# ROYAL OAKS LANDFILL
# CHEROKEE COUNTY, TEXAS
# TCEQ PERMIT NO. MSW-1614B

## MAJOR PERMIT AMENDMENT APPLICATION

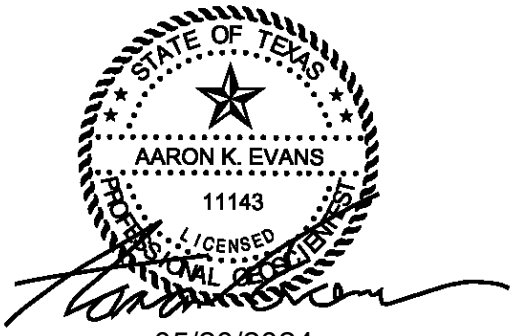
## VOLUME 6 OF 7

Prepared for

Pine Hill Farms Landfill TX, LP

May 2024

Prepared by




05/20/2024

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Project No. 0120-076-11-106

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## VOLUME 6 OF 7

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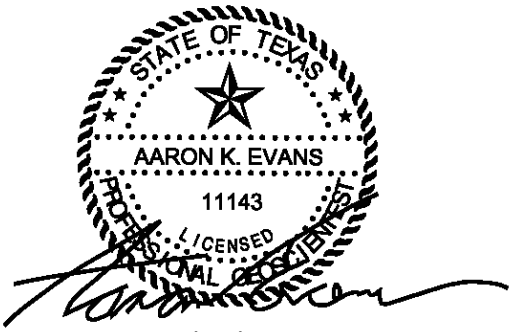


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## PART III – SITE DEVELOPMENT PLAN

## APPENDIX IIIG
## GEOLOGY REPORT

Prepared for

Pine Hill Farms Landfill TX, LP

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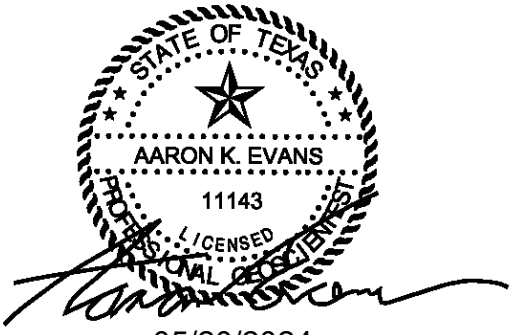


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PROFESSIONAL GEOSCIENTIST
05/20/2024

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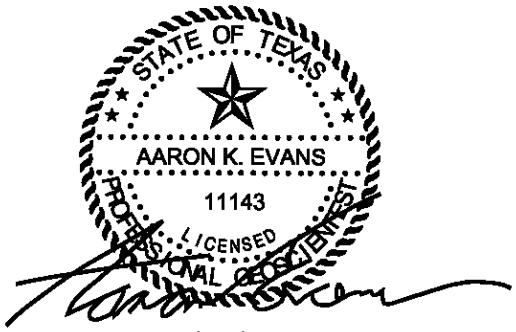


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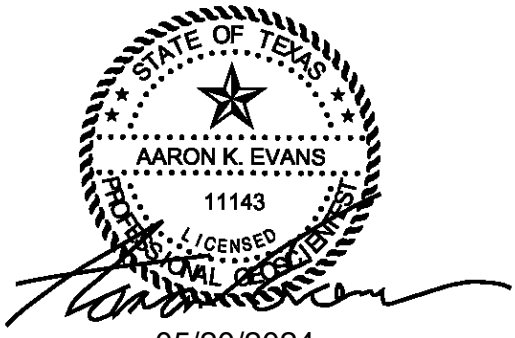


05/20/2024

# GEOLOGY REPORT CERTIFICATION

## Site Information

Site: Royal Oaks Landfill

Site Location: Cherokee County

MSW Permit No.: 1614B

## Qualified Groundwater Scientist Statement

I, Aaron K. Evans, am a Texas-licensed professional geoscientist and a qualified groundwater scientist as defined in Title 30 TAC §330.3(120). I have prepared the Geology Report which constitutes Appendix IIIG of this permit application. In my professional opinion, the Geology Report is in compliance with the requirements specified in Title 30 TAC §§330.63(e). This report has been completed specifically for the Royal Oaks Landfill. The only warranty made by me in connection with this report is that I have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of my profession, practicing in the same or similar locality. No other warranty, expressed or implied, is intended.

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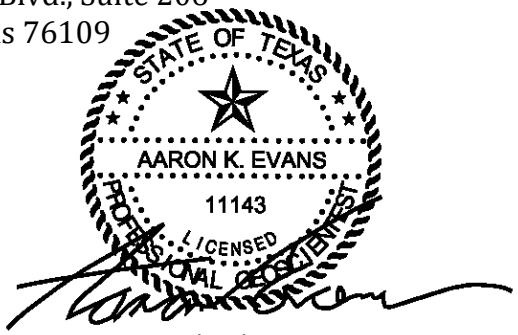
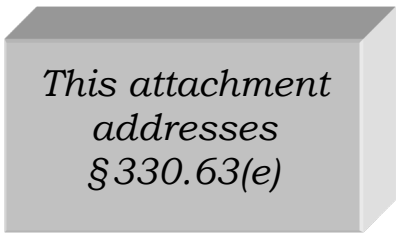



Signature: 05/20/2024

Aaron K. Evans, P.G., Texas License No. 11143

Date: 05/20/2024

# 1 INTRODUCTION




This Geology Report has been prepared for the Royal Oaks Landfill facility pursuant to the lateral landfill expansion in accordance with Texas Commission on Environmental Quality (TCEQ) Municipal Solid Waste (MSW) rules in Title 30 Texas Administrative Code (TAC) §330.63(e). Regional and site-specific geologic and hydrogeologic information are discussed in Section 2 and Section 3 of this report. The supporting regional and site-specific data are provided within the report text and the accompanying Appendices (IIIG-A through IIIG-E).

This Major Permit Amendment application (pursuant to Permit MSW-1614B) proposes an eastward expansion of the currently permitted waste disposal area by approximately 28.6-acres with a proposed expansion area elevation of deepest excavation (EDE) of 504 feet above mean sea level (ft-msl) within the existing permit boundary area. The facility's existing permitted waste disposal footprint area (54.5-acres) and EDE (602 ft-msl) was characterized previously under Permit MSW-1614A. This report extends the subsurface characterization eastward to incorporate the proposed expansion area waste disposal footprint.

# 2 REGIONAL GEOLOGIC/HYDROGEOLOGIC INFORMATION

## 2.1 Regional Physiography and Site Topography

According to the Bureau of Economic Geology (BEG) (BEG, 1996), the Royal Oaks Landfill is located in the Piney Woods portion of the Interior Coastal Plains subdivision of the Gulf Coastal Plains regional physiographic province (Wermund, 1996). The Interior Coastal Plains subdivision is an arcuate, north-south trending belt-shaped area underlain by lower Tertiary age lithologies including the Claiborne, Wilcox, and Midway Groups. The topography of the Interior Coastal Plains is typically alternating belts of sands and shales that erode into long sandy ridges (questas) and valleys with a regional slope towards the Gulf of Mexico.

According to USGS 7.5-minute topographic maps of the landfill area (reference Figure IIIG-A-5 in Appendix IIIG-A), the topography in the landfill vicinity generally slopes from west to east. Site topography is largely controlled drainages to the north and south of the facility which are commensurate with the lowermost elevations at the northeast and southwest extents of the existing undeveloped permit boundary. Prior to development of the landfill facility, the majority of the Site consisted of a topographic lobe extending from the northwest permit boundary with relief on the north, east, and south. This lobe structured feature results from differential erosion by the bounding stream courses. Pre-development, natural ground surface within the permit boundary area ranged from an elevation high of approximately ft-msl at the centermost area of the property to an elevation low of approximately 520 ft-msl at the northeast corner of the property.

## 2.2 Regional Geology

### 2.2.1 Geologic History

Geologic formations in the Site vicinity are comprised of Cenozoic sediments, over eroded Cretaceous strata, deposited under influence of regional episodic sedimentary influxes, subsidence, and eustatic sea level changes that form a gulfward thickening wedge (Grubb, 1997). Cenozoic deposition along ancient continental margin deltas within the East Texas and Houston embayments was later altered by the formation of growth faults and salt domes. (Galloway, 1994). The landfill permit boundary is underlain by the Eocene-age Claiborne Group and Paleocene-age Wilcox and Midway group sediments.

## 2.2.2 Regional Structural Geology

Figure IIIG-A-2 – (Regional Structural Features Map) presents the major regional structural geologic features. The landfill is located within the East Texas Embayment which contains a sequence of Mesozoic-era sediments deposited by northward advancing seas over extensively eroded Paleozoic and Mesozoic strata. A thick sequence of salt was deposited during the Jurassic period, followed by limestones, sandstones, siltstones and muds – all deposited in the ancestral Gulf of Mexico. Rapid subsidence and filling of the embayment by the gulf resulted in a plastic flow of the salt. The flow produced upward migrating salt structures, which caused deformation and minor faulting of overlying sediments.

Based on published information, the salt structure closest to the landfill is the Brooks salt dome (Jackson and Seni, 1984). This structure is about 20 miles northwest of the landfill and is not likely to deform landfill area sediments. In the landfill area, littoral, deltaic and minor marine deposits of Eocene-age sediments have been deposited, as shown on the regional geologic map presented in Figure IIIG-A-1.

## 2.2.3 Regional Stratigraphy

Regional stratigraphy consists of Claiborne Group (Sparta Sand, Weches, Queen City, Reklaw, and Carrizo Sand formations) and Wilcox Group sediments. Stratigraphic positions, general lithologic characteristics, and approximate depths and thicknesses for these groups are presented in Table 2-1 (modified from Mace et al., 2003, Preston et al., 1991, and Texas Water Development Board [TWDB], 1972).

According to the BEG regional geologic map, the landfill is located largely upon outcrops of the Eocene-age Weches and Queen City formations with minor amounts of Sparta Sand Formation outcrop, as shown on Figure IIIG-A-1 (Regional Geologic Map) (adapted from the BEG Geologic Atlas of Texas, Tyler Sheet, 1975, and Palestine Sheet, 1993) and Figure IIIG-A-3 (Regional Geologic Cross Sections) (adapted from TWDB, 1972). The Queen City Formation trends in a southwest to northeast direction from the Frio River in south Texas to the northeast into Louisiana. According to the TWDB, the formation's sediments were deposited in the East Texas structural basin adjacent to the Sabine Uplift, and then dips gently to the south and southeast.

The Sparta Sand and Weches formations are stratigraphically higher (younger) than the Queen City Formation and outcrop within the western majority of the landfill and predominately west of the proposed expansion area (i.e., within the currently permitted landfill footprint). The Queen City Formation outcrops across the easternmost portion of the permit boundary and across the majority of the expansion area. Underlying the Queen City Formation are the Reklaw and Carrizo formations, and the Wilcox Group. The Reklaw Formation is an aquiclude that separates the Queen City Formation from the underlying Carrizo and Wilcox units (Intera, 2004). According to the TWDB, the Reklaw Formation averages about 180 feet thick regionally.

The Sparta, Weches, Queen City and Reklaw formations represent two separate deltaic depositional sequences. The Reklaw is mainly a marine transgressive formation that consists of silts and clays with minor fine sands. The Queen City Formation represents a progradational, high constructive, lobate delta system of sands, silts, and clays. The Weches Formation is comprised largely of glauconitic mud that is generally less than 100 feet thick and representative of a marine transgression. The Sparta Sand Formation was deposited in another progradational, deltaic system consisting of sand with interbedded clay and massive sand bodies reaching up to 300 feet in total thickness in some areas regionally.

Regional geologic cross sections indicate the Tertiary System forms a southward-thickening wedge extending in the subsurface into the Gulf Coastal Plain to the south. Outcrops of Eocene formations generally strike north-northeastward with the regional dip to the east-southeast at less than 100 feet per mile (Preston and Moore, 1991).

# Table 2-1
# Regional Stratigraphy in the Vicinity of the Royal Oaks Landfill

| System | Series | Group | Formation / Unit | Approximate Formation Depth and Thickness (in Feet) | | Lithologic Characteristics |
|---|---|---|---|---|---|---|
| Tertiary | Eocene | Claiborne | Sparta Sand | Depth: | At surface in Site area | Sand, sandstone, with interbeds of clay and lignite, carbonaceous, crossbedded. |
| | | | | Thickness: | 0'-10' in Site area | |
| | | | Weches Formation | Depth: | At surface in Site area | Sand, sandstone, and clay with clay interbeds, crossbedded, with ironstone concretions. |
| | | | | Thickness: | 0'-60' in Site area | |
| | | | Queen City Sand | Depth: | At surface in Site area | Sand, sandstone, clay, lignitic, carbonaceous, crossbedded, with ironstone concretions and ledges. |
| | | | | Thickness: | 400' Regionally | |
| | | | Reklaw Formation | Depth: | 460' in Site area | Sandstone, clay, silty clay, lignitic, crossbedded. |
| | | | | Thickness: | 180' Regionally | |
| | | | Carrizo Sand | Depth: | 640' in Site area | Sandstone and sand, crossbedded. |
| | | | | Thickness: | 100' Regionally | |
| | | Wilcox | Upper Wilcox | Depth: | 740' in Site area | Mudstone, sandstone, clay sand, conglomerate, with lignite and ironstone concretions. |
| | Paleocene | | Middle Wilcox | Thickness: | 1,360' Regionally | |
| | | | Lower Wilcox | | | |
| | | Midway | Undifferentiated | Thickness: | 2,100' Regionally | Clay, silt, sand, mudstone, marl, limestone, grades into overlying Wilcox sediments |

Notes: Modified from Mace et al. (BEG, 2003), Preston et al. (TWDB, 1991), and TWDB Report-150 (TWDB, 1972).
Lithologic characteristics from Barnes et al. (BEG, 1992), Preston et al. (TWDB, 1991) and TWDB Report-150 (TWBD, 1972).

## 2.3 Geologic Processes

### 2.3.1 Fault and Seismic Data

Seismic impact zone and fault investigations are discussed in the location restrictions in Parts I/II, Appendix I/IIC. As discussed in these sections, no geologic processes, including active faults or seismic impact zones, are located within one mile of the Site.

### 2.3.2 Erosional Processes

Erosional processes in the landfill area are limited to those produced by the Royal Oaks drainage system which include rill and channel erosion and sheet flow. Erosion from natural drainage processes is minimal in the vicinity of the Site. No adverse effects from natural erosional processes are anticipated and no mass wasting has been observed.

### 2.3.3 Wetlands Identification

Details regarding jurisdictional wetland areas are provided in the location restriction demonstrations in Appendix I/IIC.

## 2.4 Regional Aquifers

Regional aquifers beneath the landfill include the Eocene-age Queen City and Carrizo aquifers. These aquifers are separated by approximately 180 feet of low permeability Reklaw Formation sediments which function as an aquiclude regionally. The Sparta Sand Aquifer is present at higher elevations and outcrops in minimal areas in the northwestern and southeastern portions of the landfill permit boundary. The low permeability sediments of the Weches Formation underlies the Sparta Sand (where present) and which functions as an aquiclude hydraulically separating the overlying Sparta Sand and underlying Queen City aquifers regionally (TWDB, 2020).

### 2.4.1 Sparta Sand Aquifer

The TWDB classifies the Sparta Sand as a minor Texas aquifer (Ashworth and Hopkins, 1995) composed predominately of crossbedded sand and sandstone with interbedded with clay (Preston et al, 1991 and TWDB., 1972).

The Sparta Sand Formation ranges in thickness from less than 200 feet in south Texas to over 700 feet in down-dip areas of northeast Texas (Harden, et al., 2004). According to the TWDB and regional water well logs, the Sparta Sand Formation is less than 20 feet thick in the vicinity of Royal Oaks Landfill.

According to the TWDB, Sparta Sand groundwater is present under unconfined conditions throughout most of northeast Texas but may be confined in areas of subcrop. According to the BEG, the Sparta Sand is present in limited areas at higher elevation atop ridges and knolls in thin weathered residual layers on the vicinity of Royal Oaks Landfill. Given its limited occurrence in the vicinity of the Site, few water wells are screened in the formation locally. Water wells screened within Sparta Sand in the vicinity of the Site are typically shallow (less than 50 feet deep). The primary source of recharge to the aquifer is precipitation infiltration on the Sparta Sand Formation outcrop and through overlying Quaternary Alluvium sediments (where present). The Sparta Sand Formation outcrop areas are shown on the Figure IIIG-A-1 (Regional Geologic Map) in Appendix IIIG-A.

### 2.4.2 Queen City Aquifer

The Queen City is classified by the TWDB as a minor Texas aquifer composed predominately of sand and loosely cemented sandstone interbedded with clay (TWDB, 2016). Queen City groundwater is present under confined conditions in areas of subcrop and under unconfined conditions in areas of outcrop (TWDB, 1972). The Queen City Aquifer is observed to be as much as 555-feet thick regionally with an approximate thickness of about 400-feet in the Site area (TWDB, 1972). The Queen City sediments were deposited by fluvial, destructive deltaic, and high-constructive lobate delta system depositional environments (BEG, 1975 & 1993 and Zivic et al, 2020). As illustrated in Figure IIIG-A-4 (Regional Aquifer Potentiometric Surface Map) the regional Queen City Aquifer groundwater flow follows the regional dip of the formation toward the south-southeast with a potentiometric head elevation of approximately 450 ft-msl locally. The primary source of recharge to the aquifer is precipitation infiltration on outcrop and through overlying transmissive strata (where present).

Hydraulic properties and groundwater quality in the Queen City Formation is summarized in Table 2-2 (Brown, 1997 and Fryer et al, 2003). According to the TWDB, Queen City Aquifer wells produce small to moderate quantities of fresh water.

### 2.4.3 Carrizo Aquifer

The Carrizo Formation and underlying Wilcox Group constitute the greater Carrizo-Wilcox Aquifer. TWDB classifies the Carrizo-Wilcox Aquifer as a major Texas aquifer. Literary sources on the Carrizo-Wilcox categorize its component geologic and hydrostratigraphic units with varied nomenclature. The Carrizo Formation is interchangeably referred to as the Carrizo Sand, the Carrizo Sand Formation, or hydrostratigraphically referred to as the Carrizo Aquifer or Upper Carrizo-Wilcox Aquifer. According to the TWDB, the Carrizo is composed primarily of cross-bedded, medium-grained sands with lesser interspersed fine-grained sediments (Boghici, 2009). Carrizo Aquifer groundwater is typically present under confined conditions but may be unconfined in areas of outcrop (TWDB, 1972).

The Carrizo Aquifer is observed to be as much as 220 feet thick regionally with an approximate thickness of 100-feet in the Site area (TWDB, 1972). The Carrizo sediments were deposited by fluvial-deltaic depositional environments (BEG, 1975 & 1993 and Zivic et al, 2020). As illustrated in Figure IIIG-A-4 (Regional Aquifer Potentiometric Surface Map), the regional Carrizo Aquifer groundwater flow follows the regional dip of the formation toward the south-southeast with a potentiometric head elevation of approximately 150 ft-msl locally. The primary source of recharge to the aquifer is precipitation infiltration on the outcrop and through overlying Quaternary sediments (where present).

According to Zivic et al (TWDB, 2020), Mace et al. (BEG, 2003), and local water well logs, the bottom elevation of the regional Carrizo-Wilcox Aquifer (bottom of the Wilcox Group) in the vicinity of the Site is about 1,400 to 2,100 feet below ground surface. Hydraulic properties and groundwater quality in the Carrizo Aquifer is summarized in Table 2-2 (Brown, 1997 and Fryar et al, 2003). According to the TWDB, Carrizo Aquifer wells produce small to moderate quantities of fresh to hard water.

## Table 2-2
## Regional Hydraulic Properties and Water Quality Parameters in the Queen City and Carrizo-Wilcox Aquifers[1]

| Hydraulic Properties | Queen City Aquifer | Carrizo Aquifer |
|---|---|---|
| Composition | Sand, siltstone, shale, clay & lignite | Sandstone & siltstone |
| Transmissivity | Average 2,000 – 4,000 gallons/day/foot | Range 2,425 – 18,027 gallons/day/foot |
| Hydraulic Conductivity | Average 8.1 feet per day | Average 13.4 feet per day |
| Flow Rate | 10-20 feet per year | 10-100 feet per year |
| Recharge Zones | On Outcrop | On outcrop (11 miles southeast of landfill) |
| Potentiometric Surface | See Figure IIIG-A-4 | See Figure IIIG-A-4 |
| Present Water Use | Public supply, industrial, irrigation, and domestic | Public supply, domestic, and some industrial |
| Water Wells Within One Mile | See Figure IIIG-A-6 and Table 2-3 | See Figure IIIG-A-6 and Table 2-3 |
| **Water Quality Parameters** | **Queen City Aquifer** | **Carrizo Aquifer** |
| Total Dissolved Solids (mg/l) | 35 – 7,948 | 41 – 6,700 |
| Chloride (mg/l Cl) | 2 – 4,457 | 3 – 4,000 |
| Sodium (mg/l Na) | 1.3 – 2,960 | 2 – 2,362 |
| Bicarbonate (mg/l $HCO_3$) | 0.61 – 1,452 | 0 – 1,610 |
| Sulfate (mg/l $SO_4$) | 1 - 500 | 0 – 1,600 |
| Fluoride (mg/l F) | 0.01 – 3.31 | 0 - 8 |

[1] Modified from Brown (1997) and Fryar et al. (2003).

## 2.5 Water Well Search

A search to identify Texas-registered water wells within a one-mile radius of the landfill permit boundary included a water well search performed by Environmental Risk Information Services (ERIS) in September 2023 for records and maps on file in the USGS National Water Information System (NWIS), Texas Submitted Drillers Report Database (SDRD), TCEQ database, Texas Water Development Board (TWDB) database, and state Water Utility Database (WUD) records. ERIS identified seven water wells within one mile of the landfill permit boundary. Weaver Consultants Group, LLC (WCG) performed an independent water well search which included review of the aforementioned databases, as well as facility records and a field reconnaissance from area roadways. No additional water wells were identified by Site reconnaissance. The ERIS water well report is provided in Appendix IIIG-A. The water well locations are shown on Figure IIIG-A-6. The information for the identified water wells within one mile of the landfill permit boundary is summarized in Table 2-3. In summary, one water well was identified within 200-feet of the permit boundary (TX3462903) and no water wells were identified within the permit boundary.

It is noted that two of the seven water wells identified in ERIS's report (TX3462903 and TX3806301) were identified in TWDB records with total well depths around 5,000-feet below ground surface (ft-bgs) with "Oil or Gas" listed under usage. Further inquiry into TWDB records indicate these two wells are oil/gas wells whose locations also correspond to "dry hole" oil/gas exploration wells in Texas Railroad Commission (RRC) records. As such, these two wells would have been plugged upon completion of drilling. The locations of these wells are shown on Figure IIIG-A-5 (Oil and gas Well Location Map) and IIIG-A-6 (Water Well Location Map) In Appendix IIIG-A. The remaining five wells were verified to be water wells with screening depths ranging from 38 to 442 ft-bgs which are commensurate with Sparta Sand, Queen City, and Carrizo Sand aquifers.

**Table 2-3**
**Registered Water Wells Within One Mile of Royal Oaks Landfill[1]**

| Well Identification Number | Total Well Depth (ft) | Screened Aquifer[2] | Use |
|---|---|---|---|
| TX3462903[3] | 5097 | Not Applicable – Dry Oil/Gas Well | Dry Oil/Gas Well |
| 38-06-3D | 48 | Sparta Sand | Domestic |
| TX3806301[3] | 4959 | Not Applicable – Dry Oil/Gas Well | Dry Oil/Gas Well |
| 269945 | 442 | Carrizo Sand | Domestic |
| 218846 | 80 | Queen City | Irrigation |
| 242701 | 260 | Queen City | Domestic |
| 38-06-3 | 38 | Sparta Sand | Domestic / Irrigation |

Notes: [1] Water well number, depth and use information obtained from digital water well reports.
[2] Water well aquifer designations based on water well log records and lithologic information.
[3] Location misidentified by ERIS as a waterwell, per TWDB and RRC records is a dry gas well.

## 2.6 Site Reconnaissance

WCG completed water well reconnaissance from area roadways during multiple Site visits conducted from June to December 2023. The purpose of the reconnaissance was to identify potential unregistered water wells within a one-mile radius of the landfill permit boundary. WCG also searched for the presence of springs and faults within the publicly accessible area within one mile of the landfill permit boundary. The reconnaissance was limited by viewing obstructions, including vegetation and structures, and private property access restrictions. The reconnaissance included visual observations for the presence of elevated water tanks, wellhead equipment, pressure balance tanks, small outlying structures having electrical power drops, and windmills. Based on the reconnaissance field observations, no new water wells, no springs, and no surface expressions of faulting were identified. According to Brune (2002), there are no active springs identified in the vicinity of the Site.

# 3 SUBSURFACE INVESTIGATION REPORT

## 3.1 Site Stratigraphy

### 3.1.1 Borehole Data

The subsurface characterization of the Site is supported by data from 88 boreholes. The data from these boreholes is summarized in Table 3-1 and their locations are shown on Figure IIIG-B-1 (Borehole Location Map). The individual lithologic logs are provided in Appendix IIIG-B. The boreholes were advanced during 10 drilling events conducted between 1981 and 2023 and are further discussed in Section 3.3.

To illustrate subsurface conditions, seven geologic cross sections were constructed from the available lithologic and hydrogeologic data obtained from the site-specific lithologic logs (provided in Appendix IIIG-B), local water well logs (provided in Appendix IIIG-A), and information contained in prior investigatory reports. These cross sections are presented in Appendix IIIG-C as Figures IIIG-C-2 through IIIG-C-8. A geologic cross section index map is included as Figure IIIG-C-1. Geologic cross sections by Groundwater Technologies in the facility's permit for MSW-1417A are provided in Appendix IIIG-C.

The groundwater elevation data presented on the cross section drawings were obtained from available tabulated water level data in previous subsurface investigation reports (for former groundwater piezometers installed prior to 2023), from the March 1993 groundwater monitoring event (for former monitor wells MW-1 through MW-7), from the December 2009 groundwater monitoring event (for former monitor wells MW-13, MW-14, MW-16, and MW-19), and from gauging conducted by WCG in September 2023 (for the existing monitor wells and 2023 piezometers).

The subsurface investigation data and geologic cross sections indicate that the facility's geology can be divided into five site-specific stratigraphic units (Surficial Sediments, Stratum A, Stratum, B, Stratum C, and Stratum D) with the lowermost four strata comprised of aquifer and aquiclude subunits. The nomenclature for these site-specific stratigraphic units generally corresponds to the unit designations in the permitted subsurface characterization for Permit MSW-1614B. Site-specific strata and substrata designations are listed below with their corresponding former nomenclature listed in parenthesis/italics:

- Surficial Sediments: (*Sparta Sand* and *Clay Overlying Aquifer*),
- Stratum A:

- Stratum A1 - Aquifer A (*Aquifer A*)
- Stratum A2 – Aquiclude A (*Basal Clay A*)

- Stratum B:
  - Stratum B1 - Aquifer B (*Aquifer A*)
  - Stratum B2 – Aquiclude B (*Basal Clay A*)
- Stratum C:
  - Stratum C1 - Aquifer C (*Sediments Below Basal Clay B*)
  - Stratum C2 – Aquiclude C (*Sediments Below Basal Clay B*)
- Stratum D:
  - Stratum D1 - Aquifer D (previously uncharacterized)
  - Stratum D2 – Aquiclude D (previously uncharacterized)

No deviations from the permitted subsurface characterization (Permit MSW-1614A) are needed or proposed under this major permit amendment (pursuant to Permit MSW-1614B). Each site-specific subsurface stratigraphic unit is further discussed in the subsequent sections.

### 3.1.2 Surficial Sediments

At ground surface within the western and southern permit boundary areas lies the Surficial Sediments site-specific stratum which is comprised of Sparta Sand and uppermost Weches Formation sediments. The Surficial Sediments are discontinuous across the permit boundary and have been removed from within the constructed waste disposal footprint. The remaining Surficial Sediments are present within the western and southern permit boundary and the existing developed waste disposal footprint at elevations above 640 ft-msl. The Surficial Sediments do not exist within the eastern half of the permit boundary and proposed expansion area. According to the existing Site exploration data, these sediments exhibit a high degree of compositional heterogeneity with interbedding and abrupt to gradational transitions between predominate material composition, and a predevelopment average thickness of approximately 15 feet.

The uppermost Surficial Sediments are present due to the in-situ weathering of Sparta Sand Formation sediments which are composed predominately of unconsolidated dry to moist sand and silty sand, with lesser proportions of sandy silt, silt, and clayey sand, and ferrous interbedding. These uppermost sediments are present within limited areas of the northwestern and western permit boundary, outside the developed waste disposal footprint, generally above elevation of 660 ft-msl. The lowermost Surficial Sediments are present due to the in-situ weathering of uppermost Weches Formation sediments which are composed predominately of unconsolidated dry to moist glauconitic silty clay, with lesser proportions of sandy clay. Laboratory vertical permeability testing indicate a downward permeability range of $2.6x10^{-8}$ to $3.4x10^{-7}$ cm/sec with an arithmetic mean permeability of $1.4x10^{-7}$ cm/sec for the in-situ samples collected from the lower Weches Formation component of the Surficial Sediments.

### 3.1.3 Stratum A

Beneath the Surficial Sediments lies Stratum A. Stratum A is discontinuous across the permit boundary and is comprised of lower Weches Formation sediments which have been removed from within the constructed waste disposal footprint. The remaining Stratum A sediments are present within the western and southern permit boundary and the existing developed waste disposal footprint at elevations above 610 ft-msl. Stratum A is comprised of substratum A1 and A2. Substratum A1 contains the facility's first monitorable groundwater zone (Aquifer A), which is hydraulically separated from underlying groundwater zones by substratum A2 (Aquiclude A).

Stratum A1 (Aquifer A) is characterized as course-grained moist to wet sediments with an average thickness of approximately 12 feet. Stratum A1 is comprised predominately of loose to poorly consolidated glauconitic sand and silty sand, with lesser sandy silt and silt and ferrous interbedding. Field slug test data from monitor wells screened within Stratum A1 indicate a permeability range of $1.11x10^{-4}$ to $3.52x10^{-3}$ cm/sec with an arithmetic mean permeability of $1.26x10^{-3}$ cm/sec. Stratum A1 (Aquifer A) sediments are underlain by low permeability fine-grained dry to moist clayey sediments of substratum A2 (Aquiclude A).

Stratum A2 (Aquiclude A) is characterized as fine-grained dry to moist sediments that function as the lower confining unit to groundwater within the overlying Aquifer A substratum with an average thickness of approximately 25 feet. Stratum A2 is comprised predominately of loose to poorly consolidated interbedded glauconitic silty clay, clayey silt, and sandy clay, with lesser sandy silt, silty sand, and occasional ironstone nodules and ferrous staining.

### 3.1.4 Stratum B

Beneath Stratum A lies Stratum B. Stratum B is discontinuous across the permit boundary and is comprised of upper Queen City Formation sediments which have been partially removed from within the constructed waste disposal footprint but are continuous beneath the developed landfill unit. Stratum B sediments are present across the majority of the permit boundary but are not observed in the easternmost expansion area footprint and permit boundary area where the existing ground surface elevation drops below an elevation of approximately 570 ft-msl. Stratum B is comprised of substrata B1 and B2. Substratum B1 contains the facility's second monitorable groundwater zone (Aquifer B) which is hydraulically separated from underlying groundwater zones by substratum B2 (Aquiclude B).

Stratum B1 (Aquifer B) is characterized as course-grained moist to wet sediments with an average thickness of approximately 13 feet. Stratum B1 is comprised predominately of loose to poorly consolidated interbedded sand and silty sand, with lesser sandy silt, silt, clayey sand, ironstone nodules, and ferrous staining. Field slug test data from monitor wells screened within Stratum B1 indicate a permeability range of $1.70x10^{-5}$ to $3.97x10^{-4}$ cm/sec with an arithmetic mean permeability of

$2.07x10^{-4}$ cm/sec. Stratum B1 (Aquifer B) sediments are underlain by low permeability fine-grained dry to moist clayey sediments of substratum B2 (Aquiclude B).

Stratum B2 (Aquiclude B) is characterized as fine-grained dry to moist sediments that function as the lower confining unit to groundwater within the overlying Aquifer B substratum with an average thickness of approximately 25 feet. Stratum B2 is comprised predominately of loose to poorly consolidated interbedded glauconitic silty clay, clayey silt, and sandy clay, with lesser sandy silt, silty sand, ironstone nodules, and ferrous staining. Laboratory soil testing indicates a vertical permeability of $7.1x10^{-7}$ cm/sec for an in-situ Stratum B2 aquiclude sample collected from expansion borehole PWCG-6.

### 3.1.5 Stratum C

Beneath Stratum B lies Stratum C. Stratum C is continuous across the permit boundary and is comprised of middle Queen City Formation sediments that are continuous beneath the developed landfill unit and generally observed between elevations of 490 and 590 ft-msl. Stratum C is comprised of substrata C1 and C2. Substratum C1 contains the facility's third monitorable groundwater zone (Aquifer C) which is hydraulically separated from underlying groundwater zones by substratum C2 (Aquiclude C).

Stratum C1 (Aquifer C) is characterized as course-grained moist to wet sediments with an average thickness of approximately 25 feet. Stratum C1 sediments are generally observed around an elevation of 570 ft-msl. Stratum C1 is comprised predominately of loose to very dense sand and silty sand, with, lignite, and lesser silt, sandy silt, sandy clay, ironstone nodules, ironstone concretions, and ferrous staining. Field slug test data from piezometers screened within Stratum C1 indicate an Aquifer C permeability range of $4.43x10^{-4}$ to $8.71x10^{-4}$ cm/sec with an arithmetic mean permeability of $5.95x10^{-4}$ cm/sec. Laboratory soil testing indicates a vertical permeability range of $1.1x10^{-5}$ to $6.1x10^{-5}$ cm/sec with an arithmetic mean vertical permeability of $2.9x10^{-5}$ cm/sec for the in-situ Stratum C1 aquifer samples. Stratum C1 (Aquifer C) sediments are underlain by low permeability fine-grained dry to moist clayey sediments of substratum C2 (Aquiclude C).

Stratum C2 (Aquiclude C) is characterized as interbedded fine-grained dry to moist sediments that function as the lower confining unit to groundwater within the overlying Aquifer C substratum with an average thickness of approximately 46 feet. Stratum C1 sediments are generally observed around an elevation of 555 ft-msl. Stratum C2 is comprised predominately of hard interbedded clay, silty clay, clayey silt, and sandy clay, with lesser lignite, sandy silt, silty sand, ironstone nodules, ironstone concretions, and ferrous staining. Laboratory soil testing indicates a vertical permeability range of $3.1x10^{-8}$ to $2.2x10^{-5}$ cm/sec with an arithmetic mean vertical permeability of $3.0x10^{-6}$ cm/sec for the in-situ Stratum C2 aquiclude samples.

### 3.1.6 Stratum D

Beneath Stratum C lies Stratum D. Stratum D is continuous across the permit boundary and is comprised of lower Queen City Formation sediments that are continuous beneath the permit boundary and generally observed below an elevation of 490 ft-msl. Stratum D is comprised of substrata D1 and D2. Substratum D1 contains the facility's fourth monitorable groundwater zone (Aquifer D) which is hydraulically separated from underlying groundwater zones by substratum D2 (Aquiclude D). Three expansion boreholes (PWCG-1, PWCG-3, and PWCG-7) were advanced to significant depth to penetrate through Stratum D1 and into the underlying Stratum D2 aquiclude. The observations and data from these three deep boreholes were used to determine the total thickness of Stratum D1 (Aquifer D) and delineate Stratum D2 (Aquiclude D) which comprises the Lower Confining Unit beneath the proposed expansion area.

Stratum D1 (Aquifer D) comprises the Uppermost Aquifer beneath the proposed expansion area and is characterized by unconsolidated very dense moist to wet sediments with a total thickness ranging from 48 to 209 feet and average thickness of approximately 122 feet. Stratum D1 is comprised predominately of silty sand and sand with lesser silt, sandy silt, and minor sandstone, lignite, siltstone, sandy clay, silty clay, ironstone nodules, and ironstone concretions. The silt composition of Stratum D1 is largely elastic and very dense. Field slug test data from piezometers screened within Stratum D1 indicate an Aquifer D permeability ranging from $1.53x10^{-5}$ to $1.03x10^{-3}$ cm/sec with an arithmetic mean permeability of $2.34x10^{-4}$ cm/sec. Laboratory soil testing indicates a vertical permeability range of $7.3x10^{-6}$ to $1.4x10^{-5}$ cm/sec with an arithmetic mean vertical permeability of $1.1x10^{-5}$ cm-sec for the in-situ Stratum D1 aquifer samples.

Stratum D1 (Aquifer D) sediments are underlain by low permeability fine-grained dry to moist clayey sediments of substratum D2 (Aquiclude D). Stratum D2 (Aquiclude D) is characterized as interbedded fine-grained dry to moist sediments that function as the Lower Confining Unit to groundwater within the overlying Aquifer D substratum.

Three deep borings were advanced to depths ranging from 9 to 30 feet into Stratum D2 (PWCG-1, PWCG-3, and PWCG-7). The top of Stratum D2 sediments were observed between the elevations of 303 and 339 ft-msl with an uppermost surface dip toward the south-southeast. Stratum D2 is comprised predominately of hard interbedded clay, silty clay, clayey silt, shaley clay, and sandy clay, with lesser sandy silt, silty sand, lignite, and manganese staining. Laboratory soil testing indicates a vertical permeability range of $8.1x10^{-9}$ to $2.3x10^{-7}$ cm/sec with an arithmetic mean vertical permeability of $9.1x10^{-8}$ cm/sec for the in-situ Stratum D2 aquiclude samples. The deepest expansion borehole (PWCG-7) was advanced to a bottom elevation of about 295 ft-msl where it was terminate in hard, dry, shaley clay sediments of Stratum D2 Lower Confining Unit sediments.

## 3.2 Soil Boring Plan

The currently approved subsurface characterization (TCEQ Permit MSW-1614A) utilized the data from 59 soil boreholes to characterize the approximately 54.5-acre waste disposal footprint with a permitted elevation of deepest excavation (EDE) of 602 ft-msl. Since Permit MSW-1614A was issued, an additional 15 boreholes were advanced for the installation of monitor wells and gas probes.

Title 30 TAC §330.63(e)(4)(B) requires that 12 boreholes be advanced to a minimum of five feet below the EDE, of which seven are required to be advanced to a minimum of 30 feet below the EDE pursuant to characterizing a 29.1-acre expansion area. The 2023 Soil Boring Plan proposed the advancement of 11 new geotechnical borings with nine piezometer installations based on a proposed EDE of 530 ft-msl. During the 2023 subsurface investigation, additional drilling was required to penetrate Stratum D1 (Uppermost Aquifer) and identify the aquiclude at the lower boundary (Stratum D2). Three additional boreholes with piezometer installations were also added to characterize Stratum C1 (Aquifer C) groundwater zone. Consequently, the proposed expansion area EDE was adjusted to 504 ft-msl to optimize expansion area utilization.

The geologic and hydrogeological data and information from the 74 previously advanced borings and the additional 14 borings and 12 piezometers installed in 2023 were utilized to assess subsurface conditions within the proposed lateral expansion areas and beneath the facility as a whole pursuant to the development of this Major Permit Amendment (for Permit MSW-1614B).

On February 6, 2023, the facility submitted a Soil Boring Plan to TCEQ pursuant to the proposed TCEQ Permit MSW-1614B landfill expansion. In correspondence dated March 8, 2023, TCEQ provided two comments, regarding subsurface investigation scheduling and Soil Boring Plan figure annotations, for which a response was provided (WCG, April 5, 2023). Soil Boring Plan approval was issued by TCEQ on April 20, 2023. Excerpts from the 2023 Soil Boring Plan are presented in Appendix IIIG-E. The TCEQ Soil Boring Plan approval letter is also presented in Appendix IIIG-E.

## 3.3 Previous Site Exploration Summary

A summary of Site explorations is provided in this section. Information regarding the borings completed at the Site are summarized in Table 3-1. The boring logs are presented in Appendix IIIG-B. The borehole locations and original ground surface elevations are shown on Figure IIIG-B-1. Based on a review of the previous permit applications, geotechnical reports, and lithologic logs, it is our understanding that all previous soil borings were conducted in accordance with established field exploration methods in general accordance with Title 30 TAC §330.63(e)(4)(c).

- A 1981 subsurface investigation by National Soil Services included the advancement of five boreholes (B-1 through B-5).
- A 1982 subsurface investigation by Maxim Engineers included the advancement of 15 boreholes (B-6 through B-20).
- A 1987 drilling project by East Texas Testing Laboratory included the advancement of seven boreholes for the installation of groundwater monitor wells (MW-1 through MW-7).
- A 1993 drilling project by Golder Associates included the advancement of 15 boreholes for the installation of gas monitoring probes (GP-1 through GP-15).
- A 1994 subsurface investigation by Groundwater Technologies included the advancement of 17 boreholes with nine geotechnical boreholes (B-21 through B-29) and eight monitor well installation (MW-8 through MW-15).
- A 2002 drilling project by Weaver Boos and Gordon included the advancement of one borehole for the installation of gas monitoring probe GP-8A.
- A 2003 drilling project by Weaver Boos Consultants included the advancement of eight boreholes for the installation of three groundwater monitor wells (MW-16, MW-17, and MW-19) and five gas monitoring probes (GP-16, GP-17, GP-2-, GP-21, and GP-22).
- A 2009 drilling project by The Carel Corporation included the advancement of five boreholes for the installation of groundwater monitor wells (MW-21 through MW-25).
- A 2017 drilling project by Hydrex Environmental included the advancement of one borehole for the installation of groundwater monitor well MW-20.
- A 2023 subsurface investigation by Weaver Consultants Group included the advancement of 14 boreholes (PWCG-1A, PWCG-1B, PWCG-2, PWCG-3, PWCG-4, PWCG-5, PWCG-6, PWCG-7A, PWCG-7B, PWCG-8, PWCG-9A, PWCG-9B, WCG-10, and WCG-11) and installation of 12 groundwater piezometers (PWCG-1A, PWCG-1B, PWCG-2, PWCG-3, PWCG-4, PWCG-5, PWCG-6, PWCG-7A, PWCG-7B, PWCG-8, PWCG-9A, and PWCG-9B). These boreholes and piezometers were drilled and installed to further characterize subsurface conditions within the eastern lateral expansion area pursuant to this Major Permit Amendment for Permit MSW-1614B.

# Table 3-1
# Summary of Existing Borehole Depths and Elevations

| Borehole Number | Northing (Site Grid) | Easting (Site Grid) | Surface Elevation | Total Depth | Bottom Elevation (ft-msl) | Bottom Depth Above (+) or Below (-) EDE | Tally of Borings 5 Feet or Greater Below EDE | Tally of Borings 30 Feet or Greater Below EDE |
|---|---|---|---|---|---|---|---|---|
| | (Site Grid) | (Site Grid) | (ft-msl) | (ft-bgs) | (ft-msl) | (ft) | | |
| 1981 Boreholes by National Soil Services | | | | | | | | |
| B-1 | 7953.0 | 10833.0 | 670.0 | 20.0 | 650.0 | 146.0 | | |
| B-2 | 8749.0 | 10598.0 | 675.0 | 20.0 | 655.0 | 151.0 | | |
| B-3 | 9572.0 | 10605.0 | 660.0 | 20.0 | 640.0 | 136.0 | | |
| B-4 | 10045.0 | 11738.0 | 595.0 | 40.0 | 555.0 | 51.0 | | |
| B-5 | 10029.0 | 12376.0 | 555.0 | 25.0 | 530.0 | 26.0 | | |
| 1983 Boreholes by Maxim Engineers | | | | | | | | |
| B-6 | 8594.0 | 10257.0 | 680.0 | 20.0 | 660.0 | 156.0 | | |
| B-7 | 7749.0 | 10965.0 | 672.0 | 40.0 | 632.0 | 128.0 | | |
| B-8 | 8053.0 | 10957.0 | 673.0 | 25.0 | 648.0 | 144.0 | | |
| B-9 | 7616.0 | 10550.0 | 635.0 | 25.0 | 610.0 | 106.0 | | |
| B-10 | 8275.0 | 10676.0 | 672.0 | 25.0 | 647.0 | 143.0 | | |
| B-11 | 7990.0 | 10246.0 | 636.0 | 25.0 | 611.0 | 107.0 | | |
| B-12 | 8935.0 | 10758.0 | 664.0 | 25.0 | 639.0 | 135.0 | | |
| B-13 | 8753.0 | 11040.0 | 675.0 | 40.0 | 635.0 | 131.0 | | |
| B-14 | 9518.0 | 11230.0 | 600.0 | 25.0 | 575.0 | 71.0 | | |
| B-15 | 9805.0 | 10880.0 | 675.0 | 25.0 | 650.0 | 146.0 | | |
| B-16 | 9311.0 | 10267.0 | 686.0 | 40.0 | 646.0 | 142.0 | | |
| B-17 | 9670.0 | 12125.0 | 564.0 | 25.0 | 539.0 | 35.0 | | |
| B-18 | 9468.0 | 11860.0 | 568.0 | 25.0 | 543.0 | 39.0 | | |
| B-19 | 8878.0 | 12485.0 | 575.0 | 25.0 | 550.0 | 46.0 | | |
| B-20 | 8822.0 | 11850.0 | 655.0 | 40.0 | 615.0 | 111.0 | | |
| 1987 Boreholes by East Texas Testing Laboratory, Inc. | | | | | | | | |
| MW-1 | 9692.0 | 10252.0 | 660.0 | 20.0 | 640.0 | 136.0 | | |
| MW-2 | 7243.0 | 10074.0 | 620.0 | 30.0 | 590.0 | 86.0 | | |
| MW-3 | 7298.0 | 10616.0 | 620.0 | 30.0 | 590.0 | 86.0 | | |
| MW-4 | 7319.0 | 11022.0 | 620.0 | 30.0 | 590.0 | 86.0 | | |
| MW-5 | 8895.0 | 12647.0 | 570.0 | 60.0 | 510.0 | 6.0 | | |
| MW-6 | 9780.0 | 12647.0 | 580.0 | 55.0 | 525.0 | 21.0 | | |
| MW-7 | 10214.0 | 12641.0 | 530.0 | 90.0 | 440.0 | -64.0 | 1 | 1 |

NOTES: Coordinates and surface elevations obtained from lithologic logs, data forms, site map drawings, or asbuilt survey reports. The proposed EDE for the eastern expansion area is 504 ft-msl.

## Table 3-1 (Continued)
## Summary of Existing Borehole Depths and Elevations

| Borehole Number | Northing (Site Grid) | Easting (Site Grid) | Surface Elevation | Total Depth | Bottom Elevation (ft-msl) | Bottom Depth Above (+) or Below (-) EDE | Tally of Borings 5 Feet or Greater Below EDE | Tally of Borings 30 Feet or Greater Below EDE |
|---|---|---|---|---|---|---|---|---|
| | (Site Grid) | (Site Grid) | (ft-msl) | (ft-bgs) | (ft-msl) | (ft) | | |
| 1987 Boreholes by East Texas Testing Laboratory, Inc. | | | | | | | | |
| GP-1 | 9659.7 | 10013.2 | 685.8 | 15.0 | 670.8 | 166.8 | | |
| GP-2 | 9394.9 | 10018.3 | 685.6 | 15.0 | 670.6 | 166.6 | | |
| GP-3 | 9140.3 | 10018.0 | 685.4 | 15.0 | 670.4 | 166.4 | | |
| GP-4 | 8855.4 | 10024.2 | 682.0 | 25.0 | 657.0 | 153.0 | | |
| GP-5 | 8593.7 | 10036.0 | 674.2 | 25.0 | 649.2 | 145.2 | | |
| GP-6 | 7810.5 | 10054.3 | 613.7 | 10.0 | 603.7 | 99.7 | | |
| GP-7 | 7244.1 | 10750.4 | 612.1 | 10.0 | 602.1 | 98.1 | | |
| GP-8 | 7932.0 | 11087.1 | 665.8 | 25.0 | 640.8 | 136.8 | | |
| GP-9 | 8569.5 | 11334.6 | 660.6 | 10.0 | 650.6 | 146.6 | | |
| GP-10 | 8580.8 | 12387.5 | 597.2 | 10.0 | 587.2 | 83.2 | | |
| GP-11 | 9381.9 | 12683.5 | 538.6 | 10.0 | 528.6 | 24.6 | | |
| GP-12 | 10239.9 | 12062.2 | 568.1 | 10.0 | 558.1 | 54.1 | | |
| GP-13 | 10199.4 | 11009.1 | 676.4 | 10.0 | 666.4 | 162.4 | | |
| GP-14 | 9917.4 | 10516.8 | 664.0 | 10.0 | 654.0 | 150.0 | | |
| GP-15 | 9750.3 | 10188.7 | 683.1 | 10.0 | 673.1 | 169.1 | | |
| 1994 Boreholes by Groundwater Technologies, Inc. | | | | | | | | |
| B-21(CC) | 9692.0 | 10311.0 | 680.0 | 146.0 | 534.0 | 30.0 | | |
| B-22 | 9309.0 | 11099.0 | 651.0 | 115.0 | 536.0 | 32.0 | | |
| B-22 | 8506.0 | 11234.0 | 662.0 | 125.0 | 537.0 | 33.0 | | |
| B-24 | 7864.0 | 11090.0 | 651.0 | 130.0 | 521.0 | 17.0 | | |
| B-25 | 7327.0 | 11010.0 | 624.0 | 56.0 | 568.0 | 64.0 | | |
| B-26 | 7268.0 | 10594.0 | 600.0 | 46.0 | 554.0 | 50.0 | | |
| B-27 | 7209.0 | 10103.0 | 614.0 | 46.0 | 568.0 | 64.0 | | |
| B-28 | 7774.0 | 10056.0 | 612.0 | 79.0 | 533.0 | 29.0 | | |
| B-29 | 9231.0 | 10064.0 | 685.0 | 150.0 | 535.0 | 31.0 | | |
| MW-8 | 9638.41 | 10103.40 | 685.6 | 40.0 | 645.6 | 141.6 | | |
| MW-9 | 9633.67 | 10112.25 | 685.8 | 78.0 | 607.8 | 103.8 | | |
| MW-10 | 8489.50 | 10025.36 | 671.1 | 35.0 | 636.1 | 132.1 | | |
| MW-11 | 8033.94 | 10038.53 | 629.3 | 30.0 | 599.3 | 95.3 | | |
| MW-12 | 7703.13 | 10258.18 | 611.7 | 18.0 | 593.7 | 89.7 | | |
| MW-13 | 7610.00 | 10702.70 | 652.3 | 58.0 | 594.3 | 90.3 | | |
| MW-14 | 8561.00 | 11335.60 | 660.9 | 26.0 | 634.9 | 130.9 | | |
| MW-15 | 8548.93 | 11336.20 | 661.7 | 60.0 | 601.7 | 97.7 | | |
| 2002 Borehole by Weaver Boos and Gordon | | | | | | | | |
| GP-8A | 7754.69 | 10988.41 | 658.6 | 55.0 | 603.6 | 99.6 | | |

NOTES: Coordinates and surface elevations obtained from lithologic logs, data forms, site map drawings, or asbuilt survey reports. The proposed EDE for the eastern expansion area is 504 ft-msl.

## Table 3-1 (Continued)
## Summary of Existing Borehole Depths and Elevations

| Borehole Number | Northing (Site Grid) | Easting (Site Grid) | Surface Elevation | Total Depth | Bottom Elevation (ft-msl) | Bottom Depth Above (+) or Below (-) EDE | Tally of Borings 5 Feet or Greater Below EDE | Tally of Borings 30 Feet or Greater Below EDE |
|---|---|---|---|---|---|---|---|---|
| | (Site Grid) | (Site Grid) | (ft-msl) | (ft-bgs) | (ft-msl) | (ft) | | |
| 2003 Boreholes by Weaver Boos Consultants | | | | | | | | |
| GP-16 | 9692.56 | 10074.54 | 687.9 | 70.0 | 617.9 | 113.9 | | |
| GP-17 | 8822.17 | 10037.12 | 684.3 | 66.0 | 618.3 | 114.3 | | |
| GP-20 | 8589.77 | 11321.29 | 664.8 | 50.0 | 614.8 | 110.8 | | |
| GP-21 | 10207.33 | 11020.53 | 678.1 | 59.0 | 619.1 | 115.1 | | |
| GP-22 | 9915.42 | 10494.19 | 669.2 | 55.0 | 614.2 | 110.2 | | |
| MW-16 | 10203.24 | 11227.56 | 641.1 | 18.0 | 623.1 | 119.1 | | |
| MW-17 | 10212.22 | 11223.16 | 643.4 | 38.0 | 605.4 | 101.4 | | |
| MW-19 | 8817.83 | 11819.77 | 625.7 | 69.0 | 556.7 | 52.7 | | |
| 2009 Boreholes by The Carel Corporation | | | | | | | | |
| MW-21 | 9047.40 | 11537.02 | 630.4 | 31.0 | 599.4 | 95.4 | | |
| MW-22 | 9081.10 | 10037.74 | 686.5 | 39.0 | 647.5 | 143.5 | | |
| MW-23 | 7987.36 | 11302.70 | 655.3 | 55.0 | 600.3 | 96.3 | | |
| MW-24 | 7826.06 | 10807.39 | 657.7 | 69.0 | 588.7 | 84.7 | | |
| MW-25 | 8261.66 | 11332.44 | 663.2 | 35.0 | 628.2 | 124.2 | | |
| 2017 Borehole by Hydrex Environmental, Inc. | | | | | | | | |
| MW-20 | 9773.45 | 11401.79 | 633.3 | 30.0 | 603.3 | 99.3 | | |
| 2023 Boreholes by Weaver Consultants Group | | | | | | | | |
| PWCG-1A | 10234.91 | 11507.95 | 618.3 | 310.0 | 308.3 | -195.7 | 2 | 2 |
| PWCG-1B | 10234.66 | 11485.41 | 620.2 | 48.0 | 572.2 | 68.2 | | |
| PWCG-2 | 10240.83 | 12092.70 | 564.8 | 141.5 | 423.3 | -80.7 | 3 | 3 |
| PWCG-3 | 9694.54 | 12703.27 | 549.9 | 240.0 | 309.9 | -194.1 | 4 | 4 |
| PWCG-4 | 9117.84 | 12699.05 | 554.9 | 136.5 | 418.4 | -85.6 | 5 | 5 |
| PWCG-5 | 8600.43 | 12548.53 | 587.7 | 170.0 | 417.7 | -86.3 | 6 | 6 |
| PWCG-6 | 8550.74 | 11964.53 | 632.9 | 215.0 | 417.9 | -86.1 | 7 | 7 |
| PWCG-7A | 8579.67 | 11370.10 | 656.9 | 362.0 | 294.9 | -209.1 | 8 | 8 |
| PWCG-7B | 8593.43 | 11369.24 | 656.1 | 115.0 | 541.1 | 37.1 | | |
| PWCG-8 | 7704.53 | 10079.08 | 609.4 | 200.0 | 409.4 | -94.6 | 9 | 9 |
| PWCG-9A | 9761.40 | 10221.82 | 681.7 | 242.0 | 439.7 | -64.3 | 10 | 10 |
| PWCG-9B | 9752.08 | 10225.50 | 682.3 | 125.0 | 557.3 | 53.3 | | |
| WCG-10 | 9456.67 | 11472.02 | 632.2 | 166.5 | 465.7 | -38.3 | 11 | 11 |
| WCG-11 | 9484.83 | 12036.77 | 576.6 | 109.0 | 467.6 | -36.4 | 12 | 12 |

NOTES: Coordinates and surface elevations obtained from lithologic logs, data forms, site map drawings, or asbuilt survey reports. The proposed EDE for the eastern expansion area is 504 ft-msl.

# 4 GROUNDWATER INVESTIGATION REPORT

## 4.1 Water Level Measurements

Groundwater is present within four distinct site-specific aquifers (Aquifer A, Aquifer B, Aquifer C, and Aquifer D). Groundwater at the facility has been evaluated using historical water-level data from the facility's former (pre-2023) and existing groundwater monitor wells and piezometers, which are mostly screened within Aquifer A and Aquifer B sediments.

Groundwater elevations from the currently approved Subtitle D groundwater monitor wells are provided in Table 4-1 and were measured during monitoring events dating back to March of 1995. These data were obtained from the facility's Subtitle D groundwater database, which is maintained by Hydrex Environmental, Inc. (Hydrex). In addition, Weaver Consultants Group began conducting monthly water level readings from the facility's existing groundwater monitor wells and 12 newly installed groundwater piezometers in August 2023, which are summarized in Table 4-2.

Groundwater potentiometric surface contour maps prepared from the 2023 WCG water level data are presented on Figures IIIG-D-2A through IIIG-D-2H (for site-specific aquifers A and B) and IIIG-D-3A through IIIG-D-3H (for site-specific aquifer C and D) in Appendix IIIG-D. The groundwater contour maps indicate a groundwater flow regime for Aquifer A and Aquifer B that is consistent with those depicted historically for the facility. Site-specific aquifers, groundwater flow regimes, and groundwater monitoring system design, is further discussed in Appendix IIIH of the SDP.

Historical water level data from the facility's former monitor wells was tabulated by Golder Associates in the facility's Permit MSW-1614A is provided in Appendix IIIG-D.

## Table 4-1
## Subtitle D Monitoring Event Groundwater Elevations

| Date | MW-8 | MW-9 | MW-10 | MW-11 | MW-12 | MW-13 | MW-14 | MW-15 | MW-16 | MW-17 | MW-19 | MW-20 | MW-21 | MW-22 | MW-23 | MW-24 | MW-25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/29/95 | 671.73 | 634.07 | 654.20 | 612.35 | 607.57 | 611.51 | 647.19 | 619.05 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 06/29/95 | 670.66 | 632.35 | 654.21 | 611.63 | 607.00 | 610.69 | 647.18 | 616.78 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 10/12/95 | 667.12 | 629.82 | 651.22 | 609.98 | 606.53 | 608.19 | 646.42 | 614.23 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 12/11/95 | 666.36 | 629.57 | 650.52 | 610.10 | 606.46 | 608.17 | 646.00 | 613.35 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 03/28/96 | 666.51 | 629.72 | 650.12 | 610.46 | 606.70 | 608.44 | 645.82 | 613.64 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 06/26/96 | 667.19 | 629.32 | 650.01 | 610.06 | 606.61 | 607.96 | 645.99 | 613.38 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 09/25/96 | 668.58 | 629.62 | 651.55 | 610.52 | 607.22 | 608.14 | 646.30 | 613.48 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 12/11/96 | 670.47 | 630.55 | 653.23 | 611.20 | 607.40 | 608.73 | 646.87 | 615.20 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 05/23/97 | 670.63 | 632.49 | 653.75 | 610.61 | 606.60 | 605.65 | 648.11 | 617.76 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 12/10/97 | 671.73 | 630.99 | 653.26 | 610.61 | 606.84 | 605.09 | 647.68 | 615.86 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 05/29/98 | 667.56 | 630.77 | 652.17 | 610.24 | 605.92 | 605.07 | 647.04 | 615.74 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 12/15/98 | 674.44 | 631.90 | 656.32 | 612.13 | 607.65 | 605.67 | 645.27 | 618.31 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 06/03/99 | 668.61 | 631.62 | 653.02 | 610.66 | 606.28 | 605.75 | 644.28 | 616.87 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 12/16/99 | 667.95 | 629.43 | 650.48 | 609.46 | 605.75 | 604.95 | 643.36 | 612.96 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 06/02/00 | 671.41 | 631.11 | 654.51 | 611.13 | 606.83 | 605.33 | 643.51 | 616.51 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 12/11/00 | 672.51 | 631.26 | 655.91 | 611.59 | 607.02 | 605.40 | 644.93 | 616.45 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 06/19/01 | 675.25 | 634.18 | 657.31 | 613.15 | 608.21 | 606.83 | 646.09 | 619.96 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 08/23/01 | NM | NM | NM | NM | 606.14 | 606.16 | 645.18 | NM | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 12/11/01 | 669.44 | 631.66 | 653.69 | 611.26 | 606.50 | 605.58 | 645.81 | 617.24 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 03/26/02 | NM | NM | NM | NM | 606.33 | 606.25 | 646.21 | NM | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 06/18/02 | 667.55 | 631.11 | 652.71 | 610.18 | 605.49 | 605.73 | 645.77 | 615.75 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 09/24/02 | NM | NM | NM | 609.33 | NM | 605.27 | NM | NM | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 10/10/02 | NM | NM | NM | NM | NM | NM | 646.50 | NM | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 12/12/02 | 670.93 | 630.87 | 653.71 | 608.92 | 604.49 | 604.05 | 646.84 | 615.33 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 03/11/03 | NM | NM | 655.68 | NM | NM | NM | 646.94 | NM | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 06/30/03 | 667.53 | 630.58 | 652.79 | 610.08 | 605.52 | 605.83 | 645.38 | 615.31 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 12/10/03 | 666.92 | 629.91 | 651.74 | 609.61 | 605.31 | 605.06 | 645.14 | 614.33 | NM | 621.55 | 575.28 | NA | NA | NA | NA | NA | NA |
| 03/10/04 | NM | NM | NM | NM | NM | NM | NM | NM | NM | 623.15 | 577.86 | NA | NA | NA | NA | NA | NA |
| 06/21/04 | 667.06 | 630.11 | 651.80 | 609.56 | 606.14 | 606.30 | 646.00 | 617.17 | NM | 621.01 | 579.13 | NA | NA | NA | NA | NA | NA |
| 09/29/04 | NM | NM | NM | NM | NM | 606.87 | NM | NM | NM | 617.99 | 577.88 | NA | NA | NA | NA | NA | NA |
| 12/07/04 | 671.93 | 631.41 | 653.95 | 609.23 | 605.51 | 605.99 | 645.52 | 617.11 | NM | 620.48 | 581.34 | NA | NA | NA | NA | NA | NA |
| 03/22/05 | NM | NM | NM | NM | NM | NM | NM | NM | 611.70 | 625.19 | 580.21 | NA | NA | NA | NA | NA | NA |
| 06/16/05 | 667.03 | 630.60 | 651.97 | 609.92 | 604.93 | 605.89 | 645.12 | 616.58 | 608.38 | 622.93 | 578.52 | NA | NA | NA | NA | NA | NA |
| 09/07/05 | NM | NM | NM | NM | NM | 605.51 | NM | 614.31 | NM | 621.89 | 576.91 | NA | NA | NA | NA | NA | NA |
| 12/19/05 | 665.70 | 629.02 | 649.89 | 609.04 | 604.34 | 606.25 | 643.88 | 613.12 | 608.14 | 621.09 | 575.44 | NA | NA | NA | NA | NA | NA |
| 03/21/06 | NM | NM | NM | 610.03 | NM | 605.24 | NM | NM | NM | NM | NM | NA | NA | NA | NA | NA | NA |
| 06/13/06 | 667.60 | 629.73 | 651.47 | 609.45 | 604.95 | 605.15 | 645.19 | 614.40 | NM | 621.18 | 576.27 | NA | NA | NA | NA | NA | NA |
| 12/05/06 | 667.46 | 629.21 | 650.79 | 609.48 | 604.47 | 604.75 | 644.39 | 613.66 | NM | 620.28 | 575.21 | NA | NA | NA | NA | NA | NA |
| 02/20/07 | NM | NM | NM | NM | 606.13 | NM | 645.98 | 617.18 | NM | NM | NM | NA | NA | NA | NA | NA | NA |
| 03/12/07 | 669.29 | 630.71 | 653.43 | 610.62 | 605.85 | 605.78 | 645.97 | 616.23 | NM | 622.15 | 577.31 | NA | NA | NA | NA | NA | NA |

NOTES: Groundwater elevations listed in feet above mean sea level.
NM = Not Measured.
NA = Not Applicable; well not installed or plugged.

## Table 4-1
## Subtitle D Monitoring Event Groundwater Elevations (continued)

| Date | MW-8 | MW-9 | MW-10 | MW-11 | MW-12 | MW-13 | MW-14 | MW-15 | MW-16 | MW-17 | MW-19 | MW-20 | MW-21 | MW-22 | MW-23 | MW-24 | MW-25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06/21/07 | 671.17 | 631.62 | 653.98 | 611.23 | 605.96 | 606.15 | 646.56 | 617.38 | NM | 623.49 | 578.57 | NA | NA | NA | NA | NA | NA |
| 09/17/07 | 668.93 | 631.89 | 653.64 | 610.45 | 605.51 | 606.17 | 646.62 | 616.61 | NM | 624.63 | 579.10 | NA | NA | NA | NA | NA | NA |
| 10/23/07 | NM | NM | NM | NM | 605.33 | NM | NM | NM | NM | NM | 577.82 | NA | NA | NA | NA | NA | NA |
| 12/06/07 | 667.74 | 630.60 | 651.19 | 609.86 | 605.23 | 604.06 | 646.13 | 614.76 | NM | 622.44 | 577.62 | NA | NA | NA | NA | NA | NA |
| 02/21/08 | NM | NM | NM | 610.81 | 606.19 | NM | 646.08 | 615.70 | NM | NM | 578.29 | NA | NA | NA | NA | NA | NA |
| 06/12/08 | 667.58 | 630.89 | 652.43 | 610.20 | 605.40 | 605.12 | 646.44 | 615.85 | NM | 622.82 | 578.31 | NA | NA | NA | NA | NA | NA |
| 08/28/08 | NM | NM | 652.53 | 610.32 | 605.40 | 605.15 | 646.52 | 616.00 | NM | NM | 578.49 | NA | NA | NA | NA | NA | NA |
| 12/11/08 | 668.03 | 630.14 | 652.13 | 610.01 | 605.60 | 605.75 | 646.01 | 614.69 | NM | 621.77 | 576.86 | NA | NA | NA | NA | NA | NA |
| 02/12/09 | NM | NM | NM | NM | 605.25 | 605.68 | NM | NM | NM | NM | NM | NA | NA | NA | NA | NA | NA |
| 06/02/09 | 667.72 | 667.27 | 652.59 | 610.42 | 605.42 | 606.20 | 646.34 | 615.84 | NM | 622.28 | 577.68 | NA | NA | NA | NA | NA | NA |
| 09/28/09 | 668.22 | 609.64 | 653.10 | NM | 605.54 | NM | NM | 613.97 | NM | 619.64 | NM | NA | 603.01 | 666.35 | 619.57 | 610.76 | 634.22 |
| 12/07/09 | 668.80 | 631.18 | 653.74 | 610.96 | 605.85 | 606.41 | 646.89 | 614.18 | 623.03 | 621.89 | 577.07 | NA | 607.04 | 665.42 | 620.65 | 609.63 | 641.12 |
| 03/09/10 | 671.55 | 632.69 | 654.98 | NM | 606.65 | NM | NM | 618.56 | NM | 624.27 | NM | NA | 607.70 | 667.71 | 623.09 | 610.01 | 641.88 |
| 06/08/10 | 667.11 | 630.19 | 622.13 | 610.00 | 605.02 | 606.23 | 646.23 | 615.46 | NM | 621.81 | 578.02 | NA | 606.09 | 664.06 | 617.47 | 608.42 | 640.63 |
| 08/30/10 | 666.75 | 629.65 | 651.56 | 609.47 | 604.23 | NM | NM | 614.33 | NM | 616.17 | NM | NA | 606.04 | 662.99 | 616.12 | 606.86 | 639.51 |
| 12/15/10 | 666.09 | 629.35 | 650.96 | 609.74 | 604.84 | 606.11 | 644.33 | 613.90 | NM | 620.74 | 575.70 | NA | 605.79 | 661.90 | 615.10 | 607.83 | 639.42 |
| 03/24/11 | 678.73 | 629.74 | 651.83 | NM | 605.51 | NM | 645.14 | 614.32 | NM | 620.78 | NM | NA | 605.75 | 662.77 | 616.91 | 608.20 | 639.43 |
| 06/16/11 | 666.07 | 628.72 | 650.36 | 609.19 | NM | 605.72 | 644.87 | 613.39 | NM | 619.96 | 575.01 | NA | 605.36 | 667.34 | 614.66 | 607.43 | 638.74 |
| 09/19/11 | NM | NM | NM | NM | 603.72 | NM | NM | NM | NM | NM | NM | NA | NM | 660.48 | 613.46 | 606.53 | NM |
| 12/07/11 | 666.87 | 628.39 | 649.26 | NM | 604.65 | NM | NM | 612.32 | NM | 619.25 | NM | NA | 605.01 | 660.22 | 613.18 | 606.51 | 637.95 |
| 03/21/12 | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NA | 607.41 | NM | NM | NM | NM |
| 06/18/12 | 668.43 | 630.13 | 603.15 | 610.48 | 636.52 | NM | NM | 615.23 | NM | 621.84 | NM | NA | 606.39 | 664.75 | 617.41 | 608.70 | 640.88 |
| 09/11/12 | NM | NM | NM | NM | 605.47 | NM | NM | NM | NM | NM | NM | NA | 605.75 | 664.27 | NM | 607.73 | NM |
| 12/03/12 | 665.43 | 628.48 | 650.53 | 601.27 | 640.20 | NM | NM | 613.11 | NM | 620.09 | NM | NA | 604.96 | 662.07 | 615.06 | 607.12 | 639.04 |
| 06/11/13 | 667.19 | 629.69 | 652.20 | 610.26 | 605.48 | NM | NM | 614.53 | NM | 620.94 | NM | NA | 605.84 | 663.44 | 616.14 | 608.23 | 640.14 |
| 09/26/13 | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NM | NA | NM | 662.11 | NM | NM | 639.68 |
| 12/03/13 | 672.96 | 630.87 | 656.29 | 611.76 | 606.72 | NA | NA | 616.81 | NA | 622.18 | NA | NA | 607.69 | 668.20 | 623.19 | 609.42 | 641.97 |
| 02/24/14 | NM | NM | 653.73 | NM | NM | NA | NA | NM | NA | NM | NA | NA | NM | NM | NM | NM | 641.75 |
| 06/02/14 | 649.47 | 631.17 | 654.34 | NM | 606.29 | NA | NA | 614.63 | NA | 622.89 | NA | NA | 607.13 | 660.85 | 620.58 | 609.65 | 641.74 |
| 08/26/14 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | NA | NM | 664.47 | NM | NM | NM |
| 10/02/14 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | NA | NM | 663.67 | NM | NM | NM |
| 12/01/14 | 647.46 | 629.64 | 653.08 | NM | 605.76 | NA | NA | 614.61 | NA | 620.40 | NA | NA | 606.34 | 663.10 | 618.09 | 608.50 | 640.94 |
| 02/12/15 | NM | NM | 654.21 | NM | 605.69 | NA | NA | NM | NA | NM | NA | NA | NM | NM | 620.69 | NM | NM |
| 06/02/15 | 654.88 | 634.39 | 657.06 | NM | 607.01 | NA | NA | 619.53 | NA | 627.12 | NA | NA | 608.44 | 671.00 | 625.09 | 611.39 | 643.91 |
| 12/07/15 | 650.86 | 630.59 | 654.95 | NM | 606.84 | NA | NA | 616.91 | NA | 622.07 | NA | NA | 607.29 | 666.23 | 622.57 | 609.68 | 642.14 |
| 02/24/16 | NM | NM | 654.61 | NM | NM | NA | NA | NM | NA | NM | NA | NA | 606.84 | 666.00 | NM | NM | NM |
| 06/20/16 | 652.21 | 633.37 | 656.12 | NM | 604.79 | NA | NA | 618.76 | NA | 626.49 | NA | NA | 608.06 | 669.30 | 623.47 | 610.88 | 643.31 |
| 09/07/16 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | NA | 607.00 | NM | NM | NM | NM |
| 12/06/16 | 647.71 | 630.05 | 653.37 | NM | 597.66 | NA | NA | 614.96 | NA | 622.02 | NA | NA | 606.69 | 663.45 | 619.54 | 608.78 | 641.49 |
| 02/13/17 | NM | NM | NM | NM | 605.76 | NA | NA | NM | NA | NM | NA | NA | NM | NM | NM | NM | NM |

NOTES: Groundwater elevations listed in feet above mean sea level.
NM = Not Measured.
NA = Not Applicable; well not installed or plugged.

## Table 4-1
## Subtitle D Monitoring Event Groundwater Elevations (continued)

| Date | MW-8 | MW-9 | MW-10 | MW-11 | MW-12 | MW-13 | MW-14 | MW-15 | MW-16 | MW-17 | MW-19 | MW-20 | MW-21 | MW-22 | MW-23 | MW-24 | MW-25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06/20/17 | 649.51 | 630.19 | 618.76 | NM | 605.61 | NA | NA | 616.41 | NA | 622.37 | NA | NA | 606.99 | 667.30 | 620.09 | 609.08 | 614.84 |
| 09/06/17 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | 608.91 | NM | 665.60 | NM | NM | NM |
| 12/11/17 | 666.26 | 629.41 | 651.61 | 609.58 | 605.01 | NA | NA | 613.81 | NA | 620.32 | NA | 608.81 | 605.76 | 663.07 | 615.81 | 607.98 | 640.49 |
| 03/07/18 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | 610.01 | NM | NM | NM | NM | NM |
| 05/29/18 | 667.96 | 631.04 | 653.56 | 610.76 | 605.51 | NA | NA | 616.21 | NA | 621.87 | NA | 610.49 | 606.49 | 665.25 | 619.34 | 609.43 | 641.97 |
| 07/25/18 | NM | NM | NM | NM | NM | NA | NA | NM | NA | 620.12 | NA | NM | NM | 663.20 | NM | NM | NM |
| 09/12/18 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | 609.10 | NM | NM | NM | NM | NM |
| 12/12/18 | 673.92 | 631.94 | 657.46 | 613.29 | 606.74 | NA | NA | 617.51 | NA | 623.35 | NA | 613.95 | 608.86 | 669.51 | 624.01 | 610.42 | 642.88 |
| 03/07/19 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | 612.11 | NM | NM | NM | NM | NM |
| 05/29/19 | 672.30 | 633.97 | 656.08 | NM | 606.68 | NA | NA | 618.21 | NA | 625.90 | NA | 610.69 | 607.54 | 668.77 | 622.74 | 610.98 | 643.29 |
| 08/13/19 | NM | NM | NM | NM | 605.56 | NA | NA | NM | NA | NM | NA | NM | NM | 665.00 | NM | NM | NM |
| 12/02/19 | 666.69 | 632.51 | 652.11 | NM | 605.36 | NA | NA | 614.28 | NA | 620.57 | NA | 609.10 | 605.86 | 663.08 | 616.28 | 608.40 | 639.34 |
| 02/17/20 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | NM | 607.39 | NM | NM | NM | NM |
| 06/16/20 | 668.11 | 631.33 | 653.64 | NM | 605.84 | NA | NA | 615.56 | NA | 623.36 | NA | 609.14 | 606.53 | 665.68 | 619.07 | 609.67 | 641.96 |
| 08/20/20 | NM | NM | NM | NM | 605.50 | NA | NA | NM | NA | NM | NA | NM | NM | NM | NM | NM | NM |
| 12/07/20 | 667.23 | 630.06 | 652.46 | NM | 605.58 | NA | NA | 614.11 | NA | 621.73 | NA | 608.63 | 605.97 | 652.58 | 616.65 | 608.39 | 640.92 |
| 03/16/21 | NM | NM | NM | NM | 606.15 | NA | NA | NM | NA | NM | NA | NM | 607.15 | NM | NM | NM | NM |
| 04/08/21 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | NM | 607.15 | NM | NM | NM | NM |
| 06/16/21 | 673.29 | 634.23 | 656.31 | NM | 606.81 | NA | NA | 617.74 | NA | NM | NA | 609.11 | 607.32 | 668.77 | 622.74 | 611.25 | 643.17 |
| 12/13/21 | 666.46 | 630.28 | 651.93 | NM | 605.26 | NA | NA | 613.71 | NA | 621.62 | NA | 608.82 | 605.71 | 663.02 | 615.89 | 608.28 | 640.90 |
| 03/02/22 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | 608.86 | NM | NM | NM | NM | NM |
| 03/16/22 | NM | NM | NM | NM | NM | NA | NA | NM | NA | NM | NA | 608.87 | NM | NM | NM | NM | NM |
| 06/20/22 | 667.24 | 630.46 | 652.95 | NM | 605.55 | NA | NA | 614.72 | NA | 622.51 | NA | 608.77 | 606.18 | 664.13 | 618.09 | 609.03 | 641.48 |
| 12/28/22 | 668.28 | 630.03 | 654.22 | NM | 606.26 | NA | NA | 614.57 | NA | 621.43 | NA | 608.99 | 607.69 | 663.85 | 618.19 | 608.80 | 640.89 |
| 06/19/23 | 668.64 | 631.69 | 654.28 | NM | 606.21 | NA | NA | 615.99 | NA | 624.14 | NA | 609.03 | 606.98 | 665.4 | 619.54 | 609.97 | 642.19 |
| 09/06/23 | NM | NM | NM | NM | 605.05 | NA | NA | NM | NA | 622.64 | NA | NM | NM | 663.60 | NM | 608.28 | NM |

NOTES: Groundwater elevations listed in feet above mean sea level.
NM = Not Measured.
NA = Not Applicable; well not installed or plugged.

## Table 4-2
## 2023 Landfill Expansion Groundwater Elevations

| Monitor Well or Piezometer | Static Groundwater Gauging Event Date and Elevation Data | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | July 28, 2023 | August 29, 2023 | September 12, 2023 | October 18, 2023 | November 16, 2023 | December 12, 2023 | January 29, 2024 | February 19, 2024 | March 24, 2024 |
| MW-8 | NM | 666.91 | 666.55 | 666.34 | 667.19 | 666.05 | 672.08 | 673.62 | 671.20 |
| MW-9 | NM | 630.37 | 630.05 | 630.18 | 630.35 | 630.19 | 631.08 | 632.52 | 632.62 |
| MW-10 | NM | 652.14 | 651.69 | 651.83 | 653.23 | 652.03 | 655.35 | 657.11 | 655.40 |
| MW-11 | NM | 609.91 | 609.63 | 610.08 | 610.60 | 610.29 | 612.11 | 613.20 | 612.42 |
| MW-12 | NM | 605.28 | 605.09 | 605.47 | 606.06 | 605.67 | 607.35 | 607.17 | 606.94 |
| MW-15 | NM | 614.08 | 613.75 | 613.65 | 613.80 | 613.56 | 615.07 | 616.80 | 616.40 |
| MW-17 | NM | 623.26 | 623.15 | 622.71 | 622.74 | 622.45 | 623.89 | 626.09 | 625.17 |
| MW-20 | NM | 609.53 | 609.45 | 609.45 | 609.59 | 609.42 | 609.82 | 609.75 | 609.80 |
| MW-21 | NM | 605.93 | 605.96 | 606.03 | 606.27 | 606.29 | 607.64 | 607.80 | 606.95 |
| MW-22 | NM | 663.39 | 663.20 | 662.53 | 662.67 | 662.12 | 667.85 | 669.73 | 666.78 |
| MW-23 | NM | 616.64 | 616.36 | 615.94 | 616.57 | 616.07 | 622.91 | 623.27 | 621.44 |
| MW-24 | NM | 608.40 | 608.27 | 608.18 | 608.60 | 608.27 | 609.28 | 610.07 | 609.97 |
| MW-25 | NM | 641.50 | 641.46 | 641.09 | 641.16 | 640.91 | 642.00 | 643.00 | 642.64 |
| PWCG-1A | 457.92 | 457.82 | 457.74 | 457.74 | 457.76 | 458.32 | 456.75 | 457.34 | 457.23 |
| PWCG-1B | 581.05 | 580.24 | 579.98 | 579.64 | 579.37 | 578.82 | 578.69 | 578.96 | 579.45 |
| PWCG-2 | 456.57 | 456.54 | 456.41 | 456.30 | 456.38 | 455.92 | 455.90 | 455.94 | 455.79 |
| PWCG-3 | 457.05 | 456.95 | 456.91 | 456.88 | 456.85 | 456.54 | 456.48 | 456.41 | 456.34 |
| PWCG-4 | 457.21 | 457.00 | 456.92 | 456.87 | 456.84 | 456.45 | 456.49 | 456.45 | 456.40 |
| PWCG-5 | 457.59 | 457.60 | 457.47 | 457.37 | 457.30 | 457.03 | 457.00 | 457.08 | 457.02 |
| PWCG-6 | 458.70 | 458.00 | 457.87 | 457.82 | 457.79 | 457.47 | 457.52 | 457.52 | 457.17 |
| PWCG-7A | 467.96 | 458.66 | 458.48 | 458.40 | 458.44 | 458.05 | 458.17 | 458.17 | 458.13 |
| PWCG-7B | 563.09 | 578.17 | 577.85 | 577.52 | 577.38 | 577.01 | 577.24 | 577.87 | 578.20 |
| PWCG-8 | 452.35 | 459.80 | 459.71 | 459.57 | 459.43 | 459.16 | 459.17 | 459.33 | 459.34 |
| PWCG-9A | 491.05 | 460.15 | 460.07 | 459.83 | 459.95 | 459.53 | 459.61 | 459.54 | 459.43 |
| PWCG-9B | 587.22 | 581.50 | 581.44 | 581.08 | 581.12 | 580.78 | 580.72 | 580.85 | 580.96 |

NOTES: Groundwater elevations listed in feet above mean sea level.
NM = Not Measured.

## 4.2 Permeability of the Uppermost Aquifer

Field slug testing and in-situ vertical hydraulic conductivity laboratory testing conducted by WCG (in 2023) and others (pre-2023) are summarized in Table 4-3 and Table 4-4; respectively. Additional vertical laboratory permeability testing was conducted by Maxim Engineers (Maxim) on remolded composite samples of Surficial Sediments from four shallow boreholes (B-1, B-10, B-12, and B-16). The geotechnical laboratory reports and information pertaining to the performed permeability testing are provided in Appendix IIIE (Geotechnical Report). The slug test reports are provided in Appendix IIIG-D.

The first continuous groundwater zone beneath the developed landfill unit is Aquifer B which is perched above Aquiclude B (within site-specific Stratum B). The second continuous groundwater zone beneath the developed landfill unit is Aquifer C which is perched above Aquiclude C (within site-specific Stratum C). The first continuous groundwater zone observed beneath both the developed landfill unit and proposed eastern expansion area is Aquifer D which is perched above Aquiclude D (within site-specific Stratum D). Therefore, Aquifer B constitutes the Uppermost Aquifer beneath the existing developed landfill unit (beneath the western half of the permit boundary, approximately) and Aquifer D constitutes the Uppermost Aquifer beneath all waste disposal areas and across the permit boundary.

The mean horizontal hydraulic conductivity values for Aquifers B, C, and D exhibit similar permeability at $2.07x10^{-4}$, $5.95x10^{-4}$, and $2.34x10^{-4}$ cm/sec; respectively. This range of hydraulic conductivity values is characteristic of the silty sand sediments which constitute the predominant lithology for these aquifer strata. Conversely, the mean vertical hydraulic conductivity values for Aquicludes B, C, and D are two-to-four orders of magnitude lower than the horizontal permeability of their overlying aquifer counterpart at $7.1x10^{-7}$, $3.0x10^{-6}$, and $9.1x10^{-8}$ cm/sec; respectively. This range of hydraulic conductivity values is characteristic of the clay-rich sediments that constitute the predominant lithology for these aquiclude strata. The range of contrasting horizontal (aquifer) to vertical (aquiclude) permeability values are reasonable given the sedimentary composition and structure of the facility's site-specific aquifers and underlying associated aquicludes. The contrasting permeability between the aquifer and aquiclude strata demonstrate a lack of hydraulic interconnectivity between site-specific aquifers across the Site.

# Table 4-3
# Summary of Slug Testing
# Hydraulic Conductivity Results*

| Borehole | By | Date | Type | Hydraulic Conductivity (cm/sec) |
|---|---|---|---|---|
| **Stratum A1 (Aquifer A) - Slug Test Results ($K_H$)** | | | | |
| MW-1 | GTI | Jun-94 | Rising Head | 3.52E-03 |
| MW-8 | GTI | Jun-94 | Rising Head | 1.11E-04 |
| MW-8 | GTI | Jun-94 | Falling Head | 1.42E-04 |
| | | | Aquifer A $K_H$ Arithmetic Mean: | 1.26E-03 |
| **Stratum B1 (Aquifer B) - Slug Test Results ($K_H$)** | | | | |
| MW-2 | GTI | Jun-94 | Rising Head | 1.70E-05 |
| MW-3 | GTI | Jun-94 | Rising Head | 3.97E-04 |
| | | | Aquifer B $K_H$ Arithmetic Mean: | 2.07E-04 |
| **Stratum C1 (Aquifer C) - Slug Test Results ($K_H$)** | | | | |
| PWCG-1B | WCG | Nov-23 | Rising Head | 4.73E-04 |
| PWCG-7B | WCG | Aug-23 | Rising Head | 8.71E-04 |
| PWCG-9B | WCG | Sep-23 | Rising Head | 4.43E-04 |
| | | | Aquifer C $K_H$ Arithmetic Mean: | 5.95E-04 |
| **Stratum D1 (Aquifer D) - Slug Test Results ($K_H$)** | | | | |
| MW-5 | GTI | Jun-94 | Rising Head | 3.31E-04 |
| PWCG-1A | WCG | Aug-23 | Rising Head | 1.09E-04 |
| PWCG-2 | WCG | Aug-23 | Rising Head | 1.19E-04 |
| PWCG-3 | WCG | Aug-23 | Rising Head | 2.73E-04 |
| PWCG-4 | WCG | Aug-23 | Rising Head | 1.03E-03 |
| PWCG-5 | WCG | Sep-23 | Rising Head | 1.53E-05 |
| PWCG-6 | WCG | Aug-23 | Rising Head | 6.04E-05 |
| PWCG-7A | WCG | Aug-23 | Rising Head | 2.51E-05 |
| PWCG-8 | WCG | Sep-23 | Rising Head | 3.58E-04 |
| PWCG-9A | WCG | Sep-23 | Rising Head | 1.88E-05 |
| | | | Aquifer D $K_H$ Arithmetic Mean: | 2.34E-04 |

NOTES: *Refer to Appendix IIIG-D for slug test reports.
$K_h$ = Horizontal hydraulic conductivity value.

