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BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

ENVIRONMENTAL MONITORING PLAN – HORIZONTAL EXPANSION

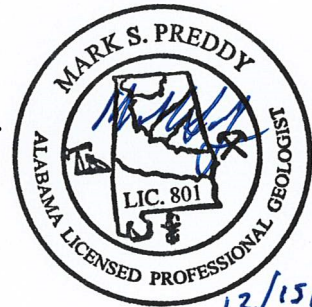
**ARROWHEAD LANDFILL
PERRY COUNTY ASSOCIATES, LLC
PERRY COUNTY, ALABAMA
SOLID WASTE PERMIT NUMBER 53-03**

Prepared for:

**ARROWHEAD ENVIRONMENTAL PARTNERS, LLC
622 Tayloe Road
Uniontown, Alabama 36786**

Prepared By:

**BUNNELL-LAMMONS ENGINEERING, INC.
6004 Ponders Court
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BLE Project Number J11-4999-29**



April 6, 2011 (Last Revised December 15, 2021)



BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

April 6, 2011 (Last Revised December 15, 2021)

Arrowhead Environmental Partners, LLC
622 Tayloe Road
Uniontown, Alabama 36786

Attention: Mr. William W. Gay, Chief Executive Officer

Subject: **Environmental Monitoring Plan – Horizontal Expansion
Arrowhead Landfill
Perry County Associates, LLC
Perry County, Alabama
Solid Waste Permit Number 53-03
BLE Project Number J11-4999-29**

Gentlemen:

Bunnell-Lammons Engineering, Inc. (BLE) has prepared an Environmental Monitoring Plan (EMP) for the Horizontal Expansion to the Arrowhead Landfill. The Environmental Monitoring Plan complies with the environmental monitoring requirements as outlined in Alabama Department of Environmental Management, Land Division – Solid Waste Program, Division 335-13, Chapter 4 titled Permit Requirement, related to groundwater and methane gas monitoring at a municipal solid waste (MSW) landfill. The attached Plan establishes locations for monitoring and describes methods for sampling groundwater and methane gas. The current revisions to the EMP include:

- Updated PQLs in the two lists of monitoring parameters of the *Groundwater Detection Monitoring Plan*.

We appreciate the opportunity to serve as your geological and geotechnical consultant on this project and look forward to continue working with you at the Arrowhead Landfill. If you have any questions, please contact us at (864) 288-1265.

Sincerely,
BUNNELL-LAMMONS ENGINEERING, INC.

Mark S. Preddy, P.G.
Consultant Geologist
Registered, Alabama #801

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*Arrowhead Landfill
Environmental Monitoring Plan – Horizontal Expansion*

*April 6, 2011 (Last Revised October 12, 2021)
BLE Project Number J11-4999-29*

FIGURES

Figure 1 – Site Location Map

ATTACHMENTS

Existing Groundwater Wells

Existing Methane Gas Monitoring Probes



INTRODUCTION

The Arrowhead Landfill is located in Perry County, Alabama southeast of the town of Uniontown (Figure 1). The facility is owned by Perry County Associates, LLC. To date, a portion of Tract 1 has been developed (began receiving waste in 2007), and the expanded Tract 1 area, Tract 2, and Tract 3 are scheduled to be developed in the future.

This Environmental Monitoring Plan (EMP) has been prepared to include procedures and locations for groundwater and methane gas monitoring as required by the Alabama Department of Environmental Control (ADEM) Rules 335-13-4.27 (groundwater) and 335-13-4.16 (methane gas). The EMP is designed to detect and quantify contamination, as well as to measure the effectiveness of engineered disposal systems. The groundwater and methane gas monitoring network for this site has been designed to provide an early warning of disposal system failure. The groundwater monitoring well locations and methane monitoring locations are indicated in the *Design and Operation Plan* (D&O Plan), *Arrowhead Landfill Horizontal Expansion for Perry County Associates, LLC*, prepared by Hodges, Harbin, Newberry, & Tribble, Inc. (HHNT), on the sheet titled *Environmental Monitoring Plan*. The facility will seek ADEM approval for future modifications or perform modifications as directed by ADEM, which has been previously reviewed and approved by ADEM.

GEOLOGIC CONDITIONS

Geologic conditions for this site summarized herein are described in the *Solid Waste Permit Application, Volume 1 of 2, Site Analysis, Perry County Associates Landfill*, dated September 2005, prepared by Jordan, Jones, and Goulding (JJ&G) which has been previously reviewed and approved by ADEM.

The site is underlain by Cretaceous-age Coastal Plain sediments comprised of the Selma Group (clay and chalk) overlying the Eutaw Formation (sand).

Regionally, the Selma Group is comprised of the Ripley Formation, Demopolis chalk, Arcola Limestone Member, and Mooreville chalk. Locally, the Selma Group generally consists of about 440 to 563 feet of low permeability, gray, clay and chalk at the landfill site. The upper 10 to 20 feet near the ground surface consists of brown clay, which represents the upper weathered portion of the formation. The existing shallow monitoring wells (GWM-15 through GWM-17) are set in the upper weathered portion of the Selma Group chalk to intersect potential perched groundwater, but they were dry when they were installed. It is anticipated that groundwater in these shallow wells will be a seasonal feature. The Selma Group serves as the confining layer for the underlying Eutaw Formation.

Underlying the Selma Group is the Eutaw Formation, which consists of gray glauconitic fine to medium sand and is a regional water supply aquifer. The existing deep monitoring wells (GWM-1 through GWM-5) were set to intersect the upper portion of the Eutaw Formation at depths ranging from 460.0 to 580.5 feet. Stabilized potentiometric water levels in the Eutaw Formation range from about 80 to 150 feet below ground surface, but the uppermost physical presence of groundwater is at the top of the Eutaw Formation and below the confining Selma Group clay and chalk.

Historical water table maps included in the semi-annual sampling reports have indicated very little potentiometric head difference in the water levels from the five existing monitoring wells set to intersect the Eutaw Formation. Potentiometric head differences among the five wells during the twelve semi-



*Arrowhead Landfill – Perry Co., Alabama
Environmental Monitoring Plan – Horizontal Expansion*

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annual sampling events since 2007 have ranged from 0.65 feet (N3; July 2, 2007) to 6.27 feet (N8; March 3, 2009). The most recent potentiometric surface elevation contours from March 8, 2011 are included on the *Environmental Monitoring Plan* in the D&O Plan prepared by HHNT.

The number, location, and placement of monitoring wells are recommended herein based on the geologic and hydrogeologic site characteristics described in the aforementioned JJ&G 2005 Permit Application and on recent potentiometric surface elevation contour maps included with the semi-annual sampling reports.

GROUNDWATER MONITORING SYSTEM



GROUNDWATER MONITORING SYSTEM

The groundwater monitoring system will define the relevant point of compliance, well locations, well construction, and phasing of well installation with cell construction. ADEM requirements for the groundwater monitoring system are included in Rule 335-13-4.27. The monitoring system was designed with regards to site geologic and hydrogeologic conditions as discussed in the *Solid Waste Permit Application, Volume 1 of 2, Site Analysis, Perry County Associates Landfill*, dated September 2005, prepared by JJ&G.

1.0 Relevant Point of Compliance

The relevant point of compliance has been established less than 150 meters (492 feet) from the boundary of the cells. The determination of the relevant point of compliance was based on the following factors:

- The hydrogeologic characteristics of the facility and the surrounding land;
- The anticipated physical/chemical characteristics of the leachate;
- The direction of groundwater flow;
- The proximity and direction of groundwater users;
- The availability of alternative drinking water supplies; and
- Public health, safety, and welfare effects.

2.0 Monitoring Well Locations

Forty (40) groundwater monitoring wells (25 shallow Selma Group monitoring wells and 15 deep Eutaw Formation monitoring wells) make up the groundwater monitoring system and their locations are indicated in the Design and Operation Plan Drawings. There are three tracts identified as facility waste disposal units (Tract 1, Tract 2, and Tract 3), and there are groundwater monitoring wells associated with each individual Tract. The monitoring wells will be installed in phases as new landfill tracts are constructed. The monitoring well locations have been selected based on the configuration of the water table, associated groundwater flow directions, and proposed cell sump locations.

The proposed monitoring well locations are discussed below:

MONITORING WELL	PROPOSED/EXISTING WELL LOCATIONS
GWM-1 (Existing Well)	Existing upgradient monitoring well set to intersect the deep groundwater in the upper portion of the Eutaw Formation north of Tract 3. The well was installed in conjunction with the construction of Tract 1 at the facility.
GWM-2 (Existing Well)	Existing downgradient monitoring well set to intersect the deep groundwater in the upper portion of the Eutaw Formation south of Tract 1. The well was installed in conjunction with the construction of Tract 1 at the facility.



MONITORING WELL	PROPOSED/EXISTING WELL LOCATIONS
GWM-3 (Existing Well)	Existing downgradient monitoring well set to intersect the deep groundwater in the upper portion of the Eutaw Formation south of Tract 1. The well was installed in conjunction with the construction of Tract 1 at the facility.
GWM-4 (Existing Well)	Existing downgradient monitoring well set to intersect the deep groundwater in the upper portion of the Eutaw Formation west of Tract 1. The well was installed in conjunction with the construction of Tract 1 at the facility.
GWM-5 (Existing Well)	Existing upgradient monitoring well set to intersect the deep groundwater in the upper portion of the Eutaw Formation north of Tract 2. The well was installed in conjunction with the construction of Tract 1 at the facility.
GMW-6 (Existing Well)	Existing upgradient monitoring well set to intersect the deep groundwater in the upper portion of the Eutaw Formation east of Tract 1. The well was installed in conjunction with Tract 1 Expansion construction.
GWM-7	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the Eutaw Formation south of Tract 2. The well will be installed in conjunction with Tract 2 (Cells No. 1-4) construction.
GWM-8	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the Eutaw Formation southwest of Tract 2. The well will be installed in conjunction with Tract 2 (Cells No. 1-4) construction.
GWM-9	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the Eutaw Formation west of Tract 2. The well will be installed in conjunction with Tract 2 (Cells No. 1-4) construction.
GWM-10	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the Eutaw Formation west of Tract 2. The well will be installed in conjunction with Tract 2 (Cells No. 5-9) construction.
GWM-11	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the Eutaw Formation northwest of Tract 2. The well will be installed in conjunction with Tract 2 (Cells No. 5-9) construction.
GWM-12 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the Selma Group clay and chalk east of Tract 1. The well was installed in conjunction with Tract 1 Expansion construction.
GWM-13 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the Selma Group clay and chalk east of Tract 1. The well was installed in conjunction with Tract 1 Expansion construction.



MONITORING WELL	PROPOSED/EXISTING WELL LOCATIONS
GWM-14 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 1. The well was installed in conjunction with <u>Tract 1</u> Expansion construction.
GWM-15 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> south of Tract 1. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.
GWM-16 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> south of Tract 1. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.
GWM-17 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 1. The well was installed in conjunction with the construction of <u>Tract 1</u> at the facility.
GWM-18 (Existing Well)	Existing downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 1. The well was installed in conjunction with <u>Tract 1</u> Expansion construction.
GWM-19	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-20	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> south of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-21	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> south of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-22	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 1-4)</u> construction.
GWM-23	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 5-9)</u> construction.
GWM-24	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 5-9)</u> construction.
GWM-25	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 5-9)</u> construction.



MONITORING WELL	PROPOSED/EXISTING WELL LOCATIONS
GWM-26	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 2. The well will be installed in conjunction with <u>Tract 2 (Cells No. 5-9)</u> construction.
GWM-27	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> south of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-28	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-29	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> west of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-30	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-31	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-32	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> north of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-33	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-34	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-35	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-36	Proposed downgradient monitoring well set to intersect the perched groundwater in the upper portion of the <u>Selma Group clay and chalk</u> east of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.



MONITORING WELL	PROPOSED/EXISTING WELL LOCATIONS
GWM-37	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> south of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-38	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> west of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-5, 9-12)</u> construction.
GWM-39	Proposed downgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> west of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 6-12)</u> construction.
GWM-40	Proposed upgradient monitoring well that will be set to intersect the deep groundwater in the upper portion of the <u>Eutaw Formation</u> east of Tract 3. The well will be installed in conjunction with <u>Tract 3 (Cells No. 1-12)</u> construction.

3.0 Monitoring Well Depths and Screened Intervals

The 25 shallow groundwater monitoring wells (GWM-12 through GWM-36) are designed to monitor the shallow (perched) groundwater in the upper weathered portion of the Selma Group chalk and clay. It is anticipated that groundwater in these shallow wells will be a seasonal feature and dependent on weather conditions. The depth of these wells will likely be in the 10 to 30 feet range. The screened interval of these wells will initially be set to bracket the stabilized water table (if present). However, if shallow groundwater is not encountered at the time of drilling, the screened interval of the wells should be set to encounter the upper weathered portion of the Selma Group chalk and clay.

The 15 deep groundwater monitoring wells (GWM-1 through GWM-11, and GWM-37 through GWM-40) are designed to monitor the groundwater in the upper portion of the Eutaw Formation sand at the site. The depth of these wells will likely be in the 450 to 600 feet range; however, the depth to the stabilized water level will likely be in the 80 to 150 feet range.

4.0 Number of Monitoring Wells

The monitoring well locations were selected to intercept groundwater flow upgradient and downgradient from the landfill cells. Areas downgradient of cell sumps, leachate tanks, and convergent groundwater flow areas were targeted for monitoring. The number of monitoring wells (25 shallow and 15 deep) is sufficient to provide representative groundwater quality samples of the groundwater in the uppermost water-bearing aquifer flowing past the relevant point of compliance.

5.0 Monitoring Well Construction

A (certified or licensed) drilling contractor will perform the well installation, and a geologist registered in the state of Alabama will supervise the drilling activities. The monitoring wells will be constructed



in accordance with the “Design and Installation of Groundwater Monitoring Wells in Aquifers”, ASTM Subcommittee D18.21 on Groundwater Monitoring. A typical well construction diagram is included in the *Miscellaneous Detail Sheet* of the D&O Plan prepared by HHNT.

The groundwater monitoring well will consist of 4-inch polyvinyl chloride (PVC) casing (Schedule 80 with flush-threaded joints) inserted into a 6-inch (or larger) diameter borehole. The bottom 10-foot section of each well will be a manufactured well screen with 0.010-inch wide slots. Centralizers will be installed every 50 feet on the PVC risers during well construction to stabilize the casing.

Filter sand will be placed in the borehole annulus around the outside of the well screen, to approximately three to five feet above the top of the screen interval. The filter sand will be used to stabilize the formation and to help yield a less turbid groundwater sample. The filter sand will consist of silica sand and will have a D_{70} grain size ranging between 0.5 and 1.0 millimeters and a coefficient of uniformity of 2.5 or less. A five foot (minimum thickness) thick bentonite seal will be installed on top of the sand backfill to seal the monitoring well at the desired level. The remaining borehole annulus will be tremie grouted to the surface with a cement/bentonite grout mixture.

Each well will be constructed with a vent hole in the top of the PVC casing and a weep hole near the base of the outer protective steel cover. A 6-ft by 6-ft square concrete pad will be constructed at the ground surface for each well. A lockable PVC cap and a protective stickup-mounted steel cover will be placed over each well. Permanent well labels will be affixed to the protective surface casing.

Once constructed, the monitoring wells should be surveyed for horizontal and vertical control by an Alabama licensed professional surveyor.

6.0 Monitoring Well Development

Each monitoring well will be developed in order to remove fine particles from the sand pack around the well screen. The well development will consist of the following:

1. place an electrical submersible pump, a manual hand pump, or bailer in the monitoring well;
2. purge groundwater from the well using the aforementioned pump or bailer; and
3. intermittently surge the well with a surge block.

Turbidity, pH, specific conductance, and temperature will be measured periodically during the well development. The wells will be developed until the turbidity has been reduced to 5 Nephelometric Turbidity Units (NTUs), or until further development no longer significantly reduces the turbidity.

7.0 Phasing of Well Installation

The groundwater monitoring system for the landfill is shown on the *Environmental Monitoring Plan*, of the D&O Plan. Once constructed, the comprehensive groundwater monitoring system will include 40 groundwater monitoring wells (25 shallow and 15 deep). The schedule for monitoring well installation is shown and is summarized on the following table.



Tract Construction	Monitoring Well Installation
Tract No. 1 (Existing)	Deep Eutaw Formation Wells: GWM-1 through GWM-6 Shallow Selma Group Wells: GWM-12 through GWM-18
Tract No. 2 (Cells No. 1-4)	Deep Eutaw Formation Wells: GMW-7 through GWM-9 Shallow Selma Group Wells: GWM-19 through GWM-22
Tract No. 2 (Cells No. 5-9)	Deep Eutaw Formation Wells: GMW-10 through GWM-11 Shallow Selma Group Wells: GWM-23 through GWM-26
Tract No. 3 (Cells No. 1-12)	Deep Eutaw Formation Wells: GWM-40
Tract No. 3 (Cells No. 1-5, 9-12)	Deep Eutaw Formation Wells: GMW-37 and GWM-38 Shallow Selma Group Wells: GWM-27, GWM-28, GWM-34 through GWM-36
Tract No. 3 (Cells No. 6-12)	Deep Eutaw Formation Wells: GWM-39 Shallow Selma Group Wells: GWM-29 through GWM-33

If it is determined that an existing well should be replaced for any reason, a *Monitoring Well Abandonment and Replacement Plan* (Plan) will be prepared for submittal to ADEM within 60 days of making the determination. The Plan will include, at a minimum, consideration of the following:

- The appropriate method for abandonment.
- The need for relocation to protect the replacement well from future damage.
- The anticipated replacement well type, depth, screened interval, casing diameter and surface completion in accordance with ADEM Admin Code 335-13-4-.27(2)(c).
- The need for replicate sample collection and if required, the number of replicate samples and a schedule for completing sample collection.
- Statistical analysis to be used for groundwater quality data collected from the replacement well and a determination addressing pooling data from the abandoned well with the new well is appropriate.

Upon approval of the Plan and the replacement of the new well, a report documenting the abandonment and replacement activities will be prepared and submitted to ADEM along with a Minor Permit Modification request to update the facility Permit and include the newly installed well into the Permit compliance well network.

8.0 Reporting

Groundwater monitoring well installation reports will be prepared upon completion of well installation and prior to new cell development. The monitoring well installation and reporting will follow the phasing of well installation mentioned in Section 7.0. The well installation reports will include documentation of boring logs, well diagrams, and field procedures. Within 60 days of well installation, development, and survey, the reports should be forwarded to ADEM.

**GROUNDWATER DETECTION
MONITORING PLAN**



GROUNDWATER DETECTION MONITORING PLAN

The detection monitoring program will define the parameters for analysis and frequency of sample collection. ADEM requirements for the sampling and analysis are included in 335-13-4.27(3).

1.0 Monitoring Parameters and Frequency

Groundwater sampling will be performed semi-annually in March and September during the landfill’s active life and post-closure care period.

A laboratory certified by the TNI (NELAC) or equivalent, which has demonstrated the ability to analyze the specific contaminants at an acceptable detectable limit established by EPA will perform the analyses and specify the laboratory methods used (EPA Manual SW-846, EPA 600/4-79-020, or an EPA approved method).

Laboratory analysis reports will identify the methods used (by number), the extraction date, and date of actual analysis. Data from samples that are not analyzed within recommended holding times will be considered suspect. Deviations from EPA approved methods will be adequately tested to ensure that the quality of the results meet the performance specifications (e.g. detection limit, sensitivity, precision, accuracy) of the reference method. A planned deviation from an approved analytical procedure will be justified and submitted for approval by ADEM prior to use.

Background sampling of the newly installed wells (shown on the plans) will be performed for establishment of a statistical database, which will include four sampling events during the first semi-annual sampling period. The monitoring wells will be sampled on a semi-annual basis thereafter (per phasing schedule).

The water samples will be tested in the field for the following indicator parameters:

INDICATOR PARAMETERS	METHOD
pH	Field test or EPA 150.1
Specific Conductivity	Field test or EPA 120.1 or EPA 9050
Temperature	Field test
Turbidity	Field test

Groundwater samples will not be field-filtered. The water will be tested in the laboratory for the Drinking Water Standard total metals and volatile organic compounds (VOCs) (ADEM Appendix I list) in accordance with the designated methods. If excessive turbidity becomes an issue, the samples may also be tested for dissolved metal as a demonstration that metal detections are related to turbidity. The list of constituents, associated methods, and detection limits are on the following two tables. The detection limits for the individual constituents will not be greater than the Practical Quantification Limit (PQL) for the chosen laboratory method.



METALS & INORGANICS	EPA METHOD	MAXIMUM DETECTION LIMIT	
		µg/l	Based on:
Antimony	6010/6020/7040/7041	5	PQL
Arsenic	6010/6020/7060/7061	5	PQL
Barium	6010/6020/7080	10	PQL
Beryllium	6010/6020/7090/7091	3	PQL
Cadmium	6010/6020/7130/7031	4	PQL
Chromium	6010/6020/7090/7091	5	PQL
Cobalt	6010/6020/7200/7201	2	PQL
Copper	6010/6020/7210/7211	5	PQL
Lead	6010/6020/7420/7421	2	PQL
Mercury	7470	0.2	PQL
Nickel	6010/6020/7520	5	PQL
Selenium	6010/6020/7740/7741	5	PQL
Silver	6010/6020/7760/7761	5	PQL
Thallium	6010/6020/7840/7841	1	PQL
Vanadium	6010/6020/7910/7911	5	PQL
Zinc	6010/6020/7950/7951	10	PQL
Boron	6010/6020	40	PQL
Calcium	6010/6020	100	PQL
Chloride	9056A	1,000	PQL
Fluoride	9056A	100	PQL
Sulfate	9056A	5,000	PQL
Total Dissolved Solids (TDS)	2540C	10,000	PQL



VOLATILES	METHOD	MAXIMUM DETECTION LIMIT	
		µg/l	Based on:
Acetone	8260	25	PQL
Acrylonitrile	8260	10	PQL
Benzene	8260	2	PQL
Bromochloromethane	8260	5	PQL
Bromodichloromethane	8260	5	PQL
Bromoform; Tribromomethane	8260	5	PQL
Carbon disulfide	8260	5	PQL
Carbon Tetrachloride	8260	2	PQL
Chlorobenzene	8260	2	PQL
Chloroethane; Ethyl Chloride	8260	2	PQL
Chloroform; Trichloromethane	8260	2	PQL
Dibromochloromethane; Chlorodibromomethane	8260	5	PQL
1,2-Dibromo-3- chloropropane; DBCP	8011	0.2	PQL
1,2-Dibromoethane; Ethylene dibromide; EDB	8011	0.05	PQL
o-Dichlorobenzene; 1,2- Dichlorobenzene	8260	5	PQL
p-Dichlorobenzene; 1,4- Dichlorobenzene	8260	5	PQL
Trans-1,4-Dichloro-2-butene	8260	5	PQL
1,1-dichloroethane; Ethylidene chloride	8260	2	PQL
1,2-dichloroethane; Ethylene dichloride	8260	2	PQL
1,1-dichloroethylene; 1,1- Dichloroethene; Vinylidene chloride	8260	2	PQL
Cis-1,2-Dichloroethylene; cis- 1,2-Dichloroethene	8260	2	PQL
Trans-1,2-Dichloroethylene; trans-1,2-Dichloroethene	8260	2	PQL
1,2-dichloropropane; Propylene dichloride	8260	2	PQL
Cis-1,3-dichloropropene	8260	2	PQL
Trans-1,3-Dichloropropene	8260	2	PQL
Ethylbenzene	8260	2	PQL
2-Hexanone; Methyl butyl ketone	8260	10	PQL



VOLATILES	METHOD	MAXIMUM DETECTION LIMIT	
		µg/l	Based on:
Methyl Bromide; Bromomethane	8260	5	PQL
Methyl Chloride; Chloromethane	8260	5	PQL
Methylene bromide; Dibromomethane	8260	5	PQL
Methylene Chloride; Dichloromethane	8260	5	PQL
Methyl ethyl ketone; MEK; 2- Butanone	8260	25	PQL
Methyl iodide; Iodomethane	8260	10	PQL
4-Methyl-2-pentanone; Methyl isobutyl ketone	8260	10	PQL
Styrene	8260	5	PQL
1,1,1,2-Tetrachloroethane	8260	2	PQL
1,1,2,2-Tetrachloroethane	8260	2	PQL
Tetrachloroethylene; Tetrachloroethene; Perchloroethylene	8260	2	PQL
Toluene	8260	2	PQL
1,1,1-Trichloroethane; Methylchloroform	8260	2	PQL
1,1,2-Trichloroethane	8260	2	PQL
Trichloroethylene; Trichloroethene	8260	2	PQL
Trichlorofluoromethane; CFC-11	8260	2	PQL
1,2,3-Trichloropropane	8260	2	PQL
Vinyl acetate	8260	10	PQL
Vinyl Chloride	8260	1	PQL
Total Xylenes	8260	5	PQL

Notes:

1. PQL = Practical Quantification Limit



2.0 Reporting

The owner or operator must report sampling activities, analytical results, and statistical analysis results of the water quality data as outlined in ADEM Rule 335-13-4-.27(2)(n).

Background sampling of newly installed wells will include four sampling events during the first semi-annual sampling period. The monitoring wells will be sampled on a semi-annual basis thereafter. The semi-annual reports should include laboratory analytical results of the water quality data, statistical results of the water quality data, a water table elevation contour map with groundwater flow directions, groundwater flow rates, and a determination of the technical sufficiency of the monitoring network.

Within 60 days of receiving valid and complete analytical results and field notes, the operator should determine whether there has been a Statistically Significant Increase (SSI) over background at each monitoring well. Reports will be submitted to ADEM within 14 days from this determination.

**GROUNDWATER SAMPLING AND
ANALYSIS PLAN**



GROUNDWATER SAMPLING AND ANALYSIS PLAN

The sampling and analysis plan will define the sample collection methods and sample handling procedures.

1.0 Water Level Measurement and Purge Volume Calculations

Water level elevations will be measured during each sampling event to determine if horizontal and vertical flow gradients have changed since initial site characterization. A change in hydrologic conditions may necessitate modification to the design of the groundwater monitoring system. A water table elevation contour map will be prepared and submitted for each sampling event.

Field measurements will include depth to water and total depth of the well to the bottom of the intake screen structure (total depth may be taken from well installation logs). The measurements will be taken to 0.1 foot. All site groundwater elevations will be measured within 48-hours for each sampling event. Each well will have a reference point from which its water level measurement is taken. The reference point will be established in relation to a permanent benchmark and the survey will also note the well location.

The water standing in a well prior to sampling may not be representative of in-situ groundwater quality. Therefore, the standing water will be removed so that water which is representative of the formation can enter the well. For wells with rapid recovery, which cannot be evacuated to dryness, at least three well volumes will be removed or until field parameters have stabilized. This reflects the present technology in which the goal is to remove standing water without diluting any potential plume by drawing in pure water.

Any item coming in contact with the inside of the well casing or the well water will be kept in a clean container and handled only with gloved hands. If possible, sampling personnel should always start with the up-gradient wells or with wells having the potential of being less contaminated.

1.1 Work Area Preparation

To minimize the potential of contamination from the surrounding environment, place a plastic sheet (such as a painter's drop cloth) around the well as a work area, then unlock protective well casing. A steel measuring tape and an electric water level meter should be brought to the plastic sheet (the water level meter and tape have been precleaned). New nitrile gloves should be donned and the well cap removed, then placed top-down on a corner of the plastic sheet.

1.2 Calculate the Volume of Water to be Evacuated

Use the electric water level meter to measure the distance from the known elevation to the top of water. Use the steel tape to measure the distance from top of casing to the bottom of the well or use total depth data from a well installation record (this information may be available from as-built well diagrams). This information should be placed on a copy of the *Field Data Information Log for Groundwater Sampling* (Attached; other forms may be used as long as the form includes the information listed on the attached form) and the height (h) of the column of water in the well should be calculated. Multiply h times the appropriate conversion factor to obtain the volume of water in the



well in gallons:

- For a 2-inch inside diameter well, $h \times 0.163 = \text{Volume (gal)}$; or
- For a 4-inch inside diameter well, $h \times 0.653 = \text{Volume (gal)}$.

The steel measuring tape and electric sounder probe should be washed between each well with a laboratory-grade, phosphate free detergent and rinsed with deionized (DI) water after each use.

2.0 Well Purging Procedures

A dedicated positive gas displacement bladder pump will be placed in each well or a bailer will be utilized to purge each well.

Bladder pumps have the capability of purging wells at low flow rates, which reduces the potential loss of VOCs by volatilization as well as lowering the potential of having turbid samples, ultimately providing a more representative sample. The wells will be purged until the field indicator parameters have stabilized as described in Section 3.0 below. Bladder pumps are made of PVC or stainless steel with an internal Teflon® bladder. Discharge tubing will also be made of Teflon®. After the pump has been installed and secured in the well to the depth of the well screen, the pump can be operated. Pump operation consists of pulsing air into the bladder with an air compressor, which is controlled by a pump controller unit. The controller unit is used to vary the discharge rate to the desired flow rate.

Bailers are made of Teflon®, which are pre-cleaned in the laboratory and wrapped in aluminum foil prior to bringing them to the landfill. Well purging using a bailer is as follows:

1. Bring 2 dish pans and a measuring container to the plastic sheet and line one dish pan with aluminum foil.
2. Bring the bailer to the plastic sheet. Unwrap it without touching the bailer.
3. Bring the roll of bailer cord to the sheet. This roll has also been covered with foil to keep it clean. Place it in the unlined dish pan and unwrap it without handling the rope.
4. At this point both bailer-handler and helper should put on a new pair of gloves.
5. The end of the bailer rope is tied to the top of the bailer. Use foil where needed to assure that the rope does not touch any item while in use.
6. The bailer is lifted and lowered carefully into the well until it is submerged.
7. The bailer is raised in a hand-over-hand manner and the rope is allowed to fall into the polyethylene dish pan lined with foil.
8. Pour groundwater from bailer into the measuring container. Repeat bailing procedure until a 3 x volume (gal) has been evacuated. If the bailer touches the container, line the lip with aluminum foil.
9. If the well goes dry before 3 volumes are obtained, then sample when the well has recovered sufficiently to provide a sample volume. Some wells require up to 8 hours for recovery and settling.



10. The rope is untied from the bailer and the used portion is cut off and discarded.
11. The used gloves, the used rope, the bailer foil, dish pan foil and the plastic sheet are rolled up and discarded in a large trash bag provided.

During the purging activities, measurements of pumping rate, temperature, pH, specific conductance, and turbidity should be made at periodic intervals and documented on a copy of the *Field Data Information Log for Groundwater Sampling* (Attached; other forms may be used as long as the form includes the information listed on the attached form).

3.0 Sample Collection Procedures

Monitoring wells shall be bailed or pumped to remove at least three times the well volume of water or until field parameters have stabilized. Groundwater quality is considered stable when pH values remain constant within 0.2 Standard Units, specific conductance varies no greater than 10%, temperature is consistent over three readings, and turbidity has stabilized or is below 10 NTUs. New nitrile gloves should be donned prior to sample collection. VOC samples can be collected directly from the discharge line at a rate not greater than 100 milliliters per minute. The samples are poured into the bottles without bubbles, and are filled to the top without headspace. It is not good practice to leave samples in the sun. They should be placed in the ice chest as soon as possible. Do not allow field equipment to touch any sample bottles while pouring.

The organic samples are the most delicate and should be collected first. A sample for volatile analysis must be filled so that the vial has a meniscus. The cap is slid over it and closed so that no bubble can be seen when the sample vial is upended. The volatile samples are always collected in pairs. The other organics usually require two or three 1-liter bottles without preservative and these should be collected next, also without headspace. Finally, preserved samples should be collected, taking great care that the acids and salts in the bottles do not contact the sampler's gloves and thus pass to other caps and bottles.

The sample bottles should now be carried to the ice chest where they are labeled, placed in zip-lock bags, and iced down. The labels can be pre-filled out leaving less work and time delay at the site. The label must have:

- Name of facility
- Date of sampling and time
- Sample description (monitoring well ID)
- Sampler's name

Additionally, mark each sample bottle with an identification number using glass-marking crayon, which is resistant to water. Bottle caps are good places to add an ID. This is a precaution in case labels get wet or come off during transport. Furthermore, it is good practice to take an extra set of sample bottles to the field in case of breakage or accidental contamination.

Upon completion of the sample collection activities, the well cap is replaced and the protective well casing should be locked. The used gloves and other sampling material should be discarded in a large trash bag.



4.0 Sample Handling and Preservation

Analysis for total metals will be performed on unfiltered representative groundwater. When there is a sediment problem, the metals sample only may be collected after waiting no longer than a maximum of 24 hours after purging.

Sample bottles will be filled to the top, capped, and placed on ice immediately after sampling. On arrival at the laboratory they will be transferred to a refrigerator. Samples for VOC analysis must be filled to the top without headspace. Special vials with septum caps will be used for this purpose. Table 1 is a list of preservatives and holding times.

Sample delivery to the laboratory will be in the shortest possible time after collection. If delay is incurred this will be entered in the field log book along with the time increment.

Trip blanks of DI water will be carried to the field through the entire sampling procedure. This will be done a minimum of one time for each sampling event. If positive detections are found, this will alert the collector to field sampling error (See Section 6.0, Quality Assurance).

5.0 Chain of Custody

Custody and protection of samples is an important legal consideration. As few people as possible should handle the samples. The sampler is personally responsible for collected samples, and will be able to attest to the integrity of samples until transfer. If the samples are placed in a vehicle, it will be kept locked. Ice chests will be locked or located in a place which is locked, and having access only by responsible officials.

A Chain-of-Custody form will be used to document the handling of samples from the moment of collection until testing. The ID number of each sampling point will be entered along with a word description of the sample. Note that several bottles collected for different parameters will have the same ID number if they come from one sampling point.

The Chain-of-Custody form will contain the facility name, date of sampling and name of the collector. Each transfer of custody is recorded with an appropriate signature, date, and time.

If the samples are to be shipped they must be sealed. The driver for the delivery service must sign the custody form or a bill of lading must be secured.

6.0 Field and Laboratory Quality Assurance/Quality Control

It is the responsibility of the Operator to insure the reliability of the analytical data gathered during the monitoring program.

