the instrumentation according to the general installation instructions that follow. Check the manual from the manufacturer for other possible steps that may be necessary as well. If bedrock or stable ground are not too deep, there is another installation method which may be used in which the instrumentation is installed inside of a borehole. If multiple settlement cells are required, check with the two manufacturers for other pieces of equipment or equipment configurations that are available to simplify the collection of the data and to reduce the number of above ground installations that are needed.

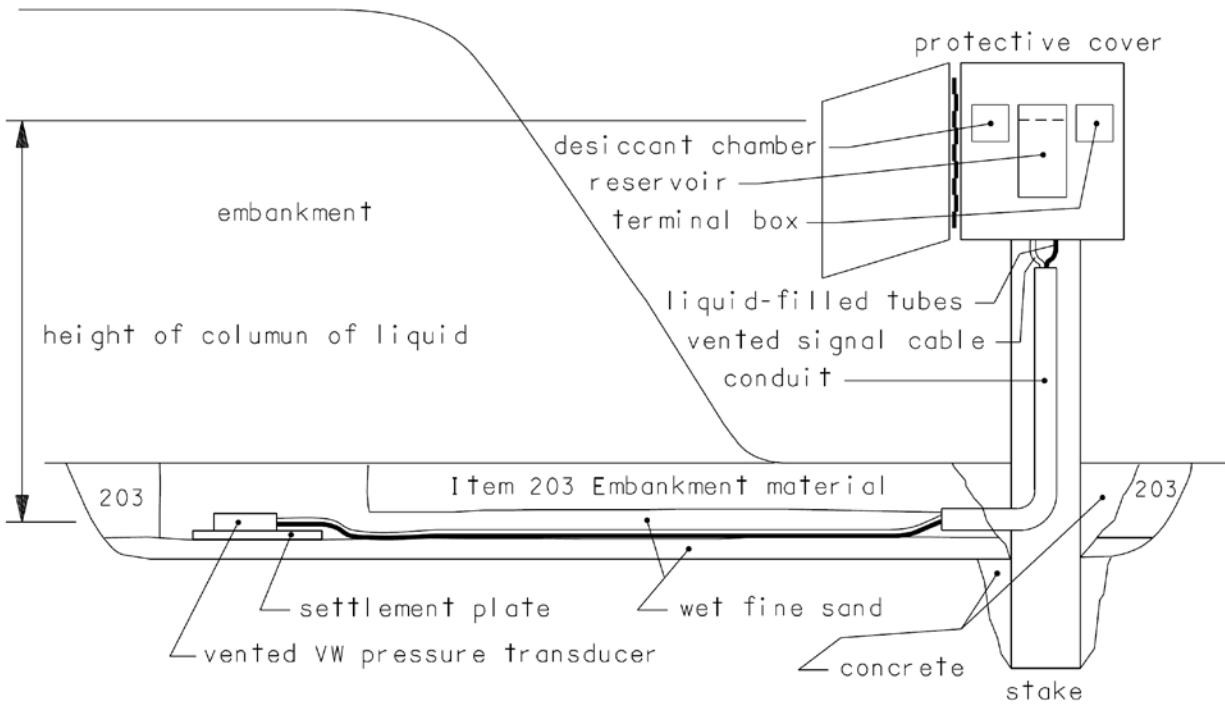
1. Install the settlement cell.
  - a) Attach the transducer to the settlement plate.
  - b) Excavate a two foot deep trench (two feet, nine inches when using Slope Indicator vented VW pressure transducers that are installed vertically) and place four inches of wet fine sand along the bottom.
  - c) Compact, smooth and level the sand and place the settlement plate on top.
  - d) Survey the elevation of the center of the tip of the transducer for transducers that are installed horizontally. Survey the elevation of the line near the top between the cap and the main body of the transducer for Slope Indicator transducers.
  - e) Cover the settlement plate and cell with hand-compacted, wet, fine sand up to ground level.
  - f) Check that the settlement cell is still functioning properly.