# Table 4-4
# Summary of Laboratory Testing
# In-Situ Hydraulic Conductivity Results*

| Borehole | Test Interval (ft-bgs) | Hydraulic Conductivity (cm/sec) |
|---|---|---|
| **Surficial Sediments - Laboratory Test Results ($K_v$)** | | |
| B-2 | 15 - 16 | 9.0E-08 |
| B-12 | 12 - 15 | 9.1E-08 |
| B-15 | 9 - 11 | 3.4E-07 |
| B-20 | 8 - 9.5 | 2.6E-08 |
| Surficial Sediments $K_V$ Arithmetic Mean: | | 1.4E-07 |
| **Stratum B2 (Aquiclude B) - Laboratory Test Results ($K_v$)** | | |
| PWCG-6 | 35.0 - 40.0 | 7.1E-07 |
| **Stratum C1 (Aquifer C) - Laboratory Test Results ($K_v$)** | | |
| B-4 | 25 - 26 | 1.5E-05 |
| PWCG-7A | 99.5 - 104.5 | 6.1E-05 |
| PWCG-7A | 239.5 - 244.5 | 1.1E-05 |
| Aquifer C $K_V$ Arithmetic Mean: | | 2.9E-05 |
| **Stratum C2 (Aquiclude C) - Laboratory Test Results ($K_v$)** | | |
| B-17 | 13 - 14 | 8.7E-08 |
| B-18 | 3 - 4.5 | 3.3E-08 |
| PWCG-1A | 55.0 - 60.0 | 1.6E-06 |
| PWCG-4 | 30.0 - 35.0 | 1.8E-06 |
| PWCG-5 | 30.0 - 35.0 | 2.9E-07 |
| PWCG-6 | 75.0 - 85.0 | 2.2E-05 |
| PWCG-9 | 125.0 - 130.0 | 7.6E-07 |
| WCG-10 | 92.0 - 99.5 | 4.5E-08 |
| WCG-11 | 17 - 27 | 3.1E-08 |
| Aquiclude C $K_V$ Arithmetic Mean: | | 3.0E-06 |
| **Stratum D1 (Aquifer D) - Laboratory Test Results ($K_v$)** | | |
| PWCG-3 | 230.0 - 231.0 | 1.4E-05 |
| PWCG-8 | 187.0 - 199.5 | 7.3E-06 |
| Aquifer D $K_V$ Arithmetic Mean: | | 1.1E-05 |
| **Stratum D2 (Aquiclude D) - Laboratory Test Results ($K_v$)** | | |
| PWCG-1A | 295.0 - 300.0 | 3.6E-08 |
| PWCG-3 | 232.0 - 234.0 | 8.1E-09 |
| PWCG-7A | 359.5 - 360.5 | 2.3E-07 |
| Aquiclude D $K_V$ Arithmetic Mean: | | 9.1E-08 |

NOTES: *Refer to Appendix IIIE-C for geotechnical laboratory reports.
$K_v$ = Vertical hydraulic conductivity value.

The site-wide hydraulic gradients for each site-specific aquifer were approximated from the September 2023 groundwater contour maps in Appendix IIIG-D (Figure IIIG-D-2A and Figure IIIG-D-3A). An effective porosity has been estimated at 30 percent for the silty sand sediments (after Morris and Johnson, 1967). The mean slug testing hydraulic conductivity value for each aquifer is utilized in the below linear flow velocity calculations.

The formula for the groundwater linear flow velocity calculation is as follows:

$$V = K_h * i * 1{,}034{,}646 / n_e$$

Where:

V = linear velocity (ft/year)
$K_h$ = hydraulic conductivity (cm/sec)
i = hydraulic gradient (ft/ft)
1,034,646 = scalar to convert from cm/sec to ft/year
$n_e$ = effective porosity

Using the above calculation, the horizontal groundwater linear velocity for each site-specific aquifer is summarized as follows.

- Aquifer A
  - Hydraulic Conductivity: $1.26 \times 10^{-3}$ cm/sec
  - Hydraulic Gradient (MW-8 to MW-10): 0.013 ft/ft
  - Effective Porosity: 0.3
  - Groundwater Velocity: 56.49 ft/year
- Aquifer B
  - Hydraulic Conductivity: $2.07 \times 10^{-4}$ cm/sec
  - Hydraulic Gradient (MW-9 to MW-12): 0.013 ft/ft
  - Effective Porosity: 0.3
  - Groundwater Velocity: 9.28 ft/year
- Aquifer C
  - Hydraulic Conductivity: $5.95 \times 10^{-4}$ cm/sec
  - Hydraulic Gradient (PWCG-9B to PWCG-7B): 0.002 ft/ft
  - Effective Porosity: 0.3
  - Groundwater Velocity: 4.10 ft/year
- Aquifer D
  - Hydraulic Conductivity: $2.34 \times 10^{-4}$ cm/sec
  - Hydraulic Gradient (PWCG-9A to PWCG-2): 0.002 ft/ft
  - Effective Porosity: 0.3
  - Groundwater Velocity: 1.61 ft/year

## 4.3 Hydrogeologic Interpretation

Groundwater at the Site is observed within four distinct hydraulically separated site-specific aquifers (Aquifer A, Aquifer B, Aquifer C, and Aquifer D).

### 4.3.1 Uppermost Aquifer

The uppermost monitorable groundwater zone within the landfill permit boundary is encountered within Stratum A1 (Aquifer A) sediments which transmits shallow perched groundwater around the currently constructed limits of waste along the western permit boundary area (between monitor well MW-8 and MW-10) and immediately downgradient of the landfill unit in the vicinity of MW-25. Aquifer A groundwater exhibits semiconfined conditions with greater confining potential in the northwest (where Statum A1 sediments are overlain by Surficial Sediment clays) and unconfined conditions downgradient to the south (nearing Stratum A1 outcrop extents).

The first continuous groundwater zone encountered beneath the developed landfill area occurs within Stratum B1 (Aquifer B) sediments which transmit perched shallow groundwater from the northwest corner of the permit boundary toward the south, southeast, and east. Stratum B1 outcrops immediately east of monitor wells MW-20 and MW-21 within the undeveloped eastern expansion area where Aquifer B groundwater seeps to surface along existing slope faces. Aquifer B does not extend below the proposed eastern expansion area or easternmost permit boundary. Aquifer B groundwater exhibits semiconfined conditions with greater confining potential in the west (where Statum B1 sediments are overlain by Stratum A2 aquiclude sediments) and unconfined conditions downgradient to the south and east (nearing Stratum B1 outcrop extents). Aquifer B is the Uppermost Aquifer beneath the currently developed landfill unit.

The second continuous groundwater zone encountered beneath the developed landfill area occurs within Stratum C1 (Aquifer C) sediments which transmit perched groundwater from the northwest corner of the permit boundary toward the southeast. Stratum C1 outcrops within the undeveloped eastern expansion area (immediately west of PWCG-2 and east of PWCG-5) where Aquifer C groundwater seeps to surface along existing slope faces. Aquifer C does not extend below the entirety of the proposed eastern expansion area or easternmost permit boundary. Aquifer C groundwater exhibits semiconfined conditions with greater confining potential in the west (where Statum C1 sediments are overlain by Stratum B2 aquiclude sediments) and unconfined conditions downgradient to the east and southeast (nearing Stratum C1 outcrop extents).

The first continuous groundwater zone encountered beneath the developed landfill area, proposed eastern expansion area, and across the permit boundary, occurs within Stratum D1 (Aquifer D) sediments which transmit groundwater from west (at PWCG-8

and PWCG-9A) and toward the east-northeast. Aquifer D is the Uppermost Aquifer beneath the permit boundary and is commensurate with the regional Queen City Aquifer.

The subsurface investigation and hydrogeologic data indicate that the facility's site-specific Aquifers A, B, C, and D, are hydraulically separated from each other by bounding low permeability Aquiclude strata A, B, C, and D; respectively.

### 4.3.2 Lower Confining Units

The low vertical hydraulic conductivity of site-specific aquiclude strata indicate a directional permeability differential of two to four orders of magnitude between sediments of Aquifers B, C, and D and underlying Aquicludes B, C, and D; respectively. The hydraulic isolation among site-specific aquifers is further supported by static groundwater elevation data from facility monitor wells and piezometers which show significant differences in potentiometric head between aquifers. These differences are most notable in the northwest corner of the facility where Aquifer A screened monitor well MW-8, Aquifer B screened monitor well MW-9, Aquifer C screened piezometer PWCG-9B, and Aquifer D screened piezometer PWCG-9A are installed in close proximity to one another near the facility entrance. The static groundwater elevation data from these four monitoring points reveal vertical potentiometric head differences of approximately 30-feet between Aquifer A and Aquifer B, 50-feet between Aquifer B and Aquifer C, and 120-feet between Aquifer C and Aquifer D.

Given these conditions, perched groundwater within Aquifers B, C, and D flows horizontally above the low permeability sediments of its respective underlying aquiclude strata and downgradient in the direction of general stratigraphic dip. Each Aquiclude strata functions as the lower confining unit for its overlying Aquifer strata. The uppermost groundwater zone observed to be continuous beneath the developed landfill unit is Aquifer B. Therefore, the first Lower Confining Unit encountered beneath the developed landfill footprint is Aquiclude B. Similarly, Aquiclude C is the Lower Confining Unit to Aquifer C, and Aquiclude D is the Lower Confining Unit to Aquifer D. Given that Aquifer D is the uppermost groundwater zone observed to be continuous beneath the eastern expansion area and across the permit boundary, the underlying Aquiclude D comprises the Lower Confining Unit for the eastern expansion area and cumulative facility waste disposal footprint.

### 4.3.3 Groundwater Monitoring System

The existing groundwater monitoring system design includes nine point of compliance (POC) monitor wells, three upgradient background monitor wells, and one observation well, which are screened within Aquifer A and Aquifer B sediments. The current Aquifer A groundwater monitoring system utilizes one background monitor well (MW-8) and three POC monitor wells (MW-10, MW-22, and MW-25). The current Aquifer B groundwater monitoring system utilizes two background monitor wells (MW-9 and MW-17), six POC monitor wells (MW-12, MW-15, MW-20, MW-21, MW-23,

and MW-24), and one observation well (MW-11). The proposed groundwater monitoring system network buildout is illustrated on Figure IIIH-A-2 and IIIH-A-3 in Appendix IIH of the SDP and includes the addition of groundwater monitoring networks for Aquifer C and Aquifer D. The groundwater monitoring system design is further discussed in the Groundwater Sampling and Analysis Plan provided in Appendix IIIH of the SDP.

## 4.4 Contaminant Pathways

In the unlikely occurrence of a release of leachate from the landfill unit, the most probable pathway for the migration of pollutants will occur vertically through the vadose zone and laterally into the uppermost saturated aquifer strata at the point of release. Once within the Uppermost Aquifer, pollutants would be transported within the aquifer strata, above the Lower Confining Unit, and down gradient in the direction of groundwater flow toward the permitted Point of Compliance and network of groundwater detection monitor wells.

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# APPENDIX IIIG-A

# REGIONAL GEOLOGIC DATA

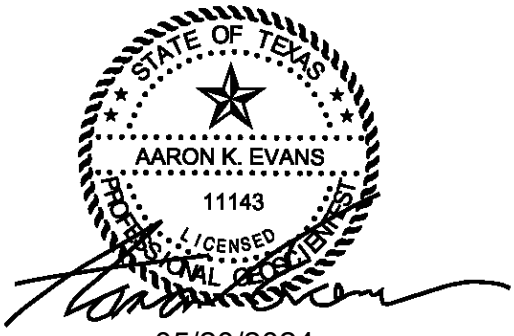


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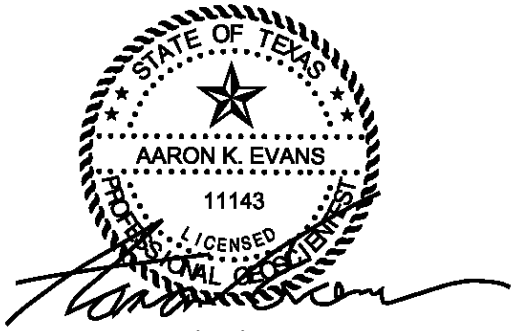
FIGURE IIIG-A-3 – Regional Geologic Cross Sections
FIGURE IIIG-A-4 – Regional Aquifer Potentiometric Surface Maps
FIGURE IIIG-A-5 – Oil and Gas Well Location Map
FIGURE IIIG-A-6 – Water Well Location Map

ERIS Water Well Report IIIG-A-7
Supplementary State of Texas Water Well Information IIIG-A-33

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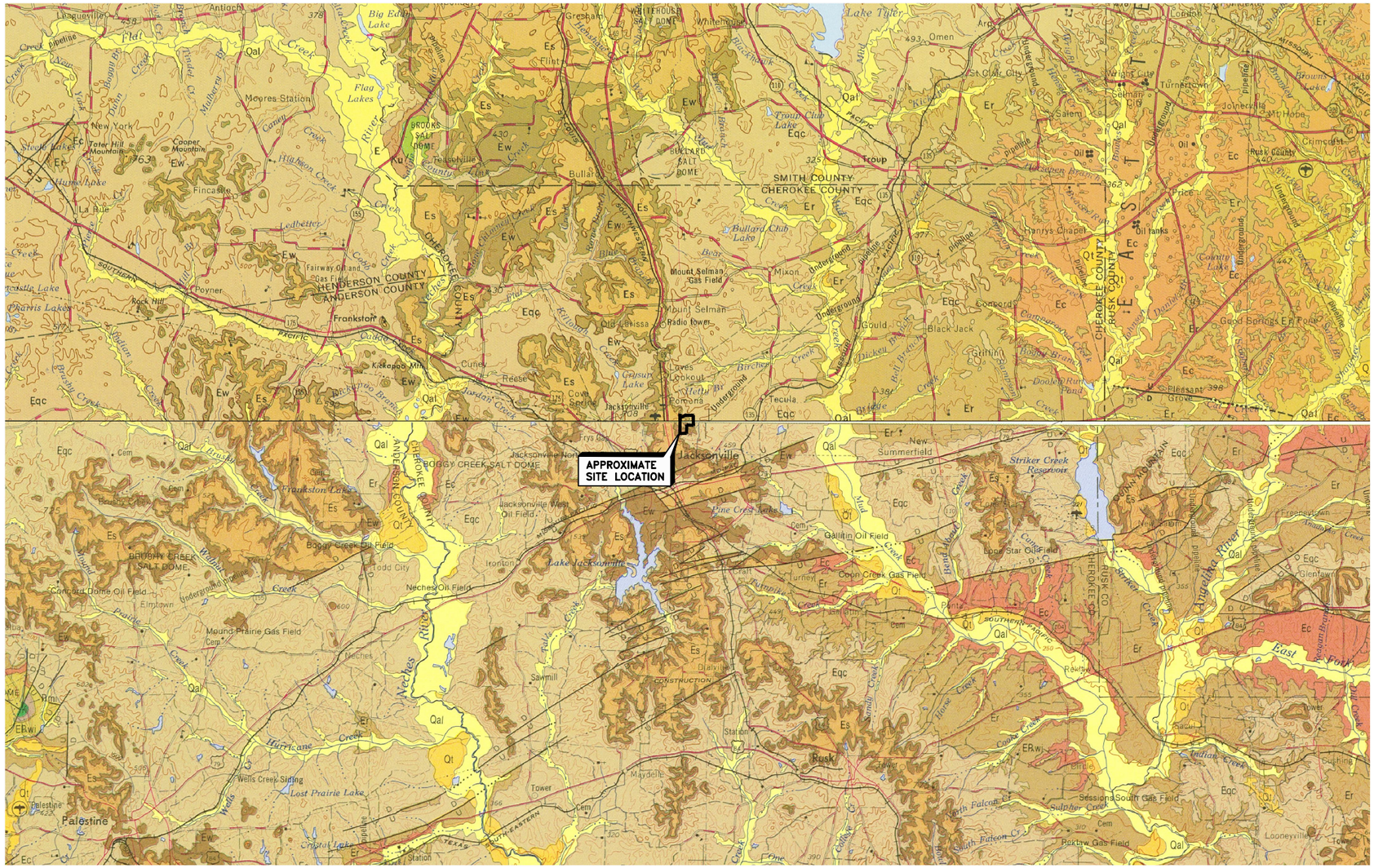


Scale 1:250,000

5 0 5 10 15 20 Statute Miles

5 0 5 10 15 20 25 30 Kilometers

5 0 5 10 Nautical Miles

CONTOUR INTERVAL 50 FEET
WITH SUPPLEMENTARY CONTOURS AT 25 FOOT INTERVALS

TRANSVERSE MERCATOR PROJECTION

1992 MAGNETIC DECLINATION FOR CENTER OF THIS SHEET
IS 5°14' E. MEAN ANNUAL CHANGE IS 6.2' WESTERLY

# GEOLOGIC ATLAS OF TEXAS, PALESTINE SHEET

SIDNEY POWERS MEMORIAL EDITION

REVISED 1993

Scale 1:250,000

5 0 5 10 15 20 Statute Miles

5 0 5 10 15 20 25 30 Kilometers

5 0 5 10 Nautical Miles

CONTOUR INTERVAL 100 FEET
WITH SUPPLEMENTARY CONTOURS AT 50 FOOT INTERVALS

TRANSVERSE MERCATOR PROJECTION

1960 MAGNETIC DECLINATION FOR THIS SHEET VARIES FROM 8°45' EASTERLY FOR THE CENTER OF THE WEST EDGE TO 7°30' EASTERLY FOR THE CENTER OF THE EAST EDGE. MEAN ANNUAL CHANGE IS 0°05' WESTERLY.

# GEOLOGIC ATLAS OF TEXAS, TYLER SHEET

JOHN T. LONSDALE MEMORIAL EDITION

REPRINTED 1975

## EXPLANATION

### SEDIMENTARY ROCKS

**Qal** — Alluvium
*Flood-plain deposits*

**Qt** — Fluviatile terrace deposits undivided

**Etg Es** — Sparta Sand
*Quartz sand, fine to medium grained, light gray to brownish gray, slightly cohesive from silt and clay matrix, massive, locally cross-bedded, interbeds of sandy clay more abundant upward, locally carbonaceous; weathers various shades of light gray, at base hard, brown, ferruginous sandstone; lower part 170± feet thick, upper part absent. Locally includes Tyler Greensand Member, Etg, quartz-glauconite greensand, grayish green, massive, locally cross-bedded; weathers dark reddish brown, abundant ironstone concretions*

**Ew** — Weches Formation
*Glauconite and quartz sand, grayish green to grayish olive green, thin bedded, locally cross-bedded to lenticular, clay interbeds light brown to moderate light gray, silty, muscovitic, thin bedded; weathers moderate to dark reddish brown, locally forms limonitic and sideritic iron ore and clay ironstone concretions; marine megafossils in southern part; 25± feet thick, range 0–70 feet*

**Eqc** — Queen City Sand
*Quartz sand, fine grained to locally medium grained, light gray to brownish gray, locally carbonaceous, and clay, gray to brown, silty, slightly lignitic, sand most abundant to west; weathers red and white mottled, ironstone concretions and ledges common; local beds of glauconite-quartz greensand,cross-bedded, weathers to ferruginous ledges and rubble; 100–400 feet thick, thins southeastward*

**Er** — Reklaw Formation
*Upper 100± feet, clay, brownish black to brownish gray, silty, muscovitic, carbonaceous, laminated, interbeds of moderate reddish-brown clay; weathers light brown, ironstone concretions common; a few marine fossils. Lower 15± feet, quartz sand, fine to very fine grained, grayish green, glauconitic, argillaceous, massive, locally cross-bedded; weathers moderate brown to dark yellowish orange with clay ironstone ledges and rubble; fossils, clay ironstone, and clay decrease northward*

**Ec** — Carrizo Sand
*Upper part, very fine sand, silt, clayey silt, silty clay, medium to dark gray, carbonaceous; weathers moderate yellowish brown to dark reddish brown, indurated ledges of dark brownish-gray ironstone common. Lower part, quartz sand, fine to medium grained, light brownish gray, weakly cohesive, massive, locally cross-bedded; weathers light gray to various shades of red. Thickness 20–100 feet*

**Ewi** — Wilcox Group undivided
*Mostly silty and sandy clay, various shades of gray, local beds of clay, lignite, silt, and quartz sand, in part carbonaceous, laminated to massive, locally cross-bedded, weathers to various shades of gray, brown, yellow, and red. Calcareous siltstone and ironstone concretions common; abundant plant fossils, a few marine fossils in southeastern part; 500–1,000 feet thick.*

**E** — Eocene rocks undivided
*Reklaw Formation, Carrizo Sand, Wilcox Group, and Midway Group on Brooks dome not separately shown*

**Ewp** — Wills Point Formation
*Clay, medium bluish gray, greenish gray, grayish green, brownish gray, silt increases upward, laminated to locally massive, glauconitic near base, rough calcareous siltstone concretions common in upper part, locally lignitic in upper part, thin bed of rosette limestone near middle; weathers medium gray to yellowish gray; fossiliferous; 500± feet thick*

**Ek** — Kincaid Formation
*Clay, medium gray to dark gray, greenish gray, brownish gray, glauconitic, calcareous, selenitic, locally silty or sandy, locally phosphatic near base, thin beds of limestone in upper part, gray, hard, detrital; weathers medium gray; fossiliferous; 180± feet thick*

**Kke** — Kemp Clay
*Clay, dark gray to bluish gray, calcareous, silty, glauconitic, calcareous concretions common; weathers dark greenish gray and black; upper part only crops out*

**Ku** — Upper Cretaceous rocks undivided
*Navarro Group, Taylor Group, and Austin Chalk on Brooks dome not separately shown*

U / D — Fault
*U, upthrown side; D, downthrown side; dotted where concealed, dashed where inferred*

Pleistocene Recent — QUATERNARY
Eocene — TERTIARY
Upper Cretaceous — CRETACEOUS

STATE OF TEXAS
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LICENSED
PROFESSIONAL GEOLOGIST
05/20/2024

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DATE: 05/2024
FILE: 0120-076-11
CAD: IIIG-A-1_REGIONAL GEO MAP.DWG
DRAWN BY: DCS
DESIGN BY: AKE
REVIEWED BY: AKE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
PINE HILL FARMS LANDFILL TX, LP

REVISIONS

| NO. | DATE | DESCRIPTION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

MAJOR PERMIT AMMENDMENT
REGIONAL GEOLOGIC MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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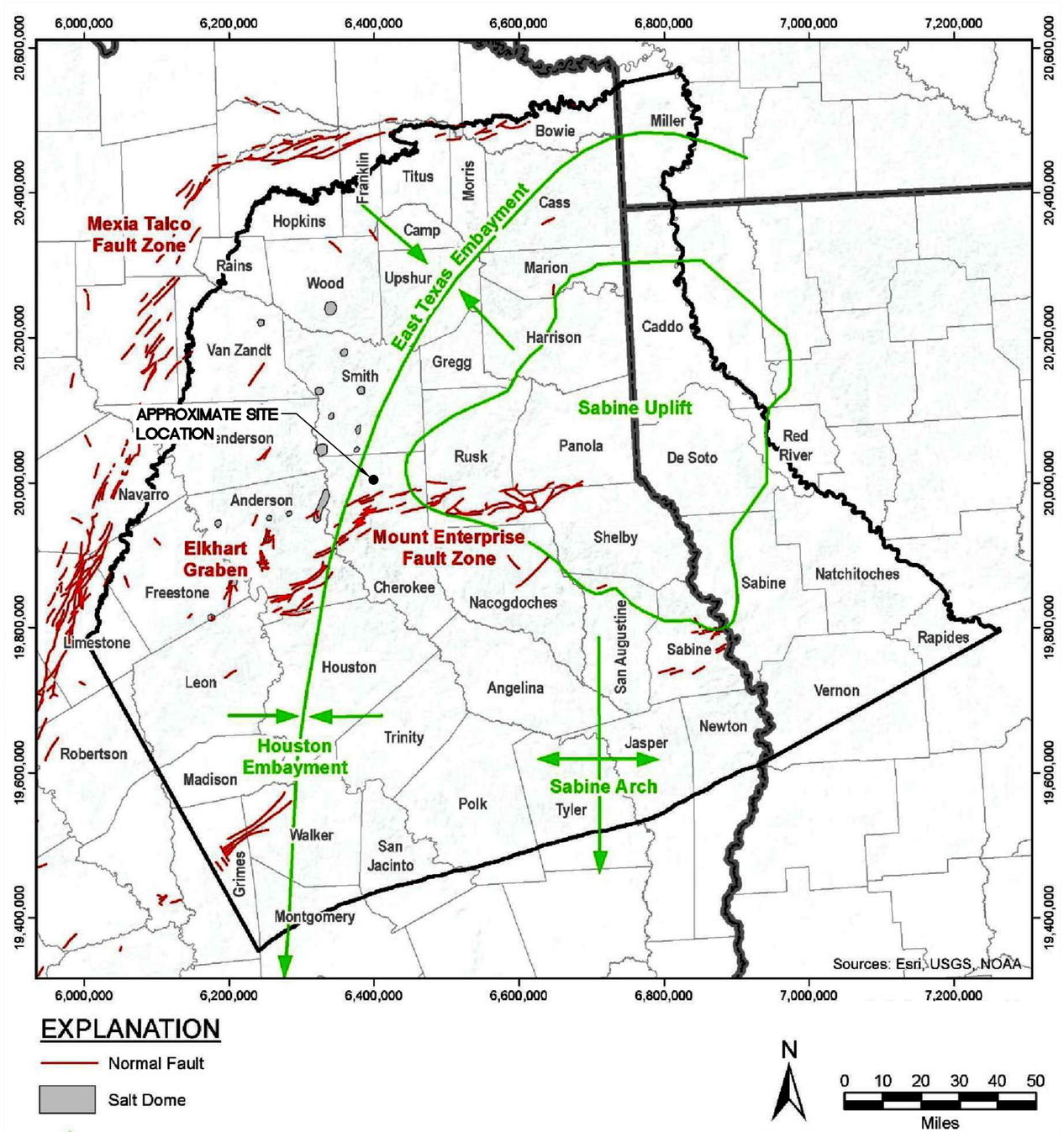
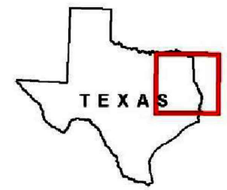
FIGURE IIIG-A-1

O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-A-1 - REGIONAL GEOLOGY MAP.dwg, byoung, 1:2




## EXPLANATION

- Normal Fault
- Salt Dome
- Anticline Showing Dip Direction
- Syncline Showing Dip Direction
- Study Area
- Polk — County/Parish and Identifier
- State

STATE OF TEXAS
AARON K. EVANS
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05/20/2024

NOTE:

1. REGIONAL STRUCTURAL FEATURES MAP ADAPTED FROM CONCEPTUAL MODEL REPORT: GROUNDWATER AVAILABILITY MODEL FOR NORTHERN PORTION OF THE QUEEN CITY, SPARTA, AND CARRIZO–WILCOX AQUIFERS, TEXAS WATER DEVELOPMENT BOARD, NOVEMBER 2020.

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MAJOR PERMIT AMENDMENT
REGIONAL STRUCTURAL FEATURES MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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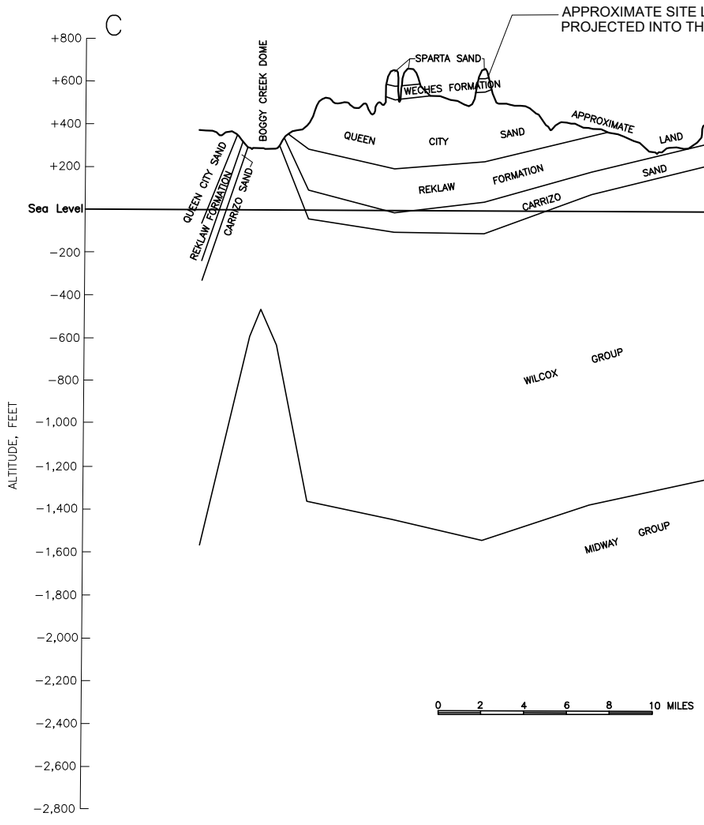
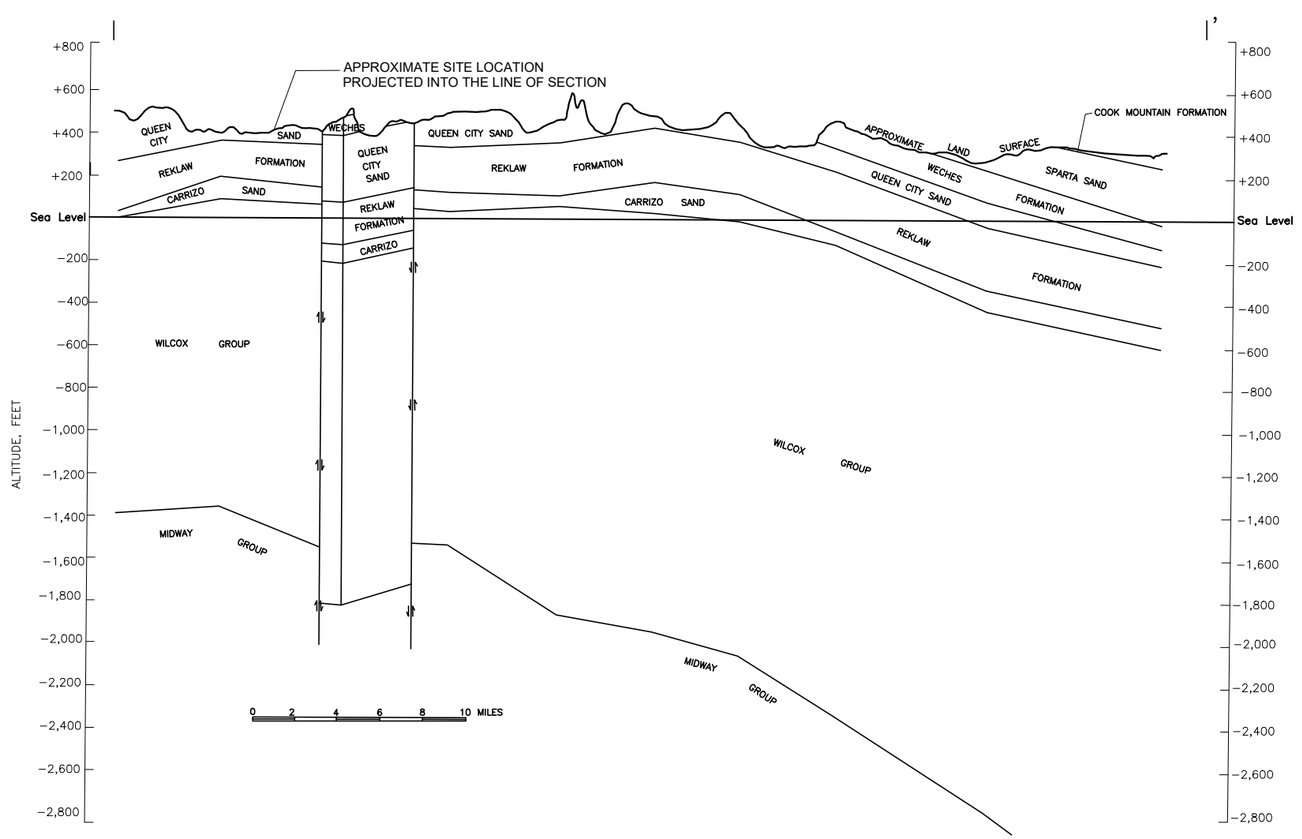
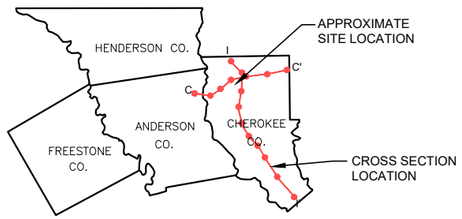
FIGURE IIIG–A–2

O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-A-2 - REGIONAL STRUCTURAL GEO.dwg, byoung, 1:2




INDEX MAP
NTS

STATE OF TEXAS
AARON K. EVANS
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

05/20/2024

NOTES:

1. CROSS SECTIONS ADAPTED FROM GROUNDWATER CONDITIONS IN ANDERSON, CHEROKEE, FREESTONE, AND HENDERSON COUNTIES, TEXAS WATER DEVELOPMENT BOARD REPORT 150, AUGUST 1972.

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# MAJOR PERMIT AMMENDMENT
## REGIONAL GEOLOGIC CROSS SECTIONS

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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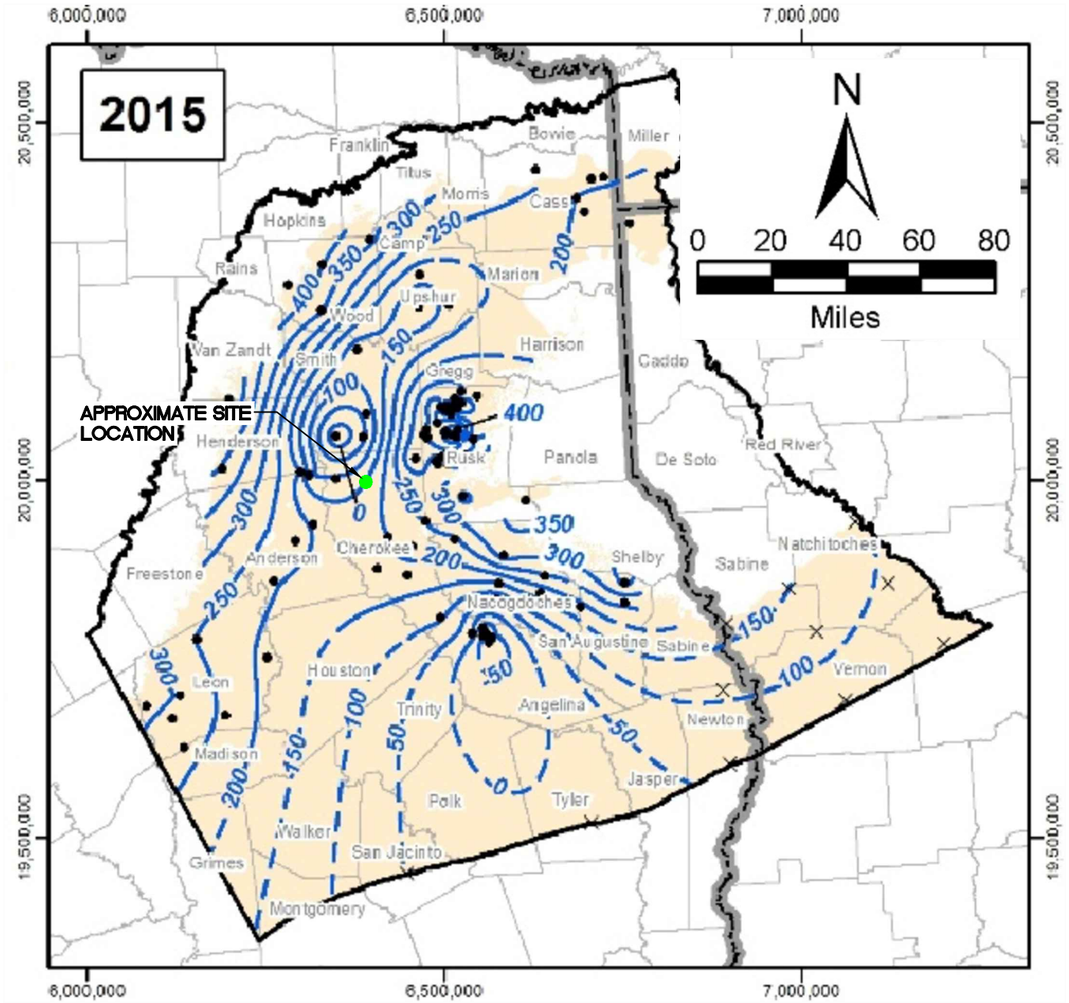
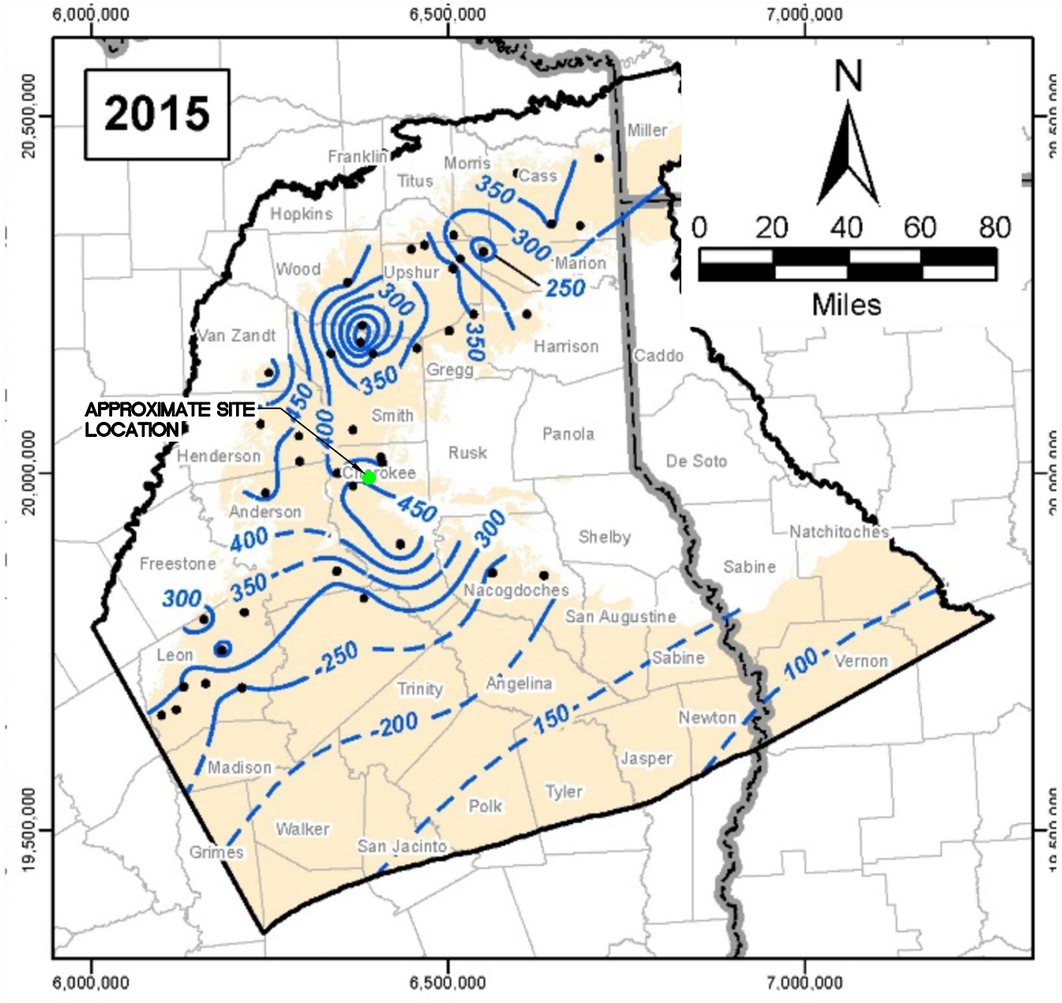
FIGURE IIIG-A-3

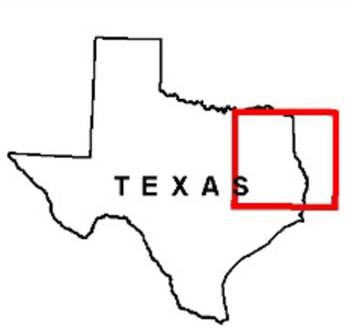
· G:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-A-3 - REGIONAL CROSS SECTIONS.dwg, byoung, 1:2




CARRIZO AQUIFER GROUNDWATER ELEVATION CONTOURS




QUEEN CITY AQUIFER GROUNDWATER ELEVATION CONTOURS




# EXPLANATION

- Location of Measurement
- —150— Groundwater Level Elevation Contour, in feet amsl (dashed where approximate). Contour interval: 50 feet
- Extent of Unit
- Study Area
- County/Parish

NOTES:

1. REGIONAL QUEEN CITY AQUIFER AND CARIZZO AQUIFER GROUNDWATER CONTOUR MAPS BASED ON POTENTIOMETRIC SURFACE ELEVATIONS MEASURED IN 2015 BY THE TEXAS WATER DEVELOPMENT BOARD.
2. GROUNDWATER ELEVATION CONTOUR MAP MODIFIED FROM ZIVIC ET AL, 2020, GROUNDWATER AVAILABILITY MODEL FOR NORTHERN PORTION OF THE QUEEN CITY, SPARTA, AND CARRIZO–WILCOX AQUIFERS, TEXAS WATER DEVELOPMENT BOARD.

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DESIGN BY: AKE
REVIEWED BY: AKE

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PINE HILL FARMS LANDFILL TX, LP

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MAJOR PERMIT AMMENDMENT
REGIONAL AQUIFER POTENTIOMETRIC SURFACE MAPS
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG–A–4

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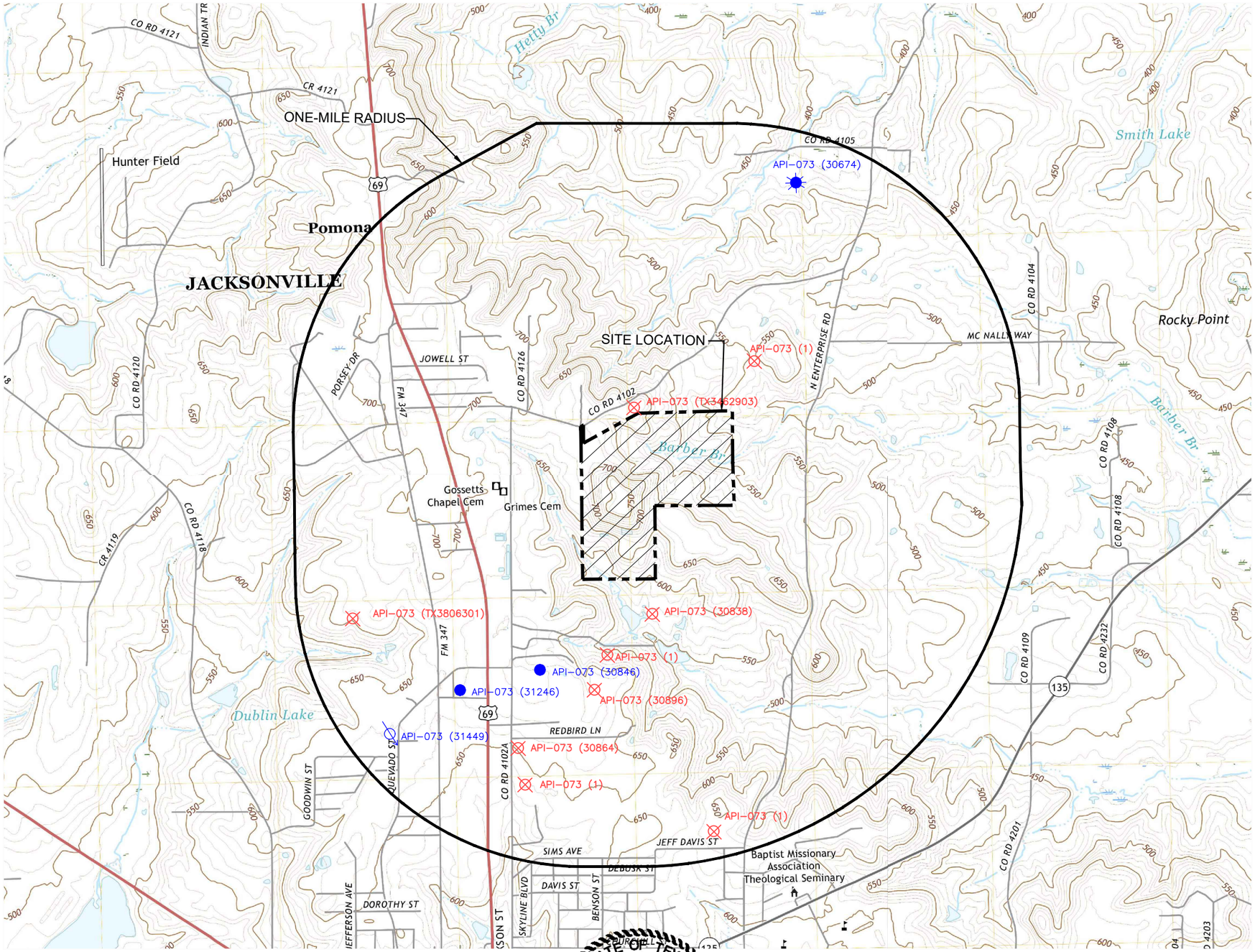
G:\0120\76\EXPANSION 2023\PART III\IIIG-A-4 - REGIONAL AQUIFERS CONTOUR MAP.dwg, byoung, 1:2




0 1000 2000
SCALE IN FEET

LEGEND

ROAD CLASSIFICATION

| | |
|---|---|
| Expressway | Local Connector |
| Secondary Hwy | Local Road |
| Ramp | 4WD |
| Interstate Route | US Route / State Route |

LANDFILL PROPERTY

| | |
|---|---|
| API-073 (30674) | OIL/GAS WELL |
| API-073 (30846) | OIL WELL |
| API-073 (31449) | INJECTION/DISPOSAL WELL |
| API-073 (30838) | DRY/PLUGGED OIL/GAS EXPLORATION HOLE |

| | |
|---|---|
| JACKSONVILLE WEST, TX 2022 | JACKSONVILLE EAST, TX 2022 |
| MOUNT SELMAN, TX 2022 | TECULA, TX 2022 |

NOTES:

1. REPRODUCED FROM 7.5 MINUTE, JACKSONVILLE WEST, JACKSONVILLE EAST, MOUNT SELMAN, AND TECULA TEXAS QUADRANGLE USGS MAP DATED 2022.
2. PERMITTED OIL AND GAS WELL LOCATIONS IN LANDFILL VICINITY OBTAINED FROM RAILROAD COMMISSION OF TEXAS ONLINE GIS AT http://www.gisp.rrc.texas.gov/gisviewer2/ IN SEPTEMBER 2023.
3. WELL NUMBERS REPRODUCED FROM RAILROAD COMMISSION OF TEXAS RECORDS INCLUDE API NUMBER FOR WELLS AND DRY HOLES AND ASSOCIATED WELL NUMBER FOR REGISTERED WELLS.
4. WELL NUMBERS FOR DRY HOLES TX3462903 AND TX3806301 OBTAINED FROM TEXAS WATER DEVELOPMENT BOARD RECORDS IN SEPTEMBER 2023.

STATE OF TEXAS
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05/20/2024

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CAD: IIIG-A-5_OIL AND GAS WELL MAP.DWG
DRAWN BY: JDW
DESIGN BY: DCS
REVIEWED BY: AKE

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# MAJOR PERMIT AMENDMENT
## OIL AND GAS WELL LOCATION MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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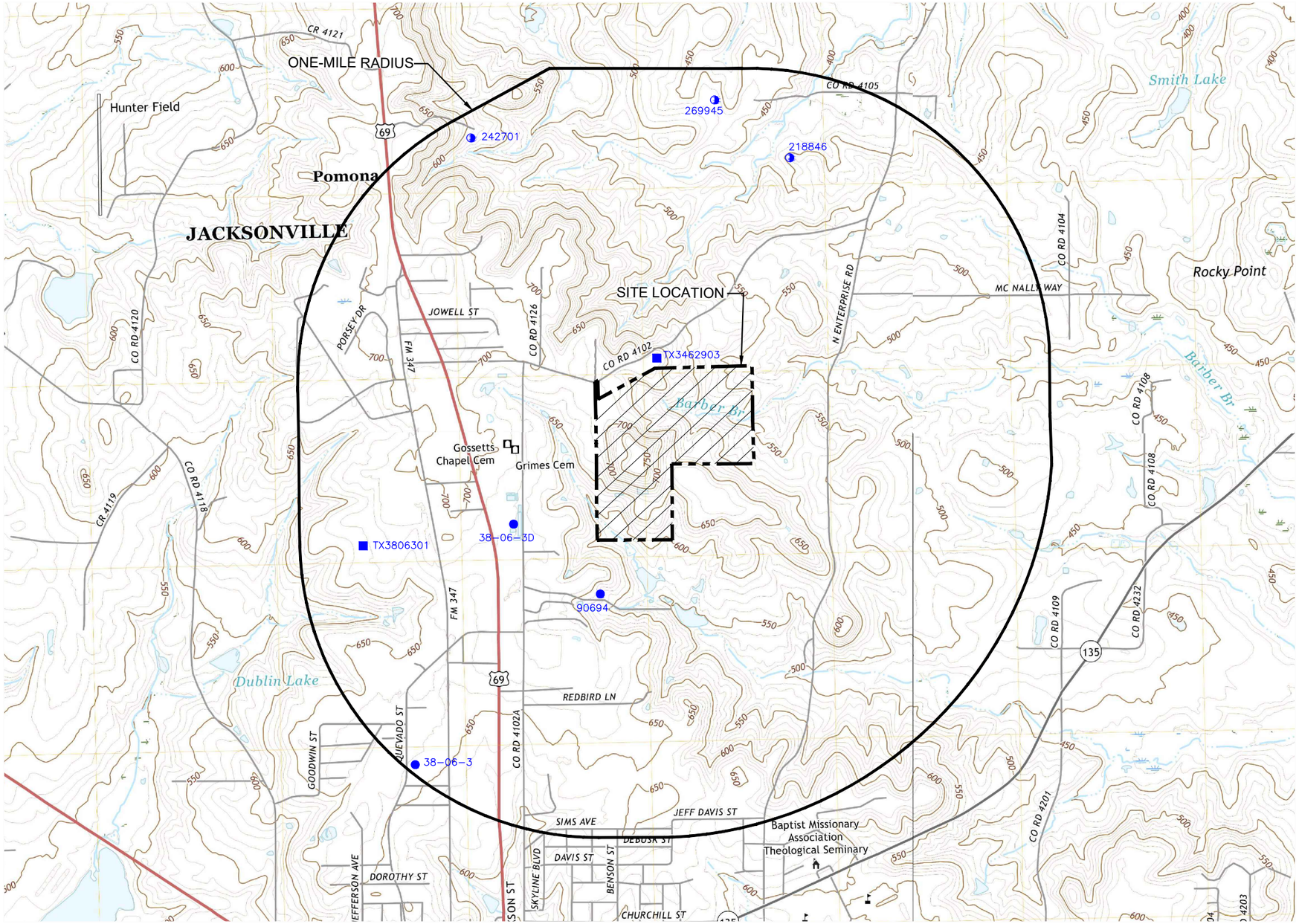
FIGURE IIIG-A-5

O:\0120\76\EXPANSION 2023\PART III\IIIG-A-5 - O & G WELL MAP.dwg, byoung, 1:2




N

0 1000 2000

SCALE IN FEET

LEGEND

ROAD CLASSIFICATION

| | |
|---|---|
| Expressway | Local Connector |
| Secondary Hwy | Local Road |
| Ramp | 4WD |
| Interstate Route | US Route |
| State Route | |

LANDFILL PROPERTY

218846 — WATER WELL LOCATION IDENTIFIED IN SDRDB RECORDS

38-06-3D — WATER WELL LOCATION IDENTIFIED IN TCEQ RECORDS

TX3462903 — OIL/GAS EXPLORATION DRY HOLE LOCATION IDENTIFIED IN TWDB RECORDS

JACKSONVILLE WEST, TX 2022

JACKSONVILLE EAST, TX 2022

MOUNT SELMAN, TX 2022

TECULA, TX 2022

STATE OF TEXAS
AARON K. EVANS
11143
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NOTES:

1. REPRODUCED FROM 7.5 MINUTE, JACKSONVILLE WEST, JACKSONVILLE EAST, MOUNT SELMAN, AND TECULA TEXAS QUADRANGLE USGS MAP DATED 2022.
2. WATER WELLS IDENTIFIED IN SDRDB, TCEQ, AND TWDB RECORDS IN SEPTEMBER 2023.
3. WATER WELL LOCATIONS PROVIDED BY ERIS, SDRDB, TCEQ, AND TWDB INTERACTIVE DATABASE VIEWER AND MODIFIED BASED ON REVIEW OF INDIVIDUAL WATER WELL REPORTS, GOOGLE EARTH AERIAL IMAGES, AND SITE RECONNAISSANCE PERFORMED BY WCG.

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DRAWN BY: JDW
DESIGN BY: DCS
REVIEWED BY: AKE

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PINE HILL FARMS LANDFILL TX, LP

REVISIONS

| NO. | DATE | DESCRIPTION |
|---|---|---|
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# MAJOR PERMIT AMENDMENT
# WATER WELL LOCATION MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIG-A-6

G:\0120\76\EXPANSION 2023\PART III\IIIG-A-6 - WATER WELL MAP.dwg, byoung, 1:2

# ERIS WATER WELL REPORT

# TEXAS WATER WELL REPORT

| | |
|---|---|
| **Project Property:** | *1-Mile Water Well Search*<br>*Royal Oaks Landfill*<br>*Jacksonville TX 75766* |
| **Project No:** | *0120-076-11-106-03* |
| **Order No:** | *23090600085* |
| **Requested by:** | *Weaver Consultants Group* |
| **Date Completed:** | *September 8, 2023* |

**Environmental Risk Information Services**
*A division of Glacier Media Inc.*
1.866.517.5204 | info@erisinfo.com | erisinfo.com

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Executive Summary: Site Report Summary - Surrounding Properties.....6
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Detail Report.....12
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Definitions.....26

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# Executive Summary

***Property Information:***

| | |
|---|---|
| **Project Property:** | *1-Mile Water Well Search*<br>*Royal Oaks Landfill  Jacksonville TX 75766* |
| **Project No:** | *0120-076-11-106-03* |

**Coordinates:**

| | |
|---|---|
| **Latitude:** | *31.99955984* |
| **Longitude:** | *-95.26409188* |
| **UTM Northing:** | *3,542,626.95* |
| **UTM Easting:** | *286,118.81* |
| **UTM Zone:** | *15R* |
| **Target Property Geometry:** | *POLYGON* |

| | |
|---|---|
| **County/Parish Covered:** | *Cherokee (TX)* |
| **Zipcode(s) Covered:** | *Jacksonville TX: 75766* |
| **State(s) Covered:** | *TX* |

# Executive Summary: Report Summary

| Database | Searched | Project Property | Within 1.00mi | Total |
|---|---|---|---|---|
| **Federal** | | | | |
| FED USGS | Y | 0 | 0 | 0 |
| **State** | | | | |
| TCEQ WELL LOGS | Y | 0 | **2** | **2** |
| SDRW WELLS | Y | 0 | **3** | **3** |
| GWDB | Y | 0 | **2** | **2** |
| WW FORT BEND | Y | 0 | 0 | 0 |
| WW HIGH PLAINS | Y | 0 | 0 | 0 |
| WW HARRIS GAL | Y | 0 | 0 | 0 |
| WUD | Y | 0 | 0 | 0 |
| | **Total:** | 0 | **7** | **7** |

**** PO – Property Only***

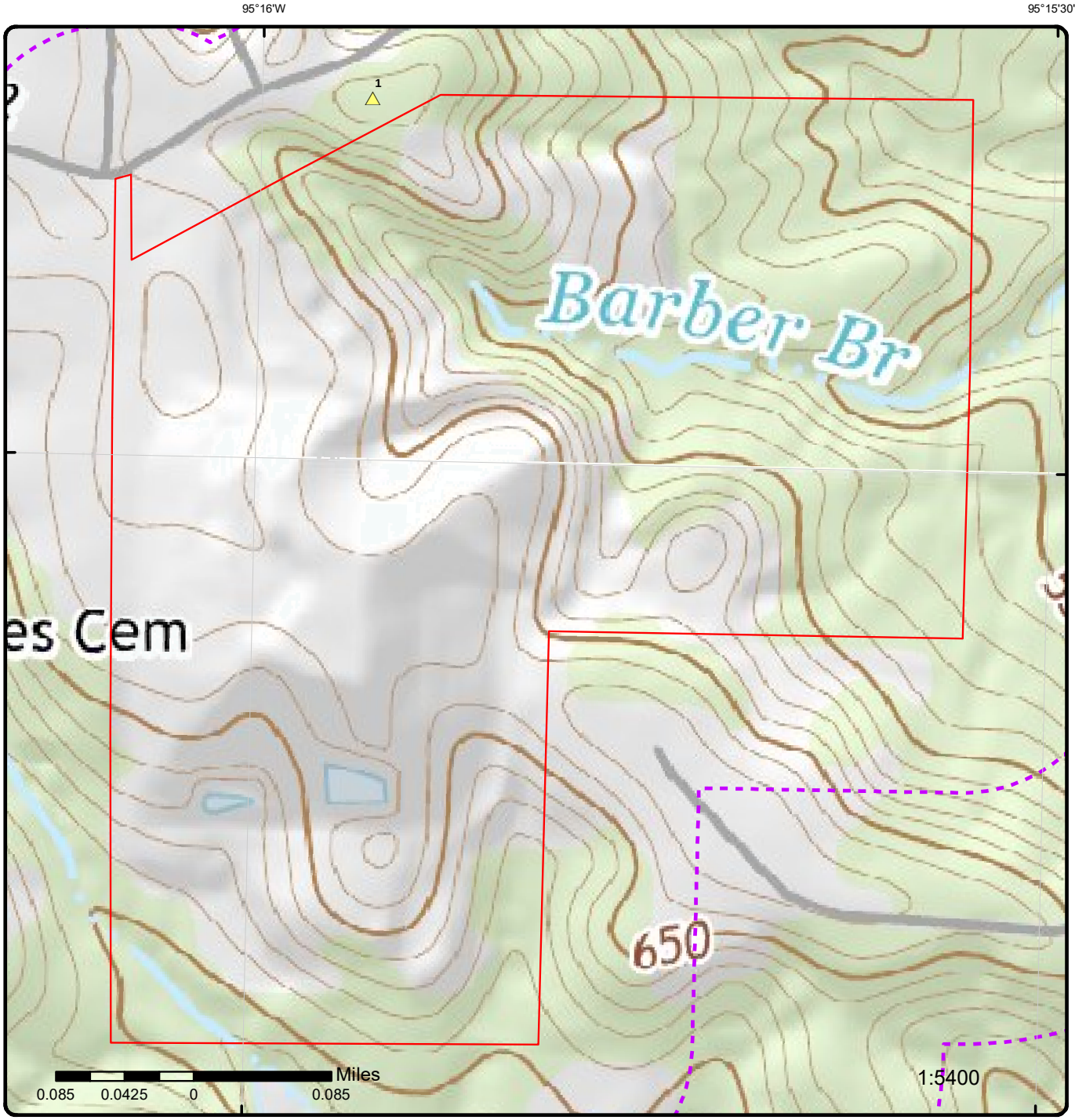
# Executive Summary: Site Report Summary - Project Property

| Map Key | DB | Company/Site Name | Address | Direction | Distance (mi/ft) | Page Number |
|---|---|---|---|---|---|---|

No records found in the selected databases for the project property.

## Executive Summary: Site Report Summary - Surrounding Properties

| Map Key | DB | Company/Site Name | Address | Direction | Distance (mi/ft) | Page Number |
|---|---|---|---|---|---|---|
| 1 | GWDB | Trice Producing Co. McNeil No.1 | TX | NNW | 0.02 / 94.77 | 12 |
| | | | ***State Well NO | Owner Name:*** *3462903 | Trice Producing Co. McNeil No.1* | |
| 2 | TCEQ WELL LOGS | ALEC GODER | TX | W | 0.28 / 1,456.74 | 14 |
| | | | ***Grid No | Owners Name:*** *38-06-3D | ALEC GODER* | |
| 3 | GWDB | Hunt Oil Co.- Iria Tucker No.1 | TX | WSW | 0.80 / 4,249.19 | 16 |
| | | | ***State Well NO | Owner Name:*** *3806301 | Hunt Oil Co.- Iria Tucker No.1* | |
| 4 | SDRW WELLS | Ralph Jarvis | 598 CR 4105 Jacksonville TX 75766 | N | 0.85 / 4,472.57 | 18 |
| | | | ***Track NO:*** *269945* | | | |
| 5 | SDRW WELLS | Ralph Jarvis | 598 CR 4105 Jacksonville TX 75766 | N | 0.89 / 4,696.22 | 19 |
| | | | ***Track NO:*** *218846* | | | |
| 6 | SDRW WELLS | Cliff Powell | Dennis Road Jacksonville TX | NW | 0.94 / 4,979.75 | 20 |
| | | | ***Track NO:*** *242701* | | | |
| 7 | TCEQ WELL LOGS | D L HELMS | TX | SW | 0.99 / 5,225.22 | 21 |
| | | | ***Grid No | Owners Name:*** *38-06-3 | D L HELMS* | |




**Map: 1.0 Mile Radius | Zoom Level: 3**
Order Number: 23090600085
Address: Royal Oaks Landfill, Jacksonville, TX

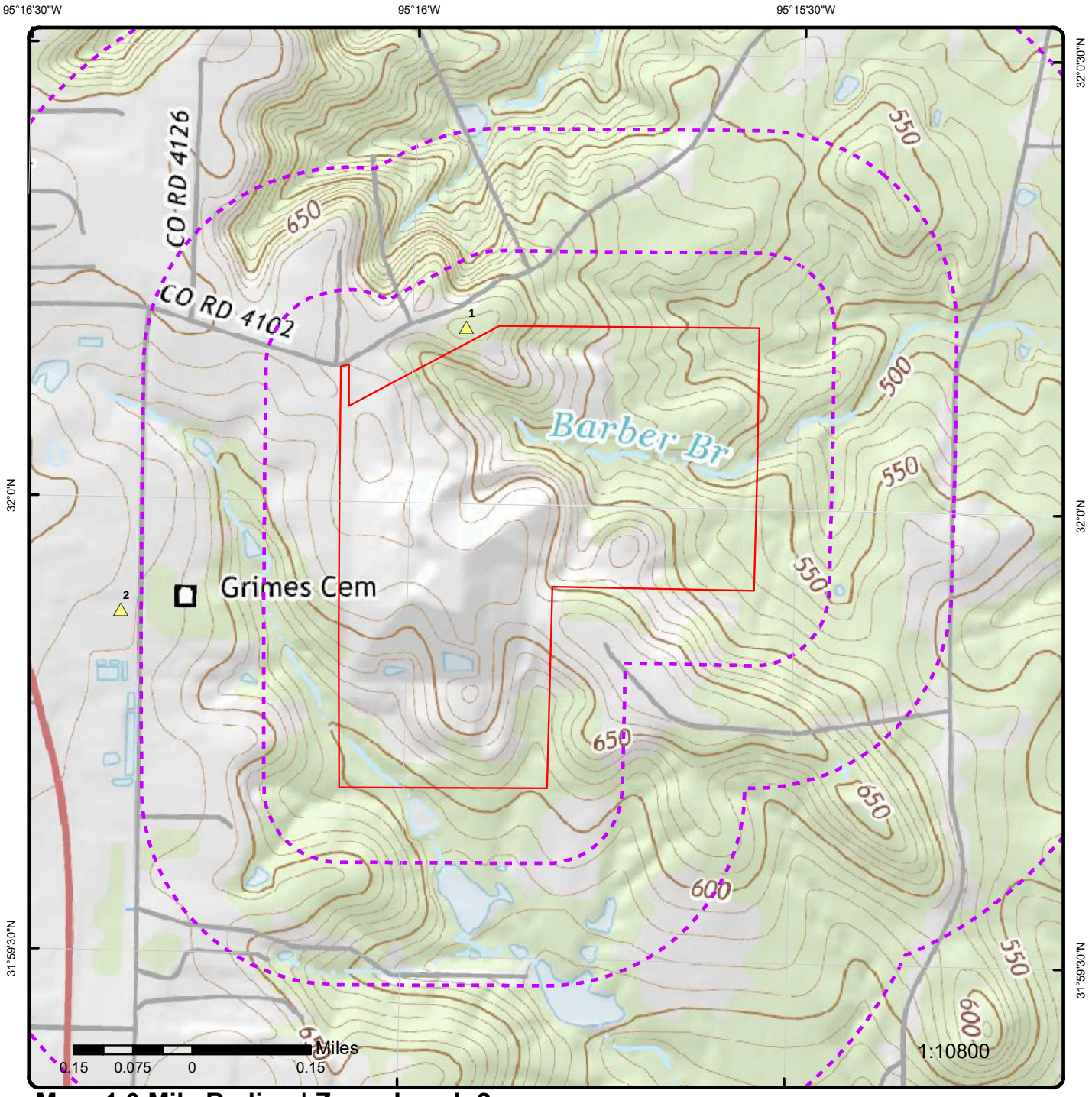
ERIS

## Plotted Water Wells

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Eris Areas with Higher Elevation
- Eris Areas with Same Elevation
- Eris Areas with Lower Elevation
- Eris Areas with Unknown Elevation

**Source:** © US Geological Survey

© ERIS Information Inc.




**Map: 1.0 Mile Radius | Zoom Level: 2**
Order Number: 23090600085
Address: Royal Oaks Landfill, Jacksonville, TX

ERIS

## Plotted Water Wells

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Eris Areas with Higher Elevation
- Eris Areas with Same Elevation
- Eris Areas with Lower Elevation
- Eris Areas with Unknown Elevation

**Source:** © US Geological Survey

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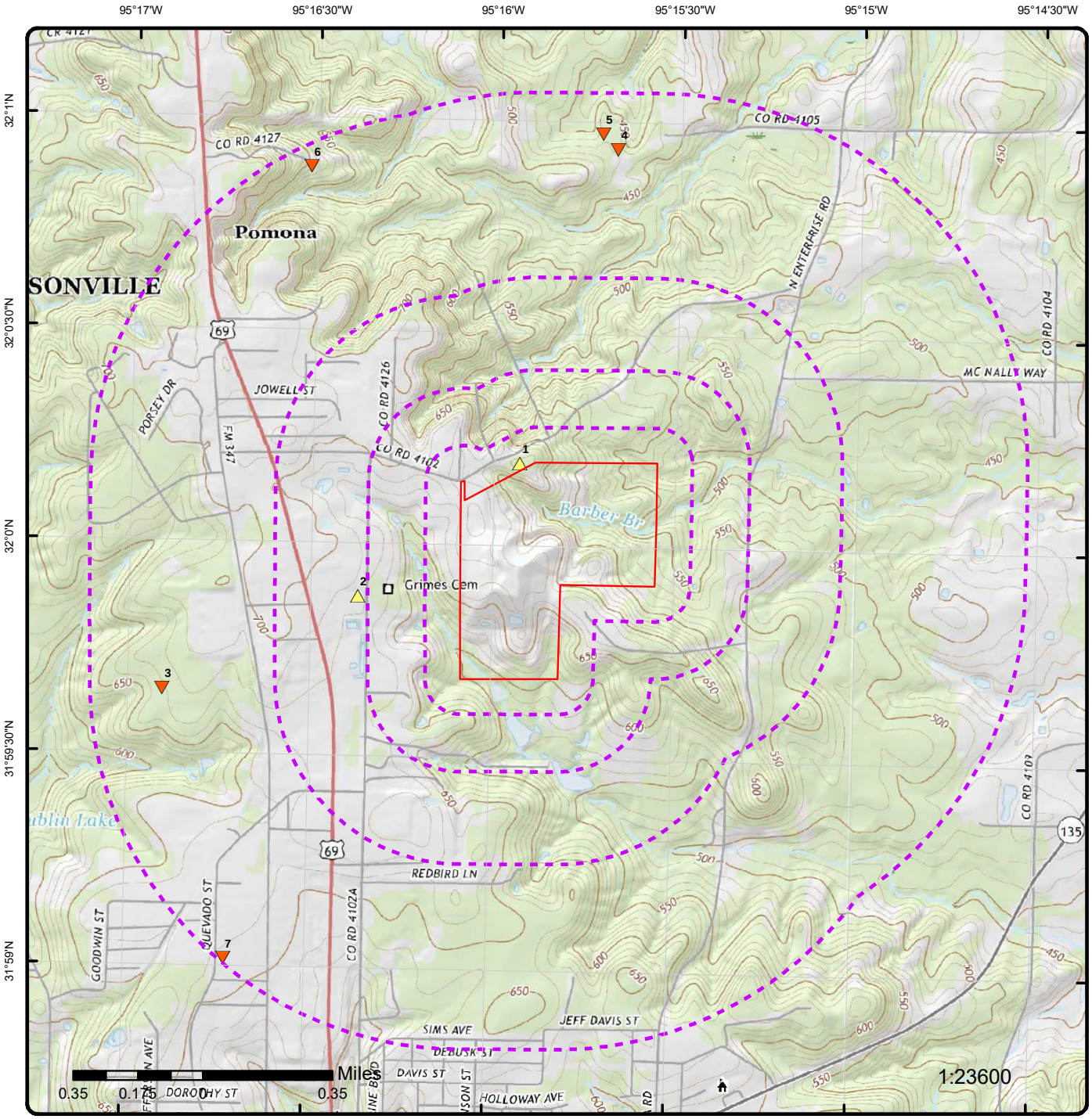



**Map: 1.0 Mile Radius | Zoom Level: 1**
Order Number: 23090600085
Address: Royal Oaks Landfill, Jacksonville, TX

ERIS

# Plotted Water Wells

Project Property
Buffer Outline

Eris Sites with Higher Elevation
Eris Sites with Same Elevation
Eris Sites with Lower Elevation
Eris Sites with Unknown Elevation

Eris Areas with Higher Elevation
Eris Areas with Same Elevation
Eris Areas with Lower Elevation
Eris Areas with Unknown Elevation

**Source:** © US Geological Survey

© ERIS Information Inc.

# Aerial **Year: 2021**

Order Number: 23090600085

Address: Royal Oaks Landfill, Jacksonville, TX

**Source:** ESRI World Imagery

© ERIS Information Inc.

# Detail Report

| Map Key | Number of Records | Direction | Distance (mi/ft) | Site | DB |
|---|---|---|---|---|---|
| 1 | 1 of 1 | NNW | 0.02 / 94.77 | Trice Producing Co. McNeil No.1<br>TX | GWDB |

| | |
|---|---|
| **Well Rep Track No:** | |
| **State Well NO:** | 3462903 |
| **Owner Name:** | Trice Producing Co. McNeil No.1 |
| **Drilling Start Dt:** | |
| **Drilling Month:** | |
| **Drilling Day:** | |
| **Drilling Year:** | 1957 |
| **Well Depth:** | 5097 |
| **Well Usage:** | |
| **Water Level Status:** | |
| **Latitude:** | 32.0033340 |
| **Longitude:** | -95.2650010 |
| **Data Source:** | Groundwater Database (GWDB) Reports; GIS shapefile of GWDB well locations |
| **Well Info Report:** | https://www3.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=3462903&Type=GWDB |
| **Document Link:** | https://www3.twdb.texas.gov/apps/waterdatainteractive//GetScannedImage.aspx?Num=3462903&Cnty=Cherokee |

# CROSS REFERENCE SHEET

Name or Subject: CR-GWTD
CHEROKEE
Located Well Data
DJ 34-62-903

Date

Regording: Electric Log

SEE

Name or Subject: GW-SC
ELECTRIC LOG FILE Q-206

TWDBS-M-3

| Map Key | Number of Records | Direction | Distance (mi/ft) | Site | DB |
|---|---|---|---|---|---|
| 2 | 1 of 1 | W | 0.28 / 1,456.74 | ALEC GODER<br>TX | TCEQ WELL LOGS |

| | |
|---|---|
| **Grid No:** | 38-06-3D |
| **Date Drilled:** | 10/24/1977 |
| **Owners Name:** | ALEC GODER |
| **County:** | CHEROKEE |
| **Water Usage:** | DOMESTIC |
| **Static Level:** | 26 |
| **Depth Drilled:** | 48 |
| **Latitude:** | 31.997935 |
| **Longitude:** | -95.272761 |

3D

Send original copy by certified mail to the Texas Water Development Board P. O. Box 13087 Austin, Texas 78711

State of Texas

WATER WELL REPORT

For TWDB use only
Well No. 38-06-3D
Located on map yes
Received: 78

1) OWNER:
Person having well drilled Abe Yoder (Name) Address Rt. 2 (Street or RFD) (City) (State)
Landowner (Name) Address Jacksonville, Tex. (Street or RFD) (City) (State)

2) LOCATION OF WELL:
County Cherokee, 2½ miles in N (N.E., S.W., etc.) direction from Jacksonville. (Town)

Locate by sketch map showing landmarks, roads, creeks, hiway number, etc.*

69
Well
1.5 mi
North
Jacksonville

(Use reverse side if necessary)

or

Give legal location with distances and directions from adjacent sections or survey lines.
Labor League
Block Survey
Abstract No.
(NW¼ NE¼ SW¼ SE¼) of Section

3) TYPE OF WORK (Check): New Well ✓ Deepening / Reconditioning / Plugging
4) PROPOSED USE (Check): Domestic ✓ Industrial / Municipal / Irrigation / Test Well / Other
5) TYPE OF WELL (Check): Rotary / Driven / Dug ✓ / Cable / Jetted / Bored

6) WELL LOG:
Diameter of hole 36 in. Depth drilled 48 ft. Depth of completed well 48 ft. Date drilled 10-24-77
All measurements made from 0 ft. above ground level.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 2 | top soil |
| 2 | 26 | red sand + clay |
| 26 | 48 | brown clay + sand |

9) Casing: Type: Old / New ✓ Steel / Plastic / Other cement
Cemented from ft. to ft.

| Diameter (inches) | Setting From (ft.) | Setting To (ft.) | Gage |
|---|---|---|---|

10) SCREEN:
Type
Perforated / Slotted

| Diameter (inches) | Setting From (ft.) | Setting To (ft.) | Slot Size |
|---|---|---|---|

(Use reverse side if necessary)

7) COMPLETION (Check): Straight wall ✓ / Gravel packed ✓ / Other / Under reamed / Open Hole

8) WATER LEVEL:
Static level 26 ft. below land surface Date 10-24-77
Artesian pressure lbs. per square inch Date
Depth to pump bowls, cylinder, jet, etc., ft. below land surface.

11) WELL TESTS:
Was a pump test made? Yes / No If yes, by whom?
Yield: gpm with ft. drawdown after hrs.
Bailer test gpm with ft. drawdown after hrs.
Artesian flow gpm
Temperature of water

12) WATER QUALITY:
Was a chemical analysis made? Yes / No
Did any strata contain undesirable water? Yes / No
Type of water? depth of strata

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief.

NAME J. M. Allen (Type or Print) Water Well Drillers Registration No. 662
ADDRESS Drawer G, Arp, Texas 75750 (Street or RFD) (City) (State)
(Signed) J. M. Allen (Water Well Driller) Allen Lumber Co. (Company Name)

Please attach electric log, chemical analysis, and other pertinent information, if available.

*Additional instructions on reverse side.

TWDBE-WD-8

| Map Key | Number of Records | Direction | Distance (mi/ft) | Site | DB |
|---|---|---|---|---|---|
| 3 | 1 of 1 | WSW | 0.80 / 4,249.19 | Hunt Oil Co.- Iria Tucker No.1<br>TX | GWDB |

| | |
|---|---|
| **Well Rep Track No:** | |
| **State Well NO:** | 3806301 |
| **Owner Name:** | Hunt Oil Co.- Iria Tucker No.1 |
| **Drilling Start Dt:** | |
| **Drilling Month:** | |
| **Drilling Day:** | |
| **Drilling Year:** | |
| **Well Depth:** | 4959 |
| **Well Usage:** | |
| **Water Level Status:** | |
| **Latitude:** | 31.9941670 |
| **Longitude:** | -95.2816670 |
| **Data Source:** | Groundwater Database (GWDB) Reports; GIS shapefile of GWDB well locations |
| **Well Info Report:** | https://www3.twdb.texas.gov/apps/waterdatainteractive//GetReports.aspx?Num=3806301&Type=GWDB |
| **Document Link:** | https://www3.twdb.texas.gov/apps/waterdatainteractive//GetScannedImage.aspx?Num=3806301&Cnty=Cherokee |

# CROSS REFERENCE SHEET

Name or Subject: CR-GWTD CHEROKEE — Located Well Data DJ 38-06-301 — Date

Regarding: Electric Log

**SEE**

Name or Subject: GW-SC ELECTRIC LOG FILE Q-17

TWDBS-M-3

| Map Key | Number of Records | Direction | Distance (mi/ft) | Site | DB |
|---|---|---|---|---|---|
| 4 | 1 of 1 | N | 0.85 / 4,472.57 | Ralph Jarvis<br>598 CR 4105<br>Jacksonville TX 75766 | SDRW WELLS |

| | |
|---|---|
| **Track NO:** | 269945 |
| **Date Submitted:** | 2011-10-28 |
| **Owner Name:** | Ralph Jarvis |
| **Owner Address:** | P.O. Box 2437 |
| **Owner Address2:** | |
| **Owner City:** | Jacksonville |
| **Owner State:** | TX |
| **Owner Zip:** | 75766 |
| **County:** | Cherokee |
| **Type of Work:** | New Well |
| **Typ of Wrk Oth Descr:** | |
| **Proposed Use:** | Domestic |
| **Prop Use Oth Descr:** | |
| **Latitude:** | 32.015834 |
| **Longitude:** | -95.261112 |
| **Drilling Date Started:** | 2011-10-21 |
| **Drilling Date Completed:** | 2011-10-22 |
| **Chemical Analysis:** | |
| **Company Name:** | Jackson Distributors |
| **Company Address:** | 431 CR 862 |
| **CompanyAddress2:** | |
| **Company City:** | Cushing |
| **Company State:** | TX |
| **Company Zip:** | 75760 |
| **Company Country:** | |
| **Data Source:** | Full SDR Database; SDRDB Well Location (Map) |
| **Report Link:** | https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=269945&Type=SDR-Well |

***Well Borehole Information***

| | |
|---|---|
| **Top Depth:** | 0 |
| **Bottom Depth:** | 442 |
| **Top Depth:** | |
| **Bottom Depth:** | 442.0 |

***Well Strata***

**Water Type:**

Good

| Map Key | Number of Records | Direction | Distance (mi/ft) | Site | DB |
|---|---|---|---|---|---|
| 5 | 1 of 1 | N | 0.89 / 4,696.22 | Ralph Jarvis<br>598 CR 4105<br>Jacksonville TX 75766 | SDRW WELLS |

**Track NO:** 218846
**Date Submitted:** 2010-06-07
**Owner Name:** Ralph Jarvis
**Owner Address:** 598 CR 4105
**Owner Address2:**
**Owner City:** Jacksonville
**Owner State:** TX
**Owner Zip:** 75766
**County:** Cherokee
**Type of Work:** New Well
**Typ of Wrk Oth Descr:**
**Proposed Use:** Irrigation
**Prop Use Oth Descr:**
**Latitude:** 32.013334
**Longitude:** -95.257223
**Drilling Date Started:** 2008-11-12
**Drilling Date Completed:** 2008-11-13
**Chemical Analysis:** No
**Company Name:** Owens Drilling & Services
**Company Address:** 18696 CR 32
**CompanyAddress2:**
**Company City:** Lindale
**Company State:** TX
**Company Zip:** 75771
**Company Country:**
**Data Source:** Full SDR Database; SDRDB Well Location (Map)
**Report Link:** https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=218846&Type=SDR-Well

***Well Borehole Information***

**Top Depth:** 0
**Bottom Depth:** 80

**Top Depth:**
**Bottom Depth:** 80.0

***Well Levels***

**Measurement:** 35
**Measurement Date:** 2008-11-13

| Map Key | Number of Records | Direction | Distance (mi/ft) | Site | DB |
|---|---|---|---|---|---|
| 6 | 1 of 1 | NW | 0.94 / 4,979.75 | Cliff Powell<br>Dennis Road<br>Jacksonville TX | SDRW WELLS |

**Track NO:** 242701
**Date Submitted:** 2011-01-31
**Owner Name:** Cliff Powell
**Owner Address:** 15822 US Hwy 79 E
**Owner Address2:**
**Owner City:** Jacksonville
**Owner State:** TX
**Owner Zip:** 75760
**County:** Cherokee
**Type of Work:** New Well
**Typ of Wrk Oth Descr:**
**Proposed Use:** Domestic
**Prop Use Oth Descr:**
**Latitude:** 32.014723
**Longitude:** -95.275278
**Drilling Date Started:** 2008-10-15
**Drilling Date Completed:** 2008-10-25
**Chemical Analysis:** No
**Company Name:** Jackson Distributors
**Company Address:** 431 CR 862
**CompanyAddress2:**
**Company City:** Cushing
**Company State:** TX
**Company Zip:** 75760
**Company Country:**
**Data Source:** Full SDR Database; SDRDB Well Location (Map)
**Report Link:** https://www3.twdb.texas.gov/apps/waterdatainteractive/GetReports.aspx?Num=242701&Type=SDR-Well

***Well Borehole Information***

**Top Depth:** 0
**Bottom Depth:** 260

**Top Depth:**
**Bottom Depth:** 260.0

***Well Levels***

**Measurement:** 110
**Measurement Date:** 2008-10-25

***Well Strata***

**Water Type:**

Good

| Map Key | Number of Records | Direction | Distance (mi/ft) | Site | DB |
|---|---|---|---|---|---|
| 7 | 1 of 1 | SW | 0.99 / 5,225.22 | D L HELMS<br>TX | TCEQ WELL LOGS |

| | |
|---|---|
| **Grid No:** | 38-06-3 |
| **Date Drilled:** | 02/10/1986 |
| **Owners Name:** | D L HELMS |
| **County:** | CHEROKEE |
| **Water Usage:** | DOMESTIC/IRRIGATION |
| **Static Level:** | 10 |
| **Depth Drilled:** | 38 |
| **Latitude:** | 31.983612 |
| **Longitude:** | -95.278631 |

Please use black ink.
Send original copy by certified mail to the Texas Department of Water Resources P. O. Box 13087 Austin, Texas 78711

# State of Texas
# WATER WELL REPORT

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

Texas Water Well Drillers Board P. O. Box 13087 Austin, Texas 78711

1) OWNER D. L. Helms (Name) Address 1510 Quevado (Street or RFD) Jacksonville (City) Tx (State) 75766 (Zip)

2) LOCATION OF WELL: County Cherokee 1 miles in W (N.E., S.W., etc.) direction from Jacksonville (Town)

Driller must complete the legal description to the right with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal description:
Section No. _____ Block No. _____ Township _____
Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☑ See attached map.

3) TYPE OF WORK (Check): ☑ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☑ Domestic ☐ Industrial ☐ Public Supply ☑ Irrigation ☐ Test Well ☐ Other _____

5) DRILLING METHOD (Check): ☑ Mud Rotary ☐ Air Hammer ☐ Driven ☐ Bored ☐ Air Rotary ☐ Cable Tool ☐ Jetted ☐ Other _____

6) WELL LOG:

Date drilled 2-10-86

DIAMETER OF HOLE

| Dia. (in.) | From (ft.) | To (ft.) |
|---|---|---|
| 6 3/4 | Surface | 38 |

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 7 | Tan Surface sd. |
| 7 | 11 | Yellow sand |
| 11 | 18 | Orange sand |
| 18 | 24 | White Sand |
| 24 | 28 | Brown Sand w. Red (iron ore) |
| 28 | 38 | Brown Sand |
| 38 | 45 | Green ~~Black~~ Sand |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☑ Gravel Packed ☐ Other _____
If Gravel Packed give interval . . . from 10 ft. to 38 ft.

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia. (in.) | New or Used | Steel, Plastic, etc. Perf., Slotted, etc. Screen Mgf., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casing Screen |
|---|---|---|---|---|---|
| 4" | N | PVC Sch 40 | 0 | 18 | |
| 4" | N | PVC Sch 40 Screen | 18 | 38 | .013 |

9) CEMENTING DATA [Rule 319.44(b)]
Cemented from 0 ft. to 10 ft.
_____ ft. to _____ ft.
Method used Gravity
Cemented by Eldon L. Lyda Jr.

10) SURFACE COMPLETION
☑ Specified Surface Slab Installed [Rule 319.44(c)]
☐ Pitless Adapter Used [Rule 319.44(d)]
☐ Approved Alternative Procedure Used [Rule 319.71]

RECEIVED
FEB 25 1986
TEXAS WATER COMMISSION

11) WATER LEVEL:
Static level 10 ft. below land surface Date 2-10-86
Artesian flow _____ gpm. Date _____

12) PACKERS: Type Depth

13) TYPE PUMP:
☐ Turbine ☑ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., 37 ft.

(Use reverse side if necessary)

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable water? ☐ Yes ☑ No
If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Fresh Depth of strata 18'-38'
Was a chemical analysis made? ☐ Yes ☑ No

14) WELL TESTS:
Type Test: ☑ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: 10 gpm with 15 ft. drawdown after 4 hrs.