A trip blank should be part of each sampling event. A trip blank is collected when VOCs are of concern and is used to determine if sample handling and shipping has compromised sample integrity. The samples are filled in the laboratory with DI water. The samples are placed in the cooler with the collected groundwater samples and returned to the laboratory for analysis. The trip blank test results are not used to correct the sample results, but are reported as-is.



A field blank should be collected with each sampling event. A field blank should be collected when weather or environmental conditions are unstable during groundwater sampling (high winds, rain, heavy equipment operation). The field blank samples consist of pouring DI water into sample containers immediately after groundwater sample collection. The analysis of the field blank sample will be used to determine if air particulates may have altered the collected groundwater samples.

In selecting a laboratory to conduct analyses of groundwater samples it will be the Operator's responsibility to ensure that the laboratory of choice is exercising a proper Quality Assurance / Quality Control (QA/QC) program. The laboratory must be Alabama certified. The approved EPA test methods contain within them the requirement to run a spiked sample to determine percent recovery. This will be a part of the lab report. Additional quality control such as method blanks and duplicates are also described in the test method and will be included in the laboratory work agreement. The laboratory QA/QC program will be a part of this Plan. Quality assurance procedures are time consuming and increase the cost of testing, but the facility will be regulated based on the results and it is the Operator's advantage to employ the best qualified laboratory.

Field instruments that the Operator will use will be calibrated prior to field use and recalibrated in the field each day. The calibration will be recorded in a field logbook along with appropriate documentation of other field activities.

7.0 Reporting

The owner or operator must report sampling activities, analytical results, and statistical analysis results of the water quality data as outlined in ADEM Rule 335-13-4-.27(2)(n).

The semi-annual reports should include laboratory analytical results of the water quality data, statistical results of the water quality data, a water table elevation contour map with groundwater flow directions, groundwater flow rates, and a determination of the technical sufficiency of the monitoring network.

Within 60 days of receiving valid and complete analytical results and field notes, the operator should determine whether there has been an SSI over background at each monitoring well. Reports will be submitted to ADEM within 14 days from this determination.

TABLE 1
Preservation Procedures and Holding Times

Parameter	EPA Method (Groundwater)	Recommended Container	Preservatives & Indicators of Groundwater Contamination	Holding Time	Volume Required For One Analysis
pH	150.1/9045C	T,P,G	Field Determined	Field/15 minutes	25 ml
Specific Conductance	120.1/9050A	T,P,G	Field Determined	Field/28 days	100 ml
TOC	415.1/9060	G, amber, Teflon-lined cap	Cool 4°C, HCL	28 days	1000 ml
TOX	9020B	T,P,G (amber), Teflon-lined cap	Cool 4°C, H ₂ SO ₄	7 days	1000 ml
Chloride	9250/9251/9253	T,P,G	Cool 4°C	28 days	200 ml
Antimony	6010/7040/7041	T,P	<u>Total Metals</u> HNO ₃ <u>Dissolved Metals</u> 1.Field filtration if possible. 2.Acidity HNO ₃	6 months	500 ml
Arsenic	6010/7060/7061				
Barium	6010/7080				
Beryllium	6010/7090/7091				
Cadmium	6010/7130/7031				
Chromium	6010/7090/7091				
Cobalt	6010/7200/7201				
Copper	6010/7210/7211				
Lead	6010/7420/7421				
Mercury	7470				
Nickel	6010/7520				
Selenium	6010/7740/7741				
Silver	6010/7760/7761				
Thallium	6010/7840/7841				
Vanadium	6010/7910/7911				
Zinc	6010/7950/7951				
Fluoride	9214	T,P	Cool 4°C	28 days	300 ml
Nitrate/Nitrite	353.2	T,P,G	Cool 4°C/H ₂ SO ₄	28 days	200 ml
Volatile Organics	8260/8011	G, Teflon-lined Cap	Cool 4°C, HCL	7-14 days	4-40 ml
Pesticides	8081A/8082/8141A	G, Teflon-lined cap	Cool 4°C	7 days	2-1,000 ml
Herbicides	8151A	G, Teflon-lined cap	Cool 4°C	7 days	2-1,000 ml
PCB	8082	G, Teflon-lined cap	Cool 4°C	7 days	2-1,000 ml
Semi-Volatile Organics	8270	G, Teflon-lined cap	Cool 4°C	7 days	2-1,000 ml
Cyanide	335.2/9010B/9012A/9014	P,G	Cool 4°C NaOH	14 days*	500 ml
Oil & Grease	1664	G	Cool 4°C, H ₂ SO ₄	28 days	2-1,000 ml
Phenols	8270C/9065	G	Cool 4°C, H ₂ SO ₄	7 days/ 28 days	2-1,000 ml

*Unless sulfide is present, - then 24 hours (see lab method)

P = polyethylene

G = glass

T = Fluorocarbon resins (Teflon, PTFE, FEP, etc.)

FIELD DATA INFORMATION LOG FOR GROUNDWATER SAMPLING

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Site Name/Client:	Casing Diameter:
Project Number:	Casing Material:
Field Personnel:	Dedicated Pump or Bailer:
Well ID #:	Locking Cap:
Date:	Protective Post/Abutment:
Weather Conditions:	Well Integrity Satisfactory:
Air Temperature:	Method of Well Evacuation:
Total Well Depth in feet (TWD) =	Method of Sample Collection:
Depth to Ground Water in feet (DGW) =	Well Yield (subjective):
Length of Water Column (LWC) = TWD - DGW =	Sample Date and Time:
2" Well: 1 Casing Volume in gallons (CV) = LWC x 0.163 =	
4" Well: 1 Casing Volume in gallons (CV) = LWC x 0.653 =	
Standard Evacuation Volume (3 casing volumes) =	
Total Volume of Water Removed (gallons):	
FIELD ANALYSIS	
Time (military)	
Volume Purged (gallons)	
Purge Rate (gpm)	
pH (S.U.)	
Sp. Cond. (µmhos/cm)	
Water Temp. (°C)	
Turbidity (NTU)	
COMMENTS/OBSERVATIONS: _____	

**GROUNDWATER STATISTICAL
ANALYSIS PLAN**



GROUNDWATER STATISTICAL ANALYSIS PLAN

1.0 Statistical Calculations

In order to determine whether the groundwater is receiving contamination from the site, it is necessary to compare the groundwater laboratory results from each semi-annual event to the background laboratory results. Statistical analysis of the groundwater data will begin after a sufficient number of background sampling events (4 to 8 events, depending on the statistical test performed) have taken place for each well and after each subsequent semi-annual event. Statistical analysis will be performed in accordance with ADEM Rule 335-13-4-.27(2). Several inherent variabilities can affect the laboratory results and these inherent variabilities should be considered:

- The sampling technique will vary somewhat from event to event even under ideal conditions.
- The aquifer matrix will contain a certain quantity of natural elements.
- The laboratory test itself can vary slightly.
- Seasonal variations can result in slightly different chemical constituents in the water samples.
- Turbidity of the sample can affect the results.

The statistical method used will depend on the number of detected concentrations and the distribution of the data for a specific compound. Techniques for performing statistical analysis will follow the “*Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*” (RCRA Unified Guidance) (March 2009 or latest version). The performance criteria specified in this RCRA Unified Guidance is consistent with ADEM Rule 335-13-4-.27(2)(m). Selection of the statistical test to be used is based on the following:

- Intrawell comparisons can be performed, as needed, using Shewhart-CUSUM control charts, prediction limits, confidence intervals, Kendell-Mann Trend tests, or by a rank-sum method for non-parametric data sets.
- Other statistical methods may be used as long as they meet the performance requirements of the RCRA Unified Guidance, with Department approval.

The background water quality database may be updated in accordance with Charter 5 of the RCRA Unified Guidance (Sections 5.3.1 and 5.3.2) every two years using outlier tests, trend tests, t-tests or Wilcoxon tests, where appropriate. This may be done with the Second Semi-Annual sampling event on even-numbered years (i.e., 2022, 2024, etc.).

2.0 Reporting

If additional verification sampling / resampling is warranted, this sampling will be performed no sooner than 30 days from the original sampling event, but no longer than 90 days from the original sampling event.

Within 30 days after receiving all the analytical report(s) including subsequent resampling reports, it will be determined whether there has been an SSI over background at each well. If it is determined that there is an SSI over background concentrations, ADEM will be notified within 14 days of the finding and a copy of the notification should be placed in the operating record. A demonstration may be made that a source other than the landfill caused the detects or that the SSI resulted from natural variation in



*Arrowhead Landfill – Perry Co., Alabama
Environmental Monitoring Plan – Horizontal Expansion*

*April 6, 2011 (Last Revised August 26, 2020)
BLE Project Number J11-4999-29*

groundwater quality or from an error in sampling, analysis or statistical evaluation. This demonstration will be certified by a qualified groundwater scientist and will be submitted to ADEM. If the demonstration has not been made within 90 days, an assessment monitoring program that conforms with ADEM Rule 335-13-4-.27(4)(a) through (j) should be initiated.

METHANE GAS MONITORING PLAN



METHANE GAS MONITORING PLAN

The objective of the Methane Gas Monitoring Plan is to detect the lateral movement of potentially explosive gases in the subsoil and along man-made migration pathways toward on-site and off-site structures. The information gathered from gas monitoring stations will be used to evaluate the potential explosive hazard of methane gas accumulations within the explosive limits of 5 - 15 percent by volume.

1.0 Monitoring Network Design and Phasing of Installation

Landfill gas monitoring points have been established on site between the landfill units and the facility boundary. Since groundwater is a vertical barrier for potential methane gas migration, areas selected for monitoring are along the facility boundary where streams, wetlands, and sediment ponds are not present.

As a result of a change in the facility’s permitted property boundary in 2016 along Cahaba Road, existing methane monitoring probes MM-105 and MM-106 and existing barhole punch locations MM-107 and MM-108 have to be abandoned and relocated. The abandoned locations will be replaced with two new methane monitoring probes (MM-105R and MM-106R) and two new bar-hole punch locations (MM-107R and MM-108R). The proposed new methane monitoring locations, the existing methane monitoring locations to be abandoned, and the new facility boundary are indicated on the revised *Environmental Monitoring Plan* of the D&O Plan prepared by HHNT.

Methane monitoring will be conducted at 81 proposed bar-hole punch locations (MM-1 through MM-58 and MM-107R through MM-129), 6 existing bar-hole punch locations (MM-63, MM-86 through MM-90), 40 existing monitoring probe locations (MM-59, through MM-62, MM-64 through MM-85 and MM-91 through MM-104), 2 proposed methane monitoring probe locations (MM-105R and MM-106R), one on-site structure (scalehouse), and culverts/drop inlets once they are constructed. The bar-hole punch locations and methane monitoring points are spaced approximately 300 feet apart in the western, northern, and eastern portions of the facility. In the southern portion of the site the bar-hole punch locations and methane monitoring points (MM-66 through MM-129) are spaced approximately 100 feet apart or 300 feet apart due to residences located as close as 600 feet west of the facility. The locations of the methane monitoring points are indicated on the *Environmental Monitoring Plan* of the D&O Plan. All bar-hole punch locations have been established by a licensed surveyor and marked with identification posts prior to the completion of the first waste cell constructed at the facility.

Bar-hole punch locations shown as existing are currently being sampled. All bar-hole punch locations shown as proposed will be sampled after cell construction progresses to that area of the landfill.

MONITORING LOCATION	LOCATIONS AND JUSTIFICATION
MM-1 to MM-20	Proposed bar-hole punch locations on a 300-foot spacing at the western property boundary.
MM-21 to MM-40	Proposed bar-hole punch locations on a 300-foot spacing at the northern property boundary.



MONITORING LOCATION	LOCATIONS AND JUSTIFICATION
MM-41 to MM-58	Proposed bar-hole punch locations on a 300-foot spacing at the eastern property boundary.
MM-59 to MM-62	Existing methane monitoring probe locations on a 300-foot spacing at the eastern property boundary.
MM-63	Existing bar-hole punch location on a 300-foot spacing at the eastern property boundary.
MM-64 to MM-65	Existing methane monitoring probe locations on a 300-foot spacing at the eastern property boundary.
MM-66 to MM-70	Existing methane monitoring probe locations on a 100-foot spacing at the eastern property boundary.
MM-71 to MM-85	Existing methane monitoring probe locations on a 100-foot spacing at the southern property boundary.
MM-86 to MM-90	Existing bar-hole punch locations on a 100-foot spacing at the southwestern property boundary.
MM-91 to MM-102	Existing methane monitoring probe locations on a 100-foot spacing at the southwestern property boundary.
MM-103 to MM-104	Existing methane monitoring probe locations on a 300-foot spacing at the southwestern property boundary.
MM-105R to MM-106R	Proposed replacement methane monitoring probe locations on a 300-foot spacing at the southwestern property boundary.
MM-107R to MM-108R	Proposed replacement bar-hole punch locations on a 100-foot spacing at the southwestern property boundary.
MM-109 to MM-129	Proposed bar-hole punch locations on a 100-foot or 300-foot spacing at the southwestern property boundary.
On-site structures	scale house

2.0 Gas Monitoring Schedule

Gas monitoring stations will be established by land surveyors and marked with a permanent station marker. For the purpose of detecting migration of potentially explosive gas from the landfill, the following monitoring schedule will be implemented:

1. Upon commencement of active operations and quarterly prior-to-closure.
2. Quarterly for at least 30 years during the post-closure care period or until demonstration is made to ADEM that methane gas no longer presents a threat to the environment.



3. Each monitoring event is to include observations for stressed vegetation due to methane gas movement. If present, areas around and beyond stressed vegetation will be monitored with a bar punch to determine if gas is moving off site.
4. Monitoring in, beneath, and around site structures will be a part of each screening event.

3.0 Monitoring Procedures

3.1 Bar-hole Punch Locations and Structures

Screening at each monitoring station will consist of initially forming a small diameter hole (1" hole with a minimum depth of four feet into the soil). This will be achieved by utilizing a punch bar or small auger (manual or gas power). At most locations, this hole should remain open for sufficient time to allow for collection and measurement of gases within the soil. If the hole tends to collapse, a small temporary perforated pipe will be placed in the hole.

After punching the bar-hole, an air sample from the bar-hole will be withdrawn and analyzed with a combustible gas indicator. The combustible gas indicator shall provide direct readings of methane concentrations (0 - 100% methane by volume). Percent of methane by volume and percent of oxygen will be recorded on approved ADEM forms along with pertinent data such as ambient air temperatures and weather for a permanent record. Should initial reading yield an exceedance, the bar-hole will be sealed at the ground surface for 30 to 60 minutes and then retested. Both initial test and retest results should be reported.

Each gas monitoring event will include monitoring of all on-site structures. Readings of percent methane by volume, percent LEL and percent oxygen will be obtained inside, beneath, and around structures. Any other installations such as a scale pit will also be monitored. Readings obtained will be recorded in the field and reported to ADEM as described below in Section 6.0.

3.2 Methane Probe Locations

An air sample from the probe casing will be withdrawn and analyzed with a combustible gas indicator, immediately after approaching the probe and opening the casing. Should an initial reading yield an exceedance (5% methane by volume or greater), the probe will be covered for 30 to 60 minutes and retested. Both initial test and retest results should be reported to ADEM along with pertinent data such as ambient air temperatures and weather for a permanent record.

4.0 Quality Assurance and Quality Control Procedures

The following quality assurance and control procedures will be implemented.

Sampling will not be performed if conditions conducive to decreasing gas concentrations are present (e.g., subsurface gas pressure less than atmospheric pressure). In this case, sampling will be delayed until such conditions pass.

Sampling must be conducted when gas pressures are at a maximum. Subsurface gas pressures have a diurnal cycle and generally are at a maximum during the afternoon. Therefore, sampling should be



conducted after 12 noon.

Gas production will vary with changes in seasons and climatic conditions. Each sampling event must be conducted under the same conditions, as near as possible, as the preceding event. Therefore, the operator will review the log of the time and conditions which existed during the proceeding sampling event and attempt to emulate those conditions as closely as possible during subsequent events.

Landfill gas will be analyzed using a combustible gas indicator, such as an E.G. Gascope, Model 62S, manufactured by Mine Safety Appliances Co., Decatur, Ga., (or equal). The combustible gas indicator will be calibrated according to the manufacture's specifications prior to the landfill gas survey.

Air samples from the bar-hole punches will be withdrawn and analyzed with the combustible gas indicator. The combustible gas indicator will provide direct readings of methane concentrations (0-100% methane and 0-100% LEL). Percent of methane and percent of LEL will be recorded, along with pertinent data such as ambient air temperatures, barometric pressure, subsurface pressure, weather conditions, and soil moisture conditions for a permanent record.

Each gas survey will include screening at on-site structures. Monitoring in on-site structures will be conducted at times when the dilution of indoor air is minimized and the concentration of soil gas is expected to be at its highest concentration. Recommended sampling locations within structures include: basements, crawl spaces, ceiling areas, and around subsurface utility lines such as service or electrical connections. Reading of percent methane and percent LEL will be recorded on forms along with pertinent data such as ambient air temperatures, barometric pressure, and weather conditions.

5.0 Methane Gas Safety Guidelines

The following guidelines should be followed when at a landfill in the presence of potentially dangerous gases:

1. No person should enter a vault or a trench on a landfill without first checking for the presence of methane gas. The person should also wear a safety harness with a second person standing by to pull him or her to safety.
2. Anyone installing probes in a landfill should wear a safety rope to prevent falling in the borehole. Open holes should be covered when they are left unattended.
3. Smoking should be prohibited on the landfill where drilling, excavating, or installation of equipment is taking place or where gas is venting from the landfill.
4. Collected gas from a mechanically evacuated system should always be cleared to minimize air pollution and any potential explosion or fire hazard.
5. Methane gas in a concentration of 5 to 15 percent is an explosive mixture. Gas accumulations should be monitored inside enclosed structures to avoid explosive conditions and properly ventilate dangerous areas when needed.

Personnel working on a landfill must be provided training regarding the danger posed by landfill gases.



Personnel operating safety equipment around the landfill must be thoroughly trained in its use and have a clear understanding of the meaning of observations made with the monitoring equipment. Monitoring equipment must also be periodically calibrated to ensure continued accuracy in the results.

6.0 Reporting

Interpretation of quarterly sampling for methane gas will be as follows:

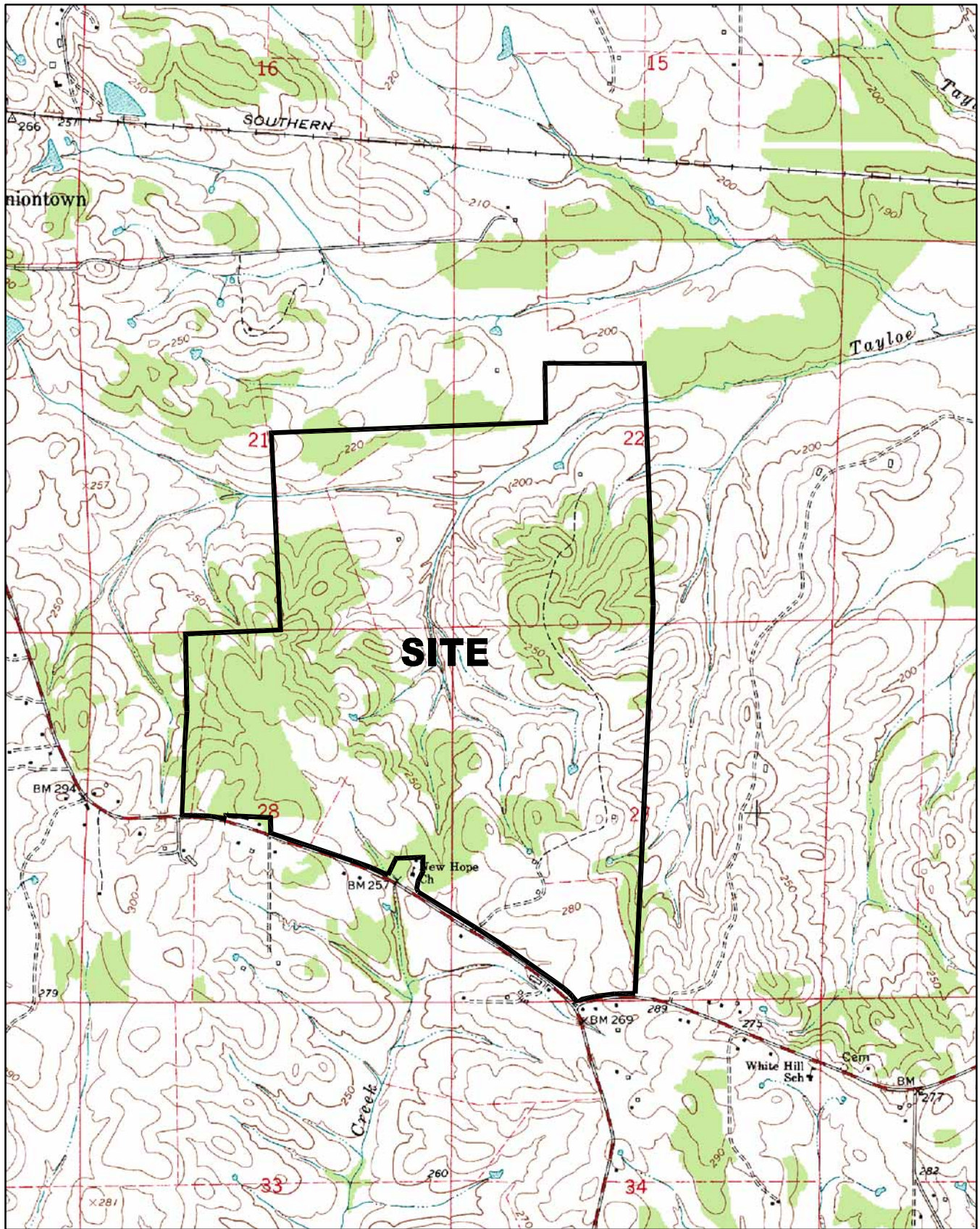
1. Methane gas concentrations shall not exceed 25 percent of the lower explosive limit (LEL). (1.25%) for gases in facility structures.
2. Methane gas concentrations shall not exceed the lower explosive limit for methane facility boundaries (5%).

Results of methane gas monitoring will be submitted to ADEM quarterly within 30 days of the methane monitoring event.

Upon findings of methane gas migration, a contingency plan including the following will be implemented:

1. Verification of explosive gas concentrations by immediate retesting.
2. Upon verifications of readings above the 25 percent of the LEL in facility structures or the LEL at facility boundaries, immediate notifications to ADEM and appropriate local public safety authorities such as the local health district, fire department, and police department will be given. Structures within 300 feet of the site boundary where the reading was at LEL will be tested for methane.
3. The monitoring frequently of the subject soil gas station(s) will be increased from quarterly monitoring to a frequency determined appropriate by ADEM until such time that the problem is corrected or determined not to pose a significant threat to the environment and public health and safety.
4. The need for methane gas control systems will be assessed upon validated finding of methane gas migration and appropriate recommendations implemented. A remediation plan as required by Rule 335-13-4-.16 will be prepared, submitted to ADEM, and implemented.

FIGURE



REFERENCE:
 USGS TOPOGRAPHIC MAP, 7.5 MINUTE SERIES,
 UNIONTOWN EAST, AL. QUADRANGLE, 1968.

DRAWN:	ACE	DATE:	08-22-20
CHECKED:	MSP	CAD:	ARROWHLF-49 SLM
APPROVED:		JOB NO:	J20-4999-49

BLE | BUNNELL
 LAMMONS
 ENGINEERING
 6004 Ponders Court, Greenville, SC 29615
 Phone: (864) 288-1255 Fax: (864) 288-4430

SITE LOCATION MAP
 ARROWHEAD LANDFILL
 PERRY COUNTY, ALABAMA

FIGURE

1

ATTACHMENTS

EXISTING GROUNDWATER WELLS

KEY TO SOIL CLASSIFICATIONS AND CONSISTENCY DESCRIPTIONS

BUNNELL-LAMMONS ENGINEERING, INC.
GREENVILLE, SOUTH CAROLINA

Penetration Resistance* Blows per Foot

SANDS

0 to 4
5 to 10
11 to 20
21 to 30
31 to 50
over 50

Relative Density

Very Loose
Loose
Firm
Very Firm
Dense
Very Dense

Particle Size Identification

Boulder: Greater than 300 mm
Cobble: 75 to 300 mm
Gravel:
Coarse - 19 to 75 mm
Fine - 4.75 to 19 mm
Sand:
Coarse - 2 to 4.75 mm
Medium - 0.425 to 2 mm
Fine - 0.075 to 0.425 mm
Silt & Clay: Less than 0.075 mm

Penetration Resistance* Blows per Foot

SILTS and CLAYS

0 to 2
3 to 4
5 to 8
9 to 15
16 to 30
31 to 50
over 50

Consistency

Very Soft
Soft
Firm
Stiff
Very Stiff
Hard
Very Hard

*ASTM D 1586

KEY TO DRILLING SYMBOLS



Grab Sample



Split Spoon Sample



Undisturbed Sample

NR = No reaction to HCL

NA = Not applicable

NS = No sample



Groundwater Table at Time of Drilling

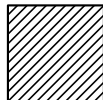


Groundwater Table 24 Hours after Completion of Drilling

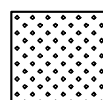
KEY TO SOIL CLASSIFICATIONS



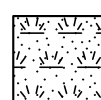
Well-graded Gravel
GW



Low Plasticity Clay
CL



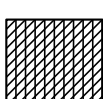
Sand
SW



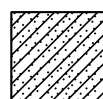
Topsoil
TOPSOIL



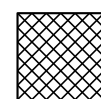
Poorly-graded Gravel
GP



Silty Clay
CL-ML



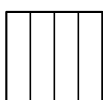
Clayey Sand
SC



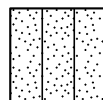
Fill
FILL



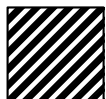
Partially Weathered Rock
BLDRCBBL



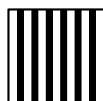
Silt
ML



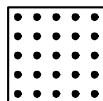
Silty Sand
SM



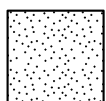
High Plasticity Clay
CH



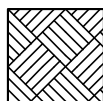
Clayey Silt
MH



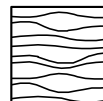
Waste
WOOD



Poorly Graded Sand
SP



Bedrock
BEDROCK



Liquid Sludge
SLUDGE

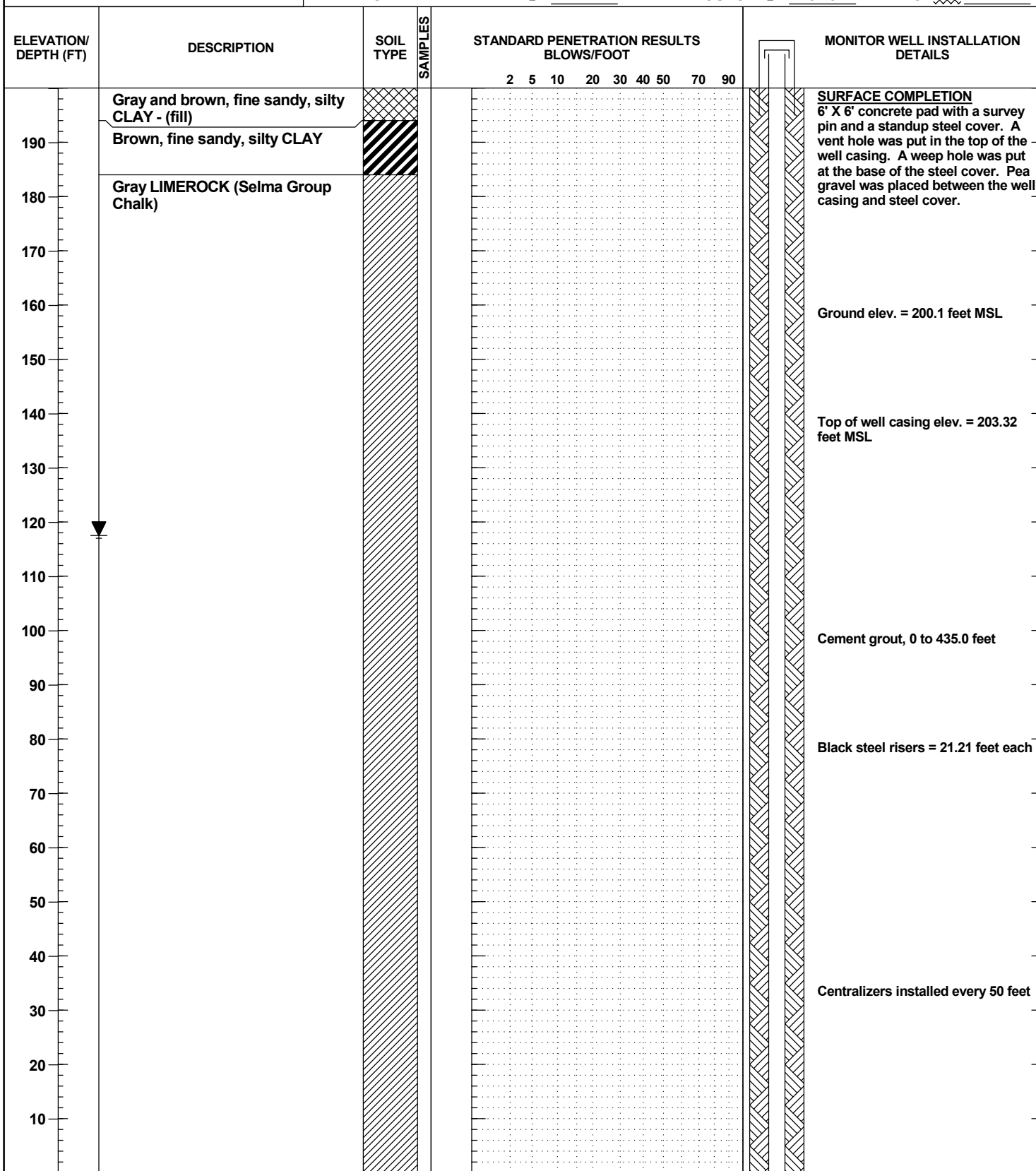


GROUNDWATER MONITORING WELL NO. GWM-1

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ∇ AFTER 7 HOURS: ∇ 82.5 CAVING> \otimes

PROJECT NO.: J07-4999-05
 START: 5-14-07 END: 5-16-07
 ELEVATION: 200.1
 LOGGED BY: M. Preddy



GEOI_WELL_4999-05.GPJ 8/20/20



GROUNDWATER MONITORING WELL NO. GWM-1

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ▽ AFTER 7 HOURS: ▽ 82.5 CAVING> ⊗

PROJECT NO.: J07-4999-05
 START: 5-14-07 END: 5-16-07
 ELEVATION: 200.1
 LOGGED BY: M. Preddy

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT										MONITOR WELL INSTALLATION DETAILS
				2	5	10	20	30	40	50	70	90		
-10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120 -130 -140 -150 -160 -170 -180 -190	Gray LIMEROCK (Selma Group Chalk)													Cement grout, 0 to 435.0 feet Black steel risers = 21.21 feet each Centralizers installed every 50 feet



GROUNDWATER MONITORING WELL NO. GWM-1

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ▽ AFTER 7 HOURS: ▽ 82.5 CAVING> ⊗

PROJECT NO.: J07-4999-05
 START: 5-14-07 END: 5-16-07
 ELEVATION: 200.1
 LOGGED BY: M. Preddy

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT											MONITOR WELL INSTALLATION DETAILS
				2	5	10	20	30	40	50	70	90			
-210	Gray LIMEROCK (Selma Group Chalk)														Cement grout, 0 to 435.0 feet
-220															Black steel risers = 21.21 feet each
-230	Gray and black, silty, fine SAND with glauconite (Eutaw Sand Formation)														Centralizers installed every 50 feet
-240															Bentonite seal, 435.0 to 445.0 feet
-250	Boring terminated at 460.5 feet. Groundwater encountered at 82.5 feet on May 21, 2007. 8-inch wash-drilled borehole.														Filter pack, sand 445.0 to 460.5 feet
-260															4-inch diameter, 0.010-inch slotted stainless steel well screen, 450.0 to 460.0 feet
-270												Total well depth, 460.5 feet			
-280												Sump = 0.5 foot stainless steel			
-290												8-inch diameter borehole			
-300												Durham Geo bladder pump installed with intake set at 453 feet			
-310															
-320															
-330															
-340															
-350															
-360															
-370															
-380															
-390															
-390															

