

SECTION 02445 SETTLEMENT INSTRUMENTATION & MONITORING

PART 1 - GENERAL

1.01 SUMMARY

- A. The Work specified in this Section includes furnishing, installing, and monitoring settlement instrumentation to monitor ground movements around and above HDD operations. The work includes, but is not limited to: installing surface monitoring points shown in Figure 1, furnishing monitoring equipment, and recording observations and measurements from the monitoring points on a periodic basis before, during, and after HDD operations.
- B. The Contractor is responsible for surveying the elevations of the surface monitoring points in accordance with the requirements herein. Elevations shall be determined before HDD operations begin to establish a baseline. Survey readings shall continue during and after HDD operations to monitor any movements related to the HDD construction. All monitoring points shall be surveyed one week and one month after all HDD has been completed to evaluate long-term settlements.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02619 - Horizontal Directional Drilling
- B. Section 03360 - Annular Space and Contract Grouting

1.03 DEFINITIONS

- A. Surface Control Points: Control points established as a reference for measuring elevation of the ground surface using optical survey methods.

1.04 QUALITY ASSURANCE

- A. Surveyor Qualifications: Surveying for monitoring control points shall be performed by a land surveyor licensed in the State of Florida with previous experience surveying for the detection of structural or surface deformations.
- B. Install surface control points within one-half (0.5) foot of the horizontal and vertical location shown on the Drawings or as directed by the Engineer.
- C. Should actual field conditions prevent installation of instruments at the locations shown on the Drawings or specified herein, Contractor shall obtain written acceptance from the Engineer for new instrument location and elevation.

1.05 SUBMITTALS

- A. Submittals shall be made in accordance with Special Provisions of the contract documents. Provide sufficient detail to allow the Engineer to judge whether the proposed equipment, materials, and procedures will meet the Contract requirements. All drawings shall be legible with dimensions accurately shown and clearly marked in English. Drawings and photographs transmitted by a facsimile will not be accepted. The Engineer's

review of submitted details and data will be based on consideration of requirements for the completed work, protection of utilities and surface features, and the possibility of unnecessary delays in the execution of the work to be constructed under this Contract. Review and acceptance of the Contractor's submittals by the Engineer shall not be construed in any way as relieving the Contractor of its responsibilities under this Contract.

1. Qualifications: Submit surveying personnel qualifications in accordance with Paragraph 1.05 A.
2. Submit the following, at least one (1) month before scheduled installation of monitoring points:
 - a. Instrumentation Schedule: Submit the proposed schedule for installing the surface monitoring points.
 - b. Description of methods and materials for installing surface monitoring points.
 - c. If Contractor proposes to install any instruments at locations other than those shown on the Drawings, submit drawings with alternate locations of proposed monitoring points shown in plan and profile.
3. Reports and Records:
 - a. Provide reports of monitoring control point data to the Engineer by noon of the day following the shift for which the measurements were taken.
 - b. Within 72 hours following installation of the instruments, submit drawings showing the actual as-built location, the instrument identification number, the instrument type, the installation date and time, and the tip elevation and instrument length. Include details of installed instruments, accessories and protective measures including all dimensions and materials used.
 - c. Submit surveyed measurements of all monitoring points at least seven (7) days prior to commencing construction of shafts to establish baseline readings.
 - d. Submit surveyed measurements of monitoring points during and after construction in accordance with Paragraph 3.01 C.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Surface Control Points: Surface control points shall be established by an inscribed marking or approved surveyor's nail driven flush with the surface in asphalt or concrete paved areas. In landscaped areas, surface control points shall be established by driving a 2-inch by 2-inch by 18-inch long timber stake flush with the ground. Each control point shall have a tag or marking indicating the station and offset from centerline.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Instrumentation shall be installed at the locations shown on the Drawings, or as directed by the Engineer. Instruments shall be installed in accordance with the approved installation schedule.
- B. Contractor shall install and perform a baseline survey of all surface settlement monitoring devices at least seven (7) days prior to the commencement of HDD operations.
- C. Once HDD operation commences, settlement points shall be surveyed once for every 10 feet of installed pipe. Additionally, all settlement monitoring devices shall be surveyed once per day for a period of one week, once at 14 days, and once at 30 days, after HDD operation is complete.
- D. Contractor shall provide access and assistance to the Engineer for obtaining supplemental monitoring data, as requested by Engineer.

3.02 SURFACE CONTROL POINTS

- A. Establish system of ten (10) surface control points and monitor in accordance with the appropriate Sections noted in Paragraph 1.02 and with the requirements herein.
- B. Surface control points shall be monitored by the Contractor in accordance with the appropriate Sections noted in Paragraph 1.02 and with the requirements herein.
- C. Provide data from readings of surface control points to the Engineer within 24 hours of reading.