I here by certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 12 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME Lyda Water Well Service (Type or Print) Water Well Driller's License No. 2561

ADDRESS RT. 6 Box 6721 (Street or RFD) Athens (City) Tex (State) 75751 (Zip)

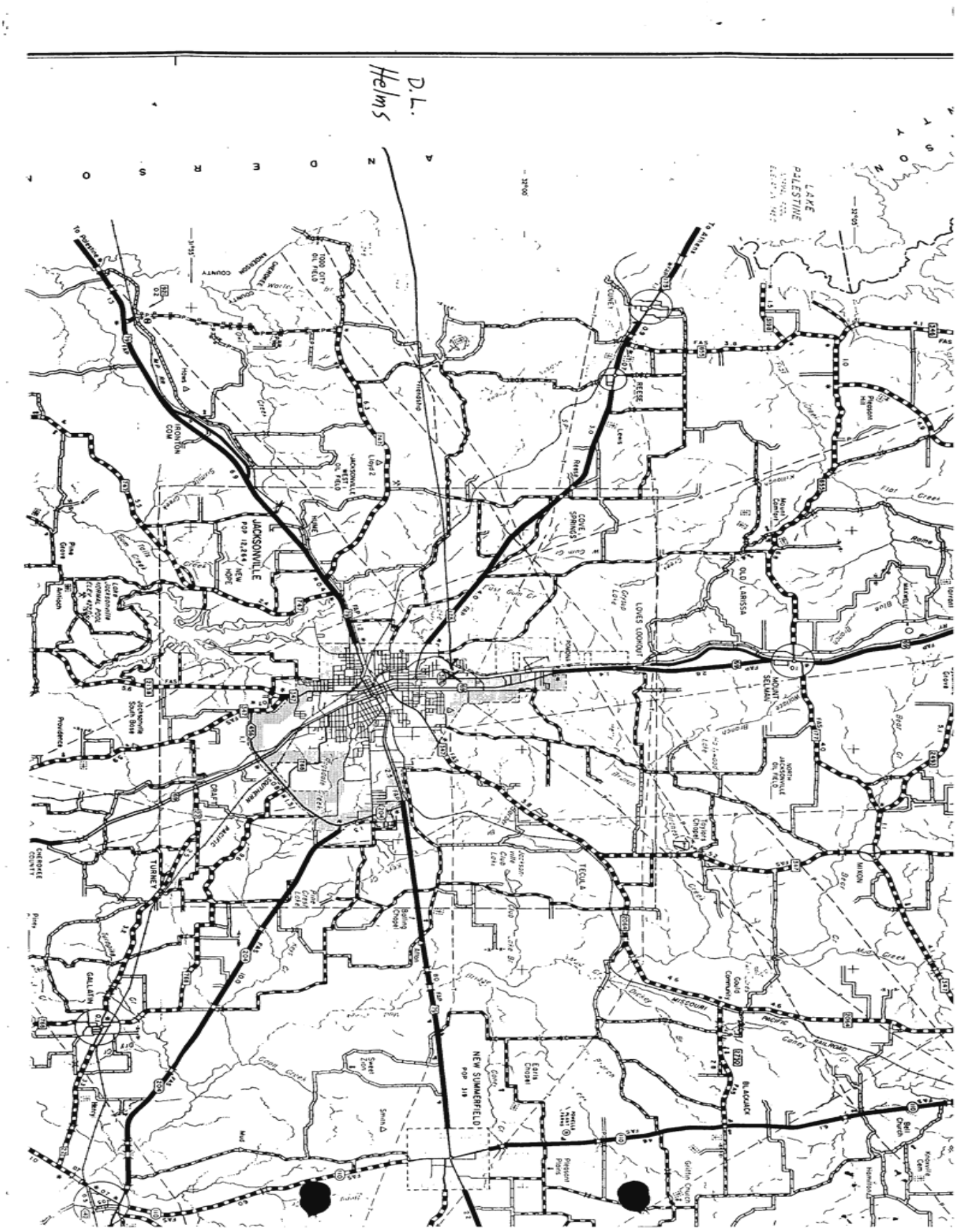
(Signed) Eldon L Lyda (Licensed Water Well Driller) (Signed) _____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TDWR use only
Well No. 38-06-3
Located on map _____

DEPARTMENT OF WATER RESOURCES COPY

TDWR-0392 (12/29/83)


D. L. Helms
JACKSONVILLE
POP 12,544
NEW SUMMERFIELD
POP 319
TURNEY
GALLATIN
TEGULA
LAKE PALESTINE
JACKSONVILLE WEST FIELD
NORTH JACKSONVILLE OIL FIELD
MIXON
BLACKJACK
MOUNT SELMAN
OLD LARISSA
LOVES LOOKOUT
COVE SPRINGS
NEW HOPE
IRONTON COM
CHEROKEE COUNTY
ANDERSON COUNTY
MISSOURI PACIFIC RAILROAD

# Appendix: Database Descriptions

*Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update.*

## Federal

***Wells from NWIS:*** FED USGS

The U.S. Geological Survey's National Water Information System (NWIS) is the nation's principal repository of water resources data. The NWIS includes comprehensive information of well-construction details, time-series data for gage height, streamflow, groundwater level, and precipitation and water use data. This NWIW dataset contains select Site Types from the overall NWIS Sites data, limited to the following Group Site Types only: Groundwater Group Site Types: Well, Collector or Ranney type well, Hyporheic-zone well, Interconnected Wells, Multiple wells; Spring Group Site Type: Spring; and Other Group Site Types: Aggregate groundwater use, Cistern.

***Government Publication Date: Mar 21, 2022***

## State

***Well Log Reports from Plotted Water Wells:*** TCEQ WELL LOGS

Locations of TCEQ Water Wells as derived from well logs in the Texas Commission on Environmental Quality (TCEQ) Water Well Report Viewer, which includes unnumbered water wells and those plotted to 2.5 minute grid locations (2-3 miles). In this collection of Well Log Reports, locations have been manually verified.

***Government Publication Date: Jul 26, 2022***

***Select Wells from SDR:*** SDRW WELLS

Locations of wells from the Submitted Drillers Report (SDR) Database with select proposed usage: Domestic, Fracking Supply, Industrial, Irrigation, Other, Public Supply, Rig Supply, Stock, Unknown. SDR is populated from the online Texas Well Report Submission and Retrieval System (TWRSRS), a cooperative Texas Department of Licensing and Regulation (TDLR) and Texas Water Development Board (TWDB) application requiring registered water-well drillers to submit reports. Excludes SDR records with the following proposed usage: Closed-Loop Geothermal, De-watering, Environmental Soil Boring, Extraction, Injection, Monitor, Test Well.

***Government Publication Date: Mar 6, 2023***

***Groundwater Database:*** GWDB

The Texas Water Development Board (TWDB) Groundwater Database (GWDB) contains information on selected water wells, springs, oil/gas tests (that were originally intended to be or were converted to water wells), water levels and water quality.

***Government Publication Date: Oct 19, 2022***

***Fort Bend Subsidence District Water Wells:*** WW FORT BEND

List of water wells in the Fort Bend Subsidence District, boundaries of which are defined as all the territory within Fort Bend County. The Fort Bend Subsidence District was created by the Texas Legislature in 1989 as a conservation and reclamation district to control land subsidence and manage groundwater resources through regulation, conservation, and coordination with suppliers of alternative water sources to assure an adequate quantity and quality of water for the future. The District's purpose is to provide for the regulation of the withdrawal of groundwater within the District to prevent subsidence that contributes to flooding, inundation or overflow of areas within the District, including rising waters resulting from storms or hurricanes.

***Government Publication Date: Jul 6, 2023***

***High Plains Water Wells:*** WW HIGH PLAINS

Inventory of water wells in the High Plains Underground Water Conservation District No. 1 (HPUWCD), which was created in 1951. As a political subdivision of Texas, HPUWCD is charged with protecting, preserving and conserving aquifers within the District's 16-county service area.

***Government Publication Date: Apr 17, 2023***

***Harris Galveston Subsidence District Water Wells:*** WW HARRIS GAL

List of water wells in the Harris-Galveston Subsidence District (HGSD). The HGSD was created by the 64th Texas Legislature as an underground water conservation district in 1975 to provide regulation of groundwater withdrawal to control subsidence.

***Government Publication Date: Jul 6, 2023***

***Water Utility Database:*** WUD

The Water Utility Database is defined as a collection of data from Texas Water Districts, Public Drinking Water Systems and Water and Sewer Utilities who submit information to the TCEQ. This database is an integrated database designed and developed to replace over 160 stand alone legacy systems representing over 5 million records of the former Texas Water Commission and the Texas Department of Health.

***Government Publication Date: Oct 1, 2020***

# Definitions

***Database Descriptions:*** This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

***Detail Report***: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

***Distance:*** The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

***Direction:*** The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

***Executive Summary:*** This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

***Map Key:*** The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

# SUPPLEMENTARY STATE OF TEXAS
# WATER WELL INFORMATION

# Texas Water Development Board (TWDB)
# Groundwater Database (GWDB)
# Well Information Report for State Well Number 34-62-903

GWDB Reports and Downloads

## Well Basic Details

Scanned Documents

| | |
|---|---|
| **State Well Number** | 3462903 |
| **County** | Cherokee |
| **River Basin** | Neches |
| **Groundwater Management Area** | 11 |
| **Regional Water Planning Area** | I - East Texas |
| **Groundwater Conservation District** | Neches & Trinity Valleys GCD |
| **Latitude** (decimal degrees) | 32.003334 |
| **Latitude** (degrees minutes seconds) | 32° 00' 12" N |
| **Longitude** (decimal degrees) | -95.265001 |
| **Longitude** (degrees minutes seconds) | 095° 15' 54" W |
| **Coordinate Source** | +/- 1 Second |
| **Aquifer Code** | NOT-APPL - Aquifer Code Is Not Applicable to this Well |
| **Aquifer** | Unassigned |
| **Aquifer Pick Method** | |
| **Land Surface Elevation** (feet above sea level) | 663 |
| **Land Surface Elevation Method** | Digital Elevation Model -DEM |
| **Well Depth** (feet below land surface) | 5097 |
| **Well Depth Source** | Another Government Agency |
| **Drilling Start Date** | |
| **Drilling End Date** | 0/0/1957 |
| **Drilling Method** | |
| **Borehole Completion** | |

| | |
|---|---|
| **Well Type** | Oil or Gas |
| **Well Use** | |
| **Water Level Observation** | None |
| **Water Quality Available** | No |
| **Pump** | |
| **Pump Depth** (feet below land surface) | |
| **Power Type** | |
| **Annular Seal Method** | |
| **Surface Completion** | |
| **Owner** | Trice Producing Co.  McNeil No.1 |
| **Driller** | |
| **Other Data Available** | |
| **Well Report Tracking Number** | |
| **Plugging Report Tracking Number** | |
| **U.S. Geological Survey Site Number** | |
| **Texas Commission on Environmental Quality Source Id** | |
| **Groundwater Conservation District Well Number** | |
| **Owner Well Number** | |
| **Other Well Number** | |
| **Previous State Well Number** | |
| **Reporting Agency** | |
| **Created Date** | |
| **Last Update Date** | |

| | |
|---|---|
| **Remarks** | Oil test. |

***Casing - No Data***

***Well Tests - No Data***

***Lithology - No Data***

***Annular Seal Range - No Data***

***Borehole - No Data***

***Plugged Back - No Data***

***Filter Pack - No Data***

***Packers - No Data***

## Water Level Measurements

No Data Available

## Water Quality Analysis - No Data Available

*GWDB DISCLAIMER: Except where noted, all of the information provided in the Texas Water Development Board (TWDB) Groundwater Database (https://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp) is believed to be accurate and reliable; however, the TWDB assumes no responsibility for any errors appearing in rules or otherwise. Further, TWDB assumes no responsibility for the use of the information provided. PLEASE NOTE that users of these data are responsible for checking the accuracy, completeness, currency and/or suitability of all information themselves. TWDB makes no guarantees or warranties as to the accuracy, completeness, currency, or suitability of the information provided via the Groundwater Database (GWDB). TWDB specifically disclaims any and all liability for any claims or damages that may result from providing GWDB data or the information it contains. For additional information or answers to questions concerning the TWDB GWDB, contact the Groundwater Data Team at GroundwaterData@twdb.texas.gov.*

# Texas Water Development Board (TWDB)
# Groundwater Database (GWDB)
# Well Information Report for State Well Number 38-06-301

GWDB Reports and Downloads

## Well Basic Details

Scanned Documents

| | |
|---|---|
| **State Well Number** | 3806301 |
| **County** | Cherokee |
| **River Basin** | Neches |
| **Groundwater Management Area** | 11 |
| **Regional Water Planning Area** | I - East Texas |
| **Groundwater Conservation District** | Neches & Trinity Valleys GCD |
| **Latitude** (decimal degrees) | 31.994167 |
| **Latitude** (degrees minutes seconds) | 31° 59' 39" N |
| **Longitude** (decimal degrees) | -95.281667 |
| **Longitude** (degrees minutes seconds) | 095° 16' 54" W |
| **Coordinate Source** | +/- 10 Seconds |
| **Aquifer Code** | NOT-APPL - Aquifer Code Is Not Applicable to this Well |
| **Aquifer** | Unassigned |
| **Aquifer Pick Method** | |
| **Land Surface Elevation** (feet above sea level) | 662 |
| **Land Surface Elevation Method** | Digital Elevation Model -DEM |
| **Well Depth** (feet below land surface) | 4959 |
| **Well Depth Source** | Another Government Agency |
| **Drilling Start Date** | |
| **Drilling End Date** | |
| **Drilling Method** | |
| **Borehole Completion** | |

| | |
|---|---|
| **Well Type** | Oil or Gas |
| **Well Use** | |
| **Water Level Observation** | None |
| **Water Quality Available** | No |
| **Pump** | |
| **Pump Depth** (feet below land surface) | |
| **Power Type** | |
| **Annular Seal Method** | |
| **Surface Completion** | |
| **Owner** | Hunt Oil Co.- Iria Tucker No.1 |
| **Driller** | |
| **Other Data Available** | |
| **Well Report Tracking Number** | |
| **Plugging Report Tracking Number** | |
| **U.S. Geological Survey Site Number** | |
| **Texas Commission on Environmental Quality Source Id** | |
| **Groundwater Conservation District Well Number** | |
| **Owner Well Number** | |
| **Other Well Number** | |
| **Previous State Well Number** | |
| **Reporting Agency** | |
| **Created Date** | |
| **Last Update Date** | |

| | |
|---|---|
| **Remarks** | Oil test. |

***Casing - No Data***

***Well Tests - No Data***

***Lithology - No Data***

***Annular Seal Range - No Data***

***Borehole - No Data***

***Plugged Back - No Data***

***Filter Pack - No Data***

***Packers - No Data***

## Water Level Measurements

No Data Available

## Water Quality Analysis - No Data Available

*GWDB DISCLAIMER: Except where noted, all of the information provided in the Texas Water Development Board (TWDB) Groundwater Database (https://www.twdb.texas.gov/groundwater/data/gwdbrpt.asp) is believed to be accurate and reliable; however, the TWDB assumes no responsibility for any errors appearing in rules or otherwise. Further, TWDB assumes no responsibility for the use of the information provided. PLEASE NOTE that users of these data are responsible for checking the accuracy, completeness, currency and/or suitability of all information themselves. TWDB makes no guarantees or warranties as to the accuracy, completeness, currency, or suitability of the information provided via the Groundwater Database (GWDB). TWDB specifically disclaims any and all liability for any claims or damages that may result from providing GWDB data or the information it contains. For additional information or answers to questions concerning the TWDB GWDB, contact the Groundwater Data Team at GroundwaterData@twdb.texas.gov.*

# STATE OF TEXAS WELL REPORT for Tracking #269945

| | | | |
|---|---|---|---|
| Owner: | **Ralph Jarvis** | Owner Well #: | **1** |
| Address: | **P.O. Box 2437<br>Jacksonville, TX 75766** | Grid #: | **34-62-9** |
| Well Location: | **598 CR 4105<br>Jacksonville, TX 75766** | Latitude: | **32° 00' 57" N** |
| | | Longitude: | **095° 15' 40" W** |
| Well County: | **Cherokee** | Elevation: | **459 ft. above sea level** |
| Type of Work: | **New Well** | Proposed Use: | **Domestic** |

Drilling Start Date: **10/21/2011** Drilling End Date: **10/22/2011**

Borehole:

| *Diameter (in.)* | *Top Depth (ft.)* | *Bottom Depth (ft.)* |
|---|---|---|
| **7.875** | **0** | **442** |

Drilling Method: **Mud (Hydraulic) Rotary**

Borehole Completion: **Filter Packed; Straight Wall**

Filter Pack Intervals:

| *Top Depth (ft.)* | *Bottom Depth (ft.)* | *Filter Material* | *Size* |
|---|---|---|---|
| **380** | **442** | **Gravel** | **16-30** |

Annular Seal Data:

| *Top Depth (ft.)* | *Bottom Depth (ft.)* | *Description (number of sacks & material)* |
|---|---|---|
| **0** | **10** | **6/ cement** |

Seal Method: **pour**

Sealed By: **Charles Jackson**

Distance to Property Line (ft.): **n/a**

Distance to Septic Field or other concentrated contamination (ft.): **n/a**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Sleeve Installed**

Water Level: **No Data**

Packers: **No Data**

Type of Pump: **Submersible** Pump Depth (ft.): **380**

Well Tests: **Pump** **Yield: 17 GPM**

Water Quality:

| Strata Depth (ft.) | Water Type |
|---|---|
| **50** | **Good** |

Chemical Analysis Made: **Unknown**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **Unknown**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **Jackson Distributors**

**431 CR 862**
**Cushing, TX 75760**

Driller Name: **Charles E. Jackson** License Number: **4692**

Apprentice Name: **Charles N. Jackson** Apprentice Number: **58687**

Comments: **No Data**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

| From (ft) To (ft) Description |
|---|
| **0-22ft Red Sand** |
| **22-65ft White Sand** |
| **65-120ft Gray Sand/ Clay** |
| **120-290ft Clay** |
| **290-310ft Gray Sand** |
| **310-325ft Clay** |
| **325-345ft Sand/ Clay** |
| **345-390ft Clay** |
| **390-430ft Sand, Coarse** |
| **430-442ft Clay** |

Casing:
BLANK PIPE & WELL SCREEN DATA

| Dia. (in.) New/Used Type Setting From/To (ft.) |
|---|
| **4" New PVC sch 40 0-380ft** |
| **4" New PVC sch 40 Screen 380-430ft .016** |
| **4" New PVC sch 40 430-442ft** |

**IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY**

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

**Texas Department of Licensing and Regulation**
**P.O. Box 12157**
**Austin, TX 78711**
**(512) 334-5540**

# STATE OF TEXAS WELL REPORT for Tracking #218846

| | | | |
|---|---|---|---|
| Owner: | **Ralph Jarvis** | Owner Well #: | **No Data** |
| Address: | **598 CR 4105<br>Jacksonville, TX 75766** | Grid #: | **34-62-9** |
| | | Latitude: | **32° 00' 48" N** |
| Well Location: | **598 CR 4105<br>Jacksonville, TX 75766** | Longitude: | **095° 15' 26" W** |
| Well County: | **Cherokee** | Elevation: | **No Data** |
| Type of Work: | **New Well** | Proposed Use: | **Irrigation** |

Drilling Start Date: **11/12/2008** Drilling End Date: **11/13/2008**

Borehole:

| *Diameter (in.)* | *Top Depth (ft.)* | *Bottom Depth (ft.)* |
|---|---|---|
| **7.5** | **0** | **80** |

Drilling Method: **Mud (Hydraulic) Rotary**

Borehole Completion: **Filter Packed**

Filter Pack Intervals:

| *Top Depth (ft.)* | *Bottom Depth (ft.)* | *Filter Material* | *Size* |
|---|---|---|---|
| **40** | **90** | **Gravel** | |

Annular Seal Data:

| *Top Depth (ft.)* | *Bottom Depth (ft.)* | *Description (number of sacks & material)* |
|---|---|---|
| **0** | **12** | **6 sacks** |

Seal Method: **Batch**

Sealed By: **BI Owens**

Distance to Property Line (ft.): **100+**

Distance to Septic Field or other concentrated contamination (ft.): **55+**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **Owner**

Surface Completion: **Surface Sleeve Installed**

Water Level: **35 ft.** below land surface on **2008-11-13** Measurement Method: **Unknown**

Packers: **No Data**

Type of Pump: **Submersible** Pump Depth (ft.): **60**

Well Tests: **Jetted** **Yield: 26 GPM with 10 ft. drawdown after 3 hours**

Water Quality:

| Strata Depth (ft.) | Water Type |
|---|---|
| **No Data** | **No Data** |

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **Owens Drilling & Services**

**18696 CR 32**
**Lindale, TX 75771**

Driller Name: **B.I. Owens** License Number: **54608**

Apprentice Name: **Billy R. Owens** Apprentice Number: **57567**

Comments: **$mew**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

| Top (ft.) | Bottom (ft.) | Description |
|---|---|---|
| **0** | **4** | **Surface Sand** |
| **4** | **18** | **Sandy Clay** |
| **18** | **32** | **Sand** |
| **32** | **36** | **Gravel** |
| **32** | **52** | **Sand** |
| **52** | **55** | **Lignite** |
| **55** | **78** | **Sand** |
| **78** | **80** | **Sand** |

Casing:
BLANK PIPE & WELL SCREEN DATA

| Dia. (in.) | New/Used | Type | Setting From/To (ft.) |
|---|---|---|---|
| **4** | **New** | **P. Casing** | **0 - 55** |
| **4** | **New** | **P. Screen** | **55 - 75 20** |
| **4** | **New** | **P. Casing** | **75 - 80** |

**IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY**

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Please include the report's Tracking Number on your written request.

**Texas Department of Licensing and Regulation**
**P.O. Box 12157**
**Austin, TX 78711**
**(512) 334-5540**

# STATE OF TEXAS WELL REPORT for Tracking #242701

| | | | |
|---|---|---|---|
| Owner: | **Cliff Powell** | Owner Well #: | **1** |
| Address: | **15822 US Hwy 79 E<br>Jacksonville, TX 75760** | Grid #: | **34-62-9** |
| | | Latitude: | **32° 00' 53" N** |
| Well Location: | **Dennis Road<br>Jacksonville, TX** | Longitude: | **095° 16' 31" W** |
| Well County: | **Cherokee** | Elevation: | **No Data** |
| Type of Work: | **New Well** | Proposed Use: | **Domestic** |

Drilling Start Date: **10/15/2008** Drilling End Date: **10/25/2008**

| | *Diameter (in.)* | *Top Depth (ft.)* | *Bottom Depth (ft.)* |
|---|---|---|---|
| Borehole: | **7.875** | **0** | **260** |

Drilling Method: **Mud (Hydraulic) Rotary**

Borehole Completion: **Filter Packed; Straight Wall**

| | *Top Depth (ft.)* | *Bottom Depth (ft.)* | *Filter Material* | *Size* |
|---|---|---|---|---|
| Filter Pack Intervals: | **200** | **255** | **Gravel** | **16-20** |

| | *Top Depth (ft.)* | *Bottom Depth (ft.)* | *Description (number of sacks & material)* |
|---|---|---|---|
| Annular Seal Data: | **0** | **10** | **8 cement** |

Seal Method: **Unknown**

Sealed By: **Unknown**

Distance to Property Line (ft.): **na**

Distance to Septic Field or other concentrated contamination (ft.): **na**

Distance to Septic Tank (ft.): **No Data**

Method of Verification: **No Data**

Surface Completion: **Surface Sleeve Installed**

Water Level: **110 ft.** below land surface on **2008-10-25** Measurement Method: **Unknown**

Packers: **No Data**

Type of Pump: **Submersible** Pump Depth (ft.): **200**

Well Tests: **Jetted** **Yield: 35 GPM**

Water Quality:

| Strata Depth (ft.) | Water Type |
|---|---|
| **50** | **Good** |

Chemical Analysis Made: **No**

Did the driller knowingly penetrate any strata which contained injurious constituents?: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the report(s) being returned for completion and resubmittal.

Company Information: **Jackson Distributors**

**431 CR 862**
**Cushing, TX 75760**

Driller Name: **Charles E. Jackson** License Number: **4692**

Comments: **$mew**

Lithology:
DESCRIPTION & COLOR OF FORMATION MATERIAL

| Top (ft.) | Bottom (ft.) | Description |
|---|---|---|
| **0** | **2** | **Topsoil** |
| **2** | **20** | **Red Clay & Rock** |
| **20** | **100** | **Clay & Shale Mix** |
| **100** | **102** | **Rock** |
| **102** | **140** | **Sand-Fine** |
| **140** | **205** | **Gray Sand & Shale Mix** |
| **205** | **255** | **White Sand-Medium** |
| **255** | **260** | **Shale & Clay** |

Casing:
BLANK PIPE & WELL SCREEN DATA

| Dia. (in.) New/Used Type Setting From/To (ft.) |
|---|
| **4 New PVC Sch40 0 - 200 Sch40** |
| **4 New PVC Screen 200 - 255 .020** |
| **4 New PVC 255 - 260 Sch40** |

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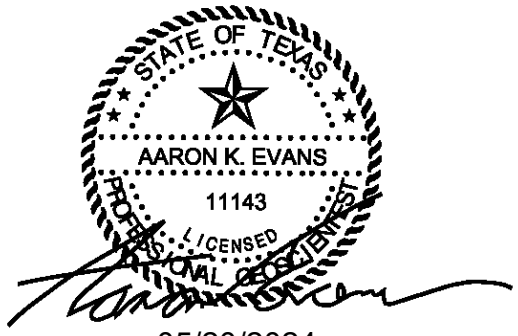
**P.O. Box 12157**
**Austin, TX 78711**
**(512) 334-5540**

# APPENDIX IIIG-B

# SITE EXPLORATION DATA




05/20/2024

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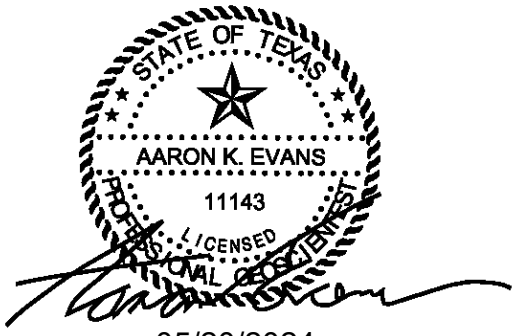
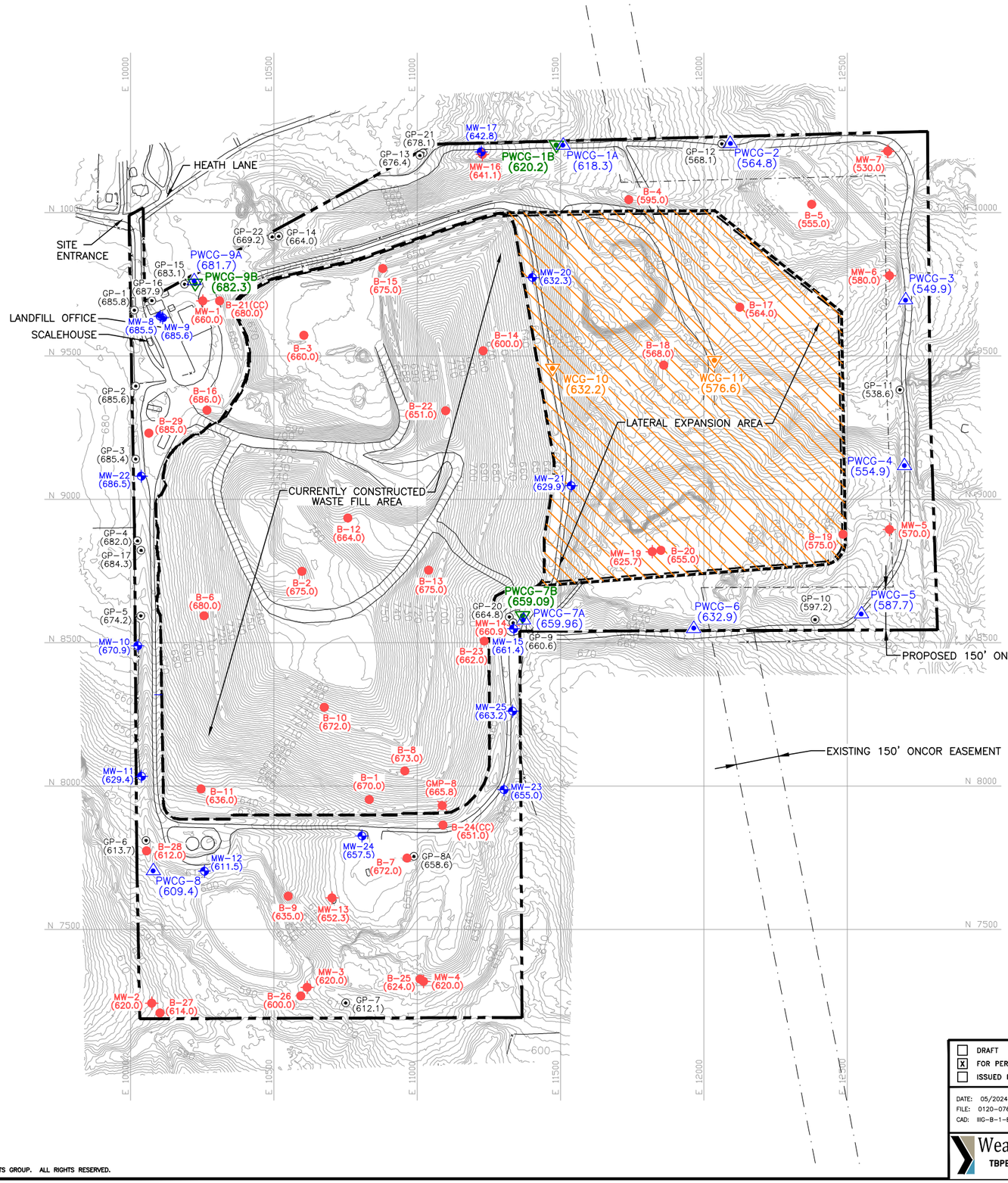
FIGURE IIIG-B-1 – Boring and Well Location Map

| | |
|---|---|
| 1981 Borehole Logs by National Soil Services | IIIG-B-2 |
| 1982 Borehole Logs by Maxim Engineers | IIIG-B-9 |
| 1987 Borehole Logs by East Texas Testing Laboratory | IIIG-B-29 |
| 1993 Borehole Logs by Golder Associates | IIIG-B-44 |
| 1994 Borehole Logs by Groundwater Technology | IIIG-B-60 |
| 2002 Borehole Log by Weaver Boos and Gordon | IIIG-B-108 |
| 2003 Borehole Logs by Weaver Boos Consultants | IIIG-B-110 |
| 2009 Borehole Logs by The Carel Corporation | IIIG-B-125 |
| 2017 Borehole Log by Hydrex Environmental | IIIG-B-132 |
| 2023 Borehole Logs by Weaver Consultants Group | IIIG-B-134 |


05/20/2024



05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- B-3 (660.0) — PREVIOUSLY ADVANCED BOREHOLE LOCATION
- MW-1 (661.0) — FORMER GROUNDWATER MONITOR WELL LOCATION
- GP-8 (666.0) — FORMER GAS MONITOR PROBE LOCATION
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- GP-1 (686.0) — EXISTING GAS MONITOR PROBE LOCATION
- PWCG-1A (618.3) — 2023 DEEP EXPANSION BOREHOLE WITH PIEZOMETER
- PWCG-1B (620.2) — 2023 SHALLOW EXPANSION BOREHOLE WITH PIEZOMETER
- WCG-10 (632.2) — 2023 EXPANSION BOREHOLE

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. FORMER BOREHOLE, GROUNDWATER MONITOR WELL, AND GAS MONITOR PROBE LOCATION COORDINATES OBTAINED FROM PREVIOUS SUBSURFACE INVESTIGATION AND INSTALLATION REPORT LITHOLOGIC LOGS, SUMMARY TABLES, AND DRAWINGS.
3. EXISTING GROUNDWATER MONITOR WELL AND 2023 EXPANSION BOREHOLE LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
4. GROUND SURFACE ELEVATION AT TIME OF DRILLING POSTED AT EACH BOREHOLE LOCATION IN FT-MSL.

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- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 05/2024
FILE: 0120-076-11
CAD: IIIG-B-1-BOREHOLE LOCATION MAP.DWG
DRAWN BY: RAA
DESIGN BY: DCS
REVIEWED BY: AKE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
PINE HILL FARMS LANDFILL TX, LP

REVISIONS

| NO. | DATE | DESCRIPTION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

# MAJOR PERMIT AMMENDMENT
## BOREHOLE LOCATION MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIG-B-1

O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-B-1 - BOREHOLE LOCATION MAP.dwg, byoung, 1:2

# 1981 BOREHOLE LOGS
# BY NATIONAL SOIL SERVICES

# LOG OF BORING NO. B-1

PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed  LOCATION: See Plan of Borings, Plate 1

ELEVATION: 670' (Appr.)

| DEPTH, FT. | SYMBOL | SAMPLES | SOIL DESCRIPTION | BLOWS PER FT. | % PASSING NO. 200 SIEVE | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE CONTENT, % | SHEAR STRENGTH IN TONS/SQ FT. (0.5 1.0 1.5) | UNIT DRY WT. LBS./CU. FT. |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | Medium dense tan silty fine sand, w/organics (SM) | 24 | | | | | | |
| 5 | | | Very dense yellowish-tan clayey fine sand, w/ironstone (SC) | 50 | | | | | | |
| 10 | | | Very stiff to hard gray clay, w/silt, heavily iron stained | 22 | 87 | 92 | 34 | | | |
| 15 | | | -w/ironstone (CH) | | | | | | | |
| 20 | | | Very dense grayish-green clayey silt (MH) | 50/3" | | | | | | |
| 25 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 35 | | | | | | | | | | |

COMPLETION DEPTH: 20.0'
DATE: 7/24/81

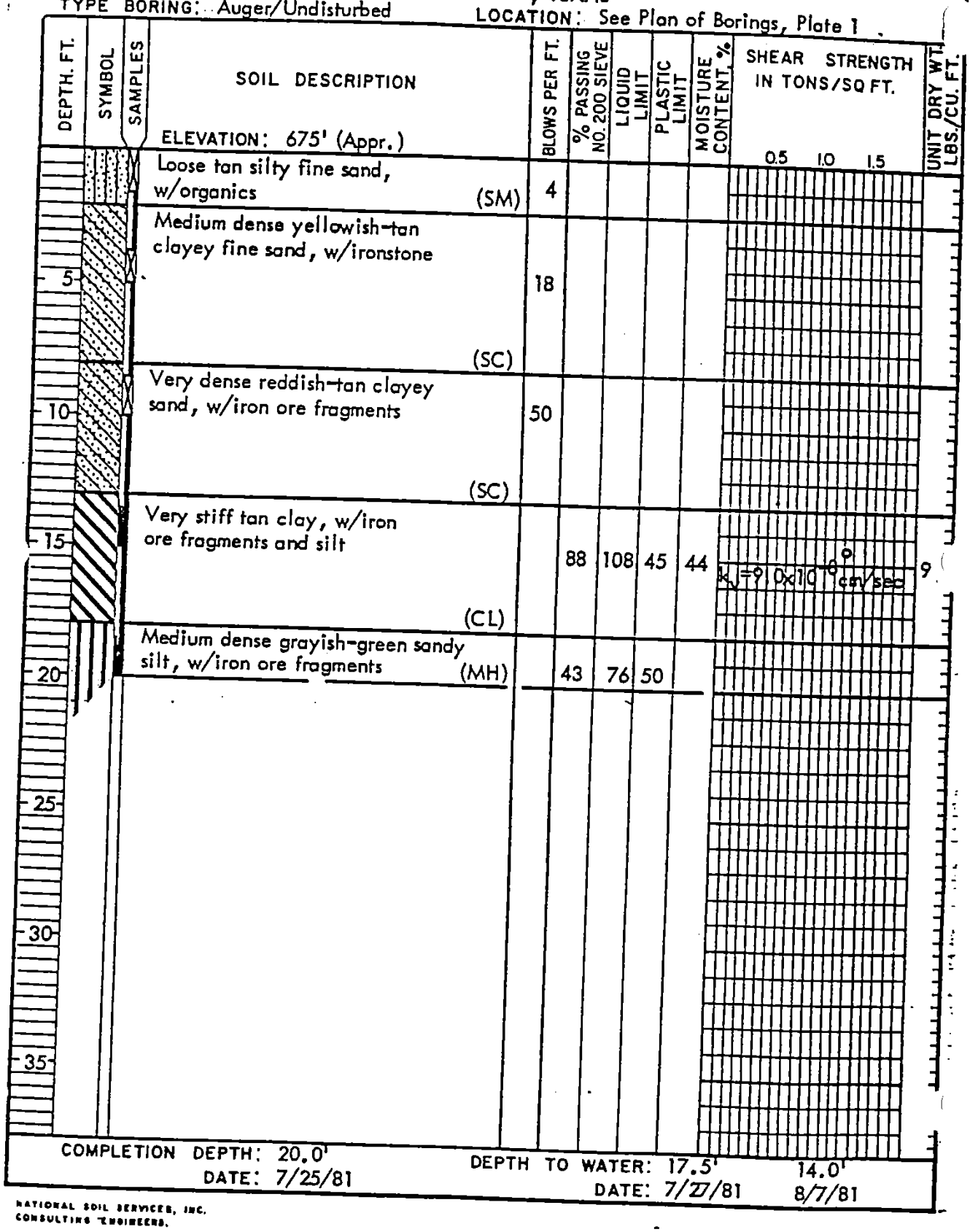
DEPTH TO WATER: 18.0' 15.0'
DATE: 7/25/81 8/7/81

NATIONAL SOIL SERVICES, INC.
CONSULTING ENGINEERS.

# LOG OF BORING NO. B-2

PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed LOCATION: See Plan of Borings, Plate 1




COMPLETION DEPTH: 20.0'
DATE: 7/25/81

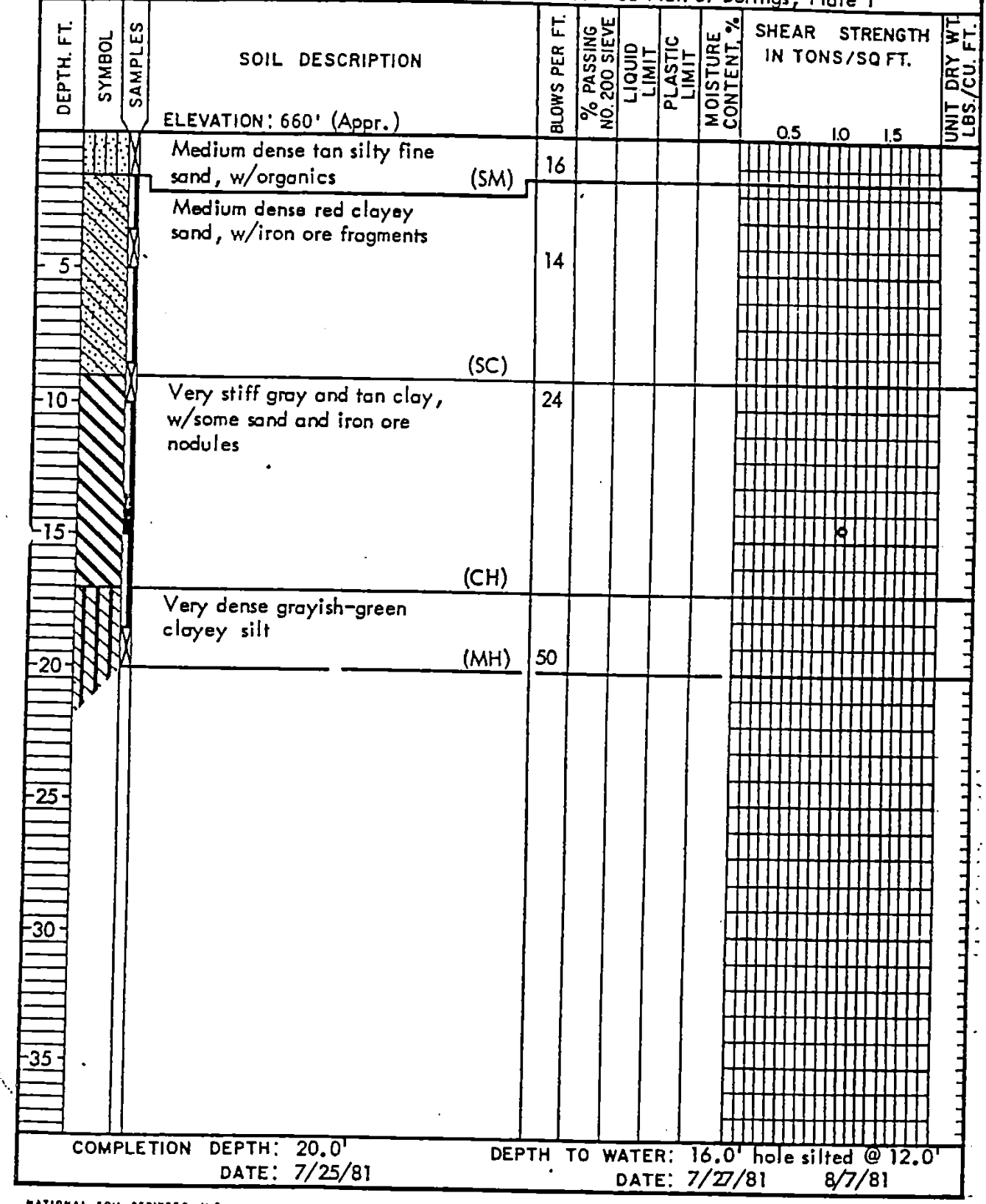
DEPTH TO WATER: 17.5' 14.0'
DATE: 7/27/81 8/7/81

NATIONAL SOIL SERVICES, INC.
CONSULTING ENGINEERS.

# LOG OF BORING NO. B-3

PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed LOCATION: See Plan of Borings, Plate 1




COMPLETION DEPTH: 20.0'
DATE: 7/25/81

DEPTH TO WATER: 16.0' hole silted @ 12.0'
DATE: 7/27/81 8/7/81

NATIONAL SOIL SERVICES, INC.
CONSULTING ENGINEERS.

# LOG OF BORING NO. B-4

PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed  LOCATION: See Plan of Borings, Plate 1

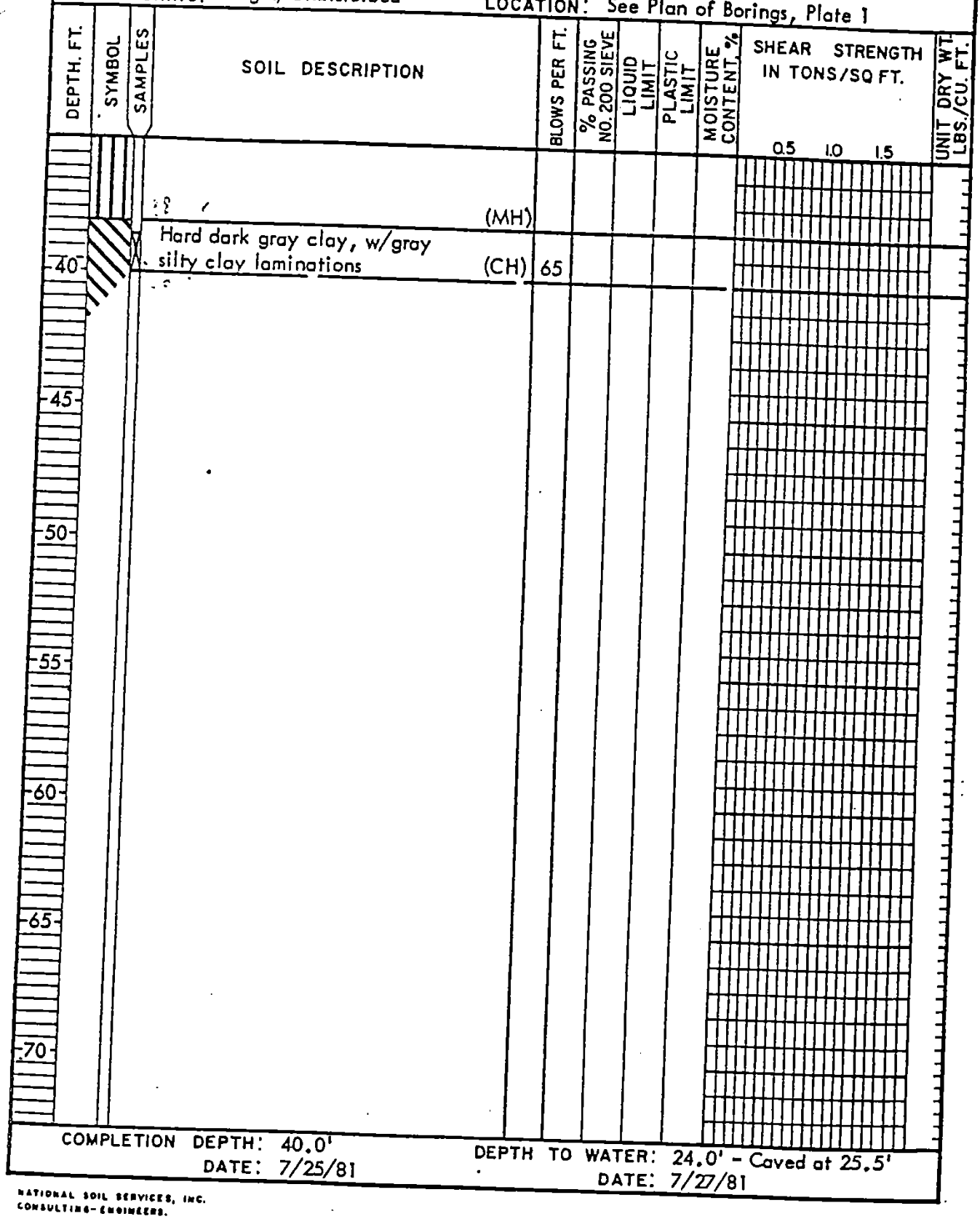
| DEPTH, FT. | SYMBOL | SAMPLES | SOIL DESCRIPTION | BLOWS PER FT. | % PASSING NO. 200 SIEVE | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE CONTENT, % | SHEAR STRENGTH IN TONS/SQ FT. (0.5 / 1.0 / 1.5) | UNIT DRY WT. LBS./CU. FT. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | ELEVATION: 595' (Appr.) | | | | | | | |
| 5 | | | Very stiff red sandy clay, w/iron ore nodules and clayey sand pockets, some organics | 26 | | | | | | |
| | | | | 21 | 51 | 46 | 16 | | | |
| 10 | | | (CL) | | | | | | | |
| 15 | | | Dense to very dense gray and yellowish-tan clayey fine sand, w/silt and iron stains | | | | | | | |
| 20 | | | -increase clay content | 83 | | | | | | |
| 25 | | | -w/tannish-gray clay pockets and iron ore nodules | | 35 | 27 | 25 | 24 | $k_v = 1.5 \times 10^{-5}$ cm/sec | 96 |
| 30 | | | -decrease clay content (SC) | 50 | | | | | | |
| 35 | | | Very dense grayish-green sandy silt | 50 | 21 | | | 23 | | |

(Continued)

NATIONAL SOIL SERVICES, INC.
CONSULTING ENGINEERS.

LOG OF BORING NO. B-4 (Cont'd.)
PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed
LOCATION: See Plan of Borings, Plate 1




COMPLETION DEPTH: 40.0'
DATE: 7/25/81

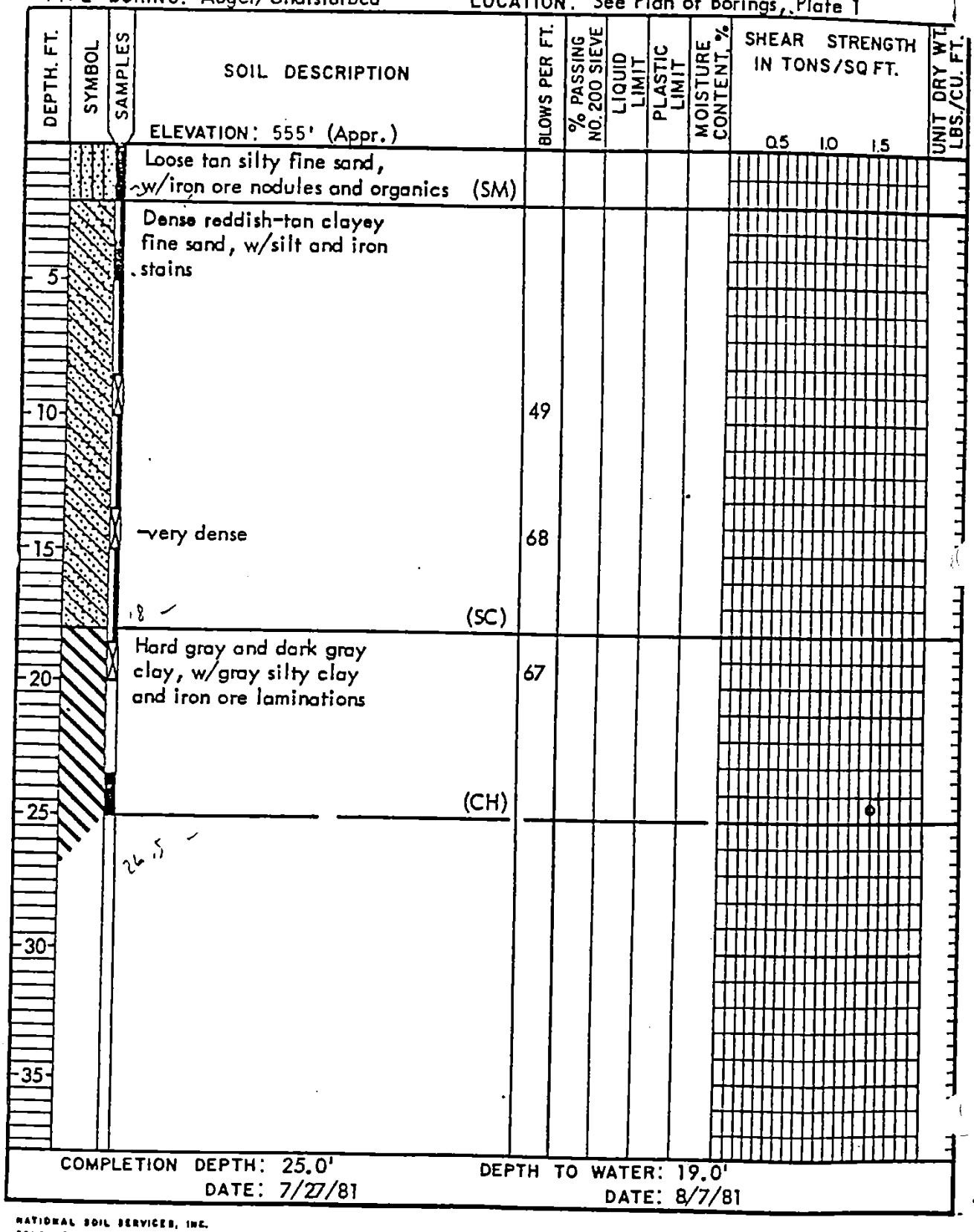
DEPTH TO WATER: 24.0' - Caved at 25.5'
DATE: 7/27/81

NATIONAL SOIL SERVICES, INC.
CONSULTING-ENGINEERS.

# LOG OF BORING NO. B 5

PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed LOCATION: See Plan of Borings, Plate 1




COMPLETION DEPTH: 25.0'
DATE: 7/27/81

DEPTH TO WATER: 19.0'
DATE: 8/7/81

NATIONAL SOIL SERVICES, INC.
CONSULTING ENGINEERS.

# 1982 BOREHOLE LOGS
# BY MAXIM ENGINEERS

# Log of Boring

Symbol: B-6

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 680'

| Depth | Samples | Symbol | Stratum Description | | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LOOSE TAN SILTY FINE SAND with organics (top 2" is topsoil) | | | | | | | 5 | |
| | | | 2.0' | (SM) | | | | | | | |
| | | | MEDIUM DENSE YELLOWISH TAN SILTY FINE SAND slightly clayey | | | | | | | | |
| | | | | | 12 | | | | | 11 | |
| 5 | | | | | | | | | | | |
| | | | 6.0' | (SM) | | | | | | | |
| | | | MEDIUM DENSE YELLOWISH TAN CLAYEY SAND with gray clay pockets and iron ore concretions | | | | | | | 22 | |
| | | | -with iron ore concretions | | 16 | | 26 | 15 | 11 | 65 | |
| 10 | | | | | | | | | | | |
| | | | 11.0' | (SC) | | | | | | | |
| | | | HARD YELLOWISH TAN AND GRAY SANDY CLAY with some iron ore nodules | | | | | | | | |
| | | | | | 21 | | | | | 40 | |
| 15 | | | | | | | | | | | |
| | | | 16.5' | (CL) | | | | | | | |
| | | | HARD YELLOWISH TAN SILTY CLAY moist, with some iron ore | | | | | | | | |
| | | | | | 28 | | 73 | 50 | 46 | 27 | |
| | | | 19.5' | (CH) | | | | | | | |
| 20 | | | | | | | | | | | |
| 25 | | | | | | | | | | | |

Completion Depth: 19.5'

Date: 12/21/82

Water Observations: Water level at 10.0' and caved at 14.5' upon completion. Water level at 7.0' and caved at 8.0' on 12/28/82.

Maxim Engineers

# Log of Boring

Number B-7

Location See Plan of Borings

Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type Intermittent Sampling

Surface Elevation Approximate 672'

| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DENSE REDDISH TAN SILTY FINE SAND with iron ore | | | | | | 50/3" | |
| | | | 2.5' (SM) | | | | | | | |
| | | | HARD REDDISH TAN CLAY with gray clay and iron ore concretions | 33 | | 62 | 35 | 27 | 80 | |
| | | | Remolded permeability = $7.6 \times 10^{-8}$ cm/sec | | | | | | | |
| 5 | | | 5.0' (CH) | | | | | | | |
| | | | HARD YELLOWISH TAN AND GRAY CLAY slickensided, with iron ore gravel | 41 | | 75 | 43 | 32 | 46 | |
| | | | 7.0' (CH) | | | | | | | |
| | | | HARD REDDISH TO YELLOWISH TAN CLAY with iron ore gravel | 34 | | 53 | 38 | 15 | 53 | |
| 10 | | | | | | | | | | |
| | | | 13.0' (CH) | | | | | | | |
| | | | VERY DENSE REDDISH TAN CLAYEY SAND with iron ore concretions | 40 | | | | | 50/2" seat | |
| 15 | | | | | | | | | | |
| | | | -moist with increasing sand and gravel | 39 | | | | | 50/3" seat | |
| 20 | | | | | | | | | | |
| | | | 21.0' (SC) | | | | | | | |
| | | | VERY DENSE GREENISH GRAY CLAYEY SAND glauconitic, cemented | | | | | | | |
| 25 | | | | | | | | | | |

# Log of Boring

Number: B-7 cont'd

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | VERY DENSE GREENISH GRAY CLAYEY SAND | | | | | | | |
| | | | 27.0' (SC) | | | | | | | |
| | | | VERY DENSE GREENISH GRAY CLAYEY SILT glauconitic | | | | | | | |
| | | | | 53 | | 63 | 60 | 3 | 50/8" | |
| 30 | | | | | | | | | | |
| | | | 32.5' (MH) | | | | | | | |
| | | | HARD GREENISH GRAY SILTY CLAY glauconitic, with some sand | | | | | | 50/5" seat | |
| 35 | | | | | | | | | | |
| | | | -increasing sand | | | | | | | |
| | | | 39.5' (CH) | | | | | | 79 | |
| 40 | | | | | | | | | | |
| 45 | | | | | | | | | | |
| 50 | | | | | | | | | | |

Completion Depth: 39.5' Date: 12/21/82

Water Observations: Water level at 18.0' and caved at 33.0' on 12/29/82.

Marin Engineers

# Log of Boring

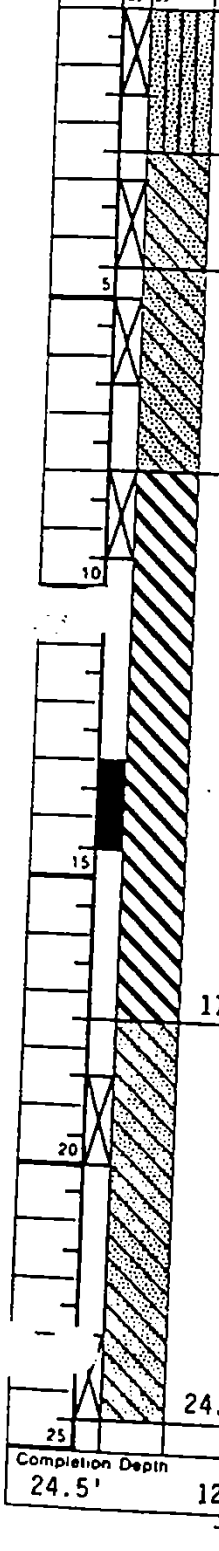
Number: B-8

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 673'




| Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|
| LOOSE REDDISH TAN SILTY FINE SAND with some organics | | | | | | 8 | |
| 2.5' (SM) | | | | | | | |
| VERY DENSE YELLOWISH TAN CLAYEY SAND with iron ore gravel | | | | | | 50/3" seat | |
| 4.5' (SC) | | | | | | | |
| VERY DENSE REDDISH BROWN CLAYEY SAND with iron ore gravel | | | | | | 50/4" seat | |
| 8.0' (SC) | | | | | | | |
| HARD YELLOWISH TAN AND GRAY CLAY with some sand pockets | 29 | | 56 | 30 | 26 | 39 | |
| 17.5' (CH) | | | | | | | |
| VERY DENSE GREENISH GRAY CLAYEY SAND glauconitic, cemented | | | | | | 50/5" seat | |
| 24.5' (SC) | | | | | | | |

Completion Depth: 24.5'

Date: 12/23/82

Water Observations: Water level at 14.0' and caved at 16.0' on 12/28/82.

# Log of Boring

Number: B-9

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 635'

| Depth | Samples | Symbol | Stratum Description | | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | STIFF REDDISH TAN SILTY CLAY with iron ore concretions | | | | | | | 10 | |
| | | | -with iron ore concretions | | | | | | | | |
| | | | | 3.0' (CL) | | | | | | | |
| 5 | | | HARD YELLOWISH TAN AND GRAY CLAY with some sand pockets | | 42 | | 66 | 43 | 23 | 40 | |
| | | | | 5.0' (CH) | | | | | | | |
| | | | VERY DENSE REDDISH BROWN SILTY SAND with iron ore | | | | | | | 50/1" seat | |
| | | | -with some reddish brown clay seams | | 19 | | | | | 50/5" seat | |
| 10 | | | | | | | | | | | |
| | | | | 12.0' (SM) | | | | | | | |
| | | | VERY STIFF GREENISH GRAY SILTY CLAY glauconitic, with some sand lenses | | | | | | | | |
| | | | -H. P. = 4.0 tsf | | | | | | | | |
| 15 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| | | | -with iron ore concretions | 21.5' (CL) | | | | | | | |
| | | | VERY DENSE GREENISH GRAY CLAYEY SAND glauconitic, cemented | | | | | | | | |
| | | | | 24.5' (SC) | | | | | | 50+ | |
| 25 | | | | | | | | | | | |

Completion Depth: 24.5'

Date: 12/23/82

Water Observations: Dry and caved at 8.0' upon completion. Water level at 11.0' and caved at 16.5' on 12/28/82.

# Log of Boring

Number: B-10

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 672'

| Depth | Samples | Symbol | Stratum Description | | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Percent Passing No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LOOSE TAN SILTY SAND with organics, topsoil | (SM) | 22 | | 27 | 15 | 12 | 9 | |
| | | | .5' FIRM REDDISH TAN SANDY TO SILTY CLAY moist, with iron ore nodules | (CL) | | | | | | | |
| | | | 2.0' VERY DENSE REDDISH BROWN SILTY FINE SAND with iron ore | | | | | | | 50/1" seat | |
| 5 | | | 5.0' | (SM) | | | | | | | |
| | | | DENSE YELLOWISH TAN CLAYEY SAND with gray clay pockets and iron ore gravel | | 34 | | | | | 43 | |
| | | | | | | | | | | 49 | |
| 10 | | | 10.0' | (SC) | | | | | | | |
| | | | HARD YELLOWISH TAN CLAY with some silt seams and iron ore gravel concretions | | | | | | | | 60 |
| | | | Remolded permeability = $1.5 \times 10^{-7}$ cm/sec | | 41 | | 72 | 41 | 31 | 52 | |
| 15 | | | | | | | | | | | |
| | | | -with iron ore concretions | | | | | | | 50+ | |
| 20 | | | 21.0' | (CH) | | | | | | | |
| | | | VERY DENSE GREENISH GRAY SILTY SAND glauconitic, cemented | | | | | | | | |
| | | | 24.5' | (SM) | | | | | | 50/4" seat | |
| 25 | | | | | | | | | | | |

Completion Depth: 24.5'

Date: 12/23/82

Water Observations: Dry and caved at 4.0' upon completion. Dry and caved at 2.0' on 12/28/82.

# Log of Boring

Number: B-11

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 636'

| Depth | Samples | Symbol | Stratum Description | | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | LOOSE FINE CLAYEY SAND with some iron ore nodules and organic matter | | | | | | | 2 | |
| 2.0' | | | | (SC) | | | | | | | |
| | | | VERY DENSE REDDISH TAN CLAYEY SAND with iron ore nodules and silty clay pockets | | | | | | | 50/3" | |
| 5 5.0' | | | | (SC) | | | | | | | |
| | | | HARD REDDISH BROWN CLAY with clayey sand pockets, ironstone concretions, and limonite stains | | 48 | | | | | 77 | |
| 9.0' | | | | (CH) | 50 | | | | | | |
| 10 | | | VERY DENSE GREENISH GRAY (glauconitic) SILTY FINE SAND with silty clay | | | | | | | | |
| | | | | | 50 | | | | | | |
| 15 | | | | | | | | | | | |
| | | | | | | | | | | 50/3" | |
| 20 | | | | | | | | | | | |
| 21.0' | | | | (SM) | | | | | | | |
| | | | VERY DENSE GREENISH GRAY SILTY FINE SAND with dark gray clayey silt pockets | | | | | | | 50/4" | |
| 24.5' | | | | (SM) | | | | | | | |
| 25 | | | | | | | | | | | |

Completion Depth: 24.5'

Date: 1/5/83

Water Observations: Dry and caved at 22.0' upon completion.

# Log of Boring

Number B-12

Location See Plan of Borings

Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type Intermittent Sampling

Surface Elevation Approximate 664'

| Depth | Samples | Symbol | Stratum Description | Moisture Content, % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | LOOSE TAN SILTY FINE SAND with organics (top 2" is topsoil) | | | | | | 6 | |
| | | | 3.0' (SM) | | | | | | | |
| 5 | | | HARD YELLOWISH TAN AND GRAY CLAY with iron ore concretions | | | | | | 50/2" | |
| | | | Permeability = $9.1 \times 10^{-8}$ cm/sec | 31 | | 74 | 34 | 40 | | |
| | | | 7.0' (CH) | | | | | | | |
| 10 | | | VERY DENSE REDDISH TAN CLAYEY SAND with iron ore concretions | 19 | | | | | 50/2" | |
| | | | 11.5' (SC) | | | | | | | |
| 15 | | | HARD YELLOWISH TAN SANDY CLAY with some gray clay and iron ore | 36 | | 68 | 37 | 31 | | |
| | | | Remolded permeability = $3.4 \times 10^{-8}$ cm/sec | | | | | | | |
| | | | 18.5' (CH) | | | | | | | |
| 20 | | | HARD GREENISH GRAY SILTY CLAY glauconitic, with sand pockets | 38 | | 47 | 42 | 5 | 65 | |
| | | | 24.5' (ML) | | | | | | | |
| 25 | | | | | | | | | | |

Completion Depth 24.5' Date 12/23/82

Water Observations Dry and caved at 18.0' upon completion. Water level at 15.0' and caved at 17.0' on 12/28/82.

# Log of Boring

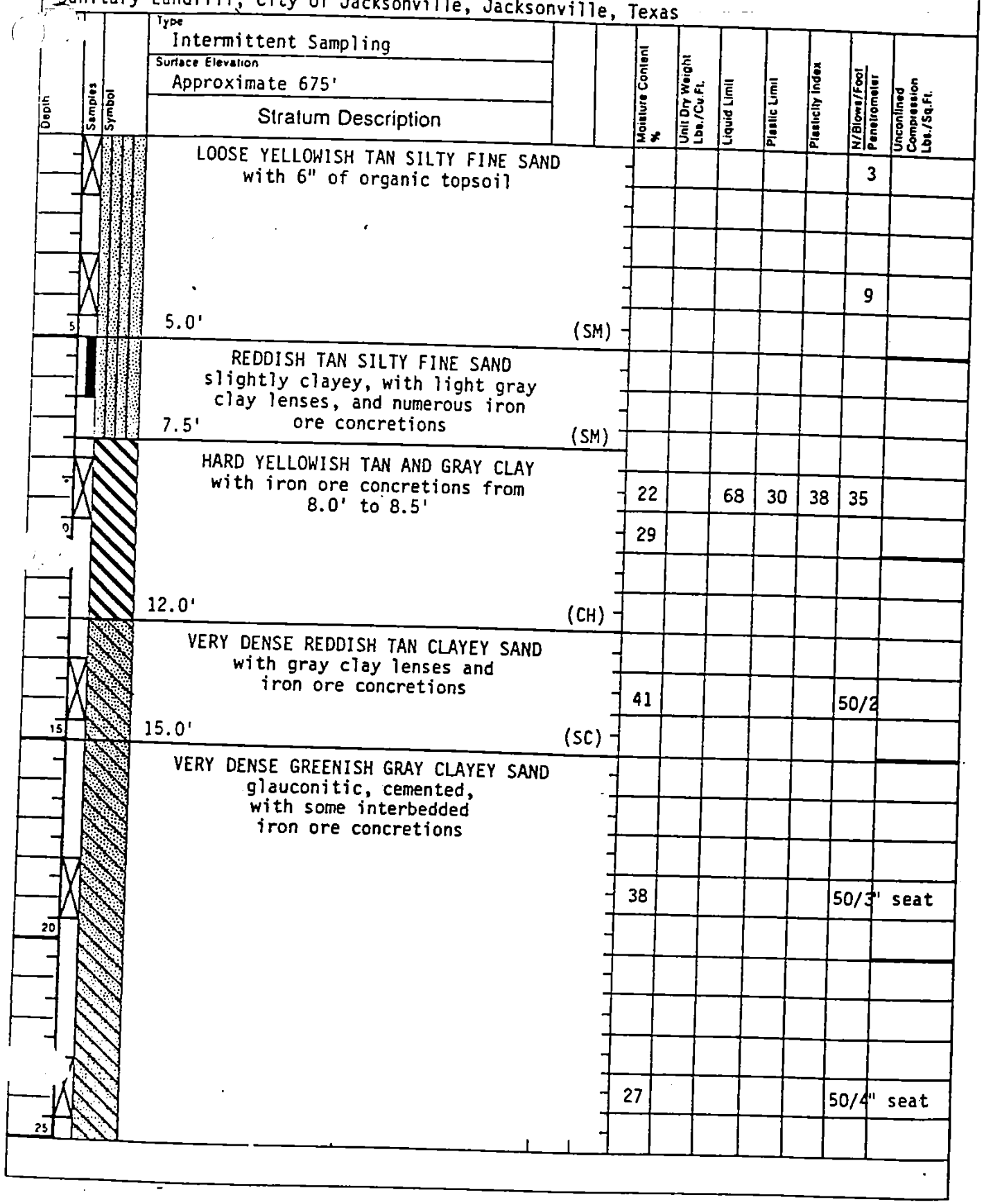
Number: B-13

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 675'



# Log of Boring

Number: B-13 cont'd

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | VERY DENSE GREENISH GRAY CLAYEY SAND | | | | | | | |
| | | | | | | | | | 50/3" seat | |
| 30 | | | | | | | | | | |
| | | | | | | | | | 50/10" | |
| 35 | | | | | | | | | | |
| | | | | | | | | | | |
| | | | 39.5' (SC) | | | | | | 50/2" seat | |
| 40 | | | | | | | | | | |
| 45 | | | | | | | | | | |
| 50 | | | | | | | | | | |

Completion Depth: 39.5' Date: 12/21/82

Water Observations: Water level at 20.0' and caved at 35.0' upon completion. Water level at 13.0' and caved at 17.0' on 1/4/83.

# Log of Boring

Number B-14

Location See Plan of Borings

Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type Intermittent Sampling

Surface Elevation Approximate 600'

| Depth | Samples | Symbol | Stratum Description | | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Percent Passing No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | HARD REDDISH BROWN SILTY CLAY with organics | | 28 | | 51 | 32 | 19 | 47 | |
| | | | | 2.5' (CH) | | | | | | | |
| 5 | | | MEDIUM DENSE REDDISH BROWN TO YELLOWISH TAN SILTY FINE SAND with clay, organics, and hematite stains | | 19 | | | | | | |
| | | | | 8.0' (SM) | | | | | | | |
| | | | STIFF GRAY SILTY CLAY with silty fine sand laminations and hematite stains | | 25 | | | | | | |
| | | | | 11.0' (CL) | | | | | | | |
| 15 | | | HARD DARK GRAYISH BROWN SILTY CLAY with silty fine sand laminations | | 22 | | 33 | 20 | 13 | 50/7" | 50 |
| | | | | 15.0' (CL) | | | | | | | |
| | | | GRAY SILTY FINE SAND seepage | | | | | | | | |
| | | | | 17.0' (SM) | | | | | | | |
| 20 | | | HARD DARK GRAYISH BROWN SILTY CLAY with silty fine sand laminations | | 25 | | 35 | 25 | 10 | | |
| | | | | 24.5' (CL) | | | | | | | |
| 25 | | | | | | | | | | | |

Completion Depth 24.5' | Date 1/4/83 | Water Observations Moist and caved at 5.0' on 1/5/83.

# Log of Boring

Number B-15

Location See Plan of Borings

Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type Intermittent Sampling

Surface Elevation Approximate 675'

| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | MEDIUM DENSE TAN SILTY FINE SAND with organics, topsoil | | | | | | 16 | |
| | | | 2.5' (SM) | | | | | | | |
| | | | HARD YELLOWISH TAN SANDY CLAY with ironstone concretions | | | | | | | |
| 5 | | | | 28 | | 52 | 32 | 20 | 50/5" | |
| | | | 7.0' (CH) | | | | | | 50/6" | |
| | | | HARD YELLOWISH TAN CLAY with iron ore concretions and hematite stains | | | | | | | |
| 10 | | | Permeability = $3.4 \times 10^{-7}$ cm/sec | 40 | 92 | 65 | 39 | 26 | | |
| | | | -ironstone ledge at 13.0' and 15.0' | | | | | | | |
| 15 | | | 15.0' (CH) | | | | | | | |
| | | | HARD YELLOWISH TAN SILTY CLAY with some cemented sand lenses | | | | | | | |
| 20 | | | | | | | | | 50/5" seat | |
| | | | 24.5' -cemented and moist (CH) | | | | | | | |
| 25 | | | | | | | | | 50/2" seat | |

Completion Depth 24.5' Date 12/30/82

Water Observations Water level at 15.0' and caved at 18.3' upon completion. Water level at 13.5' and caved at 17.0' on 1/4/83.

Mayes Engineers

# Log of Boring

Number: B-16

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 686'

| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Percent Passing No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | MEDIUM DENSE TAN SAND with some silt and organics | | | | | | 12 | |
| | | | 2.5' (SM) | | | | | | | |
| | | | HARD REDDISH TAN SANDY CLAY with some yellowish tan and gray clayey sand pockets | 19 | | 29 | 16 | 13 | | |
| | | | | 19 | | 34 | 18 | 16 | 74 | |
| 5 | | | 5.0' (CL) | | | | | | | |
| | | | VERY DENSE REDDISH TO YELLOWISH TAN CLAYEY SAND with some gray clay pockets | | | | | | 84 | |
| | | | | 14 | | 22 | 17 | 5 | 77 | 25 |
| 10 | | | | | | | | | | |
| | | | 13.0' (SC) | | | | | | | |
| | | | VERY DENSE GRAY CLAYEY SAND with hematite stains | 14 | | 23 | 13 | 10 | 50/4" | 25 |
| 15 | | | | | | | | | | |
| | | | 17.0' (SC) | | | | | | | |
| | | | DENSE REDDISH TAN CLAYEY SAND with iron ore nodules | | | | | | | |
| | | | | 13 | | | | | | |
| 20 | | | | 14 | | | | | | |
| | | | 23.0' (SC) | | | | | | | |
| | | | HARD GLAUCONITIC GREENISH GRAY SILTY CLAY with moist gravel seam at 23.5' | | 78 | 59 | 47 | 12 | 50/5" | seat |
| 25 | | | | | | | | | | |

Maxim Engineers

og of Boring | Number B-16 cont'd | Location See Plan of Borings

ject
anitary Landfill, City of Jacksonville, Jacksonville, Texas

| Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|
| | | HARD GLAUCONITIC GREENISH GRAY SILTY CLAY<br>Remolded permeability = $7.7 \times 10^{-8}$ cm/sec<br>28.0' (MH) | | | | | | | |
| | | VERY DENSE GLAUCONITIC GREENISH GRAY CLAYEY SAND cemented | 39 | | | | | 50/3" seat | |
| | | | | | | | | 50/3" seat | |
| | | 37.0' (SC) | | | | | | | |
| | | VERY DENSE GLAUCONITIC GREENISH GRAY CLAYEY SILT moist | 41 | | | | | 50/4" seat | |
| | | 39.5' (ML) | | | | | | | |

pletion Depth 9.5' | Date 12/29/82 | Water Observations: Water level at 15.0' and caved at 21.0' on 1/4/83.

Marlin Engineers

# Log of Boring

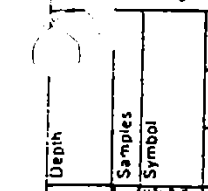
Number: B-17

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 564'




| Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Percent Passing No. 200 Sieve |
|---|---|---|---|---|---|---|---|
| MEDIUM DENSE TAN SILTY FINE SAND with organics, topsoil (SM) .5' | | | | | | 22 | |
| HARD REDDISH TAN SANDY CLAY with some yellowish tan clayey sand pockets and hematite and limonite stains | 16 | | 41 | 24 | 17 | 59 | 65 |
| -with ironstone concretions | 15 | | 33 | 15 | 18 | 51 | 64 |
| 7.5' (CL) HARD RED AND BROWNISH GRAY CLAY slickensided, with hematite and limonite stains | 24 | | 50 | 25 | 25 | 43 | 98 |
| -with some yellowish tan silty fine sand lenses | | | | | | | |
| -H. P. = 4.5 tsf | | | | | | | |
| Permeability = $8.7 \times 10^{-8}$ cm/sec | | | | | | | |
| 17.0' (CH) HARD GRAYISH BROWN CLAY with numerous silty fine sand laminations and hematite stains | 32 | | | | | | |
| 24.5' -with ironstone concretions (CH) | | | | | | | |

Completion Depth: 24.5'

Date: 12/29/82

Water Observations: Dry and caved at 8.5' on 1/4/83.

Maxim Engineers

# Log of Boring

Number: B-18

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 568'

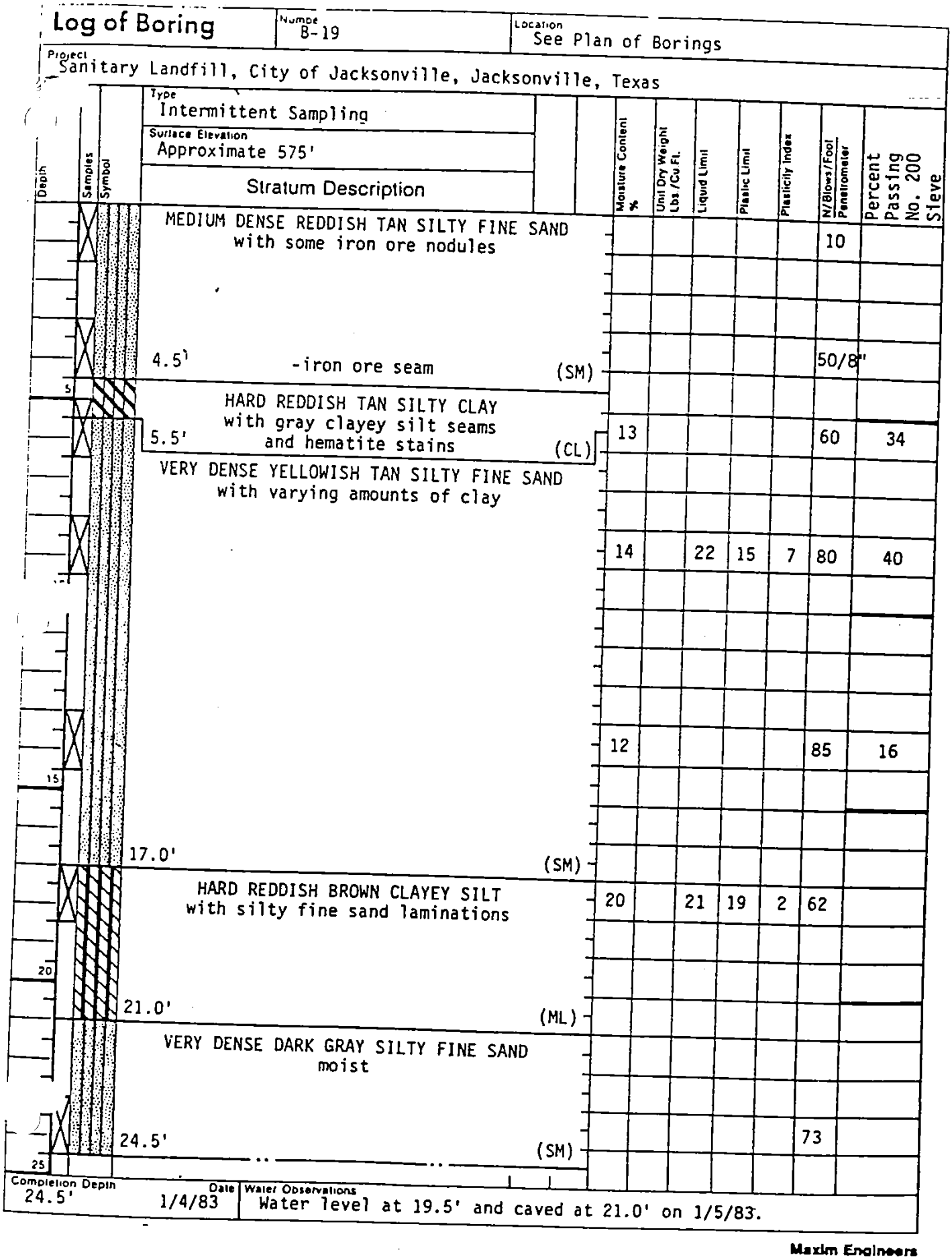
| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Percent Passing No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | MEDIUM DENSE REDDISH BROWN SILTY FINE SAND with clay and iron ore nodules | | | | | 1 | 18 | |
| | | | 2.0' (SM) | | | | | | | |
| | | | VERY STIFF REDDISH TAN SANDY TO SILTY CLAY with iron ore nodules | | | | | | | |
| | | | Permeability = $3.3 \times 10^{-8}$ cm/sec | 21 | 96 | 41 | 24 | 17 | | |
| 5 | | | 5.0' (CL) | | | | | | | |
| | | | DENSE REDDISH TAN AND YELLOWISH TAN CLAYEY SAND with iron ore concretions | | | | | | 38 | |
| | | | 7.5' (SC) | | | | | | | |
| | | | MEDIUM DENSE LIGHT GRAY AND TAN SILTY FINE SAND moist, with hematite stains | 25 | | | | | | 16 |
| 10 | | | | | | | | | | |
| | | | 13.0' (SM) | | | | | | | |
| | | | VERY DENSE DARK BROWNISH GRAY SILTY FINE SAND moist | 27 | | | | | 62 | |
| 15 | | | | | | | | | | |
| | | | | | | | | | 50+ | |
| 20 | | | | | | | | | | |
| | | | 21.5' (SM) | | | | | | | |
| | | | HARD DARK GRAY SILTY CLAY with sandy silt laminations | | | | | | | |
| | | | -H. P. = 4.5 tsf | 24 | | 37 | 25 | 12 | | |
| 25 | | | | | | | | | | |

Completion Depth: 24.5'

Date: 1/5/83

Water Observations: Water level at 7.0' and caved at 11.0' upon completion.

Maxim Engineers


Log of Boring
Number B-19
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Type Intermittent Sampling
Surface Elevation Approximate 575'
Stratum Description
Depth
Samples
Symbol
Moisture Content %
Unit Dry Weight Lbs./Cu Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Percent Passing No. 200 Sieve
MEDIUM DENSE REDDISH TAN SILTY FINE SAND with some iron ore nodules
10
4.5'
-iron ore seam
(SM)
50/8"
5
HARD REDDISH TAN SILTY CLAY with gray clayey silt seams and hematite stains
5.5'
(CL)
13
60
34
VERY DENSE YELLOWISH TAN SILTY FINE SAND with varying amounts of clay
14
22
15
7
80
40
12
85
16
15
17.0'
(SM)
HARD REDDISH BROWN CLAYEY SILT with silty fine sand laminations
20
21
19
2
62
20
21.0'
(ML)
VERY DENSE DARK GRAY SILTY FINE SAND moist
24.5'
(SM)
73
25
Completion Depth 24.5'
Date 1/4/83
Water Observations
Water level at 19.5' and caved at 21.0' on 1/5/83.
Maxim Engineers

# Log of Boring

Number: B-20

Location: See Plan of Borings

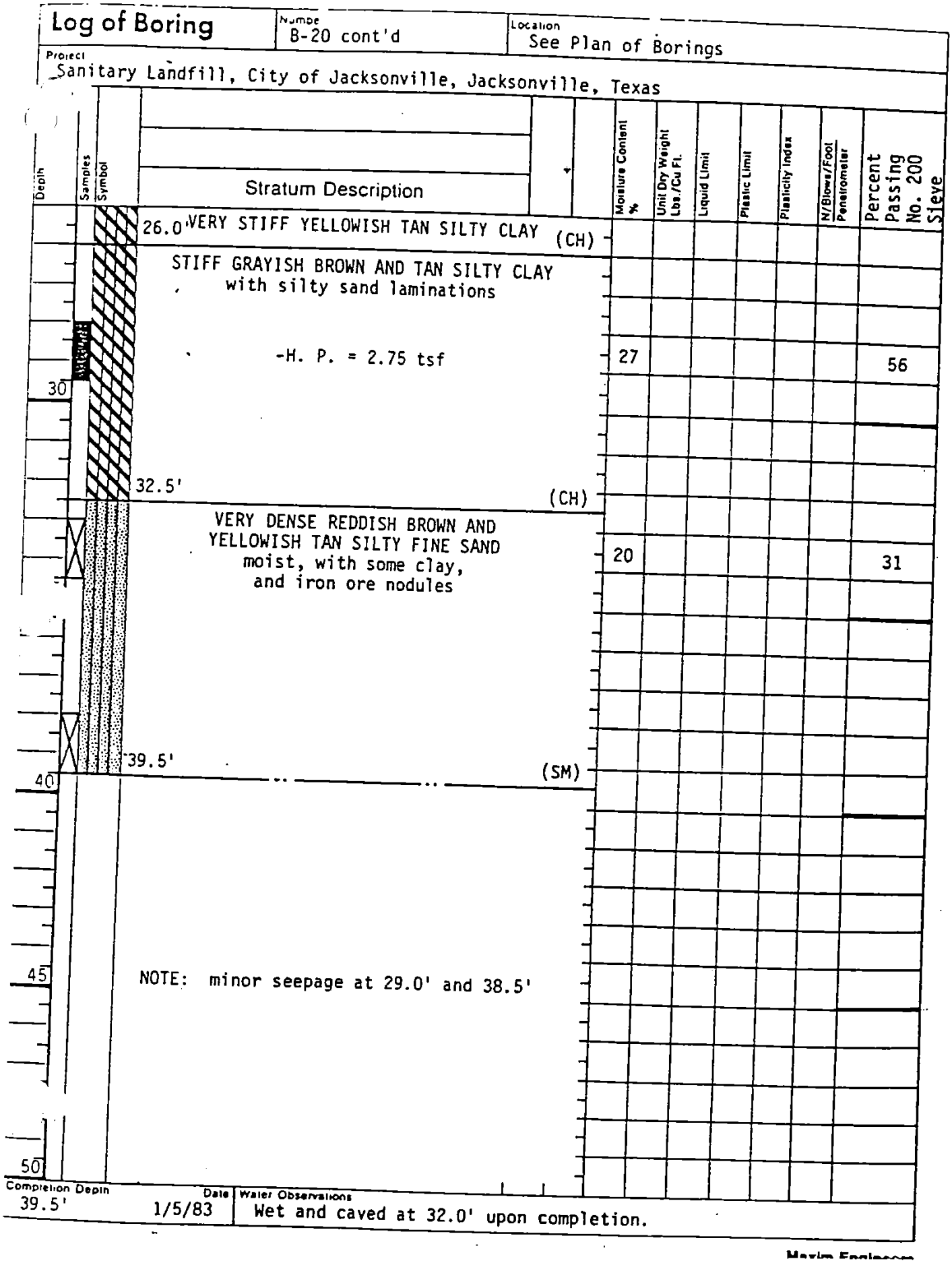
Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 655'

| Depth | Samples | Symbol | Stratum Description | | Moisture Content % | Unit Dry Weight Lbs./Cu Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Percent Passing No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | DENSE REDDISH BROWN SILTY CLAY with iron ore nodules | | | | | | | 37 | |
| | | | 3.0' | (CH) | | | | | | | |
| 5 | | | VERY DENSE REDDISH BROWN AND YELLOWISH TAN SILTY CLAY with iron ore rock lenses | | 22 | | 61 | 38 | 23 | | |
| | | | 7.0' | (CH) | | | | | | | |
| 10 | | | VERY STIFF YELLOWISH TAN SILTY CLAY with ironstone concretions and hematite stains -H. P. = 4 tsf | | 44 | 84 | 86 | 41 | 45 | | |
| | | | Permeability = $2.6 \times 10^{-8}$ cm/sec | | | | | | | | |
| 15 | | | -H. P. = 4.5 tsf | | 41 | | 75 | 40 | 35 | | |
| 20 | | | | | 47 | | 84 | 44 | 40 | | |
| 25 | | | | | | | | | | | |

Maxim Engineers


Log of Boring
Number B-20 cont'd
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Depth
Samples
Symbol
Stratum Description
Moisture Content %
Unit Dry Weight Lbs./Cu Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Percent Passing No. 200 Sieve
26.0' VERY STIFF YELLOWISH TAN SILTY CLAY (CH)
STIFF GRAYISH BROWN AND TAN SILTY CLAY
with silty sand laminations
-H. P. = 2.75 tsf
27
56
30
32.5'
(CH)
VERY DENSE REDDISH BROWN AND
YELLOWISH TAN SILTY FINE SAND
moist, with some clay,
and iron ore nodules
20
31
39.5'
(SM)
40
45
NOTE: minor seepage at 29.0' and 38.5'
50
Completion Depth 39.5'
Date 1/5/83
Water Observations
Wet and caved at 32.0' upon completion.

# 1987 BOREHOLE LOGS
# BY EAST TEXAS TESTING LABORATORY

# LOG OF BORING NO. 3
MW#5

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

JOB NO. G706-87

LOCATION: See Plan of Borings TYPE: Rotary Wash

DATE: 8 [illegible] 87

DEPTH TO WATER: ELEV.

GROUND ELEV.

| DEPTH (ft) | SYMBOL | SAMPLES | STANDARD PENETROMETER (blows/ft) | (TSF) PENETROMETER (tons/ft²) | STRATUM DESCRIPTION | |
|---|---|---|---|---|---|---|
| 5 | | | | | Red clayey sand w/iron ore gravel | (SC) |
| 10 | | | | | 12.0' | |
| 15 | | | | | Red and tan silty sand w/traces of iron ore gravel | (SM) |
| 20 | | | | | 22.0' | |
| 25 | | | | | Red and gray sandy clay w/traces of iron ore gravel and limonite stains | (CL) |
| 30 | | | | | 27.0' | |
| | | | | | Brown and gray elastic silt w/seams of iron ore gravel and gray and tan sandy silt | (ML) |
| | | | | | 31.5' | |
| 35 | | | | | Dark gray clay w/layers of gray silt fine sand 4" or less | (CL) |
| | | | | | 35.0' | |

(CONTINUED)

East Texas Testing Laboratory, Inc.