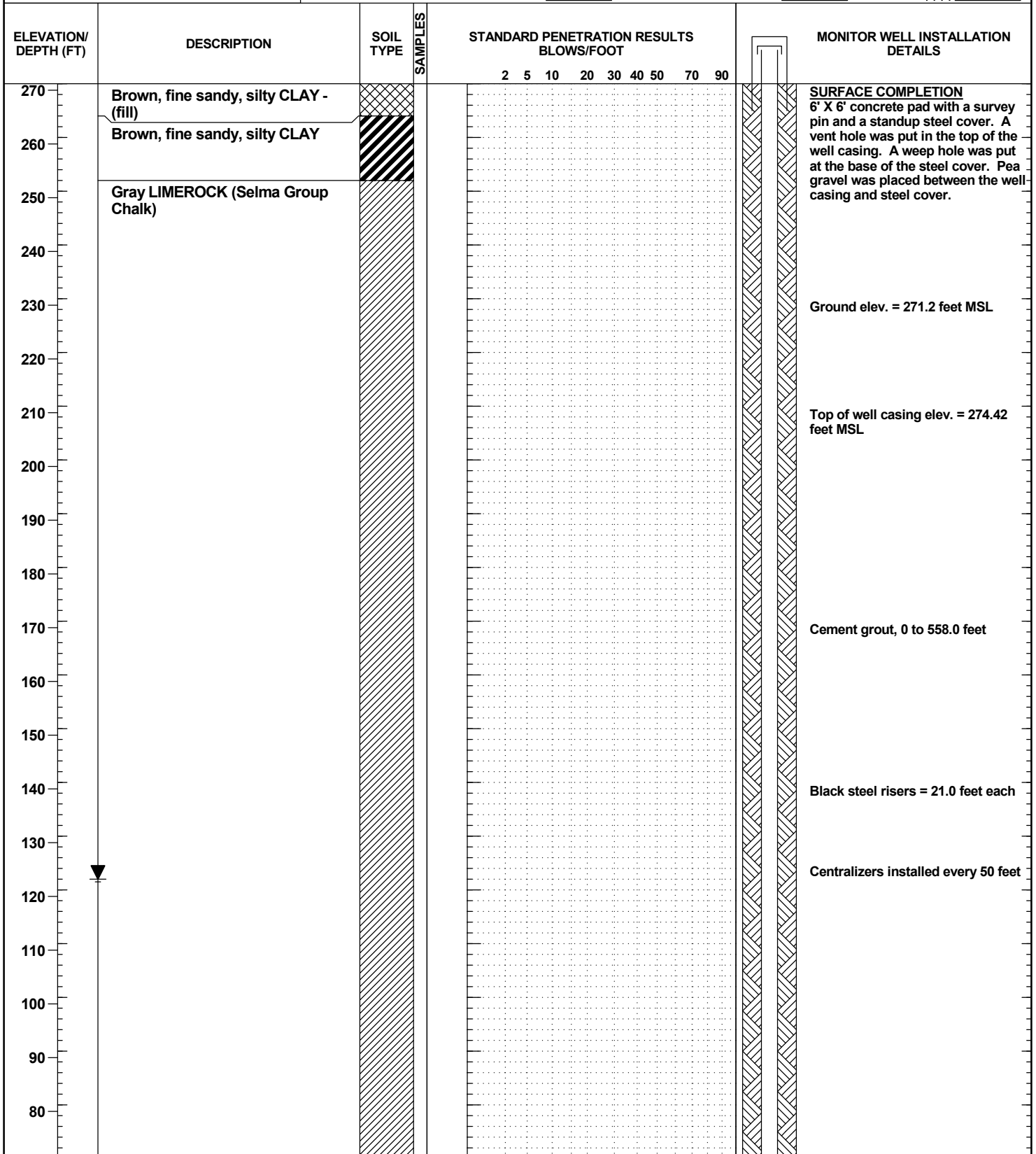


GROUNDWATER MONITORING WELL NO. GWM-2

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ▽ AFTER 9 HOURS: ▽ 148 CAVING> ⊗

PROJECT NO.: J07-4999-05
 START: 4-30-07 END: 5-2-07
 ELEVATION: 271.2
 LOGGED BY: M. Preddy



GEOI_WELL_4999-05.GPJ 8/20/20



GROUNDWATER MONITORING WELL NO. GWM-2

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ▽ AFTER 9 HOURS: ▽ 148 CAVING> ⊗

PROJECT NO.: J07-4999-05
 START: 4-30-07 END: 5-2-07
 ELEVATION: 271.2
 LOGGED BY: M. Preddy

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT										MONITOR WELL INSTALLATION DETAILS
				2	5	10	20	30	40	50	70	90		
70														
60														
50														
40														
30														
20														
10														
0														
-10														
-20														
-30	Gray LIMEROCK (Selma Group Chalk)													Cement grout, 0 to 558.0 feet
-40														
-50														Black steel risers = 21.0 feet each
-60														
-70														Centralizers installed every 50 feet
-80														
-90														
-100														
-110														
-120														

GEOI_WELL_4999-05.GPJ 8/20/20

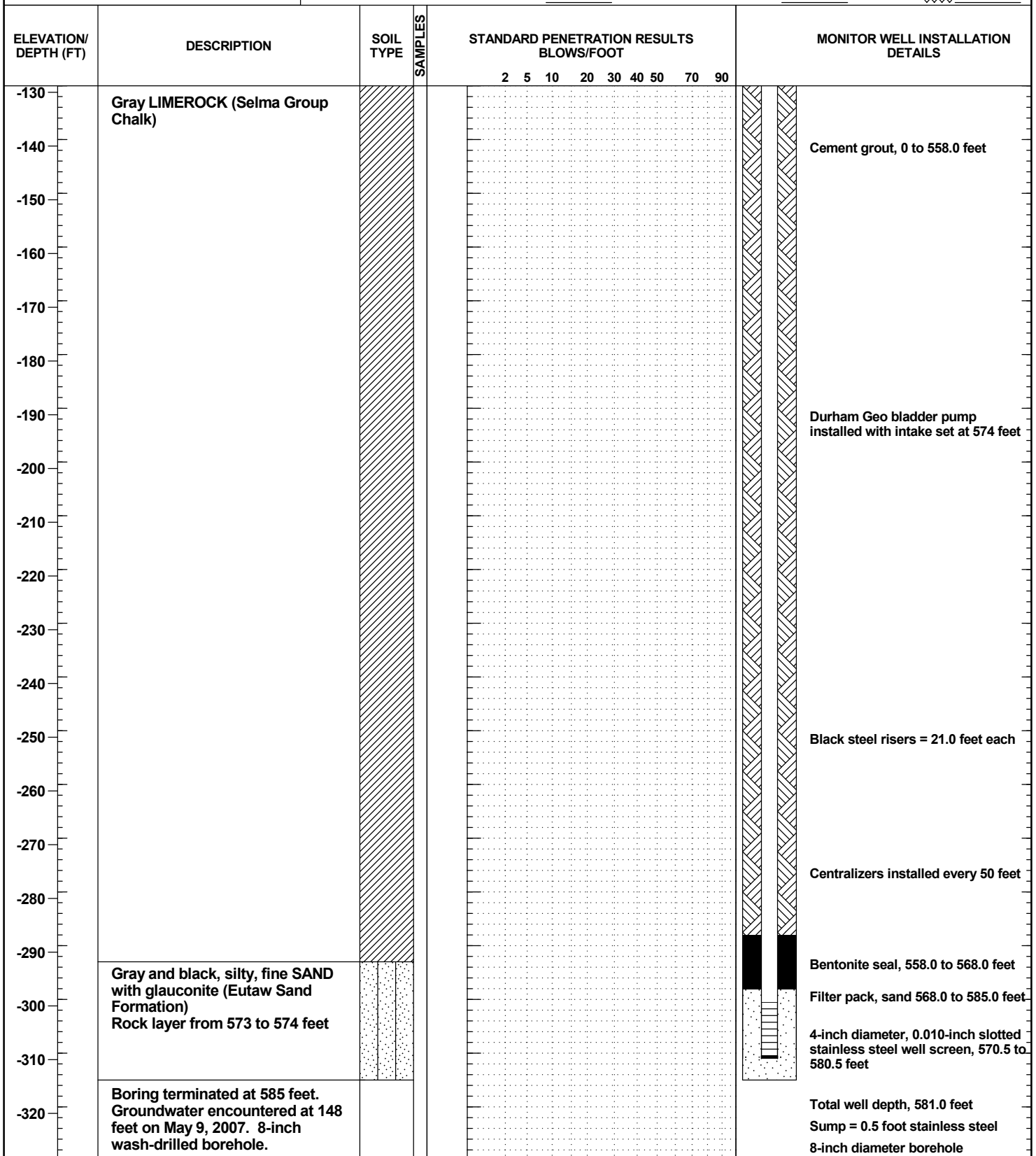


GROUNDWATER MONITORING WELL NO. GWM-2

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ▽ AFTER 9 HOURS: ▽ 148 CAVING> ⊗

PROJECT NO.: J07-4999-05
 START: 4-30-07 END: 5-2-07
 ELEVATION: 271.2
 LOGGED BY: M. Preddy



GEOI_WELL_4999-05.GPJ 8/20/20

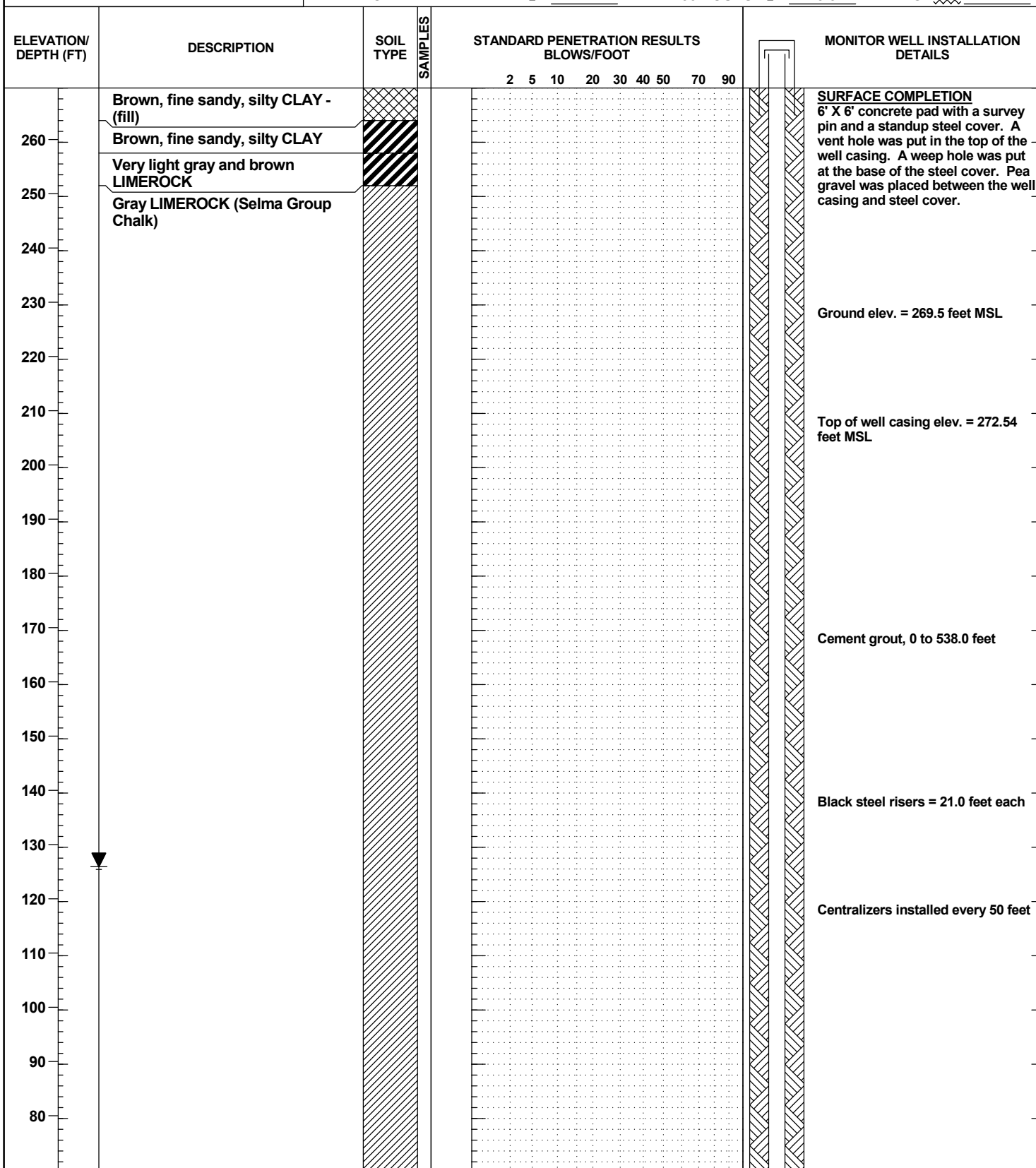


**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWM-3

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ∇ AFTER 56 HOURS: ∇ 143.57 CAVING> \otimes

PROJECT NO.: J07-4999-05
 START: 3-12-07 END: 3-14-07
 ELEVATION: 269.5
 LOGGED BY: M. Preddy



GEOI_WELL_4999-05.GPJ 8/20/20



GROUNDWATER MONITORING WELL NO. GWM-3

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ∇ AFTER 56 HOURS: ∇ 143.57 CAVING: \otimes

PROJECT NO.: J07-4999-05
 START: 3-12-07 END: 3-14-07
 ELEVATION: 269.5
 LOGGED BY: M. Preddy

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT										MONITOR WELL INSTALLATION DETAILS
				2	5	10	20	30	40	50	70	90		
60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100 -110 -120	Gray LIMEROCK (Selma Group Chalk)													Cement grout, 0 to 538.0 feet Black steel risers = 21.0 feet each Centralizers installed every 50 feet

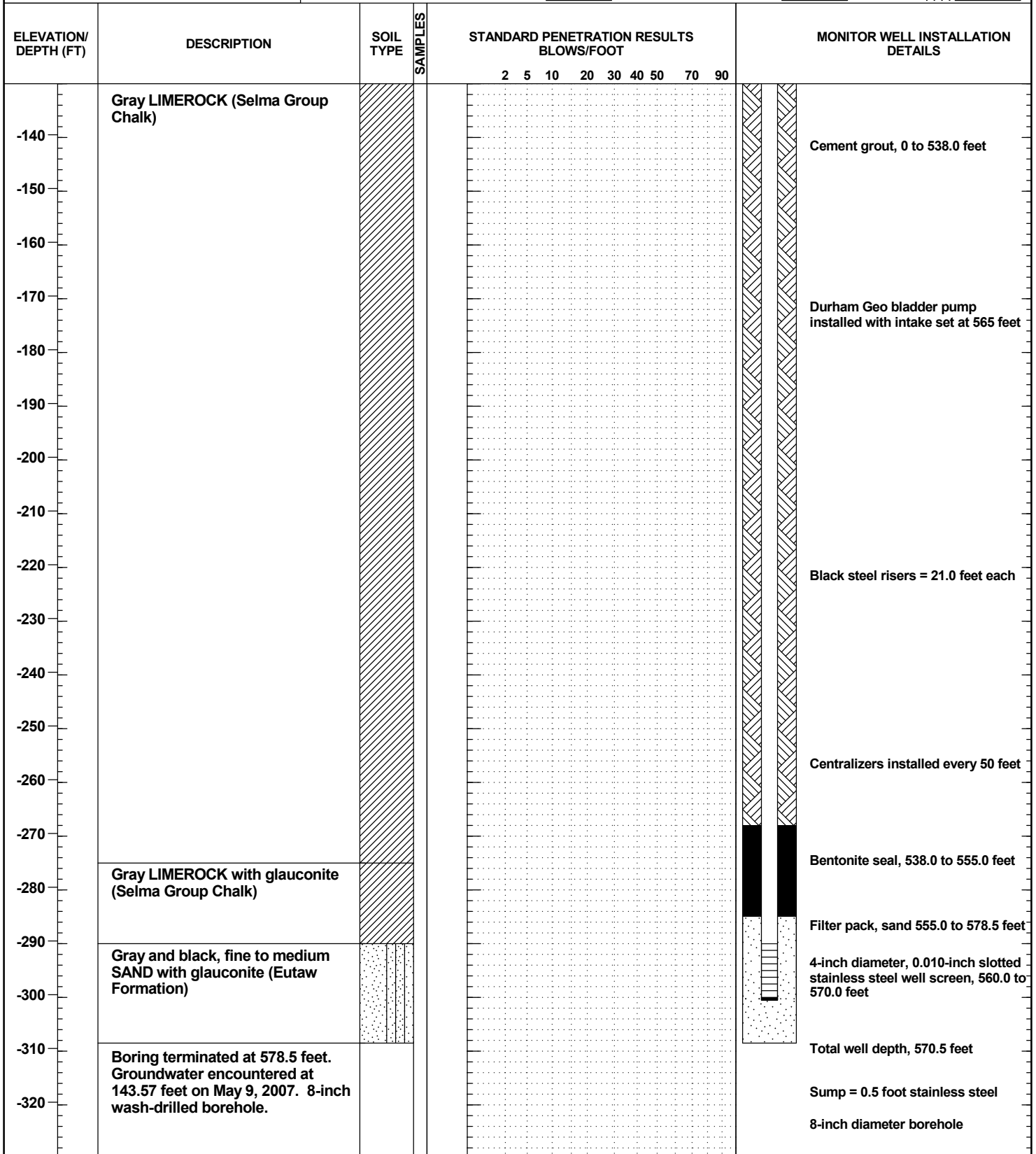
GEOI_WELL_4999-05.GPJ 8/20/20



GROUNDWATER MONITORING WELL NO. GWM-3

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill PROJECT NO.: J07-4999-05
 CLIENT: HHNT START: 3-12-07 END: 3-14-07
 LOCATION: Uniontown, Alabama ELEVATION: 269.5
 DRILLER: Allen & Willis Drilling Company, T. Willis LOGGED BY: M. Preddy
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ▽ AFTER 56 HOURS: ▽ 143.57 CAVING> ⊗



GEOI_WELL_4999-05.GPJ 8/20/20

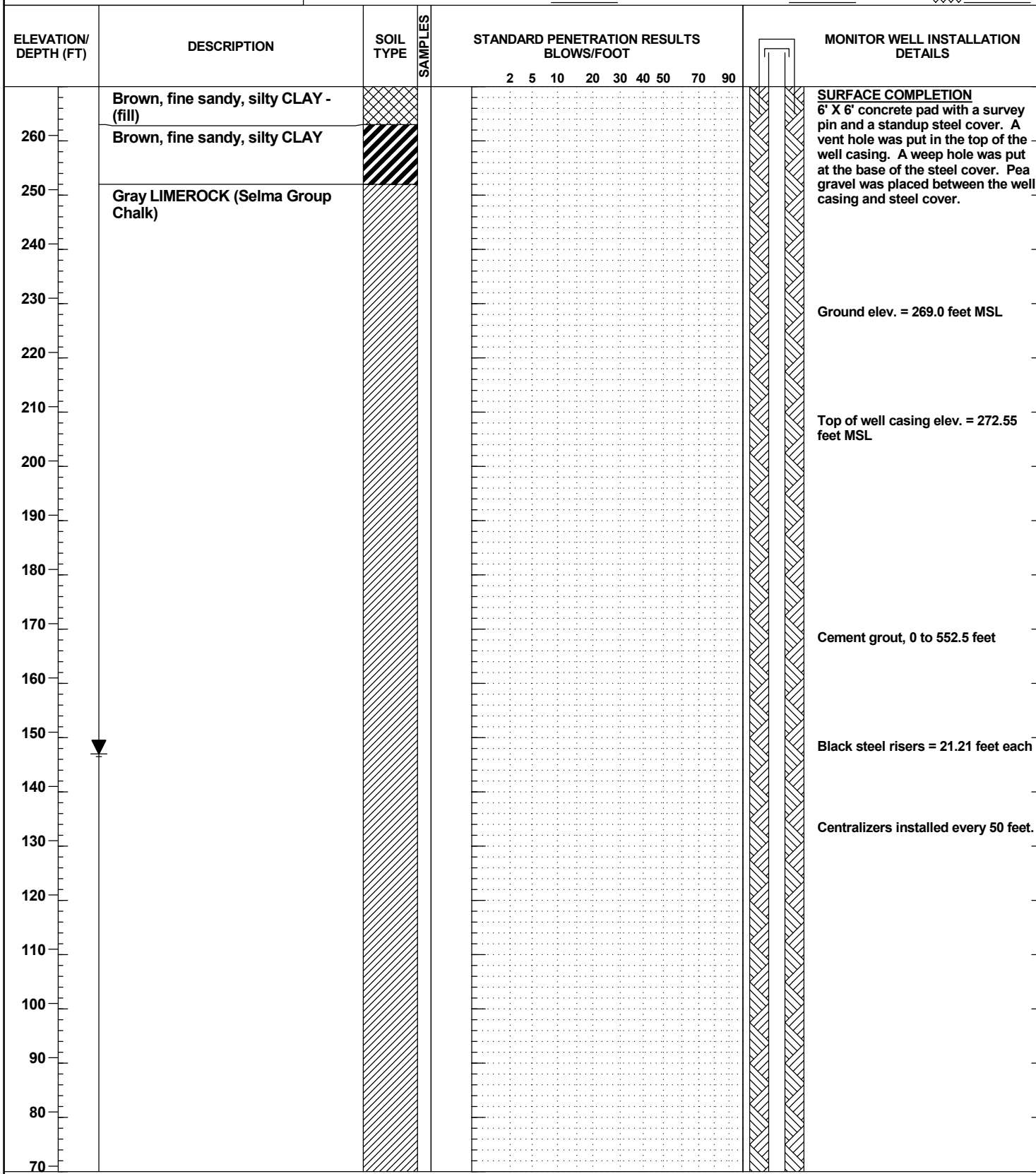


GROUNDWATER MONITORING WELL NO. GWM-4

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ∇ AFTER 13 HOURS: ∇ 123.0 CAVING: \otimes

PROJECT NO.: J07-4999-05
 START: 5-7-07 END: 5-9-07
 ELEVATION: 269.0
 LOGGED BY: M. Preddy



GEOI_WELL_4999-05.GPJ 8/20/20



GROUNDWATER MONITORING WELL NO. GWM-4

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Allen & Willis Drilling Company, T. Willis
DRILLING METHOD: Failing 1250 Holemaster wash drill
DEPTH TO - WATER> INITIAL: ▽ AFTER 13 HOURS: ▽ 123.0 CAVING> ⊗

PROJECT NO.: J07-4999-05
START: 5-7-07 END: 5-9-07
ELEVATION: 269.0
LOGGED BY: M. Preddy

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	STANDARD PENETRATION RESULTS BLOWS/FOOT								MONITOR WELL INSTALLATION DETAILS
			2	5	10	20	30	40	50	70	
60	Gray LIMEROCK (Selma Group Chalk)	[Hatched pattern]	[Grid for SPT results]								Cement grout, 0 to 552.5 feet Black steel risers = 21.21 feet each Centralizers installed every 50 feet.
50											
40											
30											
20											
10											
0											
-10											
-20											
-30											
-40											
-50											
-60											
-70											
-80											
-90											
-100											
-110											
-120											
-130											

GEOI_WELL_4999-05.GPJ 8/20/20

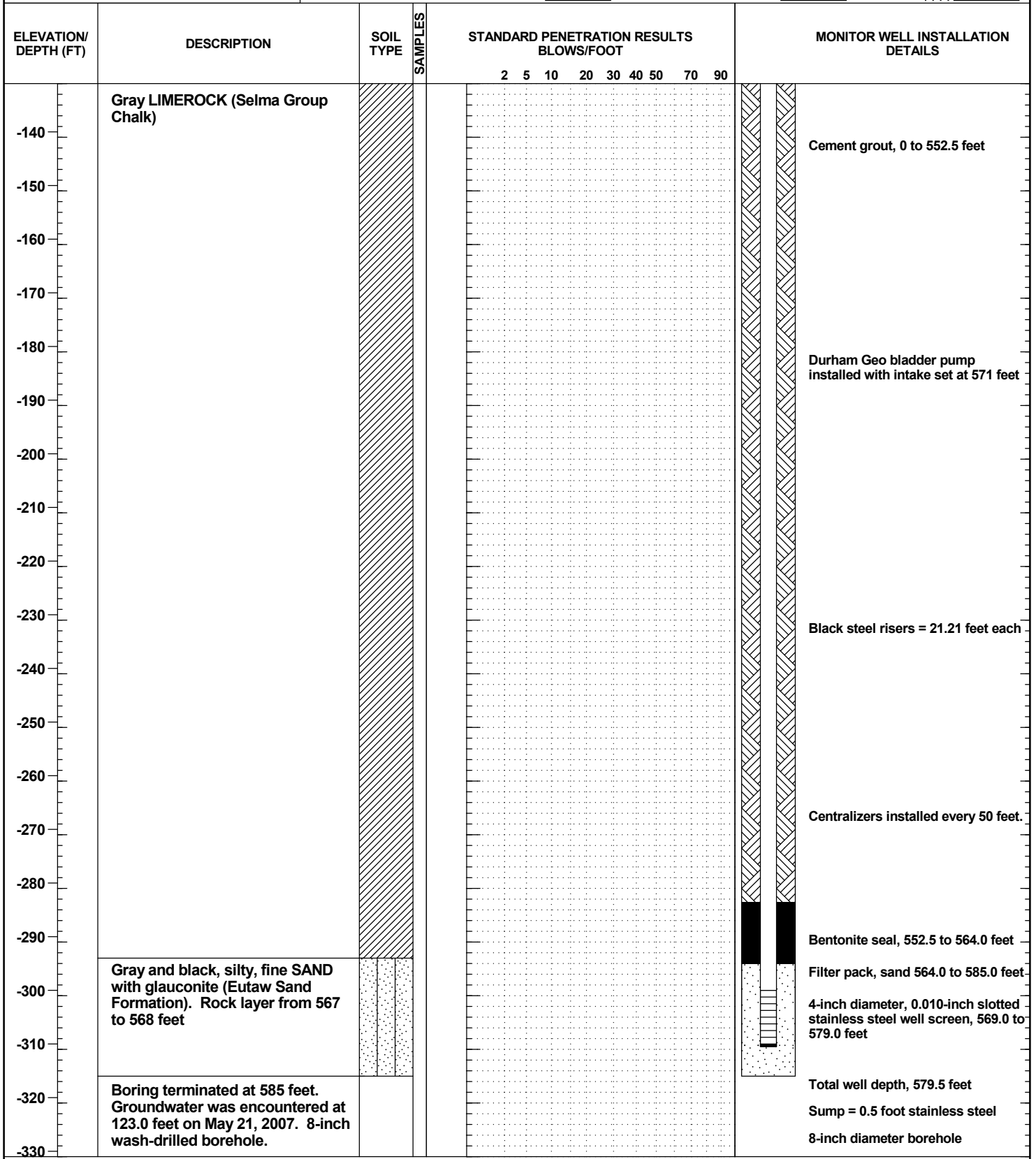


GROUNDWATER MONITORING WELL NO. GWM-4

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ∇ AFTER 13 HOURS: ∇ 123.0 CAVING> \otimes

PROJECT NO.: J07-4999-05
 START: 5-7-07 END: 5-9-07
 ELEVATION: 269.0
 LOGGED BY: M. Preddy



GEOI_WELL_4999-05.GPJ 8/20/20

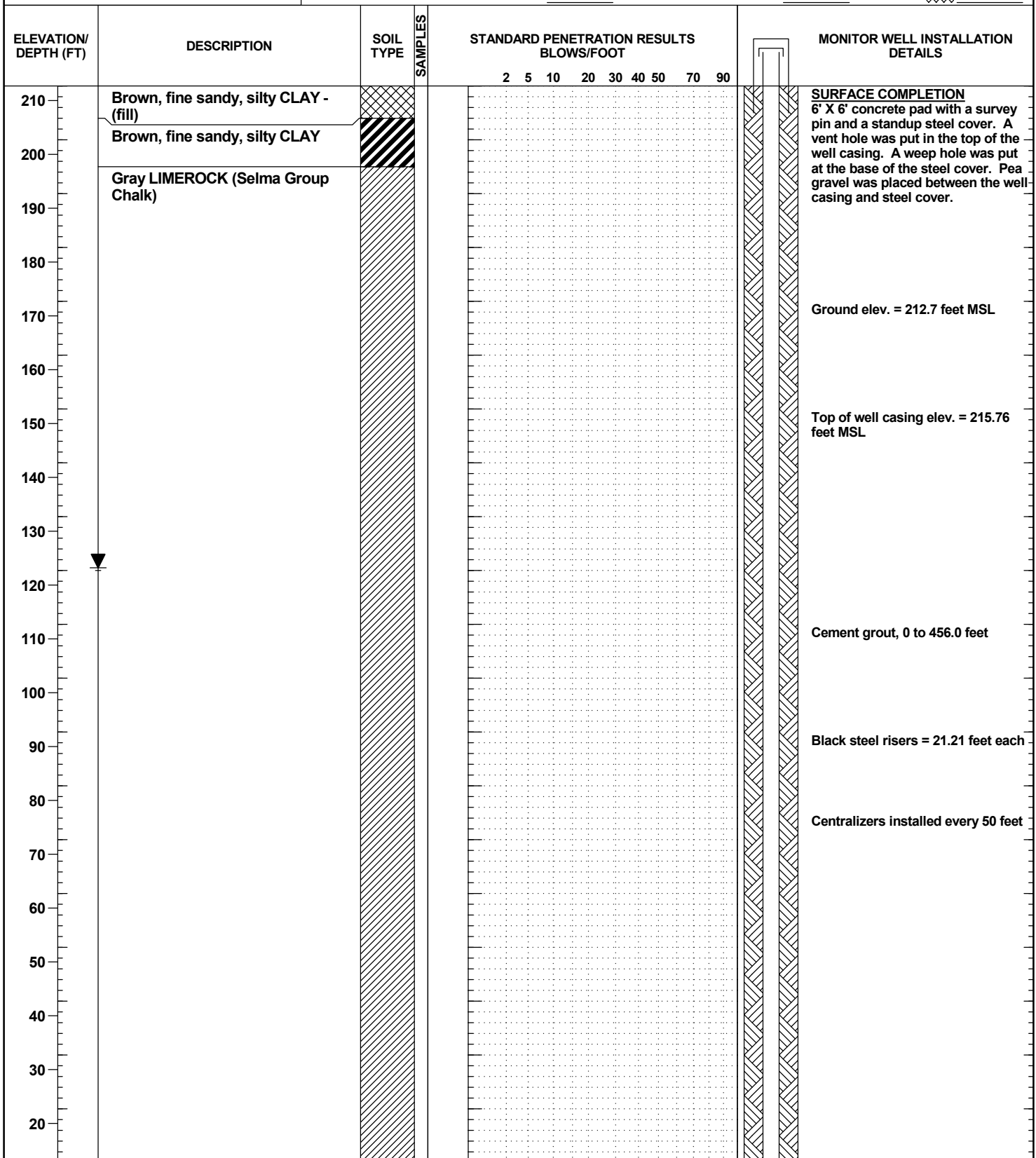


GROUNDWATER MONITORING WELL NO. GWM-5

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ∇ AFTER 6 HOURS: ∇ 89.5 CAVING: ∇

PROJECT NO.: J07-4999-05
 START: 5-22-07 END: 5-23-07
 ELEVATION: 212.7
 LOGGED BY: M. Preddy



GEOI_WELL_4999-05.GPJ 8/20/20



GROUNDWATER MONITORING WELL NO. GWM-5

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ∇ AFTER 6 HOURS: ∇ 89.5 CAVING>

PROJECT NO.: J07-4999-05
 START: 5-22-07 END: 5-23-07
 ELEVATION: 212.7
 LOGGED BY: M. Preddy

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT											MONITOR WELL INSTALLATION DETAILS		
				2	5	10	20	30	40	50	70	90					
10																	
0																	
-10																	
-20																	
-30																	
-40																	
-50																	
-60																	
-70																	
-80																	
-90	Gray LIMEROCK (Selma Group Chalk)																Cement grout, 0 to 456.0 feet
-100																	Black steel risers = 21.21 feet each
-110																	Centralizers installed every 50 feet
-120																	
-130																	
-140																	
-150																	
-160																	
-170																	
-180																	

GEOI_WELL_4999-05.GPJ 8/20/20

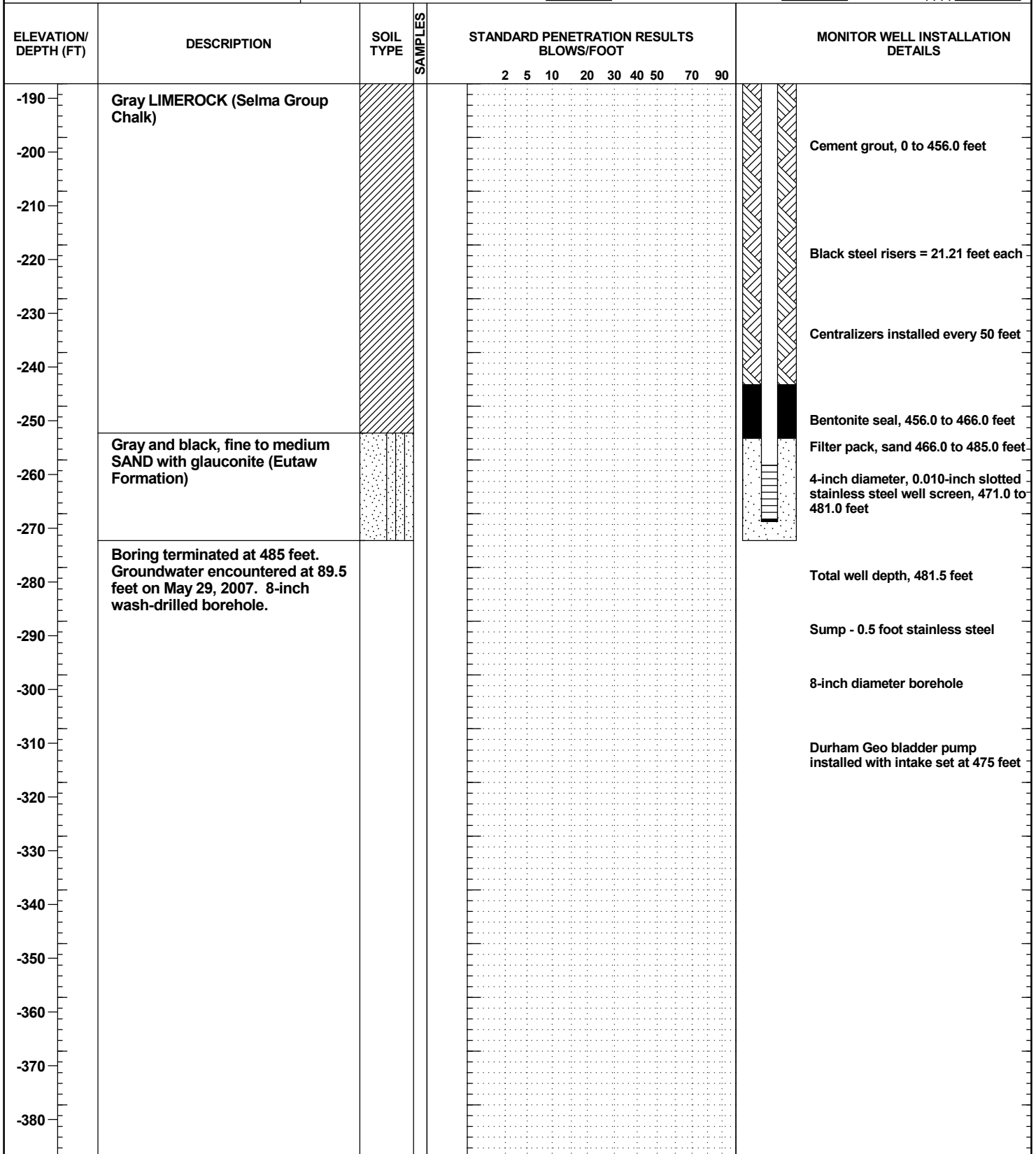


GROUNDWATER MONITORING WELL NO. GWM-5

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: Failing 1250 Holemaster wash drill
 DEPTH TO - WATER> INITIAL: ∇ AFTER 6 HOURS: ∇ 89.5 CAVING> \otimes

