

Settlement Plates

SCDOT Designation: SC-M-203-4 (07/17)

1.0 DESCRIPTION

1.1 Furnish all necessary supervision, labor, material, equipment, and related services necessary to furnish, install, and maintain settlement plates in accordance with the lines, grades, dimensions, and designs shown on the plans, this Supplemental Technical Specification (STS), the project Specifications and Special Provisions, or as directed by either the Resident Construction Engineer (RCE) or the Geotechnical Engineer-of-Record (GEOR). Measure, record, and provide to the RCE and GEOR the elevations of the settlement plates as required in this STS. Install settlement plates in the presence of the RCE and/or the GEOR. Accommodate the RCE and GEOR in the monitoring of settlement plates, as required.

2.0 MATERIALS

2.1 The settlement plate shall consist of a 30-inch square, 1/2-inch thick steel plate with a coupling centered on the plate for attaching a central steel pipe. In addition, the plate shall have a means for keeping the protective PVC casing centered on the steel rod (see Figure 1).

2.2 Extend a central steel pipe from the plate vertically to allow for measurements of the elevation of the settlement plate. The pipe shall be of sufficient diameter to prevent buckling or swaying over the height of the fill, but shall have a diameter no smaller than 2 inches. In addition, the pipe will be threaded at both ends to allow for the addition of extensions. The central steel pipe will include the necessary couplers to allow for the extension. The central pipe shall be made of black iron and meet the requirements of ASTM A53.

2.3 Install schedule 40 PVC protective casing around the central steel pipe to protect the pipe from compaction operations. The PVC protective casing will have an inside diameter of no less than 3 inches. Maintain the diameter of the PVC casing 1 inch greater than the diameter to the central steel pipe. The casing may have either glued or threaded joints. The joints should form a watertight seal. A protective cap shall be placed at the top of the PVC casing to prevent soil, water and other debris from being introduced into the casing. In addition, the casing shall extend a minimum of 1 foot and no more than 5 feet above the ground surface at the base of casing during fill placement. Visibly identify the location of the PVC casing to prevent damage to the casing during the placement of fill materials. The PVC protective casing classification shall at a minimum meet the requirements of ASTM D1784, 14222. The protective casing dimensions shall meet the requirements of ASTM D1785.

2.4 Provide incidental hardware, fasteners, tools, and the like, as necessary to install the system in accordance with this STS.

3.0 SUBMITTALS

3.1 At least 30 calendar days before beginning settlement plate installation, submit to the RCE for review a Settlement Plate Installation Plan indicating where the coupling and

protective casing supports are to be located and the method to be used to attach the coupling and casing supports. Include in the Settlement Plate Plan the means to replace/repair any damaged settlement plate or benchmark. Identify a land surveyor licensed in the State of South Carolina who has been responsible for collecting elevation data to the nearest 0.01 feet for at least 5 projects in the last 5 years. The land surveyor shall be present at the work site at all times during collection of elevation data. The Contractor shall provide a detailed resume of the land surveyor's experience and qualifications. The land surveyor, as well as any replacement for the land surveyor, will be subject to the acceptance of the Department.

3.2 Within 1 week following installation, submit an installation record for each settlement plate, which includes the plate designation, station, offset, and elevation of the settlement plate. The settlement plate shall be located to an accuracy of 0.01 feet (both vertically and horizontally). In addition, indicate on the installation plan the benchmark(s) that will be used to measure settlement from. Establish the benchmark on stable ground that is not subject to settlement and is typically located away from any earthwork/construction activities.

4.0 CONSTRUCTION REQUIREMENTS

4.1 Notify the RCE and the GEOR at least 5 working days prior to the installation of settlement plates.

4.2 Ensure a firm level base is present on site on which heavy equipment and/or other necessary equipment can be operated safely under its own power for installation of settlement plates.

4.3 Protect the settlement plates and benchmarks from damage for the duration of the Contract or as directed otherwise by the RCE. Immediately notify the RCE and GEOR if any settlement plate or benchmark is damaged. Replace/repair the settlement plate or benchmark in accordance with the previously accepted Settlement Plate Installation Plan.

4.4 Accurately locate all settlement plates in the field in accordance with drawings and ensure that no conflicts exist between settlement plates and existing and proposed structures, utilities or other construction proposed or present at the site. Settlement plates may be adjusted by the Contractor with the approval of the RCE and the GEOR to avoid utilities, foundations, and all other underground construction.

4.5 Install settlement plates prior to placement of embankment fill or retaining wall construction and following clearing and grubbing and installation of ground improvement in the immediate vicinity of each settlement plate.

4.6 Survey the central pipe(s) daily while fill is being placed, and twice weekly after completion of fill placement, unless directed otherwise by the RCE in conjunction with the GEOR. Survey the central pipe(s) both before and after the extension of the central pipe. Provide the surveys to the RCE and the GEOR within 3 calendar days. In addition, survey the ground surface elevation above each settlement plate daily as fill is being placed, and twice weekly when fill is not being placed, unless directed otherwise by the RCE or GEOR. Provide all readings at the elevation of the plate to the nearest 0.01 ft. Further, provide the temperature in degrees Fahrenheit (°F) and the time (actual) of obtaining the settlement plate elevations.