# LOG OF BORING NO. 3
MW#5

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

LOCATION: See Plan of Borings TYPE: Rotary Wash DATE: 11/11/87 & 12/24/87

DEPTH TO WATER: ELEV.

| DEPTH (ft.) | SYMBOL | SAMPLES | STANDARD PENETROMETER (blows/ft.) | HAND PENETROMETER (tons/ft²) | STRATUM DESCRIPTION |
|---|---|---|---|---|---|
| | | | | | GROUND ELEV. |
| 40 | | | | | Dark gray clay layered w/gray sand 2" or less and traces of lignite (CL) |
| 45 | | | | | 47.0' ✓ |
| 50 | | | | | Dark gray clay w/sand seams and traces of lignite (SP-CL) |
| 55 | | | | | |
| 60 | | | | | 60.0' ✓ |
| | | | | | Boring terminated @ 60.0' |
| 65 | | | | | |
| 70 | | | | | |

East Texas Testing Laboratory, Inc.

# LOG OF BORING NO. 2
MW#6

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

JOB NO. G706-87

LOCATION: See Plan of Borings TYPE: Rotary Wash DATE: 11/11/87 & 12/24/87

DEPTH TO WATER: ELEV.

GROUND ELEV.

| DEPTH (ft) | SYMBOL | SAMPLES | STANDARD PENETROMETER (blows/ft.) | HAND PENETROMETER (tons/ft²) | STRATUM DESCRIPTION | |
|---|---|---|---|---|---|---|
| 5 | | | | | Red and tan silty sand w/traces of iron ore gravel | (SM) |
| | | | | | 6.5' | |
| 10 | | | | | Gray and brown silt layered w/tan and red silty sand 1½" or less | (ML) |
| 15 | | | | | 17.0' | |
| 20 | | | | | Brown and gray elastic silt w/traces of silty sand seams and iron ore gravel seams | (ML) |
| | | | | | 21.5' | |
| 25 | | | | | Dark gray clay w/gray sand seams 2" or less | (CL) |
| 30 | | | | | | |
| 35 | | | | | 35.0' | |

(CONTINUED)

East Texas Testing Laboratory, Inc.

# LOG OF BORING NO. 2
MW #6

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

LOCATION: See Plan of Borings TYPE: Rotary Wash DATE: &

ELEV.

DEPTH TO WATER:

GROUND ELEV.

| DEPTH (ft.) | SYMBOL | SAMPLES | STANDARD PENETROMETER (blows/ft.) | HAND PENETROMETER (tons/ft²) | STRATUM DESCRIPTION | |
|---|---|---|---|---|---|---|
| 40 | | | | | Dark gray clay w/layers of gray sand | (CL) |
| 45 | | | | | | |
| | | | | | 47.5' | |
| | | | | | Gray and brown sand w/seams of elastic silt and limonite stains | (SP) |
| 50 | | | | | 50.0' | |
| | | | | | Tan and gray silty sand | (SM) |
| | | | | | 55.0' | |
| 55 | | | | | Boring terminated @ 55.0' | |
| 60 | | | | | | |
| 65 | | | | | | |
| 70 | | | | | | |

East Texas Testing Laboratory, Inc.

## LOG OF BORING NO. 1
MW#7

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

JOB NO. G706-87

LOCATION: See Plan of Borings

TYPE: Rotary Wash

DATE: 11/11/87 &12/24/87

ELEV.

DEPTH TO WATER:

GROUND ELEV.

| DEPTH (ft) | SYMBOL | SAMPLES | STANDARD PENETROMETER (blows/ft) | MUD PENETROMETER (psi) | STRATUM DESCRIPTION | |
|---|---|---|---|---|---|---|
| 5 | | | | | Red and tan sandy silt | (ML) |
| | | | | | 6.5' | |
| 10 | | | | | Red and tan silty sand w/iron ore gravel | (SM) |
| | | | | | 11.5' | |
| 15 | | | | | Red, gray and tan clayey sand w/iron ore gravel seams | (SC) |
| | | | | | 16.5' | |
| 20 | | | | | Tan silty sand w/seams of gray and red silty clay and trace of iron ore gravel | (SM) |
| | | | | | 22.0' | |
| 25 | | | | | Light gray san w/seams of brown elastic silt | (SP) |
| 30 | | | | | | |
| 35 | | | | | 35.0' | |

(CONTINUED)

East Texas Testing Laboratory, Inc.

# LOG OF BORING NO. 1

MW#7

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

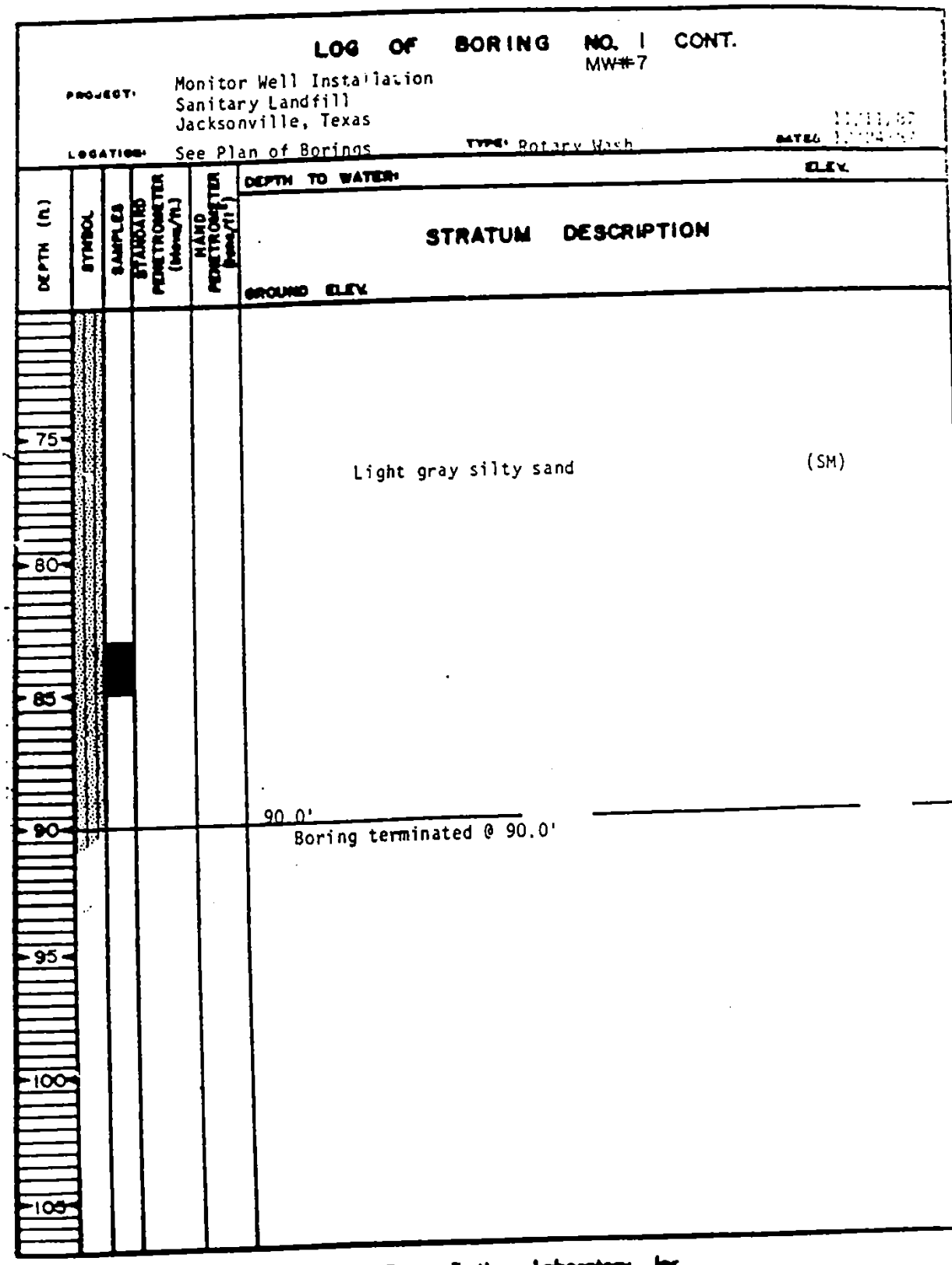
LOCATION: See Plan of Borings TYPE: Rotary Wash

DEPTH TO WATER: ELEV.

| DEPTH (ft) | SYMBOL | SAMPLES | STANDARD PENETROMETER (blows/ft.) | HAND PENETROMETER (tons/ft²) | STRATUM DESCRIPTION |
|---|---|---|---|---|---|
| | | | | | GROUND ELEV. |
| | | | | | Light gray sand w/seams of brown elastic silt 2" or less (SP) |
| 40 | | | | | 40.0' |
| 45 | | | | | Gray silty sand w/brown elastic silt and limonite stains (SM) |
| 50 | | | | | |
| 55 | | | | | |
| 60 | | | | | |
| 65 | | | | | |
| 70 | | | | | 70.0' |

(CONTINUED)

East Texas Testing Laboratory, Inc.




East Texas Testing Laboratory, Inc.

# Monitor Well Data Sheet

Monitor Well I.D. No. 1 Permit No. 1614

Latitude : W 95°15.80' Longitude : N 32°00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 660

Report all Depths from Surface Elevation

Well Depth : 20' Water Level Elevation : 655

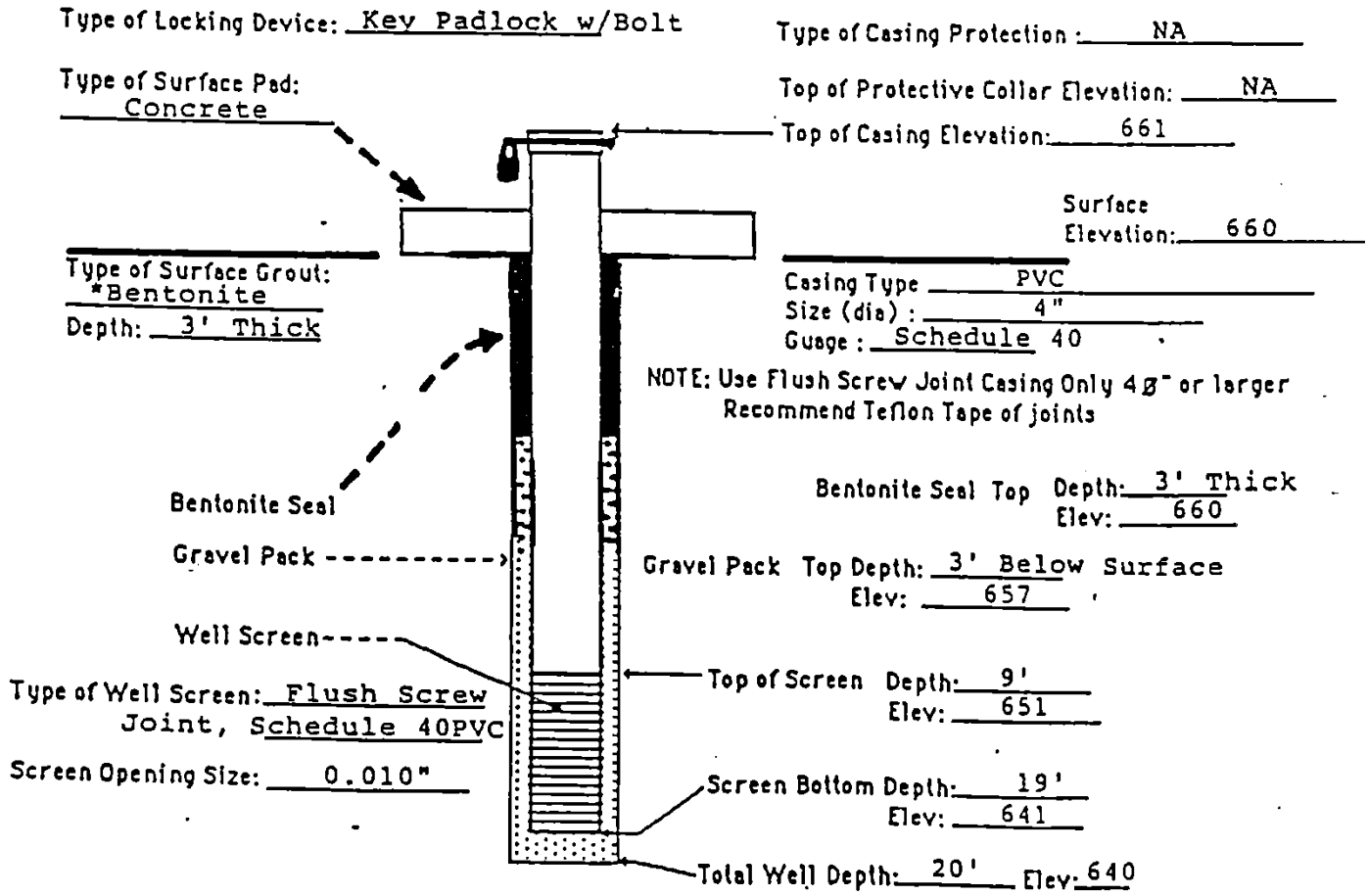
Screen Bottom:

(1) Depth : 19' (2) Elevation : 641

Gravel Pack

(1) Depth : 17' (2) Elevation : 657

SKETCH:




* - Bentonite seal was set at the top in an attempt to catch any "perched" groundwater.

# Monitor Well Data Sheet

Monitor Well I.D. No. 2 Permit No. 1614

Latitude : W 95° 15.80' Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 620 Report all Depths from Surface Elevation

Well Depth : 30' Water Level Elevation : 598

Screen Bottom:
(1) Depth : 29' (2) Elevation : 591

Gravel Pack
(1) Depth : 27' (2) Elevation : 617

SKETCH:

Type of Locking Device: Key Padlock w/Bolt

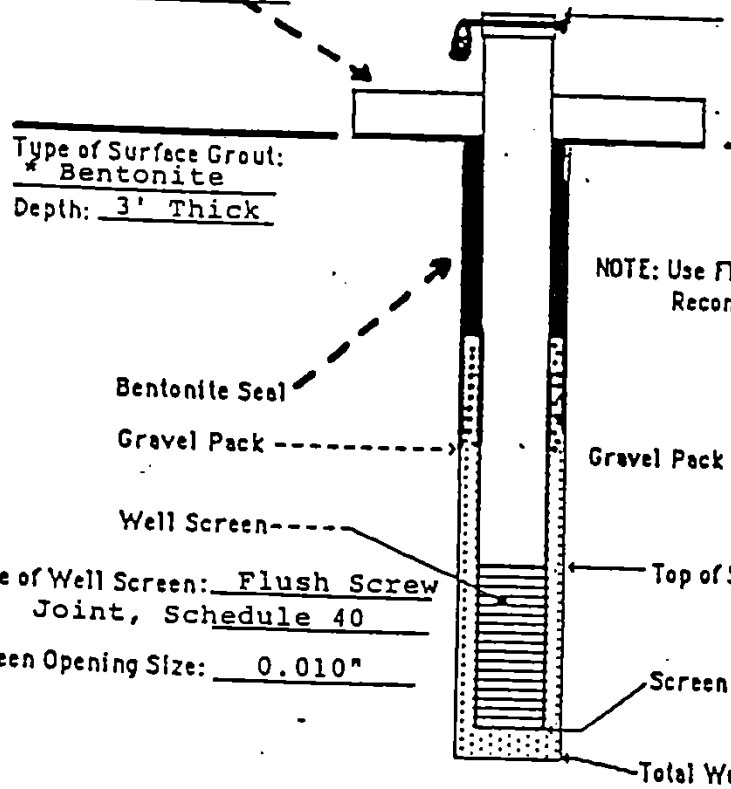
Type of Casing Protection : NA

Type of Surface Pad: Concrete

Top of Protective Collar Elevation: NA

Top of Casing Elevation: 621

Surface Elevation: 620



Type of Surface Grout: * Bentonite
Depth: 3' Thick

Casing Type PVC
Size (dia) : 4"
Guage : Schedule 40

NOTE: Use Flush Screw Joint Casing Only 4 ø" or larger
Recommend Teflon Tape of joints

Bentonite Seal

Bentonite Seal Top Depth: 3' Thick
Elev: 620

Gravel Pack

Gravel Pack Top Depth: 3' Below Surface
Elev: 617

Well Screen

Type of Well Screen: Flush Screw Joint, Schedule 40

Top of Screen Depth: 19'
Elev: 601

Screen Opening Size: 0.010"

Screen Bottom Depth: 29'
Elev: 591

Total Well Depth: 30' Elev: 590

* - Bentonite seal was set at the top in an attempt to catch any "perched" groundwater.

# Monitor Well Data Sheet

Monitor Well I.D. No. 3 Permit No. 1614

Latitude : W 95° 15.80' Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 620

Report all Depths from Surface Elevation

Well Depth : 30' Water Level Elevation : 595

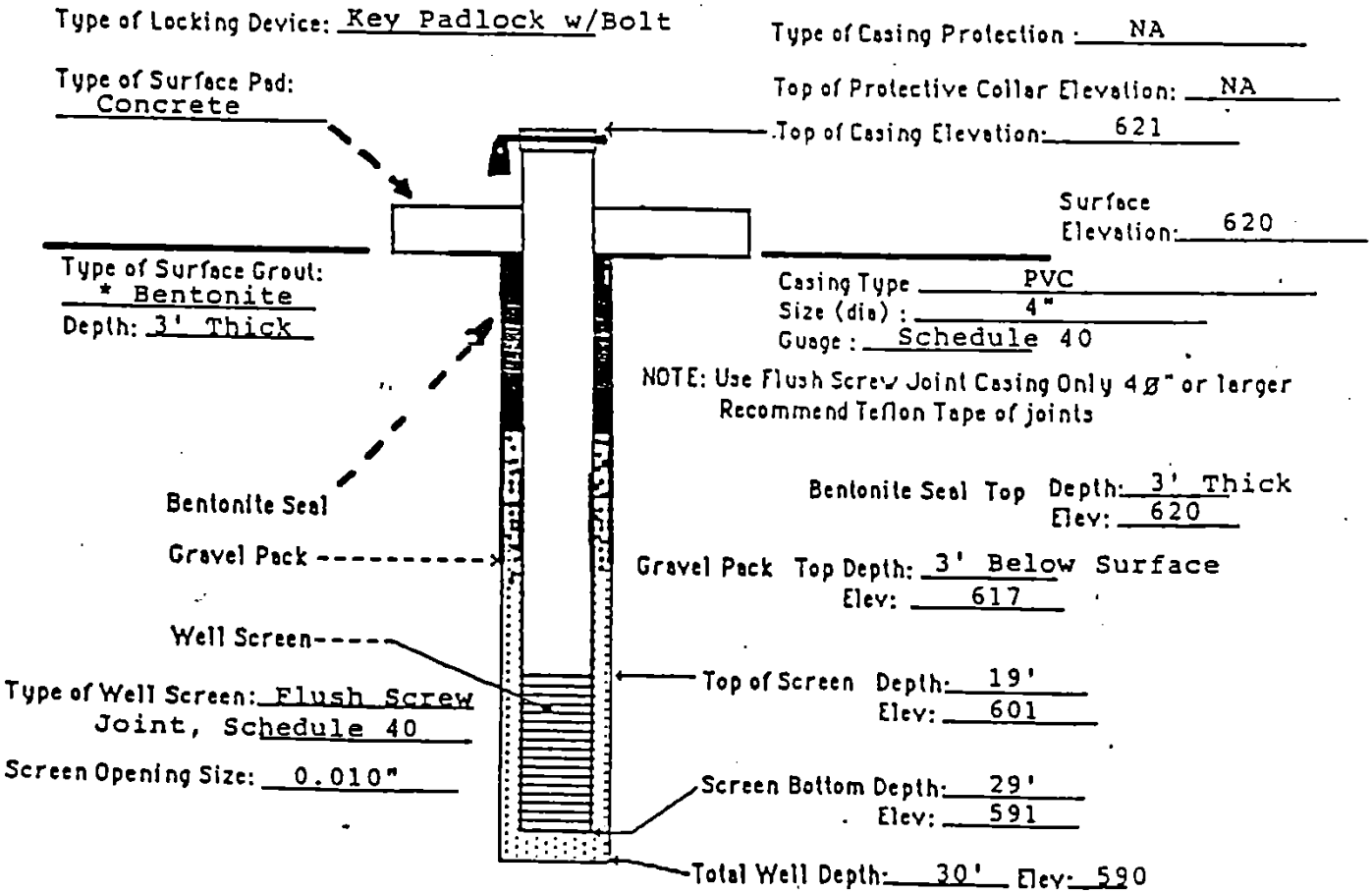
Screen Bottom:

(1) Depth : 29' (2) Elevation : 591

Gravel Pack

(1) Depth : 27' (2) Elevation : 617

SKETCH:




* - Bentonite seal was set at the top in an attempt to catch any "perched" groundwater

# Monitor Well Data Sheet

Monitor Well I.D. No. 4 Permit No. 1614

Latitude : W 95° 15.80' Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 620

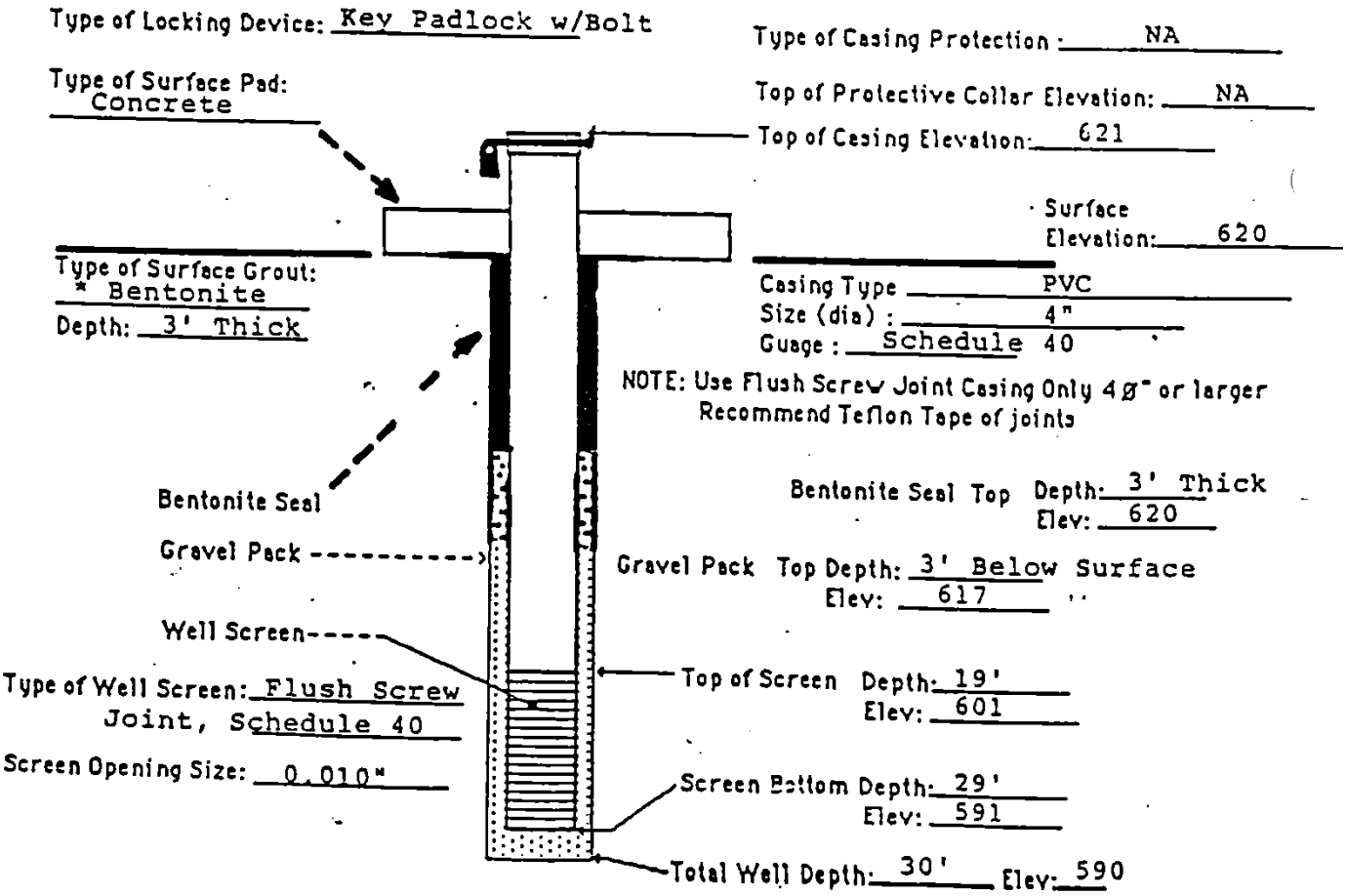
Report all Depths from Surface Elevation

Well Depth : 30' Water Level Elevation : 598

Screen Bottom:
(1) Depth : 29' (2) Elevation : 591

Gravel Pack
(1) Depth : 27' (2) Elevation : 617

SKETCH:




* - Bentonite seal was set at the top in an attempt to catch any "perched" groundwater

# Monitor Well Data Sheet

Monitor Well I.D. No. 5

Permittee or Site Name: Jacksonville Landfill
Permit No. 1614

Latitude : W 95° 15.80'

Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 570

Report all Depths from Surface Elevation

Well Depth : 60'

Water Level Elevation : 525

Screen Bottom:
(1) Depth : 60'
(2) Elevation : 510

Gravel Pack
(1) Depth : 47'
(2) Elevation : 557

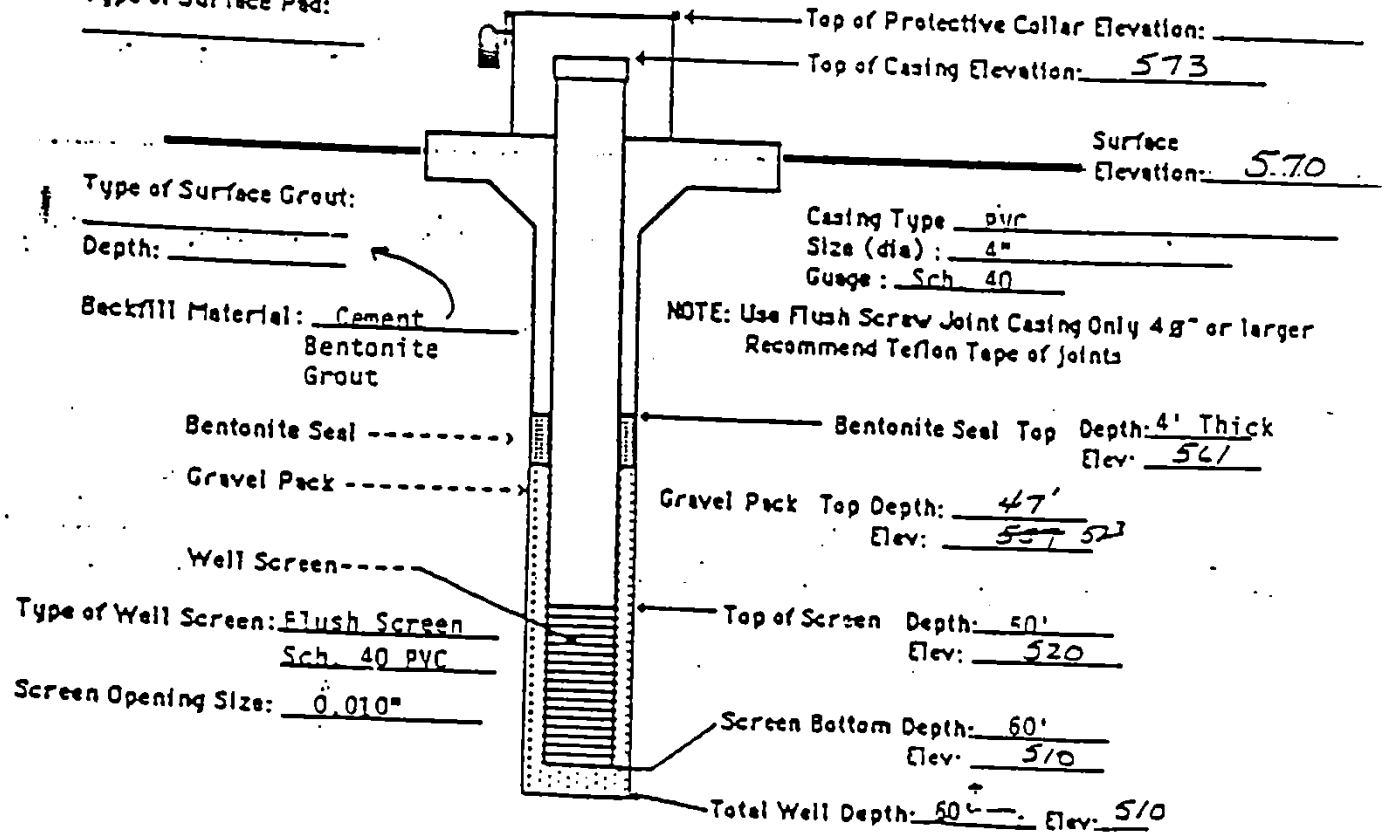
SKETCH:

Name of Geologic Formation(s) in which well is completed: Queen City

Type of Locking Device:

Type of Casing Protection :

Type of Surface Pad:




NOTE: Except for the locking cap which is recommended for security reasons, the above sketch should be considered the minimum required for monitor well instal

# Monitor Well Data Sheet

Monitor Well I.D. No. 6

Permittee or Site Name: Jacksonville Landfill

Permit No. 1614

Latitude : W 95° 15.80'

Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 580

Report all Depths from Surface Elevation

Well Depth : 55'

Water Level Elevation : 537

Screen Bottom:

(1) Depth : 55'

(2) Elevation : 525

Gravel Pack

(1) Depth : 43'

(2) Elevation : 567

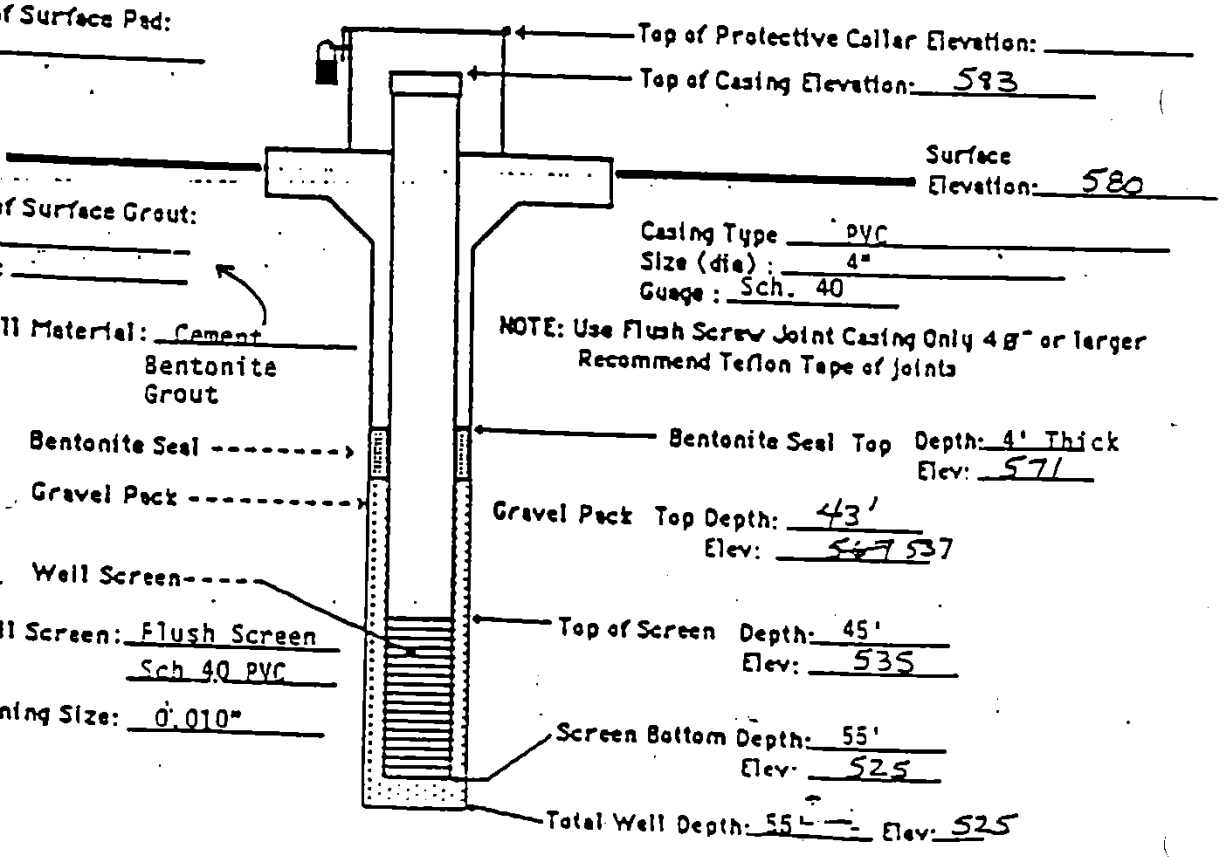
SKETCH:

Name of Geologic Formation(s) in which well is completed: QUEEN CITY

Type of Locking Device:

Type of Casing Protection :

Type of Surface Pad:




NOTE: Except for the locking cap which is recommended for security reasons, the above sketch should be considered the minimum required for monitor well install.

# Monitor Well Data Sheet

Monitor Well I.D. No. 7

Permittee or Site Name: Jacksonville Landfill

Permit No. 1614

Latitude : W 95° 15.80'

Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 530

Report all Depths from Surface Elevation

Well Depth : 93'

Water Level Elevation : 449'

Screen Bottom:

(1) Depth : 92'

(2) Elevation : 438

Gravel Pack

(1) Depth : 63' (Top)

(2) Elevation : 467

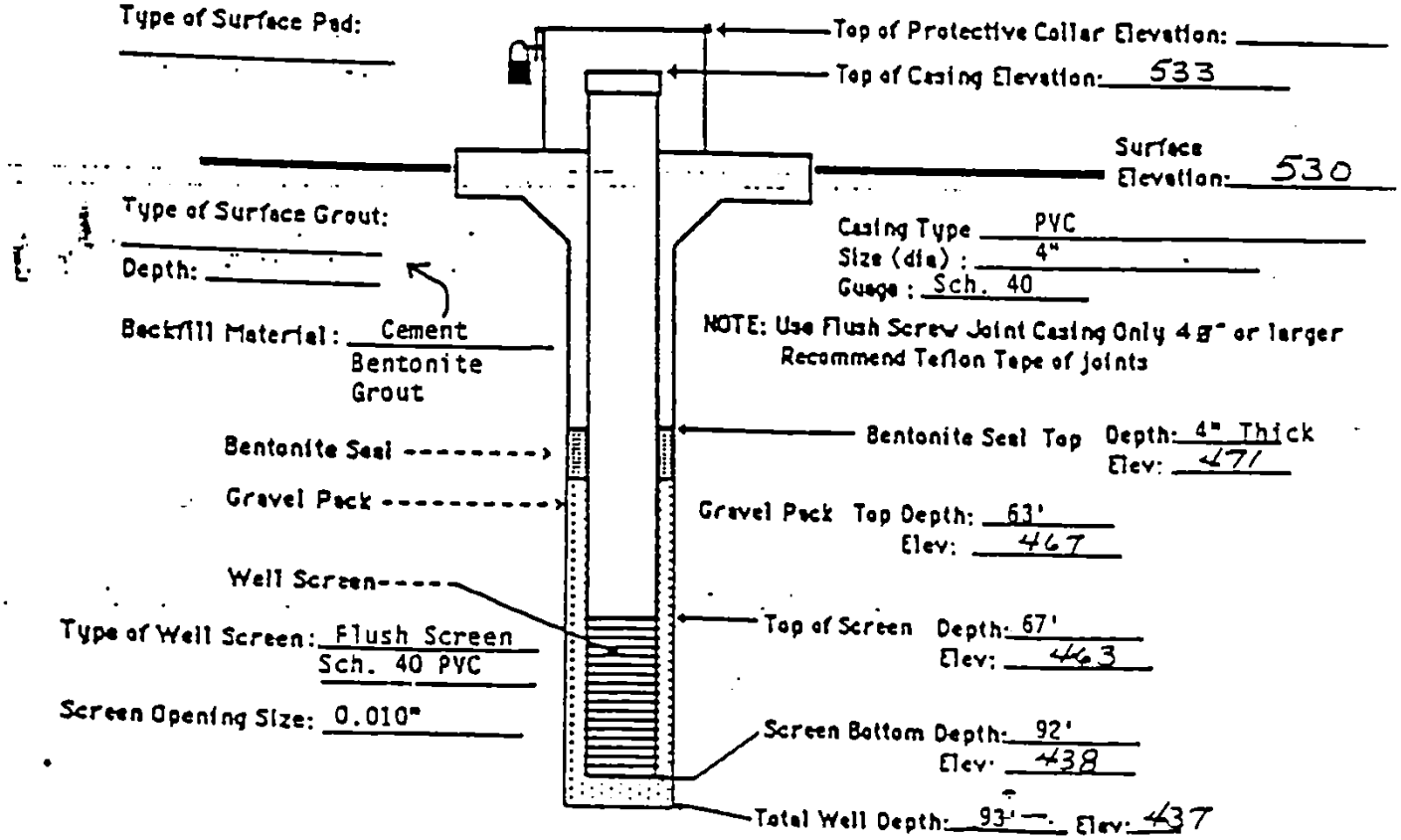
SKETCH:

Name of Geologic Formation(s) in which well is completed: QUEEN CITY

Type of Locking Device:

Type of Casing Protection :

Type of Surface Pad:




NOTE: Except for the locking cap which is recommended for security reasons, the above sketch should be considered the minimum required for monitor well instal

# 1993 BOREHOLE LOGS
# BY GOLDER ASSOCIATES

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-1

BORING DATE: 9/27/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4 25"-ID Augers | Orange-tan Silty SAND. | SM | | 685.80 / 0.00 | | | | | | | Cement; Bentonite |
| | | | | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 5 | | | | | | | | | | | | |
| | | | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 10 | | - ferrous gravel, 11 ft to 12 ft. | | | | | | | | | | |
| | | Orange-tan CLAY with ferrous gravel and sand pockets. | CH | | 673.80 / 12.00 | | | | | | | |
| 15 | | | | | | 3 | 3" ST | PUSH | | 24/24 | | |
| | | Boring terminated at 15-ft-penetration. | | | 670.80 / 15.00 | | | | | | No water level detected, 1230, 9/29/93. | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/27/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-2

BORING DATE: 9/27/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Light brown Silty SAND. | SM | | 685.60 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| 5 | | | | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 10 | | - ferrous sand pockets at 9 ft. | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 15 | | Boring terminated at 15-ft-penetration. | | | 670.60 / 15.00 | 3 | 3" ST | PUSH | | 0/24 | No recovery with Shelby tube. | |
| | | | | | | 4 | 2" SS | 50/ 1/4" | | 0/ 1/4 | No recovery with split-spoon. | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/27/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-3

BORING DATE: 9/29/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25" ID Augers | Red and tan Silty SAND. | SM | | 685.40 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement |
| | | - with ferrous stains below 3 ft. | | | | | | | | | | Bentonite |
| | | - with ferrous gravel at 4 ft. | | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 5 | | | | | | | | | | | | |
| | | | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 10 | | | | | | | | | | | | |
| | | | | | | 3 | 3" ST | PUSH | | 24/24 | | |
| 15 | | Boring terminated at 15-ft-penetration. | | | 670.40 / 15.00 | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/27/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-4

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25" ID Augers | Light tan to red Silty SAND. | | | 682.00 / 0.00 | | | | | | | Cement; Bentonite |
| 5 | | - with ferrous stains at 4 ft. | | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 10 | | - clayey sand with trace of ferrous gravel at 9 ft. | SM | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 15 | | - with ferrous gravel at 14 ft. | | | | 3 | 3" ST | PUSH | | 24/24 | Hard to drill at 13 ft. | |
| 20 | | Yellow-brown CLAY with ferrous gravel seams. | CH | | 664.00 / 18.00 | 4 | 3" ST | PUSH | | 18/24 | | 1230 9/29/93 |
| 25 | | Green glauconitic Silty SAND with red ferrous gravel. | SM | | 659.00 / 23.00 | 5 | 3" ST | PUSH | | 24/24 | | |
| | | Boring terminated at 25-ft-penetration. | | | 657.00 / 25.00 | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-5

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25" ID Augers | Red and tan Clayey SAND to Silty SAND with ferrous stains. | SM | | 674.20 / 0.00 | | | | | | | Cement |
| | | | | | | 1 | 3" ST | PUSH | | 18/24 | | Bentonite |
| 5 | | | | | | | | | | | | |
| | | - light grey at 9 ft. | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 10 | | - ferrous gravel layer, 11 ft to 12 ft. | | | 662.20 / 12.00 | | | | | | | |
| | | Tan and light grey CLAY with ferrous gravel pockets and seams. | | | | 3 | 3" ST | PUSH | | 24/24 | | |
| 15 | | | CH | | | | | | | | | |
| | | | | | | 4 | 3" ST | PUSH | | 24/24 | | 1230 9/29/93 |
| 20 | | | | | | | | | | | | |
| | | Green glauconitic Silty SAND. | SM | | 651.20 / 23.00 | 5 | 3" ST | PUSH | | 24/24 | | |
| 25 | | Boring terminated at 25-ft-penetration. | | | 649.20 / 25.00 | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-6

BORING DATE: 9/29/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES BLOWS / 6 in | SAMPLES N | SAMPLES REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Orange-red Clayey SAND with ferrous stains. | SC | | 613.70 / 0.00 | | | | | | | Cement |
| 5 | | - with ferrous gravel at 4 ft. | | | | 1 | 3" ST | PUSH | | 24/24 | | Bentonite |
| 10 | | Boring terminated at 10-ft-penetration. | | | 603.70 / 10.00 | 2 | 3" ST | PUSH | | 24/24 | | 1230 9/29/93 |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/29/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-7

BORING DATE: 9/29/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Red-orange Silty SAND to Clayey SAND. | SM | | 612.10 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| | | | | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 5 | | -clayey sand with ferrous gravel at 9 ft. | SC | | | | | | | | | |
| | | | | | | 2 | 3" ST | PUSH | | 24/24 | | |
| 10 | | Boring terminated at 10-ft-penetration. | | | 602.10 / 10.00 | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, Tx
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/29/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-8

BORING DATE: 9/27/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Brownish-red to yellow-brown CLAY. | | | 665.80 / 0.00 | | | | | | | Cement |
| 5 | | · with fine ferrous gravel at 4 ft. | | | | 1 | 3" ST | PUSH | | 24/24 | | Bentonite |
| 10 | | · with ferrous silt and gravel seams at 9 ft. | CH | | | 2 | 3" ST | PUSH | | 24/24 | | |
| 15 | | Tan and light grey CLAY with ferrous gravel pockets and seams. · with hard ferrous seams at 14 ft. | | | | 3 | 3" ST | PUSH | | 18/24 | | 1230 9/29/93 |
| 20 | | Dark green glauconitic Silty SAND. | SM | | 647.80 / 18.00 | 4 | 2" SS | 50/6" | 100 | 6/6 | Hard to drill at 18 ft. | |
| 25 | | Boring terminated at 25-ft-penetration. | | | 640.80 / 25.00 | 5 | 3" ST | PUSH | | 24/24 | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/27/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-9

BORING DATE: 9/27/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Yellow-brown CLAY with fine ferrous gravel. | CH | | 660.60 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| | | -with ferrous silt partings at 4 ft. | | | | 1 | 3" ST | PUSH | | 24/24 | | |
| 5 | | | | | | | | | | | | |
| | | | | | | 2 | 3" ST | PUSH | | 24/24 | | |
| 10 | | Boring terminated at 10-ft-penetration. | | | 650.60 / 10.00 | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/27/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-10

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Red CLAY. | CH | | 597.20 / 0.00 | | | | | | No water level detected. 1230, 9/29/93. | Cement; Bentonite |
| 5 | | -with silt and sand pockets at 4 ft. | | | | 1 | 3" ST | PUSH | | 24/24 | | |
| 10 | | - with sand seams at 9 ft. | | | | 2 | 3" ST | PUSH | | 24/24 | | |
| | | Boring terminated at 10-ft-penetration. | | | 587.20 / 10.00 | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-11

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Organic silt with fine sand, wood and root fragments. (Topsoil) | ML | | 538.60 / 0.00 | | | | | | | Cement; Bentonite |
| | | | | | | 1 | 3" ST | PUSH | | 24/24 | | |
| 5 | | | | | | | | | | | | |
| | | | | | | 2 | 3" ST | PUSH | | 24/24 | | |
| 10 | | Boring terminated at 10-ft-penetration. | | | 528.60 / 10.00 | | | | | | | 1230 9/29/93 |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-12

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Red and gray CLAY with ferrous stains. | CH | | 568.10 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| 5 | | | | | | 1 | 3" ST | PUSH | | 24/24 | | |
| 10 | | • with silt pockets and ferrous gravel at 9 ft. | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| | | Boring terminated at 10-ft-penetration. | | | 558.10 / 10.00 | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-13

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25" ID Augers | Yellow-brown Gravelly CLAY to Red fine to medium Clayey GRAVEL. | CL | | 676.40 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| 5 | | | GC | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 10 | | Boring terminated at 10-ft-penetration. | | | 666.40 / 10.00 | 2 | 3" ST | PUSH | | 18/24 | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCF
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-14

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | | | | 664.00 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| | | Yellow-brown CLAY. | | | | | | | | | | |
| | | - hard ferrous seams at 4 ft. | CH | | | 1 | 3/4" ST | PUSH | | 24/24 | | |
| 5 | | | | | | | | | | | | |
| | | - brown and with ine ferrous gravel at 9 ft. | | | | 2 | 3/4" ST | PUSH | | 24/24 | | |
| 10 | | Boring terminated at 10-ft-penetration. | | | 654.00 / 10.00 | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-15

BORING DATE: 9/27/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25" ID Augers | | | | 683.10 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| | | Light orange Silty SAND to orange and tan Clayey SAND. | SM | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 5 | | | SC | | | | | | | | | |
| | | - with ferrous gravel and stains at 9 ft. | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 10 | | Boring terminated at 10-ft-penetration. | | | 673.10 / 10.00 | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/27/93

# 1994 BOREHOLE LOGS
# BY GROUNDWATER TCHNOLOGIES

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: B-21(CC)/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/06/94*
Finish Date: *06/06/94*

**DRILLING DATA**

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Failing 1500 Rig*
Method: *Mud Rotary*

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | NA | SHELBY | CHRISTIANSEN |
| Diameter: | NA | 3" | 2" |
| Other: | NA | NA | NA |

**WELL CONSTRUCTION**

| | Riser | Screen |
|---|---|---|
| Material: | | |
| Diameter (ID): | | |
| Coupling: | | |

**WELL DEVELOPMENT**

Method:
Duration:
Gals. Purged:
Slug Test: (cm/sec)

**SURVEY DATA DATUM**

Grade: *680.00*
TWC:
TPC:
North: *9692*
East: *10311*

Geophysical Log ☑ yes ☐ no
Comments:

| Depth (feet) | WELL CONSTRUCTION | Soil / Rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | Silty Sand, SM, reddish yellow, red mottles and yellow staining, medium stiff to hard, dry to slightly moist, fine-grained, subangular well sorted quartz, occasional hard streaks | – Sparta Fm |
| | | | 1 | | 2.3 | | | | |
| 5 | | | D.O. | | D.O. | | | | |
| | | | 2 | | 1.0 | | | | |
| 10 | | | D.O. | | D.O. | | | | |
| 15 | | | | | | | | Top of Weches Formation<br>Clayey Silt; CL; interbedded clayey silt and silt sand | – Weches Fm |
| 20 | | | 3 | | 2.3 | | | | |
| 25 | | | 4 | | 7.3 | | | Glauconitic Silty Sand; SM; very dark olive gray, indurated to somewhat friable, fine- to medium-grained subangular, moderately sorted glauconite and quartz, occasional marine fossils | |
| 30 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: B-21(CC)/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/06/94*

Finish Date: *06/06/94*

| Depth (feet) | WELL CONSTRUCTION | Soil / rock | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 30 | | | | | | | | | |
| | | | 4 | | 7.3 | | | Clayey Silt: CL; black, very hard, dry, blocky, low plasticity, few borings | |
| 35 | | | 5 | | 9.2 | | | | |
| 40 | | | | | | | | | |
| | | | | | | | | Sandy, Silty Clay; CLSC; very dark grayish-green and black, low plasticity, dry to slightly moist, glauconitic, occasional marine fossils, occasional indurated thin silty sand beds | |
| 45 | | | | | | | | | |
| 50 | | | 6 | | 9.0 | | | | |
| 55 | | | 7 | | 6.5 | | | Top of Queen City Formation<br>Silty Sand; SM; very dark grayish-brown, occasional glauconitic filled burrows, occasional thin beds of glauconitic sandy silt, occasional carbonaceous material, 5% white mica | Queen City Fm |
| 60 | | | | | | | | | |
| 65 | | | 8 | | 0.5 | | | | |
| 70 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: B-21(CC)/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/06/94*

Finish Date: *06/06/94*

(CONTINUATION)

| Depth (feet) | WELL CONSTRUCTION | Soil / rock Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 70 | | | | | | | | |
| 75 | | 9 | | NR | | | Silty Clay; CL, very dark gray, hard, low plasticity, dry, interbedded with very thin beds of clayey silt, light yellowish-brown, and occasional medium beds of clayey silt, very dark gray, unconsolidated, friable, 10-20% white mica, abundant marine burrows | |
| 80 | | | | | | | | |
| 85 | | 10 | | 4.7 | | | | |
| 90 | | | | | | | | |
| 95 | | 11 | | 6.5 | | | Silty Sand; SM, very dark greyish brown, black banding, very stiff, slightly indurated, very fine- to fine-grained, subrounded, well sorted quartz sand, 10% white mica, approx. 40% quartz and 40% dark minerals, possible crossbedding, occasional thin beds of silty clay | |
| 100 | | | | | | | | |
| 105 | | 12 | | 6.6 | | | | |
| 110 | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: **B-21(CC)/Royal Oaks**



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/06/94*

Finish Date: *06/06/94*

| Depth (feet) | WELL CONSTRUCTION | Soil / Rock | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 110 | | | | | | | | | |
| 115 | | | 13 | | 8.0 | | | Silty Sand; SM, very dark grayish brown, black banding, very stiff, slightly indurated, very fine- to fine-grained, subrounded, well sorted quartz sand, 10% white mica, approx. 40% quartz and 40% dark minerals, possible crossbedding, occasional thin beds of silty clay | |
| 120 | | | | | | | | | |
| 125 | | | 14 | | 8.5 | | | Silty Clay; CL, very dark gray, light gray banding, very stiff to hard, low plasticity with highly plastic clay interbeds, interbedded with very thin beds of fat clay, and thin beds of silty sand, dark gray, 10% white mica | |
| 130 | | | | | | | | | |
| 135 | | | 15 | | 7.5 | | | | |
| 140 | | | | | | | | | |
| 145 | | | 16 | | 5.0 | | | | |
| 150 | | | | | | | | End of Continuous Core at 146.0 Feet | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: B-24(CC)/Royal Oaks

Page 1 of 4

Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/07/94*
Finish Date: *06/07/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Failing 1500 Rig*
Method: *Mud Rotary*

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | NA | SHELBY | CHRISTENSEN |
| Diameter: | NA | 3" | 2" |
| Other: | NA | NA | NA |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | | |
| Diameter (ID): | | |
| Coupling: | | |

WELL DEVELOPMENT
Method:
Duration:
Gals. Purged:
Slug Test: (cm/sec)

SURVEY DATA DATUM
Grade: *651.00*
TWC:
TPC:
North: *7864*
East: *11090*

Geophysical Log ☑ yes ☐ no
Comments:

| Depth (feet) | WELL CONSTRUCTION | Soil / rock | SAMPLE DATA Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | 1 | | 1.0 | | | Clayey Silt, CL, yellowish-brown, very stiff, low plasticity, occasional beds of ironstone | — Weches Fm |
| 5 | | | D.O. | | D.O. | | | Sandy Clay; SC, yellowish-brown | |
| | | | 2 | | 0.5 | | | | |
| 10 | | | D.O. | | D.O. | | | | |
| | | | 3 | | 1.7 | | | Clayey Silt, CL, greenish-black, very stiff, low plasticity to friable, occasional thin beds of hard siltstone, abundant glauconite | |
| 15 | | | D.O. | | D.O. | | | | |
| 20 | | | 4 | | 8.0 | | | | |
| 25 | | | 5 | | 7.5 | | | | |
| 30 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: B-24(CC)/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/07/94*

Finish Date: *06/07/94*

(CONTINUATION)

| Depth (feet) | WELL CONSTRUCTION | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 30 | | 5 | | 7.5 | | | | |
| 35 | | | | | | | Top of Queen City Formation | — Queen City Fm |
| 40 | | 6 | | 6.2 | | | Clayey Silty Sand, SC, very dark brown, very stiff to hard, low plasticity, 10% white mica, occasional vugs filled with glauconite material, occasional pyritic material | |
| 45 | | | | | | | | |
| 50 | | 7 | | 1.7 | | | Clayey Silt, CL, very dark grayish-brown, hard, low plasticity, abundant mica flakes, occasional very thin beds of organic material | |
| 55 | | | | | | | Silty Sand, SM, very dark grayish-brown, friable, soft, fine-grained, well sorted quartz | |
| 60 | | 8 | | 3.8 | | | Silty Clay, CL, very dark brown, very hard, interbeds of sandy silt | |
| 65 | | | | | | | Clayey Sand, SC, dark grayish-brown | |
| 70 | | 9 | | 4.7 | | | Clayey Silt, CL, very dark brown, very hard | |
| | | | | | | | Silty Sand, SM, very dark brown | |
| | | | | | | | Silty Clay, CL | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: B-24(CC)/Royal Oaks

Page 3 of 4

Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/07/94*

Finish Date: *06/07/94*

(CONTINUATION)

| Depth (feet) | WELL CONSTRUCTION | Soil/rock | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 70 | | | 9 | | 4.7 | | | Clayey Sand; SC | |
| | | | | | | | | Silty Clay; CL | |
| 75 | | | | | | | | Silty Sand; SM, very dark grayish-brown, crossbedded, friable, fine-grained, well sorted quartz, 5-10% white mica, 20% dark minerals | |
| 80 | | | 10 | | 8.4 | | | Silty Clay; CL, dark brown, very stiff | |
| | | | | | | | | Silty Sand; SM, very dark grayish-brown, occasional crossbeds, stiff, friable, fine-grained, well sorted quartz, 5-10% white mica | |
| 85 | | | | | | | | | |
| 90 | | | 11 | | 5.0 | | | | |
| 95 | | | | | | | | | |
| 100 | | | 12 | | 4.0 | | | | |
| 105 | | | | | | | | | |
| | | | 13 | | 6.0 | | | Silty Clay; CL, very dark brown, dark gray banding, low plasticity, interbedded with thin beds of silty sands and clays | |
| 110 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: B-24(CC)/Royal Oaks



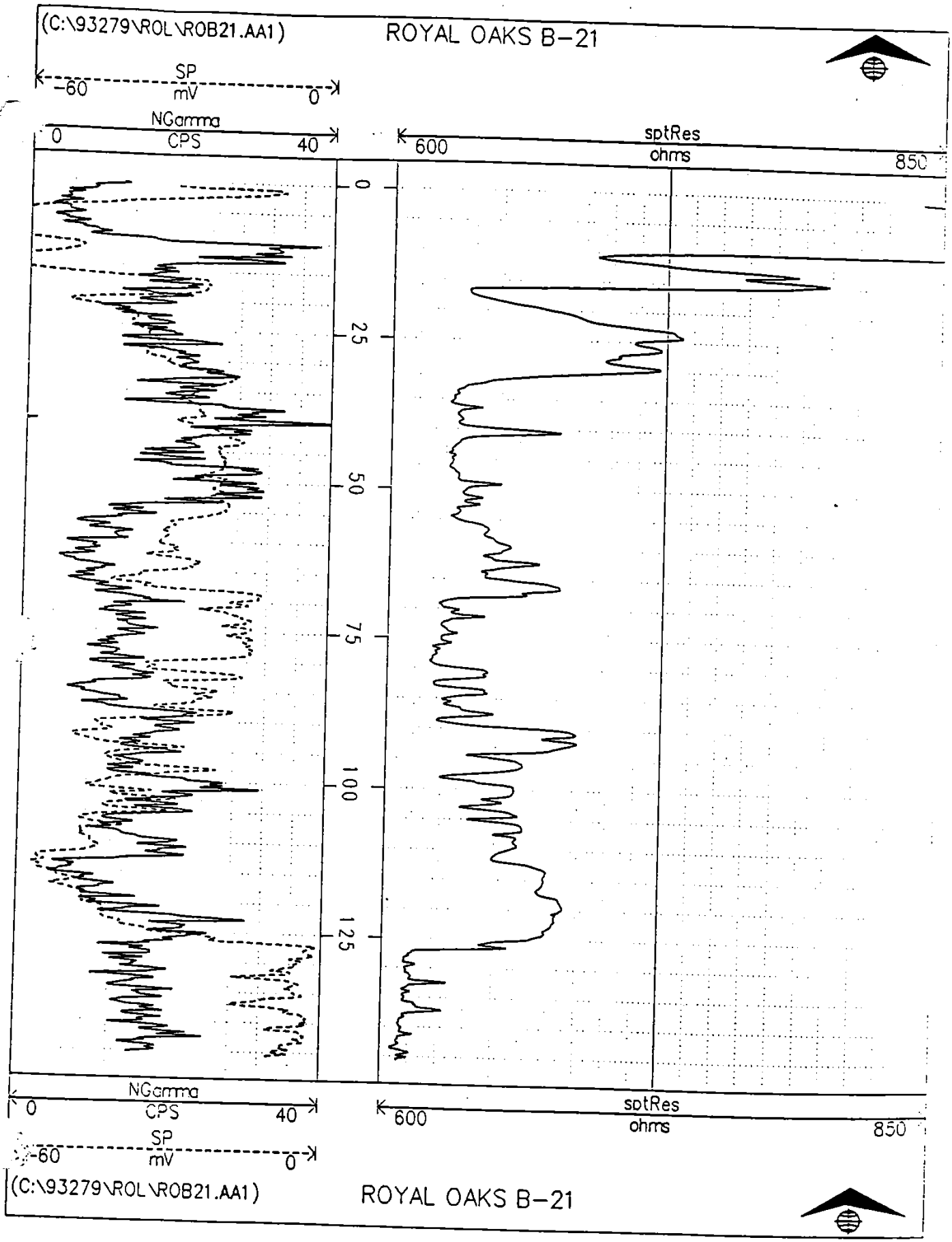
Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/07/94*

Finish Date: *06/07/94*

| Depth (feet) | WELL CONSTRUCTION | soil / rock | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 110 | | | 13 | | 6.0 | | | | |
| 115 | | | | | | | | | |
| 120 | | | 14 | | 10.0 | | | | |
| 125 | | | | | | | | | |
| 130 | | | 15 | | NR | | | End of Continuous Core at 130.0 Feet | |
| 135 | | | | | | | | | |
| 140 | | | | | | | | | |
| 145 | | | | | | | | | |
| 150 | | | | | | | | | |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CPS
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ohms
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0
25
50
75
100
125
NGamma
0
CPS
40
sptRes
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ohms
850
SP
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mV
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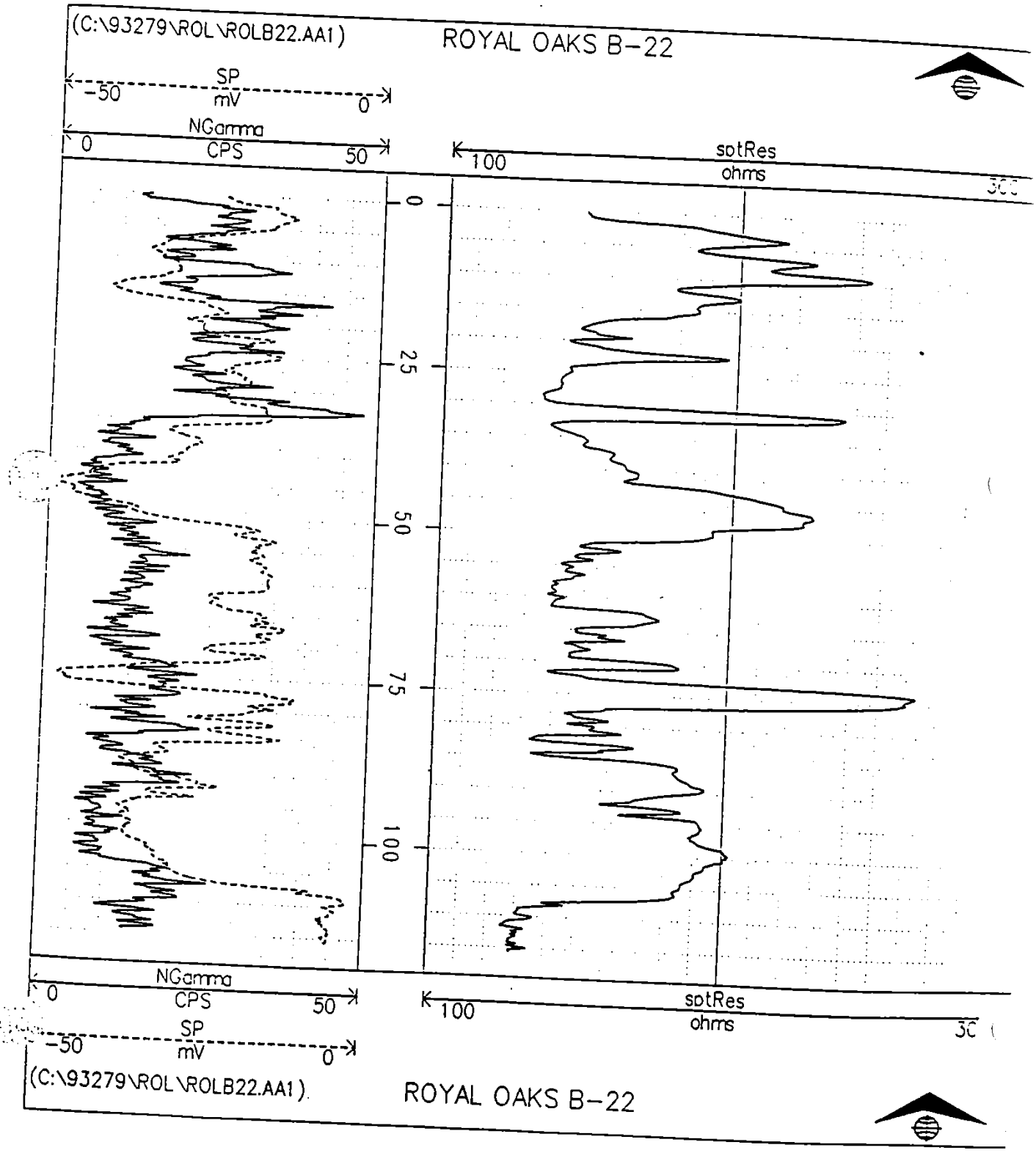
ROYAL OAKS B-21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sotRes
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25
50
75
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sotRes
ohms
SP
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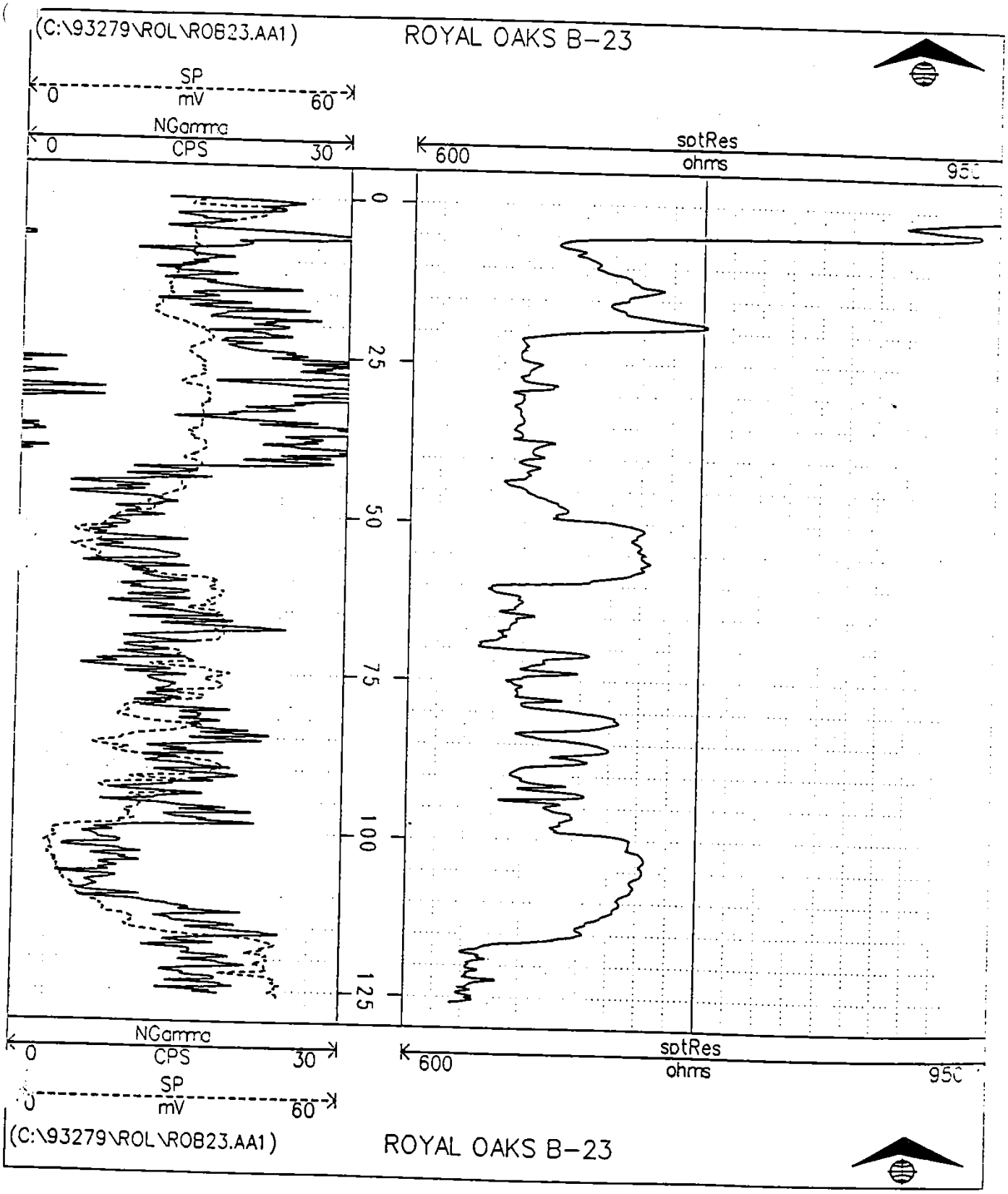
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ohms
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mV
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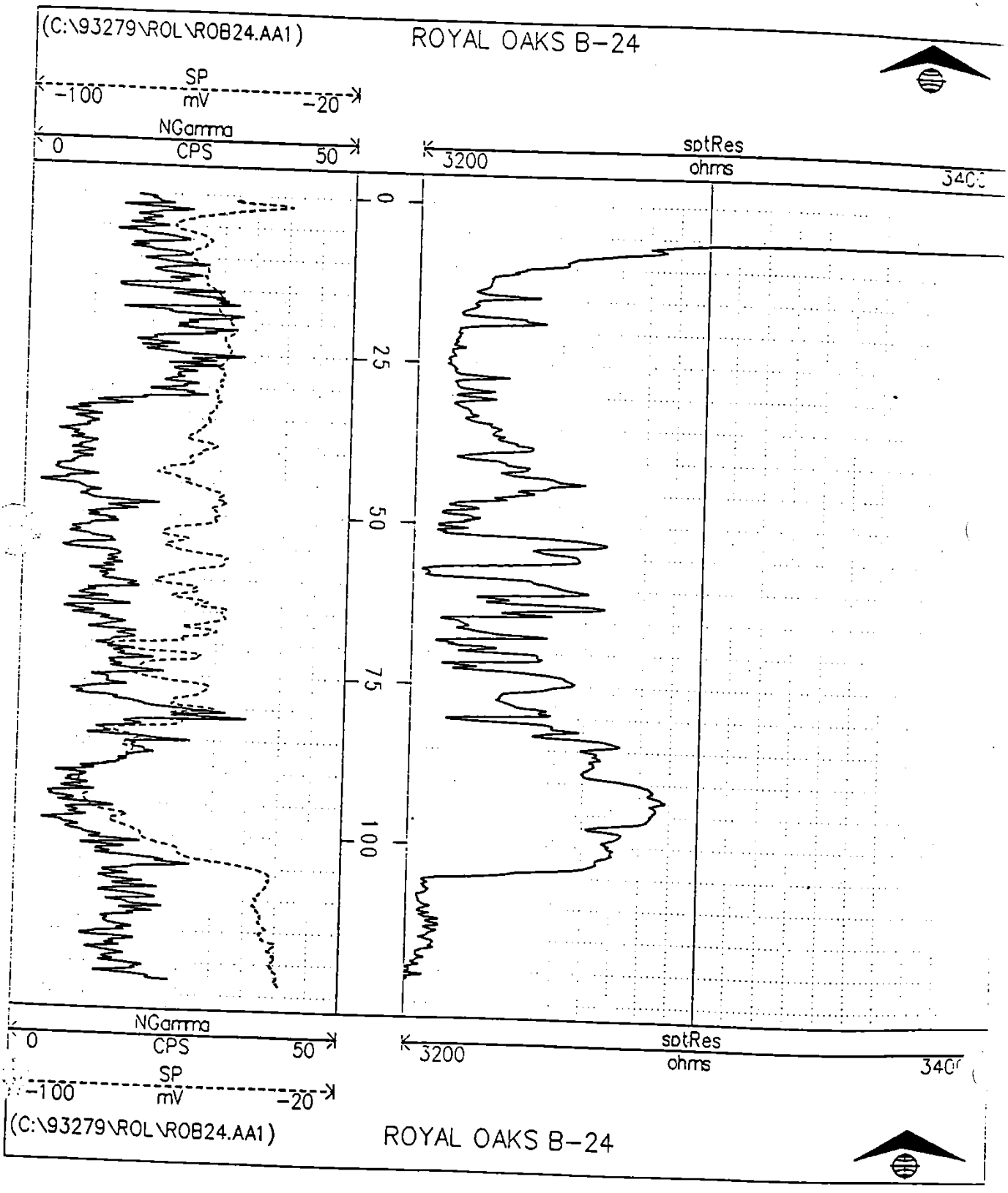
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ohms
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25
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CPS
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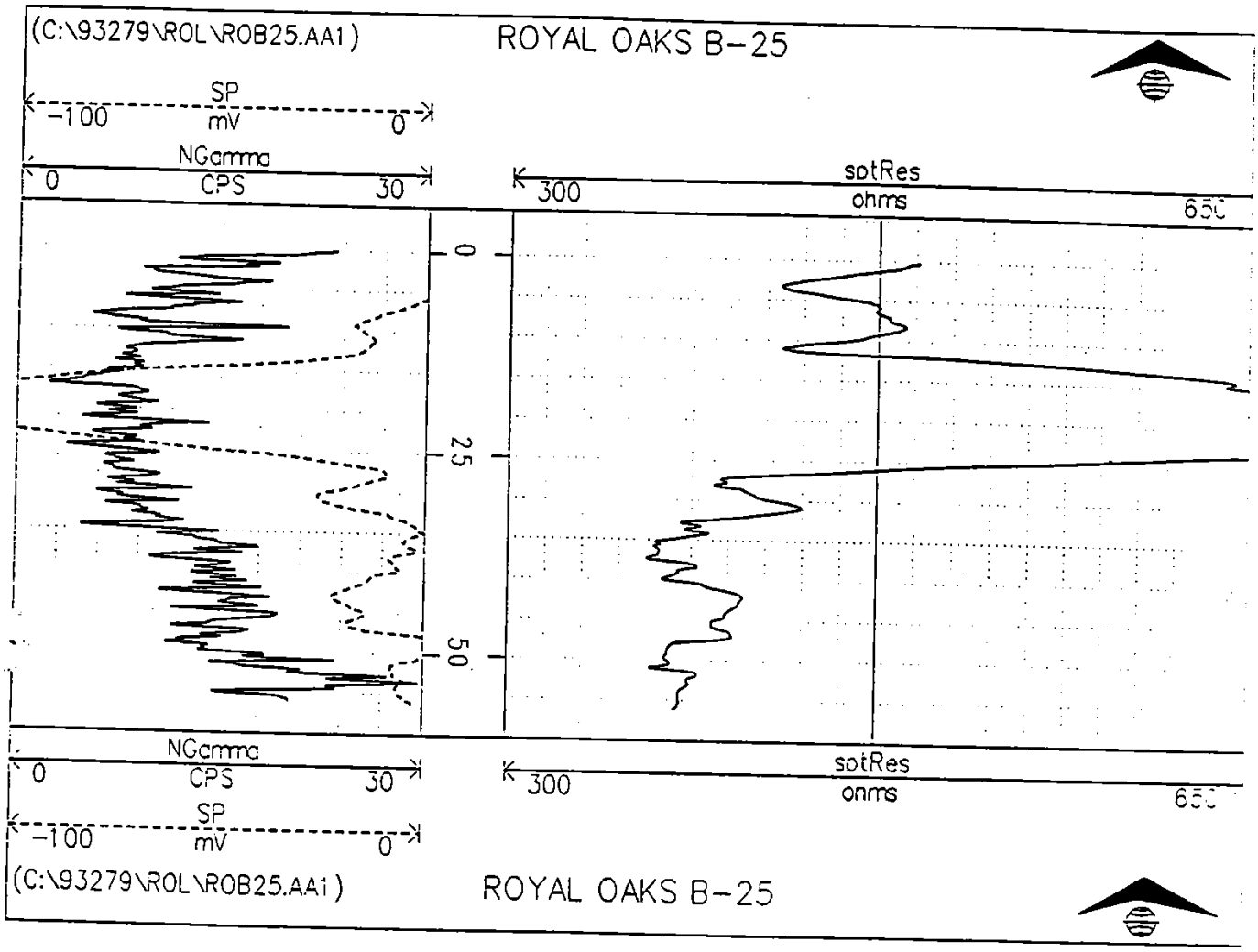
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ohms
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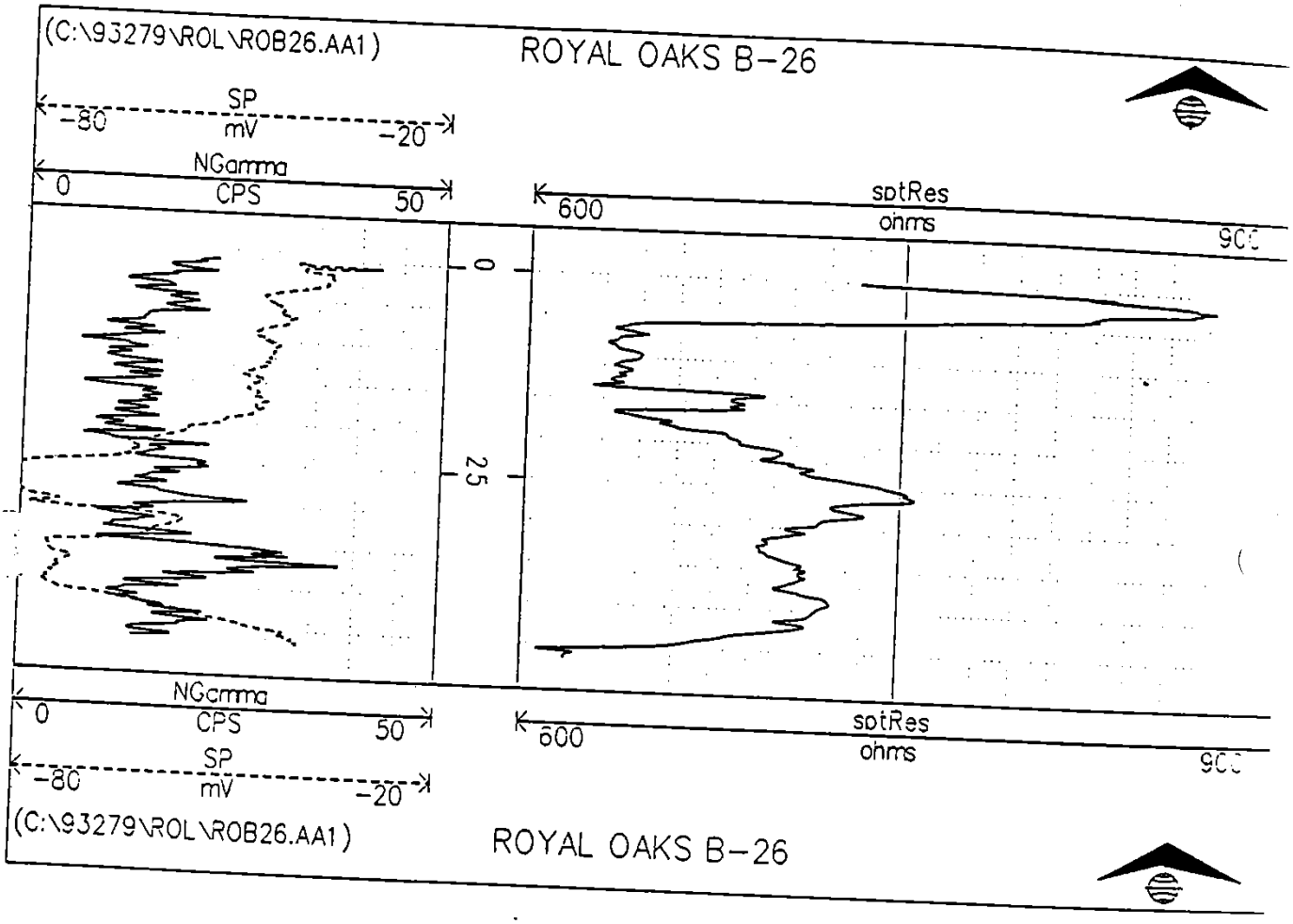
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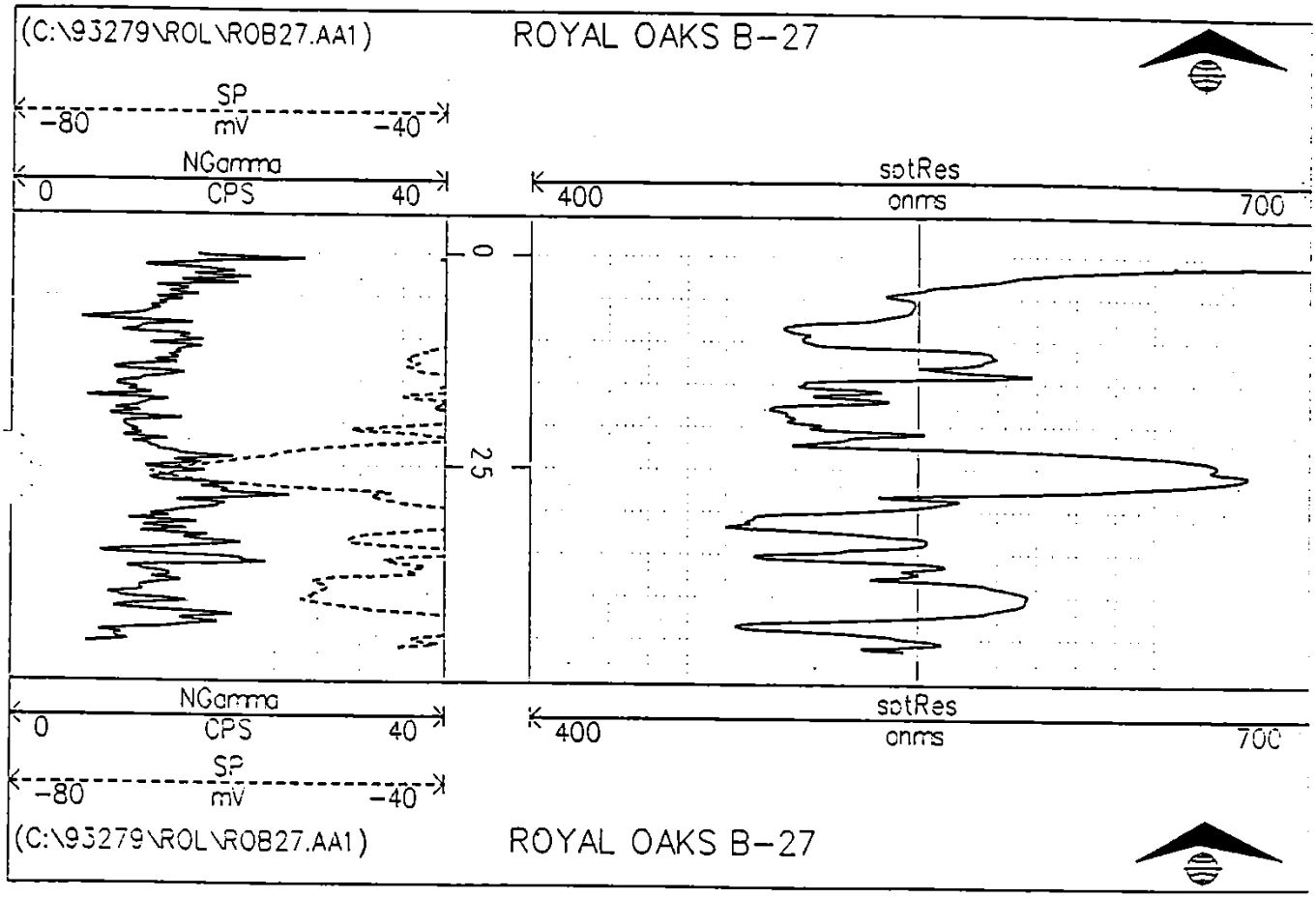
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mV
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NGamma
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CPS
40
satRes
400
ohms
700
0
25
NGamma
0
CPS
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ohms
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mV
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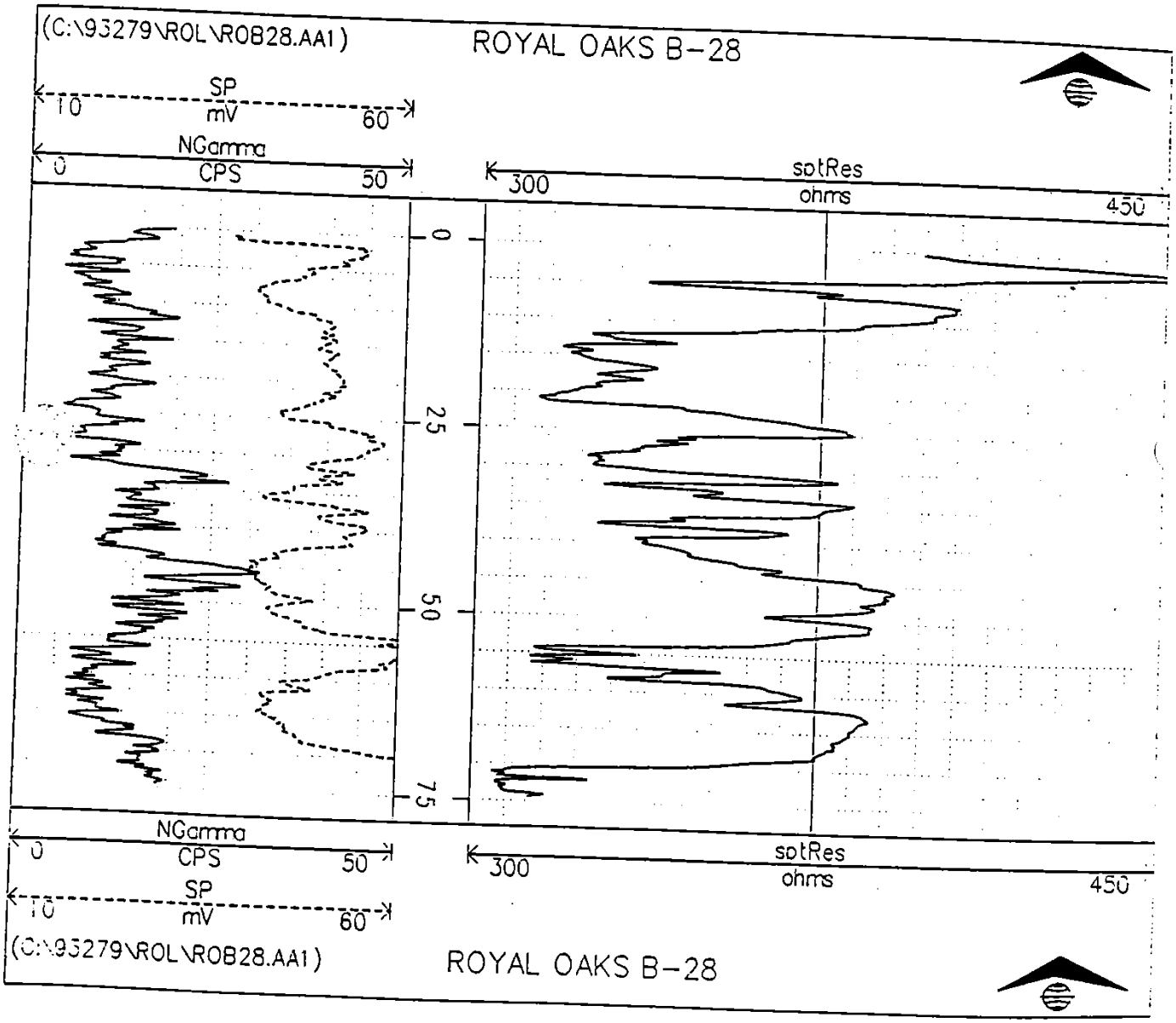
ROYAL OAKS B-27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CPS
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spfRes
ohms
450
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25
50
75
NGamma
0
CPS
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spfRes
ohms
450
SP
10
mV
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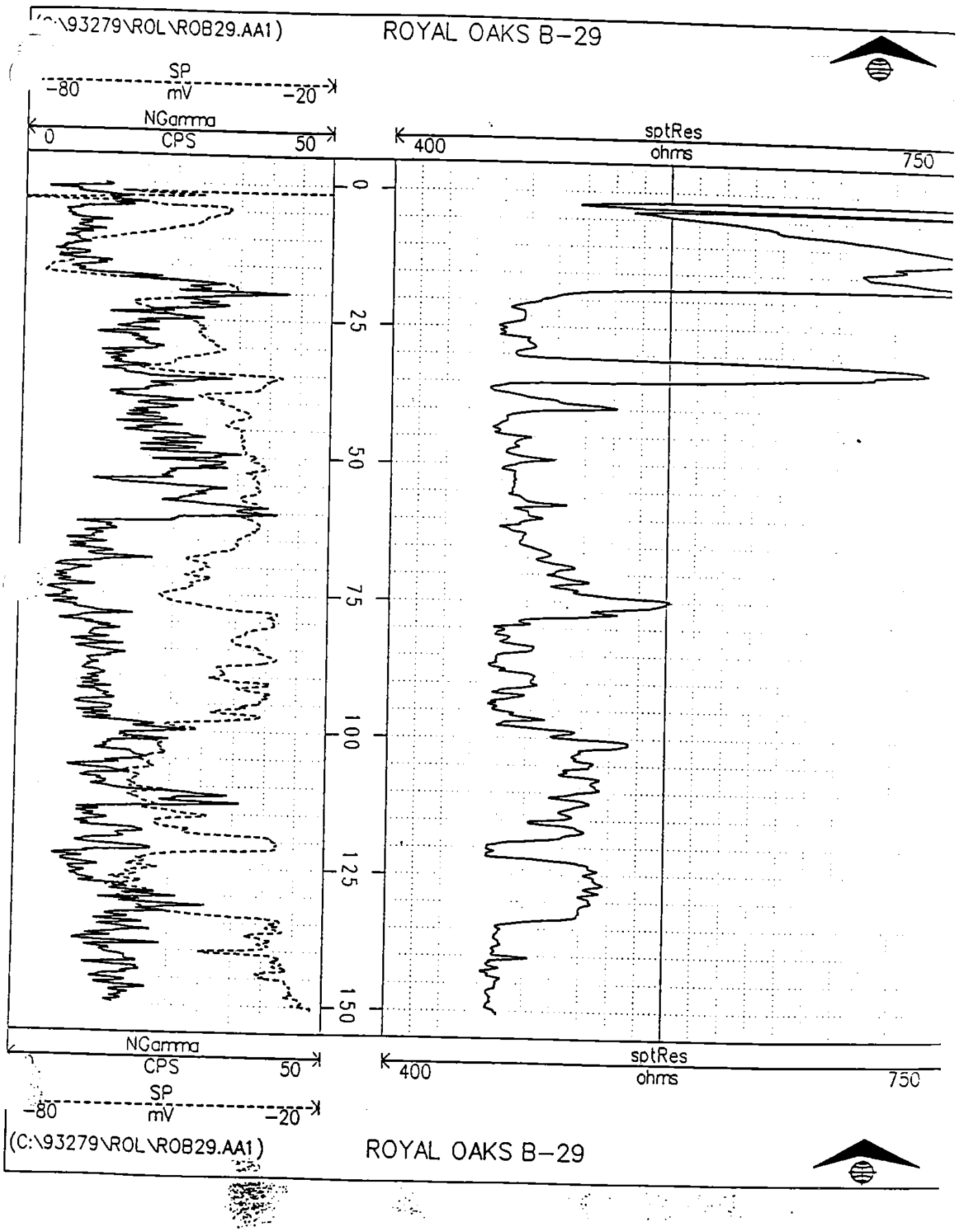
ROYAL OAKS B-28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ROYAL OAKS B-29
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mV
-20
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0
CPS
50
400
sptRes
ohms
750
0
25
50
75
100
125
150
NGamma
CPS
50
400
sptRes
ohms
750
SP
-80
mV
-20
(C:\93279\ROL\ROB29.AA1)
ROYAL OAKS B-29

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-8/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/05/94*
Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

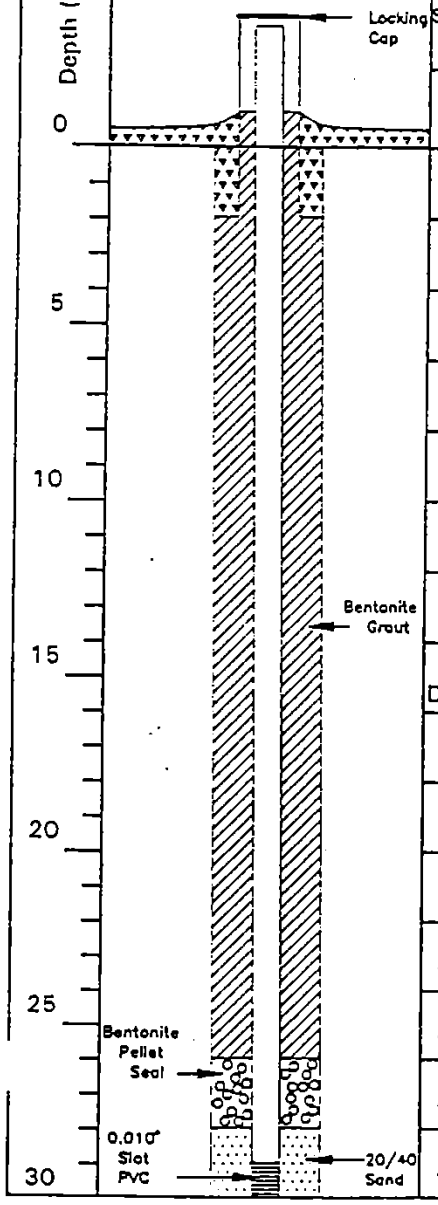
## WELL DEVELOPMENT

Method: *Surge/Purge*
Duration: *6 hours*
Gals. Purged: *240 gallons*
Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *685.53*
TWC: *688.41*
TPC: *688.77*
North: *9638.43*
East: *10103.40*

Geophysical Log: ☐ yes ☑ no
Comments:




| WELL CONSTRUCTION | Soil / rock | Samp. No. | Blows/ 6 in. | Rec. (ft.) | USCS | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | | | |
| | | 1 | | 2.0 | | | Silty Sand; SM; tan to strong brown, soft, friable, dry, very fine-grained, moderately sorted, quartz sand | Sparta Fm |
| | | 2 | | 2.0 | | | | |
| | | 3 | | 2.0 | | | | |
| | | 4 | | 2.0 | | | Clayey Sand; SC; brown, yellow and red banding, very stiff, low plasticity, dry to slightly moist, occasional hard streaks | |
| | | 5 | | 1.75 | | | | |
| | | 6 | | 1.0 | | | Silty Sand; SM; brown, yellowish-red and gray banding, stiff, slightly moist, fine-grained quartz, occasional very thin beds of ironstone | |
| | | 7 | | 1.5 | | | | |
| | | D.O. | | D.O. | | | Ironstone layers, hard, indurated sand, iron cemented | Drilled out |
| | | 8 | | 2.0 | | | Top of Weches Formation | Weches Fm |
| | | 9 | | 2.0 | | | Silty Clay; CL; yellowish-brown, strong brown bandings, hard, low plasticity, slightly moist, abundant ironstone fragments | |
| | | 10 | | 2.0 | | | | |
| | | 11 | | 2.0 | | | Clay; CH; dk gray-green, med. stiff, high plasticity, moist, glauconitic | Wet |
| | | 12 | | 1.5 | | | Clayey Sand; SC; dk gray-green, fine-grained quartz and glauconite, wet | |
| | | 13 | | 2.0 | | | Silt and Sand; SMML; dark gray-green, hard, friable, dry to slightly moist | Hard streak<br>Dry to moist |
| | | 14 | | 2.0 | | | Clayey Sand; SC; very dark grayish green, stiff, wet, glauconitic | Wet |

LAIDLAW WASTE SYSTEMS, INC.