PROJECT NO.: J07-4999-05
 START: 5-22-07 END: 5-23-07
 ELEVATION: 212.7
 LOGGED BY: M. Preddy



GEOI_WELL_4999-05.GPJ 8/20/20

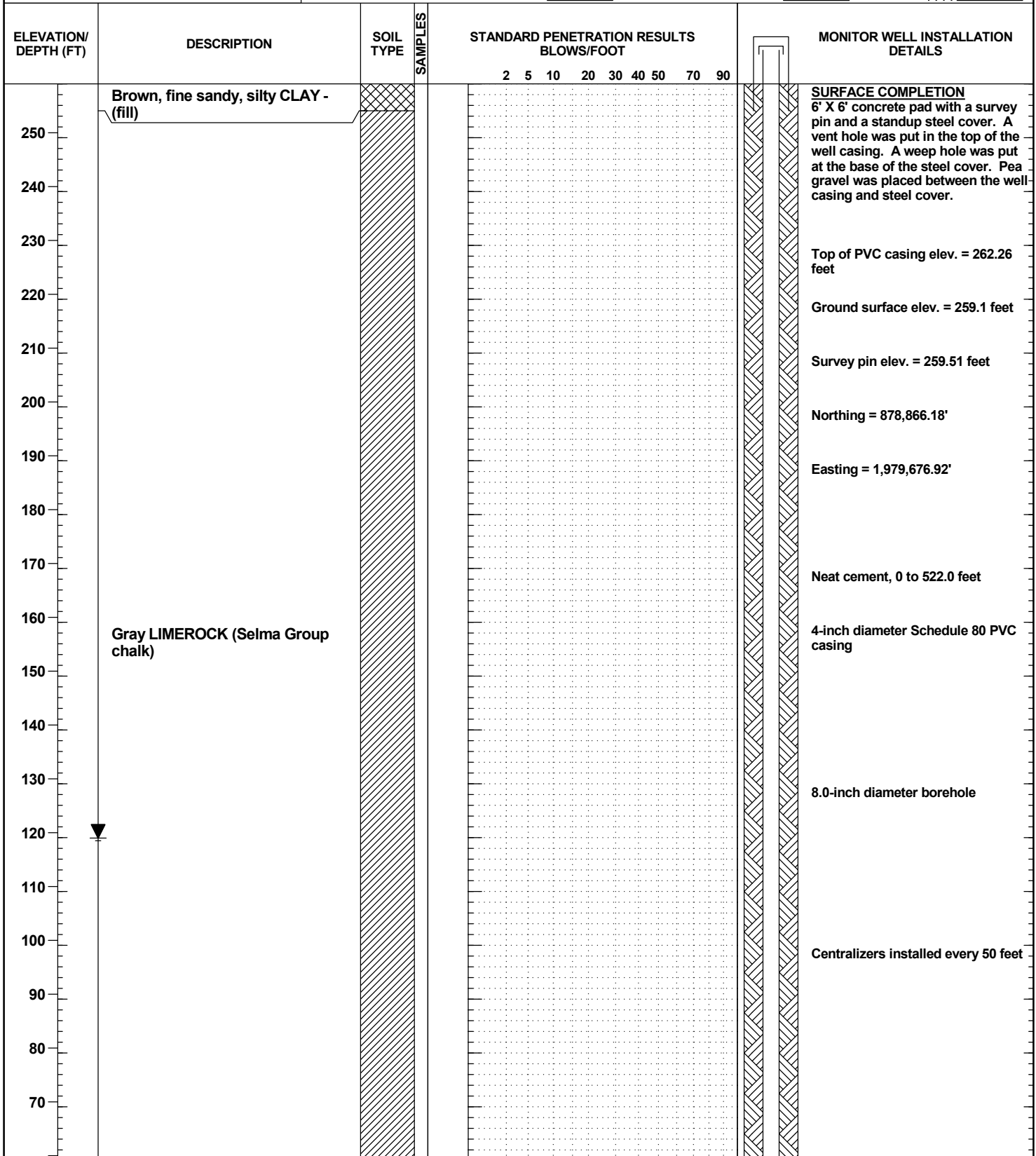


**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWM-6

PROJECT: Arrowhead Landfill
 CLIENT: HHNT
 LOCATION: Perry County, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: MJ Rotary Drill; 8.0-inch wash drilling
 DEPTH TO - WATER> INITIAL: AFTER 24 HOURS: 140.1 CAVING>

PROJECT NO.: J12-4999-30
 START: 9-16-12 END: 9-24-12
 ELEVATION: 259.1
 LOGGED BY: P. VanHeest





GROUNDWATER MONITORING WELL NO. GWM-6

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Arrowhead Landfill
 CLIENT: HHNT
 LOCATION: Perry County, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: MJ Rotary Drill; 8.0-inch wash drilling
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ 140.1 CAVING ∇

PROJECT NO.: J12-4999-30
 START: 9-16-12 END: 9-24-12
 ELEVATION: 259.1
 LOGGED BY: P. VanHeest

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT											MONITOR WELL INSTALLATION DETAILS		
				2	5	10	20	30	40	50	70	90					
50																	
40																	
30																	
20																	
10																	
0																	
-10																	
-20																	
-30																	
-40																	
-50	Gray LIMEROCK (Selma Group chalk)																
-60																	
-70																	
-80																	
-90																	
-100																	
-110																	
-120																	
-130																	

Neat cement, 0 to 522.0 feet

8.0-inch diameter borehole

Centralizers installed every 50 feet

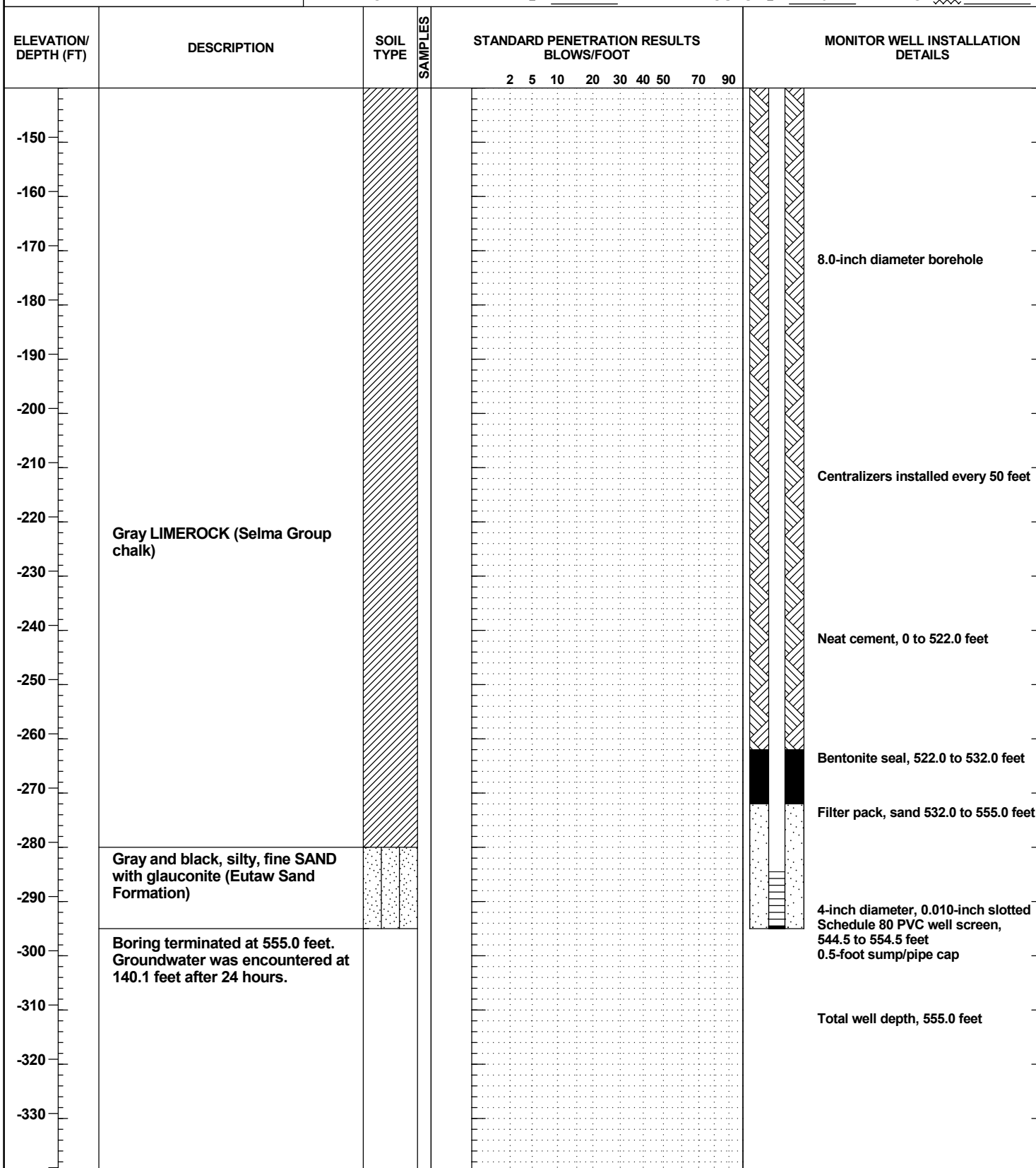


GROUNDWATER MONITORING WELL NO. GWM-6

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Arrowhead Landfill
 CLIENT: HHNT
 LOCATION: Perry County, Alabama
 DRILLER: Allen & Willis Drilling Company, T. Willis
 DRILLING METHOD: MJ Rotary Drill; 8.0-inch wash drilling
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ 140.1 CAVING ∇

PROJECT NO.: J12-4999-30
 START: 9-16-12 END: 9-24-12
 ELEVATION: 259.1
 LOGGED BY: P. VanHeest



GEOI_WELL_4999-30.GPJ 8/20/20

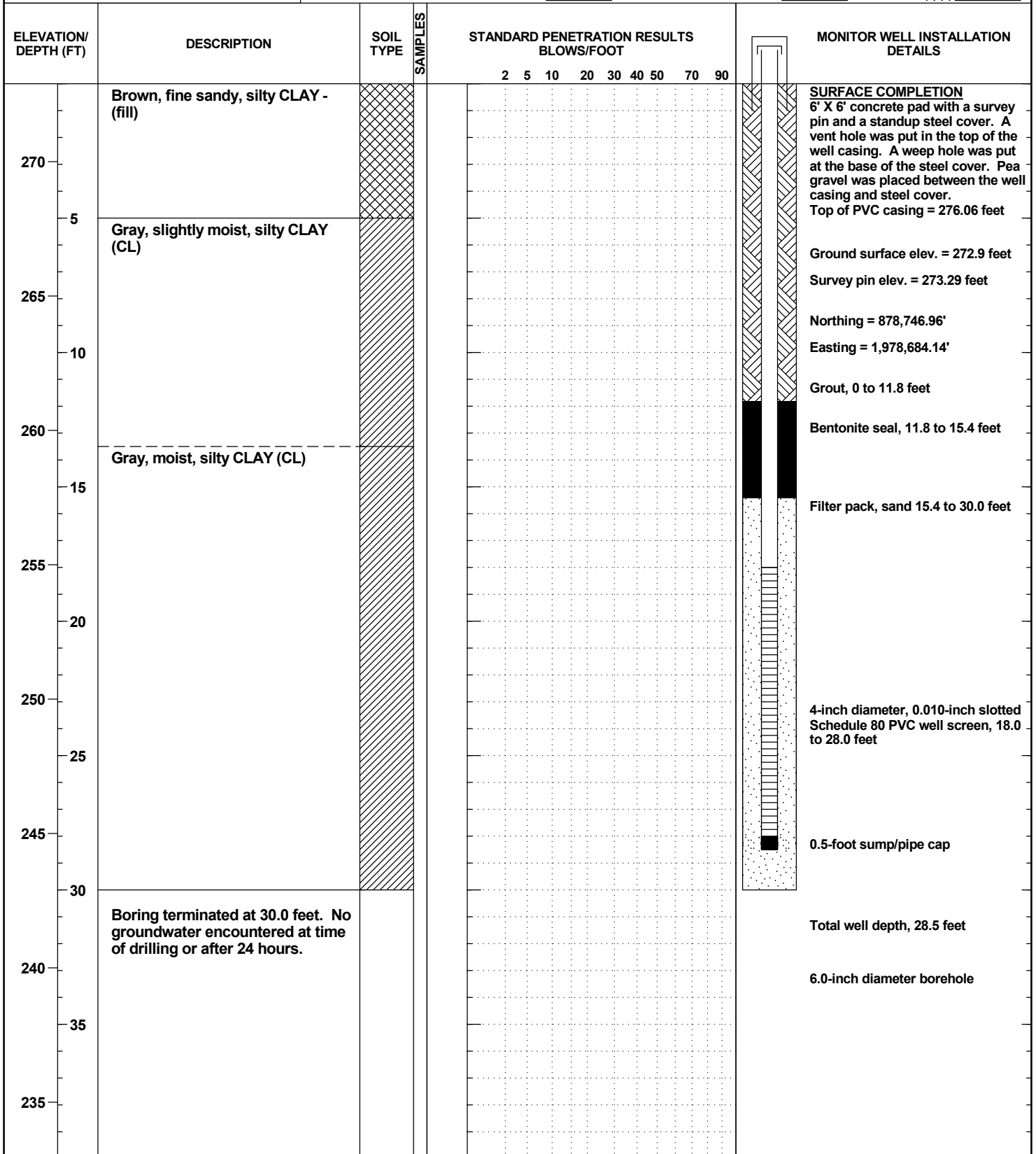


GROUNDWATER MONITORING WELL NO. GWM-12

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Arrowhead Landfill
 CLIENT: HHNT
 LOCATION: Perry County, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 6-inch air hammer
 DEPTH TO - WATER> INITIAL: ▽ dry AFTER 24 HOURS: ▽ dry CAVING> ☒

PROJECT NO.: J12-4999-30
 START: 10-3-12 END: 10-3-12
 ELEVATION: 272.9
 LOGGED BY: P. VanHeest



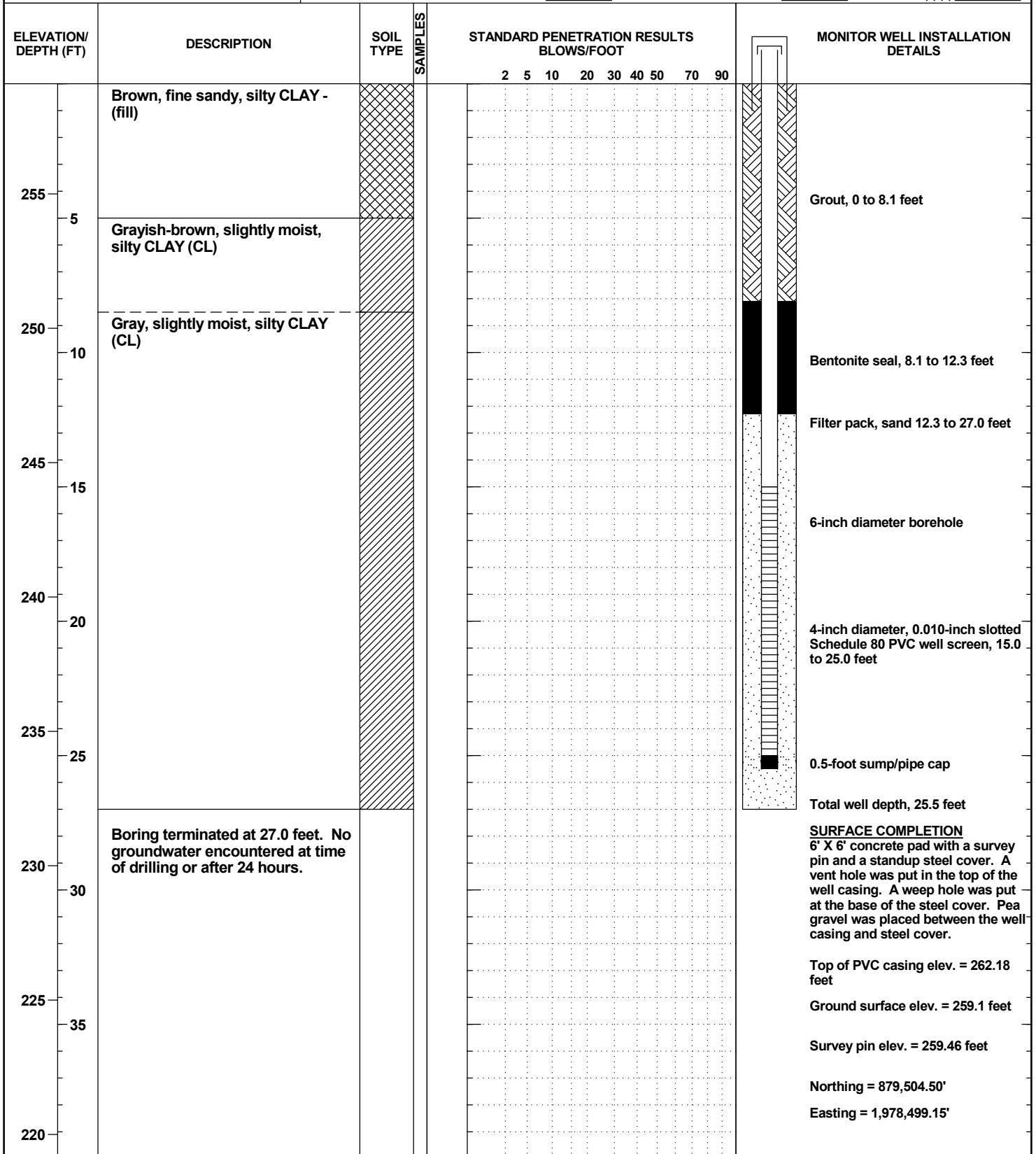


**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWM-13

PROJECT: Arrowhead Landfill
 CLIENT: HHNT
 LOCATION: Perry County, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 6-inch air hammer
 DEPTH TO - WATER> INITIAL: ▽ dry AFTER 24 HOURS: ▽ dry CAVING> ⊗

PROJECT NO.: J12-4999-30
 START: 10-4-12 END: 10-4-12
 ELEVATION: 259.1
 LOGGED BY: P. VanHeest



GEOI_WELL_4999-30.GPJ 8/19/20

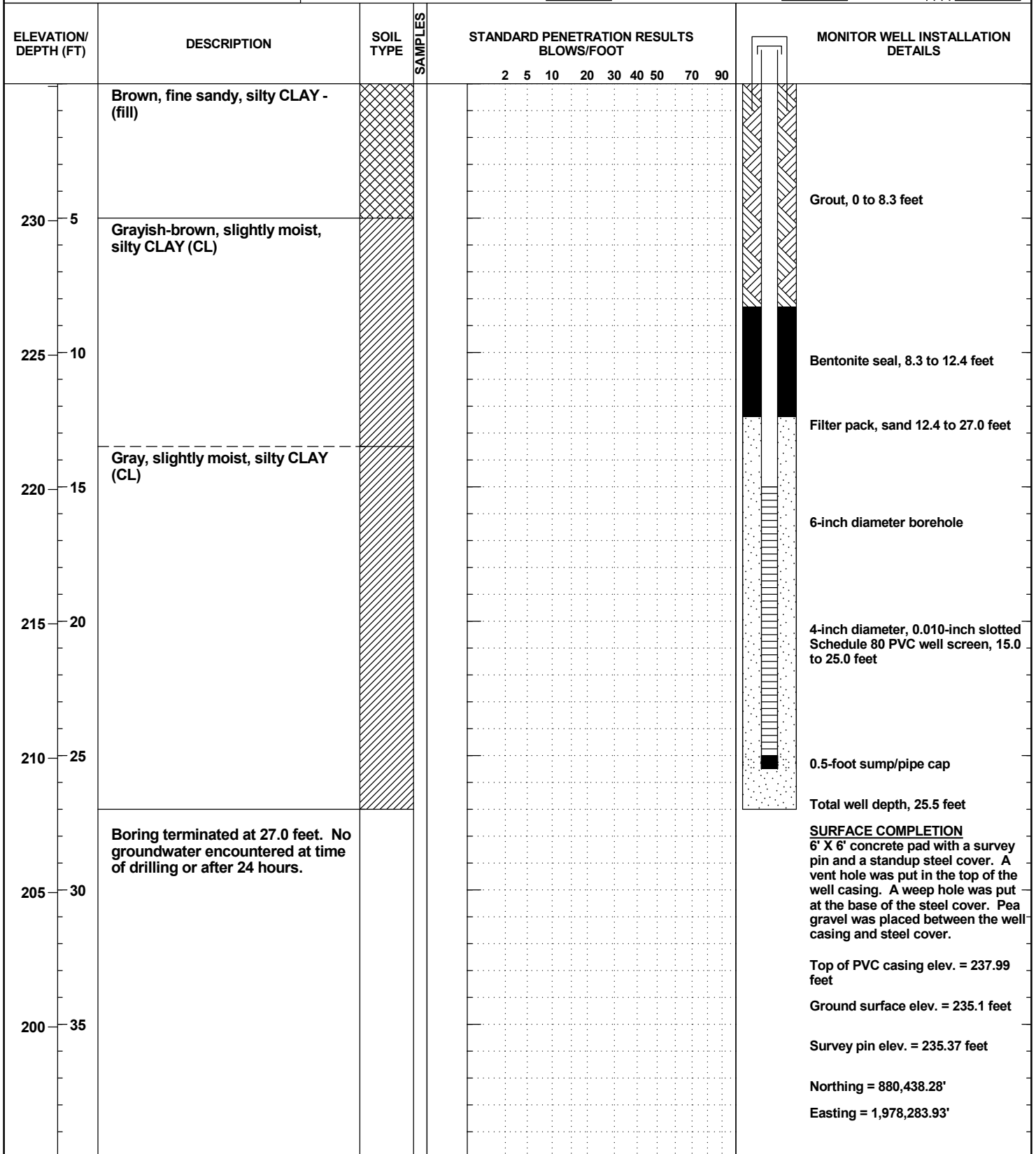


GROUNDWATER MONITORING WELL NO. GWM-14

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Arrowhead Landfill
 CLIENT: HHNT
 LOCATION: Perry County, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 6-inch air hammer
 DEPTH TO - WATER> INITIAL: ▽ dry AFTER 24 HOURS: ▽ dry CAVING> ☒

PROJECT NO.: J12-4999-30
 START: 10-4-12 END: 10-4-12
 ELEVATION: 235.1
 LOGGED BY: P. VanHeest



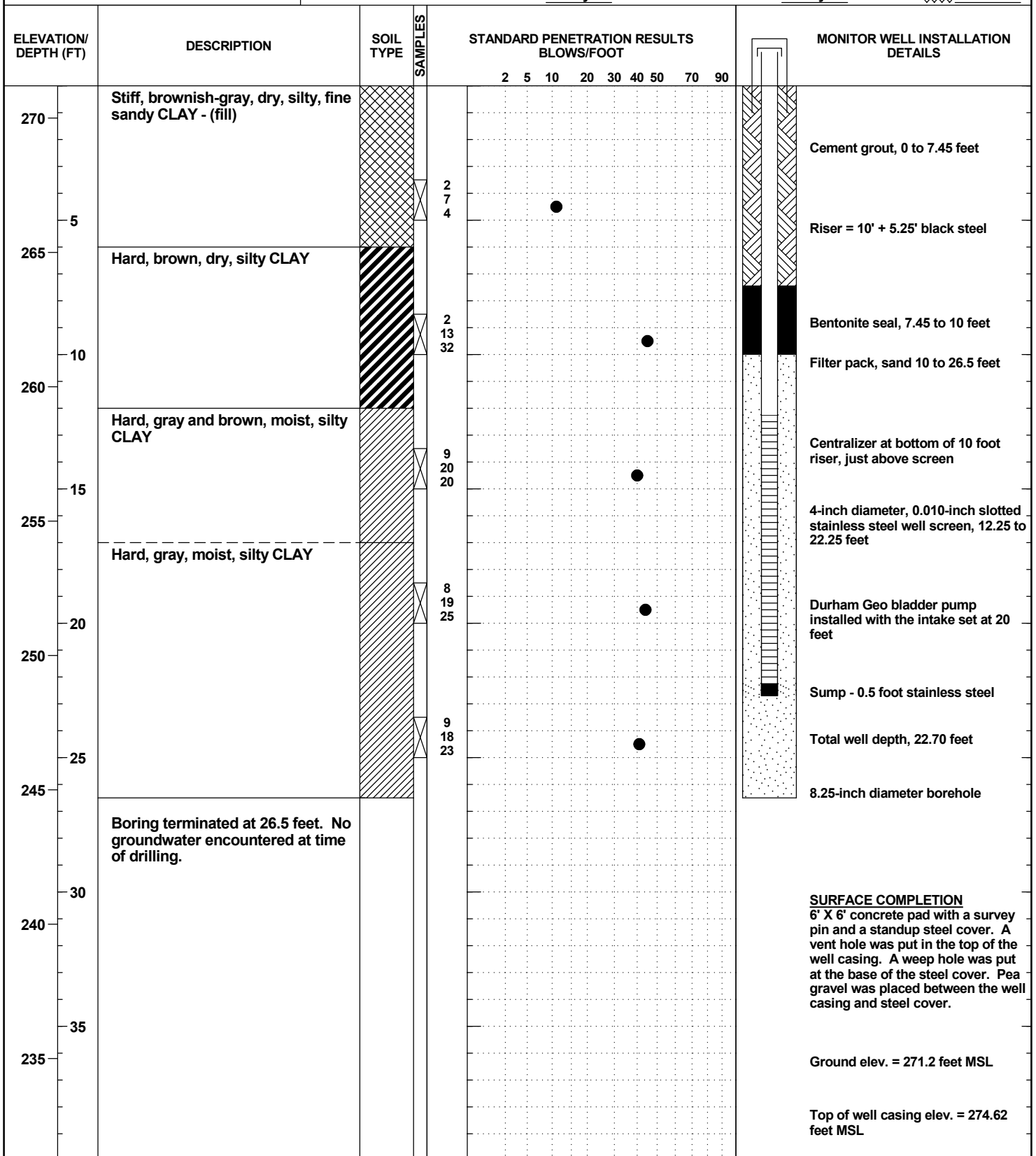


GROUNDWATER MONITORING WELL NO. GWM-15

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Bunnell-Lammons Engineering, Inc., J. Gorman
 DRILLING METHOD: Mobile B-59 Truck, hollow stem auger
 DEPTH TO - WATER> INITIAL: ▽ Dry AFTER 24 HOURS: ▽ Dry CAVING> ⊗