3.03 INSTRUMENT PROTECTION, MAINTENANCE, AND REPAIR

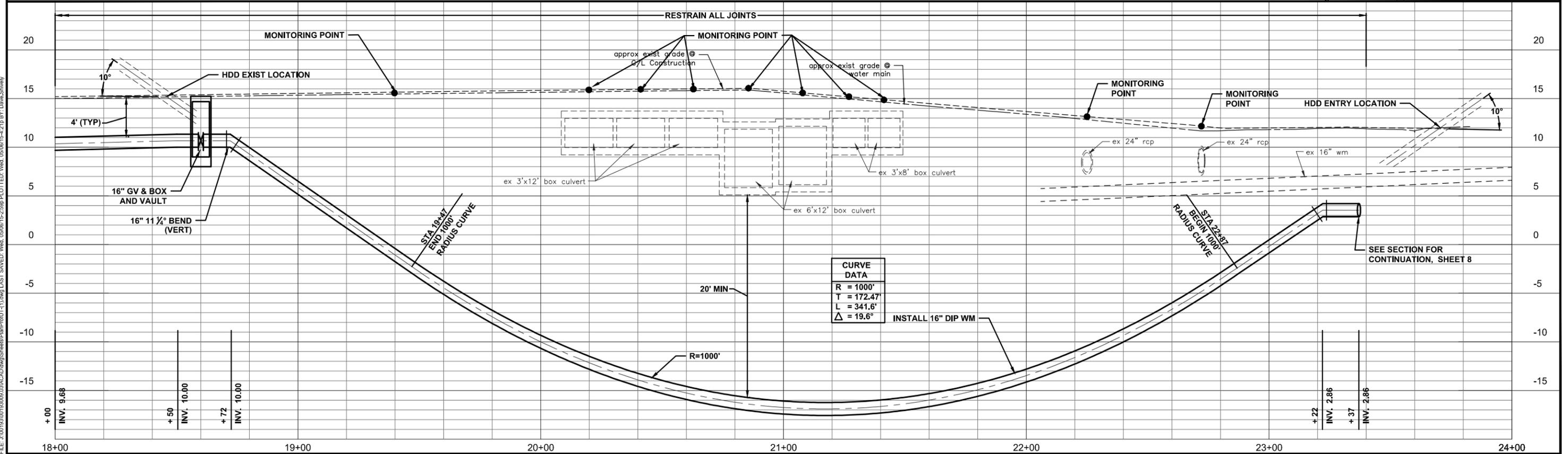
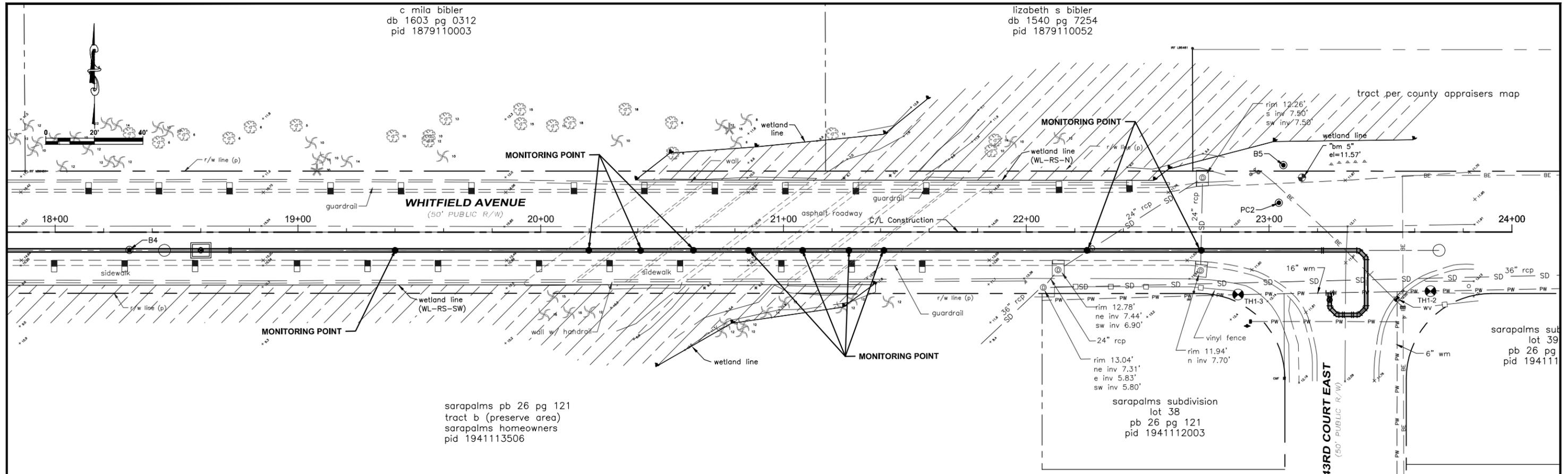
- A. Protect the instruments and control points from damage. Damaged installations shall be replaced or repaired prior to continuing the HDD operation, unless permitted otherwise in writing by the Engineer.