Subsurface Boring Log

Well Name/Location: MW-8/Royal Oaks

Page 2 of

Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/05/94*

Finish Date: *10/11/94*

| Depth (feet) | WELL CONSTRUCTION | soil / rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 30 | | | | | | | | | |
| 35 | 0.010" Slot PVC; 20/40 Sand; 11" | | 15 | | 2.0 | | | | Wet |
| | | | 16 | | 2.0 | | | | |
| | | | 17 | | 2.0 | | | | |
| | | | 18 | | 2.0 | | | | |
| 40 | | | 19 | | 2.0 | | | Silty layer @ 37' - 39' | |
| | | | | | | | | Clayey Silt; CL; very dark grayish-green, medium stiff, dry | Dry |
| | | | | | | | | End of boring at 40 feet | |
| 45 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-9/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/07/94*
Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

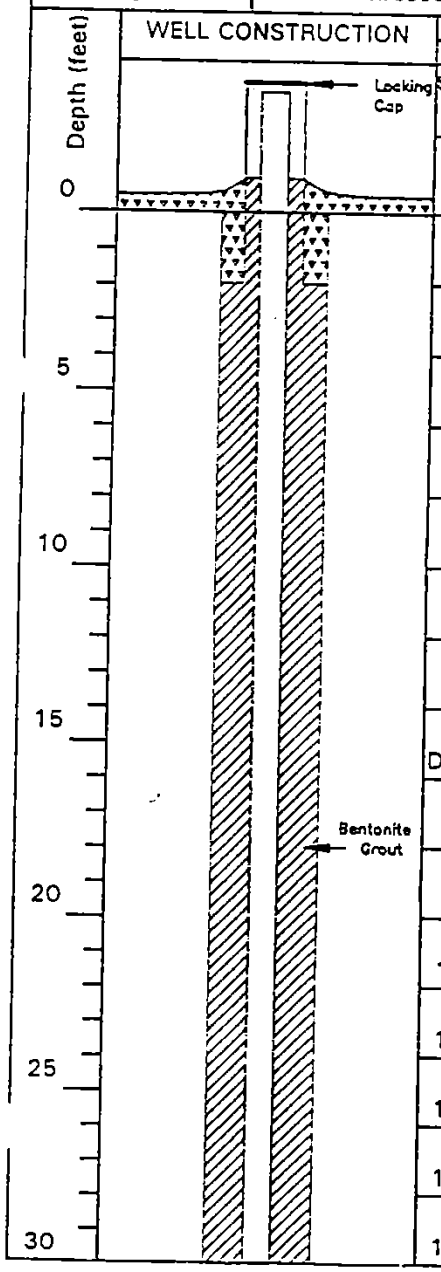
## WELL DEVELOPMENT

Method: *Surge/Purge*
Duration: *6 hours*
Gals. Purged: *390 gallons*
Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *685.63*
TWC: *688.59*
TPC: *688.87*
North: *9633.49*
East: *10112.17*

Geophysical Log: ☐ yes ☑ no
Comments:




| WELL CONSTRUCTION | soil / rock | Samp. No. | Blows/ 6 in. | Rec. (ft.) | USCS | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | | | |
| | | 1 | | 2.0 | | | Silty Sand; SM; tan to strong brown, soft, friable, dry, very fine-grained, moderately sorted, quartz sand | Sparta Fm |
| | | 2 | | 2.0 | | | | |
| | | 3 | | 2.0 | | | | |
| | | 4 | | 2.0 | | | Clayey Sand; SC; brown, yellow and red banding, very stiff, low plasticity, dry to slightly moist, occasional hard streaks | |
| | | 5 | | 1.75 | | | | |
| | | 6 | | 1.0 | | | Silty Sand; SM; brown, yellowish-red and gray banding, stiff, slightly moist, fine-grained quartz, occasional very thin beds of ironstone | |
| | | 7 | | 1.5 | | | | |
| | | D.O. | | D.O. | | | Ironstone layers, hard, indurated sand, iron cemented | Drilled out |
| | | 8 | | 2.0 | | | Top of Weches Formation<br>Silty Clay; CL; yellowish-brown, strong brown bandings, hard, plasticity, slightly moist, abundant ironstone fragments | Weches Fm |
| | | 9 | | 2.0 | | | | |
| | | 10 | | 2.0 | | | | |
| | | 11 | | 2.0 | | | Clay; CH; dk gray-green, med. stiff, high plasticity, moist, glauconitic | Wet |
| | | 12 | | 1.5 | | | Clayey Sand; SC; dk gray-green, fine-grained quartz and glauconite, wet | |
| | | 13 | | 2.0 | | | Silt and Sand; SMML; dark gray-green, hard, friable, dry to slightly moist | Hard streak<br>Dry to moist |
| | | 14 | | 2.0 | | | Clayey Sand; SC; very dark grayish green, stiff, wet, glauconitic | Wet |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-9/Royal Oaks

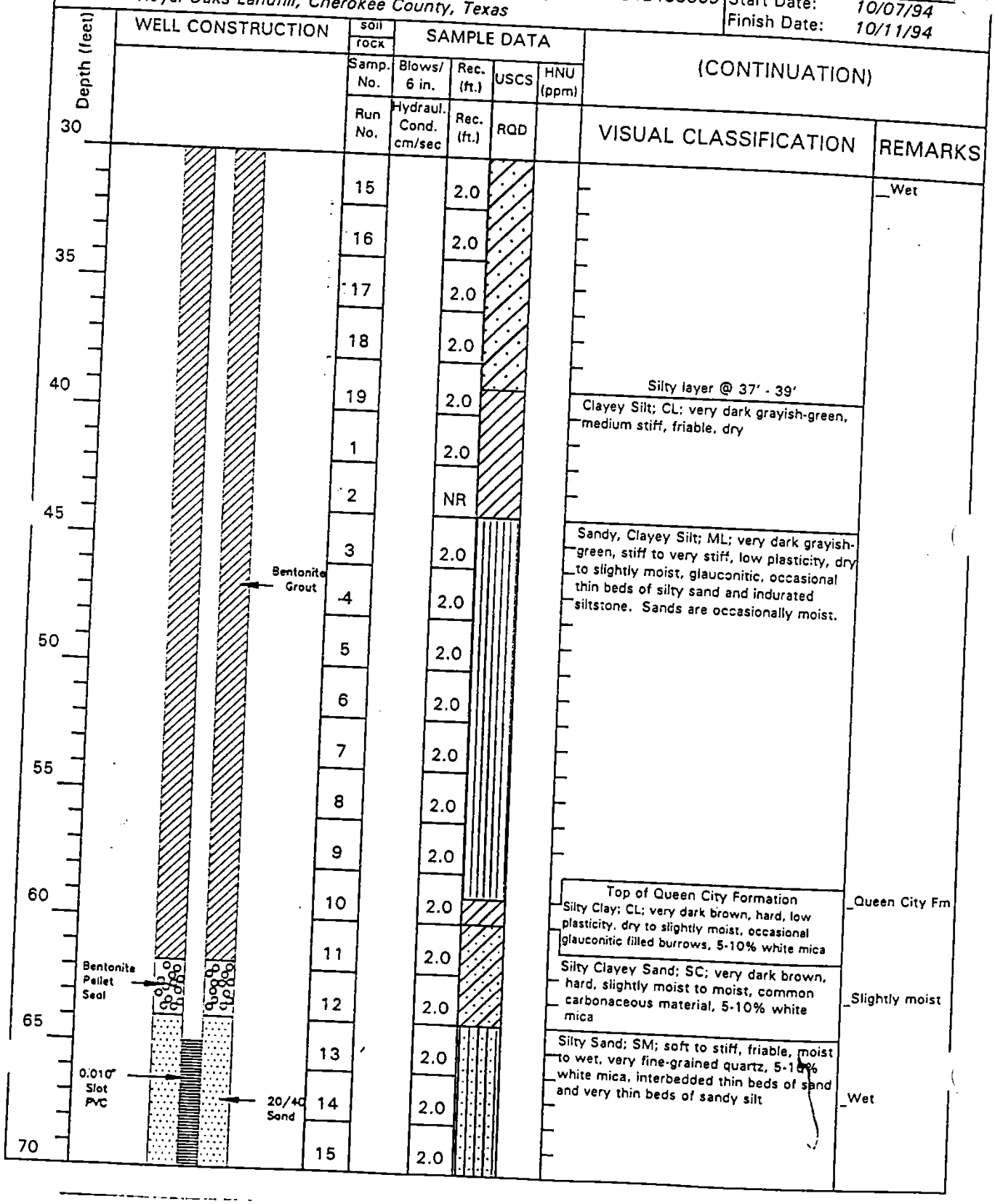


Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/07/94*

Finish Date: *10/11/94*



LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-9/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/07/94*

Finish Date: *10/11/94*

(CONTINUATION)

| Depth (feet) | WELL CONSTRUCTION | Soil / Rock Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 70 | | | | | | | | Wet |
| | 0.010" Slot PVC; 20/40 Sand; 11" | 16 | | 2.0 | | | | |
| 75 | | 17 | | 2.0 | | | | |
| | | 18 | | 2.0 | | | Clayey Sandy Silt; ML; very dark brown, stiff, low plasticity, moist to slightly moist, interbedded clays and silts | |
| | | 19 | | NR | | | | |
| 80 | | | | | | | End of boring at 78 feet | |
| 85 | | | | | | | | |
| 90 | | | | | | | | |
| 95 | | | | | | | | |
| 100 | | | | | | | | |
| 105 | | | | | | | | |
| 110 | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-10/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/04/94*
Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

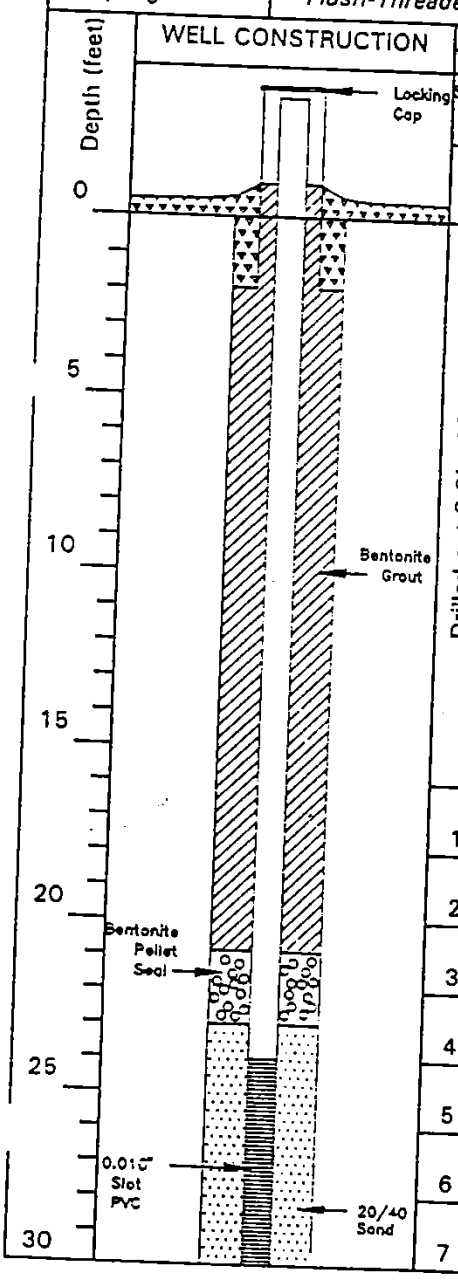
## WELL DEVELOPMENT

Method: *Surge/Purge*
Duration: *6 hours*
Gals. Purged: *140 gallons*
Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *670.91*
TWC: *673.91*
TPC: *674.32*
North: *8489.50*
East: *10025.58*

Geophysical Log: ☐ yes ☑ no
Comments:




| WELL CONSTRUCTION | soil / rock | Samp. No. | Blows/ 6 in. | Rec. (ft.) | USCS | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Silty Sand; SM; tan, friable, dry, occasional hard ironstone layers | Sparta Fm |
| Drilled out 0.0' - 16.0' | | | | | | | Top of Weches Formation<br>Clayey Silt; CL; brown, dry, occasional ironstone layers | Weches Fm |
| | | 1 | 2.0 | | | | Clay; CH; white with tan mottles, very hard high plasticity, dry, occasional thin beds of clayey silt and ironstone | |
| | | 2 | 2.0 | | | | Silty Clay; CL; brown, low plasticity, slightly moist, occasional ironstone fragments | |
| | | 3 | 2.0 | | | | Silty Sand; SM; very dark grayish-green, glauconitic, very hard, friable, very fine-grained sand, poorly sorted, occasional hard streaks | Dry<br>Slightly moist |
| | | 4 | 2.0 | | | | | |
| | | 5 | 2.0 | | | | | |
| | | 6 | 2.0 | | | | | Moist |
| | | 7 | 2.0 | | | | | |

| | Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD |
|---|---|---|---|---|

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-10/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/04/94*

Finish Date: *10/11/94*

| Depth (feet) | WELL CONSTRUCTION | soil / rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 30 | 0.010" Slot PVC; 20/40 Sand; 11" | | 8 | | 2.0 | | | | |
| | | | 9 | | 2.0 | | | | |
| 35 | | | 10 | | 1.0 | | | Silty Clay; CL; very dark grayish-green, glauconitic, very hard, low plasticity, slightly moist | |
| | | | | | | | | End of boring at 35 feet | |
| 40 | | | | | | | | | |
| 45 | | | | | | | | | |
| 50 | | | | | | | | | |
| 55 | | | | | | | | | |
| 60 | | | | | | | | | |
| 65 | | | | | | | | | |
| 70 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-11/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/06/94*

Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

## WELL DEVELOPMENT

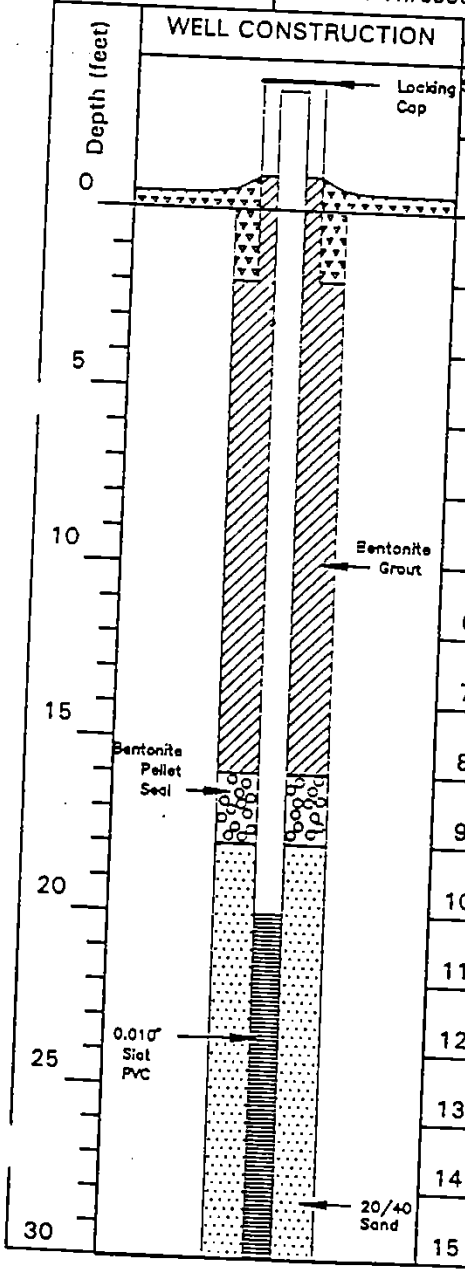
Method: *Surge/Purge*
Duration: *6 hours*
Gals. Purged: *138 gallons*
Slug Test: (cm/sec) *NA*

## SURVEY DATA DATUM

Grade: *629.40*
TWC: *631.96*
TPC: *632.38*
North: *8034.16*
East: *10038.34*

Geophysical Log: ☐ yes ☑ no

Comments:




| WELL CONSTRUCTION | soil / rock | SAMPLE DATA | | | | | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | | |
| | | 1 | | 2.0 | | | Sandy Silty Clay; CL; red to brown with depth, soft near surface, becoming hard around 4', friable to low plasticity, dry to slightly moist, high plasticity around 8' to 10', common ironstone fragments | |
| | | 2 | | 2.0 | | | | |
| | | 3 | | 2.0 | | | | |
| | | 4 | | 2.0 | | | | |
| | | 5 | | 2.0 | | | | |
| | | 6 | | 2.0 | | | –glauconitic sandy silt at 11.7' | |
| | | 7 | | 2.0 | | | Sandy Clayey Silt; CL/ML; very dark bluish-green, becoming brown with depth, soft to hard, low plasticity, slightly moist, interbedded silts and clays | |
| | | 8 | | 2.0 | | | Top of Queen City Formation<br>Silty Sand; SM; very dark brown, very stiff, friable to low plasticity, moist to wet, very fine-grained quartz, 5-10% white mica, interbedded very thin beds of silts and sands, occasional carbonaceous material | Queen City Fm<br>Moist<br>Wet |
| | | 9 | | 2.0 | | | | |
| | | 10 | | 2.0 | | | | |
| | | 11 | | 2.0 | | | | |
| | | 12 | | 2.0 | | | Sand; SP; very dark brown, medium stiff, friable, wet, 5% dark minerals, very fine-grained quartz | |
| | | 13 | | 2.0 | | | Silty Sand; SM; very dark brown, medium stiff, friable, wet, interbedded silt and sand | |
| | | 14 | | 2.0 | | | Sand; SP; very dark brown, wet, common carbonaceous material, 10% white mica | |
| | | 15 | | 2.0 | | | Sandy Silt; ML; dark brown, hard, dry, interbedded silt and clay | Dry |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-11/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/06/94*

Finish Date: *10/11/94*

| Depth (feet) | WELL CONSTRUCTION | soil / rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 30 | 20/40 Sand, 11" | | | | | | | End of boring at 30 feet | |
| 35 | | | | | | | | | |
| 40 | | | | | | | | | |
| 45 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-12/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/04/94*
Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

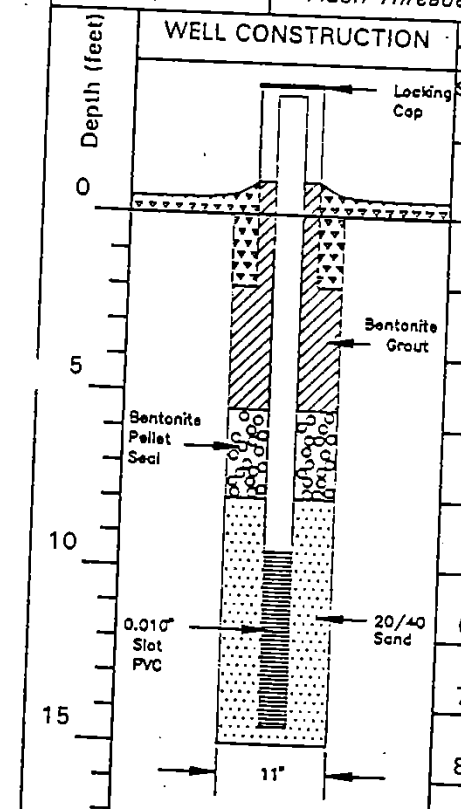
## WELL DEVELOPMENT

Method: *Surge/Purge*
Duration: *6 hours*
Gals. Purged: *111 gallons*
Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *611.49*
TWC: *614.39*
TPC: *614.77*
North: *7703.47*
East: *10258.17*

Geophysical Log: ☐ yes ☑ no
Comments:




| Run No. | Samp. No. | Blows/ 6 in. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | USCS | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 2.0 | | | | Silty Clay; CL; red; dry occasional ironstone pebbles | Queen City Fm |
| 2 | | | | 2.0 | | | | Clayey Silt; ML; yellow, red banding; slightly moist; friable | |
| 3 | | | | 2.0 | | | | Silty Sand to Sandy Silt; SM; iron stained; very fine grained sand; very moist | |
| 4 | | | | 2.0 | | | | | Very moist |
| 5 | | | | 2.0 | | | | | |
| 6 | | | | 2.0 | | | | Sand; SP; dark brown; very fine- to fine-grained; well sorted friable becomes clayey with depth; occasional carbonaceous material | Wet |
| 7 | | | | 2.0 | | | | | |
| 8 | | | | 2.0 | | | | Silty Clayey Sand; SM; brown, with very thin beds of sandy silt; slightly moist | |
| 9 | | | | 2.0 | | | | | |
| | | | | | | | | End of boring at 18 feet | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-13/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *11/11/94*
Finish Date: *11/18/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

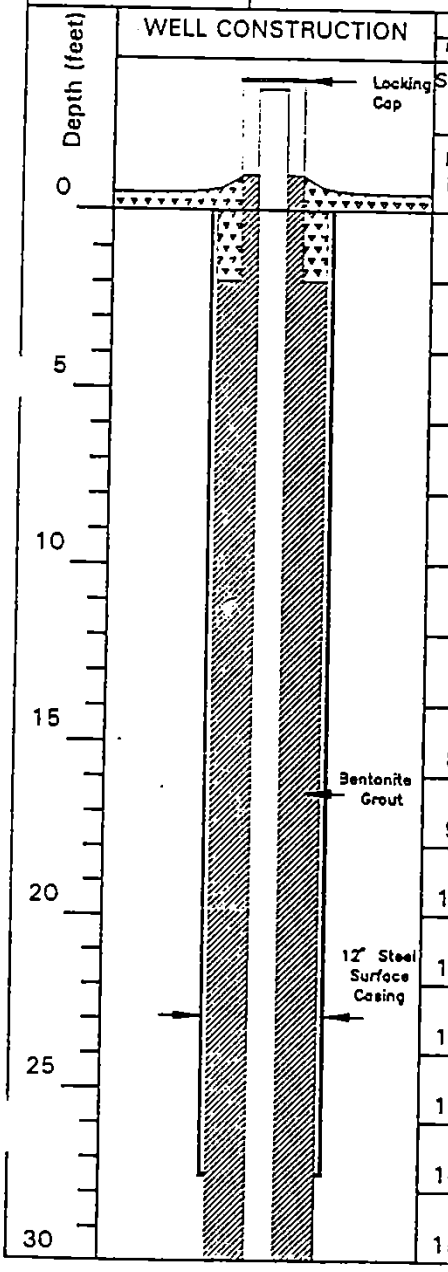
## WELL DEVELOPMENT

Method: *Surge/Purge*
Duration: *3.0 hours*
Gals. Purged: *92 gallons*
Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *652.30*
TWC: *655.13*
TPC: *655.49*
North: *7610.0*
East: *10702.7*

Geophysical Log: ☐ yes ☑ no
Comments:




| WELL CONSTRUCTION | SAMPLE DATA | | | | | | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| soil / rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | | | |
| | 1 | | 2.0 | | | | Clayey Silt; CL; brown, hard, friable to low plasticity, slightly moist, occasional ironstone fragments | Weches Fm |
| | 2 | | 2.0 | | | | | |
| | 3 | | 2.0 | | | | | |
| | 4 | | 2.0 | | | | | |
| | 5 | | 2.0 | | | | | |
| | 6 | | 2.0 | | | | | |
| | 7 | | 2.0 | | | | | |
| | 8 | | 2.0 | | | | | |
| | 9 | | 2.0 | | | | Clayey Silt; CL/ML; dark grayish-green, very stiff, friable, slightly moist, glauconitic, occasional streaks of blocky silt | |
| | 10 | | 2.0 | | | | | |
| | 11 | | 2.0 | | | | | |
| | 12 | | 2.0 | | | | | |
| | 13 | | 2.0 | | | | | |
| | 14 | | 2.0 | | | | | |
| | 15 | | 2.0 | | | | | 12-inch steel surface casing from 0-27.5' |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-13/Royal Oaks

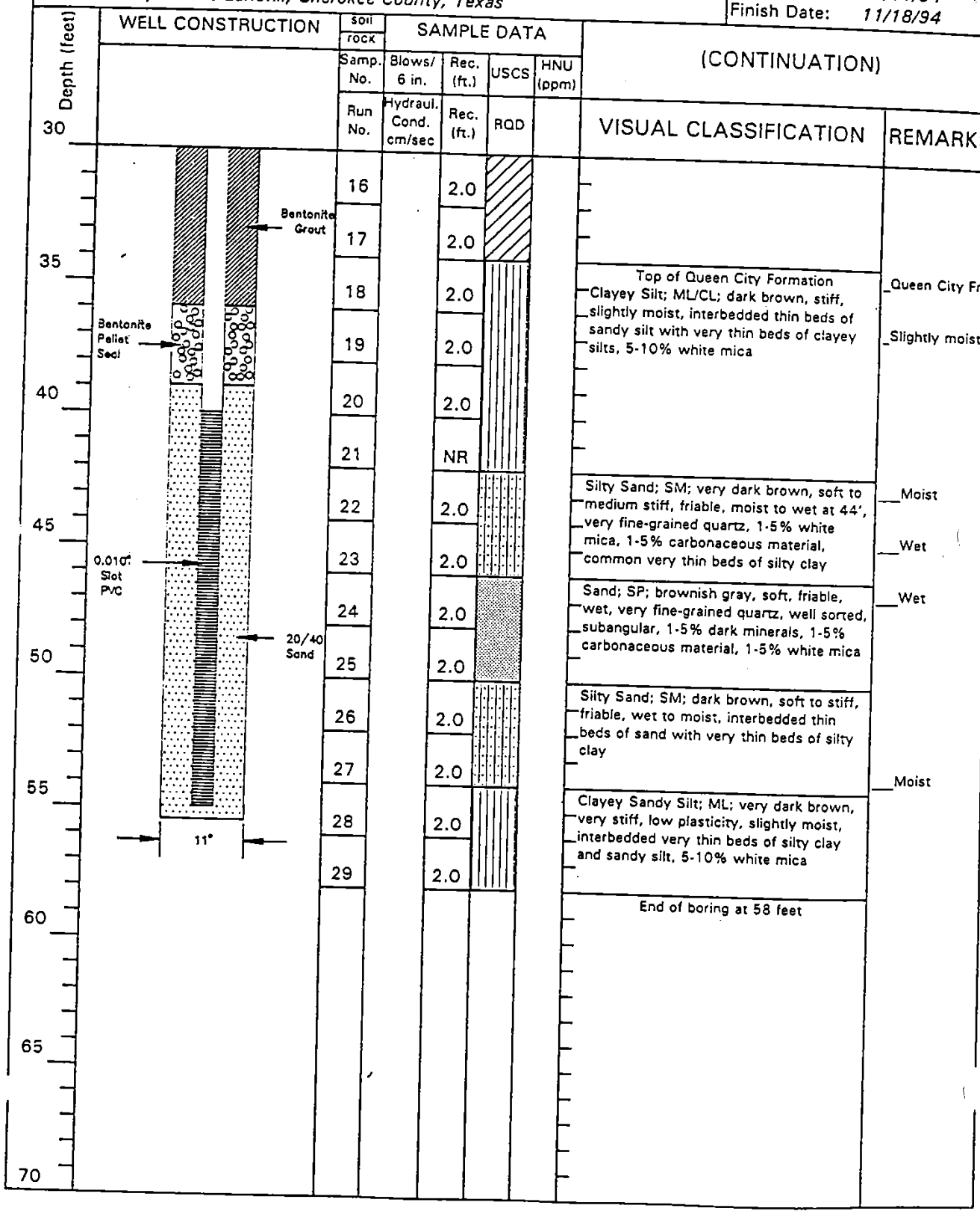


Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *11/11/94*

Finish Date: *11/18/94*




| WELL CONSTRUCTION | soil / rock | Samp. No. | Blows/ 6 in. | Rec. (ft.) | USCS | HNU (ppm) | (CONTINUATION) | |
|---|---|---|---|---|---|---|---|---|
| | | Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | | VISUAL CLASSIFICATION | REMARKS |
| | | 16 | | 2.0 | | | | |
| | | 17 | | 2.0 | | | | |
| | | 18 | | 2.0 | | | Top of Queen City Formation<br>Clayey Silt; ML/CL; dark brown, stiff, slightly moist, interbedded thin beds of sandy silt with very thin beds of clayey silts, 5-10% white mica | Queen City Fm<br>Slightly moist |
| | | 19 | | 2.0 | | | | |
| | | 20 | | 2.0 | | | | |
| | | 21 | | NR | | | | |
| | | 22 | | 2.0 | | | Silty Sand; SM; very dark brown, soft to medium stiff, friable, moist to wet at 44', very fine-grained quartz, 1-5% white mica, 1-5% carbonaceous material, common very thin beds of silty clay | Moist |
| | | 23 | | 2.0 | | | | Wet |
| | | 24 | | 2.0 | | | Sand; SP; brownish gray, soft, friable, wet, very fine-grained quartz, well sorted, subangular, 1-5% dark minerals, 1-5% carbonaceous material, 1-5% white mica | Wet |
| | | 25 | | 2.0 | | | | |
| | | 26 | | 2.0 | | | Silty Sand; SM; dark brown, soft to stiff, friable, wet to moist, interbedded thin beds of sand with very thin beds of silty clay | |
| | | 27 | | 2.0 | | | | Moist |
| | | 28 | | 2.0 | | | Clayey Sandy Silt; ML; very dark brown, very stiff, low plasticity, slightly moist, interbedded very thin beds of silty clay and sandy silt, 5-10% white mica | |
| | | 29 | | 2.0 | | | | |
| | | | | | | | End of boring at 58 feet | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-14/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/04/94*
Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

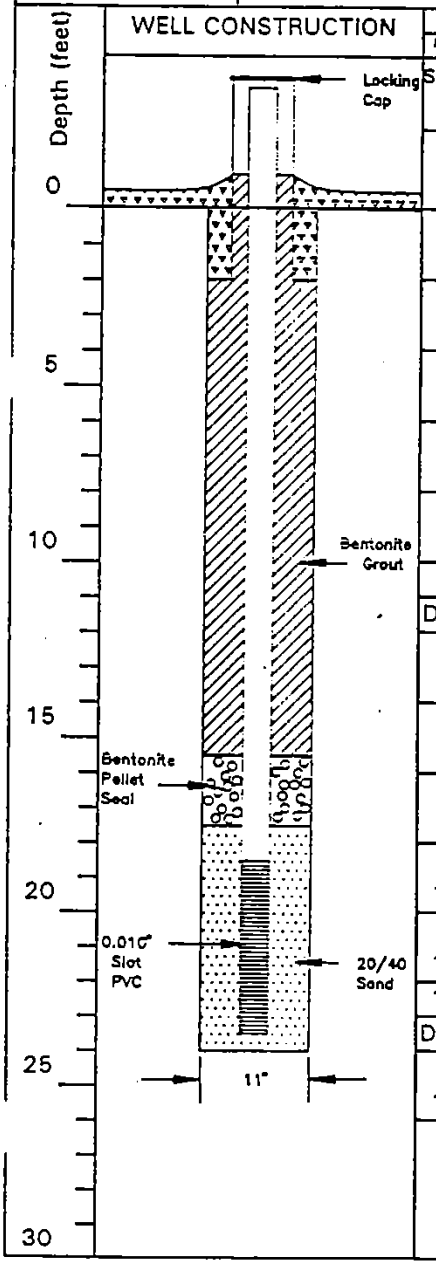
## WELL DEVELOPMENT

Method: *Surge/Purge*
Duration: *6.5 hours*
Gals. Purged: *59 gallons*
Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *611.49*
TWC: *614.39*
TPC: *614.77*
North: *7703.47*
East: *10258.17*

Geophysical Log: ☐ yes ☑ no
Comments: Geophysical log within 100 feet




| WELL CONSTRUCTION | soil / rock | SAMPLE DATA | | | | | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | Samp. No. | Blows/ 6 in. | Rec. (ft.) | USCS | HNU (ppm) | | | |
| | Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | | | | |
| | 1 | | 2.0 | | | | Clayey Silt; CL; brown to reddish-brown, yellow mottles and red and white banding, stiff, low plasticity, dry to slightly moist, occasional ironstone fragments and very thin beds | Weches Fm |
| | 2 | | 2.0 | | | | | Dry to slightly moist |
| | 3 | | 2.0 | | | | | |
| | 4 | | 2.0 | | | | | |
| | 5 | | 2.0 | | | | | Moist |
| | 6 | | 1.0 | | | | | Hard streak drilled out |
| | D.O. | | D.O. | | | | | |
| | 7 | | 2.0 | | | | Sandy Silt; ML; dark grayish-green, soft, friable, moist | |
| | 8 | | 2.0 | | | | Silty Sand; SM; dark grayish-green, medium stiff, friable, moist, occasional hard streaks, sediments become clayier with depth | Moist |
| | 9 | | 2.0 | | | | | |
| | 10 | | 2.0 | | | | | |
| | 11 | | 2.0 | | | | Clayey Silt; CL; dark grayish-green, glauconitic, hard, low plasticity, slightly moist | |
| | 12 | | 1.0 | | | | | Hard streaks |
| | D.O. | | D.O. | | | | | |
| | 13 | | 2.0 | | | | | |
| | | | | | | | End of boring at 26 feet | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-15/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *11/10/94*

Finish Date: *11/18/94*

## DRILLING DATA

Inspector: *Eric Matzner*

Contractor: *Groundwater Technology, Inc.*

Equipment: *Mobil B-61*

Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

## WELL DEVELOPMENT

Method: *Surge/Purge*

Duration: *6.0 hours*

Gals. Purged: *122 gallons*

Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *661.38*

TWC: *664.21*

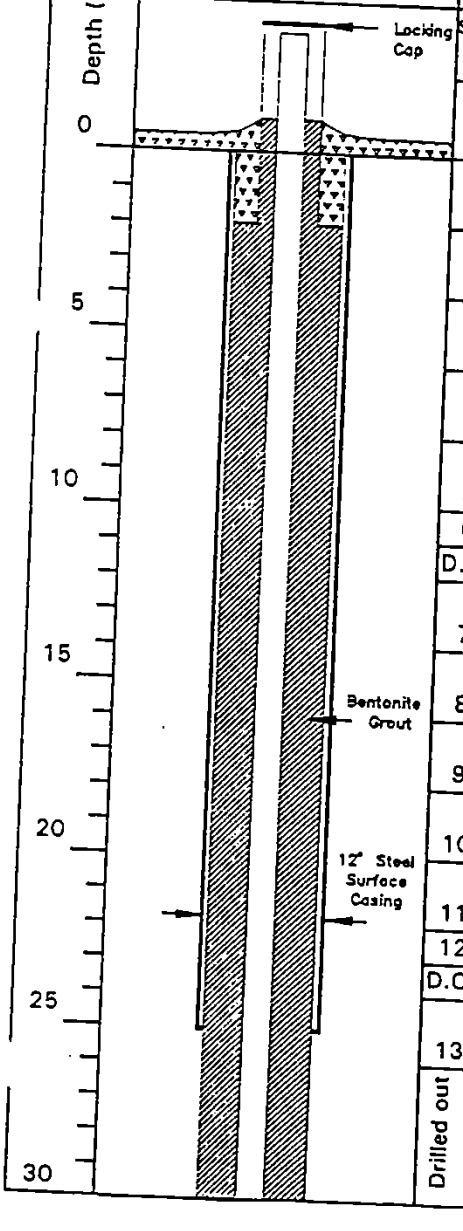
TPC: *664.58*

North: *8548.9*

East: *11336.1*

Geophysical Log: ☐ yes ☑ no

Comments:




| WELL CONSTRUCTION | SAMPLE DATA | | | | | | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | Samp. No. | Blows/ 6 in. | Rec. (ft.) | USCS | HNU (ppm) | | | |
| | Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | | | | |
| soil / rock | 1 | | 2.0 | | | | Clayey Silt; CL; brown to reddish brown, with yellow mottles and red and white banding, stiff, low plasticity, dry to slightly moist, ocasional ironstone fragments and very thin beds | Weches Fm |
| | 2 | | 2.0 | | | | | Dry to slightly moist |
| | 3 | | 2.0 | | | | | |
| | 4 | | 2.0 | | | | | |
| | 5 | | 2.0 | | | | | Moist |
| | 6 | | 1.0 | | | | | Hard streak drilled out |
| | D.O. | | D.O. | | | | | |
| | 7 | | 2.0 | | | | Sandy Silt; ML; dark grayish-green, soft, friable, moist | |
| | 8 | | 2.0 | | | | Silty Sand; SM; dark grayish-green, medium stiff, friable, moist, occasional hard streaks, sediments become clayier with depth | Moist |
| | 9 | | 2.0 | | | | | |
| | 10 | | 2.0 | | | | | |
| | 11 | | 2.0 | | | | Clayey Silt; CL; dark grayish-green, glauconitic, hard, low plasticity, slightly moist | |
| | 12 | | 1.0 | | | | | Hard streaks |
| | D.O. | | D.O. | | | | | |
| | 13 | | 2.0 | | | | | 12-inch steel surface casing 0-25' |
| | Drilled out | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-15/Royal Oaks

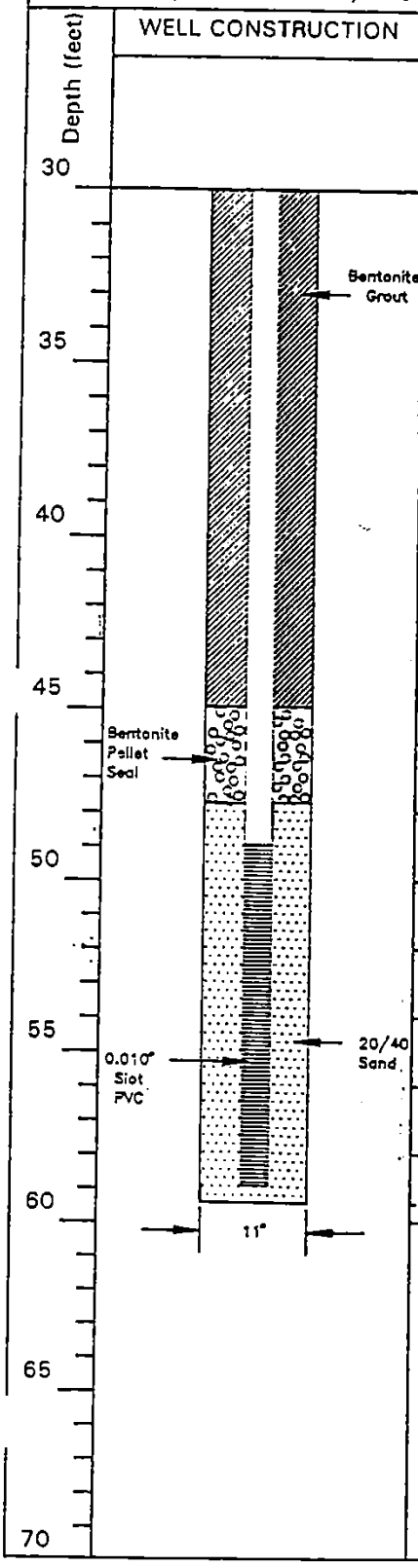


Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *11/10/94*

Finish Date: *11/18/94*




| WELL CONSTRUCTION | soil / rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | Drilled out 26'-36' | | | | | | |
| | | 1 | | 2.0 | | | Clayey Silt; CL/ML; dark grayish-green, medium soft to stiff, friable, dry to slightly moist, glauconitic, occasional siltstone rock fragments | Dry |
| | | 2 | | 2.0 | | | | |
| | | 3 | | 2.0 | | | | |
| | | 4 | | 2.0 | | | Top of Queen City Formation<br>Clayey Sandy Silt; ML; very dark brown, stiff, friable, dry to moist with depth, occasional glauconitic silt-filled burrows, 1-5% white mica | Queen City Fm<br>Moist |
| | | 5 | | 2.0 | | | | |
| | | 6 | | 2.0 | | | Silt and Sand; SM/ML; dark brown, soft, friable, moist to very moist to wet at 58.0', very fine-grained quartz, 5-10% white mica, occasional nodules of indurated sand, occasional thin beds of clayey silt and sandy silt | Moist |
| | | 7 | | 1.0 | | | | |
| | | 8 | | 2.0 | | | | |
| | | 9 | | 2.0 | | | | Very moist |
| | | 10 | | 2.0 | | | | |
| | | 11 | | 2.0 | | | | Wet |
| | | 12 | | 2.0 | | | Silty Clay; CL; dark brown, very hard, low plasticity, dry, interbedded very thin beds of silty clay and laminae of sandy silt | |
| | | | | | | | End of boring at 60 feet | |

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

County: Cherokee County

Date of Monitor Well Installation: 10/06/94

Monitor Well: Latitude: 32°00'05.0" Longitude: 95°16'03.1"

Monitor Well Groundwater

Gradient: Upgradient X Downgradient ____

MSW PERMIT NO: 1614

Monitor Well I.D. No.: MW-8

Date of Monitor Well Development: 10/17/94

Monitor Well Driller

Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

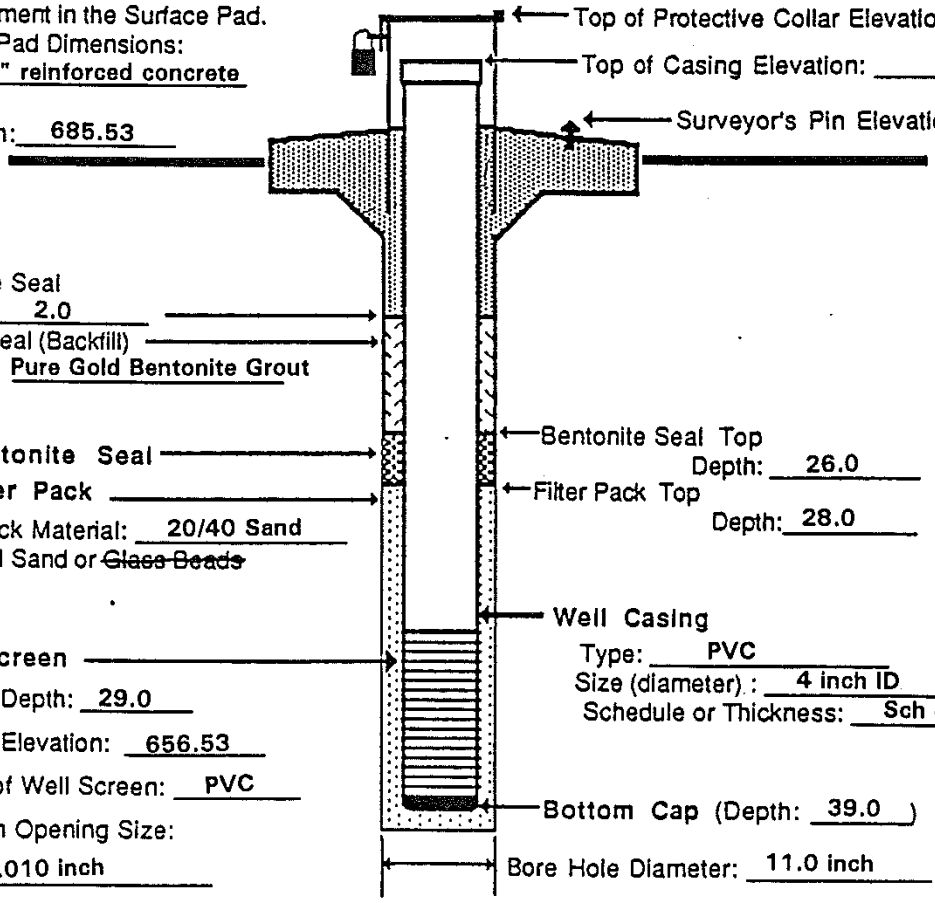
Static Water Level Elevation (with respect to MSL) after Well Developement : 673.25

Name of Geologic Formation(s) in which Well is completed: Weches

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete
Surface Elevation: 685.53



Top of Protective Collar Elevation: 688.87

Top of Casing Elevation: 688.41

Surveyor's Pin Elevation: 685.83

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal

Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top
Depth: 26.0 Elevation: 659.53

Filter Pack Top
Depth: 28.0 Elevation: 657.53

Well Screen

Top Depth: 29.0

Top Elevation: 656.53

Type of Well Screen: PVC

Screen Opening Size:
0.010 inch

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Bottom Cap (Depth: 39.0 )

Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill
County: Cherokee County
Date of Monitor Well Installation: 10/08/94
Monitor Well: Latitude: 32°00'05.0" Longitude: 95°16'03.0"
Monitor Well Groundwater
Gradient: Upgradient X Downgradient ____

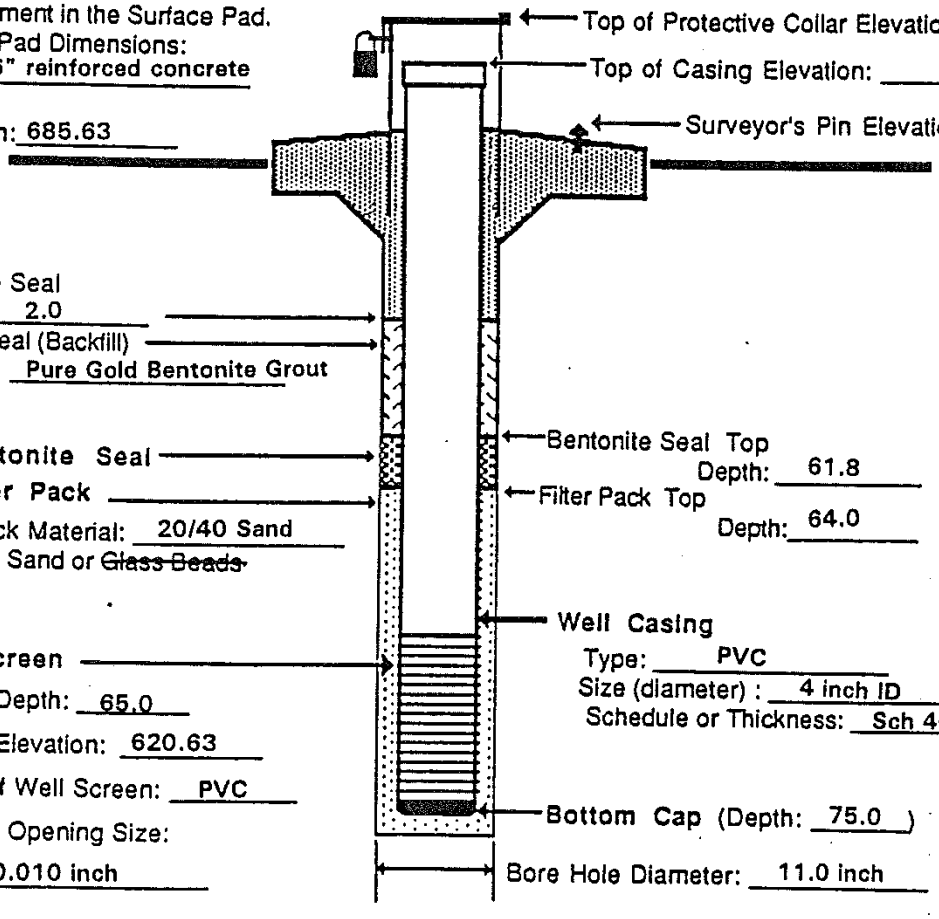
MSW PERMIT NO: 1614
Monitor Well I.D. No.: MW-9
Date of Monitor Well Development: 10/17/94
Monitor Well Driller
Name: Benny Hinojosa
License No.: 3127M

NOTE:
(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner
Static Water Level Elevation (with respect to MSL) after Well Development : 632.16
Name of Geologic Formation(s) in which Well is completed: Queen City

Type of Locking Device: pad lock
Type of Casing Protection: 6" x 5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
• 4'x4'x6" reinforced concrete
Surface Elevation: 685.63



Top of Protective Collar Elevation: 688.87
Top of Casing Elevation: 688.59
Surveyor's Pin Elevation: 685.97

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal
Filter Pack
Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top
Depth: 61.8 Elevation: 623.83
Filter Pack Top
Depth: 64.0 Elevation: 621.63

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Well Screen
Top Depth: 65.0
Top Elevation: 620.63
Type of Well Screen: PVC
Screen Opening Size:
0.010 inch

Bottom Cap (Depth: 75.0 )
Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

County: Cherokee County

Date of Monitor Well Installation: 10/05/94

Monitor Well: Latitude: 31°59'53.7" Longitude: 95°16'04.1"

Monitor Well Groundwater

Gradient: Upgradient ___ Downgradient X

MSW PERMIT NO: 1614

Monitor Well I.D. No.: MW-10

Date of Monitor Well Development: 10/18/94

Monitor Well Driller

Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

Static Water Level Elevation (with respect to MSL) after Well Developement : 654.33

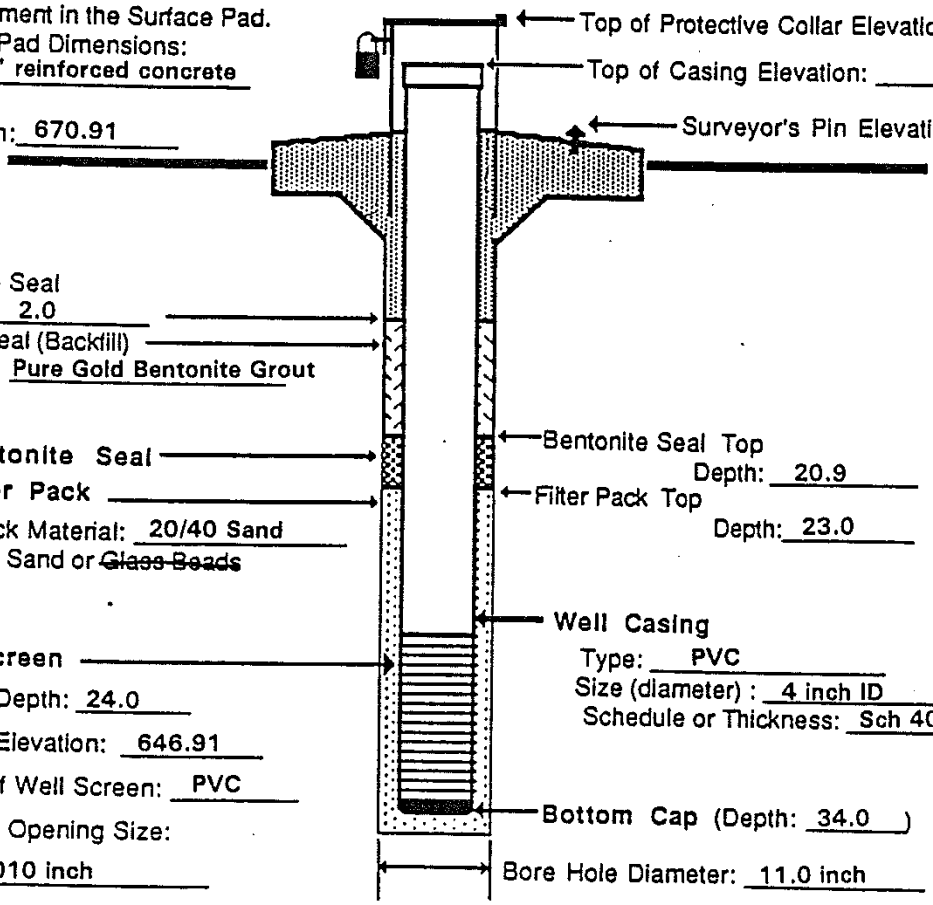
Name of Geologic Formation(s) in which Well is completed: Weches

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
• 4'x4'x6" reinforced concrete

Surface Elevation: 670.91



Top of Protective Collar Elevation: 674.32

Top of Casing Elevation: 673.91

Surveyor's Pin Elevation: 671.27

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal

Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top
Depth: 20.9 Elevation: 650.01

Filter Pack Top
Depth: 23.0 Elevation: 647.91

Well Screen

Top Depth: 24.0

Top Elevation: 646.91

Type of Well Screen: PVC

Screen Opening Size:
0.010 inch

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Bottom Cap (Depth: 34.0 )

Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

County: Cherokee County

Date of Monitor Well Installation: 10/06/94

Monitor Well: Latitude: 31°59'49.2" Longitude: 95°16'04.0"

Monitor Well Groundwater Gradient: Upgradient ___ Downgradient X

MSW PERMIT NO: 1614

Monitor Well I.D. No.: MW-11

Date of Monitor Well Development: 10/18/94

Monitor Well Driller Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

Static Water Level Elevation (with respect to MSL) after Well Developement : 611.6

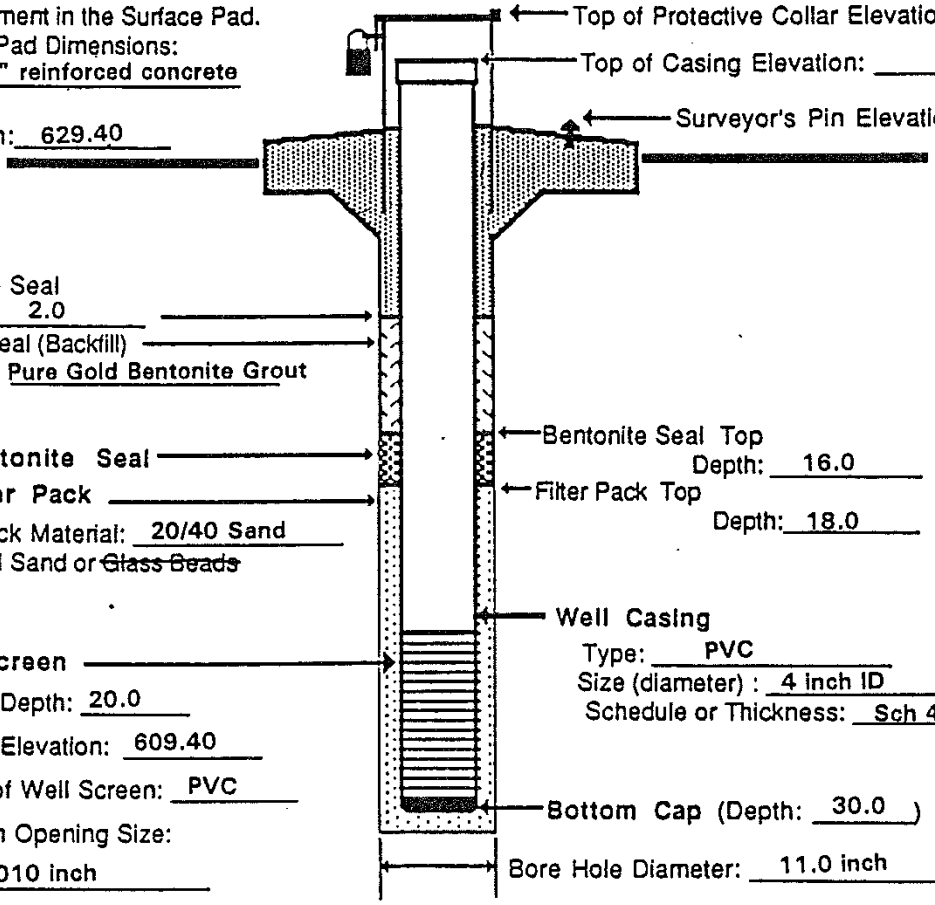
Name of Geologic Formation(s) in which Well is completed: Queen City

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete

Surface Elevation: 629.40



Top of Protective Collar Elevation: 632.38

Top of Casing Elevation: 631.96

Surveyor's Pin Elevation: 629.44

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal

Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top
Depth: 16.0 Elevation: 613.40

Filter Pack Top
Depth: 18.0 Elevation: 611.40

Well Screen

Top Depth: 20.0

Top Elevation: 609.40

Type of Well Screen: PVC

Screen Opening Size:
0.010 inch

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Bottom Cap (Depth: 30.0 )

Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

County: Cherokee County

Date of Monitor Well Installation: 10/04/94

Monitor Well: Latitude: 31°59'45.9"Longitude: 95°16'01.5"

Monitor Well Groundwater

Gradient: Upgradient ___ Downgradient X

MSW PERMIT NO: 1614

Monitor Well I.D. No.: MW-12

Date of Monitor Well Development: 02/02/95

Monitor Well Driller

Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

Static Water Level Elevation (with respect to MSL) after Well Developement : 607.31

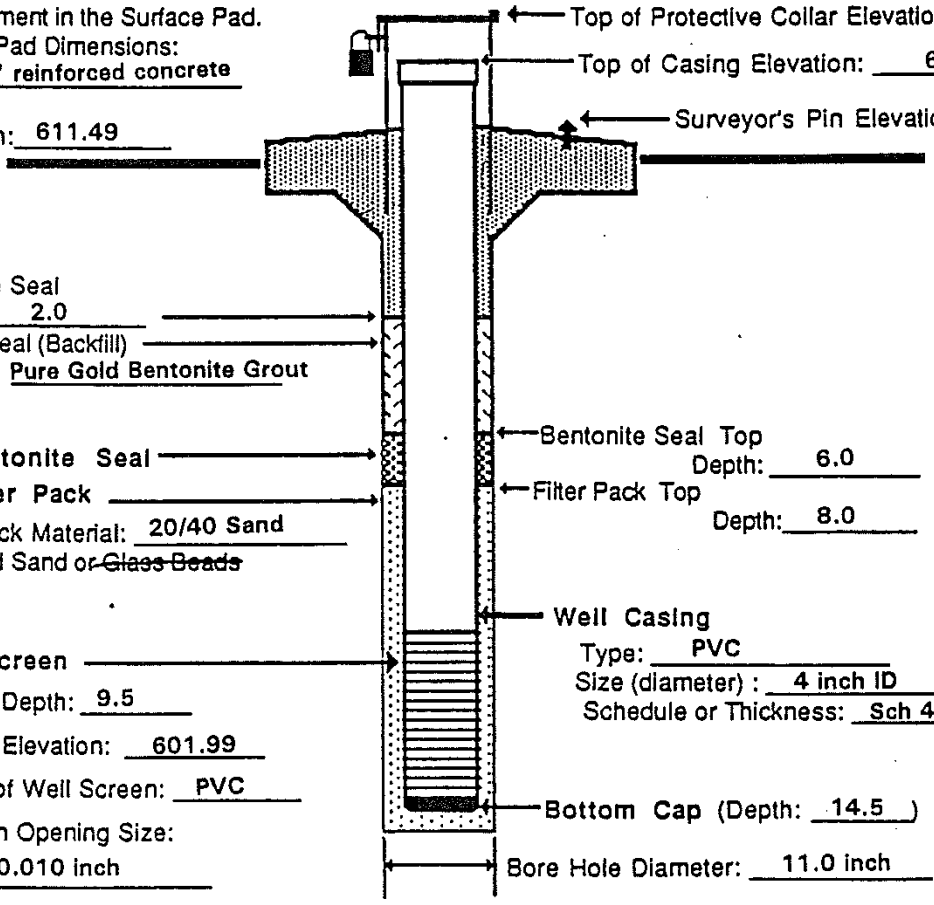
Name of Geologic Formation(s) in which Well is completed: Queen City

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete

Surface Elevation: 611.49



Top of Protective Collar Elevation: 614.77

Top of Casing Elevation: 614.39

Surveyor's Pin Elevation: 611.77

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal

Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top
Depth: 6.0 Elevation: 605.49

Filter Pack Top
Depth: 8.0 Elevation: 603.49

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Well Screen
Top Depth: 9.5
Top Elevation: 601.99
Type of Well Screen: PVC
Screen Opening Size:
0.010 inch

Bottom Cap (Depth: 14.5 )

Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

County: Cherokee County

Date of Monitor Well Installation: 11/18/94

Monitor Well: Latitude: 31°59'44.9" Longitude: 95°15'56.3"

Monitor Well Groundwater

Gradient: Upgradient ___ Downgradient X

MSW PERMIT NO: 1614

Monitor Well I.D. No.: MW-13

Date of Monitor Well Development: 12/02/94

Monitor Well Driller

Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

Static Water Level Elevation (with respect to MSL) after Well Developement : 610.26

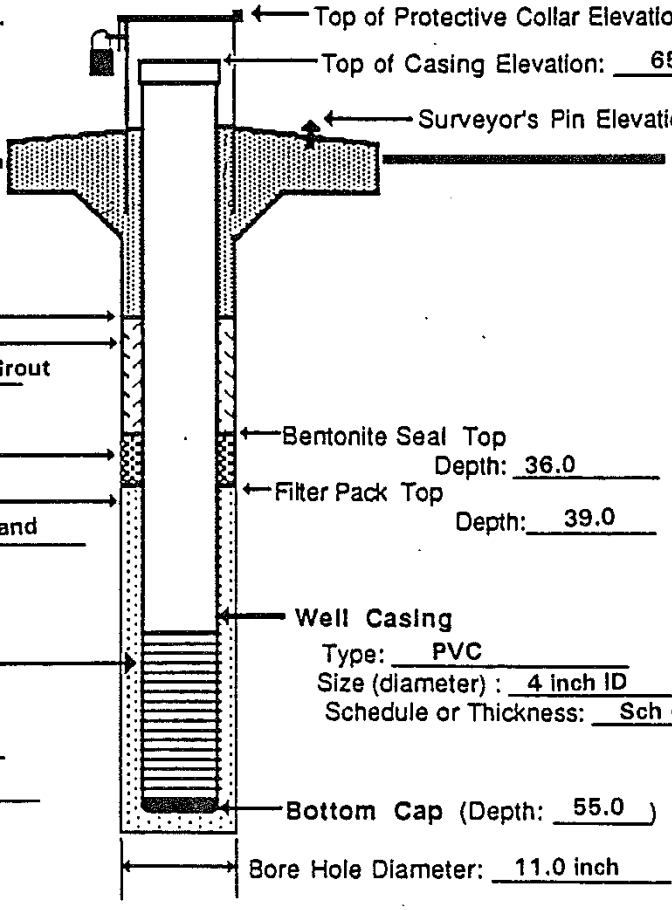
Name of Geologic Formation(s) in which Well is completed: Queen City

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete

Surface Elevation: 652.30



Top of Protective Collar Elevation: 655.49

Top of Casing Elevation: 655.13

Surveyor's Pin Elevation: 652.47

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal

Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top
Depth: 36.0 Elevation: 616.30

Filter Pack Top
Depth: 39.0 Elevation: 613.30

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Well Screen
Top Depth: 40.0
Top Elevation: 612.30
Type of Well Screen: PVC
Screen Opening Size:
0.010 inch

Bottom Cap (Depth: 55.0 )

Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

County: Cherokee County

Date of Monitor Well Installation: 10/05/94

Monitor Well: Latitude: 31°59'53.3" Longitude: 95°15'48.9"

Monitor Well Groundwater

Gradient: Upgradient ___ Downgradient X

MSW PERMIT NO: 1614

Monitor Well I.D. No.: MW-14

Date of Monitor Well Development: 02/02/95

Monitor Well Driller

Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

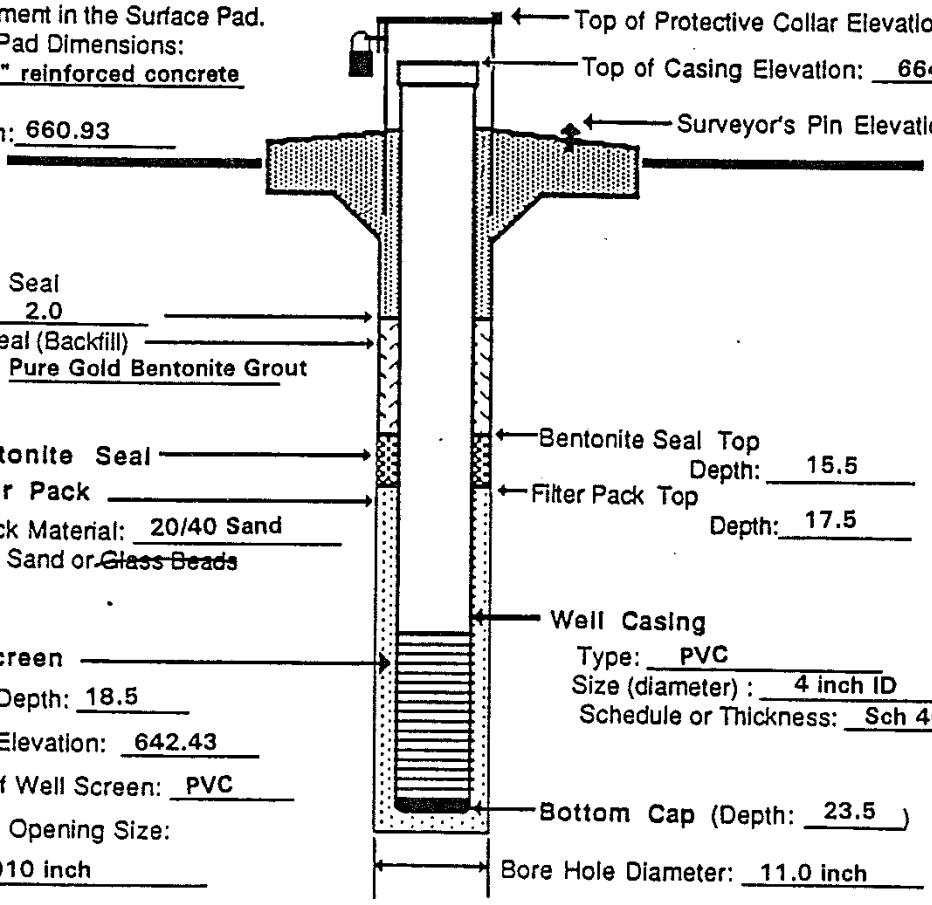
Static Water Level Elevation (with respect to MSL) after Well Developement : 647.79

Name of Geologic Formation(s) in which Well is completed: Weches

Type of Locking Device: pad lock

Type of Casing Protection: 8"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete
Surface Elevation: 660.93



Top of Protective Collar Elevation: 664.50

Top of Casing Elevation: 664.17

Surveyor's Pin Elevation: 661.50

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal

Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top
Depth: 15.5 Elevation: 645.43

Filter Pack Top
Depth: 17.5 Elevation: 643.43

Well Screen

Top Depth: 18.5

Top Elevation: 642.43

Type of Well Screen: PVC

Screen Opening Size:
0.010 inch

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Bottom Cap (Depth: 23.5 )

Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

County: Cherokee County

Date of Monitor Well Installation: 11/18/94

Monitor Well: Latitude: 31°59'54.7" Longitude: 95°16'03.7"

Monitor Well Groundwater Gradient: Upgradient ___ Downgradient X

MSW PERMIT NO: 1614

Monitor Well I.D. No.: MW-15

Date of Monitor Well Development: 11/18/94

Monitor Well Driller Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

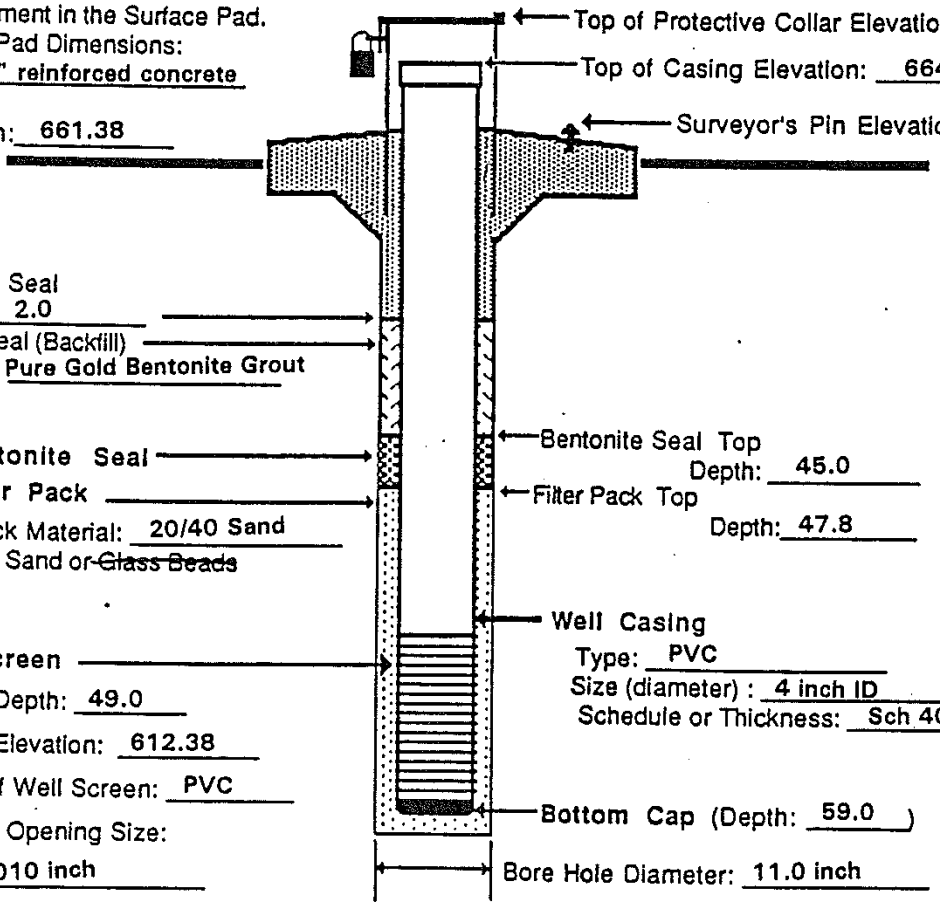
Static Water Level Elevation (with respect to MSL) after Well Developement : 618.44

Name of Geologic Formation(s) in which Well is completed: Queen City

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete
Surface Elevation: 661.38



Top of Protective Collar Elevation: 664.58

Top of Casing Elevation: 664.21

Surveyor's Pin Elevation: 661.72

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal

Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top
Depth: 45.0 Elevation: 616.38

Filter Pack Top
Depth: 47.8 Elevation: 613.58

Well Screen

Top Depth: 49.0

Top Elevation: 612.38

Type of Well Screen: PVC

Screen Opening Size:
0.010 inch

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Bottom Cap (Depth: 59.0 )

Bore Hole Diameter: 11.0 inch

end original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

ttention Owner: *Confidentiality* / *rivilege Notice on Reverse Side*

# State of Texas
# WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 757 (Zip)

) LOCATION OF WELL:
County CHEROKEE , 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

riller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check): ☐ Driven
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-8
Date Drilling: Started: 10/5 19 94 Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (In.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 40 |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other _____
If gravel packed, give interval . . . from 28 ft. to 40 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 16 | Tan to brown silty clayey sand |
| 16 | 23 | Brown to green silty clay |
| 23 | 39 | Dark grey/green glauconitic clayey sand |
| 39 | 40 | Dark grey/green clayey silt |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | To | Gage Casting Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 29 | |
| 4 | N | SCH. 40 PVC SCREEN | 29 | 39 | 0.010 |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 28 ft. No of Sacks Used _____

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

12) Packers: Type Depth

13) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS : NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

Signed) Benny Hinojosa (Licensed Water Well Driller) (Signed) _____ (Registered Driller Trainee)

Benny Hinojosa

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

and original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

ttention Owner: *Confidentiality* / *rivilege Notice on Reverse Side*

# State of Texas
# WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 75766 (Zip)

) LOCATION OF WELL:
County CHEROKEE , 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

riller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☒ SEE ATTACHED MAP

) TYPE OF WORK (Check):
☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply
☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check): ☐ Driven
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored
☐ Air Rotary ☐ Cable Tool ☒ Other HSA

) Well Log: MW-9
Date Drilling:
Started: 10/7 19 94
Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (In.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 78 |
| | | |
| | | |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other _____
If gravel packed, give interval . . . from 64 ft. to 78 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 16 | Tan to brown silty clayey sand |
| 16 | 23 | Brown to green silty clay |
| 23 | 39 | Dark grey/green glauconitic clayey sand |
| 39 | 44 | Dark grey/green clayey silt |
| 44 | 59 | Dark grey/green sandy clayey silt |
| 59 | 60 | Dark brown silty clay |
| 60 | 74 | Dark brown silty clayey sand |
| 74 | 78 | Dark brown clayey sandy silt |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casting Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 65 | |
| 4 | N | SCH. 40 PVC SCREEN | 65 | 75 | 0.010 |
| | | | | | |
| | | | | | |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 64 ft. No of Sacks Used _____

3) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

4) WELL TESTS : NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

5) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

12) Packers: Type Depth

hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

ned) _____ (Licensed Water Well Driller) (Signed) _____ (Registered Driller Trainee)

*Benny Hinojosa*

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

WD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

end original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

ttention Owner: *Confidentiality* / *rivilege Notice on Reverse Side*

# State of Texas
# WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

1) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) — ADDRESS: Royal Oaks Landfill Heath Lane (Street or RFD) Jacksonville (City) TX (State) 7576[illegible] (Zip)

2) LOCATION OF WELL:
County CHEROKEE , 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check):
☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-10
Date Drilling:
Started: 10/4 19 94
Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (In.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 35 |
| | | |
| | | |

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 9 | Tan silty sand |
| 9 | 16 | Brown claey silt |
| 16 | 19 | Tan to brown silty clay |
| 19 | 34 | Dark grey/green silty sand |
| 34 | 35 | Dark grey/green silty clay |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other _____
If gravel packed, give interval . . . from 23 ft. to 35 ft.

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casing | Gage Screen |
|---|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 24 | | |
| 4 | N | SCH. 40 PVC SCREEN | 24 | 34 | | 0.010 |
| | | | | | | |
| | | | | | | |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 23 ft. No of Sacks Used _____

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

12) Packers: Type Depth

13) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS : NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete Items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) — WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) Benny Hinojosa (Licensed Water Well Driller) — (Signed) _____ (Registered Driller Trainee)

Benny Hinojosa

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

Attention Owner: *Confidentiality Privilege Notice on Reverse Side*

# State of Texas
# WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

1) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 75766 (Zip)

2) LOCATION OF WELL:
County CHEROKEE , 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check):
☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-11
Date Drilling:
Started: 10/6 19 94
Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (In.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 30 |
| | | |
| | | |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other _____
If gravel packed, give interval . . . from 18 ft. to 30 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 12 | Red to brown sandy silty clay |
| 12 | 14 | Green to brown sandy claey silt |
| 14 | 29 | Dark brown silty sand |
| 29 | 30 | dark brown sandy silt |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casting Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 20 | |
| 4 | N | SCH. 40 PVC SCREEN | 20 | 30 | 0.010 |
| | | | | | |
| | | | | | |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 18 ft. No of Sacks Used _____

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

12) Packers: Type Depth

13) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS : NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowldege and belief. I understand that failure to complete Items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) Benny Hinojosa (Licensed Water Well Driller) (Signed) _____ (Registered Driller Trainee)

Benny Hinojosa

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

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Attention Owner: *Confidentiality Privilege Notice on Reverse Side*

# State of Texas WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

1) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 757 (Zip)

2) LOCATION OF WELL:
County CHEROKEE, 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check):
☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-12
Date Drilling: Started: 10/4 19 94 Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (in.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 18 |

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 2 | Red silty clay |
| 2 | 4 | Yellow claey silt |
| 4 | 10 | Red silty sand |
| 10 | 14 | Brown sand |
| 14 | 18 | Brown silty claey sand |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other _____
If gravel packed, give interval . . . from 8 ft. to 18 ft.

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casing Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 9.5 | |
| 4 | N | SCH. 40 PVC SCREEN | # | 14.5 | 0.010 |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 8 ft. No of Sacks Used _____

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

12) Packers: Type Depth

13) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder ☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS : NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) Benny Hinojosa (Licensed Water Well Driller) (Signed) _____ (Registered Driller Trainee)

*Benny Hinojosa*

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

AWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

Attention Owner: *Confidentiality Privilege Notice on Reverse Side*

# State of Texas WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 75766 (Zip)

1) LOCATION OF WELL:
County CHEROKEE , 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. ____ Block No. ____ Township ____ Abstract No. ____ Survey Name ____
Distance and direction from two intersecting section or survey lines ____
☒ SEE ATTACHED MAP

2) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check): ☐ Driven
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

3) Well Log: MW-13
Date Drilling:
Started: 11/11 19 94
Completed: 11/18 19 94

DIAMETER OF HOLE

| Dia. (In.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 58 |
| | | |
| | | |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other ____
If gravel packed, give interval . . . from 39 ft. to 58 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 42 | Brown/green claet silt |
| 42 | 54 | Brown silty sand |
| 54 | 58 | Brown claey sandy silt |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casing Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 40 | |
| 4 | N | SCH. 40 PVC SCREEN | 40 | 55 | 0.010 |
| | | | | | |
| | | | | | |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used ____
Bentonite 2 ft. to 39 ft. No of Sacks Used ____

6) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ____
Depth to pump bowls, cylinder, jet, etc., ____ ft.

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

4) WELL TESTS : NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.

11) WATER LEVEL: NONE TAKEN
Static level ____ ft. below land surface. Date: ____
Artesian flow ____ gpm. Date: ____

5) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? ☐ Yes ☒ No

12) Packers: Type Depth

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) Benny Hinojosa (Licensed Water Well Driller) (Signed) ____ (Registered Driller Trainee)

Benny Hinojosa

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. ____ Located on map ____

WWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

Attention Owner: *Confidentiality Privilege Notice on Reverse Side*

# State of Texas WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

1) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 757 (Zip)

2) LOCATION OF WELL:
County CHEROKEE , 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check):
☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-14
Date Drilling: Started: 10/4 19 94 Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (In.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 26 |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other _____
If gravel packed, give interval . . . from 18 ft. to 26 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 13 | Brown clacy silt |
| 13 | 14 | Grey/green sandy silt |
| 14 | 20 | Grey/green silty sand |
| 20 | 26 | Grey/green clacy silt |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casting Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 19 | |
| 4 | N | SCH. 40 PVC SCREEN | 19 | 24 | 0.010 |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 17.5 ft. No of Sacks Used _____

13) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder ☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

14) WELL TESTS : NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

12) Packers:

| Type | Depth |
|---|---|
| | |

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) Benny Hinojosa (Licensed Water Well Driller) (Signed) _____ (Registered Driller Trainee)

Benny Hinojosa

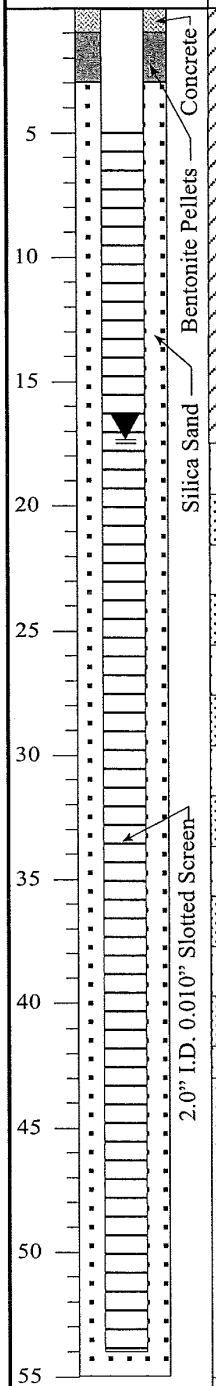
Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

# 2002 BOREHOLE LOG
# BY WEAVER BOOS AND GORDON

# BORING LOG FOR GAS PROBE GP-8A




Silty Clay, yellow brown, soft, dry, firm, becomes slightly moist and plastic with occasional sand (< 10%) at 10'. Numerous black ferrugenous stringers, especially at 8-10'. Sand is very well rounded, medium grained feldspar. Becomes very moist due to probable water table at 17.5'.

Alternating Glauconitic Siltstone and Clayey Sandy Silt, dark green, 1 - 2' thick, with about a 50/50 ratio. Siltstone is hard, dry to moist, and occassional ferrugenous stringers and traces of muscovite. Clayey Sandy Silt is unconsolidated, soft, sticky, wet, usually flows, and has no return in split spoon. Occassional slickensides and bivalve fossils seen in siltstone. Sand content in siltstone decreases with depth. Rocks are probably Eocene-age Weches Formation.

Silty Sandstone, greenish brown, alternating with units having higher clay content. Sandstone is very fine grained, loose, wet to moist, well sorted and rounded quartz grains. Units with higher clay content recovered in split spoon. Low clay content units flow.

Note: Probe installed at N 7755.0, E 10988.6 at surface elevation 658.6 feet m.s.l.


*Weaver Boos & Gordon*
6420 Southwest Blvd., Fort Worth, Texas
(817) 735-9770


Installed: 01/21/02

**Boring Log for Gas Probe GP-8A**
Pine Hill Farms Landfill TX, LP
Royal Oaks Landfill
Jacksonville, Cherokee County, Texas

# 2003 BOREHOLE LOGS
# BY WEAVER BOOS CONSULTANTS

WEAVER BOOS CONSULTANTS
GEO-ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. MW-16

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/31/2003 Northing: 10203.24 ft.
Boring End Date: 7/31/2003 Easting: 11227.56 ft.
TOC Elevation: 643.6 Ground Elevation: 641.08 ft.