PROJECT NO.: J07-4999-05
 START: 5-9-07 END: 5-9-07
 ELEVATION: 271.2
 LOGGED BY: M. Preddy



GEOI_WELL_4999-05.GPJ 8/19/20



GROUNDWATER MONITORING WELL NO. GWM-16

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill

PROJECT NO.: J07-4999-05

CLIENT: HHNT

START: 5-9-07 END: 5-9-07

LOCATION: Uniontown, Alabama

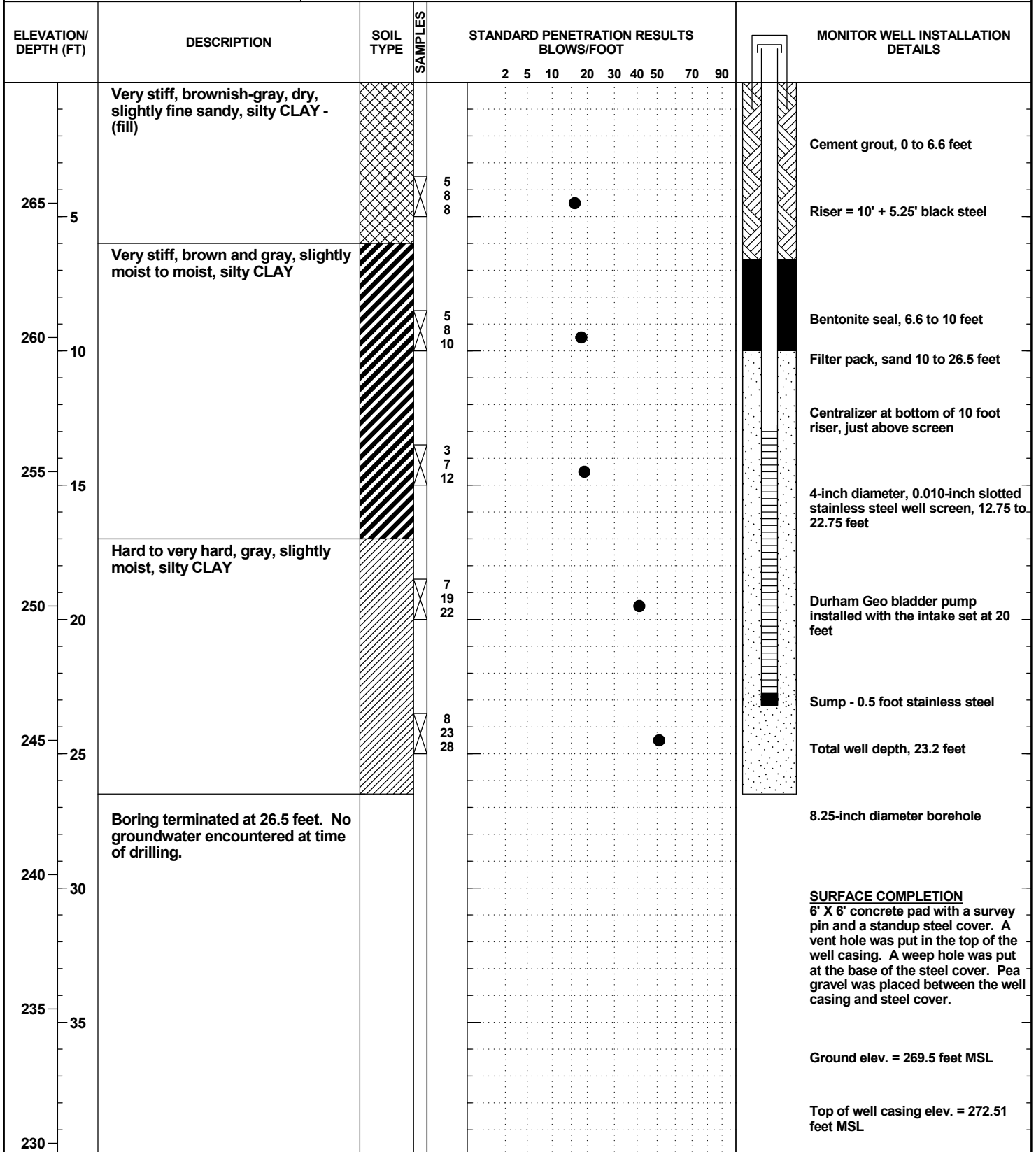
ELEVATION: 269.5

DRILLER: Bunnell-Lammons Engineering, Inc., J. Gorman

LOGGED BY: M. Preddy

DRILLING METHOD: Mobile B-59 Truck, hollow stem auger

DEPTH TO - WATER> INITIAL: ▽ Dry AFTER 24 HOURS: ▽ Dry CAVING: ☒



GEOI_WELL_4999-05.GPJ 8/19/20



GROUNDWATER MONITORING WELL NO. GWM-17

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill

PROJECT NO.: J07-4999-05

CLIENT: HHNT

START: 5-10-07 END: 5-10-07

LOCATION: Uniontown, Alabama

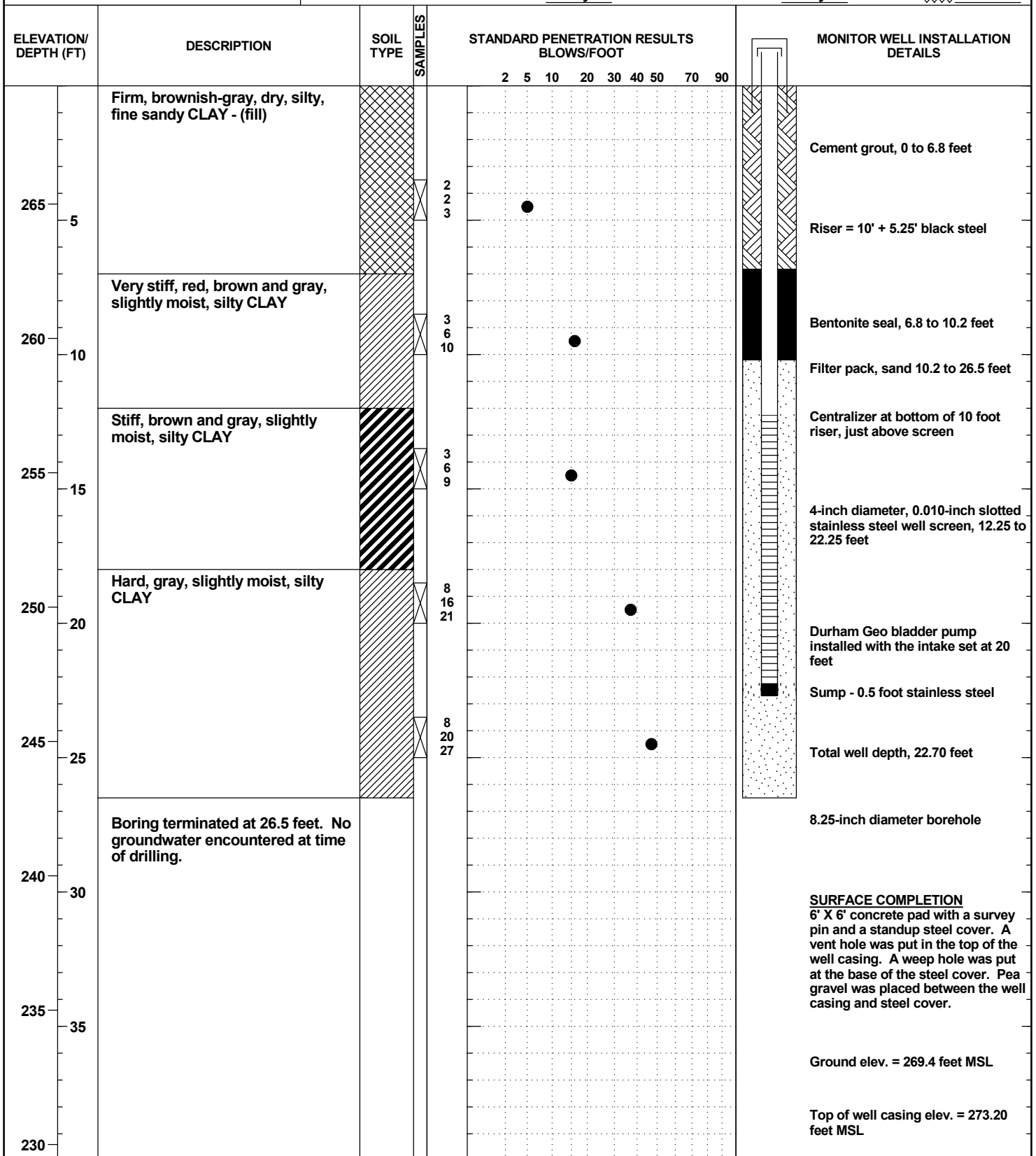
ELEVATION: 269.4

DRILLER: Bunnell-Lammons Engineering, Inc., J. Gorman

LOGGED BY: M. Preddy

DRILLING METHOD: Mobile B-59 Truck, hollow stem auger

DEPTH TO - WATER> INITIAL: Dry AFTER 24 HOURS: Dry CAVING



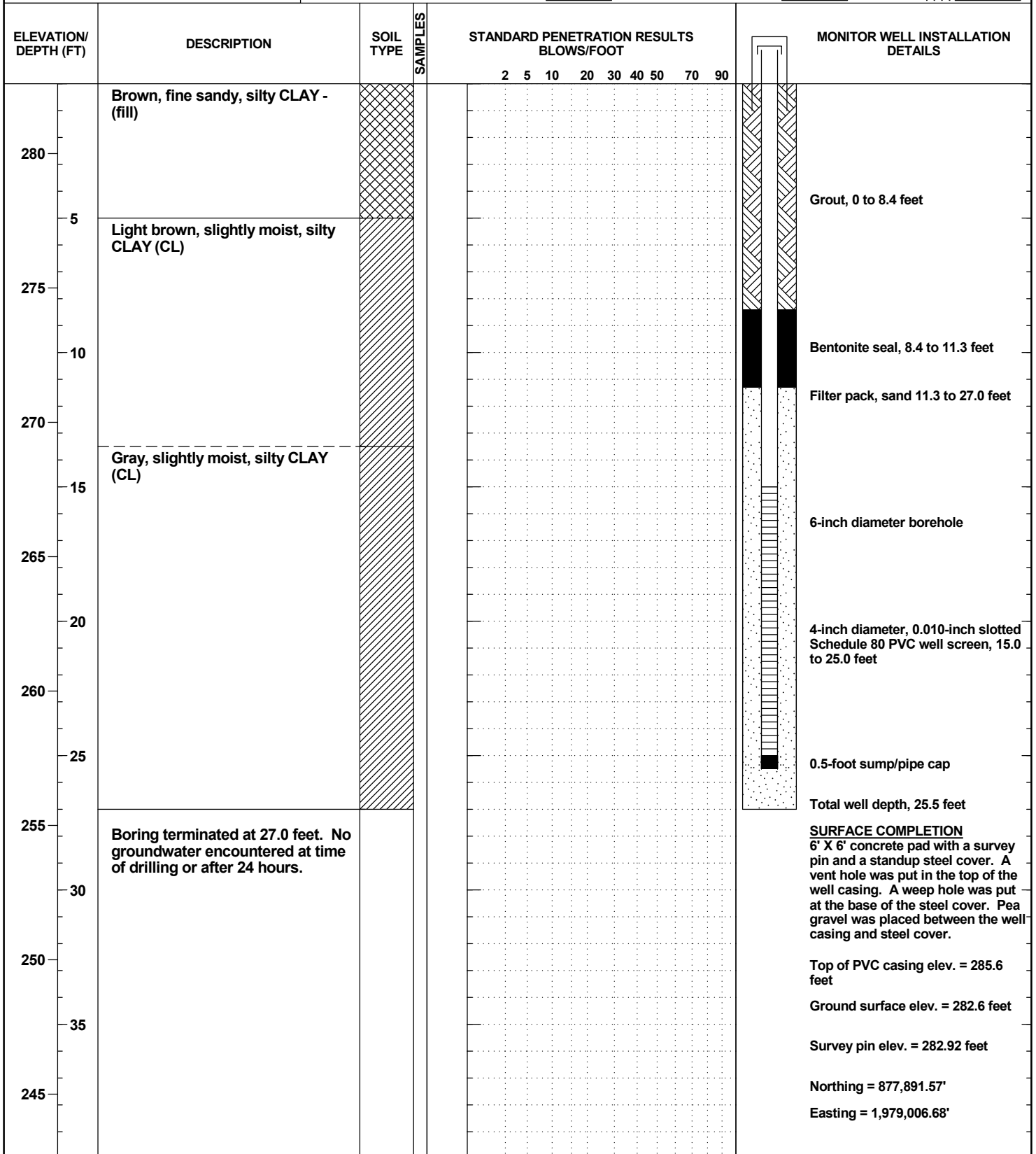


**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

GROUNDWATER MONITORING WELL NO. GWM-18

PROJECT: Arrowhead Landfill
 CLIENT: HHNT
 LOCATION: Perry County, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 6-inch air hammer
 DEPTH TO - WATER> INITIAL: ▽ dry AFTER 24 HOURS: ▽ dry CAVING> ☒

PROJECT NO.: J12-4999-30
 START: 10-3-12 END: 10-3-12
 ELEVATION: 282.6
 LOGGED BY: P.VanHeest



SURFACE COMPLETION
 6' X 6' concrete pad with a survey pin and a standup steel cover. A vent hole was put in the top of the well casing. A weep hole was put at the base of the steel cover. Pea gravel was placed between the well casing and steel cover.

Top of PVC casing elev. = 285.6 feet
 Ground surface elev. = 282.6 feet
 Survey pin elev. = 282.92 feet
 Northing = 877,891.57'
 Easting = 1,979,006.68'


GEOI_WELL_4999-30.GPJ 8/19/20

**EXISTING METHANE GAS MONITORING
PROBES**

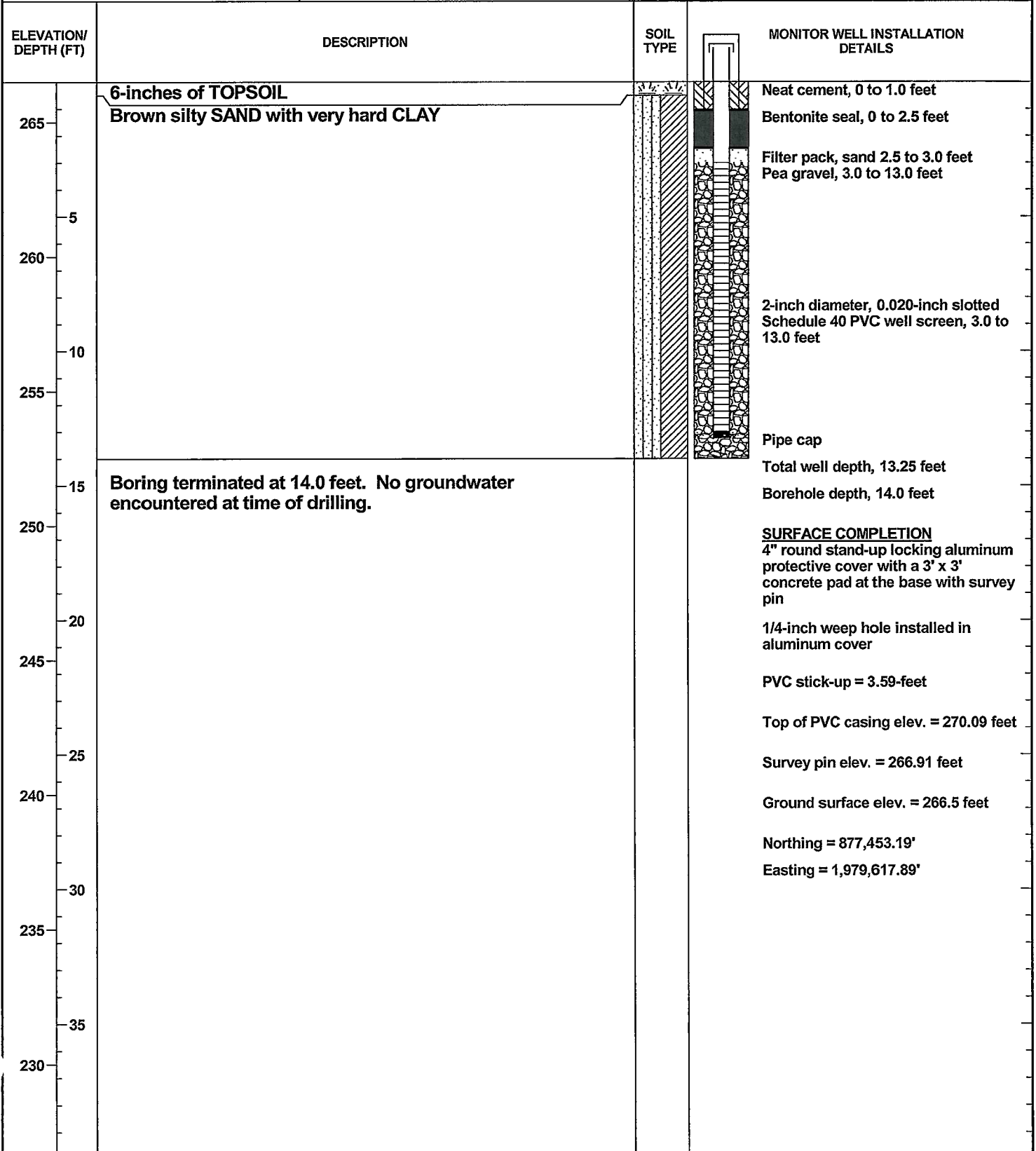


METHANE MONITORING PROBE NO. MM-64

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 4-1/4 inch hollow stem auger
 DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING> 

PROJECT NO.: J07-4999-06
 START: 6-21-07 END: 6-21-07
 ELEVATION: 266.5
 LOGGED BY: T. Gradwell



GEOC_WELLNB_4999-L 12/22/10

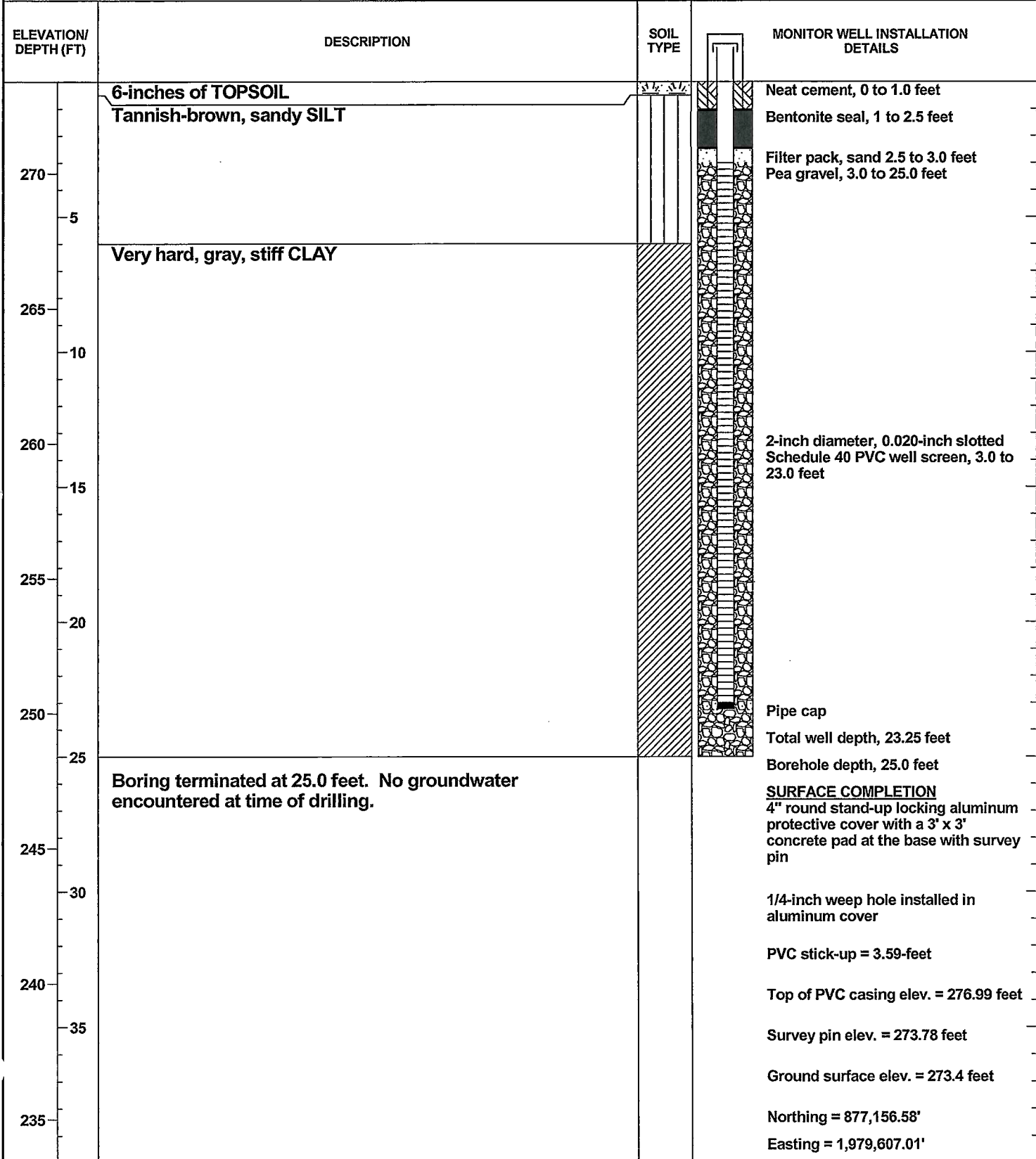


METHANE MONITORING PROBE NO. MM-65

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: ⊠

PROJECT NO.: J07-4999-06
 START: 6-26-07 END: 6-26-07
 ELEVATION: 273.4
 LOGGED BY: T. Gradwell




12/22/10
GEO_T_WELLNB 4999-L

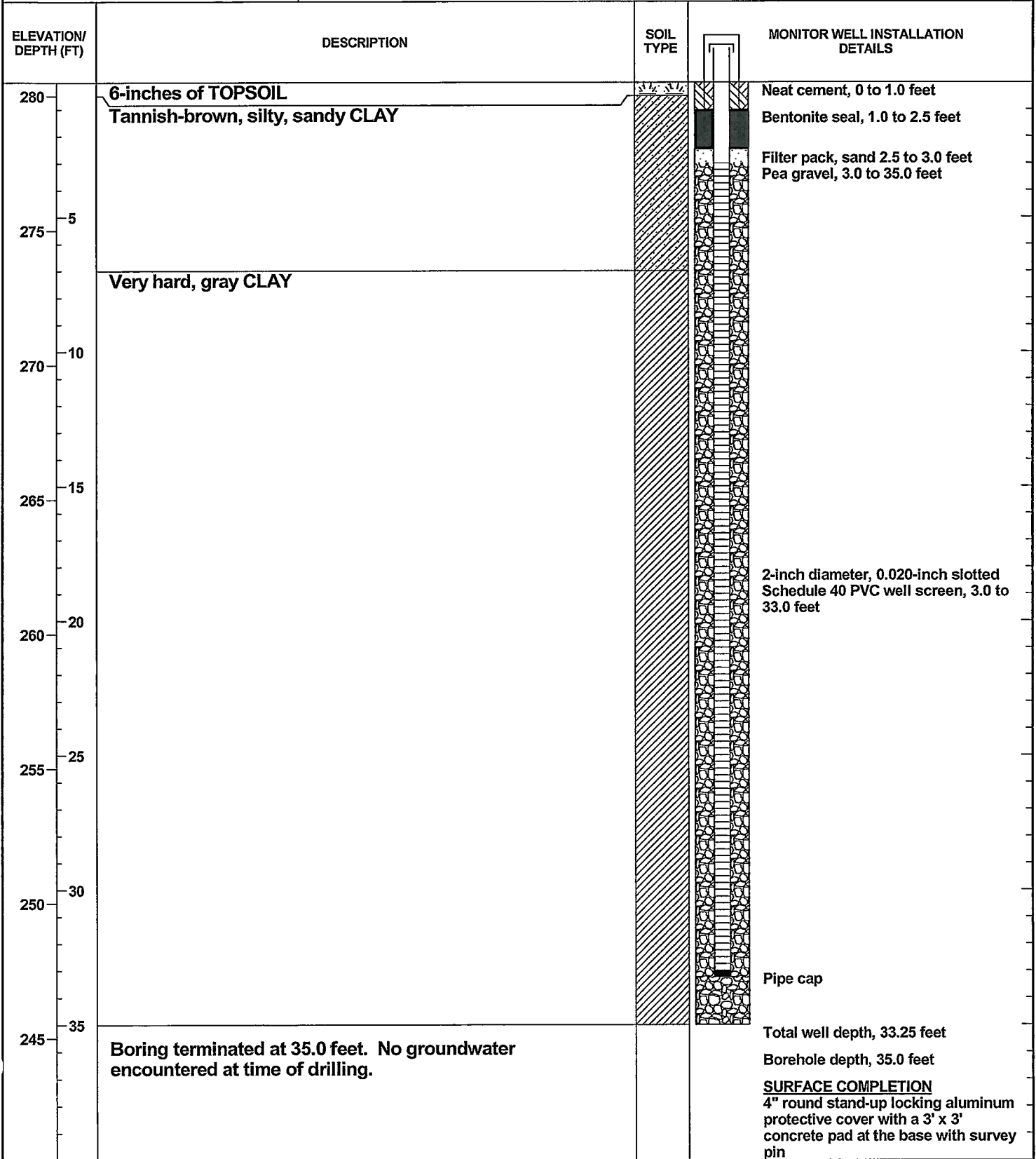


METHANE MONITORING PROBE NO. MM-66

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING> 

PROJECT NO.: J07-4999-06
 START: 6-26-07 END: 6-26-07
 ELEVATION: 280.5
 LOGGED BY: T. Gradwell



GEOC_WELLINB_4999-06_12/22/10



METHANE MONITORING PROBE NO. MM-66

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill PROJECT NO.: J07-4999-06
CLIENT: HHNT START: 6-26-07 END: 6-26-07
LOCATION: Uniontown, Alabama ELEVATION: 280.5
DRILLER: Landprobe, T. Gradwell LOGGED BY: T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ▽ AFTER 24 HOURS: ▽ CAVING> ⊗

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
240 45 235 50 230 55 225 60 220 65 215 70 210 75 205			1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.73-feet Top of PVC casing elev. = 284.23 feet Survey pin elev. = 280.88 feet Ground surface elev. = 280.5 feet Northing = 876,841.99' Easting = 1,979,598.88'

GEOC_WELLNB 4999-C. 12/22/10



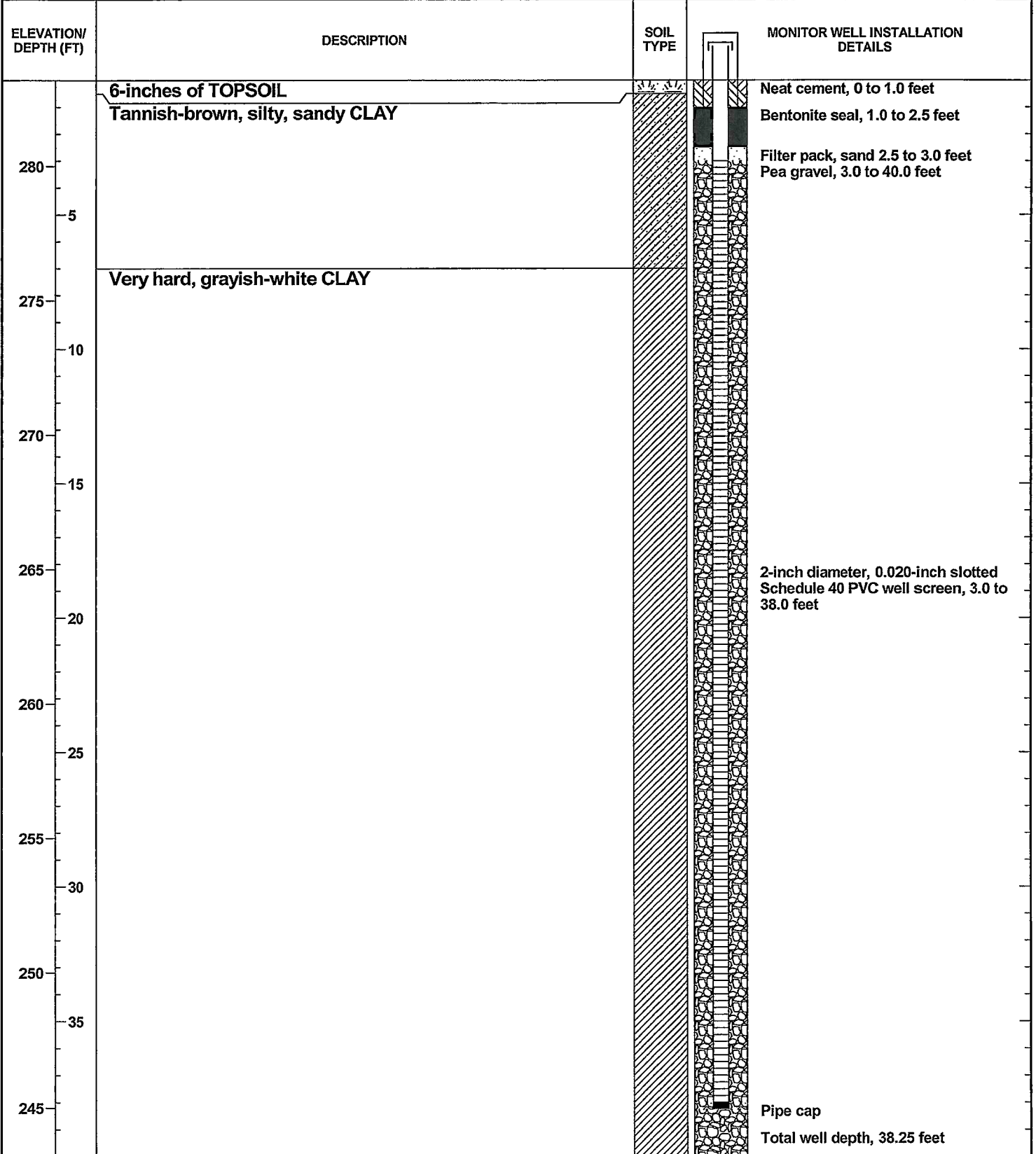
METHANE MONITORING PROBE NO. MM-67

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇

PROJECT NO.: J07-4999-06
START: 6-26-07 END: 6-27-07
ELEVATION: 283.2
LOGGED BY: T. Gradwell

AFTER 24 HOURS: ∇ CAVING: ☒



GEOT_WELLNB 4999-06 12/22/10



METHANE MONITORING PROBE NO. MM-67

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING> XXXX

PROJECT NO.: J07-4999-06
START: 6-26-07 END: 6-27-07
ELEVATION: 283.2
LOGGED BY: T. Gradwell


ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
240 45 235 50 230 55 225 60 220 65 215 70 210 75 205	<p>Boring terminated at 40.0 feet. No groundwater encountered at time of drilling.</p>		<p>Borehole depth, 40.0 feet SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.51-feet Top of PVC casing elev. = 286.71 feet Survey pin elev. = 283.58 feet Ground surface elev. = 283.2 feet Northing = 876,736.79' Easting = 1,979,586.55'</p>

GEOC_WELLNB_4999-06_12/22/10

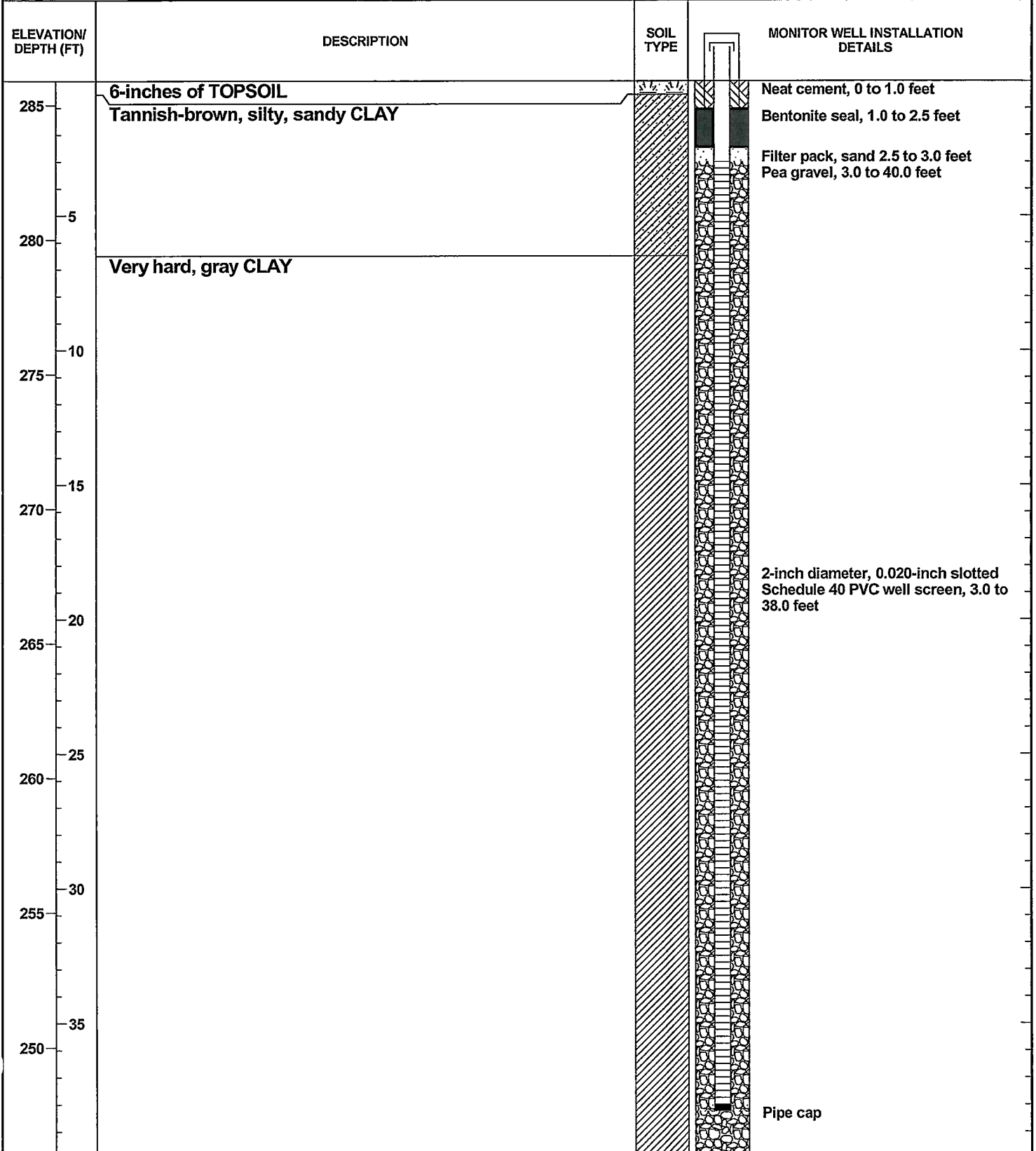


METHANE MONITORING PROBE NO. MM-68

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING> 

PROJECT NO.: J07-4999-06
START: 6-27-07 END: 6-27-07
ELEVATION: 285.9
LOGGED BY: T. Gradwell



GEOT_WELLNB 4999-C 12/22/10



METHANE MONITORING PROBE NO. MM-68

PROJECT: Perry County Landfill

PROJECT NO.: J07-4999-06

CLIENT: HHNT

START: 6-27-07 END: 6-27-07

LOCATION: Uniontown, Alabama

ELEVATION: 285.9

DRILLER: Landprobe, T. Gradwell

LOGGED BY: T. Gradwell

DRILLING METHOD: 6-inch air rotary

DEPTH TO - WATER> INITIAL: ∇

AFTER 24 HOURS: ∇

CAVING> ⊗

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
245 240 45 235 50 230 55 225 60 220 65 215 70 210 75	<p>Boring terminated at 40.0 feet. No groundwater encountered at time of drilling.</p>		<p>Total well depth, 38.25 feet Borehole depth, 40.0 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.61-feet Top of PVC casing elev. = 289.51 feet Survey pin elev. = 286.54 feet Ground surface elev. = 285.9 feet Northing = 876,637.69' Easting = 1,979,589.19'</p>

GEOI_WELLN 4999-06_12/22/10



METHANE MONITORING PROBE NO. MM-69

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill

PROJECT NO.: J07-4999-06

CLIENT: HHNT

START: 6-27-07 END: 6-27-07

LOCATION: Uniontown, Alabama

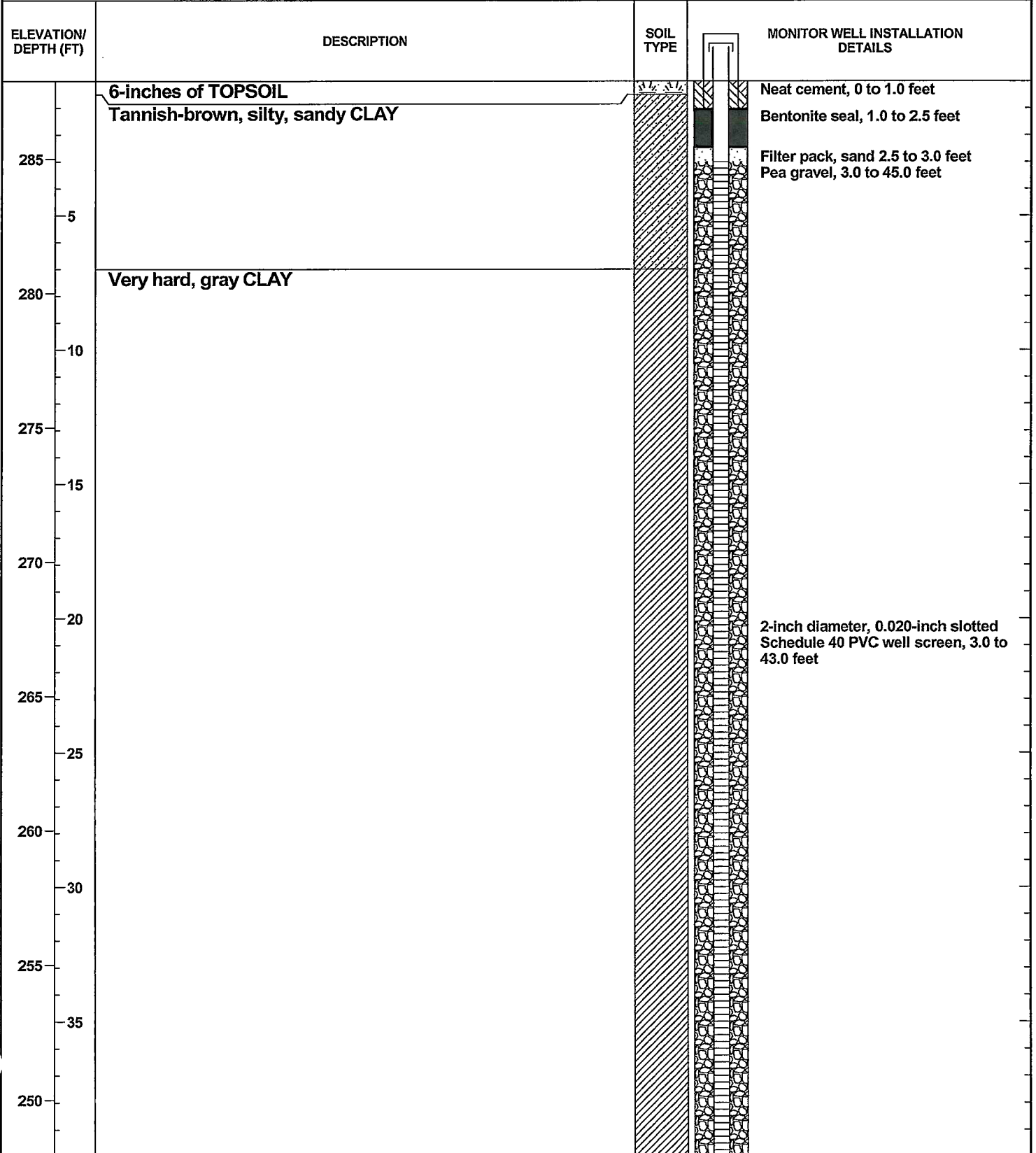
ELEVATION: 287.9

DRILLER: Landprobe, T. Gradwell

LOGGED BY: T. Gradwell

DRILLING METHOD: 6-inch air rotary

DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING: \otimes _____



GEOLOGICAL WELL LOG 4999-L 12/22/10

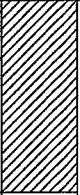



METHANE MONITORING PROBE NO. MM-69

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING> ⊗

PROJECT NO.: J07-4999-06
START: 6-27-07 END: 6-27-07
ELEVATION: 287.9
LOGGED BY: T. Gradwell

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
245 45	Very hard, gray CLAY		 2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 43.0 feet Pipe cap
240 50 235 55 230 60 225 65 220 70 215 75 210	Boring terminated at 40.0 feet. No groundwater encountered at time of drilling.		Total well depth, 43.25 feet Borehole depth, 45.0 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.71-feet Top of PVC casing elev. = 291.61 feet Survey pin elev. = 288.35 feet Ground surface elev. = 287.9 feet Northing = 876,545.34' Easting = 1,979,585.23'