4.7 Accommodate the Engineer during construction to provide safe and timely access to settlement plates for the purpose of obtaining measurements, as construction progresses, if required.

4.8 Evaluation of the settlement plate data will be the responsibility of the GEOR.

4.9 Once the RCE and GEOR has determined that the settlement plates have served their purpose and are no longer needed, abandon the settlement plates in-place. Remove as much of the central steel pipe as can be recovered and cut the PVC casing off 2 feet beneath the finished subgrade. Fill the PVC casings remaining in the ground with lean grout and place 2 feet of properly compacted fill on top of the testing location.

5.0 METHOD OF MEASUREMENT

5.1 The number of settlement plates will be as provided in the plans unless written authorization for additional and/or reduction of settlement plates has been provided by the RCE in conjunction with the GEOR. The contract unit price includes all equipment, including but not limited to the settlement plates, mobilization, labor, surveys, materials, incidentals, and abandonment required by this STS. Replacement or repair of any settlement plate will be at no cost to the Department.

6.0 BASIS OF PAYMENT

6.1 The price and payment for this work shall be full compensation as measured in the prior Section of this STS based on the acceptance of the Settlement Plate installation by the RCE and the GEOR.

6.2 Payments shall be made under:

| Item No. | Pay Item | Pay Unit |
|-----------------|--------------------------------------|-----------------|
| 2038110 | Monitoring Device – Settlement Plate | Each |

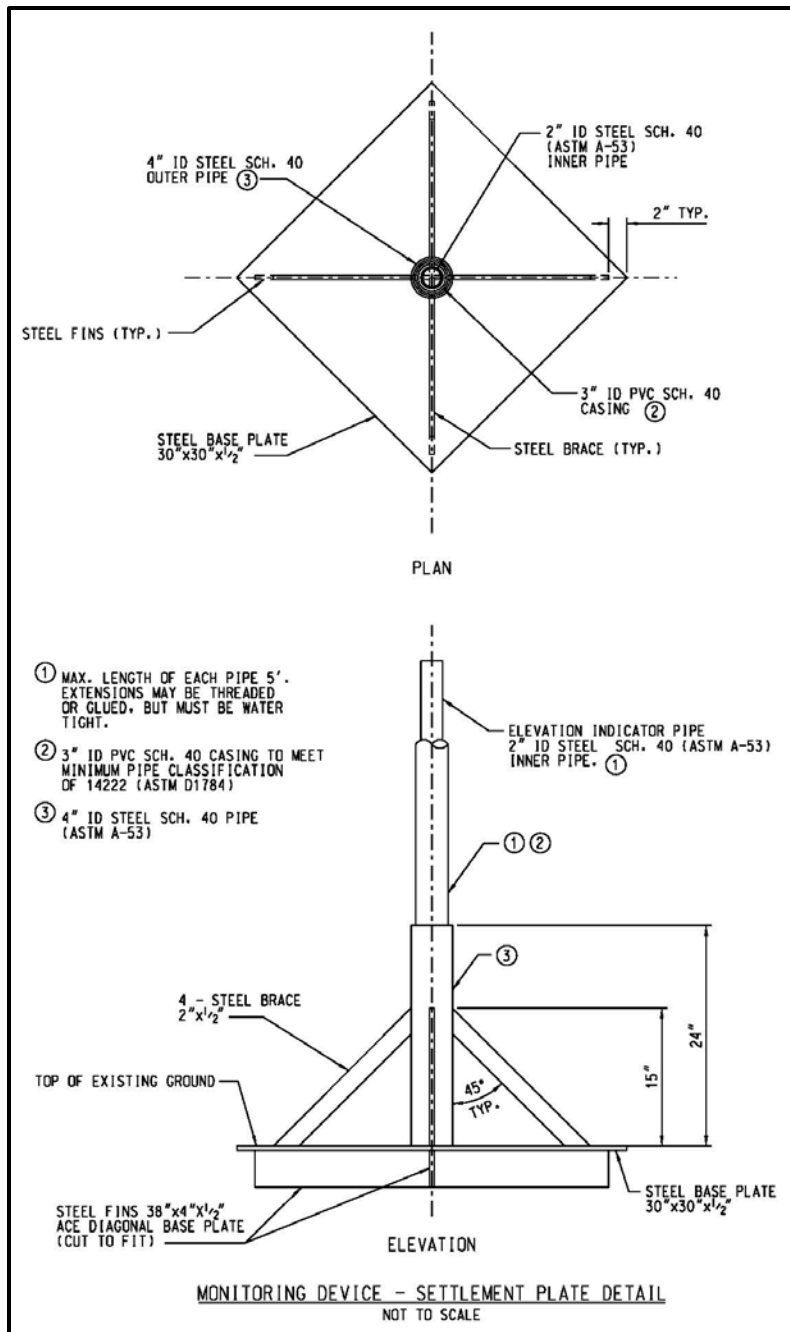


Figure 1