Remarks: Well is dry.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Sand, silty, clay, dry, ironstone fragments, red brown (10R3/4). 639.1 | | | | | | | | | | | |
| | | | Clay, silty slightly sandy, moderately moist, moderately plastic, red brown (10R 4/6) with ironstone fragments. 636.1 | | | | | | | | | | | |
| 5 | C | | Silt, clayey, sandy, moderately moist, with red brown layers and ironstone fragments. - increased clay content. | | | | | | | | | | 632.1 | |
| 10 | C | | - increased silt, sand, abundant ironstone fragments. 628.1 | | | | | | | | | | 629.1 628.1 | |
| 15 | C | | Sand, clayey, silty, very moist, medium to fine grained, unconsolidated, banded tan and dark brown (10YR 6/2 to 10YR 4/2). 623.1 | | | | | | | | | | 623.1 | |
| 20 | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | |

WELL VERSION 3.0_RO ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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WEAVER BOOS CONSULTANTS
GEO-ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. MW-17

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/31/2003 Northing: 10212.05 ft.
Boring End Date: 7/31/2003 Easting: 11222.93 ft.
TOC Elevation: 645.07 Ground Elevation: 642.82 ft.

Remarks: Water at 30 feet at time of drilling, 23.73 feet BTOC after 24 hours. Additional above ground casing and new protective cover installed 6 days after original completion. Orginal above ground casing was approximately 26 inches AGL.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Sand, silty, clay, dry, ironstone fragments, red brown (10R3/4). 640.8 | | | | | | | | | | | |
| | | | Clay, silty slightly sandy, moderately moist, moderately plastic, red brown (10R 4/6) with ironstone fragments. 637.8 | | 0.5 | | | | | | | | | |
| 5 | C | | Silt, clayey, sandy, moderately moist, with red brown layers and ironstone fragments. - increased clay content. | | 3.0 | | | | | | | | | |
| 10 | C | | - increased silt, sand, abundant ironstone fragments. 629.8 | | 4.0 | | | | | | | | | |
| 15 | C | | Sand, clayey, silty, very moist, medium to fine grained, unconsolidated, banded tan and dark brown (10YR 6/2 to 10YR 4/2). | | | | | | | | | | | |
| 20 | C | | - hard. - color change to yellow, becomes loose. | | | | | | | | | | | |
| 25 | C | | - wet. | | | | | | | | | | 618.8 616.8 614.8 | |
| 30 | C | | 612.8 Sand/Clay, moist, alternating layers of olive grey sand, (5Y 4/1) and dark brown plastic clay (10YR 2/2). Sand is medium to fine grained, slightly silty, clayey. Clay is firm, plastic, sandy. | | | | | | | | | | | |
| 35 | C | | 604.8 | | | | | | | | | | 604.8 | |

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WEAVER BOOS CONSULTANTS
GEO-ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. MW-19

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 8/1/2003 Northing: 8817.83 ft.
Boring End Date: 8/1/2003 Easting: 11819.77 ft.
TOC Elevation: 629.02 Ground Elevation: 625.65 ft.

Remarks: Water at 45 feet at tiem of drilling, 50.02 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Clay, sandy, plastic, w/ ironstone fragments, pale yellow (10YR 8/1), damp. 622.7 | | 4.0 | | | | | | | | | |
| 5 | C | | Sand, clayey, silty, w/ ironstone fragments. 618.7 | | | | | | | | | | | |
| | | | - color change to dark grey-brown (10YR 4/2). 615.7 | | 3.0 | | | | | | | | | |
| 10 | C | | - color- pale brown (5YR 5/2). 611.7 | | 3.5 | | | | | | | | | |
| | | | Lignite, silty, sandy, damp with disseminated pyrite, and pyrite intergrowths and replacements. 610.7 | | | | | | | | | | | |
| 15 | C | | Sand, interbedded with coal (lignite), yellow - brown (10 YR 6/2, 10YR 6/6). 605.7 | | | | | | | | | | | |
| 20 | C | | Clay, w/ interbedded sands. 55% clay, 45% sand. Clay is slightly plastic, silty, moist, with lenses of very plastic clay, sand is very fine grained silty, moist. dark olive grey (5G 3/1). 600.7 | | | | | | | | | | | |
| 25 | C | | Interbedded sandy clay and clayey sand, with occasional clean sand lenses, moist. Sand is fine to very fine grained, unconsolidated. Clay is moderately plastic, slightly silty. Olive grey (5Y 3/2). | | | | | | | | | | | |
| 30 | C | | 591.7 | | | | | | | | | | | |
| 35 | C | | Sand, with interbedded clay, 55% sand, 45% clay, sand is very fine grained, unconsolidated, clay is moderately plastic, silty. Olive grey (5Y 3/2). | | | | | | | | | | | |

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# LOG OF BORING NO. MW-19

WEAVER BOOS CONSULTANTS
GEO-ENVIRONMENTAL ENGINEERS AND SCIENTISTS

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 8/1/2003 Northing: 8817.83 ft.
Boring End Date: 8/1/2003 Easting: 11819.77 ft.
TOC Elevation: 629.02 Ground Elevation: 625.65 ft.

Remarks: Water at 45 feet at tiem of drilling, 50.02 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | 584.7 | | | | | | | | | | | |
| | | | Clay, plastic, moist, with interbedded sands, 60% clay 40% sand, dark olive grey (5G 4/1 to 5G 3/1). | | | | | | | | | | | |
| | | | 581.7 | | | | | | | | | | | |
| 45 | C | | Sand, very fine grained silty, limonitic layers and some ironstone, tan (10R 6/2). | | | | | | | | | | | |
| 50 | C | | | | | | | | | | | | | |
| 55 | C | | | | | | | | | | | | 571.7 | |
| | | | | | | | | | | | | | 568.7 | |
| | | | | | | | | | | | | | 566.7 | |
| 60 | C | | 565.7 | | | | | | | | | | | |
| | | | Clay, with interbeded sand 70% clay 30% sand, slightly plastic, moist, stiff, dark olive grey (5G 3/1). | | | | | | | | | | | |
| | | | 562.7 | | | | | | | | | | | |
| 65 | C | | Sand, fine to very fine grained, glauconitic, silty, olive grey (5G 2/1). | | | | | | | | | | | |
| | | | 556.7 | | | | | | | | | | 556.7 | |
| 70 | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | |

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GEO ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. GP-16

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 8/1/2003 Northing: 9692.56 ft.
Boring End Date: 8/1/2003 Easting: 10074.54 ft.
TOC Elevation: 687.94 Ground Elevation: 684.92 ft.

Remarks: Water at 45 feet at time of drilling, 56.57 BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/Ft | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Sand, clayey, silty, fine grained, red, orange, dry. 681.9 | | 0.5 | | | | | | | | | |
| 5 | C | | Sand, fine to very fine grained, loose, slightly moist, yellow-orange (10YR 6/2). 674.9 | | 3.5 | | | | | | | | | |
| 10 | C | | Ironstone, hard, hematitic. 673.9 | | | | | | | | | | | |
| | | | Sand, clayey, silty, w/ ironstone fragments,dry, unconsolidated, light brown (5YR 6/6). | | 2.5 | | | | | | | | | |
| 15 | C | | 668.9 | | | | | | | | | | | |
| | | | Clay, silty, slightly sandy, non-plastic, medium brown (5YR 4/4). | | 4.0 | | | | | | | | | |
| 20 | C | | 660.4 | | | | | | | | | | | |
| 25 | C | | Sand, clayey, silty, glauconitic, fine grained, moist, medium grey green (5BG 4/2). - color change to brown-dark brown (5YR 4/3 - 5YR 2/2), very moist. 654.9 | | | | | | | | | | | |
| 30 | A | | Clay, silty, plastic, firm, dark brown (5YR 2/2). 650.9 | | | | | | | | | | | |
| 35 | A | | Sand, silty, glauconitic, fine to very fine grained, WET, grey-green (10G 4/2). 644.9 | | | | | | | | | | | |

WELL VERSION 3.0_RO_ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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WEAVER BOOS CONSULTANTS
GEO ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. GP-16

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 8/1/2003 Northing: 9692.56 ft.
Boring End Date: 8/1/2003 Easting: 10074.54 ft.
TOC Elevation: 687.94 Ground Elevation: 684.92 ft.

Remarks: Water at 45 feet at time of drilling, 56.57 BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | A | | Silt, sandy, slightly clayey, wet yellow grey-green (10GY 5/2). | | | | | | | | | | | |
| | | | 636.9 | | | | | | | | | | | |
| 50 | A | | Sand, gluaconitic, clayey, silty, very fine grained, blue green (5BG 4/2). | | | | | | | | | | 631.9 | |
| | | | 630.9 | | | | | | | | | | | |
| 55 | C | | Clay, sandy, glauconitic, plastic, firm, moderately moist. | | | | | | | | | | 628.9 | |
| | | | 628.9 | | | | | | | | | | 627.9 | |
| 60 | C | | Sand, with alternating clay bands, sand is fine - very fine grained, very friable. Clay is brown, hard, slightly plastic, moist. | | | | | | | | | | | |
| 65 | C | | | | | | | | | | | | 617.9 | |
| | | | 614.9 | | | | | | | | | | 614.9 | |
| 70 | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | |

WELL VERSION 3.0_RO ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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GEO-ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. GP-17

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/29/2003 Northing: 8822.17 ft.
Boring End Date: 7/29/2003 Easting: 10037.12 ft.
TOC Elevation: 684.29 Ground Elevation: 680.72 ft.

Remarks: Water at 40 feet at time of drilling, 57.28 BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Sand, loose, slightly moist, medium to fine grained, yellow-brown, (10YR 6/2). Possible fill. | | 5.0 | | | | | | | | | |
| 5 | C | | 674.7 | | | | | | | | | | | |
| | | | Sand, slightly silty, friable, medium grained, angular, reddish brown, (10R 4/6). | | 3.5 | | | | | | | | | |
| | | | 671.7 | | | | | | | | | | | |
| 10 | C | | Sand, loose, moist, w/ grey banded layers. | | 0.5 | | | | | | | | | |
| 15 | C | | 663.7 | | 0.5 | | | | | | | | | |
| | | | Clay, very plastic, firm, moist, light grey, bentonitic. | | | | | | | | | | | |
| | | | 662.7 | | | | | | | | | | | |
| | C | | Sand, friable, medium to fine grained, angular, w/ ironstone fragments. | | | | | | | | | | | |
| 20 | | | 660.7 | | | | | | | | | | | |
| | | | Clay, very silty, sandy, moist, interbedded clay (55%) and sandy silt (45%), dark grey-green (5G 2/1). | | | | | | | | | | | |
| | | | 656.7 | | | | | | | | | | | |
| | C | | Sand, silty, clayey, very fine to fine grained, dark grey to grey green (5G 2/1 - 10G 6/2) some interbedded clays. 24-25 very hard, wet @ 26'. | | | | | | | | | | | |
| 25 | | | - more clay, plastic, silty, moist | | | | | | | | | | | |
| | C | | - more silty sand, very wet, green grey (10G 6/2) | | | | | | | | | | | |
| 30 | | | 648.7 | | | | | | | | | | | |
| | | | Clay, silty, plastic, wet, grey-green (10G 6/2). | | | | | | | | | | | |
| | | | 646.7 | | | | | | | | | | | |
| | C | | Interbedded layers of silt sand and clay. Layers are approx 1 foot thick, silty sandy clay, sandy clayey silt, and clayey silty sand. dark grey-green (5G 3/2). | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | |
| | C | | | | | | | | | | | | | |

WELL VERSION 3.0_RO ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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WEAVER BOOS CONSULTANTS
GEO ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. GP-17

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/29/2003 Northing: 8822.17 ft.
Boring End Date: 7/29/2003 Easting: 10037.12 ft.
TOC Elevation: 684.29 Ground Elevation: 680.72 ft.

Remarks: Water at 40 feet at time of drilling, 57.28 BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | C | | Interbedded layers of silt sand and clay. Layers are approx 1' thick, silty sandy clay, sandy clayey silt, and clayey silty sand. dark grey-green (5G 3/2). | | | | | | | | | | | |
| 50 | C | | | | | | | | | | | | 627.7 | |
| 55 | C | | 626.7<br>Clay, sandy, silty, glauconitic, moderately plastic, firm, moist, dark green - grey (5G 3/2) | | | | | | | | | | 625.7<br>624.7 | |
| 60 | C | | 620.7<br>Sand, fine to very fine grained, with interbedded clays, friable,slightly moist, brown sands (5YR 4/1)) - dark brown (clays (10YR 2/2)). | | | | | | | | | | | |
| 65 | | | 614.7 | | | | | | | | | | 614.7 | |
| 70 | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | |

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WEAVER BOOS CONSULTANTS
GEO-ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. GP-20

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/30/2003 Northing: 8589.77 ft.
Boring End Date: 7/30/2003 Easting: 11321.29 ft.
TOC Elevation: 664.82 Ground Elevation: 661.12 ft.

Remarks: Water at 35 feet at time of drilling, 43.31 feet BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Field Tests | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Clay, very plastic, slightly moist, bentonitic, w/ iron staining, light grey (5Y 8/1). 660.1 | | | | Laboratory Tests | | | | | | | | |
| | | | Sand, clayey, silty, very fine grained, slightly moist, iron staining. | | 4.0 | | | | | | | | | | |
| 5 | C | | 656.1 Clay, plastic, bentonitic, dry, light iron staining, light grey (5Y 8/1). 654.1 | | | | | | | | | | | | |
| | | | Sand, silty, clayey, very fine grained, w/ hard ironstone layers, brown (10YR 5/4). | | 4.5 | | | | | | | | | | |
| 10 | C | | | | | | | | | | | | | | |
| | | | | | 3.0 | | | | | | | | | | |
| 15 | C | | 645.1 | | | | | | | | | | | | |
| | | | Silt, clayey, sandy, dark grey, (5G 2/1). | | | | | | | | | | | | |
| 20 | C | | 639.1 Clay, very silty, sandy, moist, firm, very plastic, dark grey (5G 2/1). 637.1 | | | | | | | | | | | | |
| 25 | C | | Silt, clayey, with thin sand laminations, moderately moist, dark grey green (5G 3/2), shaley. | | | | | | | | | | | | |
| 30 | C | | 631.1 Clay, very silty, firm, moist, moderately plastic. 629.1 | | | | | | | | | | | | |
| | | | Silt, with interbedded clay and sand layers, glauconitic, dark grey green (5G 3/2). | | | | | | | | | | | | |
| 35 | C | | 622.6 | | | | | | | | | | | 624.1 | |
| | | | Sand, with sandstone and silt, fine to very fine grained, medium green (10G4/2). | | | | | | | | | | | 622.1 621.1 | |

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WEAVER BOOS CONSULTANTS
GEO ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. GP-20

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/30/2003 Northing: 8589.77 ft.
Boring End Date: 7/30/2003 Easting: 11321.29 ft.
TOC Elevation: 664.82 Ground Elevation: 661.12 ft.

Remarks: Water at 35 feet at time of drilling, 43.31 feet BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Field Tests | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | 619.1 | | | | Laboratory Tests | | | | | | | | |
| 45 | C | | Sand, interbedded clean brown (5YR 4/1) and silty dark green (5G 3/2) sands, friable, slightly moist. | | | | | | | | | | | | |
| 50 | | | 611.1 | | | | | | | | | | | 611.1 | |
| 55 | | | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | | | |
| 70 | | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | | |

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GEO ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. GP-21

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/28/2003 Northing: 10207.33 ft.
Boring End Date: 7/28/2003 Easting: 11020.53 ft.
TOC Elevation: 678.1 Ground Elevation: 674.72 ft.

Remarks: Water at 35 feet at time of drilling, 35.19 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Clay, slightly silty, low plasticity, dry, mottled light brown (5YR 5/6) and yellow orange (10YR 6/6). | | 4.0 | | | | | | | | | |
| 5 | C | | | | 4.0 | | | | | | | | | |
| 10 | C | | | | 4.0 | | | | | | | | | |
| 15 | C | | 657.7 | | | | | | | | | | | |
| | | | Sand, silty, slightly clayey, fine grained, glauconitic, greyish green (5G 5/2). | | | | | | | | | | | |
| 20 | C | | | | | | | | | | | | | |
| 25 | C | | | | | | | | | | | | | |
| 30 | C | | 644.7 Clay, silty, plastic, firm, WET, dark grey (5G 2/1). | | | | | | | | | | | |
| 35 | C | | 639.7 Clay, silty, plastic, slightly sandy, slightly gauconitic, dark grey green (10G 2/2). | | | | | | | | | | | |
| | | | 635.7 Silt, clayey, slightly moist, dark grey green (10G 2/2). | | | | | | | | | | | |

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GEO ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. GP-21

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/28/2003 Northing: 10207.33 ft.
Boring End Date: 7/28/2003 Easting: 11020.53 ft.
TOC Elevation: 678.1 Ground Elevation: 674.72 ft.

Remarks: Water at 35 feet at time of drilling, 35.19 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Field Tests | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Laboratory Tests | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | C | | Silt, clayey, slightly moist, dark grey green (10G 2/2). | | | | | | | | | | | | 628.7 | |
| | C | | 626.7 | | | | | | | | | | | | 626.7 | |
| 50 | C | | Sand, slightly clayey, with rare clay lenses, very fine grained, moist, olive grey - olive black (5Y 4/1 - 5Y 2/1). | | | | | | | | | | | | 625.7 | |
| 55 | C | | 615.4 | | | | | | | | | | | | 615.4 | |
| 60 | | | | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | | | | |
| 70 | | | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | | | |

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# LOG OF BORING NO. GP-22

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/28/2003 Northing: 9915.42 ft.
Boring End Date: 7/28/2003 Easting: 10494.19 ft.
TOC Elevation: 669.23 Ground Elevation: 665.64 ft.

Remarks: Water at 40 at time of drilling, 34.40 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Clay, silty, moist, w/ thin bands of reddish ironstone, dark yellow orange (10YR 6/6). | | 4.0 | | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 5 | | | | | 4.0 | | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 10 | | | 654.1 | | 0.5 | | | | | | | | | |
| | | | Clay, hard, plastic, silty, dark green (5G 3/2). 653.6 | | | | | | | | | | | |
| | C | | Clay, silty, micaceous, dark grey green (5G 3/2). | | | | | | | | | | | |
| 15 | | | 649.6 | | 0.5 | | | | | | | | | |
| | | | Sand, silty, clayey, very fine - fine grained, glauconitic. | | | | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 25 | | | 640.6 | | | | | | | | | | | |
| | | | Clay, silty, moderately plastic, dark grey green (5G 3/1). | | | | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 30 | | | 634.6 | | | | | | | | | | | |
| | | | Sand, silty, hard, very fine grained, pale green (10G 6/2). | | | | | | | | | | | |
| | | | 632.6 | | | | | | | | | | | |
| | C | | Clay, plastic, greenish black (5GY 2/1). | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | |
| | C | | | | | | | | | | | | | |

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GEO ENVIRONMENTAL ENGINEERS AND SCIENTISTS

# LOG OF BORING NO. GP-22

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/28/2003 Northing: 9915.42 ft.
Boring End Date: 7/28/2003 Easting: 10494.19 ft.
TOC Elevation: 669.23 Ground Elevation: 665.64 ft.

Remarks: Water at 40 at time of drilling, 34.40 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/Ft | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Clay, plastic, greenish black (5GY 2/1). 622.6 | | | | | | | | | | 623.6 | |
| 45 | C | | Sand, clayey, micaceous, very fine to fine grained, slightly moist, olive grey (5Y 5/2). | | | | | | | | | | 621.6<br>620.6 | |
| 50 | C | | | | | | | | | | | | | |
| 55 | C | | 610.6 | | | | | | | | | | 610.6 | |
| 60 | | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | | |
| 70 | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | |

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# 2009 BOREHOLE LOGS
# BY THE CAREL CORPORATION

LOG OF MONITOR WELL NO. MW-21

Project Description: 2009 Monitor Well Installations

Location: Royal Oaks Landfill

Surface El.: 629.9 feet
Completion Depth: 31 feet
Date Boring Started: 9/24/2009
Date Boring Completed: 9/29/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| | | | Silty CLAY, dark brown, dry | | Concrete from 0 to 2' bgs |
| | | | SILT, red to brown | | |
| | | | GRAVEL with some silt, reddish rusty brown, gravel is subangular and poorly sorted with iron nodules, dry | | |
| 5 | | | CLAY, reddish brown | | |
| | | | Silty CLAY with some mixed gravel, subangular and poorly sorted gravel | | |
| | | | Silty CLAY, reddish orange, slightly moist | | |
| 10 | | | Silty CLAY, reddish orange, friable, dry | | Bentonite grout from 2' to 20.5' bgs |
| 15 | | | SILT, reddish orange, friable with some dry clay particles, dry, clay particles have white silt stringers | | |
| | | | slightly moist at 18 feet below ground surface | | |
| 20 | | | moist at 20 feet below ground surface | | |
| | | | | | Bentonite seal from 20.5' to 23.5' bgs |
| | | | Silty SAND, light gray, sand is very fine grained, subrounded, and well sorted, wet | | 20/40 Silica sand from 23.5' to 31' bgs |
| 25 | | | Silty SAND, medium gray, sand is very fine grained and subrounded, wet | | 0.010" Slotted screen from 25.5' to 28' bgs |
| | | | SILT, medium to dark gray, moist | | |
| 30 | | | CLAY, dark gray to brown, hard | | |
| 35 | | | | | |
| 40 | | | | | |

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
#4152
LICENSED
PROFESSIONAL GEOSCIENTIST

10/28/09

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

| Groundwater Observations | |
|---|---|
| Date | Depth |
| 9/25/09 | 23.00 |
| 9/29/09 | 21.96 |

Remarks: 10 inch borehole diameter

MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/16/09

LOG OF MONITOR WELL NO. MW-21
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

LOG OF MONITOR WELL NO. MW-22

Project Description: 2009 Monitor Well Installations

Location: Royal Oaks Landfill

Surface El.: 686.5 feet
Completion Depth: 39 feet
Date Boring Started: 9/21/2009
Date Boring Completed: 9/28/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| | | | Silty CLAY, red to brown | | Concrete from 0 to 2' bgs |
| 5 | | | SAND, very fine to fine grained, tan, moderately well sorted | | |
| | | | SAND, red to brown, black iron stone staining | | |
| | | | Silty SAND, red to brown (rusty) silt to very fine grained sand, well sorted | | |
| 10 | | | Tight and hard at 10 feet below ground surface | | |
| | | | Silty SAND, red to brown (rusty), silt to very fine grained sand, well sorted, soft friable sand, moist | | Bentonite grout from 2' to 21' bgs |
| 15 | | | Silty SAND, yellow, red to brown hard drilling at 16 feet below ground surface | | |
| | | | SAND, brown to light brown, silt to very fine grained sand, well sorted, wet to moist | | |
| 20 | | | SILTSTONE, iron-some limonite | | |
| | | | CLAY, gray to green, some glauconite | | Bentonite seal from 21' to 24' bgs |
| 25 | | | GRAVEL with some sand, iron, yellow brown, limonite, gravel is rusty brown and poorly sorted, wet | | 20/40 Silica sand from 24' to 39' bgs |
| | | | CLAY, dry, gray to green, gray to black glauconite | | |
| 30 | | | Silty CLAY with sand, silty to fine grained sand, clay is grayish green with some glauconite, dry to damp | | 0.010" Slotted screen from 26' to 36' bgs |
| | | | Sandy GRAVEL, black to brown, poorly sorted, wet | | |
| 35 | | | Silty SAND with clay, reddish orange to brown, silty sand | | |
| | | | GRAVEL and sand, orange brown | | 3' sump |
| 40 | | | CLAY, gray to green, glauconite, very plastic, wet | | |
| 45 | | | | | |

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
#4152
LICENSED
PROFESSIONAL GEOSCIENTIST

10/28/09

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

| Groundwater Observations | |
|---|---|
| Date | Depth |
| 9/21/09 | 24.00 |
| 9/28/09 | 22.85 |

Remarks: 10 inch borehole diameter

LOG OF MONITOR WELL NO. MW-22
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/28/09

## LOG OF MONITOR WELL NO. MW-23

Project Description: 2009 Monitor Well Installations

CAREL

Location: Royal Oaks Landfill

Surface El.: 655 feet
Completion Depth: 55 feet
Date Boring Started: 9/24/2009
Date Boring Completed: 9/29/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| 0 | | | Silty CLAY, dark brown, dry | | Concrete from 0 to 2' bgs |
| 5 | | | dark gray, greenish black with some glauconite | | |
| 10 | | | dark brown | | |
| | | | dark gray to green | | |
| 15 | | | Silty SAND, reddish brown, with gravel at base, silty to gravel, dry | | Bentonite grout from 2' to 35' bgs |
| | | | Silty CLAY, dark gray to green with glauconite | | |
| 20 | | | Silty SAND, dark gray to green, sand is silty to very fine grained and subrounded, moderately sorted with some glauconite, dry | | |
| 25 | | | with clay, gray to brown, moist | | |
| 30 | | | red to rusty brown, with some limonite | | |
| | | | SILT, light gray to white, moist | ▽ | |
| 35 | | | Silty SAND, light gray to white, sand is silty to very fine grained and subrounded, moderately well sorted, wet | ▼ | Bentonite seal from 35' to 39' bgs |
| | | | light brown | | |
| 40 | | | yellow to orange-brown | | 20/40 Silica sand from 39' to 55' bgs |
| 45 | | | brown, moist | | 0.010" Slotted screen from 42' to 52' bgs |
| 50 | | | gray brown | | |
| | | | Silty CLAY, gray brown and brown mixed layer, dry, hard | | 3' sump |
| 55 | | | | | |
| 60 | | | | | |
| 65 | | | | | |

Michael J. Hull 10/28/09

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
#4152
LICENSED
PROFESSIONAL GEOSCIENTIST

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

Groundwater Observations

| Date | Depth |
|---|---|
| 9/24/09 | 35.00 |
| 9/29/09 | 38.02 |

Remarks: 10 inch borehole diameter

LOG OF MONITOR WELL NO. MW-23
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/28/09

LOG OF MONITOR WELL NO. MW-24

Project Description: 2009 Monitor Well Installations

CAREL

Location: Royal Oaks Landfill

Surface El.: 657.5 feet
Completion Depth: 69 feet
Date Boring Started: 9/22/2009
Date Boring Completed: 9/28/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| 0 | | | Silty CLAY, red to brown | | Concrete from 0 to 2' bgs |
| 2 | | | GRAVEL, sand, dark brown to black, gravel is poorly sorted with iron and limonite | | |
| 5 | | | CLAY, yellow to brown, silty, limonite stain | | |
| | | | SILT, dark gray to green, gray black with glauconite | | |
| | | | Silty CLAY, yellow to brown with limonite staining carbonaceous | | |
| 10 | | | Silt and CLAY, dark gray to brown with glauconite inclusions, friable | | |
| 15 | | | Silty CLAY, silt dark gray to green with glauconite, friable, slightly moist | | |
| 20 | | | SILT, light gray to green with clay, hard, dry | | |
| 25 | | | Silty CLAY, dark gray to green, soft, friable with glauconite | | Bentonite grout from 2' to 49' bgs |
| 30 | | | | | |
| 35 | | | SILTSTONE, light gray to green, hard, dry | | |
| | | | Silty CLAY, dark gray to green, soft, friable, with glauconite, carbonaceous | | |
| 40 | | | | | |

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
4152
LICENSED
PROFESSIONAL GEOSCIENTIST

10/28/09

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

| Groundwater Observations | |
|---|---|
| Date | Depth |
| 9/22/09 | 53.00 |
| 9/28/09 | 49.82 |

Remarks: 10 inch borehole diameter

MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/28/09

LOG OF MONITOR WELL NO. MW-24
PAGE 1 of 2

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

LOG OF MONITOR WELL NO. MW-24

Project Description: 2009 Monitor Well Installations

Location: Royal Oaks Landfill

Surface El.: 657.5 feet
Completion Depth: 69 feet
Date Boring Started: 9/22/2009
Date Boring Completed: 9/28/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| | | | CLAY, dark brown, silty, slightly moist to moist with light gray silt stringer, soft, friable towards base, moist | | |
| 45 | | | Silty SAND, brown, sand is silty to very fined grained, moderately sorted, soft, friable, moist | | |
| 50 | | | light gray, moist to wet | | Bentonite seal from 49' to 54' bgs |
| 55 | | | Sandy SILT, brown to gray, sand is very fine grained and subrounded, moderately well sorted, wet | | 20/40 Silica sand from 54' to 69' bgs |
| | | | Silty CLAY, brown to gray, moist | | |
| 60 | | | CLAY, dark brown, dry | | 0.010" Slotted screen from 56' to 66' bgs |
| | | | SILT, dark gray to brown, moist | | |
| 65 | | | Silt/Silty SAND, dark brown, subrounded to rounded, well sorted, moist | | |
| | | | | | 3' sump |
| 70 | | | | | |
| 75 | | | | | |
| 80 | | | | | |

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
#4152
LICENSED
PROFESSIONAL GEOSCIENTIST
10/28/09

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

| Groundwater Observations | |
|---|---|
| Date | Depth |
| 9/22/09 | 53.00 |
| 9/28/09 | 49.82 |

Remarks: 10 inch borehole diameter

LOG OF MONITOR WELL NO. MW-24
PAGE 2 of 2

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/28/09

LOG OF MONITOR WELL NO. MW-25

Project Description: 2009 Monitor Well Installations

CAREL

Location: Royal Oaks Landfill

Surface El.: 663.2 feet
Completion Depth: 35 feet
Date Boring Started: 9/23/2009
Date Boring Completed: 9/29/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| 0 | | | Sandy SILT, dark gray to green, black, silt, subrounded, well sorted, hard, dry | | Concrete from 0 to 2' bgs |
| 2 | | | CLAY, white, plastic, moist | | |
| 5 | | | SANDY Silt, red to rusty brown, sand is very fine grained and subrounded, moderately sorted with iron nodules, dry to slightly moist | | |
| 10 | | | Sandy SILT, red (rusty) brown and gray to green, silt to very fine grained, subrounded, moderately well sorted, inter bedded with glauconite, dry | | Bentonite grout from 2' to 21' bgs |
| 15 | | | dark gray to green, fissile and soft with glauconite and slightly wet at 12' bgs | | |
| 20 | | | Silty SAND, dark gray to green, sand is silt to very fine grained and is subrounded, moderately sorted, fissile and soft with glauconite, moist | | |
| 21 | | | CLAY, gray to green, glauconite, plastic, slightly moist | | |
| 24 | | | Silt SAND, dark gray to green, sand is silt to very fine grained and subrounded, moderately sorted with glauconitic and fissile, moist | | Bentonite seal from 21' to 24' bgs |
| 25 | | | slightly wet to wet at 24' bgs | | 20/40 Silica sand from 24' to 35' bgs |
| 28 | | | moist at 28' bgs | | |
| 30 | | | SILTSTONE, silicified, light gray to white, hard streak, moist | | 0.010" Slotted screen from 27' to 32' bgs |
| 32 | | | | | 3' sump |
| 35 | | | CLAY, dark gray to green | | |
| 40 | | | | | |
| 45 | | | | | |

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
#1152
LICENSED
PROFESSIONAL GEOSCIENTIST

Michael J. Hull 10/28/09

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

| Groundwater Observations | |
|---|---|
| Date | Depth |
| 9/23/09 | 24.00 |
| 9/29/09 | 21.62 |

Remarks: 10 inch borehole diameter

LOG OF MONITOR WELL NO. MW-25
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

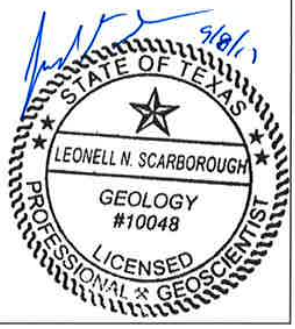
MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/28/09

# 2017 BOREHOLE LOG
# BY HYDREX ENVIRONMENTAL

Hydrex ENVIRONMENTAL

# Monitor Well

Monitor Well No.: **MW-20**




## PROJECT INFORMATION

| | |
|---|---|
| PROJECT: | **Royal Oaks Landfill** |
| PROJECT NO.: | **L-04-1144** |
| LOGGED BY: | **Stephen Rowland, Dillon Bybee** |
| SUPERVISING PG: | **Leonell N. Scarborough** |
| COMPLETION: | **7/18/17** |
| DEVELOPMENT: | **7/21/17** |
| SITE LOCATION: | **Jacksonville, Texas** |
| WELL OWNER: | **Royal Oaks Landfill** |

## DRILLING INFORMATION

| | |
|---|---|
| DRILLER: | **Thomas Daniel Cook** |
| DRILLER'S LICENSE NO.: | **2853** |
| RIG TYPE: | **D-50** |
| METHOD OF DRILLING: | **Hollow Stem Auger** |
| SAMPLING METHODS: | **Split Barrel Sampler** |
| TOP OF CASING ELEV. | **635.61'** |
| HOLE DIAMETER: | **8.25"** |
| LATITUDE: **32.001907** | LONGITUDE: **-95.263573** |

■ Sample ▼ Water level after completion ▽ Water level while drilling

TBPG Firm No. 50027

| DESCRIPTION | USCS | SOIL SYMBOLS | DEPTH | SAMPLE | WATER LEVEL | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|
| | | | | | | 4.5' X 4.5' X6" Sloped Concrete Pad; Surface Casing With Capped 4" Well Inside |
| SILTY CLAY - Road base and fill, reddish-brown silty clay, dry<br>-@ 2'-4', some iron oxide concretions and fine-grained brown quartz sand<br>-@ 4'-6', color change to dark greenish-black | CL | | 0–4 | | | Cement |
| CLAY - Dark green clay, very dense, shell fragments throughout, dry | CH | | 6–7 | | | Bentonite |
| SILTY CLAY - Dark greenish-brown silty clay with some fine-grained quartz sand and iron oxide concretions, dry<br>-@ 12', zone of increased iron oxide concretions<br>-@ 13.8', white silty clay lens | CL | | 8–15 | | | 4" Sch. 40 PVC Riser |
| SILTY SAND - Very fine reddish-yellow sand with some silt, iron oxide streaks and white silty sand lenses throughout | SM | | 15–19 | | | 20/40 Silica Sand |
| SILTY SAND - Alternating bands of greyish-yellow and white medium-grained quartz sand with lenses of brownish-red silty clay, wet at 21' | SM | | 20–23 | | ▽ ▼ | 0.010" Slotted 4" Sch. 40 PVC Well Screen |
| CLAY - Dark brownish-black clay, very dense, with white silt laminations throughout, increasing silt with depth, dry | CH | | 24–30 | | | 4" PVC Bottom Cap @ 27.5' |

NOTES: Log should not be used separately from original report. USCS Description based on field classification.

# 2023 BOREHOLE LOGS
# BY WEAVER CONSULTANTS GROUP

Weaver Consultants Group

# KEY TO LITHOLOGIC LOGS
# ROYAL OAKS LF - PERMIT MSW-1614B
# 2023 EXPANSION SUBSURFACE INVESTIGATION

## SAMPLING METHODS:

| Symbol: | Sampling Method: |
|---|---|
| U | Thin Walled Shelby Tube Sample |
| SPT | Split Spoon Barrel Sample |
| C | Split Core Barrel Sample |
| SC | Sonic Core Sample |
| A | Auger Sample |
| WR | Rotary Wash Sample |

## RELATIVE DENSITY OF COARSE GRAINED SOILS:

| Penetration Resistance: (Blows/Foot) | Relative Density: |
|---|---|
| 0 - 4 | Very Loose |
| 4 - 10 | Loose |
| 10 - 30 | Medium Dense |
| 30 - 50 | Dense |
| Over 50 | Very Dense |

## CONSISTENCY OF FINE-GRAINED SOILS:

| Unconfined Compressive Strength: (Tons per Square Foot) | Consistency: | Field Criteria: |
|---|---|---|
| Less than 0.25 | Very Soft | Squeezes between fingers when fist is closed. |
| 0.25 to 0.50 | Soft | Easily molded by fingers. |
| 0.50 to 1.00 | Firm | Molded by strong pressure of fingers. |
| 1.00 to 2.00 | Stiff | Imprinted very slightly by finger pressure. |
| 2.00 to 4.00 | Very Stiff | Cannot imprint with finger pressure / can penetrate w/ pencil. |
| 4.00 and Up | Hard | Imprinted only slightly by pencil point. |

## MOISTURE:

| Description: | Criteria: |
|---|---|
| Dry | Absence of moisture. |
| Moist | Damp, but no visible water. |
| Wet | Very damp to visible water. |

## PLASTICITY

| Description: | Criteria: |
|---|---|
| Non-plastic | 1/8" Thread Can't Be Rolled. |
| Low | 1/8" Thread Difficult to Roll / No Lump. |
| Medium | 1/8" Thread Easy to Roll / No reroll / No Lump. |
| High | Long time to 1/8" Thread at Plastic Limit. |

## STRATIFICATION:

| Description: | Thickness: |
|---|---|
| Massive Bedding | > 10 ft. |
| Very Thickly Bedded | 3 ft. to 10 ft. |
| Thickly Bedded | 1 ft. to 3 ft. |
| Moderately Bedded | 3 in. to 1 ft. |
| Thinly Bedded | 1.2 in. to 3 in. |
| Very Thinly Bedded | 3/8 in. to 1.2 in. |
| Laminated | < 3/8 in. |
| No Visible Bedding | Not Visually Evident |

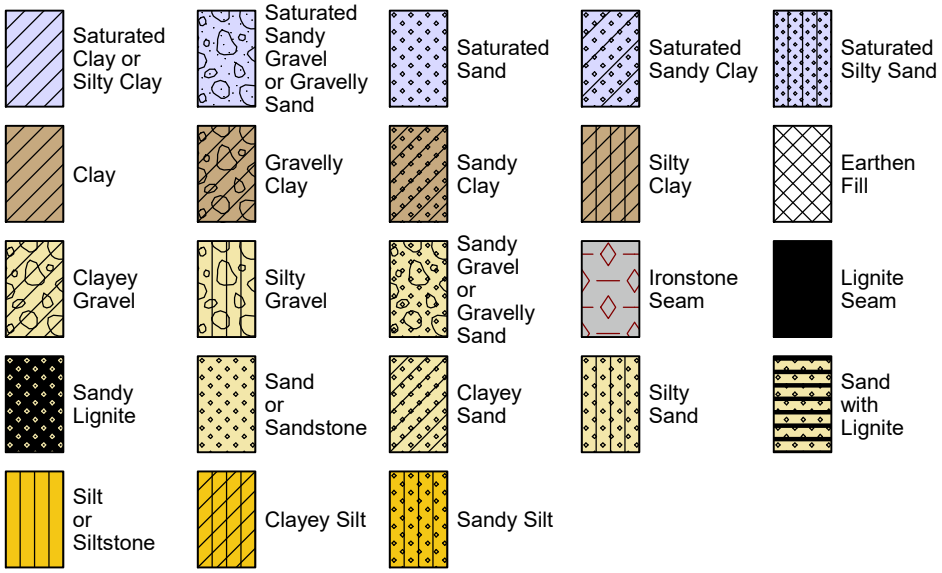
## SEDIMENTARY TEXTURES:

| Description: | Definition: |
|---|---|
| Slickensides | Polished fracture surface seen in clay. |
| Fractures | Failure plane, commonly w/ mineralization. |
| Blocky | Angular lumps that resist further breakdown. |
| Brecciated | Angular fragments commonly due to faulting. |
| Friable | Consolidated material easily broken into small pieces |
| Calcareous | Contains calcium carbonate, commonly as cement. |
| Interbedded | Indicates alternating layers of contrasting sediments. |
| Intermixed | Irregular clasts of contrasting sediments with no bedding. |

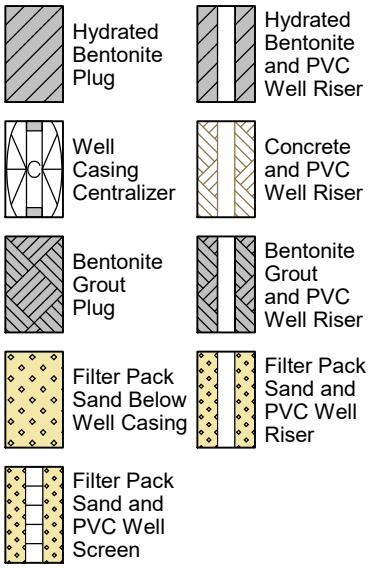
## SUBSURFACE CONDITIONS:

The lithologic log soil and rock descriptions are based on visual field observations. The lithologic unit contacts shown on the logs indicate approximate boundaries between materials. The actual contacts may be gradational and vary between borehole locations. The visual/manual procedures used for the field classification of soils were performed in general accordance with ASTM Standard D-2488. Water level observations were made at the time of drilling and at subsequent times, as indicated. Future water levels may vary significantly from those indicated due to climatic factors, construction activity, or other factors.

## LITHOLOGIC UNITS




## PIEZOMETER AND PLUGGING DETAIL

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# LOG OF BORING NO. PWCG-1A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA & Environmental Works



Boring Start Date: 3/14/2023 Northing (Site Grid): 10234.91
Boring End Date: 6/25/2023 Easting (Site Grid): 11507.95
Ground Surface Elevation at Time of Drilling: 618.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 621.15 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.74 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | CLAY, silty, trace sand & gravel, intermixed, moist, low to medium plasticity, very loose to loose, no visible bedding, dark-red, yellowish-red, & gray. | | | 4 | | | | | | | | 616.30 |
| | SPT | | | | | 5 | | | | | | | | |
| | SPT | | - becomes laminated to thinly bedded below 3'. | | | 8 | | | | | | | | |
| | SPT | | | | | 4 | | | | | | | | |
| | SPT | | CLAY, silty, interbedded, moist, low to medium plasticity, loose to medium dense, laminated to thinly bedded, gray & reddish-yellow. | 614.8 | | 7 | | | | | | | | |
| 5 | SPT | | | 613.3 | | 11 | | | | | | | | |
| | SPT | | SILT, moist, low to medium plasticity, loose to dense, laminated to thinly bedded, gray. | | | 11 | | | | | | | | |
| | SPT | | - with ironstones and iron staining below 7'. | | | 10 | | | | | | | | |
| | SPT | | | 610.8 | | 16 | | | | | | | | |
| | SPT | | SAND, silty, interbedded & intermixed, wet, non-plastic, loose to dense, laminated to thinly bedded, gray & yellowish-red. | | | 8 | | | | | | | | |
| 10 | SPT | | - 8" silty clay seam at 9'. | | | 11 | | | | | | | | |
| | SPT | | | | | 15 | | | | | | | | |
| | SPT | | | | | 14 | | | | | | | | |
| | SPT | | - becomes interbedded with trace clayey laminations below 13'. | | | 37 | | | | | | | | |
| | SPT | | | | | 49 | | | | | | | | |
| | SPT | | | | | 22 | | | | | | | | |
| 15 | SPT | | | 602.8 | | 20 | | | | | | | | |
| | SPT | | SILT, sandy, trace clay, intermixed, moist, non-plastic to low plasticity, loose to very dense, no visible bedding, gray & yellowish-red. | | | 22 | | | | | | | | |
| | SPT | | | | | 17 | | | | | | | | |
| | SPT | | | | | 17 | | | | | | | | |
| | SPT | | | | | 17 | | | | | | | | |
| | SPT | | | | | 7 | | | | | | | | |
| 20 | SPT | | - with ironstones and iron staining below 22.5'. | | | 8 | | | | | | | | |
| | SPT | | | | | 12 | | | | | | | | |
| | SPT | | - 6" silty clay seam at 23.5'. | | | 7 | | | | | | | | |
| | SPT | | | | | 10 | | | | | | | | |
| | SPT | | | | | 26 | | | | | | | | |
| 25 | SPT | | - 10" silty clay seam at 26'. | | | 14 | | | | | | | | |
| | SPT | | | | | 24 | | | | | | | | |
| | SPT | | - sand content increasing with depth below 27'. | | | 26 | | | | | | | | |
| | SPT | | | | | 26 | | | | | | | | |
| | SPT | | | | | 29 | | | | | | | | |
| | SPT | | | | | 50/5" | | | | | | | | |
| | SPT | | | | | 31 | | | | | | | | |
| | SPT | | | | | 50/4" | | | | | | | | |
| | SPT | | | | | 33 | | | | | | | | |
| | SPT | | | | | 50/4" | | | | | | | | |
| | SPT | | | | | 27 | | | | | | | | |
| | SPT | | | | | 36 | | | | | | | | |
| | SPT | | | | | 35 | | | | | | | | |
| | SPT | | | | | 8 | | | | | | | | |
| | SPT | | | | | 12 | | | | | | | | |
| | SPT | | | | | 17 | | | | | | | | |
| | SPT | | | | | 12 | | | | | | | | |
| | SPT | | | | | 21 | | | | | | | | |
| | SPT | | | | | 21 | | | | | | | | |
| | SPT | | | | | 6 | | | | | | | | |
| | SPT | | | | | 6 | | | | | | | | |
| | SPT | | | | | 40 | | | | | | | | |
| | SPT | | | | | 27 | | | | | | | | |
| | SPT | | | 589.8 | | 36 | | | | | | | | |
| | SPT | | SAND, silty, with ironstone, intermixed & interbedded, dry to moist, non-plastic to low plasticity, loose to dense, laminated, yellowish-red, gray, & light-brown. | | | 44 | | | | | | | | |
| | | | | | | 12 | | | | | | | | |
| | | | | | | 5 | | | | | | | | |

ROLF - PIEZOS (DUAL DRILLERS) ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/18/24

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# LOG OF BORING NO. PWCG-1A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA & Environmental Works



Boring Start Date: 3/14/2023 Northing (Site Grid): 10234.91
Boring End Date: 6/25/2023 Easting (Site Grid): 11507.95
Ground Surface Elevation at Time of Drilling: 618.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 621.15 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.74 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | SAND, silty, dry to moist (continued). | | | 10 | | | | | | | | |
| | SPT | | | | | 12 | | | | | | | | |
| | | | | | | 30 | | | | | | | | |
| | SPT | | - 6" clay seam at 32'. | | | 26 | | | | | | | | |
| | | | - 2" ironstone seam at 32.5'. | | | 6 | | | | | | | | |
| | SPT | | | | | 11 | | | | | | | | |
| | | | | | | 35 | | | | | | | | |
| | SPT | | | | | 23 | | | | | | | | |
| | | | | | | 28 | | | | | | | | |
| | SPT | | - becomes intermixed with clayey and silty laminations below 34.5'. | | | 50/5" | | | | | | | | |
| 35 | | | | 583.3 | | 8 | | | | | | | | |
| | SPT | | SAND, trace silt, trace clay, with ironstone, intermixed, dry to moist, non-plastic when moistened, loose to very dense, no visible bedding, light-brown & strong-brown, with iron staining. | | | 37 | | | | | | | | |
| | | | | | | 50/5.5" | | | | | | | | |
| | SPT | | | | | 15 | | | | | | | | |
| | | | | | | 26 | | | | | | | | |
| | SPT | | | | | 32 | | | | | | | | |
| | | | | | | 11 | | | | | | | | |
| | SPT | | - 9" hard, black, lignitic clay seam at 39'. | | | 10 | | | | | | | | |
| | | | | | | 15 | | | | | | | | |
| | SPT | | | | | 14 | | | | | | | | |
| 40 | | | | 578.3 | | 19 | | | | | | | | |
| | SPT | | SAND, clayey, silty, with ironstones, dry to moist, low to medium plasticity, medium dense to very dense, no visible bedding, yellowish-red, gray, & light-brown, with iron staining. | | | 50/5" | | | | | | | | |
| | | | | | | 4 | | | | | | | | |
| | SPT | | | | | 28 | | | | | | | | |
| | | | | 576.3 | | 50/6" | | | | | | | | ▽ |
| | SPT | | SAND, trace silt and clay, with ironstones, intermixed, wet, non-plastic, very loose to very dense, no visible bedding, light-brown & strong-brown. | | | 17 | | | | | | | | |
| | | | | | | 26 | | | | | | | | |
| | SPT | | | | | 38 | | | | | | | | |
| | | | | | | 26 | | | | | | | | |
| | SPT | | | | | 36 | | | | | | | | |
| | | | | | | 45 | | | | | | | | |
| 45 | SPT | | | | | 29 | | | | | | | | |
| | | | | | | 39 | | | | | | | | |
| | | | | 571.8 | | 45 | | | | | | | | |
| | SPT | | SAND, clayey, silty, moist, low plasticity, medium dense to very dense, laminated to moderately bedded, gray, brown, & black. | | | 16 | | | | | | | | |
| | | | | | | 42 | | | | | | | | |
| | SPT | | - 6" siltstone seam at 47'. | | | 50/5" | | | | | | | | |
| | | | | | | 33 | | | | | | | | |
| | SPT | | | | | 50/5.5" | | | | | | | | |
| | | | | | | 37 | | | | | | | | |
| 50 | | | | | | | | | | | | | | |
| | SPT | | - 4" siltstone seam at 50.5'. | | | 50/5.5" | | | | | | | | |
| | | | | | | 6 | | | | | | | | |
| | SPT | | | | | 6 | | | | | | | | |
| | | | | | | 14 | | | | | | | | |
| | SPT | | | | | 50/6" | | | | | | | | |
| | | | | | | 13 | | | | | | | | |
| | | | | 563.8 | | 26 | | | | | | | | |
| | SPT | | CLAY, silty, trace sand, dry, plastic when moistened, loose to very dense, laminated, black. | | | 44 | | | | | | | | |
| 55 | | | | | | 16 | | | | | | | | |
| | SPT | | | | | 21 | | | | | | | | |
| | | | | | | 24 | | | | | | | | |
| | SPT | | | | | 21 | | | | | | | | |
| | | | | | | 25 | | | | | | | | |
| | SPT | | | | | 32 | | | | | | | | |
| | | | | | | 19 | | | | | | | | |
| | | | | | | 24 | 100.9 | 23 | 95.6 | 64 | 21 | 43 | $1.6 \times 10^{-6}$ | |
| | SPT | | | | | 30 | | | | | | | | |
| | | | | | | 13 | | | | | | | | |
| | SPT | | | | | 18 | | | | | | | | |

ROLF - PIEZOS (DUAL DRILLERS) ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/18/24

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# LOG OF BORING NO. PWCG-1A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA & Environmental Works



Boring Start Date: 3/14/2023 Northing (Site Grid): 10234.91
Boring End Date: 6/25/2023 Easting (Site Grid): 11507.95
Ground Surface Elevation at Time of Drilling: 618.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 621.15 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.74 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Field Tests / Laboratory Tests | | | | | | | | | | | |
| | SPT | | CLAY, silty, dry (continued). | | | 24 | | | | | | | | |
| | SPT | | | | | 10, 24 | | | | | | | | |
| | SPT | | | | | 28, 16 | | | | | | | | |
| | SPT | | | | | 24, 34 | | | | | | | | |
| 65 | SPT | | | | | 20, 22 | | | | | | | | |
| | SPT | | | | | 35, 21 | 99.4 | 23 | 97.1 | 57 | 21 | 36 | | |
| | SPT | | | | | 27, 36 | | | | | | | | |
| | SPT | | - 6" siltstone seam at 68.5'.<br>- becomes shaley below 69'. | | | 17, 21 | | | | | | | | |
| | | | | | | 23, 15 | | | | | | | | |
| 70 | C | | | | 4.5+ | 22, 38 | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | | | - high angle fracture observed at 73.5'. | | 4.5+ | | | | | | | | | |
| 75 | | | | | 4.5+ | | | | | | | | | |
| | C | | | | 4.5+ | | | | | | | | | |
| 80 | | | | 538.3 | | | | | | | | | | 538.30 |
| | C | | SILT, clayey, sandy, interbedded, dry, non-plastic to low plasticity when moistened, soft to hard, laminated, black. | | 1.0 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 85 | | | - becomes laminated to moderatly bedded, and very-dark-brown & gray below 85.0'. | | 2.0 | | | | | | | | | |
| | C | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.0<br>0.5 | | | | | | | | | |

ROLF - PIEZOS (DUAL DRILLERS) ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/18/24

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# LOG OF BORING NO. PWCG-1A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA & Environmental Works



Boring Start Date: 3/14/2023 Northing (Site Grid): 10234.91
Boring End Date: 6/25/2023 Easting (Site Grid): 11507.95
Ground Surface Elevation at Time of Drilling: 618.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 621.15 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.74 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Field Tests / Laboratory Tests | | | | | | | | | | | |
| 95 | C | | SILT, sandy, trace clay, interbedded, dry, non-plastic when moistened, loose to soft, laminated to moderately bedded, light-gray, reddish-yellow, & red. | 528.3 | | | | | | | | | | C |
| | | | | 519.3 | | | | | | | | | | |
| 100 | C | | SANDSTONE, silty, trace clay, interbedded, dry to moist, non-plastic, loose to hard, laminated to moderately bedded, gray & reddish-yellow, poorly consolidated, friable. | | 3.5 | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | | | | | 3.5 | | | | | | | | | |
| 105 | | | - becomes laminated to thickly bedded below 105'. | | 4.5+ | | | | | | | | | |
| | C | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | 12.6 | 16 | | | | | | |
| 110 | | | | | 4.5+ | | | | | | | | | |
| | | | | | 2.75 | | | | | | | | | |
| | C | | | | 3.5 | | | | | | | | | |
| | | | | | 3.5 | | | | | | | | | |
| 115 | | | - No core recovery from 115' to 123' - cuttings logged. | | | | | | | | | | | |
| | C | | | | | | | | | | | | | |

ROLF - PIEZOS (DUAL DRILLERS) ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/18/24

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# LOG OF BORING NO. PWCG-1A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA & Environmental Works



Boring Start Date: 3/14/2023 Northing (Site Grid): 10234.91
Boring End Date: 6/25/2023 Easting (Site Grid): 11507.95
Ground Surface Elevation at Time of Drilling: 618.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 621.15 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.74 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Field Tests | | | | Laboratory Tests | | | | | | | |
| | C | | SANDSTONE, silty, dry to moist (continued). | | | | | | | | | | | C |
| | | | | 495.3 | | | | | | | | | | |
| | SPT | | SAND, silty, clayey, intermixed, moist, non-plastic to low plasticity, medium dense to very dense, no visible bedding, light-gray & dark-gray. | | | 15<br>50/2.5" | | | | | | | | |
| 125 | | | - No core recovery from 125' to 130' - cuttings logged. | | | | | | | | | | | |
| | C | | | | | | | | | | | | | |
| | | | | 488.3 | | | | | | | | | | |
| 130 | SPT | | SAND, silty, trace clay, intermixed, moist, non-plastic, medium dense to very dense, no visible bedding, gray. | | | 21<br>50/4" | | | | | | | | |
| | C | | - No core recovery from 131' to 135' - cuttings logged. | | | | | | | | | | | |
| | | | | 483.3 | | | | | | | | | | |
| 135 | SPT | | SAND, silty, clayey, intermixed, moist, non-plastic to low plasticity, very loose to medium dense, no visible bedding, light-gray & dark-gray. | | | 4<br>2<br>4<br>30 | | | | | | | | |
| | C | | | | | | | | | | | | | |
| | | | | 478.3 | | | | | | | | | | |
| 140 | SPT | | SAND, silty, trace clay, intermixed, moist, non-plastic, loose to medium dense, no visible bedding, gray. | | | 4<br>8<br>23 | | | | | | | | |
| | C | | | | | | | | | | | | | |
| | | | | 473.3 | | | | | | | | | | |
| 145 | SPT | | SAND, silty, intermixed, moist, non-plastic, very dense, no visible bedding, red. | | | 50/2.5" | | | | | | | | |
| | C | | - becomes red & gray below 150'. | | | | | | | | | | | |

ROLF - PIEZOS (DUAL DRILLERS) ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/18/24

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# LOG OF BORING NO. PWCG-1A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA & Environmental Works



Boring Start Date: 3/14/2023 Northing (Site Grid): 10234.91
Boring End Date: 6/25/2023 Easting (Site Grid): 11507.95
Ground Surface Elevation at Time of Drilling: 618.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 621.15 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.74 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | SAND, silty, moist (continued). | | | 50/3" | | | | | | | | C |
| | | | | 466.3 | | | | | | | | | | |
| | C | | SANDSTONE, with ironstone gravel, trace clay, intermixed, moist to wet, non-plastic, hard, no visible bedding, reddish-yellow & dark-red, with iron staining. | | 4.5+ | | | | | | | | | |
| 155 | C | | | | | | | | | | | | | |
| | | | | 458.8 | | | | | | | | | | ▽ |
| 160 | SPT | | SAND, silty, trace clay, intermixed, moist to wet, non-plastic, dense to very dense, no visible bedding, gray, yellow, very-pale-brown, & gray, with iron staining. - No core recovery from 161' to 165' - cuttings logged. | | | 44<br>50/2.5" | | | | | | | | 458.30 |
| | C | | | | | | | | | | | | | |
| 165 | SPT | | - No core recovery from 165.5' to 170' - cuttings logged. | | | 50/2.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 170 | SPT | | - No core recovery from 170.5' to 175' - cuttings logged. | | | 50/5" | | | | | | | | 448.30 |
| | C | | | | | | | | | | | | | |
| 175 | SPT | | - No core recovery from 175.5' to 180' - cuttings logged. | | | 50/4.25" | | | | | | | | |
| | C | | | | | | | | | | | | | |

ROLF - PIEZOS (DUAL DRILLERS) ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/18/24

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# LOG OF BORING NO. PWCG-1A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA & Environmental Works



Boring Start Date: 3/14/2023 Northing (Site Grid): 10234.91
Boring End Date: 6/25/2023 Easting (Site Grid): 11507.95
Ground Surface Elevation at Time of Drilling: 618.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 621.15 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.74 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | SAND, silty, moist to wet (continued).<br>- No core recovery from 180.5' to 185' - cuttings logged. | | | 50/5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 185 | SPT | | | | | 45 | | | | | | | | |
| | | | - No core recovery from 186' to 190' - cuttings logged. | | | 50/3.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 190 | | | | 428.3 | | | | | | | | | | 428.30 |
| | SPT | | SAND, silty, moist to wet, non-plastic, dense to very dense, no visible bedding, gray.<br>- No core recovery from 190.5' to 195' - cuttings logged. | | | 50/4" | | | | | | | | 426.30 |
| | C | | | | | | | | | | | | | |
| 195 | SPT | | | | | 35 | | | | | | | | |
| | | | - No core recovery from 196' to 200' - cuttings logged. | | | 50/2.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 200 | SPT | | - switched drilling method to sonic coring below 200.5'. | | | 50/5.5" | | | | | | | | 418.30 |
| | | | | | | | | | | | | | | |
| 205 | | | | | | | | | | | | | | |
| | SC | | | | | | | | | | | | | |

ROLF - PIEZOS (DUAL DRILLERS) ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/18/24

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# LOG OF BORING NO. PWCG-1A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA & Environmental Works



Boring Start Date: 3/14/2023 Northing (Site Grid): 10234.91
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Ground Surface Elevation at Time of Drilling: 618.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 621.15 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.74 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, moist to wet (continued). | | | | | | | | | | | |
| 215 | | | - becomes stiff to very stiff below 215'. | | 1.5 | | | | | | | | | |
| | | | | | 1.25 | | | | | | | | | |
| | | | | | 1.25 | | | | | | | | | |
| | | | | | 2.25 | | | | | | | | | |
| 220 | | | | | 1.75 | | | | | | | | | |
| | | | | | 2.25 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| 225 | SC | | - becomes intermixed with trace organics & black mottling below 226'. | | 2.0 | | | | | | | | | |
| | | | | | 3.0 | | | | | | | | | |
| | | | | | 2.75 | | | | | | | | | |
| 230 | | | | | 2.0 | | | | | | | | | |
| | | | | | 2.75 | | | | | | | | | |
| | | | | | 2.0 | | 29.8 | 26 | | | | | | |
| | | | | | 3.0 | | | | | | | | | |
| 235 | | | - becomes firm with decreasing silt content below 235'. | | 1.75 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| | | | | | 1.0 | | | | | | | | | |
| | | | - becomes intermixed with trace lignite below 239'. | | 2.0 | | | | | | | | | |

ROLF - PIEZOS (DUAL DRILLERS) ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/18/24

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# LOG OF BORING NO. PWCG-1A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
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| First | Second | Third | Fourth |
|---|---|---|---|
| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

Field Tests | Laboratory Tests

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 245 | SC | | SAND, silty, moist to wet (continued).<br>- 4" clay seam at 243'. | 372.8 | 1.25<br>1.75 | | | | | | | | | |
| 250 | | | SAND, silty, clayey, interbedded, moist to wet, low plasticity, stiff to hard, laminated, dark-gray.<br>- becomes interbedded with thin clay seams below 248'.<br>- 3" sandstone seam at 251.5'.<br>- becomes stiff to hard below 252'.<br>- 2" sandstone seam at 252.5'.<br>- 2" sandstone seam at 253.5'. | | 2.5<br>1.75<br>2.0<br>2.75<br>3.5<br>4.5+<br>4.5+ | | | | | | | | | |
| 255 | SC | | | | 4.5+<br>2.0<br>2.5 | | | | | | | | | |
| 260 | | | - 6" clay seam at 261'.<br>- 2" clay seam at 262.5'. | | 4.0<br>4.0<br>4.25<br>2.25 | | | | | | | | | |
| 265 | | | SAND, silty, trace clay, intermixed, moist to wet, non-plastic, dense to very dense, laminated to very thinly bedded, gray, yellow, very-pale-brown, & gray, with iron staining. | 353.3 | 1.0<br>2.25<br>2.5<br>1.5 | | | | | | | | | |

ROLF - PIEZOS (DUAL DRILLERS) ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/18/24

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| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Field Tests | | Laboratory Tests | | | | | | | |
| 275 | SC | | SAND, silty, moist to wet (continued). | | 1.25<br>2.25<br>2.25<br>1.5<br>1.5<br>1.25<br>4.5+<br>2.25<br>2.25<br>3.5 | | | | | | | | | |
| 280 | SC | | CLAY, sandy, silty, with lignite, interbedded, dry, plastic when moistened, hard, laminated to very thinly bedded, dark-gray & black.<br>- low angle fracture at 283'.<br>- 10" sandy silt seam at 285'.<br>- 6" sand seam at 287'. | 338.3 | 4.5+<br>4.5+ | | | | | | | | | |
| 290 | | | LIGNITE, sandy, dry, non-plastic when moistened, hard, laminated, black. | 330.3 | | | | | | | | | | |
| 295 | | | CLAY, silty, sandy, interbedded, dry, low to medium plasticity when moistened, hard, laminated, dark-gray, gray, & black. | 323.3 | 4.5+ | | 100.2 | 17 | 108.8 | 46 | 18 | 28 | $3.6 \times 10^{-8}$ | |

ROLF - PIEZOS (DUAL DRILLERS) ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/18/24

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# LOG OF BORING NO. PWCG-1A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA & Environmental Works



Boring Start Date: 3/14/2023 Northing (Site Grid): 10234.91
Boring End Date: 6/25/2023 Easting (Site Grid): 11507.95
Ground Surface Elevation at Time of Drilling: 618.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 621.15 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.74 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 610.8 ft-msl | 576.3 ft-msl | 458.8 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 305 | SC | | CLAY, silty, sandy, dry (continued). | | | | | | | | | | | |
| 310 | | | | 308.3 | | | | | | | | | | 308.30 |
| | | | Total Borehole Depth = 310'. | | | | | | | | | | | |
| 315 | | | | | | | | | | | | | | |
| 320 | | | | | | | | | | | | | | |
| 325 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-1B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 6/30/2023 Northing (Site Grid): 10234.66
Boring End Date: 6/30/2023 Easting (Site Grid): 11485.41
Ground Surface Elevation at Time of Drilling: 620.20 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 623.23 ft-msl
▼ = Static Potentiometric Surface Elevation: 579.98 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 612.7 ft-msl | 578.2 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, silty, trace sand & gravel, intermixed, moist, low to medium plasticity, very loose to loose, no visible bedding, dark-red, yellowish-red, & gray. | | | | | | | | | | | 618.20 |
| | | | - becomes laminated to thinly bedded below 3'. | 616.7 | | | | | | | | | | |
| | | | CLAY, silty, interbedded, moist, low to medium plasticity, loose to medium dense, laminated to thinly bedded, gray & reddish-yellow. | 615.2 | | | | | | | | | | |
| 5 | | | SILT, moist, low to medium plasticity, loose to dense, laminated to thinly bedded, gray. | | | | | | | | | | | |
| | | | - with ironstones and iron staining below 7'. | 612.7 | | | | | | | | | | |
| | | | SAND, silty, interbedded & intermixed, wet, non-plastic, loose to dense, laminated to thinly bedded, gray & yellowish-red. | | | | | | | | | | | |
| | | | - 8" silty clay seam at 9'. | | | | | | | | | | | |
| 10 | SC | | - becomes interbedded with trace clayey laminations below 13'. | | | | | | | | | | | |
| | | | | 604.7 | | | | | | | | | | |
| 15 | | | SILT, sandy, trace clay, intermixed, moist, non-plastic to low plasticity, loose to very dense, no visible bedding, gray & yellowish-red. | | | | | | | | | | | |
| | | | - with ironstones and iron staining below 22.5'. | | | | | | | | | | | |
| 20 | | | - 6" silty clay seam at 23.5'. | | | | | | | | | | | |
| | | | - 10" silty clay seam at 26'. | | | | | | | | | | | |
| 25 | | | - sand content increasing with depth below 27'. | | | | | | | | | | | |
| | | | | 591.7 | | | | | | | | | | |
| | | | SAND, silty, with ironstone, intermixed & interbedded, dry to moist, non-plastic to low plasticity, loose to dense, laminated, yellowish-red, gray, & light-brown. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-1B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 6/30/2023 Northing (Site Grid): 10234.66
Boring End Date: 6/30/2023 Easting (Site Grid): 11485.41
Ground Surface Elevation at Time of Drilling: 620.20 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 623.23 ft-msl
▼ = Static Potentiometric Surface Elevation: 579.98 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 612.7 ft-msl | 578.2 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SC | | SAND, silty, dry to moist (continued).<br><br>- 6" clay seam at 32'.<br>- 2" ironstone seam at 32.5'.<br><br>- becomes intermixed with clayey and silty laminations below 34.5'. | 585.2 | | | | | | | | | | |
| 35 | | | SAND, trace silt, trace clay, with ironstone, intermixed, dry to moist, non-plastic when moistened, loose to very dense, no visible bedding, light-brown & strong-brown, with iron staining.<br><br>- 9" hard, black, lignitic clay seam at 39'. | 580.2 | | | | | | | | | | |
| 40 | | | SAND, clayey, silty, with ironstones, dry to moist, low to medium plasticity, medium dense to very dense, no visible bedding, yellowish-red, gray, & light-brown, with iron staining. | 578.2 | | | | | | | | | | 580.20<br>578.20 |
| | SC | | SAND, trace silt and clay, with ironstones, intermixed, wet, non-plastic, very loose to very dense, no visible bedding, light-brown & strong-brown. | 573.7 | | | | | | | | | | |
| 45 | | | SAND, clayey, silty, moist, low plasticity, medium dense to very dense, laminated to moderately bedded, gray, brown, & black. | 572.2 | | | | | | | | | | 573.20<br>572.20 |
| | | | Total Borehole Depth = 48'. | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-2

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 6/1/2023 Northing (Site Grid): 10240.83
Boring End Date: 6/8/2023 Easting (Site Grid): 12092.70
Ground Surface Elevation at Time of Drilling: 564.80 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 567.92 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.41 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 455.8 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SILT, sandy, dry, non-plastic when moistened, firm, no visible bedding, brownish red, friable. | 562.8 | | | | | | | | | | 562.80 |
| 5 | SC | | SAND, silty, clayey, interbedded, dry, non-plastic to medium plasticity when moistened, firm to hard, no visible bedding, reddish yellow, gray, with red mottling.<br>- 6" sand seam at 4'.<br>- with ironstone concretions & limonite stains below 7'. | | 4.5+<br>4.5+ | | | | | | | | | |
| 10 | | | - becomes hard, dark-red, & reddish-yellow with increasing clay content below 10'. | | 4.5+ | | 70.0 | 20 | | 50 | 20 | 30 | | |
| 15 | SC | | - with intermixed siltstone clasts below 14.5'. | 546.8 | | | | | | | | | | |
| 20 | | | SILT, clayey, sandy, dry, plastic when moistened, hard, laminated to thinly bedded with crossbedding, gray, light-gray, reddish-yellow, & red, with iron & limonite staining.<br>- 6" moist sand seam at 22'. | 542.3 | 4.5+<br>3.0 | | | | | | | | | |
| 25 | SC | | CLAY, silty, sandy, interbedded, dry, plastic when moistened, very stiff to hard, laminated to moderately bedded, gray, & reddish-yellow, with iron staining.<br>- becomes nterbedded with moist sand/silt seams below 25.5'.<br>- 5" silty sand seam at 27.5'. | | 4.0<br>4.5<br>3.0<br>2.5 | | 95.4 | 31 | | | | | | |
| | | | - 1" lignite seam above underlying sand contact. | 534.8 | 4.25 | | | | | | | | | |

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# LOG OF BORING NO. PWCG-2

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 6/1/2023 Northing (Site Grid): 10240.83
Boring End Date: 6/8/2023 Easting (Site Grid): 12092.70
Ground Surface Elevation at Time of Drilling: 564.80 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 567.92 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.41 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 455.8 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty (elastic), clayey, intermixed, wet, non-plastic to low plasticity, soft to firm, yellowish-brown. | 531.8 | | | | | | | | | | |
| | | | SAND, silty, clayey, intermixed, dry, non-plastic to low plasticity when moistened, soft to firm, gray, & reddish-yellow, with iron & limonite staining. - 6" dry sand seam at 34.5'. | 529.8 | | | | | | | | | | |
| 35 | SC | | SAND, silty, clayey, intermixed and interbedded, dry, non-plastic to low plasticity when moistened, soft to firm, laminated to thinly bedding, gray, & reddish-yellow, with iron & limonite staining. | 524.3 | | | | | | | | | | |
| 40 | SC | | SAND, silty, with trace clay, interbedded, dry, non-plastic when moistened, dense to very dense, laminated to thickly bedded, light-gray. - becomes reddish-yellow & light gray with iron staining below 44'. | | | | | | | | | | | |
| 45 | SC | | | | | | | | | | | | | |
| 50 | SPT | | - becomes moist below 51'. | | | 33<br>50/3" | | | | | | | | |
| | SC | | - becomes light-gray & pinkish-gray with dark-gray mottling below 52.5'. | | | | | | | | | | | |
| 55 | SC | | - becomes dry below 55'. - becomes moist, very-pale-brown & light-brownish-gray below 59'. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-2

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 6/1/2023 Northing (Site Grid): 10240.83
Boring End Date: 6/8/2023 Easting (Site Grid): 12092.70
Ground Surface Elevation at Time of Drilling: 564.80 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 567.92 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.41 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 455.8 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, moist (continued). | | | | | | | | | | | |
| | | | | | | | 22.9 | 13 | | | | | | |
| | SC | | - becomes laminated to thinly bedded, crossbedded, & gray below 63'. | | | | | | | | | | | |
| 65 | | | - becomes pale-brown & gray below 64.5'. | | | | | | | | | | | 499.80 |
| | | | - becomes gray with dark-gray mottling below 66.5'. | | | | | | | | | | | |
| | SC | | | | | | | | | | | | | |
| 70 | SPT | | | | | 30<br>50/2.5" | | | | | | | | C |
| | SC | | - becomes dry below 72'. | | | | | | | | | | | |
| | | | - 1" clayey ironstone seam at 74'.<br>- becomes pale-brown & light-gray below 74.5'. | | | | | | | | | | | |
| 75 | SC | | - 6" ironstone seam at 77.5'.<br>- becomes interbedded with laminated to thinly bedded silt & ironstone seams and staining below 78'. | | | | | | | | | | | |
| 80 | | | - becomes dry to moist below 80'. | | | | | | | | | | | |
| | SC | | - 6" clayey silt seam at 83'. | | | | | | | | | | | |
| 85 | | | | | | | | | | | | | | |
| | SC | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-2

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 6/1/2023 Northing (Site Grid): 10240.83
Boring End Date: 6/8/2023 Easting (Site Grid): 12092.70
Ground Surface Elevation at Time of Drilling: 564.80 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 567.92 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.41 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 455.8 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, dry to moist (continued). | | | | | | | | | | | |
| | SC | | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | | | |
| | SC | | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | | | |
| | SC | | - becomes grayish-brown & light-gray below 103.5'. | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | | |
| | SC | | | 455.8 | | | | | | | | | | |
| | | | SAND, silty (elastic), wet, non-plastic, medium dense to very dense, laminated to very thickly bedded, with crossbedding, light-gray, with iron staining. | | | | | | | | | | | 454.80 |
| 110 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 115 | SC | | | | | | | | | | | | | 448.80 |
| | | | - becomes gray with dark-gray mottling below 118'. | | | | 34.0 | 22 | | | | | | |

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# LOG OF BORING NO. PWCG-2

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 6/1/2023 Northing (Site Grid): 10240.83
Boring End Date: 6/8/2023 Easting (Site Grid): 12092.70
Ground Surface Elevation at Time of Drilling: 564.80 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 567.92 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.41 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 455.8 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, wet (continued). | | | | | | | | | | | |
| 125 | SC | | | | | | | | | | | | | |
| 130 | | | - becomes gray & dark-gray with brown mottling below 132.5'. | | | | | | | | | | | |
| 135 | SC | | - becomes dark-gray below 135'. | | | | | | | | | | | 428.80 |
| 140 | SPT | | | 423.3 | | 21<br>25<br>50/5" | | | | | | | | 426.80<br>423.30 |
| | | | Total Borehole Depth = 141.5'. | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-3

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 3/27/2023 Northing (Site Grid): 9694.54
Boring End Date: 4/10/2023 Easting (Site Grid): 12703.27
Ground Surface Elevation at Time of Drilling: 549.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 552.73 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.91 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 459.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | SAND, silty, clayey, with ironstone, intermixed, dry, very loose to loose, plastic when moistened, laminated to thinly bedded, dark-red, gray, & yellowish-red, with iron staining. | | | 2 | | | | | | | | |
| | SPT | | | | | 4<br>6 | | | | | | | | |
| | SPT | | | 545.4 | | 5<br>7<br>10 | | | | | | | | 546.40 |
| 5 | C | | CLAY, silty, sandy, intermixed, dry, plastic when moistened, loose to medium dense, laminated to thinly bedded, reddish-gray, with iron staining. | | 4.0<br>4.5+ | 3<br>9<br>14 | | | | | | | | |
| | C | | SAND, silty, trace clay, with ironstone, intermixed, dry, soft to firm, non-plastic to plastic when moistened, strong-red, reddish-yellow, & gray, with iron staining. | 542.4 | 4.5+ | | | | | | | | | |
| 10 | C | | CLAY, silty, sandy, interbedded, dry, plastic when moistened, firm to stiff, laminated, reddish-gray, with iron staining.<br>- 6" silty sand seam at 13'. | 539.4 | 4.5<br>2.5<br>3.25<br>3.0 | | | | | | | | | |
| 15 | C | | CLAY, silty, sandy, interbedded, dry, plastic when moistened, soft to stiff, laminated, dark-gray to black.<br>- with trace lignite below 17.5'. | 534.9 | 2.75<br>3.5<br>2.25<br>1.25<br>0.5 | | 83.5 | 14 | | 41 | 19 | 28 | | |
| 20 | C | | - 3" silt seam at 22'.<br>- 2" sandstone seam at 23'.<br>- 5" silt seam at 24'. | 525.4 | 3.25<br>3.0<br>4.5+<br>2.5<br>3.25 | | | | | | | | | |
| 25 | C | | CLAY, sandy, silty, with ironstone, interbedded, dry, plastic when moistened, soft to firm, moderately bedded, yellowish-red, light-gray & reddish-gray, with iron staining. | 519.9 | 2.0<br>12.5<br>3.5<br>0.75<br>2.5 | | | | | | | | | |

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# LOG OF BORING NO. PWCG-3

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 3/27/2023 Northing (Site Grid): 9694.54
Boring End Date: 4/10/2023 Easting (Site Grid): 12703.27
Ground Surface Elevation at Time of Drilling: 549.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 552.73 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.91 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 459.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | SAND, silty, with clay & ironstone, interbedded, dry, non-plastic to low plasticity when moistened, soft, moderately bedded, yellowish-red, light-gray, & reddish-gray, with iron staining. | | 2.5<br>3.75 | | | | | | | | | |
| | | | | 515.4 | | | | | | | | | | |
| 35 | C | | SAND, silty, with ironstone, dry, non-plastic when moistened, dense, reddish-yellow, with iron & manganese staining, micaceous. | | | | | | | | | | | |
| | | | - becomes moist below 38.5'. | | 0.75 | | | | | | | | | |
| 40 | C | | - becomes light-gray below 39.5'. | | | | | | | | | | | |
| | | | | 504.9 | | | | | | | | | | |
| 45 | SPT | | SAND, silty (elastic), dry, non-plastic when moistened, medium dense to very dense, very-light-gray & pale-yellow, with iron & limonite staining. | | | 32<br>50/4" | 55.6 | 4 | | | | | | |
| | C | | | | | | | | | | | | | |
| 50 | SPT | | | | | 37<br>50/3.5" | | | | | | | | 499.90 |
| | C | | - becomes moist below 54'. | | | | | | | | | | | |
| 55 | SPT | | | | | 36<br>50/4" | | | | | | | | |
| | C | | - becomes white & very-light-gray below 60'. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-3

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 3/27/2023 Northing (Site Grid): 9694.54
Boring End Date: 4/10/2023 Easting (Site Grid): 12703.27
Ground Surface Elevation at Time of Drilling: 549.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 552.73 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.91 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 459.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | SAND, silty, dry (continued). | | | 38<br>50/4" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 65 | SPT | | | | | 36<br>50/5.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 70 | SPT | | | | | 19<br>32<br>50/6" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 75 | SPT | | - moisture content gradually increasing with depth below 75'. | | | 31<br>50/5" | | | | | | | | 475.40 |
| | C | | | | | | | | | | | | | |
| 80 | SPT | | | | | 47<br>50/2" | | | | | | | | 469.90 |
| | C | | | | | | | | | | | | | |
| 85 | SPT | | | | | 50/4.5" | | | | | | | | |
| | C | | | 459.9 | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-3

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 3/27/2023 Northing (Site Grid): 9694.54
Boring End Date: 4/10/2023 Easting (Site Grid): 12703.27
Ground Surface Elevation at Time of Drilling: 549.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 552.73 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.91 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 459.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | - becomes wet below 90'. | | | 47<br>50/2" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 95 | SPT | | | | | 50/5" | | | | | | | | 454.90 |
| | C | | | | | | 29.2 | 28 | | | | | | 452.90 |
| 100 | SPT | | | | | 50/6" | | | | | | | | 449.90 |
| | C | | | | | | | | | | | | | |
| 105 | SPT | | | | | 40<br>44<br>50/3" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 110 | SPT | | - becomes white & light-gray below 110'. | | | 27<br>50/5.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 115 | SPT | | | | | 28<br>50/4" | | | | | | | | |
| | C | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-3

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 3/27/2023 Northing (Site Grid): 9694.54
Boring End Date: 4/10/2023 Easting (Site Grid): 12703.27
Ground Surface Elevation at Time of Drilling: 549.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 552.73 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.91 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 459.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | SAND, silty, wet (continued). | | | 12<br>41<br>50/3.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 125 | SPT | | | | | 50/4.5" | | | | | | | | |
| | C | | | | | | 20.7 | 22 | | | | | | |
| 130 | SPT | | - silt content increasing with depth below 130'. | | | 18<br>34<br>50/3" | | | | | | | | |
| | C | | - 3" silt seam at 132'. | | 4.5+<br>2.25 | | | | | | | | | |
| 135 | SPT | | - becomes gray below 136'. | | | 28<br>44<br>46 | | | | | | | | |
| | C | | - 3" sandstone seam with lignite at 137.5'. | | 0.5<br>4.5+<br>0.5 | | | | | | | | | |
| 140 | SPT | | | | | 50/5.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 145 | SPT | | - becomes laminated to very thinly bedded with trace lignite below 145'. | | | 13<br>29<br>45 | | | | | | | | |
| | C | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-3

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 3/27/2023 Northing (Site Grid): 9694.54
Boring End Date: 4/10/2023 Easting (Site Grid): 12703.27
Ground Surface Elevation at Time of Drilling: 549.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 552.73 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.91 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 459.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | SAND, silty, wet (continued). | | | 23<br>46<br>50/4" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 155 | SPT | | | | | 20<br>39<br>50/3.25" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 160 | SPT | | - 3" lignitic silt seam at 160'. | | | 50/5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 165 | SPT | | | | | 48<br>50/4" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 170 | SPT | | | | | 50/5.5" | | | | | | | | |
| | C | | | 374.9 | | | | | | | | | | |
| 175 | SPT | | SAND, silty, with lignite, interbedded & crossbedded, wet, non-plastic, dense to very dense, laminated to thinly bedded, very-light-gray & black. | | | 50/5" | | | | | | | | |
| | C | | - 2" lignite seam at 178'. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-3

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 3/27/2023 Northing (Site Grid): 9694.54
Boring End Date: 4/10/2023 Easting (Site Grid): 12703.27
Ground Surface Elevation at Time of Drilling: 549.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 552.73 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.91 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 459.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | SAND, silty, wet (continued). | | | 37<br>50/3" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 185 | SPT | | | | | 34<br>50/2.75" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 190 | SPT | | | | | 50/4" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 195 | SPT | | | | | 50/4.25" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 200 | SPT | | | | | 50/5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 205 | | | | 343.9 | | | | | | | | | | |
| | C | | SAND, silty, interbedded & crossbedded, wet, non-plastic, dense to very dense, laminated to thinly bedded, very-light-gray & gray.<br><br>- becomes intermixed with poorly consolidated claystone and | 339.9 | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-3

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 3/27/2023 Northing (Site Grid): 9694.54
Boring End Date: 4/10/2023 Easting (Site Grid): 12703.27
Ground Surface Elevation at Time of Drilling: 549.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 552.73 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.91 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 459.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger, air rotary, & sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | silstone clasts below 210'. | | | 40 | | | | | | | | |
| | SPT | | SAND, silty, with clayey silt seams, interbedded & crossbedded, wet, non-plastic, dense to very dense, laminated to thinly bedded, very-light-gray & gray. | | | 50/3.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 215 | C | | | | | | | | | | | | | |
| | | | - becomes interbedded with lignite laminations below 220'. | | | | | | | | | | | |
| 220 | SPT | | | | | 26 50/3.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 225 | C | | | 319.9 | | | | | | | | | | |
| 230 | SPT | | SILT, clayey, sandy, intermixed, moist, low to high plasticity, dense to very dense, laminated to thinly-bedded, dark-gray. | 317.9 | | 35 50/2.5" | 94.5 | 28 | 94.6 | 52 | 25 | 27 | $1.4x10^{-5}$ | |
| | C | | CLAY, silty, sandy (shaley), with trace lignite, interbedded, moist, medium to high plasticity, very stiff to hard, laminated to very thinly-bedded, dark-gray & black. | | 4.5+ | | 93.3 | 15 | 114.0 | 63 | 21 | 42 | $8.1x10^{-9}$ | |
| 235 | C | | Total Borehole Depth = 240.0'. | 309.9 | | | | | | | | | | 309.90 |

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# LOG OF BORING NO. PWCG-4

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 4/24/2023 Northing (Site Grid): 9117.84
Boring End Date: 5/10/2023 Easting (Site Grid): 12699.05
Ground Surface Elevation at Time of Drilling: 554.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 557.30 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.92 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 457.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger & air rotary drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | SILT, clayey, sandy, with ironstone, interbedded & intermixed, moist, low to medium plasticity, soft to firm, laminated to moderately bedded, dark-red, yellow, gray, & yellowish-red, with iron staining. | | 3.0 | | | | | | | | | 552.90 |
| 5 | | | | | 2.5 | | | | | | | | | |
| | C | | CLAY, silty, sandy, with ironstone, interbedded, moist, low to medium plasticity, firm to hard, laminated to moderately bedded, yellowish-red, yellow, gray, dark-red, & reddish-gray, with iron staining. | 549.4 | 1.75 | | | | | | | | | |
| | | | | | 2.25 | | 99.9 | 23 | | 47 | 17 | 30 | | |
| 10 | | | | | 2.25 | | | | | | | | | |
| | | | | | 2.75 | | | | | | | | | |
| | C | | - 2" silty sand seam at 12.5'. | | 1.0 | | | | | | | | | |
| | | | | | 4.5 | | | | | | | | | |
| 15 | | | - 2" silty sand seam at 15.0'. | | 0.75 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| | | | | | 3.0 | | | | | | | | | |
| | C | | - becomes dark-brown with yellowish-red & light-gray below 17'. | | 4.0 | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 20 | | | | | 4.0 | | 97.8 | 27 | | | | | | |
| | | | - 1" silty sand seam at 21'. | | 4.0 | | | | | | | | | |
| | C | | | | 2.75 | | | | | | | | | |
| | | | - 3" silty sand seam at 24'. | | 1.75 | | | | | | | | | |
| 25 | | | - 2" silty sand seam at 24.5'. | | | | | | | | | | | |
| | | | | | 3.75 | | | | | | | | | |
| | C | | | | 3.5 | | | | | | | | | |
| | | | - 2" sand seam at 28'. | | 3.5 | | | | | | | | | |
| | | | | 524.9 | 3.75 | | | | | | | | | |

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# LOG OF BORING NO. PWCG-4

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 4/24/2023 Northing (Site Grid): 9117.84
Boring End Date: 5/10/2023 Easting (Site Grid): 12699.05
Ground Surface Elevation at Time of Drilling: 554.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 557.30 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.92 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 457.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger & air rotary drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | CLAY, sandy, silty, interbedded, moist, low to medium plasticity, soft to hard, laminated to moderately bedded, dark-gray, gray, & dark-brown. | | 4.5+ | | | | | | | | | |
| | | | - 5" silty sand seam at 32'. | | 4.0 | | 88.0 | 23 | 92.3 | 47 | 19 | 28 | $1.8x10^{-6}$ | |
| | | | - 3" silty sand seam at 33.5'. | | 3.5 | | | | | | | | | |
| 35 | C | | | | 4.0 | | | | | | | | | |
| | | | | | 1.25 | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 40 | C | | - sand content increasing with depth below 41'. | | 2.0 | | | | | | | | | |
| | | | | | 3.75 | | | | | | | | | |
| | | | | 510.4 | 1.25 | | | | | | | | | |
| 45 | C | | SAND, silty, trace clay, with ironstone, interbedded, dry to moist, non-plastic, very soft to soft, laminated to thinly bedded, reddish-yellow & reddish-gray, with iron staining. | | 1.25 | | | | | | | | | |
| | | | | | 0.5 | | | | | | | | | |
| | | | - becomes gray to dark-gray with trace lignite below 47.5'. | | 4.5 | | | | | | | | | |
| | | | | 504.9 | 0.5 | | | | | | | | | |
| 50 | SPT | | SAND, clayey, intermixed, dry to moist, non-plastic to low plasticity when moistened, loose to very dense, dark-reddish-brown, with iron staining. | | | 9<br>38<br>50/3.5" | | | | | | | | |
| | | | - 6" silty sand seam at 51.5'. | 502.9 | | | | | | | | | | |
| | C | | CLAY, moist to wet, low to medium plasticity, soft to firm, laminated, dark-reddish-brown. | 501.9 | 0.25 | | | | | | | | | |
| | | | SAND, silty, trace clay, with ironstone, interbedded, dry to moist, non-plastic, medium dense, laminated to thinly bedded, reddish-yellow & reddish-gray, with iron staining. | 500.9 | 3.0 | | | | | | | | | |
| | | | | 499.9 | 0.25 | | | | | | | | | |
| 55 | SPT | | CLAY, moist to wet, low to medium plasticity, soft to firm, laminated, dark-reddish-brown. | | | 16 | | | | | | | | |
| | | | SAND, clayey, silty, interbedded, moist to wet, low to medium plasticity, medium dense, laminated to moderately bedded, dark-gray, gray, & dark-brown, with iron staining. | 497.9 | | 17<br>29 | | | | | | | | |
| | C | | CLAY, moist to wet, low to medium plasticity, soft to firm, laminated, dark-reddish-brown. | 496.9 | 1.75 | | | | | | | | | |
| | | | LIGNITE, sandy, with ironstone, intermixed, dry, non-plastic when moistened, soft to firm, dark-gray. | 495.9 | 1.0 | | | | | | | | | |
| | | | SAND, silty, with ironstone, intermixed, dry, non-plastic | | 2.0 | | | | | | | | | |