GEOT_WELLNB 4999-06 . 12/22/10

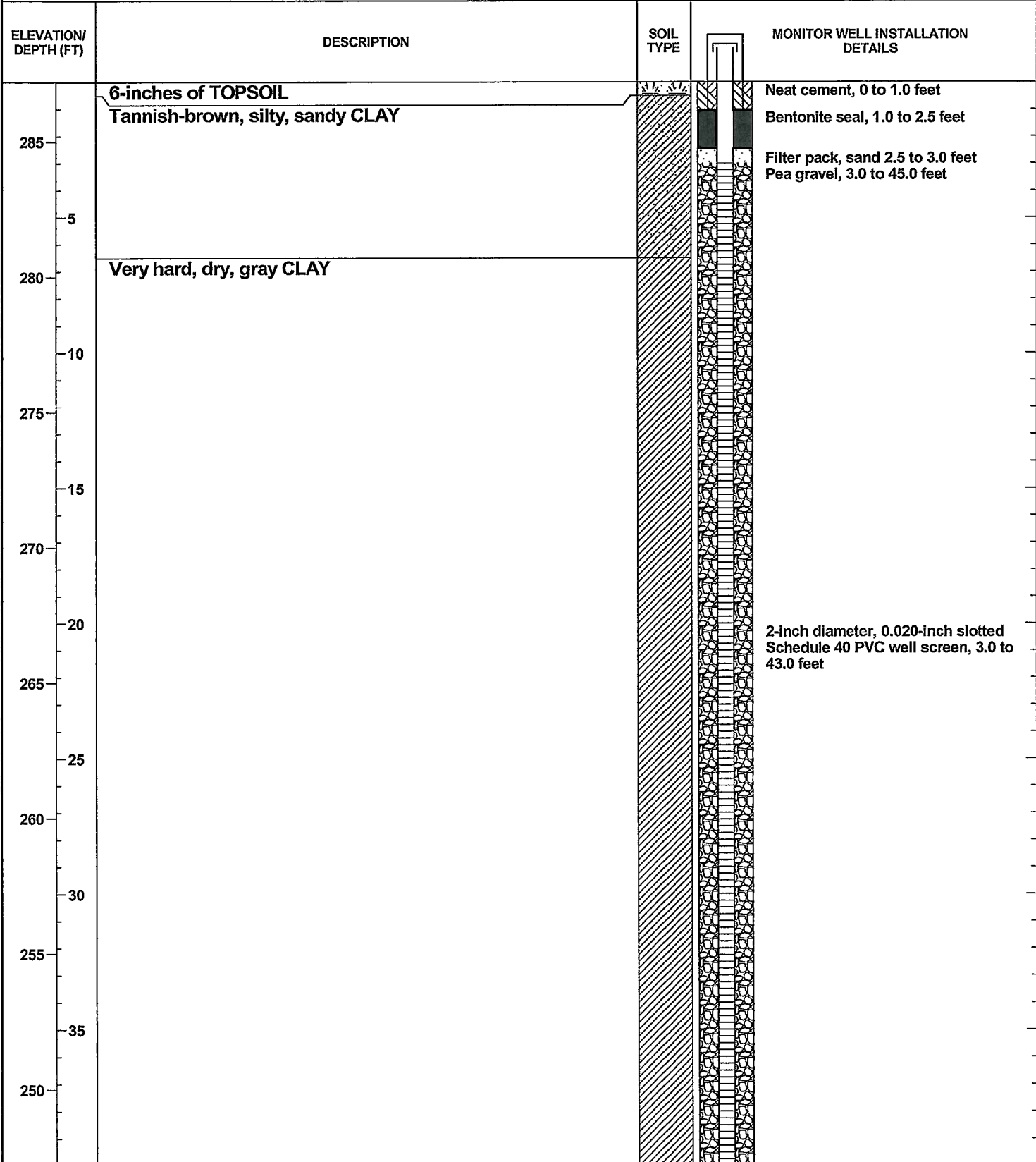


METHANE MONITORING PROBE NO. MM-70

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: ☒

PROJECT NO.: J07-4999-06
START: 6-27-07 END: 6-28-07
ELEVATION: 287.2
LOGGED BY: T. Gradwell



GEOT_WELLNB_4999-06_12/22/10




METHANE MONITORING PROBE NO. MM-70

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____

PROJECT NO.: J07-4999-06
START: 6-27-07 END: 6-28-07
ELEVATION: 287.2
LOGGED BY: T. Gradwell

CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
245 45	Very hard, dry, gray CLAY		 2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 43.0 feet Pipe cap
240 50 235 55 230 60 225 65 220 70 215 75 210	Boring terminated at 45.0 feet. No groundwater encountered at time of drilling.		Total well depth, 43.25 feet Borehole depth, 45.0 feet SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.40-feet Top of PVC casing elev. = 290.60 feet Survey pin elev. = 287.49 feet Ground surface elev. = 287.2 feet Northing = 876,480.96' Easting = 1,979,582.39'

GEO. WELL NO. 4999-06, 12/22/10

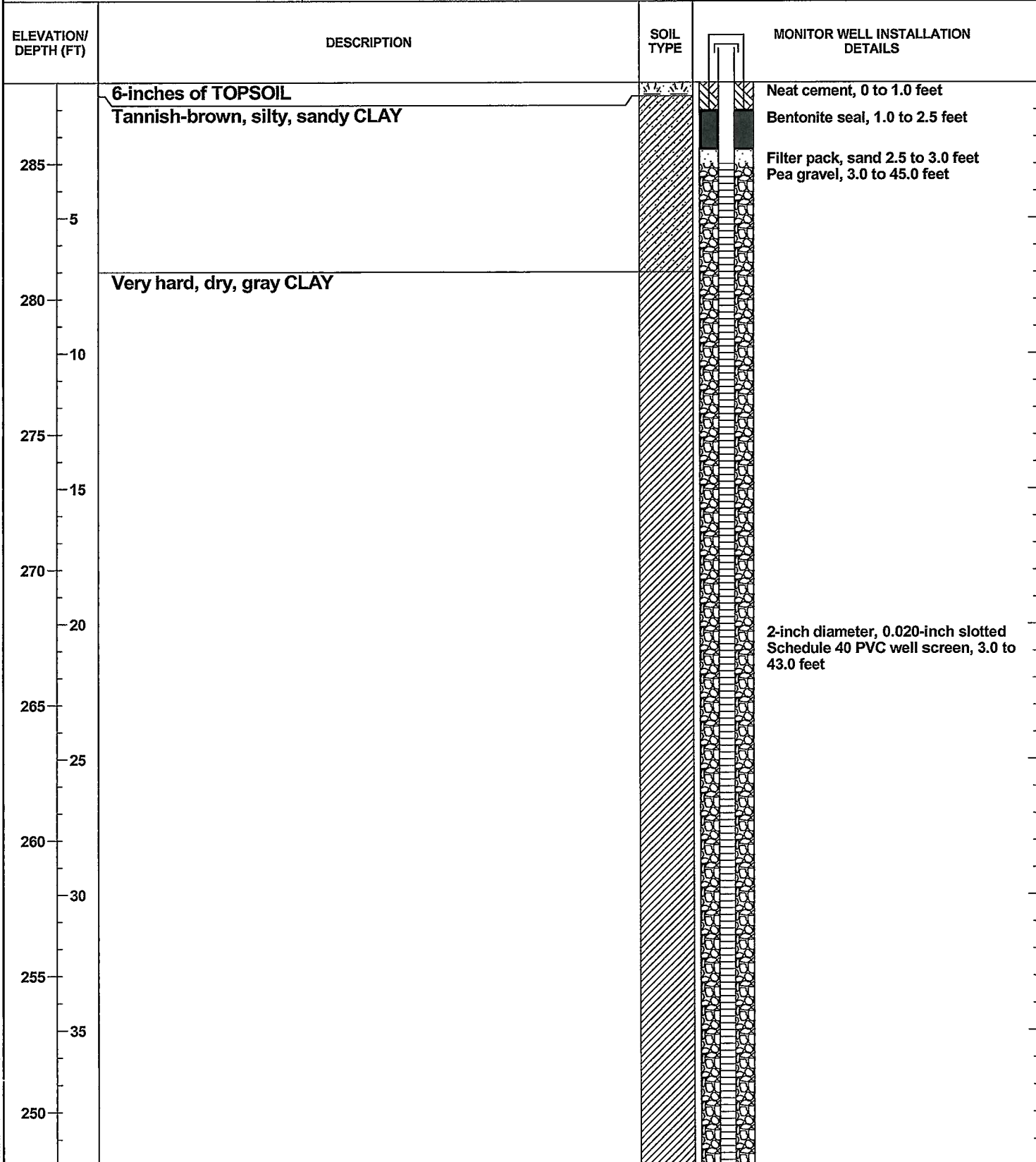


METHANE MONITORING PROBE NO. MM-71

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: ☒

PROJECT NO.: J07-4999-06
 START: 6-28-07 END: 6-28-07
 ELEVATION: 288.0
 LOGGED BY: T. Gradwell




GEOLOGICAL WELL NO. 4999-06, 12/22/10

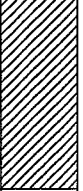


METHANE MONITORING PROBE NO. MM-71

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING> 

PROJECT NO.: J07-4999-06
 START: 6-28-07 END: 6-28-07
 ELEVATION: 288.0
 LOGGED BY: T. Gradwell


ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
245 45 240 50 235 55 230 60 225 65 220 70 215 75 210	<p>Very hard, dry, gray CLAY</p> <hr/> <p>Boring terminated at 45.0 feet. No groundwater encountered at time of drilling.</p>		<p>2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 43.0 feet</p> <p>Pipe cap</p> <p>Total well depth, 43.25 feet Borehole depth, 45.0 feet</p> <p><u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover</p> <p>PVC stick-up = 3.39-feet</p> <p>Top of PVC casing elev. = 291.39 feet</p> <p>Survey pin elev. = 288.45 feet Ground surface elev. = 288.0 feet Northing = 876,475.67' Easting = 1,979,515.29'</p>

GEO_T_WELLNB 4999-06 - 12/22/10

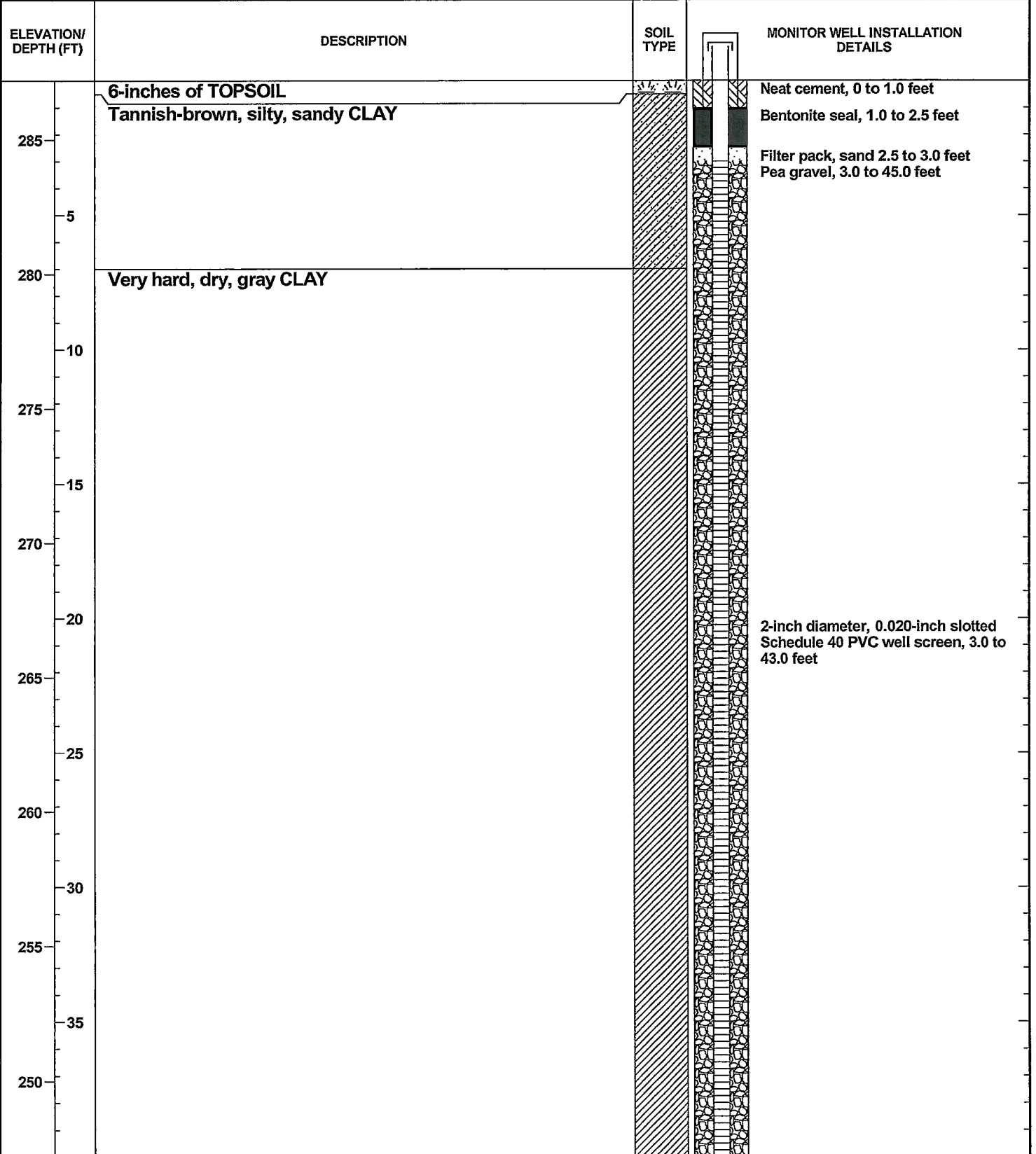


METHANE MONITORING PROBE NO. MM-72

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING> 

PROJECT NO.: J07-4999-06
START: 6-28-07 END: 6-28-07
ELEVATION: 287.2
LOGGED BY: T. Gradwell



GEO_T_WELLNB 4999-06 12/22/10



METHANE MONITORING PROBE NO. MM-72

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill

PROJECT NO.: J07-4999-06

CLIENT: HHNT

START: 6-28-07 END: 6-28-07

LOCATION: Uniontown, Alabama


ELEVATION: 287.2

DRILLER: Landprobe, T. Gradwell

LOGGED BY: T. Gradwell

DRILLING METHOD: 6-inch air rotary

DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING> 

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
245 45	Very hard, dry, gray CLAY		<p>2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 43.0 feet</p> <p>Pipe cap</p> <p>Total well depth, 43.25 feet Borehole depth, 45.0 feet</p>
240 50 235 55 230 60 225 65 220 70 215 75 210	Boring terminated at 45.0 feet. No groundwater encountered at time of drilling.		<p>SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.43-feet Top of PVC casing elev. = 290.63 feet</p> <p>Survey pin elev. = 287.77 feet Ground surface elev. = 287.2 feet Northing = 876,472.08' Easting = 1,979,435.36'</p>

GEO_T_WELLNB 4999-06 12/22/10

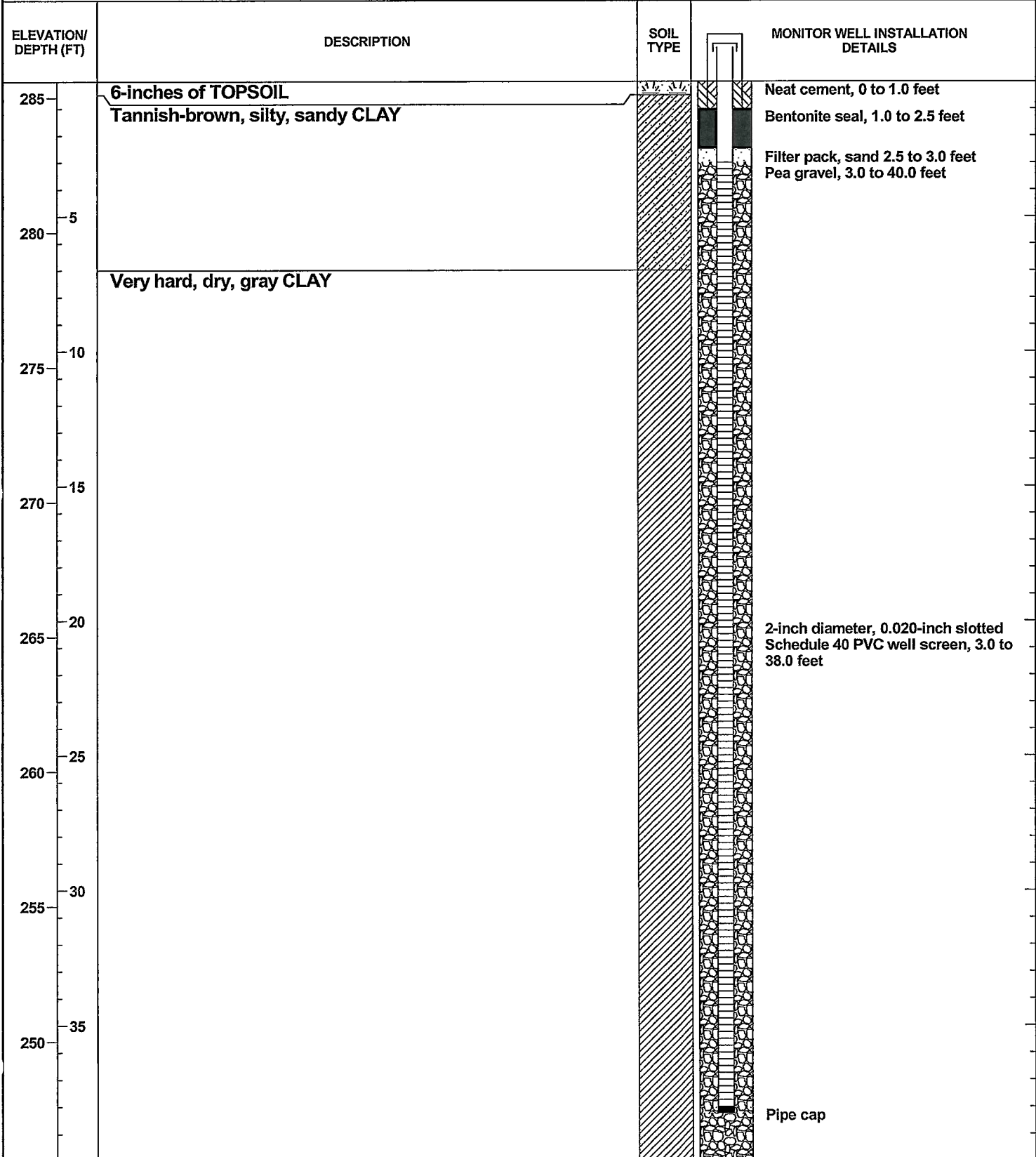


METHANE MONITORING PROBE NO. MM-73

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING> ⊗

PROJECT NO.: J07-4999-06
START: 6-28-07 END: 6-28-07
ELEVATION: 285.6
LOGGED BY: T. Gradwell



GEO. WELLNB 4999-L, 12/22/10



METHANE MONITORING PROBE NO. MM-73

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill

PROJECT NO.: J07-4999-06

CLIENT: HHNT

START: 6-28-07 END: 6-28-07

LOCATION: Uniontown, Alabama

ELEVATION: 285.6

DRILLER: Landprobe, T. Gradwell

LOGGED BY: T. Gradwell

DRILLING METHOD: 6-inch air rotary

DEPTH TO - WATER> INITIAL: ▽

AFTER 24 HOURS: ▽

CAVING> 

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
245 45 240 50 235 55 230 60 225 65 220 70 215 75 210	<p>Boring terminated at 40.0 feet. No groundwater encountered at time of drilling.</p>		<p>Total well depth, 38.25 feet Borehole depth, 40.0 feet</p> <p>SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover</p> <p>PVC stick-up = 3.64-feet Top of PVC casing elev. = 289.24 feet</p> <p>Survey pin elev. = 286.07 feet Ground surface elev. = 285.6 feet Northing = 876,465.10' Easting = 1,979,334.39'</p>

GEO. WELLNB 4999-C 12/22/10



METHANE MONITORING PROBE NO. MM-74

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill

PROJECT NO.: J07-4999-06

CLIENT: HHNT

START: 6-29-07 END: 6-29-07

LOCATION: Uniontown, Alabama

ELEVATION: 283.2

DRILLER: Landprobe, T. Gradwell

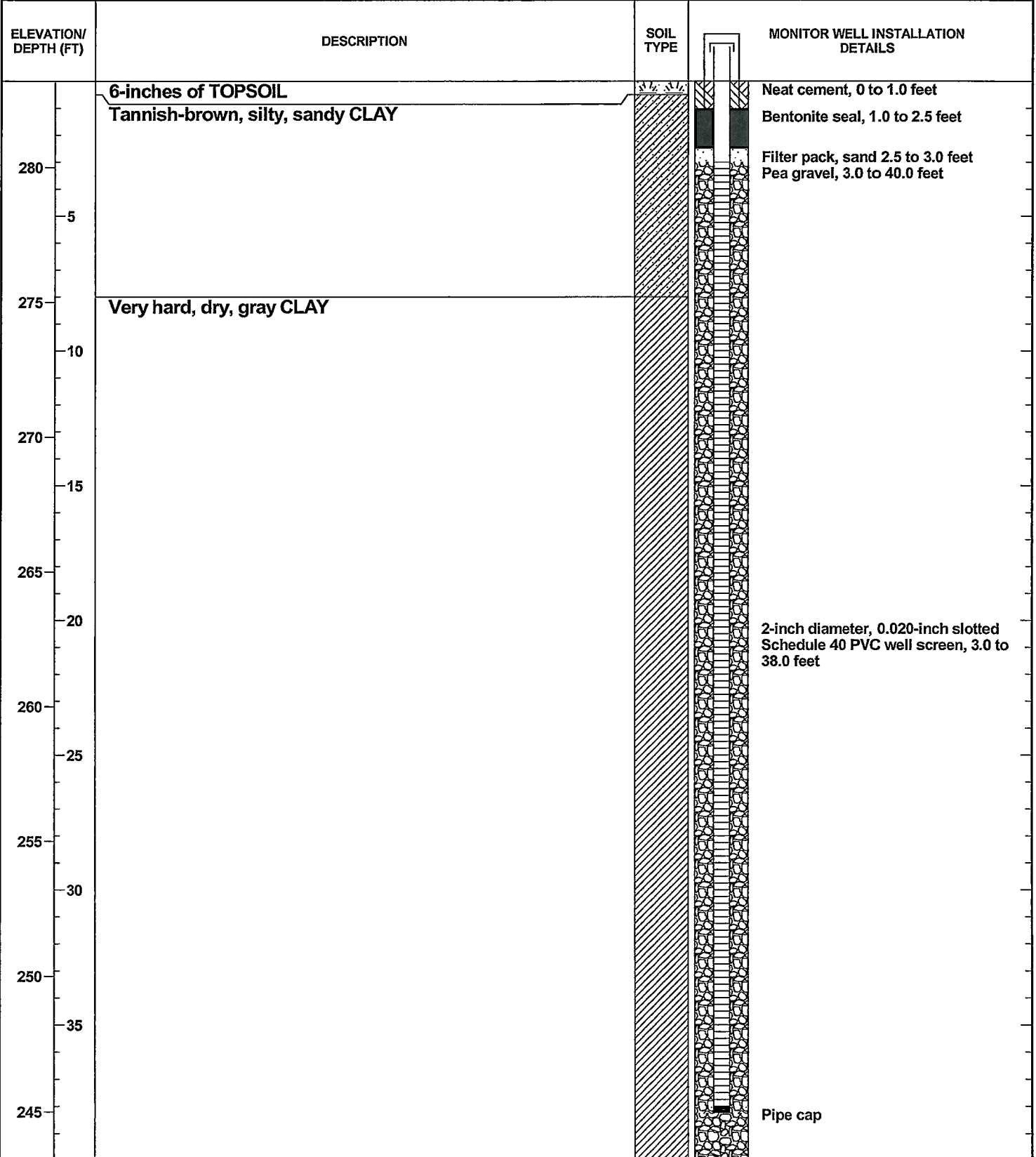
LOGGED BY: T. Gradwell

DRILLING METHOD: 6-inch air rotary

DEPTH TO - WATER> INITIAL: ▽

AFTER 24 HOURS: ▽

CAVING: ▨



GEOT. WELL NO. 4999-06, 12/22/10



METHANE MONITORING PROBE NO. MM-74

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill PROJECT NO.: J07-4999-06
 CLIENT: HHNT START: 6-29-07 END: 6-29-07
 LOCATION: Uniontown, Alabama ELEVATION: 283.2
 DRILLER: Landprobe, T. Gradwell LOGGED BY: T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING> ⊗


ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
240 45 235 50 230 55 225 60 220 65 215 70 210 75 205	<p>Boring terminated at 40.0 feet. No groundwater encountered at time of drilling.</p>		<p>Total well depth, 38.25 feet Borehole depth, 40.0 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.56-feet Top of PVC casing elev. = 286.76 feet Survey pin elev. = 283.56 feet Ground surface elev. = 283.2 feet Northing = 876,458.55' Easting = 1,979,237.71'</p>

GEOC_WELLINB_4999-06_12/22/10

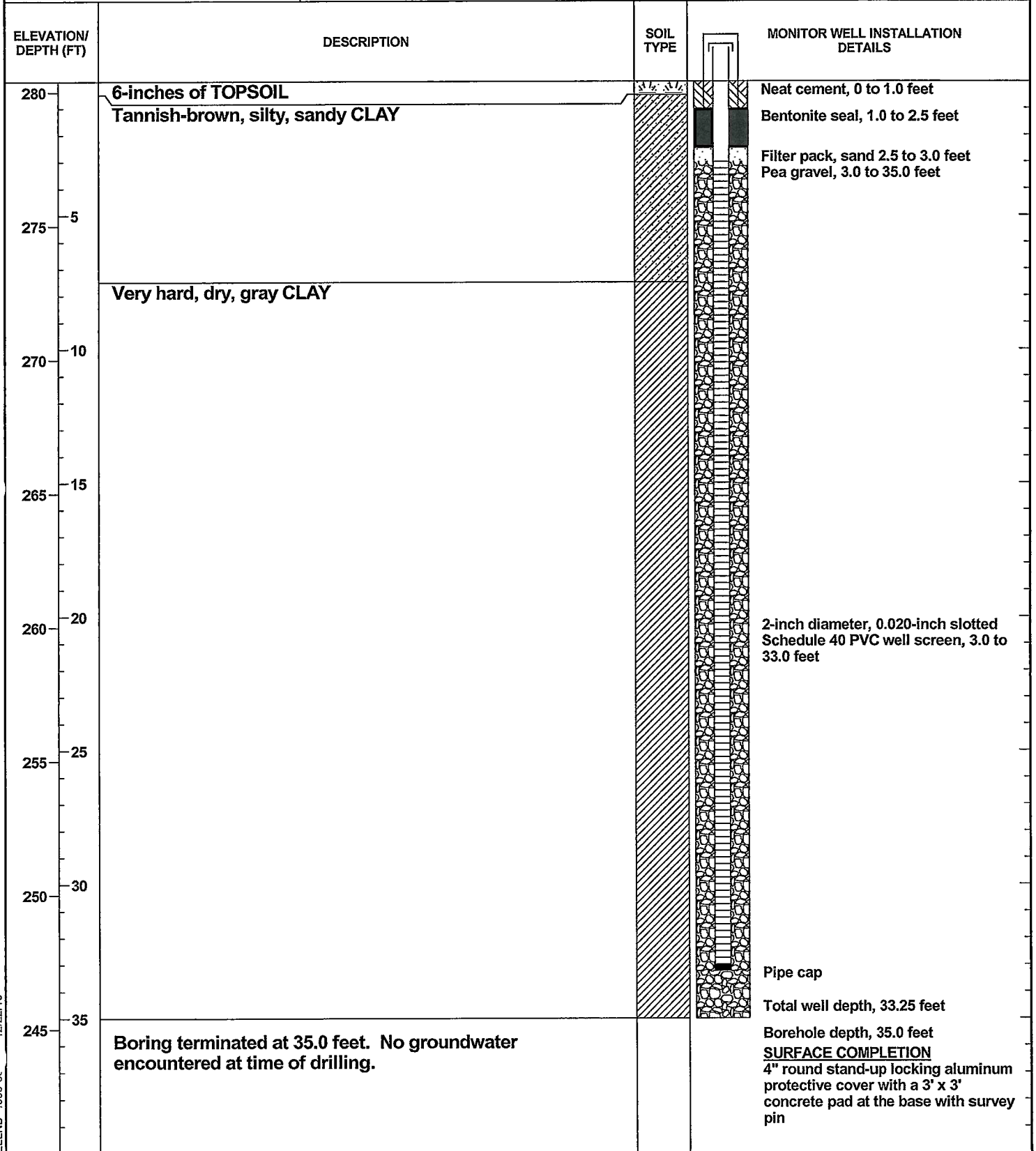


METHANE MONITORING PROBE NO. MM-75

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING> 

PROJECT NO.: J07-4999-06
START: 6-29-07 END: 6-29-07
ELEVATION: 280.4
LOGGED BY: T. Gradwell



GEO. WELL NO. 4999-06 12/22/10



METHANE MONITORING PROBE NO. MM-75

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇

PROJECT NO.: J07-4999-06
 START: 6-29-07 END: 6-29-07
 ELEVATION: 280.4
 LOGGED BY: T. Gradwell

DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING> ☒

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
240 235 45 230 50 225 55 220 60 215 65 210 70 205 75			<p>1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.68 feet Top of PVC casing elev. = 284.08 feet</p> <p>Survey pin elev. = 280.93 feet Ground surface elev. = 280.4 feet Northing = 876,443.46' Easting = 1,979,131.91'</p>

GEOT_WELLNB_4999-06... 12/22/10

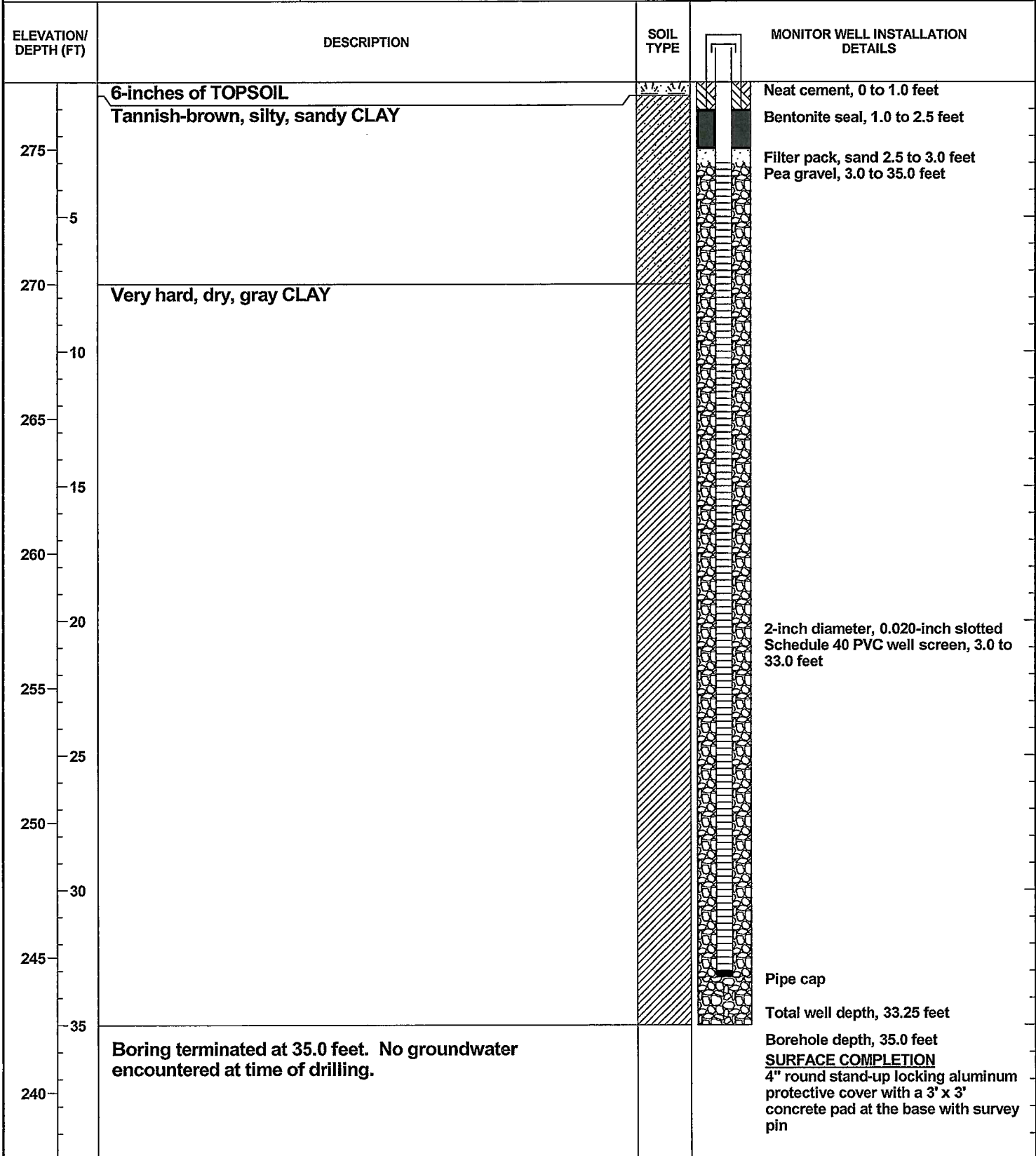


METHANE MONITORING PROBE NO. MM-76

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: ☒

PROJECT NO.: J07-4999-06
 START: 6-29-07 END: 6-29-07
 ELEVATION: 277.5
 LOGGED BY: T. Gradwell



GEO_T_WELLNB 4999-L 12/22/10



METHANE MONITORING PROBE NO. MM-76

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING> ⊗

PROJECT NO.: J07-4999-06
START: 6-29-07 END: 6-29-07
ELEVATION: 277.5
LOGGED BY: T. Gradwell

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
235 45 230 50 225 55 220 60 215 65 210 70 205 75 200			1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.91 feet Top of PVC casing elev. = 281.41 feet Survey pin elev. = 278.06 feet Ground surface elev. = 277.5 feet Northing = 876,424.18' Easting = 1,979,028.48'