2. Install the tubing and cable.
  - a) Check to make sure the four inches of compacted, wet, fine sand along the bottom of the trench is fairly level and not undulating.
  - b) Lay the cable and tubes side by side without touching or crossing each other.
  - c) Keep some slack in the cable and tubing. Do not stretch the cable or tubing tight.
  - d) Check the tubes for signs of air bubbles.
  - e) Hand compact four inches of wet, fine sand over the cable and tubes.
  - f) Backfill and hand compact the rest of the trench with C&MS 203 Embankment material.
  
3. Install the reservoir.
  - a) Mount the reservoir in a protective cover attached to a wall or a stake such that the reservoir is higher than the trench housing the settlement transducer. Position the reservoir so that it is not exposed to direct sunlight. If using a stake, install it four feet deep and cement it into the ground in a plumb position.
  - b) Use metal or rigid plastic conduit to protect the cable and tubing. The conduit should start in the trench near the end, bend upwards and extend up the stake or wall almost all the way to the protective cover.
  - c) Fill the reservoir according to the manufacturer's directions.
  - d) Attach the tubes to the reservoir. Be careful not to allow any air to be trapped inside the tubing.
  - e) Attach the vent tube to the desiccant chamber.
  - f) Connect the signal cable to the terminal box.
  - g) Survey the elevation of the water level in the reservoir and note the reading on the scale attached to the reservoir (if applicable).
  
4. Obtain initial readings.
  - a) These are important baseline readings and they should not be taken when the reservoir, conduit or tubes are exposed to direct sunlight. Take the readings according to the manufacturer's instructions. (Note: a data datalogger can be used instead of a portable readout box to take the readings.) Reduce the data according to the instructions given in the settlement cell manual provided by the manufacturer.

**Protective Measures:** House the reservoir in a waterproof, lockable protective cover some distance away from the construction area. In this way the ground will be stable and the reservoir will remain at the same elevation to provide a reliable reference. Also, the reservoir should be located so that it will be out of the way of construction equipment and therefore safe from being run over.

# SETTLEMENT CELL

NOT TO SCALE



## ITEM SPECIAL–SETTLEMENT PLATFORMS

**Description:** This item consists of furnishing, constructing, and maintaining settlement platforms and obtaining settlement readings as required by the plans or as directed by the Engineer. At the option and expense of the DBT, additional settlement platforms may be installed at locations approved by the Engineer. Settlement readings shall be taken weekly during construction and during any specified waiting period. The readings shall be plotted on graph paper presenting deformation (on the negative y-axis) and fill height (on the positive y-axis) versus time (on the x-axis). In order to create the graph, use the settlement platform spreadsheet located at [http://www.dot.state.oh.us/divisions/prodmgt/geotechnical/geotechnical\\_documents/Blank\\_Settlement\\_Reading\\_Plots-English.xls](http://www.dot.state.oh.us/divisions/prodmgt/geotechnical/geotechnical_documents/Blank_Settlement_Reading_Plots-English.xls) in the OGE website Publications and Documents section. A copy of each cumulative plot shall be sent to the Office of Geotechnical Engineering, Attention: Geotechnical Design Coordinator, after each settlement reading is recorded.