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# LOG OF BORING NO. PWCG-4

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 4/24/2023 Northing (Site Grid): 9117.84
Boring End Date: 5/10/2023 Easting (Site Grid): 12699.05
Ground Surface Elevation at Time of Drilling: 554.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 557.30 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.92 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 457.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger & air rotary drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | when moistened, medium dense to very dense, thinly bedded, reddish-yellow & white, with iron staining. | | | | | | | | | | | 494.90 |
| | C | | | | | | | | | | | | | |
| 65 | SPT | | - becomes white below 65'. | | | 36<br>50/3" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 70 | SPT | | | | | 29<br>50/4.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 75 | SPT | | | | | 40<br>50/4" | | | | | | | | |
| | C | | | | 4.5+ | | 28.3 | 11 | | | | | | |
| 80 | SPT | | | | | 23<br>50/5.5" | | | | | | | | 474.90 |
| | C | | | | | | | | | | | | | |
| 85 | SPT | | - becomes moist below 85'. | | | 50/3.75" | | | | | | | | |
| | C | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-4

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 4/24/2023 Northing (Site Grid): 9117.84
Boring End Date: 5/10/2023 Easting (Site Grid): 12699.05
Ground Surface Elevation at Time of Drilling: 554.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 557.30 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.92 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 457.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger & air rotary drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | SAND, silty, moist (continued). | | | 50/5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 95 | SPT | | - becomes light-brown & reddish-yellow-below 95'. | | | 50/3" | | | | | | | | |
| | | | | 457.9 | | | | | | | | | | |
| | C | | - becomes moist to wet below 97.0'. | | | | | | | | | | | |
| 100 | SPT | | - becomes light-brown & light-gray below 100'. | | | 50/4.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 105 | SPT | | - becomes laminated to thinly bedded, light-gray & reddish-yellow below 105'. | | | 50/5.75" | | | | | | | | 449.90 |
| | C | | | | | | | | | | | | | |
| 110 | SPT | | | | | 50/4.5" | | | | | | | | 444.90 |
| | C | | | | | | | | | | | | | |
| 115 | SPT | | - becomes light-gray & gray below 115'. | | | 50/5" | | | | | | | | |
| | C | | | | | | 30.6 | 18 | | | | | | |

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# LOG OF BORING NO. PWCG-4

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: CoreCo USA



Boring Start Date: 4/24/2023 Northing (Site Grid): 9117.84
Boring End Date: 5/10/2023 Easting (Site Grid): 12699.05
Ground Surface Elevation at Time of Drilling: 554.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 557.30 ft-msl
▼ = Static Potentiometric Surface Elevation: 456.92 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 457.9 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via hollow stem auger & air rotary drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SPT | | - becomes gray with trace lignite clasts below 120'. | | | 16<br>33<br>50/4.5" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 125 | SPT | | | | | 22<br>34<br>50/5.75" | | | | | | | | |
| | C | | | | | | | | | | | | | |
| 130 | SPT | | | | | 18<br>45<br>50/2.75" | | | | | | | | 424.90 |
| | C | | | | | | | | | | | | | 422.90 |
| 135 | SPT | | | 418.4 | | 15<br>32<br>50/5" | | | | | | | | 418.40 |
| | | | Total Borehole Depth = 136.5'. | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-5

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/18/2023 Northing (Site Grid): 8600.43
Boring End Date: 5/23/2023 Easting (Site Grid): 12548.53
Ground Surface Elevation at Time of Drilling: 587.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 590.55 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.47 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 571.7 ft-msl | 458.7 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SILT, sandy, trace clay, with ironstone, moist, non-plastic, soft to loose, laminated, dark-reddish-brown, with brown mottling. | 585.2 | | | | | | | | | | 585.70 |
| | | | SAND, silty, trace clay, moist, soft to loose, reddish-yellow & strong-brown. | 584.7 | 1.5 | | | | | | | | | |
| | SC | | CLAY, silty, trace sand, moist, medium to high plasticity, laminated, dark-reddish-brown, light-gray & yellowish-brown, with iron staining. | 583.7 | 1.5 | | | | | | | | | |
| 5 | | | SAND, silty, trace clay, moist, soft to loose, yellowish-brown, homogenous. | 582.7 | 0.5 | | | | | | | | | |
| | | | CLAY, sandy, silty, interbedded, moist, medium plasticity, stiff to hard, dark-reddish-brown, yellowish-brown, & light-gray. - 6" silty clay seam at 5.5'. | 579.7 | 4.5 / 3.5 | | | | | | | | | |
| 10 | SC | | SAND, silty (elastic), clayey, moist, non-plastic, soft to loose, yellowish-brown, with reddish-brown mottling, with iron staining. | 571.7 | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | |
| 20 | SC | | SAND, silty (elastic), moist to wet, very dense, reddish-yellow. | | | | | | | | | | | |
| 25 | SPT | | - becomes laminated below 25'. | | | 50/4" | | | | | | | | |
| | | | - 2" sandstone seam at 26'. | | | | | | | | | | | |
| | SC | | - becomes dark-gray & black below 27'. | 557.7 | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-5

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/18/2023 Northing (Site Grid): 8600.43
Boring End Date: 5/23/2023 Easting (Site Grid): 12548.53
Ground Surface Elevation at Time of Drilling: 587.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 590.55 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.47 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 571.7 ft-msl | 458.7 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Field Tests | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Laboratory Tests | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, silty, sandy, interbedded, moist, medium to high plasticity, firm, laminated to very thinly bedded, gray & dark-gray. | | 4.25 | | | | | | | | | | | |
| | | | | | 4.25 | | | | | | | | | | | |
| | SC | | | | | | | 93.5 | 23 | 100.4 | 55 | 25 | 30 | $2.9x10^{-7}$ | | |
| | | | | | 3.75 | | | | | | | | | | | |
| 35 | | | | | 4.0 | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | | | |
| | SC | | - 10" sandy silt seam at 37'. | | 1.75 | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | |
| | | | - 3" sandy silt seam at 40.5'. | | 4.5+ | | | | | | | | | | | |
| | | | | | 3.75 | | | | | | | | | | | |
| | SC | | | | 4.5+ | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | | | |
| 45 | | | | | 4.5+ | | | | | | | | | | | |
| | | | | | 4.5 | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | | | |
| | SC | | - 5" sandy silt seam at 47'. | | 4.5+ | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | | | |
| | | | | 537.7 | 3.75 | | | | | | | | | | | |
| 50 | | | CLAY, silty, sandy, interbedded, moist, medium to high plasticity, medium dense to dense, laminated to thinly bedded, dark-gray & light-gray. | | | 10 | | | | | | | | | | |
| | SPT | | | | | 12 | | | | | | | | | | |
| | | | | | | 18 | | | | | | | | | | |
| | | | | | 4.5+ | 28 | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | | | |
| | SC | | | | 4.0 | | | | | | | | | | | |
| 55 | | | | | 4.5+ | | | | | | | | | | | |
| | | | - silt & sand content increasing with depth below 56. | | 4.5+ | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | | | |
| | SC | | | | 4.5+ | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-5

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/18/2023 Northing (Site Grid): 8600.43
Boring End Date: 5/23/2023 Easting (Site Grid): 12548.53
Ground Surface Elevation at Time of Drilling: 587.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 590.55 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.47 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 571.7 ft-msl | 458.7 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, silty, sandy, moist (continued). | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | SC | | | | 4.5+ | | | | | | | | | |
| 65 | | | | | 4.5+ | | | | | | | | | |
| | | | | | 3.5 | | | | | | | | | |
| | | | | | 3.0 | | | | | | | | | |
| | SC | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 70 | | | | | 4.0 | | | | | | | | | |
| | | | - 4" sandy silt seam at 71'. | | 4.5+ | | | | | | | | | |
| | | | - with trace lignite below 71.5'. | | 2.0 | | | | | | | | | |
| | SC | | | | 3.5 | | 81.0 | 22 | | 28 | 10 | 18 | | |
| 75 | | | | | 3.5 | | | | | | | | | |
| | | | | | 2.0 | | | | | | | | | |
| | SC | | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | | | 507.70 |
| | SC | | | | | | | | | | | | | |
| 85 | | | | | | | | | | | | | | |
| | | | | 501.7 | 4.25 | | | | | | | | | |
| | SPT | | SAND, clayey, silty, trace lignite, dry to moist, non-plastic to low plasticity, medium dense to very dense, gray & dark-gray. | | | 12 | | | | | | | | |
| | SC | | | | 1.5 | 50/2" | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |

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# LOG OF BORING NO. PWCG-5

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/18/2023 Northing (Site Grid): 8600.43
Boring End Date: 5/23/2023 Easting (Site Grid): 12548.53
Ground Surface Elevation at Time of Drilling: 587.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 590.55 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.47 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 571.7 ft-msl | 458.7 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SC | | SAND, clayey, silty, dry to moist (continued). | | | | 66.2 | 11 | | | | | | |
| 95 | SC | | | | 4.5 | | | | | | | | | |
| | | | - 2" lignitic clay seam at 98.5'.<br>- becomes light-brown below 99'. | 487.7 | | | | | | | | | | |
| 100 | SC | | SAND, silty, dry to moist, non-plastic, loose to medium dense, brown, dark-brown, & dark-gray. | | | | | | | | | | | |
| 105 | SC | | - becomes dry below 106'. | | | | | | | | | | | |
| 110 | SC | | - with trace lignite below 113.5'. | | | | | | | | | | | |
| 115 | SPT | | - silt content increasing with depth below 118'. | | | 5<br>18<br>29 | | | | | | | | |

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# LOG OF BORING NO. PWCG-5

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/18/2023 Northing (Site Grid): 8600.43
Boring End Date: 5/23/2023 Easting (Site Grid): 12548.53
Ground Surface Elevation at Time of Drilling: 587.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 590.55 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.47 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 571.7 ft-msl | 458.7 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SC | | SAND, silty, moist (continued). | | | | | | | | | | | |
| | | | - becomes moist below 123'. | | | | | | | | | | | |
| 125 | SC | | | | | | | | | | | | | |
| | | | | 458.7 | | | | | | | | | | |
| | | | - becomes wet below 129'. | | | | | | | | | | | |
| 130 | SC | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | 452.70 |
| 140 | SC | | | | | | | | | | | | | 447.70 |
| 145 | | | | | | | | | | | | | | |
| | SC | | | | | | | | | | | | | |

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ROLF - PIEZOS ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/19/24

# LOG OF BORING NO. PWCG-5

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/18/2023 Northing (Site Grid): 8600.43
Boring End Date: 5/23/2023 Easting (Site Grid): 12548.53
Ground Surface Elevation at Time of Drilling: 587.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 590.55 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.47 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 571.7 ft-msl | 458.7 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 155 | SC | | SAND, silty, wet (continued). | | | | | | | | | | | |
| | | | - 6" lignitic sand seam at 157'. | | | | | | | | | | | |
| 160 | SC | | | | 2.5 | | | | | | | | | 427.70 |
| | | | | | | | | | | | | | | 425.20 |
| 165 | SC | | | | | | | | | | | | | |
| 170 | | | | 417.7 | | | | | | | | | | 417.70 |
| | | | Total Borehole Depth = 170'. | | | | | | | | | | | |
| 175 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-6

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/25/2023 Northing (Site Grid): 8550.74
Boring End Date: 7/22/2023 Easting (Site Grid): 11964.53
Ground Surface Elevation at Time of Drilling: 632.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 635.70 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.87 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 605.4 ft-msl | 567.4 ft-msl | 458.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SILT, sandy, trace clay, with ironstone, moist, non-plastic, loose, laminated, dark-reddish-brown & brown, with iron staining. | | | | | | | | | | | 630.90 |
| | | | - becomes dry below 2'. | | | | | | | | | | | |
| | | | | 628.9 | | | | | | | | | | |
| 5 | SC | | SAND, silty, with ironstone, dry, non-plastic when moistened, loose, laminated, dark-reddish-brown, with iron staining. | | | | | | | | | | | |
| | | | - with trace clay below 6'. | | | | | | | | | | | |
| | | | - becomes hard below 8.5'. | | 4.5+ | | | | | | | | | |
| 10 | | | | 622.4 | | | | | | | | | | |
| | | | SAND, silty (elastic), trace clay, interbedded, dry to moist, non-plastic, loose, laminated to thinly bedded, brownish-yellow & light-gray, with iron staining. | | | | | | | | | | | |
| | | | - becomes intermixed, gray & light-brown below 13'. | | | | | | | | | | | |
| 15 | SC | | | 615.9 | | | | | | | | | | |
| | | | SAND, silty (elastic), with ironstone, moist, non-plastic, soft, laminated, reddish-brown. | | | | | | | | | | | |
| | | | | 612.9 | | | | | | | | | | |
| 20 | | | CLAY, sandy, silty, interbedded, dry, non-plastic to low plasticity when moistened, hard, laminated to thinly bedded, gray & black. | | 4.5+ | | | | | | | | | |
| | | | | 610.4 | | | | | | | | | | |
| | | | SAND, silty (elastic), clayey, dry to moist, non-plastic to low plasticity, soft to firm, no visible bedding, black, micaceous. | | 4.5+ | | | | | | | | | |
| | | | | | 2.5 | | | | | | | | | |
| 25 | SC | | | | 2.0 | | | | | | | | | |
| | | | | 605.4 | | | | | | | | | | |
| | | | - becomes moist to wet below 27.5'. | | 3.0 | | | | | | | | | |

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# LOG OF BORING NO. PWCG-6

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/25/2023 Northing (Site Grid): 8550.74
Boring End Date: 7/22/2023 Easting (Site Grid): 11964.53
Ground Surface Elevation at Time of Drilling: 632.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 635.70 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.87 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 605.4 ft-msl | 567.4 ft-msl | 458.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 601.9 | 1.25 | | | | | | | | | |
| | | | CLAY, sandy, silty, interbedded, dry, non-plastic to low plasticity when moistened, hard, laminated to thinly bedded, gray & black. | 599.9 | 4.5+ | | | | | | | | | |
| 35 | SC | | SAND, silty (elastic), clayey, dry to moist, non-plastic to low plasticity, soft to firm, laminated to thinly bedded, black, micaceous. | 596.9 | 4.5+ | | | | | | | | | |
| | | | CLAY, sandy, silty, interbedded, dry, low to medium plasticity when moistened, hard, laminated to thinly bedded, gray & black. | 592.9 | | | 86.4 | 19 | 105.5 | 38 | 12 | 26 | $7.1 \times 10^{-7}$ | |
| 40 | | | SAND, silty (elastic), clayey, dry to moist, non-plastic to low plasticity, soft to firm, laminated to thinly bedded, black, micaceous. | 591.4 | 1.25 | | | | | | | | | |
| | SC | | CLAY, sandy, silty, interbedded, dry, non-plastic to low plasticity when moistened, hard, laminated to thinly bedded, gray & black. | 590.4 | 4.5+ | | | | | | | | | |
| | | | SAND, silty (elastic), clayey, dry to moist, non-plastic to low plasticity, soft to firm, laminated to very thinly bedded, black, micaceous. | 589.4<br>588.4 | 4.5+ | | | | | | | | | |
| 45 | | | CLAY, sandy, silty, interbedded, dry, plastic when moistened, hard, laminated to thinly bedded, gray & black. | | | | | | | | | | | |
| | | | SAND, silty (elastic), clayey, dry to moist, non-plastic to low plasticity, soft to firm, laminated to very thinly bedded, black, micaceous.<br>- 6" glauconitic sandy clay seam at 49'. | 583.4 | | | | | | | | | | |
| 50 | SC | | SAND, silty (elastic), clayey, dry to moist, non-plastic to low plasticity, soft to firm, laminated to thinly bedded, black, micaceous. | 579.9 | 3.0 | | | | | | | | | |
| | | | SAND, silty, moist, non-plastic to low plasticity, firm to hard, no visible bedding, black. | | 4.5+ | | | | | | | | | |
| 55 | | | | 572.9 | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-6

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/25/2023 Northing (Site Grid): 8550.74
Boring End Date: 7/22/2023 Easting (Site Grid): 11964.53
Ground Surface Elevation at Time of Drilling: 632.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 635.70 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.87 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 605.4 ft-msl | 567.4 ft-msl | 458.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SC | | CLAY, sandy, silty, interbedded, dry, non-plastic to low plasticity when moistened, hard, laminated to thinly bedded, gray & black. | 571.4 | 4.5+ | | | | | | | | | |
| | | | SAND, silty, moist, non-plastic to low plasticity, loose to dense, no visible bedding, black. | | | | | | | | | | | |
| | | | - becomes dark-brown below 63.5'. | | 3.5 | | | | | | | | | |
| 65 | | | | 567.4 | | | | | | | | | | ▽ |
| | | | - becomes moist to wet and black below 65.5'. | | | | | | | | | | | |
| | | | | | 1.25 | | | | | | | | | |
| | | | | | 1.75 | | | | | | | | | |
| 70 | SC | | | | | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| 75 | SPT | | | 555.9 | | 5<br>16<br>35 | | | | | | | | |
| | SC | | CLAY, sandy, silty, interbedded, moist, non-plastic to low plasticity, firm to hard, laminated to thinly bedded, black & gray. | | 4.5+ | | | | | | | | | |
| | | | - 6" sand seam at 79'. | | 3.75 | | | | | | | | | |
| 80 | | | - becomes laminated below 79.5'. | | | | 20.5 | 16 | 107.7 | 39 | 21 | 18 | $2.2x10^{-5}$ | C |
| | | | | | 4.5+ | | | | | | | | | |
| 85 | SC | | | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | | | - silt content increasing with depth below 89'.<br>- 6" silt seam at 89.5'. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-6

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/25/2023 Northing (Site Grid): 8550.74
Boring End Date: 7/22/2023 Easting (Site Grid): 11964.53
Ground Surface Elevation at Time of Drilling: 632.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 635.70 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.87 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 605.4 ft-msl | 567.4 ft-msl | 458.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Field Tests | | | | Laboratory Tests | | | | | | | |
| 95 | SC | | CLAY, sandy, silty moist (continued). | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 100 | SC | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 105 | | | SAND, silty, dry to moist (continued). | | 4.5+ | | | | | | | | | |
| | | | - 3" silt seam at 106.5'. | | 4.5 | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 110 | SC | | | | | | | | | | | | | |
| | | | - 8" clay seam at 112'. | | 4.5+ | | | | | | | | | |
| | | | | | 3.0 | | | | | | | | | |
| 115 | | | - 8" sand seam at 115'. | | 4.5+ | | | | | | | | | |
| | | | - 3" sand seam at 116'. | | 4.5+ | | | | | | | | | |
| | | | | | 4.0 | | | | | | | | | |
| | SC | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |

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# LOG OF BORING NO. PWCG-6

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/25/2023 Northing (Site Grid): 8550.74
Boring End Date: 7/22/2023 Easting (Site Grid): 11964.53
Ground Surface Elevation at Time of Drilling: 632.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 635.70 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.87 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 605.4 ft-msl | 567.4 ft-msl | 458.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, sandy, silty moist (continued). | | 4.5<br>4.5+ | | | | | | | | | 512.90 |
| 125 | SC | | SAND, silty, dry, non-plastic, soft, very dense, no visible bedding, light-gray. | 507.9 | | | | | | | | | | |
| 130 | SPT | | | 502.4 | | 50/3" | | | | | | | | |
| | SC | | SAND, silty (elastic), clayey interbedded, with trace ironstone & lignite, laminated to very thinly bedded, dry to moist, low plasticity, very dense, black & gray. | | | | | | | | | | | |
| 135 | SC | | - 2" lignite seam at 138.5'. | 492.9 | | | 75.8 | 13 | | | | | | C |
| 140 | SPT | | SAND, silty (elastic), dry to moist, non-plastic, very dense, no visible bedding, gray. | | | 50/2" | | | | | | | | |
| | SC | | | | | | | | | | | | | |
| 145 | SC | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-6

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/25/2023 Northing (Site Grid): 8550.74
Boring End Date: 7/22/2023 Easting (Site Grid): 11964.53
Ground Surface Elevation at Time of Drilling: 632.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 635.70 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.87 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 605.4 ft-msl | 567.4 ft-msl | 458.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SC | | SAND, silty, dry to moist (continued). | | | | | | | | | | | |
| | SC | | | | | | | | | | | | | |
| 155 | SC | | | | | | | | | | | | | |
| | SPT | | | | | 50/1" | | | | | | | | |
| 160 | SC | | | | | | | | | | | | | |
| | SC | | | | | | | | | | | | | |
| 165 | | | | | | | | | | | | | | |
| | SC | | | | | | | | | | | | | |
| 170 | | | | 458.9 | | | | | | | | | | ▽ |
| | SC | | - becomes wet below 174'. | | | | | | | | | | | ▼ |
| 175 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-6

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/25/2023 Northing (Site Grid): 8550.74
Boring End Date: 7/22/2023 Easting (Site Grid): 11964.53
Ground Surface Elevation at Time of Drilling: 632.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 635.70 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.87 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 605.4 ft-msl | 567.4 ft-msl | 458.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 185 | SC | | SAND, silty, wet (continued). | | | | 40.7 | 15 | | | | | | 447.90 |
| 190 | | | | | | | | | | | | | | 442.90 |
| 195 | SC | | | | | | | | | | | | | |
| 200 | | | | | | | | | | | | | | |
| 205 | SC | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-6

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: D. Sicking
Drilling Firm: Environmental Works



Boring Start Date: 5/25/2023 Northing (Site Grid): 8550.74
Boring End Date: 7/22/2023 Easting (Site Grid): 11964.53
Ground Surface Elevation at Time of Drilling: 632.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 635.70 ft-msl
▼ = Static Potentiometric Surface Elevation: 457.87 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 605.4 ft-msl | 567.4 ft-msl | 458.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, wet (continued). | | | | | | | | | | | 422.90 |
| | SC | | | | | | | | | | | | | 420.90 |
| 215 | | | | 417.9 | | | | | | | | | | 417.90 |
| | | | Total Borehole Depth = 215'. | | | | | | | | | | | |
| 220 | | | | | | | | | | | | | | |
| 225 | | | | | | | | | | | | | | |
| 230 | | | | | | | | | | | | | | |
| 235 | | | | | | | | | | | | | | |

Field Tests | Laboratory Tests

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# LOG OF BORING NO. PWCG-7A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/7/2023 Northing (Site Grid): 8579.67
Boring End Date: 7/11/2023 Easting (Site Grid): 11370.10
Ground Surface Elevation at Time of Drilling: 656.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 659.96 ft-msl
▼ = Static Potentiometric Surface Elevation: 458.48 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 617.4 ft-msl | 570.9 ft-msl | 457.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SILT, sandy, clayey, with ironstone, interbedded, moist, non-plastic to low plasticity, very stiff, laminated to very thinly bedded, dark-reddish-brown & reddish-brown, with iron staining. | | | | | | | | | | | 654.90 |
| 5 | SC | | | 649.4 | 3.0 | | | | | | | | | |
| | | | SAND, silty, trace clay, dry, non-plastic when moistened, loose, laminated, dark-reddish-brown & brown. | 646.9 | | | | | | | | | | |
| 10 | | | SAND, with lignite, dry, non-plastic when moistened, loose, laminated, black with dark-green mottling, glauconitic. | | | | | | | | | | | |
| | | | - becomes moist below 13'. | 642.9 | 1.5 | | | | | | | | | |
| 15 | SC | | SAND, clayey, trace silt, lignitic, moist, low plasticity, soft to loose, laminated to very thinly bedded, black & greenish-gray, glauconitic. | 639.9 | 2.25 | | | | | | | | | |
| | | | SILT, clayey, sandy, dry, plastic when moistened, soft to very stiff, laminated to very thinly bedded, dark-gray & greenish-gray, glauconitic. | | | | | | | | | | | |
| 20 | | | - with trace pyrite crystals below 22'. | | | | | | | | | | | |
| 25 | SC | | | | 1.75 | | | | | | | | | |

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Logging Geologists: C. Mink
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▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 617.4 ft-msl | 570.9 ft-msl | 457.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SILT, clayey, snady, dry (continued). | 622.9 | 4.5+ | | | | | | | | | |
| 35 | SC | | SILT, clayey, sandy, lignitic, moist, low plasticity, very stiff to hard, laminated to very thinly bedded, black, brown, & greenish-gray, glauconitic. | 617.4 | 4.5+ 4.5+ | | | | | | | | | ▽ |
| 40 | | | SAND, silty, clayey, lignitic, wet, non-plastic to low plasticity, very stiff to hard, laminated to very thinly bedded, black, brown, & greenish-gray, glauconitic. | | 3.0 2.5 | | | | | | | | | |
| 45 | SC | | | | 2.5 | | 58.2 | 45 | | | | | | |
| 50 | SC | | | 603.9 | 2.5 | | | | | | | | | |
| | | | CLAY, silty, sandy, interbedded, dry, low to medium plasticity when moistened, hard, laminated, dark-brown. | 601.9 | | | | | | | | | | |
| 55 | SC | | CLAY, silty, sandy, trace ironstone, interbedded, moist, low to medium plasticity, hard, laminated to thinly bedded, dark-brown. | 598.9 | 4.25 | | | | | | | | | |
| | | | CLAY, silty, trace sand, interbedded, dry, medium to high plasticity when moistened, hard, laminated, dark-brown. | | | | | | | | | | | |

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|---|---|---|---|
| 617.4 ft-msl | 570.9 ft-msl | 457.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65 | SC | | CLAY, silty, dry (continued). | | 4.5+ | | | | | | | | | |
| | | | - becomes interbedded with light-gray sandy silt seams below 62'. | | | | 98.6 | 31 | | 51 | 18 | 33 | | |
| | | | - 2" clay seam at 64.5'. | | 4.5+ | | | | | | | | | |
| | | | SAND, silty, clayey, interbedded, moist, non-plastic to low plasticity, very stiff to hard, laminated to thinly bedded, black & brown. | 591.4 | 3.5 | | | | | | | | | |
| 70 | | | | | | | | | | | | | | |
| | | | SILT, clayey, sandy, interbedded, moist, low to medium plasticity, hard, laminated to very thinly bedded, brown & black. | 584.9 | 4.5+ | | | | | | | | | |
| 75 | SC | | | 579.9 | | | | | | | | | | |
| | | | SAND, silty (elastic), moist, non-plastic, hard, laminated, dark-gray & brown. | | 4.5+ | | | | | | | | | |
| 80 | | | | 573.9 | | | | | | | | | | |
| | | | SAND, silty, clayey, trace organics, moist, low plasticity, medium dense to very dense, laminated, brown, dark-gray, with black mottling. | | | | | | | | | | | |
| 85 | SC | | | 570.9 | | | | | | | | | | ▽ |
| | | | - becomes wet and dark-gray & black below 86'. | | 3.0 | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |

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# LOG OF BORING NO. PWCG-7A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/7/2023 Northing (Site Grid): 8579.67
Boring End Date: 7/11/2023 Easting (Site Grid): 11370.10
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▼ = Static Potentiometric Surface Elevation: 458.48 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 617.4 ft-msl | 570.9 ft-msl | 457.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, wet (continued). | | 4.5+ | | | | | | | | | C |
| | SC | | | | | | | | | | | | | |
| 95 | SPT | | | | 2.25 | 28<br>48<br>50/2" | | | | | | | | |
| | | | | 556.9 | | | | | | | | | | |
| 100 | SC | | SAND, silty (elastic), moist to wet, non-plastic, medium dense to very dense, no visible bedding, brown. | | 2.25 | | 21.5 | 23 | 100.7 | | | | $6.1x10^{-5}$ | |
| | | | | | 2.0 | | | | | | | | | |
| 105 | | | | | 3.25 | | | | | | | | | |
| 110 | | | | | 3.5 | | | | | | | | | |
| | | | | 544.9 | | | | | | | | | | |
| | | | SAND, clayey, silty, dry, plastic when moistened, hard, laminated to moderately bedded, very dark brown, light gray. | | 4.5+ | | | | | | | | | |
| 115 | SC | | - 2" clay seam at 117'. | | 4.5+ | | | | | | | | | |
| | | | | 537.9 | | | | | | | | | | |
| | | | CLAY, silty, sandy, shaley, interbedded, dry to moist, low to high plasticity, hard, laminated, very-dark-brown & | | 4.5+ | | | | | | | | | |

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| First | Second | Third | Fourth |
|---|---|---|---|
| 617.4 ft-msl | 570.9 ft-msl | 457.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | light-gray. | | | | | | | | | | | C |
| | | | - 1' sand seam at 121'. | | | | | | | | | | | |
| 125 | SC | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 130 | | | | | 4.5+ | | 94.1 | 16 | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 135 | SC | | - becomes brown with black mottling below 135'. | | 4.5+ | | | | | | | | | |
| 140 | | | - 3" sand seam at 141'. | | 4.5+ | | | | | | | | | |
| | | | | 512.9 | | | | | | | | | | |
| 145 | SC | | SAND, clayey, silty, moist, non-plastic to low plasticity, hard, laminated, brown & light-gray. | 509.9 | 4.5+ | | | | | | | | | |
| | | | CLAY, sandy, silty, shaley, interbedded, dry to moist, low to medium plasticity, hard, laminated, brown & light-gray with black mottling. | | | | | | | | | | | |

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Supervising Geologist: Aaron K. Evans, P.G.
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| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, sandy, silty, dry to moist (continued). | | | | | | | | | | | |
| | | | - 10" sand seam at 152.5'. | | 2.0 | | | | | | | | | |
| | | | - 6" sand seam at 154.5'. | 501.9 | | | | | | | | | | |
| 155 | SC | | SAND, silty, clayey, moist, non-plastic, very stiff, laminated, light-gray & very-dark-brown. | | 3.0 | | | | | | | | | |
| | | | | | 3.25 | | | | | | | | | |
| | | | | 496.9 | | | | | | | | | | 496.90 |
| 160 | SPT | | SAND, clayey, silty, interbedded, moist, non-plastic, dense to very dense, laminated, dark-brown. | | 4.5+ | 40<br>50/1.5" | | | | | | | | |
| | | | | | 2.0 | | | | | | | | | |
| 165 | SC | | | | 2.5 | | | | | | | | | |
| | | | | | 3.5 | | | | | | | | | |
| 170 | | | - 3" clay seam at 171'. | 484.9 | 3.0 | | | | | | | | | |
| | | | SAND, trace silt, trace clay, moist, non-plastic, very stiff, laminated, dark-brown. | | 3.0 | | | | | | | | | |
| | | | | | 3.0 | | | | | | | | | |
| 175 | SC | | | | | | | | | | | | | |
| | | | - 6" clay seam at 177.5'. | | 1.5 | | | | | | | | | |
| | | | - becomes dry to moist & brown below 179'. | | | | | | | | | | | |

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▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 617.4 ft-msl | 570.9 ft-msl | 457.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Field Tests | | | | Laboratory Tests | | | | | | | |
| 185 | SC | | - 6" clayey lignitic sand seam at 180.5'. | 466.9 | | | | | | | | | | |
| 190 | | | SAND, clayey, silty, trace lignite, intermixed, moist, non-plastic to low plasticity, firm to stiff, laminated, very-dark-brown & dark-gray. | 464.9 | 1.5 | | | | | | | | | |
| | | | SAND, silty (elastic), trace clay, intermixed, moist, non-plastic, very dense, laminated, dark-brown. | | 1.0 | | | | | | | | | |
| 195 | SC | | | | 1.5 | | | | | | | | | |
| | | | | 457.9 | | | | | | | | | | |
| 200 | | | - becomes moist to wet below 199.0'. | | 1.25 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| 205 | SC | | - with trace clay & lignitic laminations below 207'. | | 3.0 | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, wet (continued). | | 1.5 | | | | | | | | | 446.90 |
| | SC | | | | 1.0 | | | | | | | | | |
| 215 | | | | | | | | | | | | | | |
| | | | | 438.9 | 1.75 | | | | | | | | | |
| | | | SAND, silty (elastic), wet, non-plastic, very dense, laminated, light-gray. | | | | | | | | | | | |
| 220 | SC | | | | | | | | | | | | | 434.90 |
| | | | | | 1.0 | | | | | | | | | |
| 225 | | | | | | | | | | | | | | |
| | | | | | 1.0 | | | | | | | | | |
| 230 | SC | | | | | | | | | | | | | |
| | | | | | 1.25 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| 235 | | | | | | | | | | | | | | |
| | | | | | 1.75 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, wet (continued). | | 2.0 | | | | | | | | | 414.90 |
| | | | - becomes interbedded with brown sand seams below 243'. | | 1.75 | | 22.8 | 22 | 99.1 | NL | NP | | $1.1x10^{-5}$ | 412.90 |
| 245 | SC | | | | 1.5 | | | | | | | | | |
| 250 | | | | | 1.5 | | | | | | | | | |
| 255 | | | | 398.9 | | | | | | | | | | |
| | | | SAND, silty, clayey, trace lignite, intermixed, moist to wet, non-plastic to low plasticity, stiff to hard, laminated, light-gray & brown. | | 4.5 | | | | | | | | | |
| 260 | | | | 395.4 | 4.5+ | | | | | | | | | |
| | | | SAND, silty, (elastic), trace clay, trace lignite, interbedded & intermixed, wet, non-plastic, firm to very dense, laminated, light-gray, brown, & black. | | 1.5 | | | | | | | | | |
| 265 | SC | | | | 2.0 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |

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# LOG OF BORING NO. PWCG-7A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/7/2023 Northing (Site Grid): 8579.67
Boring End Date: 7/11/2023 Easting (Site Grid): 11370.10
Ground Surface Elevation at Time of Drilling: 656.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 659.96 ft-msl
▼ = Static Potentiometric Surface Elevation: 458.48 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 617.4 ft-msl | 570.9 ft-msl | 457.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 275 | | | SAND, silty, wet (continued). | | 1.5 | | | | | | | | | |
| | | | | | 2.0 | | | | | | | | | |
| | | | | | 2.5 | | | | | | | | | |
| 280 | | | | | 2.0 | | | | | | | | | |
| | | | | | 1.75 | | | | | | | | | |
| 285 | SC | | | | 2.0 | | | | | | | | | |
| 290 | | | | 363.9 | 2.0 | | | | | | | | | |
| | | | SAND, clayey, silty, interbedded & intermixed, moist to wet, non-plastic to low plasticity, hard, laminated to thinly bedded, light-brown. | | 4.0 | | | | | | | | | |
| 295 | | | | | 4.5 | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | | | | 357.9 | | | | | | | | | | |
| | | | SAND, clayey, silty, interbedded to intermixed, moist to wet, non-plastic to low plasticity, hard, laminated to thinly bedded, | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-7A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/7/2023 Northing (Site Grid): 8579.67
Boring End Date: 7/11/2023 Easting (Site Grid): 11370.10
Ground Surface Elevation at Time of Drilling: 656.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 659.96 ft-msl
▼ = Static Potentiometric Surface Elevation: 458.48 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 617.4 ft-msl | 570.9 ft-msl | 457.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | brown & greenish-gray. | | 4.0 | | | | | | | | | |
| 305 | SC | | | | 3.0 | | | | | | | | | |
| | | | | | 3.5 | | | | | | | | | |
| 310 | | | - with iron staining below 312'. | | 2.5 | | | | | | | | | |
| | | | | | 2.5 | | | | | | | | | |
| 315 | | | | | | | | | | | | | | |
| | | | | | 1.0 | | | | | | | | | |
| 320 | | | | | | | | | | | | | | |
| | | | | | 2.0 | | | | | | | | | |
| 325 | SC | | | | 2.0 | | | | | | | | | |
| | | | | | 2.75 | | | | | | | | | |

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# LOG OF BORING NO. PWCG-7A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/7/2023 Northing (Site Grid): 8579.67
Boring End Date: 7/11/2023 Easting (Site Grid): 11370.10
Ground Surface Elevation at Time of Drilling: 656.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 659.96 ft-msl
▼ = Static Potentiometric Surface Elevation: 458.48 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 617.4 ft-msl | 570.9 ft-msl | 457.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, clayey, silty, moist to wet (continued). | | 4.0 | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | | | | | 1.75 | | | | | | | | | |
| 335 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 340 | | | | | 1.0 | | | | | | | | | |
| | SC | | | | | | | | | | | | | |
| 345 | | | - 1" lignite seam at 349'. | | | | | | | | | | | |
| 350 | | | | 303.9 | 4.5+ | | | | | | | | | |
| | | | CLAY, shaley, silty, trace sand, interbedded, dry, medium to high plasticity, hard, laminated, dark-brown with light-gray mottling. | | | | | | | | | | | |
| 355 | | | | | 4.5+ | | | | | | | | | |
| | SC | | | | | | 99.7 | 18 | 101.2 | 53 | 21 | 32 | | |
| | | | | | 4.5+ | | | | | | | | | |

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# LOG OF BORING NO. PWCG-7A

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/7/2023 Northing (Site Grid): 8579.67
Boring End Date: 7/11/2023 Easting (Site Grid): 11370.10
Ground Surface Elevation at Time of Drilling: 656.90 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 659.96 ft-msl
▼ = Static Potentiometric Surface Elevation: 458.48 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 617.4 ft-msl | 570.9 ft-msl | 457.9 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, shaley, silty, dry (continued). | 294.9 | | | | 16 | 109.5 | | | | $2.3x10^{-7}$ | 294.90 |
| | | | Total Borehole Depth = 362'. | | | | | | | | | | | |
| 365 | | | | | | | | | | | | | | |
| 370 | | | | | | | | | | | | | | |
| 375 | | | | | | | | | | | | | | |
| 380 | | | | | | | | | | | | | | |
| 385 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-7B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/12/2023 Northing (Site Grid): 8593.43
Boring End Date: 7/12/2023 Easting (Site Grid): 11369.24
Ground Surface Elevation at Time of Drilling: 656.10 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 659.09 ft-msl
▼ = Static Potentiometric Surface Elevation: 577.85 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 616.6 ft-msl | 570.1 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SILT, sandy, clayey, with ironstone, interbedded, moist, non-plastic to low plasticity, very stiff, laminated to very thinly bedded, dark-reddish-brown & reddish-brown, with iron staining. | | | | | | | | | | | 654.10 |
| 5 | | | | 648.6 | | | | | | | | | | |
| | | | SAND, silty, trace clay, dry, non-plastic when moistened, loose, laminated, dark-reddish-brown & brown. | | | | | | | | | | | |
| 10 | SC | | | 646.1 | | | | | | | | | | |
| | | | SAND, with lignite, dry, non-plastic when moistened, loose, laminated, black with dark-green mottling, glauconitic. | | | | | | | | | | | |
| | | | - becomes moist below 13'. | 642.1 | | | | | | | | | | |
| 15 | | | SAND, clayey, trace silt, lignitic, moist, low plasticity, soft to loose, laminated to very thinly bedded, black & greenish-gray, glauconitic. | | | | | | | | | | | |
| | | | | 639.1 | | | | | | | | | | |
| | | | SILT, clayey, sandy, dry, plastic when moistened, soft to very stiff, laminated to very thinly bedded, dark-gray & greenish-gray, glauconitic. | | | | | | | | | | | |
| 20 | | | - with trace pyrite crystals below 22'. | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-7B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/12/2023 Northing (Site Grid): 8593.43
Boring End Date: 7/12/2023 Easting (Site Grid): 11369.24
Ground Surface Elevation at Time of Drilling: 656.10 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 659.09 ft-msl
▼ = Static Potentiometric Surface Elevation: 577.85 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 616.6 ft-msl | 570.1 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SC | | SILT, clayey, snady, dry (continued). | 622.1 | | | | | | | | | | |
| 35 | | | SILT, clayey, sandy, lignitic, moist, low plasticity, very stiff to hard, laminated to very thinly bedded, black, brown, & greenish-gray, glauconitic. | 616.6 | | | | | | | | | | ▽ |
| 40 | | | SAND, silty, clayey, lignitic, wet, non-plastic to low plasticity, very stiff to hard, laminated to very thinly bedded, black, brown, & greenish-gray, glauconitic. | 603.1 | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | |
| 50 | SC | | | | | | | | | | | | | 606.10 |
| | | | CLAY, silty, sandy, interbedded, dry, low to medium plasticity when moistened, hard, laminated, dark-brown. | 601.1 | | | | | | | | | | |
| 55 | | | CLAY, silty, sandy, trace ironstone, interbedded, moist, low to medium plasticity, hard, laminated to thinly bedded, dark-brown. | 598.1 | | | | | | | | | | |
| | | | CLAY, silty, trace sand, interbedded, dry, medium to high plasticity when moistened, hard, laminated, dark-brown. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-7B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/12/2023 Northing (Site Grid): 8593.43
Boring End Date: 7/12/2023 Easting (Site Grid): 11369.24
Ground Surface Elevation at Time of Drilling: 656.10 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 659.09 ft-msl
▼ = Static Potentiometric Surface Elevation: 577.85 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 616.6 ft-msl | 570.1 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65 | | | CLAY, silty, dry (continued).<br>- becomes interbedded with light-gray sandy silt seams below 62'.<br>- 2" clay seam at 64.5'. | 590.6 | | | | | | | | | | |
| 70 | SC | | SAND, silty, clayey, interbedded, moist, non-plastic to low plasticity, very stiff to hard, laminated to thinly bedded, black & brown. | 584.1 | | | | | | | | | | |
| 75 | | | SILT, clayey, sandy, interbedded, moist, low to medium plasticity, hard, laminated to very thinly bedded, brown & black. | 579.1 | | | | | | | | | | |
| 80 | | | SAND, silty (elastic), moist, non-plastic, hard, laminated, dark-gray & brown. | 573.1 | | | | | | | | | | |
| 85 | | | SAND, silty, clayey, trace organics, moist, low plasticity, medium dense to very dense, laminated, brown, dark-gray, with black mottling. | 570.1 | | | | | | | | | | |
| | | | - becomes wet and dark-gray & black below 86'. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-7B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/12/2023 Northing (Site Grid): 8593.43
Boring End Date: 7/12/2023 Easting (Site Grid): 11369.24
Ground Surface Elevation at Time of Drilling: 656.10 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 659.09 ft-msl
▼ = Static Potentiometric Surface Elevation: 577.85 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 616.6 ft-msl | 570.1 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SC | | SAND, silty, clayey, wet (continued). | | | | | | | | | | | 566.10 |
| 95 | | | | | | | | | | | | | | |
| | | | | 556.1 | | | | | | | | | | 560.10 |
| 100 | | | SAND, silty (elastic), moist to wet, non-plastic, medium dense to very dense, no visible bedding, brown. | | | | | | | | | | | |
| 105 | SC | | | | | | | | | | | | | 550.10 |
| 110 | | | | 544.1 | | | | | | | | | | 547.60 |
| | | | SAND, clayey, silty, dry, plastic when moistened, hard, laminated to moderately bedded, very dark brown, light gray. | | | | | | | | | | | |
| 115 | | | | 541.1 | | | | | | | | | | 541.10 |
| | | | Total Borehole Depth = 115'. | | | | | | | | | | | |

Field Tests | Laboratory Tests

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# LOG OF BORING NO. PWCG-8

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/12/2023 Northing (Site Grid): 7704.53
Boring End Date: 7/13/2023 Easting (Site Grid): 10079.08
Ground Surface Elevation at Time of Drilling: 609.40 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 612.35 ft-msl
▼ = Static Potentiometric Surface Elevation: 459.71 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 601.4 ft-msl | 569.4 ft-msl | 461.4 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Field Tests / Laboratory Tests | | | | | | | | | | | |
| 5 | SC | | SAND, silty, with ironstone, dry, non-plastic when moistened, stiff to very stiff, laminated to thinly bedded, dark-reddish-brown & reddish-yellow, with iron staining. | 603.4 | | | | | | | | | | 607.40 |
| | | | SAND, silty, clayey, moist, non-plastic, stiff, laminated, yellowish-red & dark-reddish-brown. - 10" light-gray sand seam at 7'. | 601.4 | 1.5 | | | | | | | | | ▽ |
| 10 | SC | | SAND, silty (elastic), wet, non-plastic to low plasticity, very stiff, laminated, dark-brown & light-gray. | | 2.5 | | | | | | | | | |
| | | | | | 3.25 | | | | | | | | | |
| 15 | SC | | | 593.4 | 3.0 | | 17.1 | 19 | | | | | | |
| | | | CLAY, silty, sandy, dry to moist, low plasticity, hard, laminated, dark-brown & light-gray. | | 4.5+ | | | | | | | | | |
| 20 | SC | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 25 | SC | | | | 3.5 | | | | | | | | | |
| | | | | | 2.0 | | | | | | | | | |
| | SC | | | | 2.75 | | | | | | | | | |
| | | | | | 4.25 | | | | | | | | | |

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# LOG OF BORING NO. PWCG-8

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/12/2023 Northing (Site Grid): 7704.53
Boring End Date: 7/13/2023 Easting (Site Grid): 10079.08
Ground Surface Elevation at Time of Drilling: 609.40 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 612.35 ft-msl
▼ = Static Potentiometric Surface Elevation: 459.71 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 601.4 ft-msl | 569.4 ft-msl | 461.4 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, silty, sandy, dry to moist (continued). - with trace lignite laminations below 31'. | | 4.0 | | | | | | | | | |
| 35 | SC | | | 572.4 | 4.5+ | | | | | | | | | |
| | | | SAND, silty, clayey, moist, non-plastic to low plasticity, hard, laminated, dark-gray & dark-brown. | | 2.0 | | | | | | | | | |
| 40 | SC | | | 569.4 | 4.5+ | | | | | | | | | ▽ |
| | | | - becomes wet with elastic silt below 40'. | | 4.5 | | | | | | | | | |
| 45 | SC | | | 564.4 | | | | | | | | | | |
| | | | SAND, silty (elastic), interbedded, wet, non-plastic, very stiff, laminated to thinly bedded, greenish-gray & brown. | | 2.5 | | | | | | | | | |
| 50 | SC | | | | 2.5 | | | | | | | | | |
| | | | | 556.4 | 2.0 | | | | | | | | | |
| | | | SAND, silty, clayey, moist to wet, low plasticity, hard, laminated, greenish-gray & very-dark-brown, glauconitic. | | 4.5+ | | | | | | | | | |
| 55 | SC | | | | | | | | | | | | | |
| | | | - clay content decreasing with depth below 58'. | | 4.5+ | | | | | | | | | |
| | SC | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-8

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/12/2023 Northing (Site Grid): 7704.53
Boring End Date: 7/13/2023 Easting (Site Grid): 10079.08
Ground Surface Elevation at Time of Drilling: 609.40 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 612.35 ft-msl
▼ = Static Potentiometric Surface Elevation: 459.71 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 601.4 ft-msl | 569.4 ft-msl | 461.4 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, moist to wet (continued) - becomes brown & dark-brown below 61'. | | 1.75 | | | | | | | | | |
| 65 | SC | | | | 1.5 | | | | | | | | | C |
| | | | | 542.4 | | | | | | | | | | |
| | | | CLAY, sandy, silty, dry to moist, low to medium plasticity, hard, laminated, very dark brown, light gray. | | 4.5+ | | | | | | | | | |
| 70 | SC | | - becomes moist below 71'. | | 4.5+ | | | | | | | | | |
| 75 | SC | | - becomes dark-gray below 75'. | | 4.5+ | | | | | | | | | |
| 80 | SC | | | | 4.5+ | | | | | | | | | |
| 85 | SC | | - becomes interbedded below 85'. | | 4.5+ | | | | | | | | | |
| | SC | | | | 4.5+ | | | | | | | | | |

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# LOG OF BORING NO. PWCG-8

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



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▼ = Static Potentiometric Surface Elevation: 459.71 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 601.4 ft-msl | 569.4 ft-msl | 461.4 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, sandy, silty, dry to moist (continued). | | | | | | | | | | | |
| 95 | SC | | | | 4.5+ | | | | | | | | | |
| | | | - 2" silt seam at 98.5'. | | 4.5+ | | | | | | | | | |
| 100 | SC | | | | 4.5+ | | | | | | | | | |
| | | | - 4" sand seam at 102.5'. | | | | | | | | | | | |
| | | | - becomes dry below 104'. | | 4.5+ | | | | | | | | | |
| 105 | SC | | | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | 499.40 |
| 110 | SC | | | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 115 | SC | | | | | | | | | | | | | |
| | | | | 491.9 | 4.5+ | | | | | | | | | |
| | SC | | SAND, silty, clayey, moist, non-plastic, stiff to very stiff, laminated, light-gray & dark-gray. | | 1.5 | | | | | | | | | |

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# LOG OF BORING NO. PWCG-8

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



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Boring End Date: 7/13/2023 Easting (Site Grid): 10079.08
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Top of PVC Piezometer Casing Datum Elevation: 612.35 ft-msl
▼ = Static Potentiometric Surface Elevation: 459.71 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 601.4 ft-msl | 569.4 ft-msl | 461.4 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, moist (continued). | | | | | | | | | | | |
| | | | - 2" sandy clay seam at 121'. | | 1.5 | | | | | | | | | |
| 125 | SC | | | | | | | | | | | | | |
| | | | - 10" clay seam at 127'. | | 4.5+ | | | | | | | | | |
| 130 | SC | | | | 1.5 | | | | | | | | | |
| 135 | SC | | | | 2.0 | | | | | | | | | |
| 140 | SC | | | | 1.5 | | | | | | | | | |
| | | | | | 2.0 | | | | | | | | | |
| 145 | SC | | | | | | | | | | | | | |
| | | | | 461.4 | | | | | | | | | | |
| | SC | | - becomes moist to wet below 148'. | | 1.5<br>2.5 | | | | | | | | | |

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Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/12/2023 Northing (Site Grid): 7704.53
Boring End Date: 7/13/2023 Easting (Site Grid): 10079.08
Ground Surface Elevation at Time of Drilling: 609.40 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 612.35 ft-msl
▼ = Static Potentiometric Surface Elevation: 459.71 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 601.4 ft-msl | 569.4 ft-msl | 461.4 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

Field Tests | Laboratory Tests

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, wet (continued). | | | | | | | | | | | |
| 155 | SC | | - 4" clay seam at 156.5'. | | 4.5+ | | | | | | | | | |
| | | | - 6" clay seam at 159'. | | | | | | | | | | | |
| 160 | SC | | | 449.4 | 3.5 | | | | | | | | | |
| | | | SAND, silty, wet, non-plastic, stiff to very stiff, laminated, light-gray. | | 1.5 | | | | | | | | | |
| 165 | SC | | - with trace lignite below 167'. | | | | | | | | | | | 444.40 |
| | | | | | 3.0 | | | | | | | | | |
| 170 | SC | | | | 1.5 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| 175 | SC | | | | 1.5 | | | | | | | | | 433.40 |
| | SC | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-8

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/12/2023 Northing (Site Grid): 7704.53
Boring End Date: 7/13/2023 Easting (Site Grid): 10079.08
Ground Surface Elevation at Time of Drilling: 609.40 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 612.35 ft-msl
▼ = Static Potentiometric Surface Elevation: 459.71 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 601.4 ft-msl | 569.4 ft-msl | 461.4 ft-msl | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, wet (continued). | | 2.5 | | | | | | | | | |
| 185 | SC | | | | 1.5 | | | | | | | | | |
| | | | - with no lignite below 187'. | | 2.0 | | | | | | | | | |
| 190 | SC | | | | 1.5 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| 195 | SC | | | | 1.25 | | 24.1 | 23 | 109.7 | NL | NP | | $7.3 \times 10^{-6}$ | 413.40 |
| | SC | | | 409.4 | | | | | | | | | | 411.40 |
| 200 | | | Total Borehole Depth = 200'. | | | | | | | | | | | 409.40 |
| 205 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/14/2023 Northing (Site Grid): 9761.40
Boring End Date: 7/16/2023 Easting (Site Grid): 10221.82
Ground Surface Elevation at Time of Drilling: 681.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.05 ft-msl
▼ = Static Potentiometric Surface Elevation: 460.07 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 652.7 ft-msl | 624.7 ft-msl | 577.7 ft-msl | 469.7 ft-msl |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | SC | | SAND, silty, clayey, interbedded, dry, non-plastic when moistened, loose, laminated to thinly bedded, yellowish-red & dark-red, with iron staining. | | | | | | | | | | | 679.70 |
| | | | | | 3.5 | | | | | | | | | |
| 5 | SC | | - with trace ironstone below 8'. | | | | | | | | | | | |
| | | | | 671.7 | | | | | | | | | | |
| 10 | SC | | CLAY, sandy, silty, with ironstone, interbedded and intermixed, moist, low to medium plasticity, very stiff, laminated to thinly bedded, yellowish-red & gray. | | 3.25 | | | | | | | | | |
| | | | | | 3.5 | | | | | | | | | |
| 15 | | | | 664.2 | | | | | | | | | | |
| | SC | | SAND, silty, clayey, dry, non-plastic when moistened, very stiff, laminated to thinly bedded, greenish-black & black, with organics. | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |
| | SC | | | | 3.0 | | | | | | | | | |
| 25 | | | | | | | | | | | | | | |
| | SC | | | 652.7 | | | | | | | | | | |
| | SC | | SAND, silty, clayey, interbedded, moist to wet, non-plastic to low plasticity, very stiff, laminated, greenish-black & brown. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/14/2023 Northing (Site Grid): 9761.40
Boring End Date: 7/16/2023 Easting (Site Grid): 10221.82
Ground Surface Elevation at Time of Drilling: 681.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.05 ft-msl
▼ = Static Potentiometric Surface Elevation: 460.07 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 652.7 ft-msl | 624.7 ft-msl | 577.7 ft-msl | 469.7 ft-msl |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, wet (continued). | | 3.0 | | | | | | | | | |
| | | | | | 3.5 | | | | | | | | | |
| 35 | SC | | | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | | | | 643.2 | | | | | | | | | | |
| | | | SILT, sandy, clayey, interbedded, dry to moist, non-plastic to low plasticity, very stiff, laminated, greenish-black & brown. | | 3.0 | | | | | | | | | |
| 40 | SC | | | | | | | | | | | | | |
| | | | - becomes moist below 44'. | | 3.0 | | | | | | | | | |
| 45 | SC | | | | | | | | | | | | | |
| | | | | | 3.5 | | | | | | | | | |
| 50 | SC | | | | | | | | | | | | | |
| | | | | 628.7 | | | | | | | | | | |
| | | | CLAY, silty, sandy, moist, low to medium plasticity, hard, laminated, very-dark-brown, brown, & black, with organics. | | 4.0 | | | | | | | | | |
| 55 | SC | | - with trace lignite laminations below 56.5'. | 624.7 | | | | | | | | | | ▽ |
| | | | SAND, silty (elastic), clayey, wet, non-plastic to low plasticity, very dense, laminated, very-dark-brown & brown. | | 4.0 | | | | | | | | | |
| | SC | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/14/2023 Northing (Site Grid): 9761.40
Boring End Date: 7/16/2023 Easting (Site Grid): 10221.82
Ground Surface Elevation at Time of Drilling: 681.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.05 ft-msl
▼ = Static Potentiometric Surface Elevation: 460.07 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 652.7 ft-msl | 624.7 ft-msl | 577.7 ft-msl | 469.7 ft-msl |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, wet (continued). | | 1.5 | | | | | | | | | |
| 65 | SC | | | 614.7 | | | | | | | | | | |
| | | | SILT, clayey, sandy, interbedded, moist, low plasticity, very stiff, laminated, very-dark-brown & brown. | | 4.5+ | | | | | | | | | |
| 70 | SC | | | 609.7 | 2.5 | | | | | | | | | |
| | | | CLAY, silty, sandy, interbedded, moist, low to medium plasticity, very stiff, laminated, very-dark-brown & brown. | | 3.5 | | | | | | | | | |
| 75 | SC | | | 604.7 | 4.5+ | | | | | | | | | |
| | | | SILT, sandy, clayey, interbedded, moist, non-plastic, very stiff, laminated, very-dark-brown & brown. | | 3.0 | | | | | | | | | |
| 80 | SC | | | | 2.5 | | | | | | | | | |
| 85 | SC | | - becomes moist below 87'. | | | | | | | | | | | |
| | SC | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



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▼ = Static Potentiometric Surface Elevation: 460.07 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 652.7 ft-msl | 624.7 ft-msl | 577.7 ft-msl | 469.7 ft-msl |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95 | SC | | SILT, sandy, clayey, moist (continued). | | | | | | | | | | | |
| | | | - 1' clay seam at 97'. | 583.7 | 4.5+ | | | | | | | | | |
| 100 | SC | | CLAY, sandy, silty, interbedded, moist, low plasticity, very stiff, laminated to very thinly bedded, greenish-gray & brown, glaucanitic. | 577.7 | | | | | | | | | | |
| 105 | SC | | SAND, silty (elastic), wet, non-plastic, very stiff, brown. | | 1.75 | | | | | | | | | |
| 110 | SC | | | | 1.5 | | | | | | | | | |
| 115 | SC | | | | 1.5 | | | | | | | | | |
| | SC | | | | 2.0 | | | | | | | | | |

ROLF - PIEZOS ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/19/24

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# LOG OF BORING NO. PWCG-9A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/14/2023 Northing (Site Grid): 9761.40
Boring End Date: 7/16/2023 Easting (Site Grid): 10221.82
Ground Surface Elevation at Time of Drilling: 681.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.05 ft-msl
▼ = Static Potentiometric Surface Elevation: 460.07 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 652.7 ft-msl | 624.7 ft-msl | 577.7 ft-msl | 469.7 ft-msl |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, wet (continued). | | 2.5 | | | | | | | | | |
| | | | | 557.7 | | | | | | | | | | |
| 125 | SC | | CLAY, silty, sandy, interbedded and intermixed, moist, medium to high plasticity, hard, laminated to moderately bedded, brown & light-gray. | | 4.5+ | | | | | | | | | |
| | | | | | 4.25 | | | | | | | | | |
| | | | | | | | 99.4 | 24 | 98.8 | 58 | 21 | 37 | $7.6x10^{-7}$ | |
| 130 | SC | | | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 135 | SC | | | | 3.5 | | | | | | | | | |
| | | | | | 4.5 | | | | | | | | | |
| 140 | SC | | | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 145 | SC | | - 4" sand seam at 146'. | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | SC | | | 531.7 | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/14/2023 Northing (Site Grid): 9761.40
Boring End Date: 7/16/2023 Easting (Site Grid): 10221.82
Ground Surface Elevation at Time of Drilling: 681.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.05 ft-msl
▼ = Static Potentiometric Surface Elevation: 460.07 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 652.7 ft-msl | 624.7 ft-msl | 577.7 ft-msl | 469.7 ft-msl |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, sitly, sandy, dry, plastic when moistened, hard, laminated, dark-gray & brown. | | 4.5+ | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 155 | SC | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 160 | SC | | | 519.7 | 4.5+ | | | | | | | | | |
| | | | SAND, clayey, silty, moist, non-plastic to low plasticity, very stiff, laminated to thinly bedded, light-gray & very-dark-brown. | | 2.5 | | | | | | | | | |
| 165 | SC | | | | 2.5 | | | | | | | | | |
| | | | | | 3.5 | | | | | | | | | |
| 170 | SC | | | | 3.0 | | | | | | | | | |
| | | | - becomes light-gray & dark-gray below 174'. | | | | | | | | | | | |
| 175 | SC | | - becomes dry below 176'. | | 4.5+ | | | | | | | | | |
| | | | | 502.7 | | | | | | | | | | |
| | SC | | CLAY, sandy, silty, dry, plastic when moistened, hard, laminated to thinly bedded, light-gray & very-dark-brown. | | 4.5+ | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/14/2023 Northing (Site Grid): 9761.40
Boring End Date: 7/16/2023 Easting (Site Grid): 10221.82
Ground Surface Elevation at Time of Drilling: 681.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.05 ft-msl
▼ = Static Potentiometric Surface Elevation: 460.07 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 652.7 ft-msl | 624.7 ft-msl | 577.7 ft-msl | 469.7 ft-msl |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, sandy, silty, dry (continued). | | | | | | | | | | | 501.70 |
| 185 | SC | | | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| 190 | SC | | | | 3.5 | | | | | | | | | |
| | | | | 487.7 | | | | | | | | | | |
| 195 | SC | | SAND, silty, moist, non-plastic, hard, light-gray, moisture content increasing gradually with depth. | | 1.5 | | | | | | | | | |
| 200 | SC | | | | 1.5 | | | | | | | | | |
| 205 | SC | | | | 1.5 | | | | | | | | | 476.70 |
| | SC | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/14/2023 Northing (Site Grid): 9761.40
Boring End Date: 7/16/2023 Easting (Site Grid): 10221.82
Ground Surface Elevation at Time of Drilling: 681.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.05 ft-msl
▼ = Static Potentiometric Surface Elevation: 460.07 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 652.7 ft-msl | 624.7 ft-msl | 577.7 ft-msl | 469.7 ft-msl |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, moist (continued). | | | | | | | | | | | |
| | | | - becomes wet below 212'. | 469.7 | | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| 215 | SC | | | | | | | | | | | | | 466.70 |
| 220 | SC | | | | | | | | | | | | | |
| 225 | SC | | | | | | | | | | | | | |
| 230 | SC | | | | | | | | | | | | | |
| 235 | SC | | | | | | | | | | | | | 446.70 |
| | SC | | | | | | | | | | | | | 444.70 |

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# LOG OF BORING NO. PWCG-9A

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/14/2023 Northing (Site Grid): 9761.40
Boring End Date: 7/16/2023 Easting (Site Grid): 10221.82
Ground Surface Elevation at Time of Drilling: 681.70 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.05 ft-msl
▼ = Static Potentiometric Surface Elevation: 460.07 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 652.7 ft-msl | 624.7 ft-msl | 577.7 ft-msl | 469.7 ft-msl |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, wet (continued). | 439.7 | | | | | | | | | | 439.70 |
| | | | Total Borehole Depth = 242'. | | | | | | | | | | | |
| 245 | | | | | | | | | | | | | | |
| 250 | | | | | | | | | | | | | | |
| 255 | | | | | | | | | | | | | | |
| 260 | | | | | | | | | | | | | | |
| 265 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/16/2023 Northing (Site Grid): 9752.08
Boring End Date: 7/16/2023 Easting (Site Grid): 10225.50
Ground Surface Elevation at Time of Drilling: 682.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.22 ft-msl
▼ = Static Potentiometric Surface Elevation: 581.44 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 653.3 ft-msl | 625.3 ft-msl | 578.3 ft-msl | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, interbedded, dry, non-plastic when moistened, loose, laminated to thinly bedded, yellowish-red & dark-red, with iron staining. | | | | | | | | | | | 680.30 |
| 5 | SC | | | | | | | | | | | | | |
| | | | - with trace ironstone below 8'. | 672.3 | | | | | | | | | | |
| 10 | | | CLAY, sandy, silty, with ironstone, interbedded and intermixed, moist, low to medium plasticity, very stiff, laminated to thinly bedded, yellowish-red & gray. | | | | | | | | | | | |
| 15 | SC | | | 664.8 | | | | | | | | | | |
| | | | SAND, silty, clayey, dry, non-plastic when moistened, very stiff, laminated to thinly bedded, greenish-black & black, with organics. | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |
| 25 | SC | | | 653.3 | | | | | | | | | | ▽ |
| | | | SAND, silty, clayey, interbedded, moist to wet, non-plastic to low plasticity, very stiff, laminated, greenish-black & brown. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/16/2023 Northing (Site Grid): 9752.08
Boring End Date: 7/16/2023 Easting (Site Grid): 10225.50
Ground Surface Elevation at Time of Drilling: 682.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.22 ft-msl
▼ = Static Potentiometric Surface Elevation: 581.44 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 653.3 ft-msl | 625.3 ft-msl | 578.3 ft-msl | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, wet (continued). | | | | | | | | | | | |
| 35 | SC | | | 643.8 | | | | | | | | | | |
| 40 | SC | | SILT, sandy, clayey, interbedded, dry to moist, non-plastic to low plasticity, very stiff, laminated, greenish-black & brown.<br>- becomes moist below 44'. | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | |
| 50 | | | | 629.3 | | | | | | | | | | |
| 55 | SC | | CLAY, silty, sandy, moist, low to medium plasticity, hard, laminated, very-dark-brown, brown, & black, with organics.<br>- with trace lignite laminations below 56.5'. | 625.3 | | | | | | | | | | |
| | | | SAND, silty (elastic), clayey, wet, non-plastic to low plasticity, very dense, laminated, very-dark-brown & brown. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/16/2023 Northing (Site Grid): 9752.08
Boring End Date: 7/16/2023 Easting (Site Grid): 10225.50
Ground Surface Elevation at Time of Drilling: 682.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.22 ft-msl
▼ = Static Potentiometric Surface Elevation: 581.44 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 653.3 ft-msl | 625.3 ft-msl | 578.3 ft-msl | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, wet (continued). | | | | | | | | | | | |
| 65 | SC | | | 615.3 | | | | | | | | | | |
| | | | SILT, clayey, sandy, interbedded, moist, low plasticity, very stiff, laminated, very-dark-brown & brown. | | | | | | | | | | | |
| 70 | | | | 610.3 | | | | | | | | | | |
| | | | CLAY, silty, sandy, interbedded, moist, low to medium plasticity, very stiff, laminated, very-dark-brown & brown. | | | | | | | | | | | |
| 75 | SC | | | 605.3 | | | | | | | | | | 607.30 |
| | | | SILT, sandy, clayey, interbedded, moist, non-plastic, very stiff, laminated, very-dark-brown & brown. | | | | | | | | | | | |
| 80 | | | | | | | | | | | | | | |
| 85 | SC | | - becomes moist below 87'. | | | | | | | | | | | |

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# LOG OF BORING NO. PWCG-9B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/16/2023 Northing (Site Grid): 9752.08
Boring End Date: 7/16/2023 Easting (Site Grid): 10225.50
Ground Surface Elevation at Time of Drilling: 682.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.22 ft-msl
▼ = Static Potentiometric Surface Elevation: 581.44 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 653.3 ft-msl | 625.3 ft-msl | 578.3 ft-msl | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SILT, sandy, clayey, moist (continued). | | | | | | | | | | | |
| 95 | SC | | - 1' clay seam at 97'. | 584.3 | | | | | | | | | | |
| 100 | | | CLAY, sandy, silty, interbedded, moist, low plasticity, very stiff, laminated to very thinly bedded, greenish-gray & brown, glaucanitic. | 578.3 | | | | | | | | | | |
| 105 | SC | | SAND, silty (elastic), wet, non-plastic, very stiff, brown. | | | | | | | | | | | 577.30 |
| 110 | | | | | | | | | | | | | | 570.30 |
| 115 | SC | | | | | | | | | | | | | |

Field Tests | Laboratory Tests

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# LOG OF BORING NO. PWCG-9B

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/16/2023 Northing (Site Grid): 9752.08
Boring End Date: 7/16/2023 Easting (Site Grid): 10225.50
Ground Surface Elevation at Time of Drilling: 682.30 ft-msl
Top of PVC Piezometer Casing Datum Elevation: 685.22 ft-msl
▼ = Static Potentiometric Surface Elevation: 581.44 ft-msl

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 653.3 ft-msl | 625.3 ft-msl | 578.3 ft-msl | Not Observed |

Remarks: Borehole advanced via sonic drilling methods. Static water level gauged September 2023.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Groundwater Piezometer Construction Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, wet (continued). | | | | | | | | | | | 560.30 |
| | SC | | | 558.3 | | | | | | | | | | 558.30 |
| 125 | | | CLAY, silty, sandy, interbedded and intermixed, moist, medium to high plasticity, hard, laminated to moderately bedded, brown & light-gray. | 557.3 | | | | | | | | | | |
| | | | Total Borehole Depth = 125'. | | | | | | | | | | | |
| 130 | | | | | | | | | | | | | | |
| 135 | | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | |
| 145 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. WCG-10

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/17/2023 Northing (Site Grid): 9456.67
Boring End Date: 7/19/2023 Easting (Site Grid): 11472.02
Ground Surface Elevation at Time of Drilling: 632.20 ft-msl
Top of PVC Piezometer Casing Datum Elevation: ft-msl
▼ = Static Potentiometric Surface Elevation: Not Observed

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 615.2 ft-msl | 580.2 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods and plugged with high solids bentonite grout via tremie pipe upon completion.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Borehole Plugging Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | FILL (roadbase), silt, gravel, dry, loose, white. | 631.2 | | | | | | | | | | |
| | | | SILT, clayey, sandy, interbedded, dry, plastic when moistened, firm, laminated, black. | 629.2 | | | | | | | | | | |
| | | | SAND, clayey, silty, with ironstone, moist, non-plastic, soft to firm, laminated, brown. | 627.2 | | | | | | | | | | |
| 5 | | | CLAY, sandy, silty, interbedded, moist, low plasticity, very stiff, laminated, greenish-gray, with iron staining. | 625.2 | 2.0 | | | | | | | | | |
| | SC | | CLAY, silty, sandy, with ironstone, inerbedded, moist, medium to high plasticity, very stiff, laminated, very-dark-brown & greenish-gray, glauconitic, with iron staining. | | 2.0 | | | | | | | | | |
| 10 | | | | | 3.0 | | 39.5 | | | 58 | 32 | 26 | | |
| 15 | | | | | 2.5 | | | | | | | | | |
| | | | | 615.2 | 2.0 | | | | | | | | | ▽ |
| | SPT | | SAND, silty, clayey, wet, non-plastic to low plasticity, very loose, very stiff, laminated, dark-gray & greenish-black, with iron staining. | | | 2<br>3<br>4 | | | | | | | | |
| 20 | | | | 611.2 | 2.25 | | | | | | | | | |
| | SC | | CLAY, silty, sandy, with ironstone, moist, low to medium plasticity, loose to medium dense, no visible bedding, greenish-black, with iron staining. | | | | | | | | | | | |
| 25 | | | | | | | 94.5 | 24 | | | | | | |
| | | | | | 2.5 | | | | | | | | | |
| | | | | | 3.0 | | | | | | | | | |

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# LOG OF BORING NO. WCG-10

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/17/2023 Northing (Site Grid): 9456.67
Boring End Date: 7/19/2023 Easting (Site Grid): 11472.02
Ground Surface Elevation at Time of Drilling: 632.20 ft-msl
Top of PVC Piezometer Casing Datum Elevation: ft-msl
▼ = Static Potentiometric Surface Elevation: Not Observed

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 615.2 ft-msl | 580.2 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods and plugged with high solids bentonite grout via tremie pipe upon completion.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Borehole Plugging Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35 | SC | | CLAY, silty, sandy, moist (continued). | | 3.0 | | | | | | | | | |
| | SPT | | | 593.2 | | 9<br>26<br>13 | | | | | | | | |
| 40 | SC | | SAND, silty, trace clay, with ironstone, moist, non-plastic, medium dense to dense, laminated, brown, dark-reddish-brown, red & light-gray, with iron staining. | | 4.5+ | | | | | | | | | |
| 45 | | | | | 3.5 | | | | | | | | | |
| 50 | | | | 580.2 | | | | | | | | | | ▽ |
| | SC | | - becomes wet below 52'. | | | | 28.3 | 22 | | | | | | |
| 55 | | | | | 2.5 | | | | | | | | | |
| | SPT | | | | | 11<br>27<br>44 | | | | | | | | |
| | | | | | 2.5 | | | | | | | | | |

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Top of PVC Piezometer Casing Datum Elevation: ft-msl
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▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 615.2 ft-msl | 580.2 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods and plugged with high solids bentonite grout via tremie pipe upon completion.

Field Tests | Laboratory Tests

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Borehole Plugging Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 65 | SC | | SAND, silty, wet (continued). | 566.2 | 2.5 | | | | | | | | | |
| | | | SAND, clayey, silty, dry to moist, non-plastic to medium plasticity, very stiff to hard, no visible bedding, dark-gray & light-gray. | | 2.5 | | | | | | | | | |
| 70 | | | | | 2.5 | | | | | | | | | |
| | SC | | | | 3.5 | | | | | | | | | |
| 75 | | | - becomes laminated below 77'. | | 1.5 | | | | | | | | | |
| | SPT | | | | 4.5+ | 8<br>16<br>27 | | | | | | | | |
| 80 | | | | | 4.5+ | | | | | | | | | |
| | SC | | - becomes dark-gray, light-gray, brown, & very-dark-brown below 84.5'. | | | | | | | | | | | |
| 85 | | | | | 4.5+ | | | | | | | | | |

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Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/17/2023 Northing (Site Grid): 9456.67
Boring End Date: 7/19/2023 Easting (Site Grid): 11472.02
Ground Surface Elevation at Time of Drilling: 632.20 ft-msl
Top of PVC Piezometer Casing Datum Elevation: ft-msl
▼ = Static Potentiometric Surface Elevation: Not Observed

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 615.2 ft-msl | 580.2 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods and plugged with high solids bentonite grout via tremie pipe upon completion.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Borehole Plugging Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, clayey, silty, dry to moist (continued). | 540.2 | | | | | | | | | | |
| | SC | | SAND, clayey, silty, moist, non-plastic to low plasticity, hard, laminated, brown & light-gray. | 537.7 | 4.5+ | | | | | | | | | |
| 95 | | | CLAY, silty, sandy, interbedded, dry to moist, medium to high plasticity, very stiff to hard, laminated to thinly bedded, dark-gray & very-dark-brown. | | 4.5+<br>3.5 | | 91.6 | 32 | 90.8 | 64 | 22 | 42 | $4.5 \times 10^{-8}$ | |
| | | | | 532.2 | | | | | | | | | | |
| 100 | SC | | CLAY, silty, sandy, interbedded, moist, medium to high plasticity, very dense, laminated, dark gray, light-gray, very-dark-brown, & black. | | 4.5+<br>4.5+ | | 92.9 | 17 | 96.1 | 44 | 25 | 19 | | |
| 105 | SPT | | | | | 50/6" | | | | | | | | |
| | | | | 523.2 | | | | | | | | | | |
| 110 | | | SAND, silty, clayey, interbedded, moist, non-plastic to low plasticity, firm to hard, laminated, light-gray & dark-gray, very-dark-brown, & black. | | 1.5<br>2.5<br>4.0 | | | | | | | | | |
| 115 | SC | | | | 3.25<br>4.25<br>3.0<br>2.0 | | | | | | | | | |

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# LOG OF BORING NO. WCG-10

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/17/2023 Northing (Site Grid): 9456.67
Boring End Date: 7/19/2023 Easting (Site Grid): 11472.02
Ground Surface Elevation at Time of Drilling: 632.20 ft-msl
Top of PVC Piezometer Casing Datum Elevation: ft-msl
▼ = Static Potentiometric Surface Elevation: Not Observed

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 615.2 ft-msl | 580.2 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods and plugged with high solids bentonite grout via tremie pipe upon completion.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Borehole Plugging Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, moist (continued). | | 1.5 | | | | | | | | | |
| | | | | | 1.5 | | | | | | | | | |
| 125 | | | - becomes dry below 125'. | | | | | | | | | | | |
| | SPT | | | 504.2 | | 24<br>34<br>50/5" | | | | | | | | |
| | | | CLAY, silty, sandy, interbedded, moist, medium to high plasticity, medium dense to very dense, laminated, light-gray & dark-gray, very-dark-brown, & black. | | 3.5 | | | | | | | | | |
| 130 | | | | 500.2 | | | | | | | | | | |
| | | | SAND, silty, dry, non-plastic when moistened, very dense, no visible bedding, light-gray & brown with black mottling. | | 1.5 | | 77.3 | 17 | | | | | | |
| 135 | SC | | | | | | | | | | | | | |
| 140 | | | | | | | | | | | | | | |
| 145 | SPT | | | | | 50/3" | | | | | | | | |

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Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/17/2023 Northing (Site Grid): 9456.67
Boring End Date: 7/19/2023 Easting (Site Grid): 11472.02
Ground Surface Elevation at Time of Drilling: 632.20 ft-msl
Top of PVC Piezometer Casing Datum Elevation: ft-msl
▼ = Static Potentiometric Surface Elevation: Not Observed

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 615.2 ft-msl | 580.2 ft-msl | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods and plugged with high solids bentonite grout via tremie pipe upon completion.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Borehole Plugging Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 155 | SC | | SAND, silty, dry (continued). | | 1.5 | | | | | | | | | |
| | | | | 474.2 | | | | | | | | | | |
| 160 | | | SAND, silty, moist, non-plastic, loose to medium dense, laminated, light-gray with black mottling. | | 1.0 | | | | | | | | | |
| 165 | SPT | | | 465.7 | | 7<br>12<br>21 | | | | | | | | 465.70 |
| | | | Total Borehole Depth = 166.5'. | | | | | | | | | | | |
| 170 | | | | | | | | | | | | | | |
| 175 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. WCG-11

Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/16/2023 Northing (Site Grid): 9484.83
Boring End Date: 7/17/2023 Easting (Site Grid): 12036.77
Ground Surface Elevation at Time of Drilling: 576.60 ft-msl
Top of PVC Piezometer Casing Datum Elevation: ft-msl
▼ = Static Potentiometric Surface Elevation: Not Observed

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 571.6 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods and plugged with high solids bentonite grout via tremie pipe upon completion.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Hand Penetrometer Test (tsf) | Penetration Blows/6-inches | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Vertical Hydraulic Permeability (cm/sec) | Borehole Plugging Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SAND, silty, clayey, with ironstone, dry, non-plastic to low plasticity when moistened, hard, laminated, dark-red & yellowish-red, with iron stains & roots. | | 4.5 | | | | | | | | | |
| | | | | | 2.5 | | | | | | | | | |
| 5 | SC | | | 571.6 | | | | | | | | | | ▽ |
| | | | - becomes wet and reddish-brown below 5'. | | | | | | | | | | | |
| | | | | 567.6 | | | | | | | | | | |
| | | | SAND, silty (elastic), moist to wet, non-plastic, stiff, laminated, yellowish brown, with iron stains. | | 1.5 | | | | | | | | | |
| 10 | | | - with very-dark-red mottling below 11.5'. | | 1.5 | | | | | | | | | |
| | SC | | - becomes gray below 13.5'. | | 1.5 | | | | | | | | | |
| 15 | | | | | 2.0 | | | | | | | | | |
| | | | | 559.6 | 2.0 | | | | | | | | | |
| | SPT | | CLAY, silty, sandy, interbedded, moist, low to medium plasticity, loose to medium dense, laminated to very thinly bedded, light-gray & dark-gray. | | 4.5 | 9<br>14<br>16 | | | | | | | | |
| 20 | | | | | 4.5+ | | | | | | | | | |
| | SC | | | | 3.5 | | 94.0 | 24 | 62.6 | 43 | 17 | 26 | $3.1 \times 10^{-8}$ | |
| | | | | 551.6 | | | | | | | | | | |
| 25 | | | CLAY, silty, sandy, interbedded, moist, medium to high plasticity, loose to medium dense, laminated to thinly bedded, light-gray & dark-gray. | | 4.5+ | | | | | | | | | |
| | | | - 2.5" silt seam at 26'. | | | | | | | | | | | |
| | | | - 6" silt seam at 28'. | | | | | | | | | | | |
| | SC | | | | 4.5+ | | | | | | | | | |

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Weaver Consultants Group

Project Title: Royal Oaks LF - 2023 Subsurface Investigation

Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



Boring Start Date: 7/16/2023 Northing (Site Grid): 9484.83
Boring End Date: 7/17/2023 Easting (Site Grid): 12036.77
Ground Surface Elevation at Time of Drilling: 576.60 ft-msl
Top of PVC Piezometer Casing Datum Elevation: ft-msl
▼ = Static Potentiometric Surface Elevation: Not Observed

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 571.6 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods and plugged with high solids bentonite grout via tremie pipe upon completion.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Borehole Plugging Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | CLAY, silty, sandy, moist (continued). | | | | | | | | | | | |
| | | | | | 4.5+ | | | | | | | | | |
| | | | - 2" sand seam at 33'. | | | | | | | | | | | |
| 35 | SC | | | | | | | | | | | | | |
| | SPT | | | | 4.0 - 4.5 | 9<br>16<br>21 | | | | | | | | |
| 40 | SC | | | | | | | | | | | | | |
| | | | - 2" lignite seam at 43'. | | 4.5+ | | | | | | | | | |
| 45 | SC | | - 2" lignite seam at 45'. | | 4.5+ | | | | | | | | | |
| 50 | SC | | | | | | 91.0 | 21 | 97.9 | 53 | 28 | 25 | | |
| 55 | SC | | | | | | | | | | | | | |
| | SC | | SAND, clayey, silty, interbedded, moist, non-plastic to low plasticity, loose to medium dense, thin to moderately bedded, | 517.6 | | | | | | | | | | |

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Top of PVC Piezometer Casing Datum Elevation: ft-msl
▼ = Static Potentiometric Surface Elevation: Not Observed

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 571.6 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods and plugged with high solids bentonite grout via tremie pipe upon completion.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Borehole Plugging Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | light-gray & very-dark-brown. | | 2.0 - 2.5 | | | | | | | | | |
| 65 | SC | | - 6" sand seam at 64'.<br>- 1" lignite seam at 65'.<br>- 1" clay seam at 66'.<br>- 1' clay seam at 67'. | | 2.0<br>4.5 | | 49.5 | 21 | | | | | | |
| 70 | SC | | | | 2.0 | | | | | | | | | |
| 75 | SC | | - 1" lignite seam at 74'. | | 1.5 | | | | | | | | | |
| | SPT | | - 8" clay seam at 76.5'.<br>- becomes gray & light-gray below 77'. | | 4.5+ | 9<br>16<br>24 | | | | | | | | |
| 80 | SC | | CLAY, sandy, silty, interbedded, moist, medium to high plasticity, hard, laminated to moderately bedded, dark-gray & light-yellowish-brown, with yellowish-brown mottling.<br>- 8" clayey sand seam at 81'. | 497.1 | 4.0<br>4.5+ | | | | | | | | | |
| 85 | SC | | SAND, clayey, interbedded, moist, low plasticity, very stiff, laminated, light-yellowish-brown & yellowish-brown.<br>- 6" clay seam at 86.5'. | 493.6 | 2.0<br>4.5+ | | | | | | | | | |
| | SC | | SAND, silty, clayey, interbedded, moist, non-plastic, very dense, laminated, light-yellowish-brown & yellowish-brown. | 489.1 | | | | | | | | | | |

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Project No: 0120-076-11-106

Supervising Geologist: Aaron K. Evans, P.G.
Logging Geologists: C. Mink
Drilling Firm: Environmental Works



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Boring End Date: 7/17/2023 Easting (Site Grid): 12036.77
Ground Surface Elevation at Time of Drilling: 576.60 ft-msl
Top of PVC Piezometer Casing Datum Elevation: ft-msl
▼ = Static Potentiometric Surface Elevation: Not Observed

▽ = Groundwater Observed at Time of Drilling (uppermost elevation):

| First | Second | Third | Fourth |
|---|---|---|---|
| 571.6 ft-msl | Not Observed | Not Observed | Not Observed |

Remarks: Borehole advanced & continuously sampled via sonic drilling methods and plugged with high solids bentonite grout via tremie pipe upon completion.

| Depth (ft) | Sample Type and Interval | Graphic Log | Lithologic Description | FT-MSL | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/6-inches | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Vertical Hydraulic Permeability (cm/sec) | Borehole Plugging Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95 | SC | | SAND, silty, clayey, moist (continued). | | 1.5 | | | | | | | | | |
| | SPT | | | | | 50/3" | | | | | | | | |
| 100 | SC | | - becomes gray below 100'. | | 2.0 | | 34.1 | 9 | | | | | | |
| 105 | SC | | | 467.1 | | | | | | | | | | 467.10 |
| 110 | | | Total Borehole Depth = 109.5'. | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | | |

ROLF - BORING ONLY ROLF - PERMIT (2023).GPJ WCG FTW - MASTER GINT TEMPLATE.GDT 4/19/24

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# APPENDIX IIIG-C

# SITE GEOLOGIC DATA

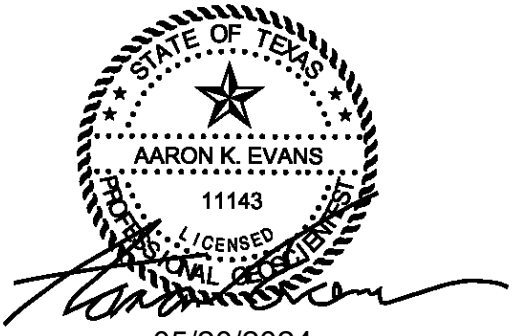


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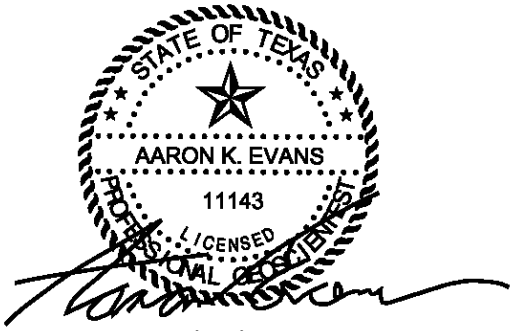
FIGURE IIIG-C-1 – Geologic Cross Section Index Map
FIGURE IIIG-C-2 – Geologic Cross Section A-A′
FIGURE IIIG-C-3 – Geologic Cross Section B-B′
FIGURE IIIG-C-4 – Geologic Cross Section C-C′
FIGURE IIIG-C-5 – Geologic Cross Section D-D′
FIGURE IIIG-C-6 – Geologic Cross Section E-E′
FIGURE IIIG-C-7 – Geologic Cross Section F-F′
FIGURE IIIG-C-8 – Geologic Cross Section G-G’

1994 Geologic Cross Sections by Groundwater Technologies IIIG-C-9

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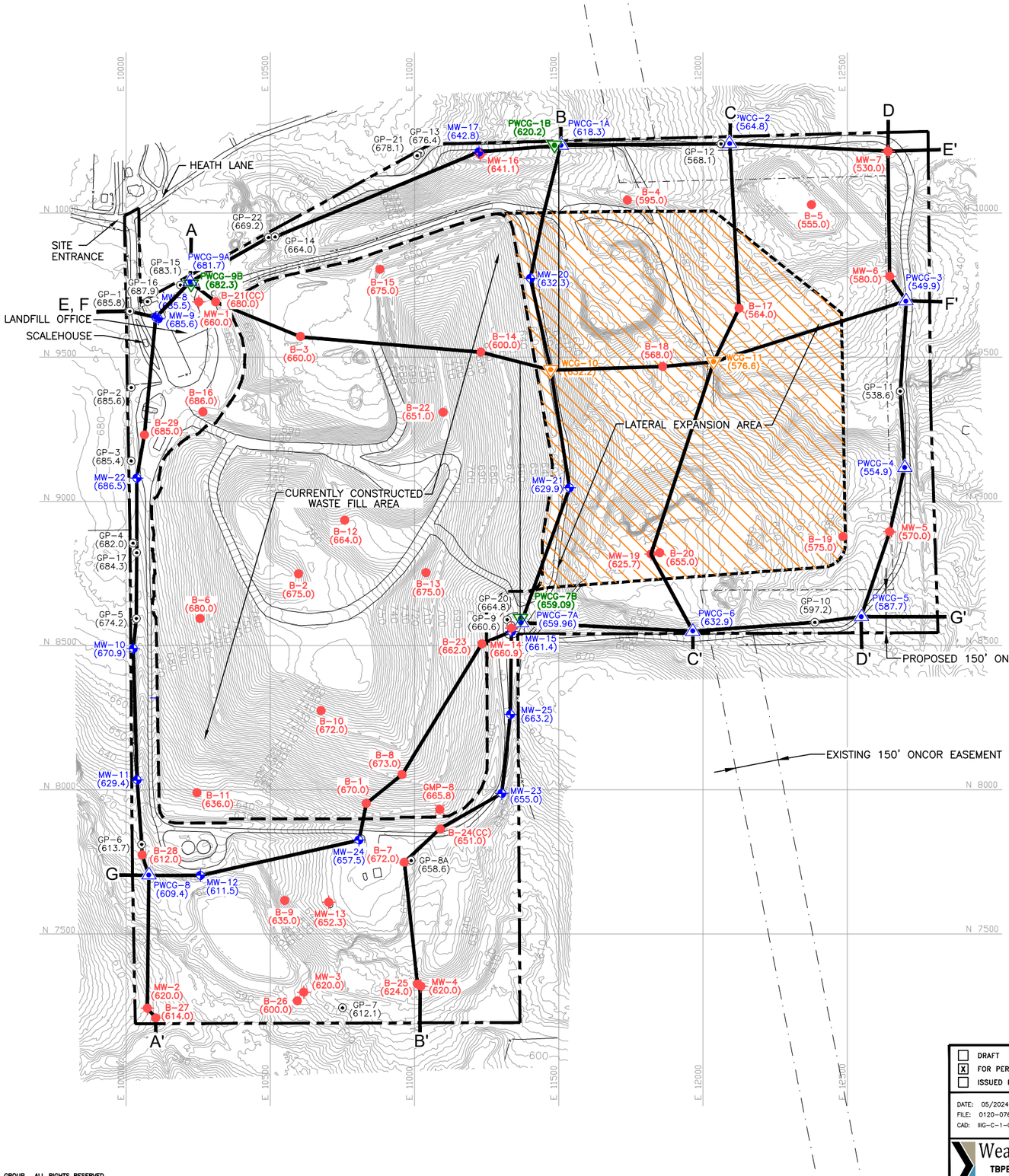

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LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- B-3 (660.0) — PREVIOUSLY ADVANCED BOREHOLE LOCATION
- MW-1 (661.0) — FORMER GROUNDWATER MONITOR WELL LOCATION
- GP-8 (666.0) — FORMER GAS MONITOR PROBE LOCATION
- MW-25 (663.2) — EXISTING GROUNDWATER MONITOR WELL LOCATION
- GP-1 (686.0) — EXISTING GAS MONITOR PROBE LOCATION
- PWCG-1A (618.3) — 2023 DEEP EXPANSION BOREHOLE WITH PIEZOMETER
- PWCG-1B (620.2) — 2023 SHALLOW EXPANSION BOREHOLE WITH PIEZOMETER
- WCG-10 (632.2) — 2023 EXPANSION BOREHOLE
- A — A' — GEOLOGIC CROSS SECTION LOCATION

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. FORMER BOREHOLE, GROUNDWATER MONITOR WELL, AND GAS MONITOR PROBE LOCATION COORDINATES OBTAINED FROM PREVIOUS SUBSURFACE INVESTIGATION AND INSTALLATION REPORT LITHOLOGIC LOGS, SUMMARY TABLES, AND DRAWINGS.
3. EXISTING GROUNDWATER MONITOR WELL AND 2023 EXPANSION BOREHOLE LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
4. GROUND SURFACE ELEVATION AT TIME OF DRILLING POSTED AT EACH BOREHOLE LOCATION IN FT-MSL.