GEOC_WELLN 4999-06 - 12/22/10

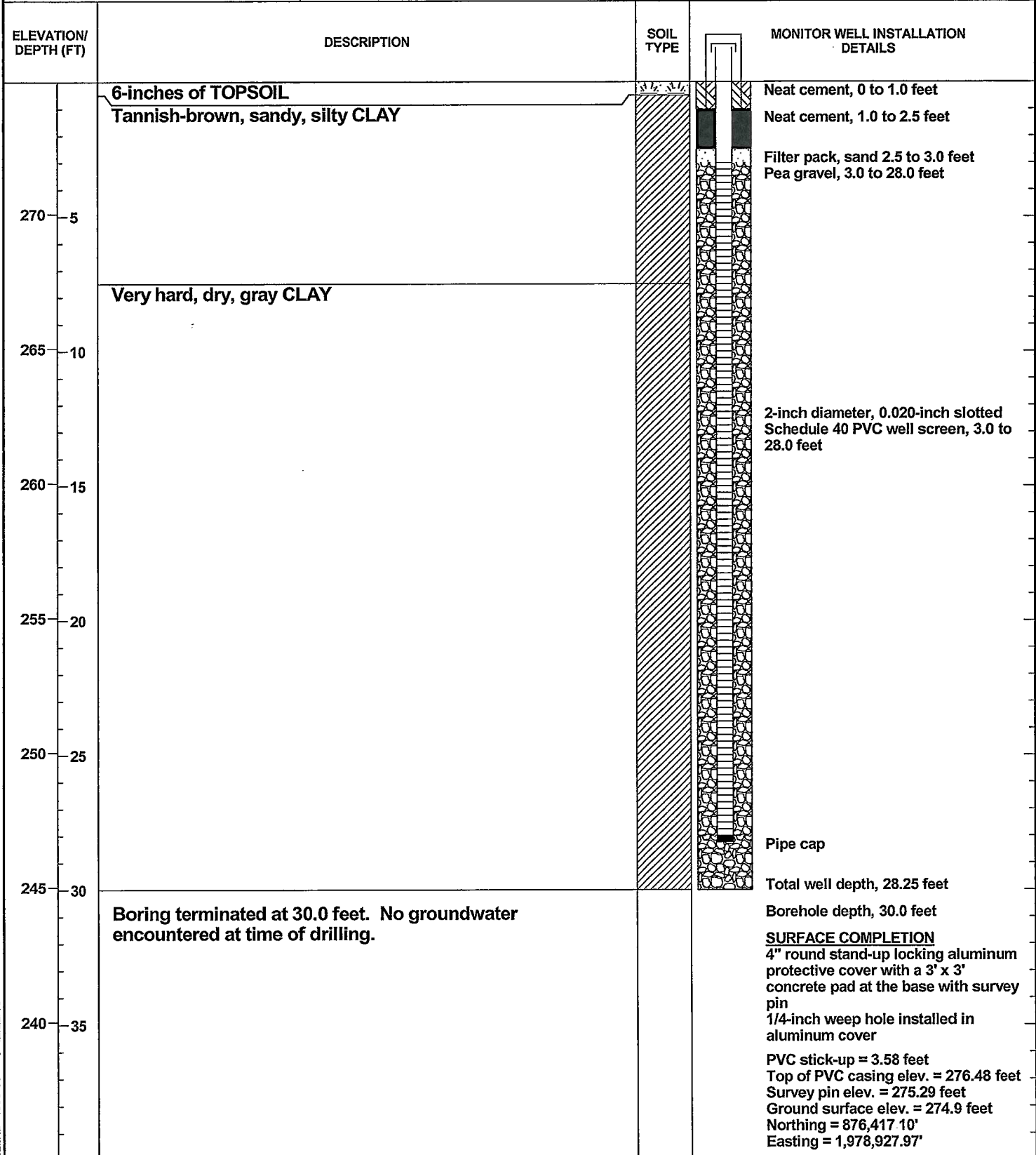


METHANE MONITORING PROBE NO. MM-77

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING:

PROJECT NO.: J07-4999-06
 START: 6-29-07 END: 6-30-07
 ELEVATION: 274.9
 LOGGED BY: T. Gradwell



GEOC_WELLINB 4999-06 12/22/10

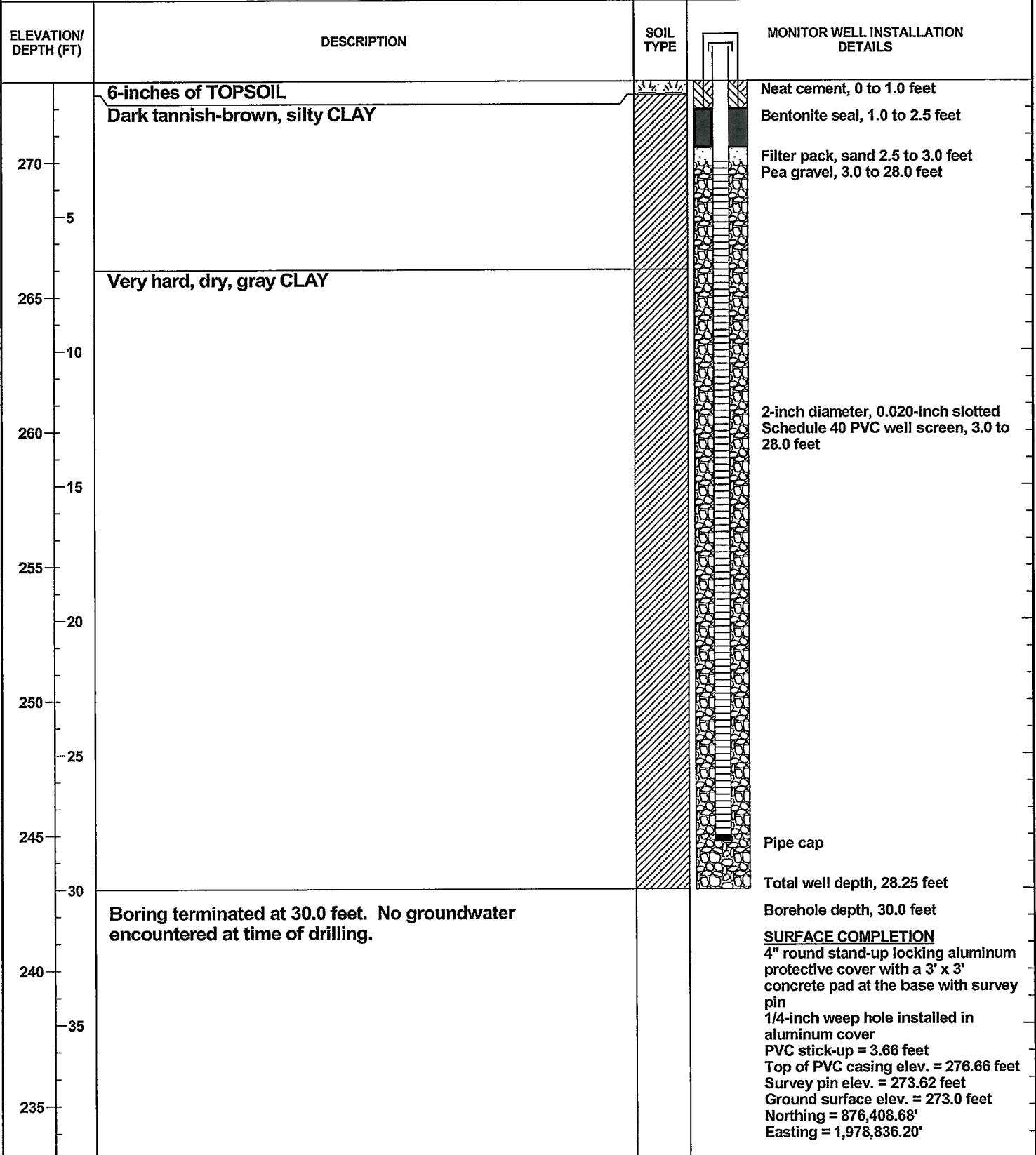


METHANE MONITORING PROBE NO. MM-78

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: ☒

PROJECT NO.: J07-4999-06
 START: 6-30-07 END: 6-30-07
 ELEVATION: 273.0
 LOGGED BY: T. Gradwell



GEOI_WELLINB_4999-06..._J_12/22/10

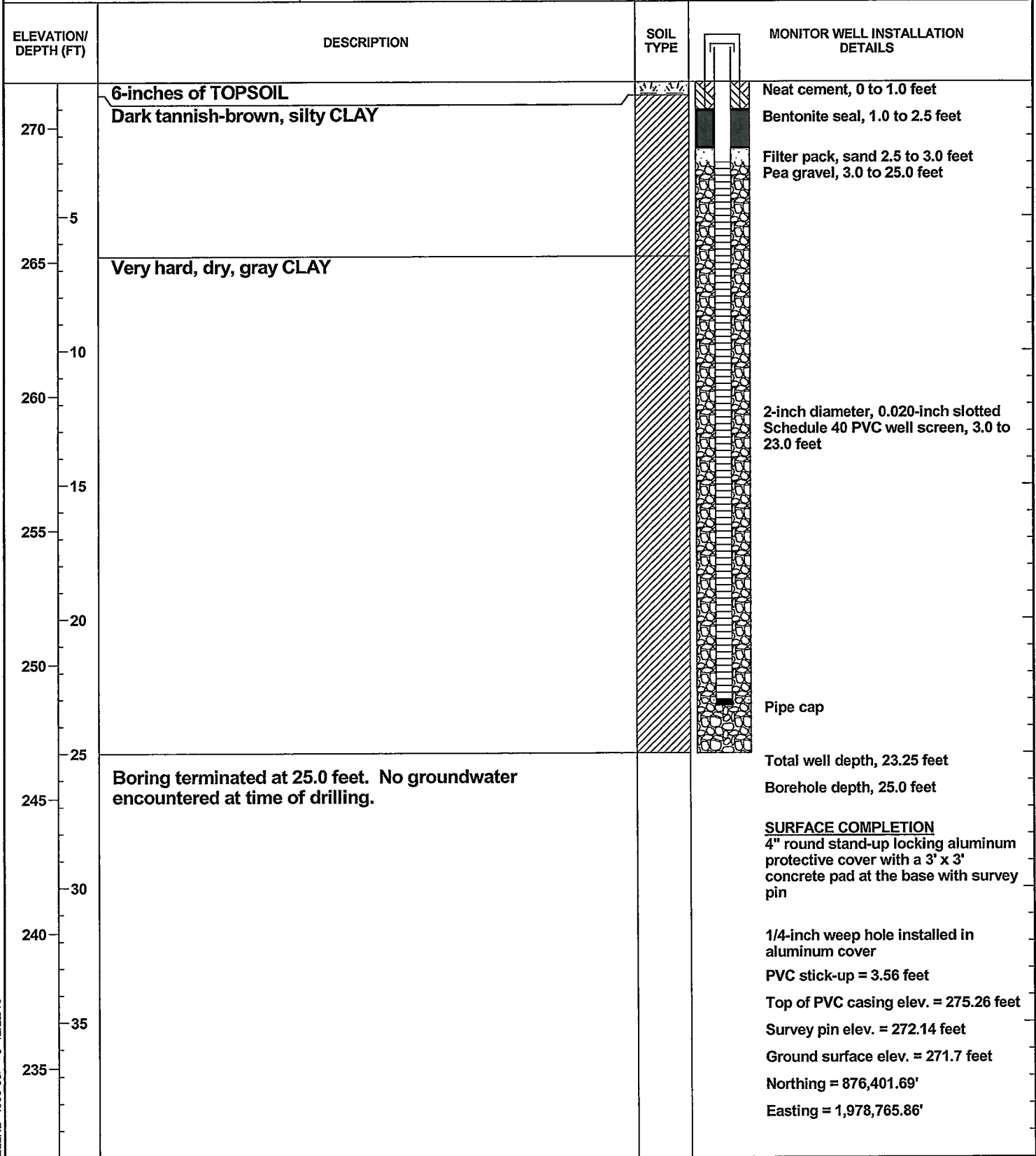


METHANE MONITORING PROBE NO. MM-79

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: ☒

PROJECT NO.: J07-4999-06
START: 6-30-07 END: 6-30-07
ELEVATION: 271.7
LOGGED BY: T. Gradwell



GEOT_WELLINB 4999-06... 12/22/10



METHANE MONITORING PROBE NO. MM-80

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill

PROJECT NO.: J07-4999-06

CLIENT: HHNT

START: 6-30-07 END: 6-30-07

LOCATION: Uniontown, Alabama

ELEVATION: 271.8

DRILLER: Landprobe, T. Gradwell

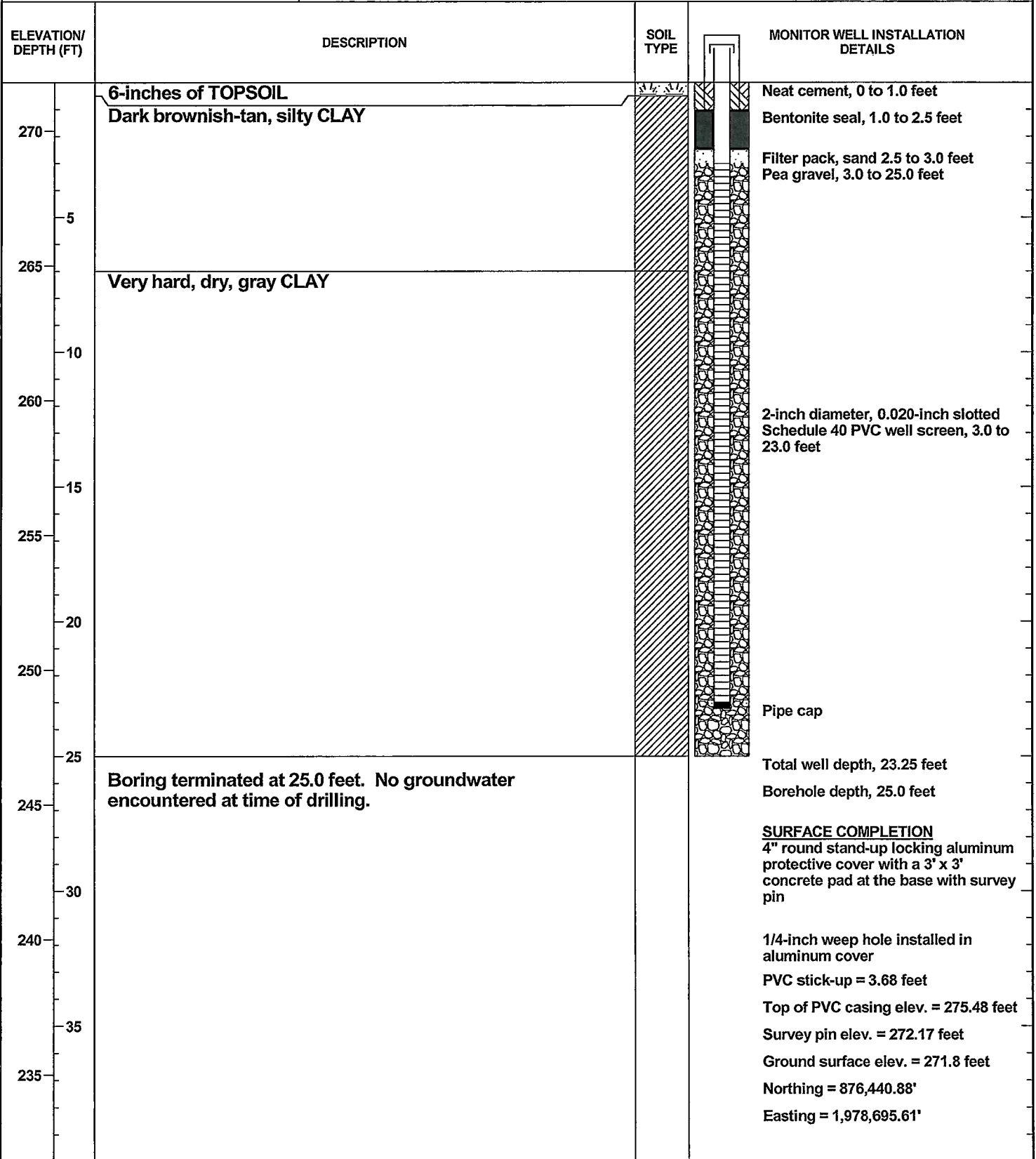
LOGGED BY: T. Gradwell

DRILLING METHOD: 6-inch air rotary

DEPTH TO - WATER> INITIAL: _____

AFTER 24 HOURS: _____

CAVING> _____



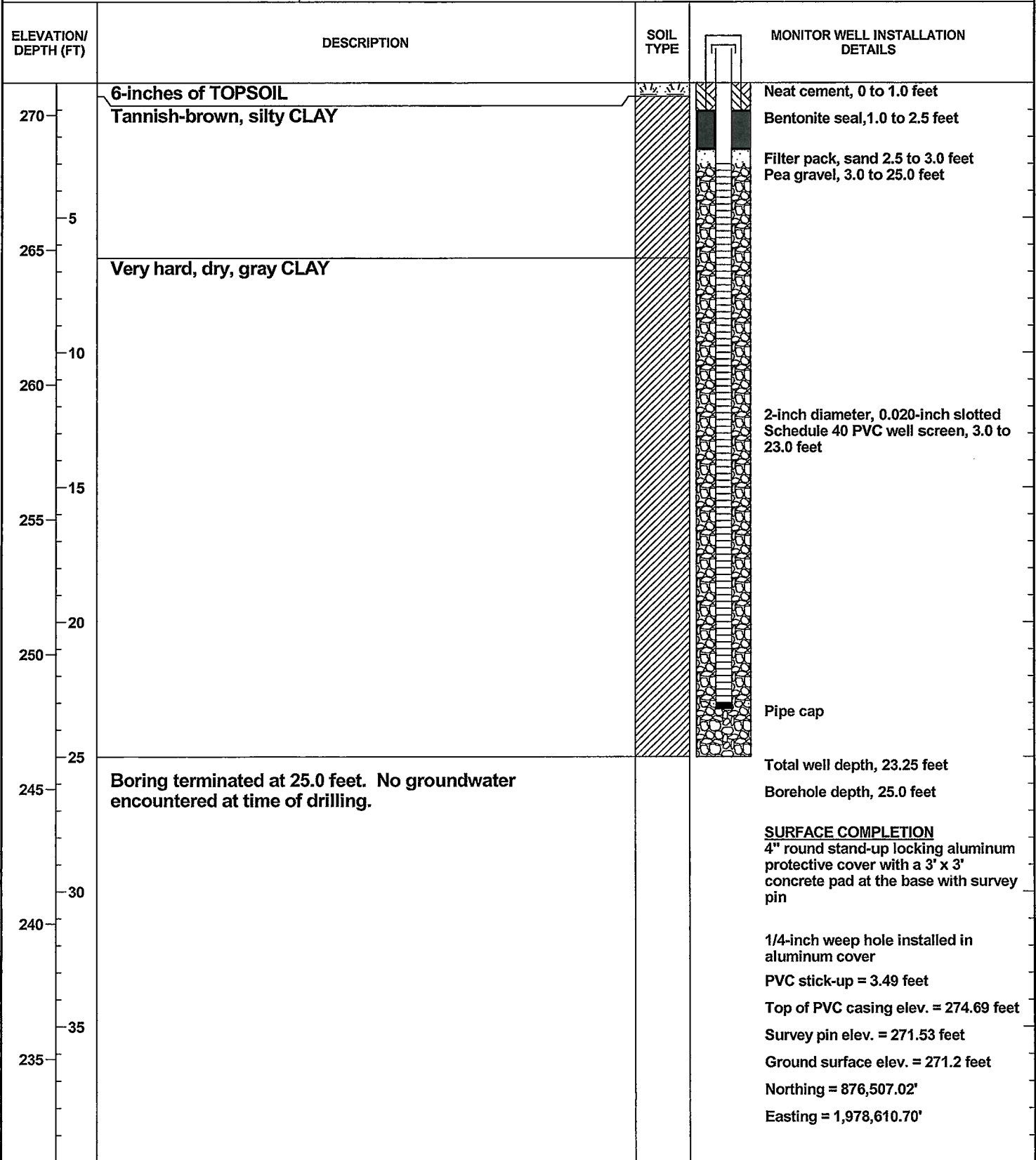
GEOC_WELLNB 4999-L 12/22/10



METHANE MONITORING PROBE NO. MM-81

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill PROJECT NO.: J07-4999-06
 CLIENT: HHNT START: 7-1-07 END: 7-1-07
 LOCATION: Uniontown, Alabama ELEVATION: 271.2
 DRILLER: Landprobe, T. Gradwell LOGGED BY: T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: ⊗



GEO_T_WELLNB 4999-06. J 12/22/10



METHANE MONITORING PROBE NO. MM-82

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING>

PROJECT NO.: J07-4999-06
 START: 7-1-07 END: 7-1-07
 ELEVATION: 270.1
 LOGGED BY: T. Gradwell


ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
265 - 5	6-inches of TOPSOIL Tannish-brown, silty CLAY		Neat cement, 0 to 1.0 feet Bentonite seal, 1.0 to 2.5 feet
260 - 10	Gray CLAY		Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 20.0 feet
255 - 15			2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 18.0 feet
250 - 20	Boring terminated at 20.0 feet. No groundwater encountered at time of drilling.		Pipe cap Total well depth, 18.25 feet
245 - 25			Borehole depth, 20.0 feet SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
240 - 30			1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.72 feet Top of PVC casing elev. = 273.82 feet Survey pin elev. = 270.51 feet Ground surface elev. = 270.1 feet Northing = 876,574.41' Easting = 1,978,547.53'
235 - 35			

GEO_T_WELLNB_4999-06_12/22/10





METHANE MONITORING PROBE NO. MM-83

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
 CLIENT: HHNT
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, T. Gradwell
 DRILLING METHOD: 6-inch air rotary
 DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING: 

PROJECT NO.: J07-4999-06
 START: 7-1-07 END: 7-1-07
 ELEVATION: 268.5
 LOGGED BY: T. Gradwell

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
265 5	6-inches of TOPSOIL Tannish-brown, silty CLAY		Neat cement, 0 to 1.0 feet Bentonite seal, 1.0 to 2.5 feet Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 20.0 feet
260 10	Gray CLAY		2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 18.0 feet
255 15			
250 20			Pipe cap Total well depth, 18.25 feet
245 25	Boring terminated at 20.0 feet. No groundwater encountered at time of drilling.		Borehole depth, 20.0 feet SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.56 feet Top of PVC casing elev. = 272.06 feet Survey pin elev. = 268.83 feet Ground surface elev. = 268.5 feet Northing = 876,638.20' Easting = 1,978,467.56'
240 30			
235 35			
230			

GEOI_WELLNB_4999-06_12/22/10



METHANE MONITORING PROBE NO. MM-84

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill

PROJECT NO.: J07-4999-06

CLIENT: HHNT

START: 7-2-07 END: 7-2-07

LOCATION: Uniontown, Alabama

ELEVATION: 272.2

DRILLER: Landprobe, T. Gradwell

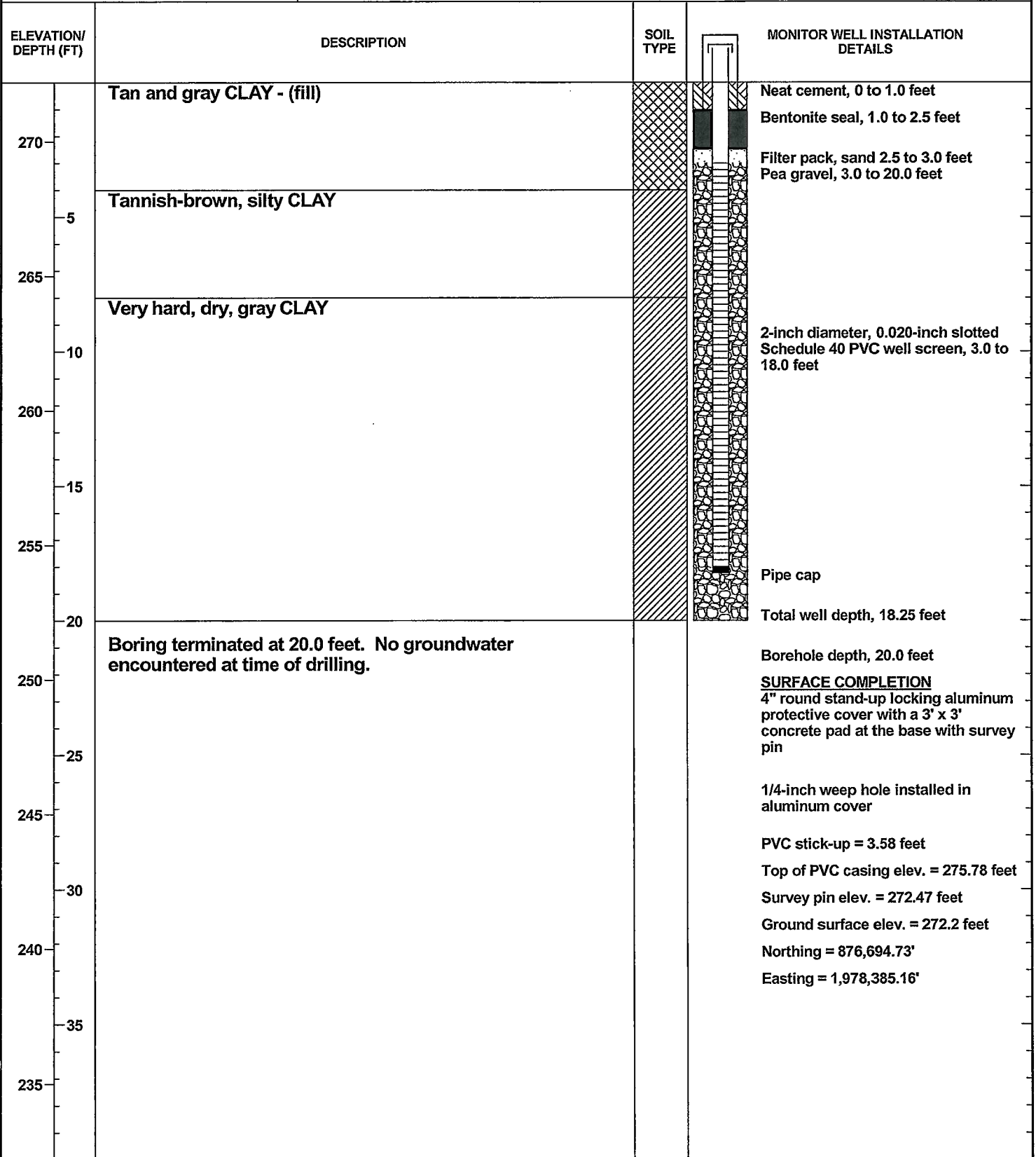
LOGGED BY: T. Gradwell

DRILLING METHOD: 6-inch air rotary

DEPTH TO - WATER> INITIAL: ▽

AFTER 24 HOURS: ▽

CAVING: ▣



GEOC_WELLNB 4999-06 12/22/10



METHANE MONITORING PROBE NO. MM-85

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry County Landfill
CLIENT: HHNT
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, T. Gradwell
DRILLING METHOD: 6-inch air rotary
DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING: \otimes

PROJECT NO.: J07-4999-06
START: 7-1-07 END: 7-1-07
ELEVATION: 262.5
LOGGED BY: T. Gradwell

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
260	6-inches of TOPSOIL Tannish-brown, silty CLAY		Neat cement, 0 to 1.0 feet Bentonite seal, 1.0 to 2.5 feet
5	Gray CLAY		Filter pack, sand 2.5 to 3.0 feet Pea gravel, 3.0 to 10.0 feet
10	Boring terminated at 10.0 feet. No groundwater encountered at time of drilling.		2-inch diameter, 0.020-inch slotted Schedule 40 PVC well screen, 3.0 to 8.0 feet Pipe cap Total well depth, 8.25 feet Borehole depth, 10.0 feet
15			SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.55 feet Top of PVC casing elev. = 266.05 feet Survey pin elev. = 262.89 feet Ground surface elev. = 262.5 feet Northing = 876,767.03' Easting = 1,978,284.29'
20			
245			
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GEO. WELLNB 4999-06 - 12/22/10



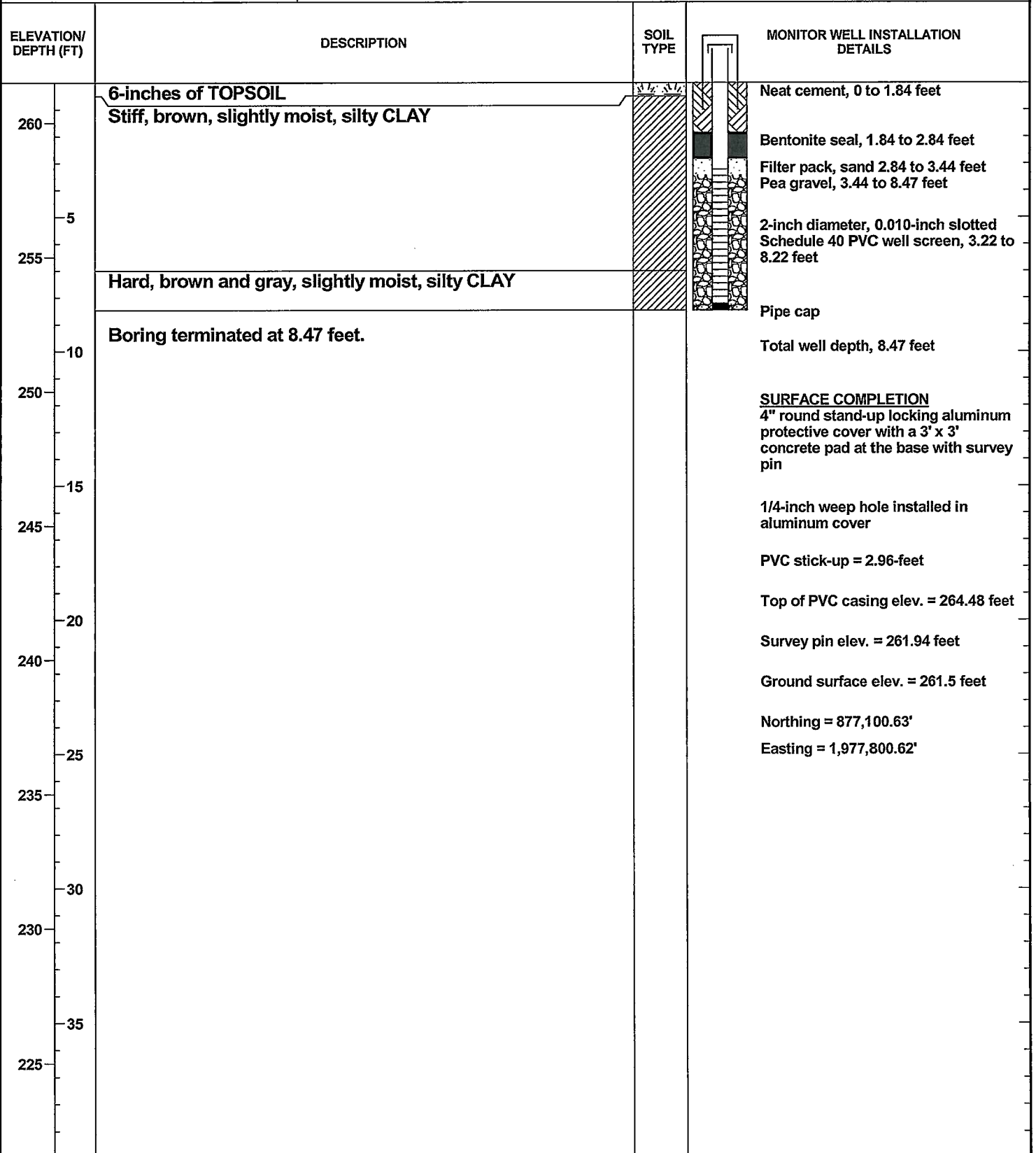
METHANE MONITORING PROBE NO. MM-91

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
 CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇

PROJECT NO.: J09-4999-18
 START: 9-9-09 END: 9-9-09
 ELEVATION: 261.5
 LOGGED BY: M. Preddy/C. Brown

CAVING: ⊗



GEO. WELLNB 4999-1, J 12/22/10



METHANE MONITORING PROBE NO. MM-92

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
 CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: \otimes

PROJECT NO.: J09-4999-18
 START: 9-9-09 END: 9-9-09
 ELEVATION: 263.0
 LOGGED BY: M. Preddy/C. Brown

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
260	6-inches of TOPSOIL Light brown, slightly moist, silty CLAY		Neat cement, 0 to 1.19 feet Bentonite seal, 1.19 to 2.19 feet Filter pack, sand 2.19 to 2.79 feet Pea gravel, 2.79 to 8.19 feet
255	Very stiff, gray, slightly moist, silty CLAY		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 2.94 to 7.94 feet
250	Boring terminated at 8.19 feet.		Pipe cap Total well depth, 8.19 feet
245			SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
240			1/4-inch weep hole installed in aluminum cover
235			PVC stick-up = 3.04-feet
230			Top of PVC casing elev. = 266.00 feet
225			Survey pin elev. = 263.37 feet Ground surface elev. = 263.0 feet Northing = 877,158.82' Easting = 1,977,726.85'