3.04 ABANDONMENT OF INSTRUMENTS

- A. Surface Control Points: All surface control points on public property shall remain in place at the completion of the Work. Remove all surface control points on private property during the cleanup and restoration work, or as required by the Engineer.

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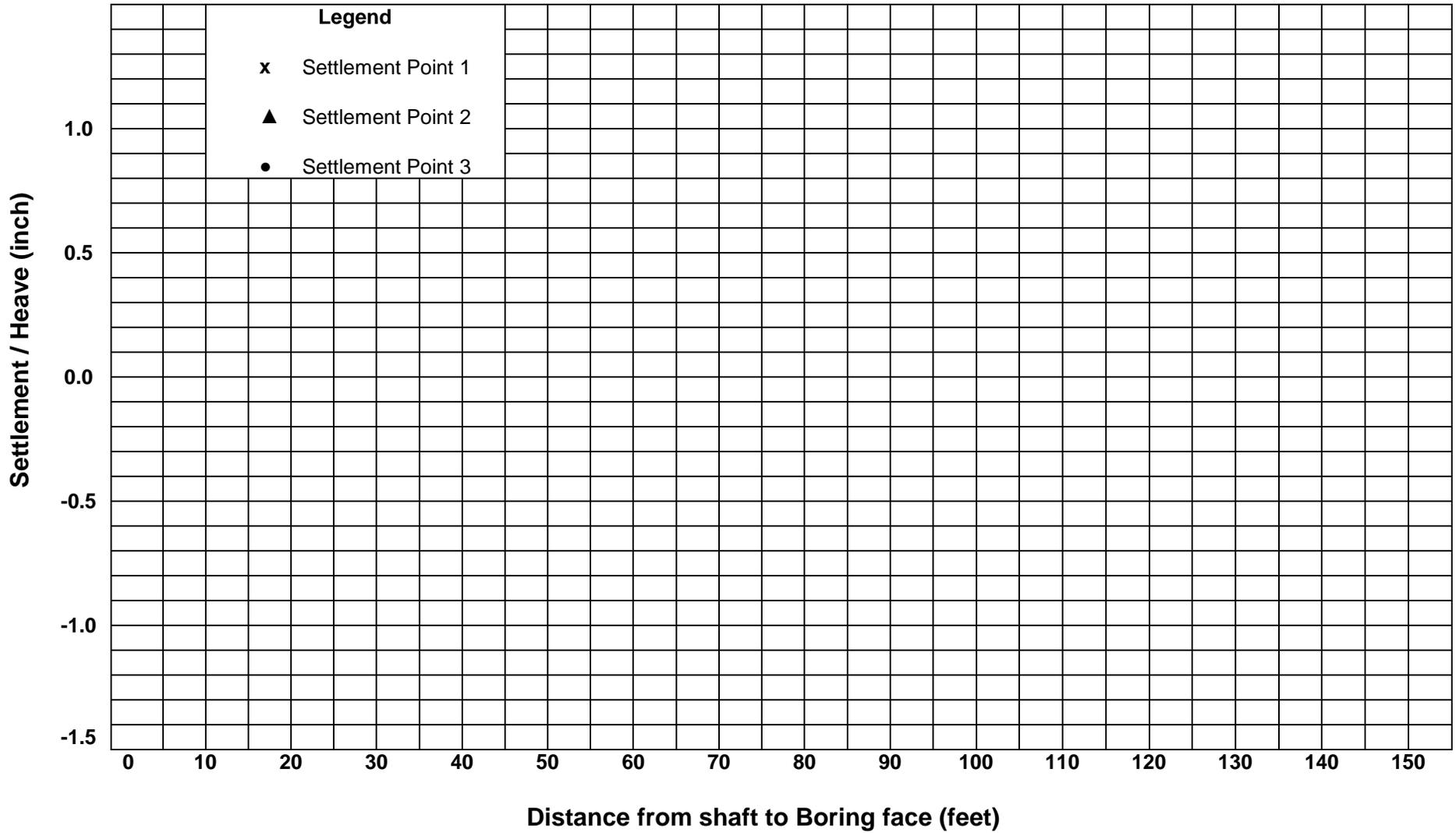
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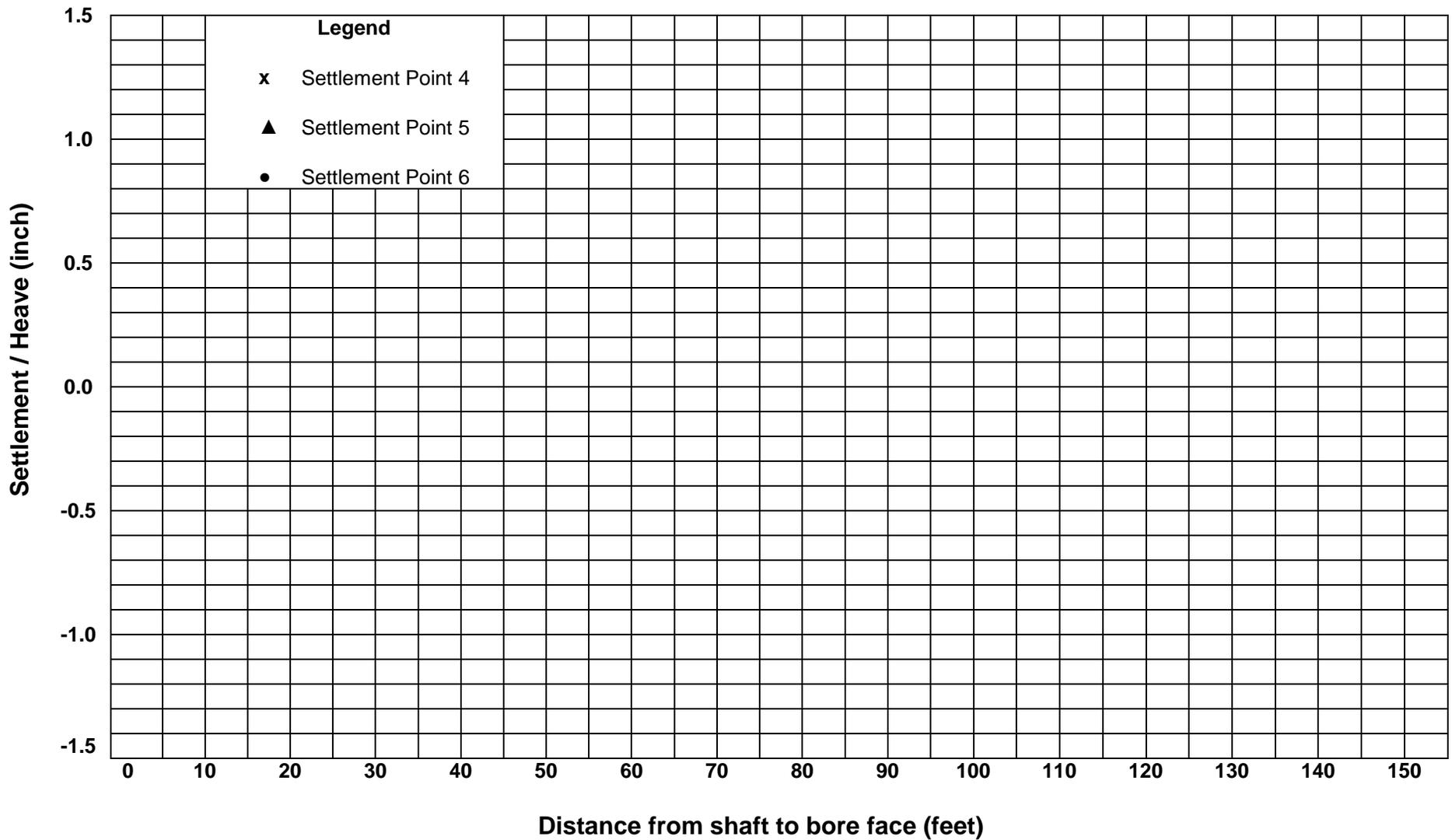
WHITFIELD AVENUE 16-INCH WATER MAIN
MANATEE COUNTY, FLORIDA

FIGURE 1
SURFACE MONITORING
LOCATIONS

Daily Settlement Monitoring Form
Manatee County Florida
Whitfield Avenue 16-inch Water Main



**Daily Settlement Monitoring Form
Manatee County Florida
Whitfield Avenue 16-inch Water Main**



Daily Settlement Monitoring Form
Manatee County Florida
Whitfield Avenue 16-inch Water Main