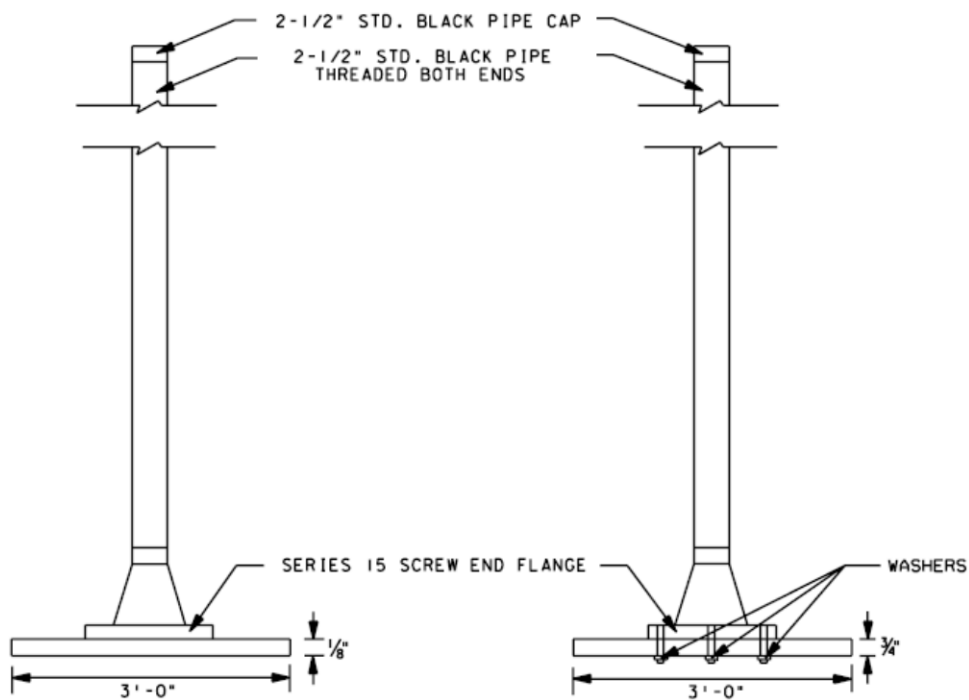
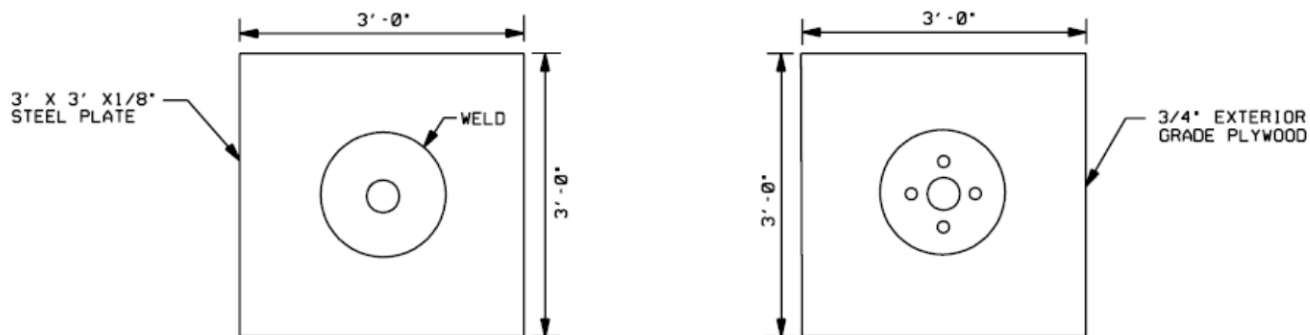
**Materials:** Sound lumber such as 19mm (3/4-inch) exterior grade plywood shall be used for the base. The pipe shall be 64mm (2-1/2-inch) standard black pipe with threaded fittings as shown on the plans. A steel plate 915mm x 915mm x 3.2mm (36" x 36" x 1/8") may be substituted for the lumber for the platforms, at the DBT's option.

**Construction Methods:** The platform shall conform to the details shown on the plans. The platform shall be set on a level surface. The pipe shall be firmly secured to the platform and shall be maintained in a plumb position during the placement of the embankment. The pipe shall be marked at intervals to facilitate measurement of the depth of fill. The DBT shall stop work in any location where the settlement platform has been disturbed or damaged. Platforms or pipes damaged or displaced during construction shall be restored to their proper condition at the DBT's expense.

Prior to paving, the top of the settlement platform pipe shall be cut off 600mm (two feet) below the finished surface of the subgrade or finished ground surface, whichever is applicable.

## SETTLEMENT PLATFORM

NOT TO SCALE



### NOTES:

1. SETTLEMENT PLATFORMS SHALL BE PLACED AT THE LOCATION INDICATED IN THE PLANS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
2. CONTRACTOR HAS OPTION OF USING EITHER STEEL OR PLYWOOD PLATFORM BASE.
3. CONTRACTOR SHALL FURNISH MATERIALS AND LABOR TO EXTEND PIPE UP THROUGH ENTIRE FILL.
4. SETTLEMENT PLATFORMS SHALL BE ANCHORED BY STAKES DRIVEN AT EACH CORNER TO PREVENT OVERTURNING.

DATE: 5-II-1999