GEOC_WELLNB_4999-18_12/22/10



METHANE MONITORING PROBE NO. MM-93

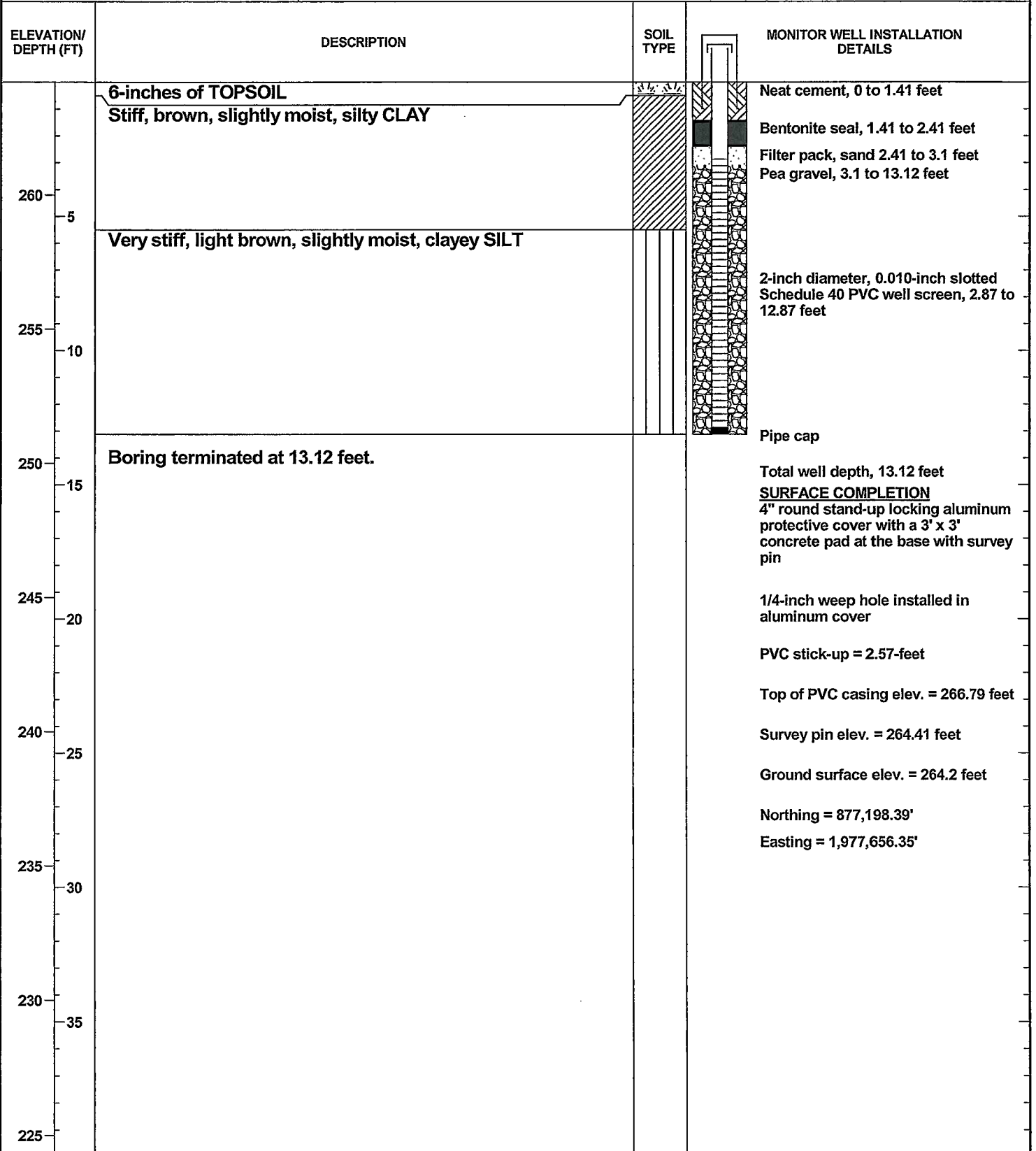
**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, R. Banks

PROJECT NO.: J09-4999-18
START: 9-9-09 END: 9-9-09
ELEVATION: 264.2
LOGGED BY: M. Preddy/C. Brown

DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING:



GEOI. WELLNB 4999-1. 12/22/10



METHANE MONITORING PROBE NO. MM-94

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
 CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
 DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING>

PROJECT NO.: J09-4999-18
 START: 9-9-09 END: 9-9-09
 ELEVATION: 264.5
 LOGGED BY: M. Preddy/C. Brown

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
260 - 5	6-inches of TOPSOIL Stiff, brown, slightly moist, fine to medium sandy, silty CLAY		Neat cement, 0 to 1.09 feet Bentonite seal, 1.09 to 2.09 feet Filter pack, sand 2.09 to 2.69 feet Pea gravel, 2.69 to 13.19 feet
255 - 10	Very stiff, grayish-brown, clayey SILT		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 2.94 to 12.94 feet
250 - 15	Boring terminated at 13.19 feet.		Pipe cap Total well depth, 13.19 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
245 - 20			1/4-inch weep hole installed in aluminum cover PVC stick-up = 2.97-feet Top of PVC casing elev. = 267.42 feet Survey pin elev. = 264.85 feet Ground surface elev. = 264.5 feet Northing = 877,288.82' Easting = 1,977,547.87'
240 - 25			
235 - 30			
230 - 35			
225			

GEOI_WELLNB 4999-1, J 12/22/10

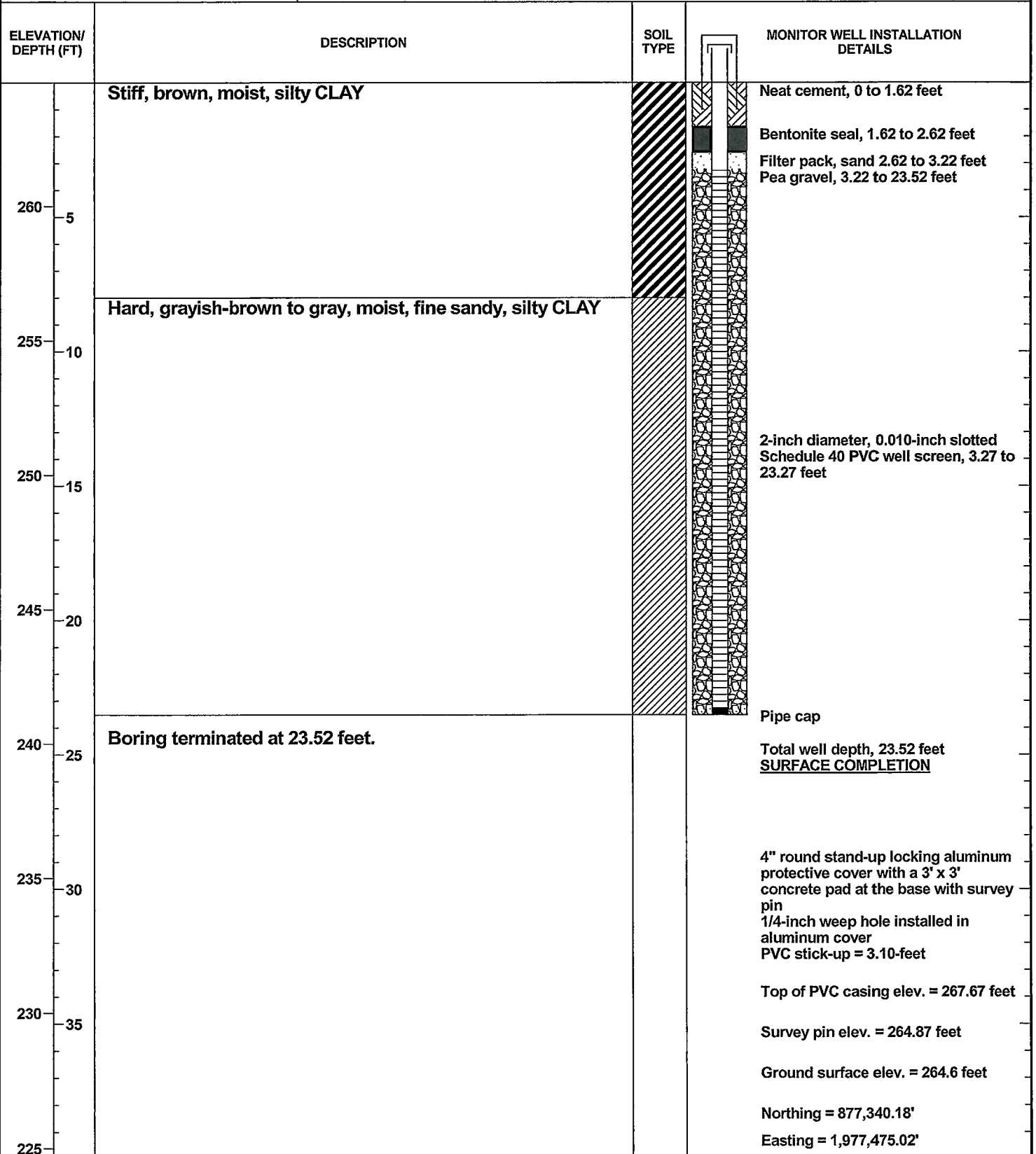


METHANE MONITORING PROBE NO. MM-95

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, R. Banks
DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING:

PROJECT NO.: J09-4999-18
START: 9-8-09 END: 9-8-09
ELEVATION: 264.6
LOGGED BY: M. Preddy/C. Brown



GEOT_WELLNB 4999-1 J 12/22/10





METHANE MONITORING PROBE NO. MM-96

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, R. Banks
DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: ⊗

PROJECT NO.: J09-4999-18
START: 9-3-09 END: 9-3-09
ELEVATION: 264.2
LOGGED BY: M. Preddy/C. Brown

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
260 5	Stiff, brown, slightly moist, silty CLAY		Neat cement, 0 to 1.15 feet
255 10			Bentonite seal, 1.15 to 2.15 feet Filter pack, sand 2.15 to 2.75 feet Pea gravel, 2.75 to 13.25 feet
250 15	Hard, grayish-brown, moist, silty CLAY		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.00 to 13.00 feet
245 20	Boring terminated at 13.25 feet.		Pipe cap
240 25			Total well depth, 13.25 feet
235 30			SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
230 35			1/4-inch weep hole installed in aluminum cover
225			PVC stick-up = 2.90-feet Top of PVC casing elev. = 267.07 feet Survey pin elev. = 264.49 feet Ground surface elev. = 264.2 feet Northing = 877,375.13' Easting = 1,977,374.74'

GEOC_WELLNB 4999-18 J 12/22/10



METHANE MONITORING PROBE NO. MM-97

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
 CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
 DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING>

PROJECT NO.: J09-4999-18
 START: 9-3-09 END: 9-3-09
 ELEVATION: 264.5
 LOGGED BY: M. Preddy/C. Brown

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
260 5	Brown, slightly moist, silty CLAY		Neat cement, 0 to 1.25 feet
255 10			Bentonite seal, 1.25 to 2.25 feet Filter pack, sand 2.25 to 2.85 feet Pea gravel, 2.85 to 23.35 feet
250 15	Hard, grayish-brown, moist, clayey SILT		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.10 to 23.10 feet
245 20			
240 25	Boring terminated at 23.35 feet.		Pipe cap
235 30			Total well depth, 23.35 feet
230 35			SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
225			1/4-inch weep hole installed in aluminum cover
			PVC stick-up = 2.86-feet
			Top of PVC casing elev. = 267.37 feet
			Survey pin elev. = 264.84 feet
			Ground surface elev. = 264.5 feet
			Northing = 877,438.48'
			Easting = 1,977,316.97'

GEO. WELLNB 4999-1, J 12/22/10

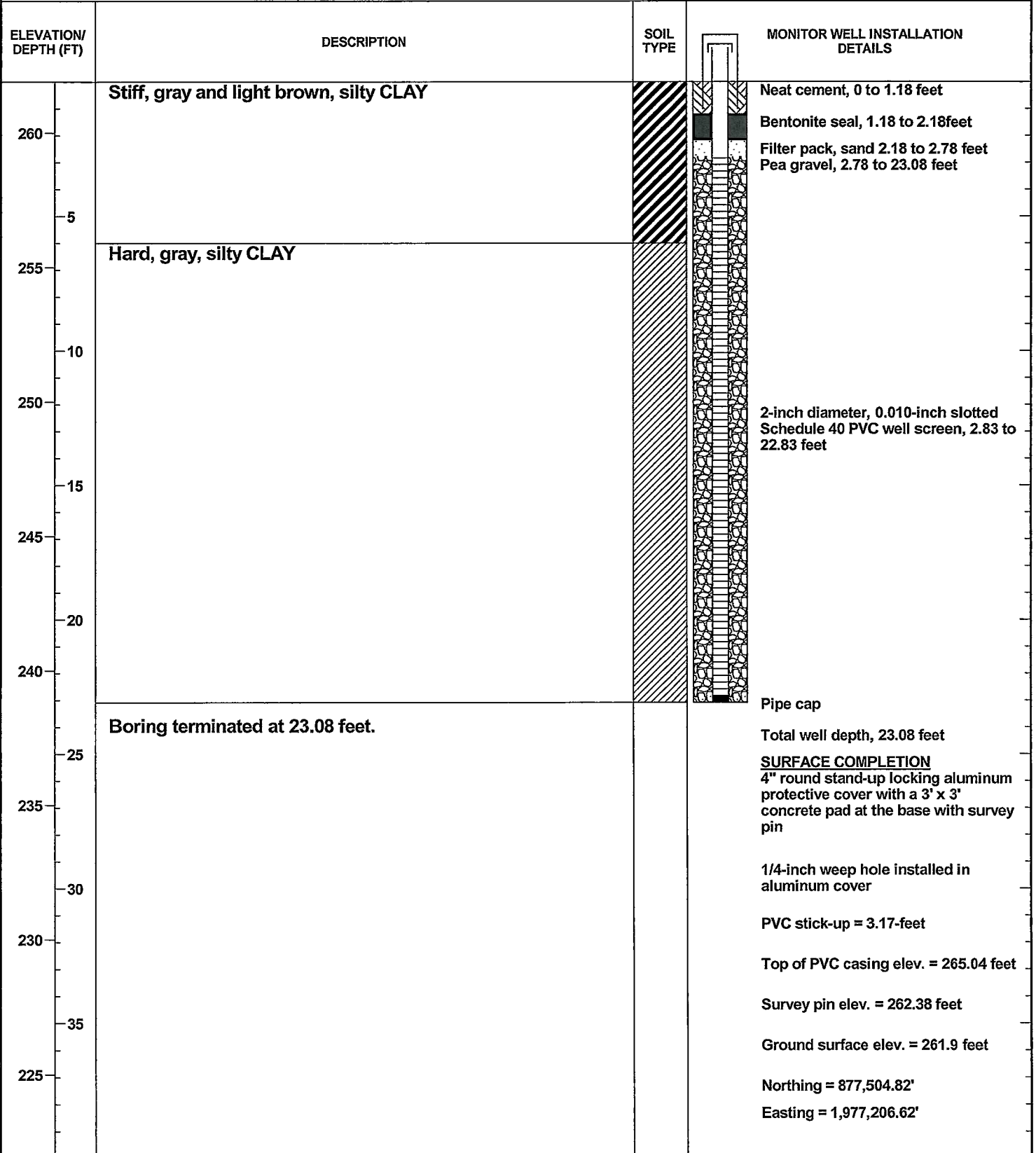


METHANE MONITORING PROBE NO. MM-98

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
 CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: ☒

PROJECT NO.: J09-4999-18
 START: 9-4-09 END: 9-4-09
 ELEVATION: 261.9
 LOGGED BY: M. Preddy/C. Brown



GEOI_WELLNB 4999-1 12/22/10



METHANE MONITORING PROBE NO. MM-99

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
 CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: \otimes

PROJECT NO.: J09-4999-18
 START: 9-9-09 END: 9-9-09
 ELEVATION: 261.3
 LOGGED BY: M. Preddy/C. Brown

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
260	6-inches of TOPSOIL Stiff, brown, silty CLAY		Neat cement, 0 to 1.29 feet Bentonite seal, 1.29 to 2.29 feet Filter pack, sand 2.29 to 2.99 feet Pea gravel, 2.99 to 18.29 feet
255	Hard, gray and light brown, silty CLAY		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.04 to 18.04 feet
250	Hard, gray, slightly fine sandy, silty CLAY		
245	Boring terminated at 18.29 feet.		Pipe cap
240			Total well depth, 18.29 feet
235			SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
230			1/4-inch weep hole installed in aluminum cover
225			PVC stick-up = 3.30-feet
			Top of PVC casing elev. = 264.57 feet
			Survey pin elev. = 261.86 feet
			Ground surface elev. = 261.3 feet
			Northing = 877,541.38'
			Easting = 1,977,131.23'

GEO. WELLNB 4999- J 12/22/10

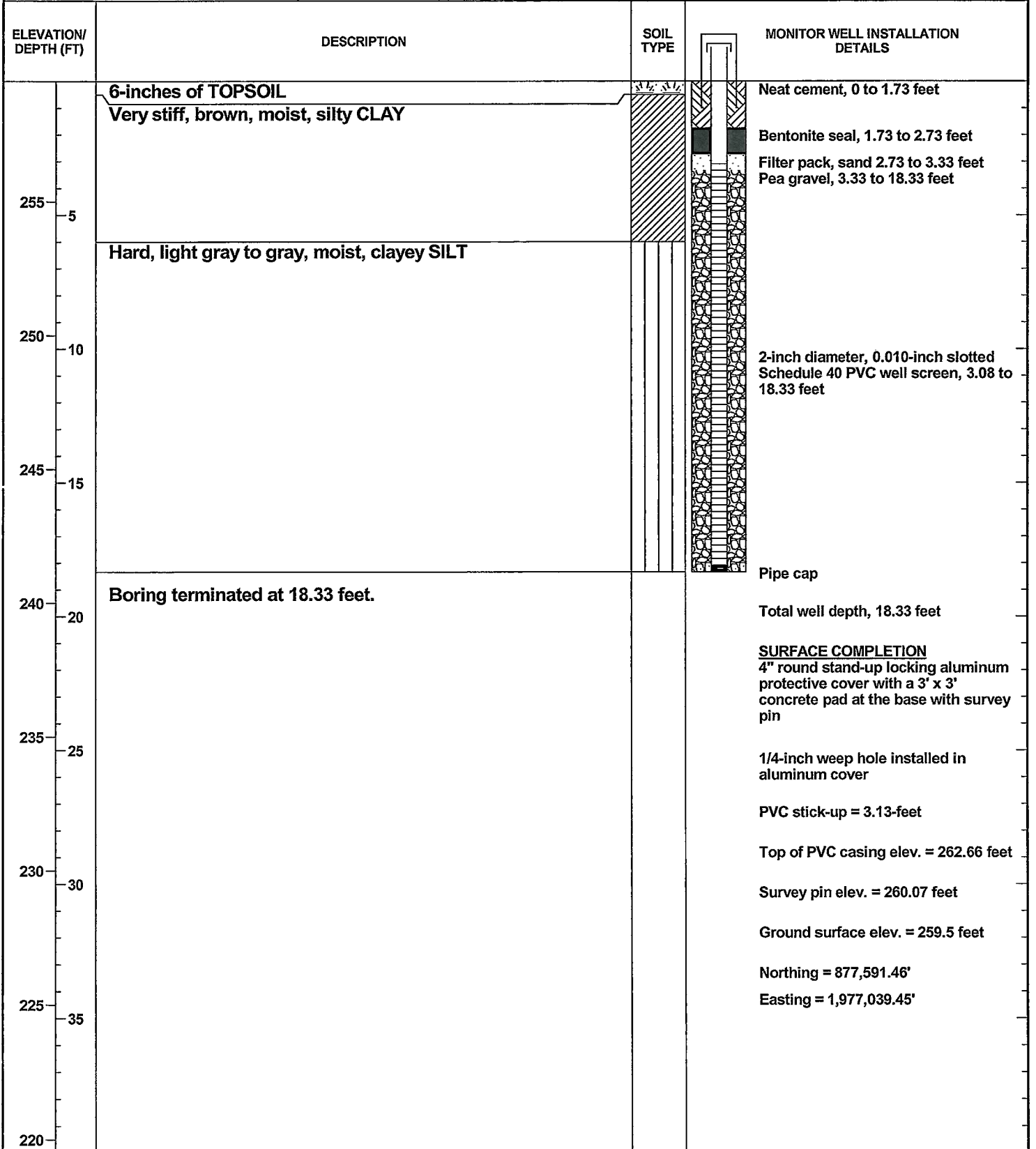


METHANE MONITORING PROBE NO. MM-100

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, R. Banks
DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: \otimes

PROJECT NO.: J09-4999-18
START: 9-10-09 END: 9-10-09
ELEVATION: 259.5
LOGGED BY: M. Preddy/C. Brown



GEOT_WELLNB_4999-1 J 12/22/10

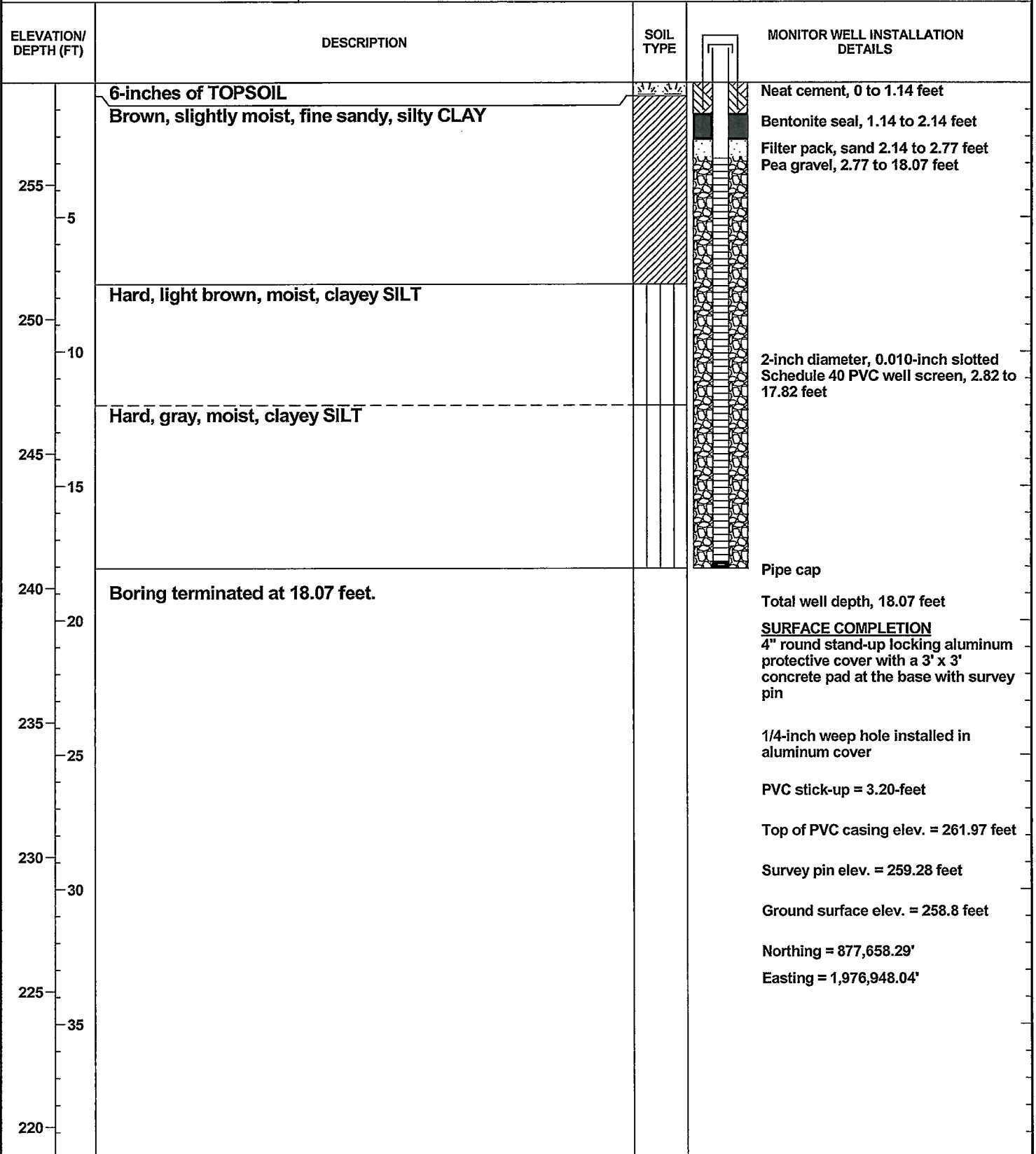


METHANE MONITORING PROBE NO. MM-101

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
 CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
 DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING: \otimes _____

PROJECT NO.: J09-4999-18
 START: 9-10-09 END: 9-10-09
 ELEVATION: 258.8
 LOGGED BY: M. Preddy/C. Brown



GEO_T_WELLNB 4999-. J 12/22/10



METHANE MONITORING PROBE NO. MM-102

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
 CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
 LOCATION: Uniontown, Alabama
 DRILLER: Landprobe, R. Banks
 DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
 DEPTH TO - WATER> INITIAL: ∇ _____ AFTER 24 HOURS: ∇ _____ CAVING> _____

PROJECT NO.: J09-4999-18
 START: 9-10-09 END: 9-10-09
 ELEVATION: 258.3
 LOGGED BY: M. Preddy/C. Brown

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
255 5	6-inches of TOPSOIL Stiff, brown, slightly moist, silty CLAY		Neat cement, 0 to 1.12 feet Bentonite seal, 1.12 to 2.12 feet Filter pack, sand 2.12 to 2.78 feet Pea gravel, 2.78 to 18.01 feet
250 10	Hard, gray, moist, silty CLAY		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 2.76 to 17.76 feet
245 15			
240 20	Boring terminated at 18.01 feet.		Pipe cap Total well depth, 18.01 feet <u>SURFACE COMPLETION</u> 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.15-feet Top of PVC casing elev. = 261.42 feet Survey pin elev. = 258.74 feet Ground surface elev. = 258.3 feet Northing = 877,689.98' Easting = 1,976,892.29'
235 25			
230 30			
225 35			
220			

GEO_T_WELLNB_4999- J 12/22/10



METHANE MONITORING PROBE NO. MM-103

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill
CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.
LOCATION: Uniontown, Alabama
DRILLER: Landprobe, R. Banks
DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING: \otimes

PROJECT NO.: J09-4999-18
START: 9-3-09 END: 9-3-09
ELEVATION: 260.6
LOGGED BY: M. Preddy/C. Brown

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
260	Soft, light brown, moist, fine to medium sandy, clayey SILT		Neat cement, 0 to 1.19 feet Bentonite seal, 1.19 to 2.19 feet Filter pack, sand 2.19 to 2.82 feet Pea gravel, 2.82 to 18.27 feet
255			
250	Hard, gray, moist, clayey SILT		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.02 to 18.02 feet
245	Very hard, gray, slightly moist, clayey SILT		
240	Boring terminated at 18.27 feet.		Pipe cap Total well depth, 18.27 feet SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 3.04-feet Top of PVC casing elev. = 263.68 feet Survey pin elev. = 261.07 feet Ground surface elev. = 260.6 feet Northing = 877,885.56' Easting = 1,976,636.30'
235			
230			
225			

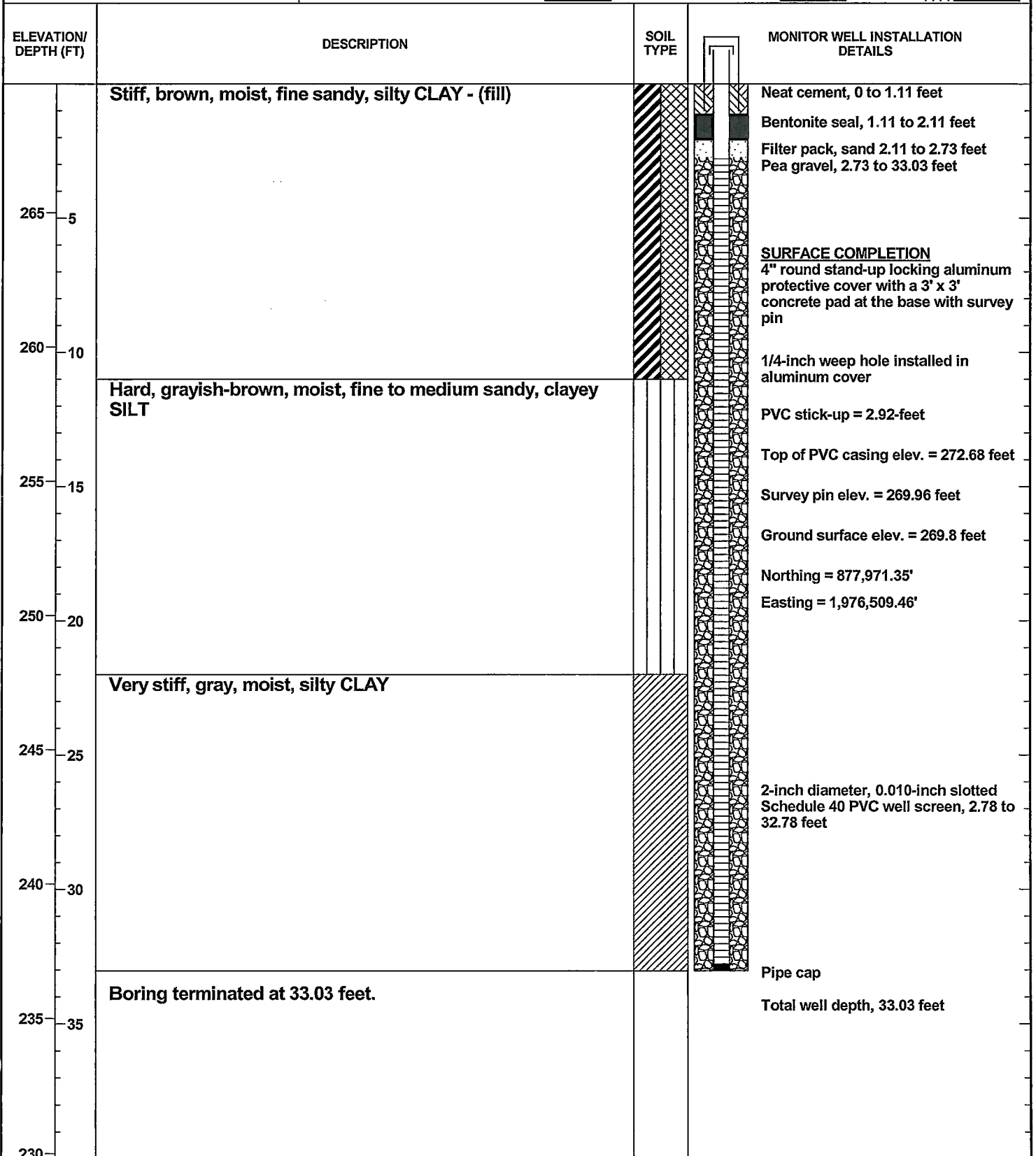
GEOT_WELLNB 4999... 12/22/10



METHANE MONITORING PROBE NO. MM-104

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill PROJECT NO.: J09-4999-18
 CLIENT: Hodges, Harbin, Newberry & Tribble, Inc. START: 9-9-09 END: 9-9-09
 LOCATION: Uniontown, Alabama ELEVATION: 269.8
 DRILLER: Landprobe, R. Banks LOGGED BY: M. Preddy/C. Brown
 DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
 DEPTH TO - WATER> INITIAL: ∇ AFTER 24 HOURS: ∇ CAVING:



GEO. WELLING 4999-1 12/22/10



METHANE MONITORING PROBE NO. MM-105

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill PROJECT NO.: J09-4999-18
 CLIENT: Hodges, Harbin, Newberry & Tribble, Inc. START: 9-8-09 END: 9-8-09
 LOCATION: Uniontown, Alabama ELEVATION: 265.1
 DRILLER: Landprobe, R. Banks LOGGED BY: M. Preddy/C. Brown
 DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger
 DEPTH TO - WATER> INITIAL: AFTER 24 HOURS: CAVING:

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
260-5	Stiff, brown, slightly moist, silty CLAY		Neat cement, 0 to 1.13 feet Bentonite seal, 1.13 to 2.13 feet Filter pack, sand 2.13 to 2.76 feet Pea gravel, 2.76 to 18.28 feet
255-10	Hard, gray, moist, fine sandy, silty CLAY		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 3.03 to 18.03 feet
250-15	Boring terminated at 18.28 feet.		Pipe cap
245-20			Total well depth, 18.28 feet SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin
240-25			1/4-inch weep hole installed in aluminum cover
235-30			PVC stick-up = 3.30-feet Top of PVC casing elev. = 268.39 feet Survey pin elev. = 265.59 feet Ground surface elev. = 265.1 feet
230-35			Northing = 878,223.18' Easting = 1,976,461.19'

GEOLOGICAL WELL NO. 4999-18 J 12/22/10



METHANE MONITORING PROBE NO. MM-106

**BUNNELL-LAMMONS
ENGINEERING, INC.**
GEOTECHNICAL AND ENVIRONMENTAL
CONSULTANTS

PROJECT: Perry Uniontown Landfill

PROJECT NO.: J09-4999-18

CLIENT: Hodges, Harbin, Newberry & Tribble, Inc.

START: 9-9-09 END: 9-9-09

LOCATION: Uniontown, Alabama

ELEVATION: 260.6

DRILLER: Landprobe, R. Banks




LOGGED BY: M. Preddy/C. Brown

DRILLING METHOD: CME 750 ATV; 8-1/4 inch OD hollow stem auger

DEPTH TO - WATER> INITIAL: ▽

AFTER 24 HOURS: ▽

CAVING> ☒

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	MONITOR WELL INSTALLATION DETAILS
260 5 255	Brown, moist, medium sandy, silty CLAY		Neat cement, 0 to 0.93 feet Bentonite seal, 0.93 to 1.93 feet Filter pack, sand 1.93 to 2.55 feet Pea gravel, 2.55 to 18.17 feet
250 10 245 15	Gray, slightly moist, medium sandy, clayey SILT		2-inch diameter, 0.010-inch slotted Schedule 40 PVC well screen, 2.92 to 17.92 feet
240 20 235 25 30 35 225	Boring terminated at 18.17 feet.		Pipe cap Total well depth, 18.17 feet SURFACE COMPLETION 4" round stand-up locking aluminum protective cover with a 3' x 3' concrete pad at the base with survey pin 1/4-inch weep hole installed in aluminum cover PVC stick-up = 2.71-feet Top of PVC casing elev. = 263.29 feet Survey pin elev. = 260.89 feet Ground surface elev. = 260.6 feet Northing = 878,274.67' Easting = 1,976,271.00'

GEO_T_WELLNB 4999- J 12/22/10