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DESIGN BY: DCS
REVIEWED BY: AKE

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PINE HILL FARMS LANDFILL TX, LP

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# MAJOR PERMIT AMENDMENT
## GEOLOGIC CROSS-SECTION LOCATION MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-C-1

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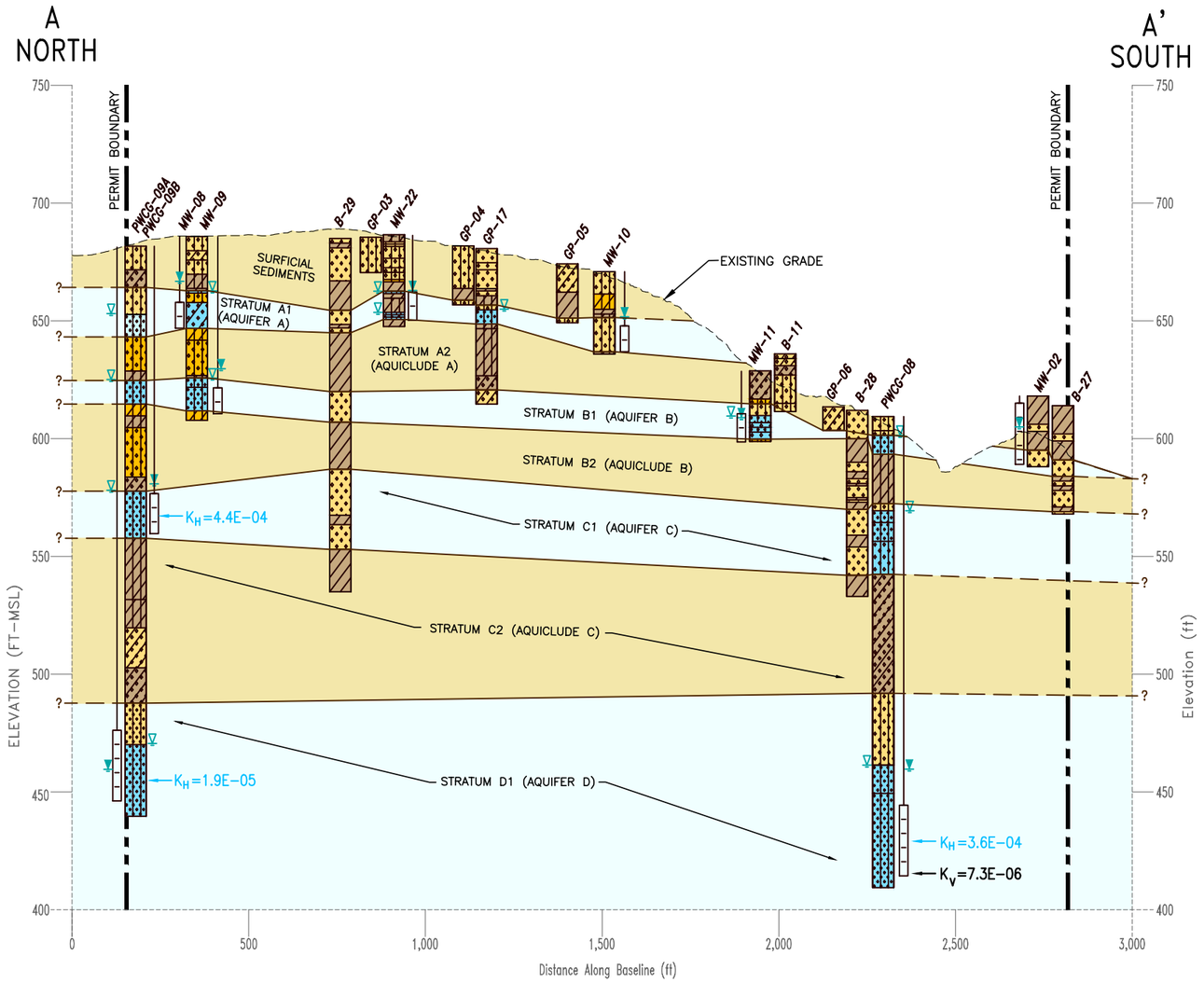
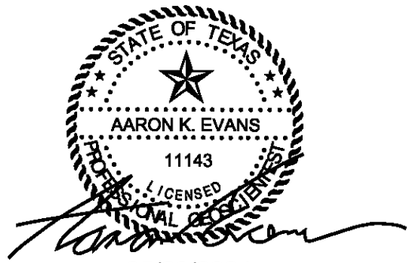



0 30 60
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

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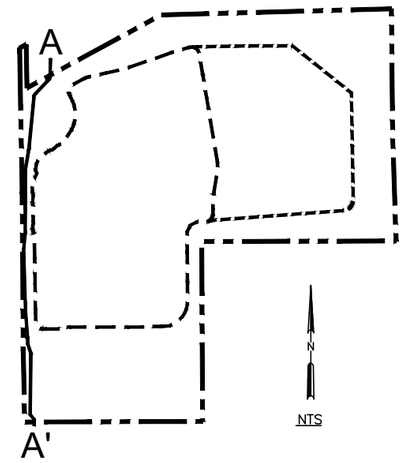
LITHOLOGY

- Saturated Sand
- Saturated Sandy Gravel or Gravelly Sand
- Saturated Silty Sand
- Saturated Sandy Clay
- Saturated Clay or Silty Clay
- Earthen Fill
- Sand or Sandstone
- Silty Sand
- Sandy Gravel or Gravelly Sand
- Clayey Gravel
- Clayey Sand
- Sand with Lignite
- Silt or Siltstone
- Sandy Silt
- Clayey Silt
- Clay
- Silty Clay
- Sandy Clay
- Gravelly Clay
- Sandy Lignite
- Lignite




LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING GRADE
- EXCAVATION GRADE (APPROXIMATE)
- PROPOSED FINAL COVER GRADE
- MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- TOP OF SATURATED ZONE OBSERVED AT TIME OF DRILLING (SEE NOTE 4)
- STATIC POTENTIOMETRIC GROUNDWATER SURFACE (SEE NOTE 5)
- $K_H$=3.6E-04 SLUG TESTING HYDRAULIC CONDUCTIVITY VALUE (SEE NOTE 6)
- $K_V$=7.3E-06 LABORATORY VERTICAL HYDRAULIC CONDUCTIVITY VALUE (SEE NOTE 6)

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG-C-1.
3. BOREHOLE AND WELL/PIEZOMETER DATA OBTAINED FROM PREVIOUS LITHOLOGIC LOGS, REPORTS, AND CROSS SECTION DRAWINGS (IF DRILLED PRIOR TO 2023) AND 2023 SUBSURFACE INVESTIGATIONS BY WEAVER CONSULTANTS GROUP (FOR 2023 EXPANSION BOREHOLES).
4. TOP OF SATURATED ZONE OBSERVED AT TIME OF DRILLING OBTAINED FROM LITHOLOGIC BOREHOLE LOGS.
5. STATIC POTENTIOMETRIC GROUNDWATER ELEVATIONS OBTAINED FROM SUBTITLE D GROUNDWATER MONITORING DATABASE FROM GAUGING COMPLETED BY GOLDER ASSSOCIATES IN MARCH 1993 (FOR FORMER MONITOR WELLS MW-1 THROUGH MW-7), BY THE CAREL CORPORATION IN DECEMBER 2009 (FOR FORMER MONITOR WELLS MW-13, MW-14, MW-16, AND MW-19), AND FROM GAUGING CONDUCTED BY WEAVER CONSULTANTS GROUP IN SEPTEMBER 2023 (FOR EXISTING WELLS AND PIEZOMETERS).
6. HYDRAULIC CONDUCTIVITY VALUES FROM SLUG TESTING ($K_H$) AND GEOTECHNICAL LABORATORY MEASUREMENTS ($K_V$) LISTED IN CM/S.
7. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE DEPICTED.
8. BOREHOLE GRAPHICS ARE HORIZONTALLY EXAGGERATED FOR ILLUSTRATION PURPOSES AND MAY BE OFFSET FROM ONE ANOTHER TO PREVENT OVERLAP IN SECTION SPACE.

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TBPE REGISTRATION NO. F-3727

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# MAJOR PERMIT AMENDMENT
## GEOLOGIC CROSS SECTION A-A'

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-C-2

O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-C-2_8-SECTION A_G.dwg, byoung, 1:2

B NORTH

B' SOUTH

PERMIT BOUNDARY

PROPOSED LIMITS OF WASTE

PROPOSED FINAL COVER

EXISTING GRADE

STRATUM B1 (AQUIFER B)

STRATUM A1 (AQUIFER A)

SURFICIAL SEDIMENTS

STRATUM A2 (AQUICLUDE A)

STRATUM B2 (AQUICLUDE B)

STRATUM C1 (AQUIFER C)

STRATUM C2 (AQUICLUDE C)

STRATUM D1 (AQUIFER D)

STRATUM D2 (AQUICLUDE D)

PROPOSED EXCAVATION

PWCG-01A, PWCG-01B, MW-20, WCG-10, MW-21, PWCG-07A, PWCG-07B, MW-14, MW-15, B-23, MW-25, MW-23, GP-08, B-24 (CC), GP-08A, B-07, B-25, MW-04

$K_H$=4.7E-04
$K_V$=1.6E-06
$K_V$=4.5E-08
$K_H$=8.7E-04
$K_V$=6.1E-05
$K_H$=1.1E-04
$K_H$=2.5E-05
$K_V$=3.6E+08
$K_V$=2.3E-07

ELEVATION (FT-MSL)

Elevation (ft)

800, 750, 700, 650, 600, 550, 500, 450, 400, 350, 300, 250

0, 500, 1,000, 1,500, 2,000, 2,500, 3,000, 3,500

Distance Along Baseline (ft)

0 30 60 VERTICAL SCALE IN FEET

0 200 400 HORIZONTAL SCALE IN FEET

STATE OF TEXAS
AARON K. EVANS
11143
LICENSED PROFESSIONAL GEOLOGIST
05/20/2024

B
B'
NTS

LITHOLOGY

- Saturated Sand
- Saturated Sandy Gravel or Gravelly Sand
- Saturated Silty Sand
- Saturated Sandy Clay
- Saturated Clay or Silty Clay
- Earthen Fill
- Sand or Sandstone
- Silty Sand
- Sandy Gravel or Gravelly Sand
- Clayey Gravel
- Clayey Sand
- Sand with Lignite
- Silt or Siltstone
- Sandy Silt
- Clayey Silt
- Clay
- Silty Clay
- Sandy Clay
- Gravelly Clay
- Sandy Lignite
- Lignite

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING GRADE
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- $K_H$=3.6E-04 SLUG TESTING HYDRAULIC CONDUCTIVITY VALUE (SEE NOTE 6)
- $K_V$=7.3E-06 LABORATORY VERTICAL HYDRAULIC CONDUCTIVITY VALUE (SEE NOTE 6)

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DESIGN BY: DCS
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Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
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# MAJOR PERMIT AMENDMENT
## GEOLOGIC CROSS SECTION B-B'

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-C-3

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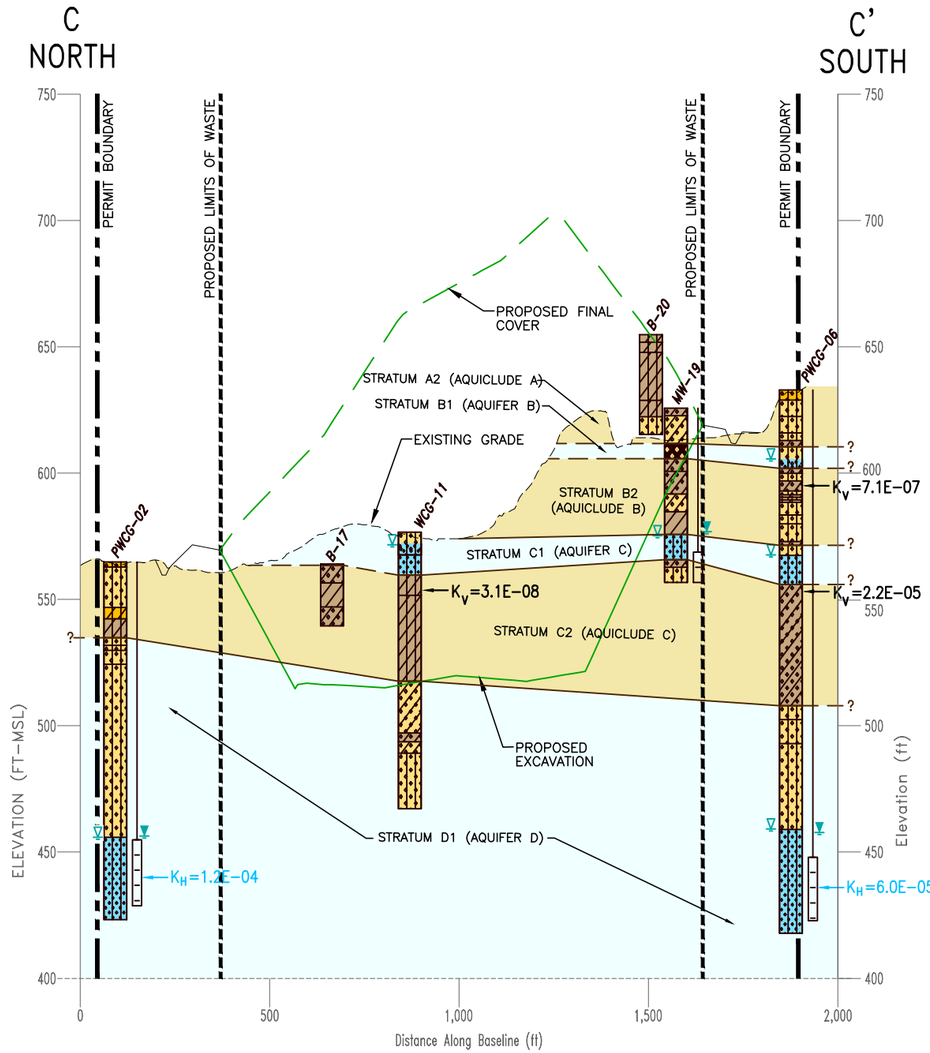
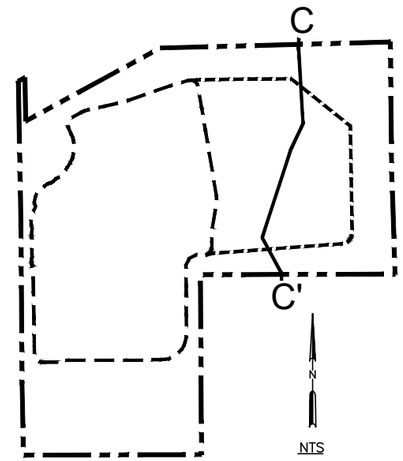



0 30 60
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

LITHOLOGY

- Saturated Sand
- Saturated Sandy Gravel or Gravelly Sand
- Saturated Silty Sand
- Saturated Sandy Clay
- Saturated Clay or Silty Clay
- Earthen Fill
- Sand or Sandstone
- Silty Sand
- Sandy Gravel or Gravelly Sand
- Clayey Gravel
- Clayey Sand
- Sand with Lignite
- Silt or Siltstone
- Sandy Silt
- Clayey Silt
- Clay
- Silty Clay
- Sandy Clay
- Gravelly Clay
- Sandy Lignite
- Lignite




LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING GRADE
- EXCAVATION GRADE (APPROXIMATE)
- PROPOSED FINAL COVER GRADE
- MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- TOP OF SATURATED ZONE OBSERVED AT TIME OF DRILLING (SEE NOTE 4)
- STATIC POTENTIOMETRIC GROUNDWATER SURFACE (SEE NOTE 5)
- $K_H$=3.6E-04 — SLUG TESTING HYDRAULIC CONDUCTIVITY VALUE (SEE NOTE 6)
- $K_V$=7.3E-06 — LABORATORY VERTICAL HYDRAULIC CONDUCTIVITY VALUE (SEE NOTE 6)

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6. HYDRAULIC CONDUCTIVITY VALUES FROM SLUG TESTING ($K_H$) AND GEOTECHNICAL LABORATORY MEASUREMENTS (K ) LISTED IN CM/S. v
7. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE DEPICTED.
8. BOREHOLE GRAPHICS ARE HORIZONTALLY EXAGGERATED FOR ILLUSTRATION PURPOSES AND MAY BE OFFSET FROM ONE ANOTHER TO PREVENT OVERLAP IN SECTION SPACE.

STATE OF TEXAS
AARON K. EVANS
11143
LICENSED
PROFESSIONAL GEOLOGIST

05/20/2024

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# MAJOR PERMIT AMENDMENT
## GEOLOGIC CROSS SECTION C-C'

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-C-4

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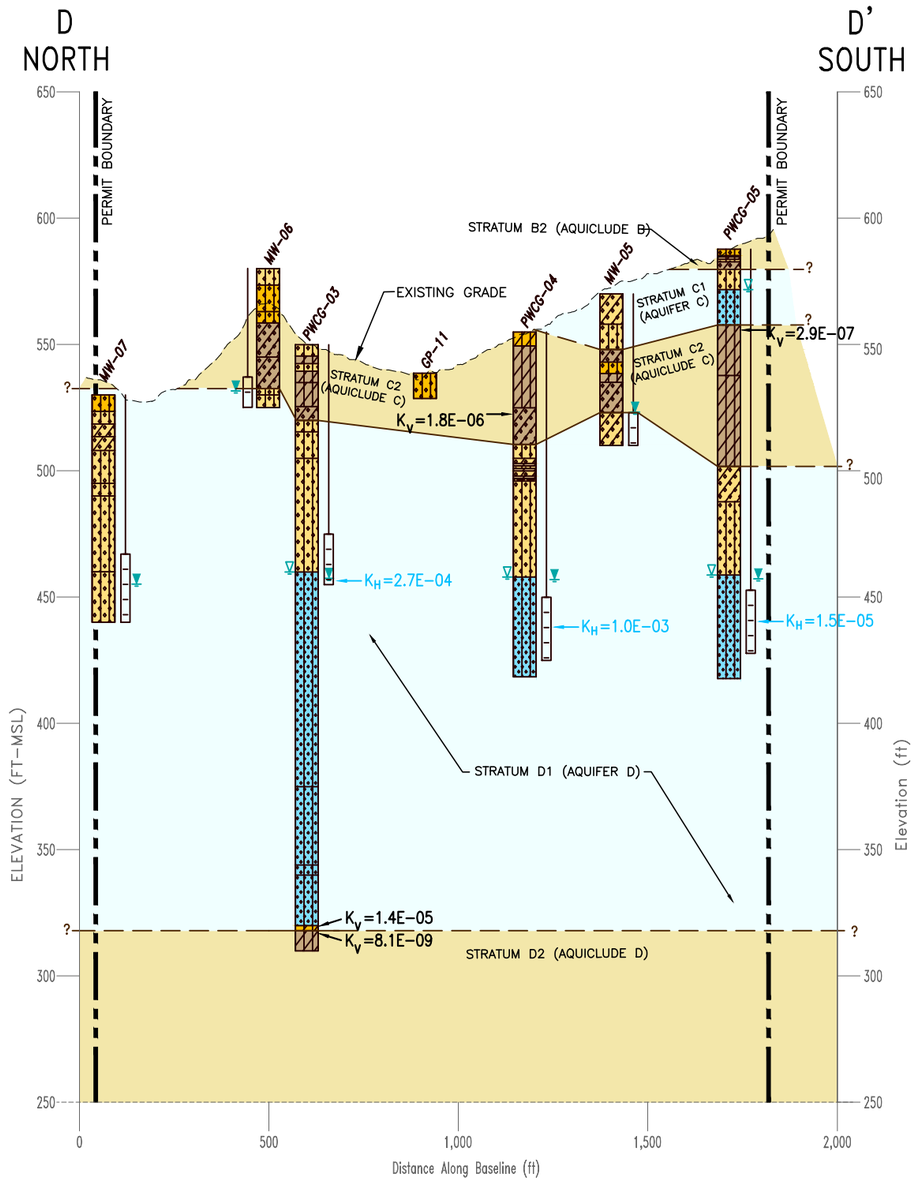
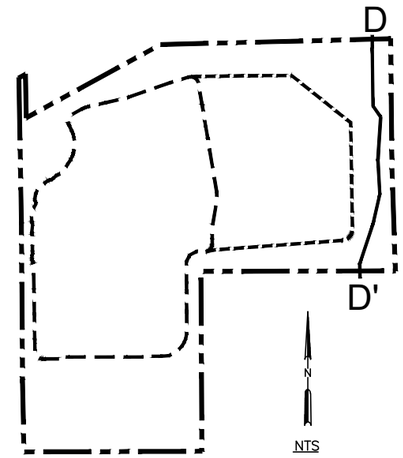



0 30 60
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

LITHOLOGY

- Saturated Sand
- Saturated Sandy Gravel or Gravelly Sand
- Saturated Silty Sand
- Saturated Sandy Clay
- Saturated Clay or Silty Clay
- Earthen Fill
- Sand or Sandstone
- Silty Sand
- Sandy Gravel or Gravelly Sand
- Clayey Gravel
- Clayey Sand
- Sand with Lignite
- Silt or Siltstone
- Sandy Silt
- Clayey Silt
- Clay
- Silty Clay
- Sandy Clay
- Gravelly Clay
- Sandy Lignite
- Lignite




LEGEND

- PERMIT BOUNDARY
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- PROPOSED LIMITS OF WASTE
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PROFESSIONAL GEOSCIENTIST
05/20/2024

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DATE: 05/2024
FILE: 0120-076-11
CAD: IIIG-C-2_8-SECTION A_G.DWG

DRAWN BY: SRF
DESIGN BY: DCS
REVIEWED BY: AKE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
PINE HILL FARMS LANDFILL TX, LP

| REVISIONS | | |
|---|---|---|
| NO. | DATE | DESCRIPTION |
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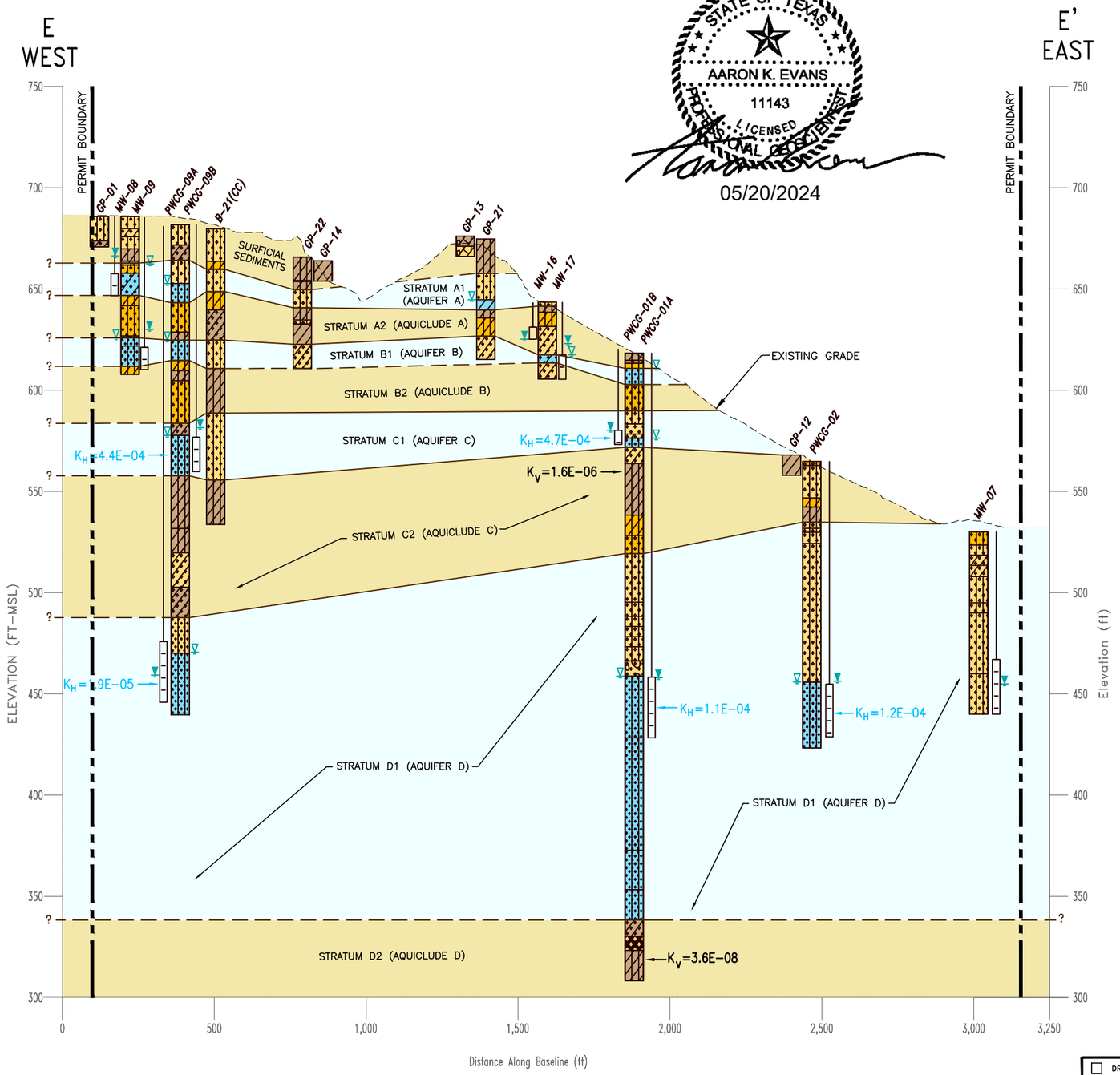
| | | |

# MAJOR PERMIT AMENDMENT
## GEOLOGIC CROSS SECTION D-D'
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIG-C-5

O:\0120\76\EXPANSION 2023\PART III\IIIG-C-2_8-SECTION A_G.dwg, byoung, 1:2




STATE OF TEXAS
AARON K. EVANS
11143
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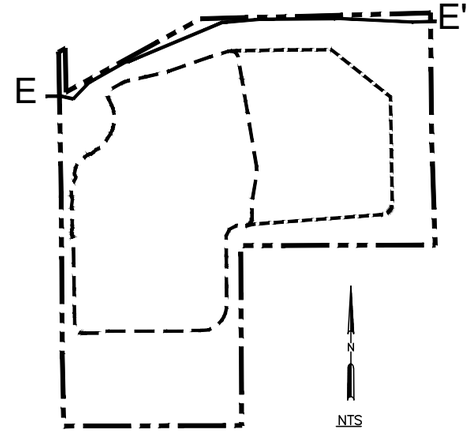
PROFESSIONAL GEOLOGIST

05/20/2024




LITHOLOGY

| | | |
|---|---|---|
| Saturated Sand | Saturated Sandy Gravel or Gravelly Sand | Saturated Silty Sand |
| Saturated Sandy Clay | Saturated Clay or Silty Clay | Earthen Fill |
| Sand or Sandstone | Silty Sand | Sandy Gravel or Gravelly Sand |
| Clayey Gravel | Clayey Sand | Sand with Lignite |
| Silt or Siltstone | Sandy Silt | Clayey Silt |
| Clay | Silty Clay | Sandy Clay |
| Gravelly Clay | Sandy Lignite | Lignite |

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING GRADE
- EXCAVATION GRADE (APPROXIMATE)
- PROPOSED FINAL COVER GRADE
- MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- TOP OF SATURATED ZONE OBSERVED AT TIME OF DRILLING (SEE NOTE 4)
- STATIC POTENTIOMETRIC GROUNDWATER SURFACE (SEE NOTE 5)
- $K_H$=3.6E-04 — SLUG TESTING HYDRAULIC CONDUCTIVITY VALUE (SEE NOTE 6)
- $K_V$=7.3E-06 — LABORATORY VERTICAL HYDRAULIC CONDUCTIVITY VALUE (SEE NOTE 6)

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG-C-1.
3. BOREHOLE AND WELL/PIEZOMETER DATA OBTAINED FROM PREVIOUS LITHOLOGIC LOGS, REPORTS, AND CROSS SECTION DRAWINGS (IF DRILLED PRIOR TO 2023) AND 2023 SUBSURFACE INVESTIGATIONS BY WEAVER CONSULTANTS GROUP (FOR 2023 EXPANSION BOREHOLES).
4. TOP OF SATURATED ZONE OBSERVED AT TIME OF DRILLING OBTAINED FROM LITHOLOGIC BOREHOLE LOGS.
5. STATIC POTENTIOMETRIC GROUNDWATER ELEVATIONS OBTAINED FROM SUBTITLE D GROUNDWATER MONITORING DATABASE FROM GAUGING COMPLETED BY GOLDER ASSSOCIATES IN MARCH 1993 (FOR FORMER MONITOR WELLS MW-1 THROUGH MW-7), BY THE CAREL CORPORATION IN DECEMBER 2009 (FOR FORMER MONITOR WELLS MW-13, MW-14, MW-16, AND MW-19), AND FROM GAUGING CONDUCTED BY WEAVER CONSULTANTS GROUP IN SEPTEMBER 2023 (FOR EXISTING WELLS AND PIEZOMETERS).
6. HYDRAULIC CONDUCTIVITY VALUES FROM SLUG TESTING ($K_H$) AND GEOTECHNICAL LABORATORY MEASUREMENTS ($K_V$) LISTED IN CM/S.
7. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE DEPICTED.
8. BOREHOLE GRAPHICS ARE HORIZONTALLY EXAGGERATED FOR ILLUSTRATION PURPOSES AND MAY BE OFFSET FROM ONE ANOTHER TO PREVENT OVERLAP IN SECTION SPACE.

0 30 60
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

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PREPARED FOR
PINE HILL FARMS LANDFILL TX, LP

REVISIONS

| NO. | DATE | DESCRIPTION |
|---|---|---|
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# MAJOR PERMIT AMENDMENT
## GEOLOGIC CROSS SECTION E-E'

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-C-6

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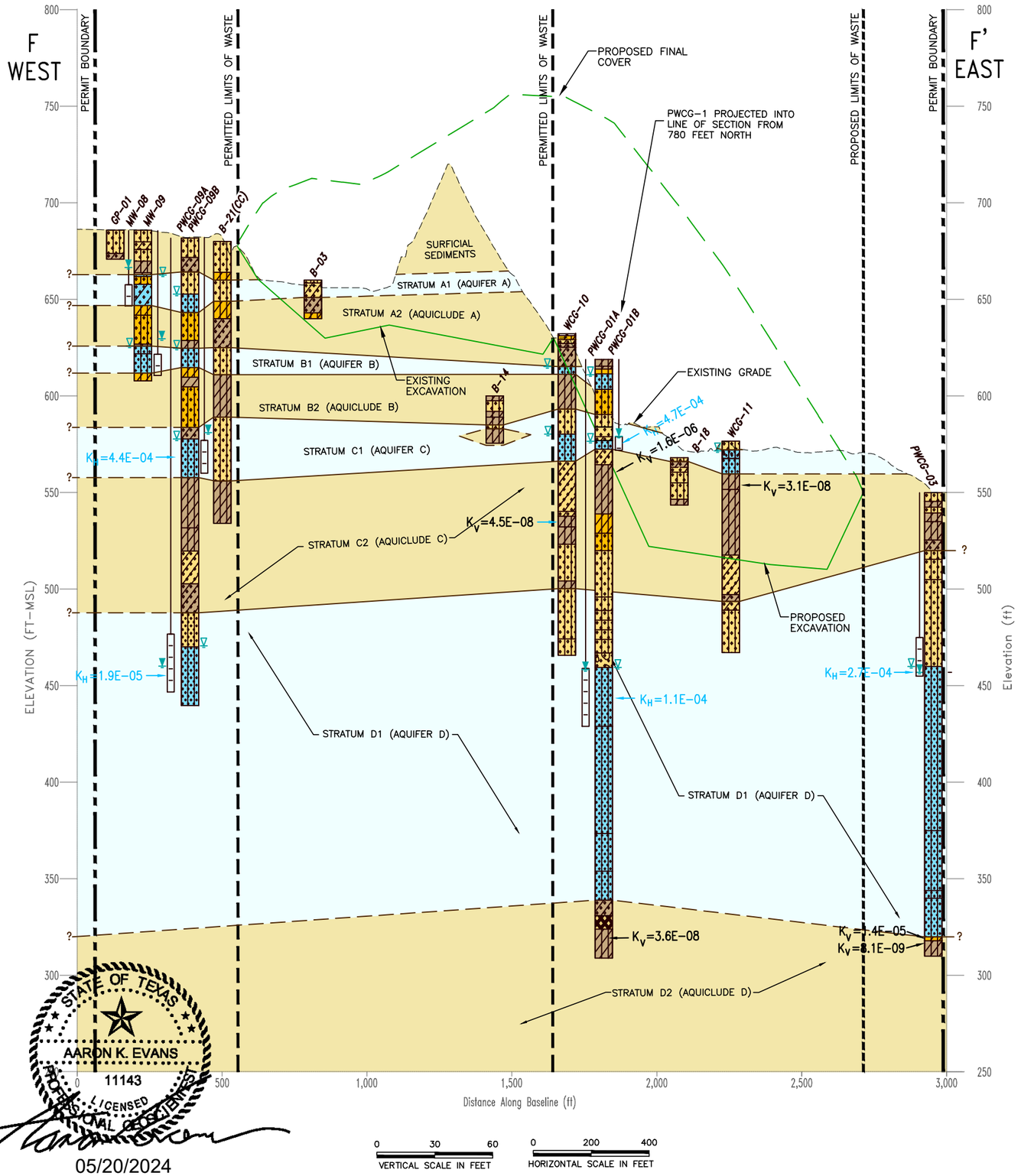
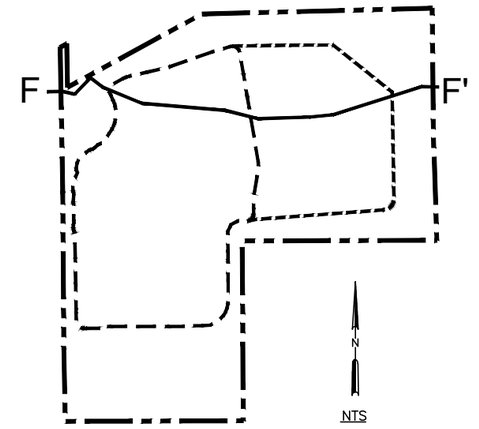
O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-C-2_8-SECTION A_G.dwg, byoung, 1:2




LITHOLOGY

| | | |
|---|---|---|
| Saturated Sand | Saturated Sandy Gravel or Gravelly Sand | Saturated Silty Sand |
| Saturated Sandy Clay | Saturated Clay or Silty Clay | Earthen Fill |
| Sand or Sandstone | Silty Sand | Sandy Gravel or Gravelly Sand |
| Clayey Gravel | Clayey Sand | Sand with Lignite |
| Silt or Siltstone | Sandy Silt | Clayey Silt |
| Clay | Silty Clay | Sandy Clay |
| Gravelly Clay | Sandy Lignite | Lignite |

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING GRADE
- EXCAVATION GRADE (APPROXIMATE)
- PROPOSED FINAL COVER GRADE
- MONITOR WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- TOP OF SATURATED ZONE OBSERVED AT TIME OF DRILLING (SEE NOTE 4)
- STATIC POTENTIOMETRIC GROUNDWATER SURFACE (SEE NOTE 5)
- $K_H$=3.6E-04 SLUG TESTING HYDRAULIC CONDUCTIVITY VALUE (SEE NOTE 6)
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NOTES:

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STATE OF TEXAS
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11143
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05/20/2024

0 30 60
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

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# MAJOR PERMIT AMENDMENT

## GEOLOGIC CROSS SECTION F-F'

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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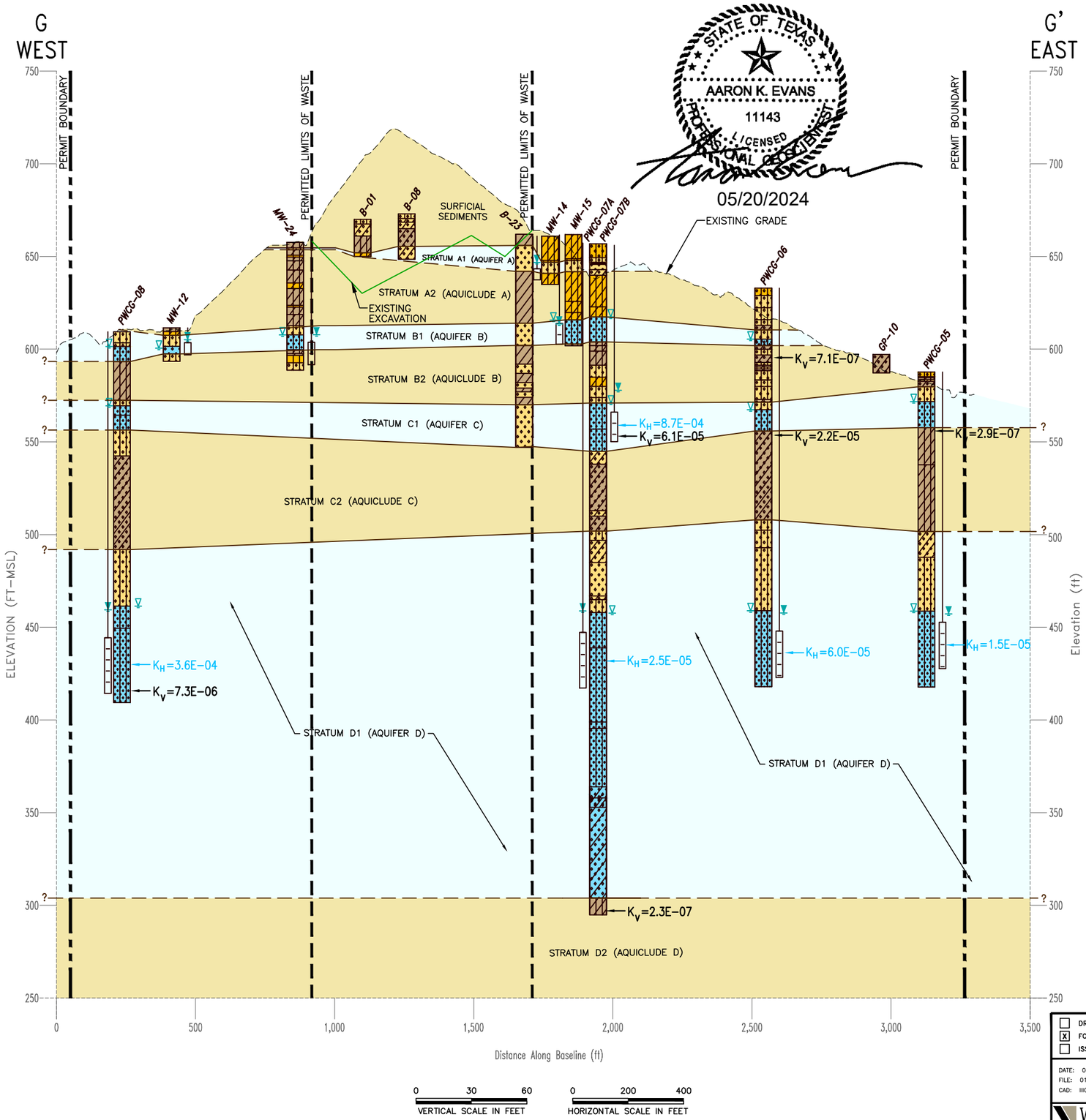
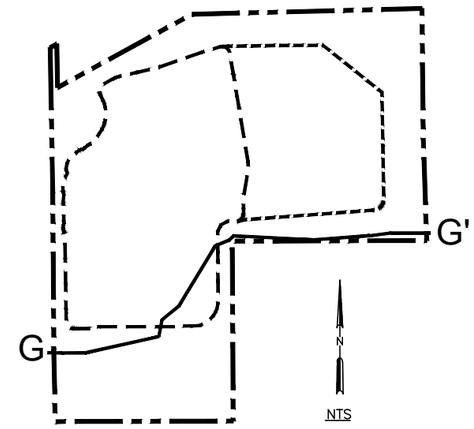
FIGURE IIIG-C-7

O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-C-2_8-SECTION A_G.dwg, byoung, 1:2




LITHOLOGY

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- Saturated Sandy Gravel or Gravelly Sand
- Saturated Silty Sand
- Saturated Sandy Clay
- Saturated Clay or Silty Clay
- Earthen Fill
- Sand or Sandstone
- Silty Sand
- Sandy Gravel or Gravelly Sand
- Clayey Gravel
- Clayey Sand
- Sand with Lignite
- Silt or Siltstone
- Sandy Silt
- Clayey Silt
- Clay
- Silty Clay
- Sandy Clay
- Gravelly Clay
- Sandy Lignite
- Lignite

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING GRADE
- EXCAVATION GRADE (APPROXIMATE)
- PROPOSED FINAL COVER GRADE
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0 30 60
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

STATE OF TEXAS
AARON K. EVANS
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# MAJOR PERMIT AMENDMENT
## GEOLOGIC CROSS SECTION G–G'

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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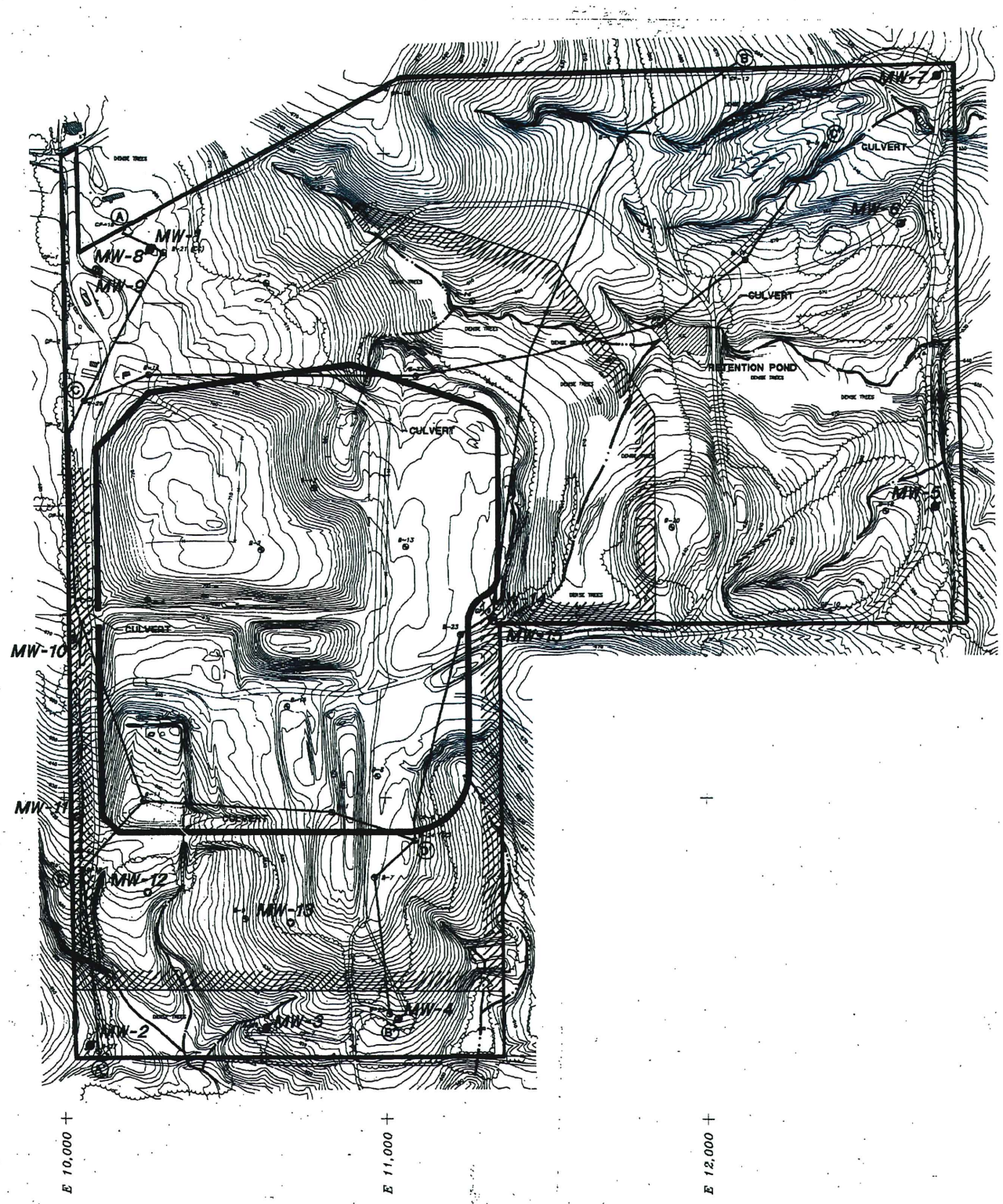
FIGURE IIIG–C–8

O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-C-2_8-SECTION A_G.dwg, byoung, 1:2

# 1994 GEOLOGIC CROSS SECTIONS BY GROUNDWATER TECHNOLOGIES




## EXPLANATION

- MW-8 — Monitoring Well Location
- MW-1 — Plugged and Abandoned Well Location
- B-22 — Geotechnical Boring
- B-24 (CC) — Continuous Core
- GP-1 — Gas Monitor Probe
- Fence
- Vegetation Line
- Waste Management Unit Boundary
- Property Boundary
- Relevant Point of Compliance
- Surface Water Boundary
- C — C' Line of Geologic Cross Section
- Flowing Stream
- Ephemeral Stream
- 630 Topographic Contour Interval = 2 feet.

| GROUNDWATER MONITORING WELL NETWORK | | | |
|---|---|---|---|
| Upgradient | | Downgradient | |
| Aquifer A | Aquifer B | Aquifer A | Aquifer B |
| MW-8 | MW-9 | MW-10 | MW-11 |
| | | MW-14 | MW-12 |
| | | | MW-13 |
| | | | MW-15 |

200 0 200 400
scale in feet

NOTES: 1. Survey grid is based on site grid coordinates established by Stanger Surveying Company, Tyler, Texas.

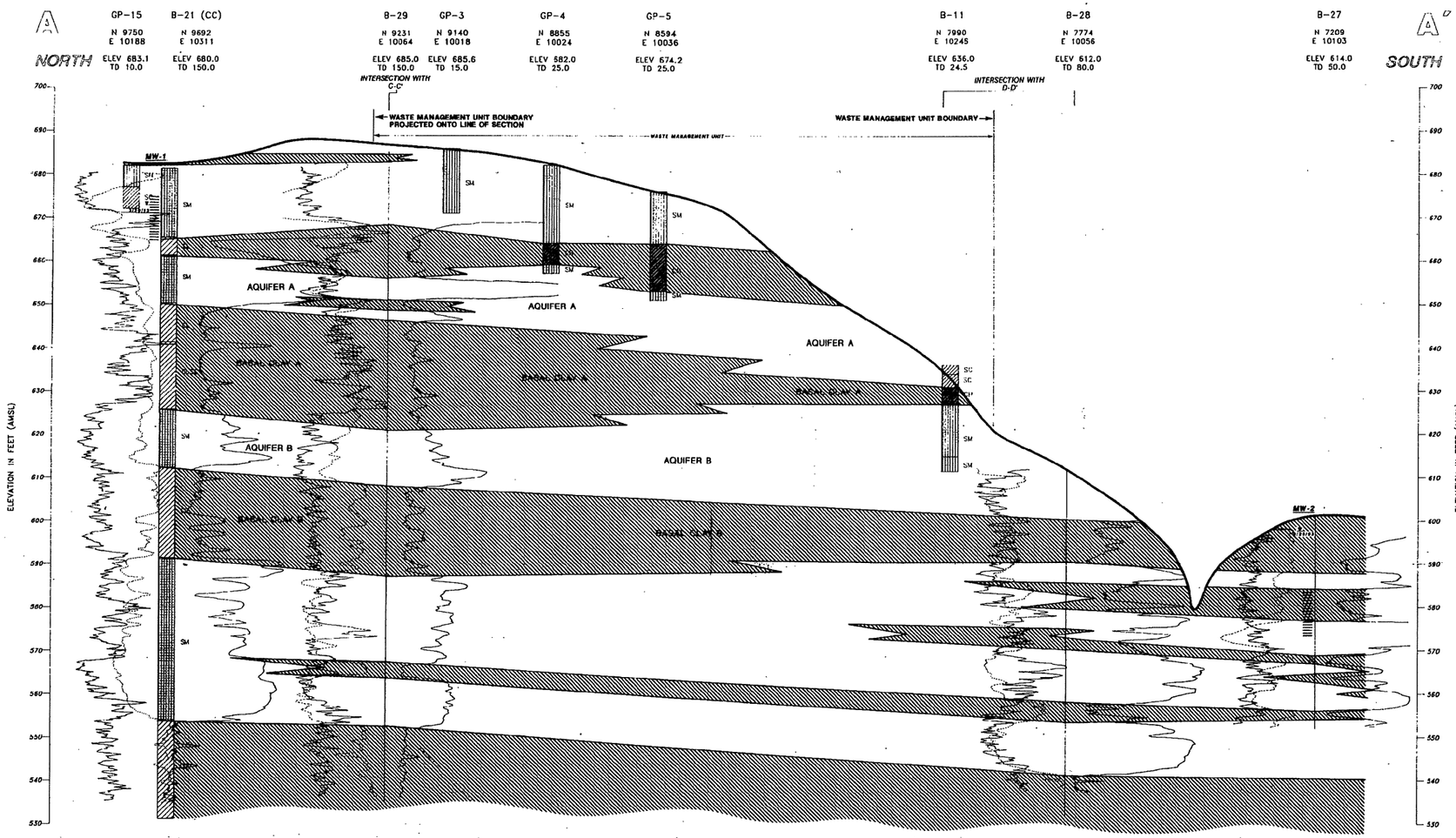
2. Topography adapted from aerial photograph, Metropolitan Aerial Survey, Inc., Fort Worth, Texas: flown February 1, 1994.

GROUNDWATER TECHNOLOGY
505 E. HUNTLAND, STE #350
AUSTIN, TEXAS 78752 (512) 458-5249

LAIDLAW WASTE SYSTEMS, INC.

SITE MAP
ROYAL OAKS LANDFILL

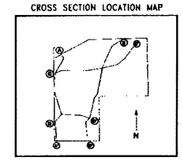
| DESIGNED BY: | DETAILED BY: | CHECKED BY: |
|---|---|---|
| ECM | DK | |
| DRAWING DATE: 1/25/95 | ACAD FILE: COMBINJ2 | |
| PROJECT NO.: 042480069 | REVISION: | |




## EXPLANATION

- GM — Silty gravels, gravel-sand-silt mixtures
- GC — Clayey gravels, gravel-sand-clay mixtures
- SP — Poorly-graded sands, gravelly sands, little or no fines
- SM — Silty sands, sand and silt mixtures
- SC — Clayey sands, sand and clay mixtures
- ML — Inorganic silts and very fine sands, silty or clayey fine sands or clayey silts with slight plasticity
- CL — Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
- OL — Organic silts and organic silty clays of low plasticity
- MH — Inorganic silts, micaceous or diatomaceous fine sand or silty soils
- CH — Inorganic clays of high plasticity, fat clays
- FILL
- Aquitard

CROSS SECTION LOCATION MAP




NOTES:
1. Northings, eastings, and elevations for borings are approximate.
2. Site topography estimated from 1983 contour map.
3. * – Boring projected onto line of section.
4. CC – Continuous Core.

20
10
0 100 200
Scale in Feet

Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 10'
Vertical Exaggeration = 10X

LAIDLAW WASTE SYSTEMS, INC.

GEOLOGIC CROSS SECTION A-A'
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

| | | | |
|---|---|---|---|
| PROJECT | 042450088 | REVISIONS | 12/23/94 |
| DATE | 6/17/94 | ACAD FILE | JA.DWG |

GROUNDWATER TECHNOLOGY

B

NORTH

GP-12
N 10240
E 12052
ELEV 568.1
TD 10.0

B-4
N 10045
E 11738
ELEV 595.0
TD 40.0

GP-9
N 8570
E 11335
ELEV 660.6
TD 10.0

B-23
N 8506
E 11234
ELEV 662.0
TD 115.0

GP-8
N 7932
E 11087.1
ELEV 665.8
TD 25.0

B-24(CC)
N 7864
E 10990
ELEV 651.0
TD 130.0

B-7
N 7749
E 10965
ELEV 672.0
TD 39.5

B-25
N 7327
E 11010
ELEV 674.0
TD 50.0

B'

SOUTH

INTERSECTION WITH C-C'

INTERSECTION WITH D-D'

WASTE MANAGEMENT UNIT BOUNDARY PROJECTED ONTO LINE OF SECTION

WASTE MANAGEMENT UNIT

WASTE MANAGEMENT UNIT BOUNDARY

DENSE THICK (TOPO INFERRED)

AQUIFER A

AQUIFER B

MW-4

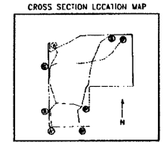
ELEVATION IN FEET (AMSL)

670 660 650 640 630 620 610 600 590 580 570 560 550 540 530

## EXPLANATION

| | | |
|---|---|---|
| GM | Silty gravels, gravel-sand-silt mixtures | |
| GC | Clayey gravels, gravel-sand-clay mixtures | |
| SP | Poorly-graded sands, gravelly sands, little or no fines | |
| SM | Silty sands, sand and silt mixtures | |
| SC | Clayey sands, sand and clay mixtures | |
| ML | Inorganic silts and very fine sands, silty or clayey fine sands or clayey silts with slight plasticity | |
| CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays | |
| OL | Organic silts and organic silty clays of low plasticity | |
| MH | Inorganic silts, micaceous or diatomaceous fine sand or silty soils | |
| CH | Inorganic clays of high plasticity, fat clays | |
| FILL | | |
| | Aquitard | |

CROSS SECTION LOCATION MAP




NOTES: 1. Northings, eastings, and elevations for borings are approximate.
2. Site topography estimated from 1953 contour map.
3. * - Boring projected onto line of section.
4. CC - Continuous Core.

0 100 200
Scale in Feet

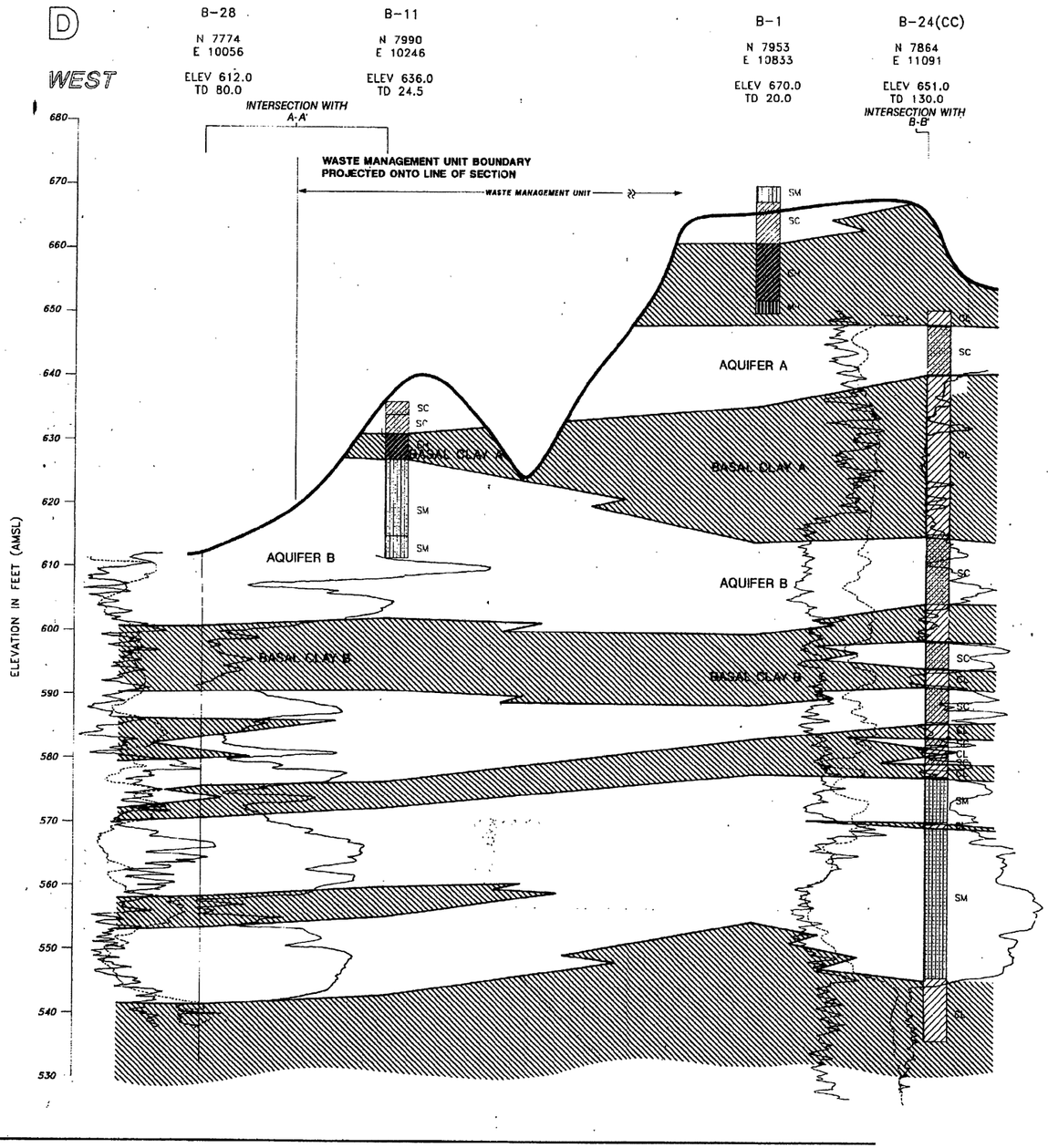
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 10'
Vertical Exaggeration = 10X

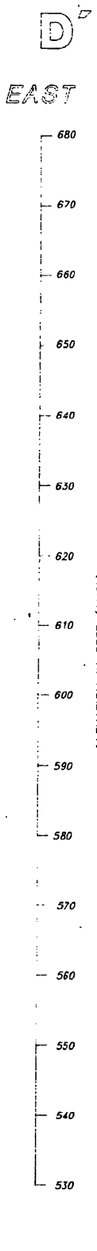
LAIDLAW
LAIDLAW WASTE SYSTEMS, INC.

GEOLOGIC CROSS SECTION B-B'
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

| | |
|---|---|
| PROJECT 047455085 | REVISIONS 12/28/84 |
| DATE 8/17/84 | DRAWN FILE JCB90 |

GROUNDWATER TECHNOLOGY




## EXPLANATION

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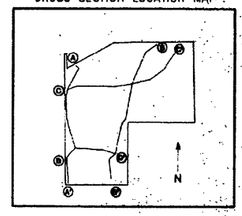
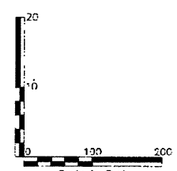
| CH | Inorganic clays of high plasticity, fat clays |
| FILL | |
| | Aquitard |

CROSS SECTION LOCATION MAP




NOTES:
1. Northings, eastings, and elevations for borings are approximate.
2. Site topography estimated from 1993 contour map.
3. * – Boring projected onto line of section.
4. CC – Continuous Core.



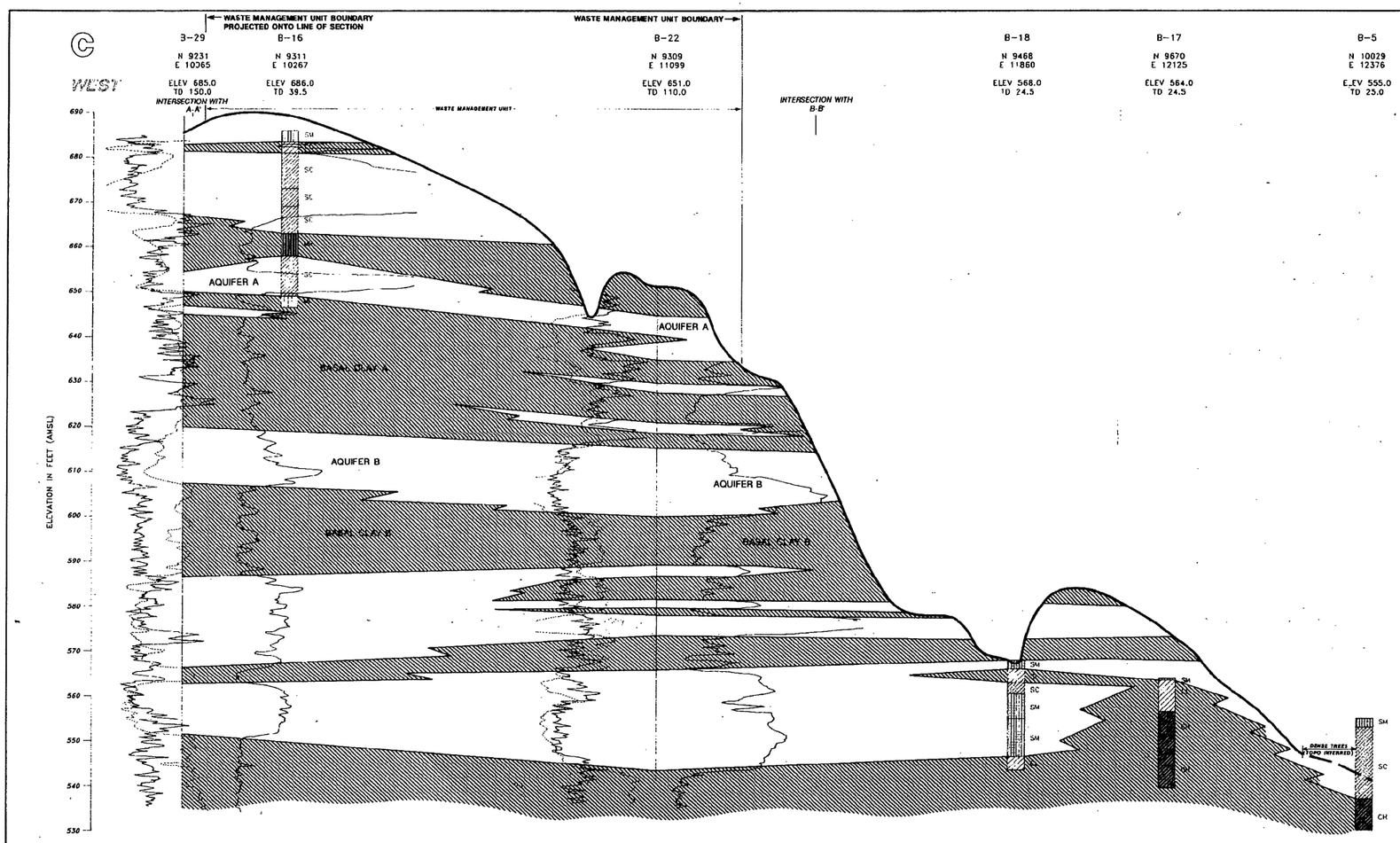

Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 10'
Vertical Exaggeration = 10X

LAIDLAW
LAIDLAW WASTE SYSTEMS, INC.

GEOLOGIC CROSS SECTION D-D'
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

| | | | |
|---|---|---|---|
| PROJECT | 042480069 | REVISIONS | 12/23/94 |
| DATE | 6/17/94 | ACAD FILE | JG.DWG |

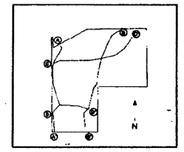
GROUNDWATER TECHNOLOGY




## EXPLANATION

- GW — Silty gravels, gravel–sand–silt mixtures
- GC — Clayey gravels, gravel–sand–clay mixtures
- SP — Poorly–graded sands, gravelly sands, little or no fines
- SM — Silty sands, sand and silt mixtures
- SC — Clayey sands, sand and clay mixtures
- ML — Inorganic silts and very fine sands, silty or clayey fine sands or clayey silts with slight plasticity
- CL — Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
- OL — Organic silts and organic silty clays of low plasticity
- MH — Inorganic silts, micaceous or diatomaceous fine sand or silty soils
- CH — Inorganic clays of high plasticity, fat clays
- FILL
- Aquitard

CROSS SECTION LOCATION MAP




NOTES: 1. Northings, eastings, and elevations for borings are approximate.
2. Site topography estimated from 1993 contour map.
3. * – Boring projected onto line of section.
4. CC – Continuous Core.

LAIDLAW WASTE SYSTEMS, INC.

GEOLOGIC CROSS SECTION C-C'
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

| | |
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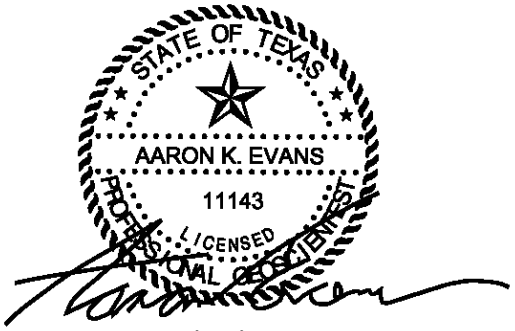
| PROJECT 042480069 | REVISIONS 12/23/94 |
| DATE 6/17/94 | CAD FILE .D.DWG |

GROUNDWATER TECHNOLOGY

# APPENDIX IIIG-D

# SITE HYDROGEOLOGIC DATA




05/20/2024

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FIGURE IIIG-D-2A – August 2023 Aquifers A & B Groundwater Contour Map
FIGURE IIIG-D-2B – September 2023 Aquifer A & B Groundwater Contour Map
FIGURE IIIG-D-2C – October 2023 Aquifer A & B Groundwater Contour Map
FIGURE IIIG-D-2D – November 2023 Aquifer A & B Groundwater Contour Map
FIGURE IIIG-D-2E – December 2023 Aquifer A & B Groundwater Contour Map
FIGURE IIIG-D-2F – January 2024 Aquifer A & B Groundwater Contour Map
FIGURE IIIG-D-2G – February 2024 Aquifer A & B Groundwater Contour Map
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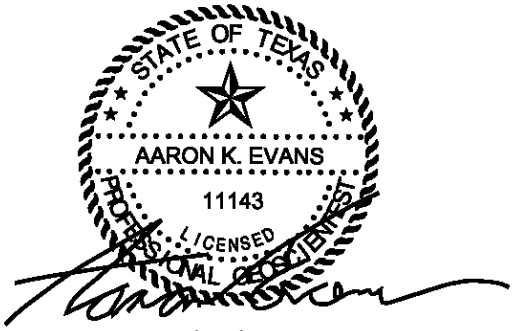
FIGURE IIIG-D-3D – November 2023 Aquifer C & D Groundwater Contour Map
FIGURE IIIG-D-3E – December 2023 Aquifer C & D Groundwater Contour Map
FIGURE IIIG-D-3F – January 2024 Aquifer C & D Groundwater Contour Map
FIGURE IIIG-D-3G – February 2024 Aquifer C & D Groundwater Contour Map
FIGURE IIIG-D-3H – March 2024 Aquifer C & D Groundwater Contour Map

1982 Maxim Data Permeability Test Results IIIG-D-3
1993 Golder Associates Historical Water Level Data IIIG-D-5
1994 Groundwater Technologies Slug Test Reports IIIG-D-9
2023 Slug Test Reports by Weaver Consultants Group IIIG-D-16

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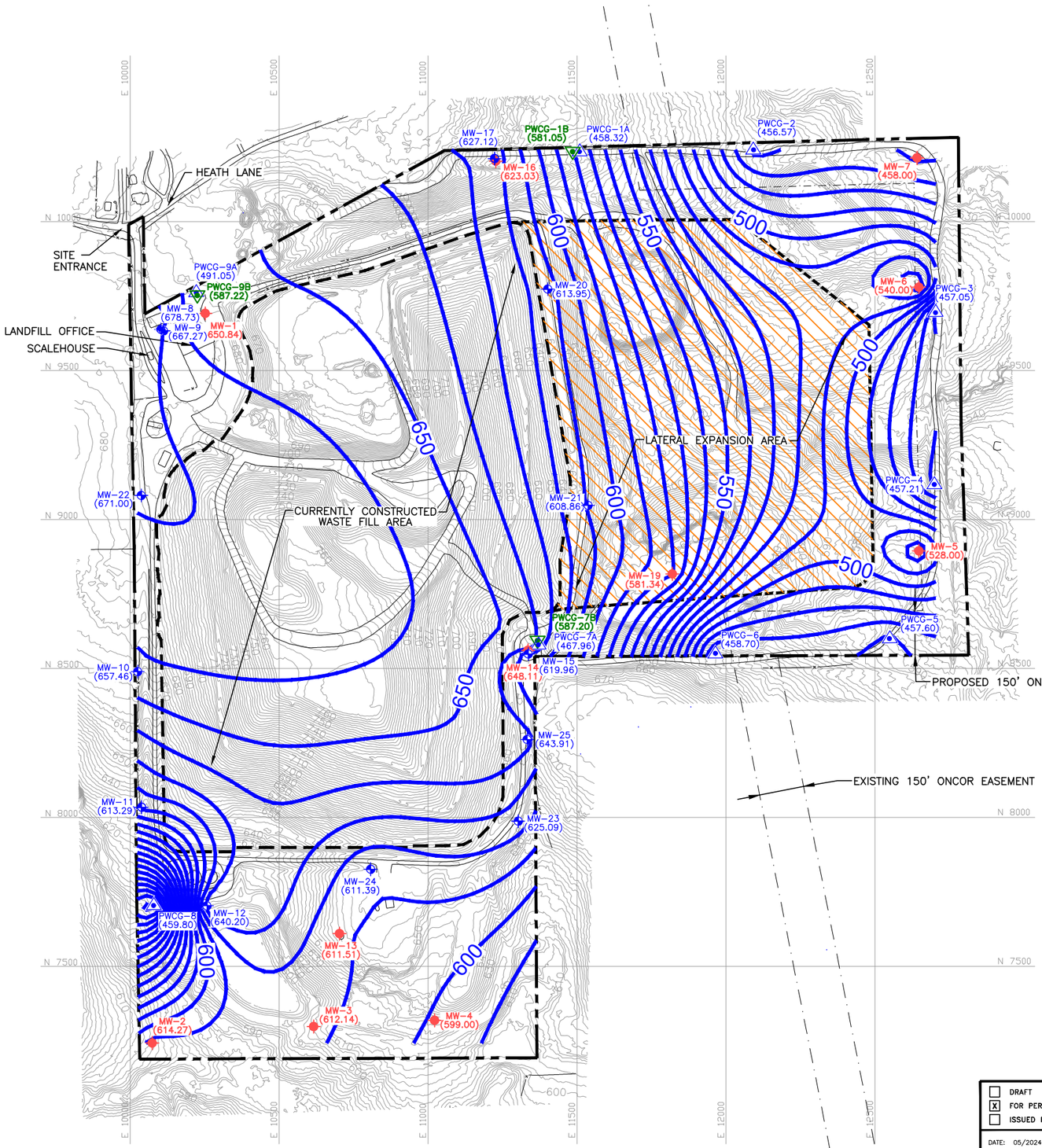


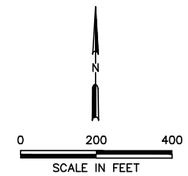


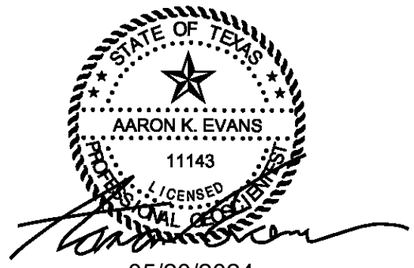


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LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- MW-1 (661.0) — FORMER GROUNDWATER MONITOR WELL WITH HIGHEST MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-25 (663.2) — EXISTING GROUNDWATER PIEZOMETER WITH HIGHEST MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
- PWCG-1B (620.2) — 2023 AQUIFER C EXPANSION PIEZOMETER WITH HIGHEST MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
- PWCG-1A (618.3) — 2023 AQUIFER D PIEZOMETER WITH HIGHEST MEASURED GROUNDWATER ELEVATION POSTED IN FT-MSL
- 650 — HIGHEST MEASURED GROUNDWATER POTENTIOMETRIC SURFACE IN FT-MSL

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. EXISTING GROUNDWATER MONITOR WELL LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
3. GROUNDWATER ELEVATION DATA OBTAINED FROM THE FACILITY'S SUBTITLE D GROUNDWATER MONITORING DATABASE PROVIDED BY HYDREX IN DECEMBER 2023, FROM PREVIOUS SUBSURFACE EXPLORATION AND INVESTIGATION REPORTS, AND FROM GAUGING CONDUCTED BY WEAVER CONSULTANTS GROUP IN 2023 AND 2024.
4. HIGHEST MEASURED GROUNDWATER ELEVATIONS IN DEEP PIEZOMETERS PWCG-1A, PWCG-7A, PWCG-7B, PWCG-9A, AND PWCG-9B HAVE NOT BEEN CONTOURED DUE TO SIGNIFICANT DIFFERENCE IN GROUNDWATER DEPTH AS COMPARED TO ADJACENT SHALLOWER MONITORING POINTS.
5. HIGHEST MEASURED GROUNDWATER SURFACE CONTOURS CREATED USING THE HIGHEST MEASURED GROUNDWATER ELEVATION RECORDED AT EACH MEASUREMENT POINT AND DO NOT REPRESENT A SINGLE GAUGING EVENT OR ACTUAL GROUNDWATER FLOW.
6. HIGHEST MEASURED GROUNDWATER ELEVATIONS IN DEEP PIEZOMETERS PWCG-1A, PWCG-7A, PWCG-7B, PWCG-9A, AND PWCG-9B HAVE NOT BEEN CONTOURED DUE TO SIGNIFICANT DIFFERENCE IN GROUNDWATER DEPTH AS COMPARED TO ADJACENT SHALLOWER MONITORING POINTS.

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DESIGN BY: DCS
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# MAJOR PERMIT AMENDMENT

## HIGHEST MEASURED GROUNDWATER CONTOUR MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-1

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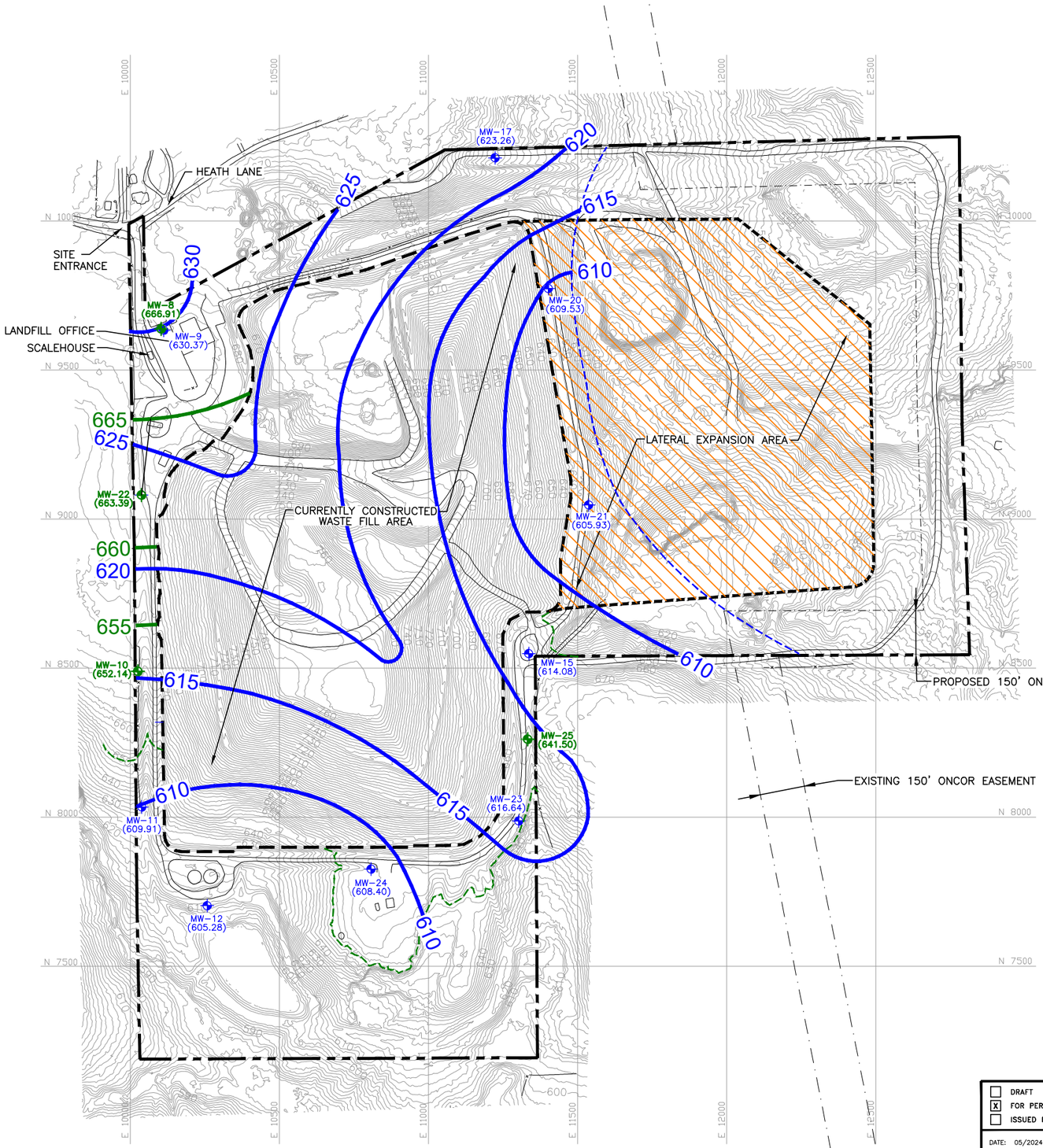


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11143
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PROFESSIONAL GEOSCIENTIST

05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- MW-8 (666.91) — EXISTING AQUIFER A GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-9 (630.37) — EXISTING AQUIFER B GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 660 — AQUIFER A GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 620 — AQUIFER B GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER A APPROXIMATE OUTCROP BOUNDARY
- AQUIFER B APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. EXISTING GROUNDWATER MONITOR WELL LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN AUGUST 2023 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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# MAJOR PERMIT AMENDMENT
## AUGUST 2023
## AQUIFERS A AND B
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-2A

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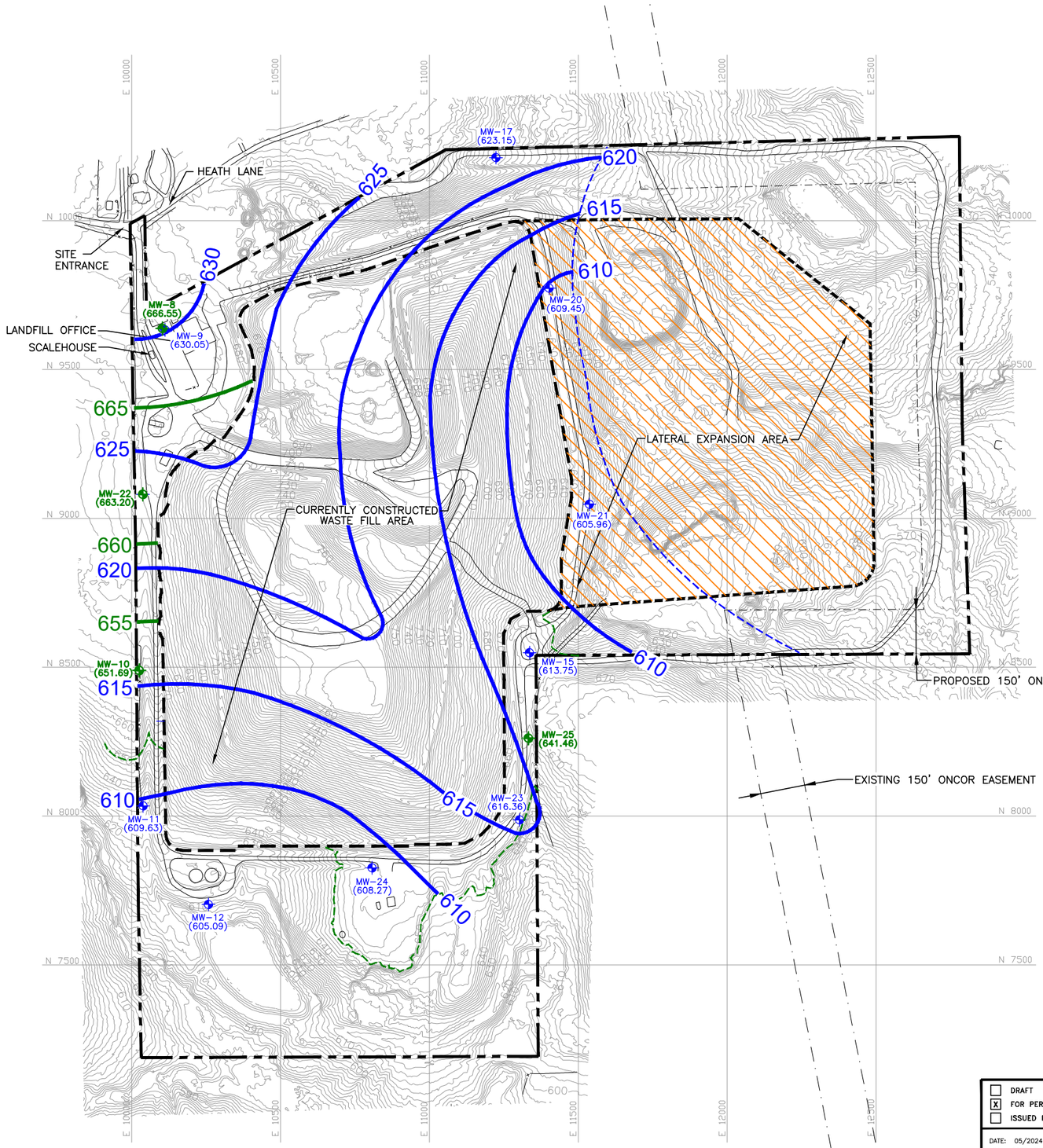


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LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- MW-8 (666.55) — EXISTING AQUIFER A GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-9 (630.05) — EXISTING AQUIFER B GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 660 — AQUIFER A GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 620 — AQUIFER B GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER A APPROXIMATE OUTCROP BOUNDARY
- AQUIFER B APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
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3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN SEPTEMBER 2023 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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# MAJOR PERMIT AMENDMENT SEPTEMBER 2023 AQUIFERS A AND B GROUNDWATER CONTOUR MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-2B

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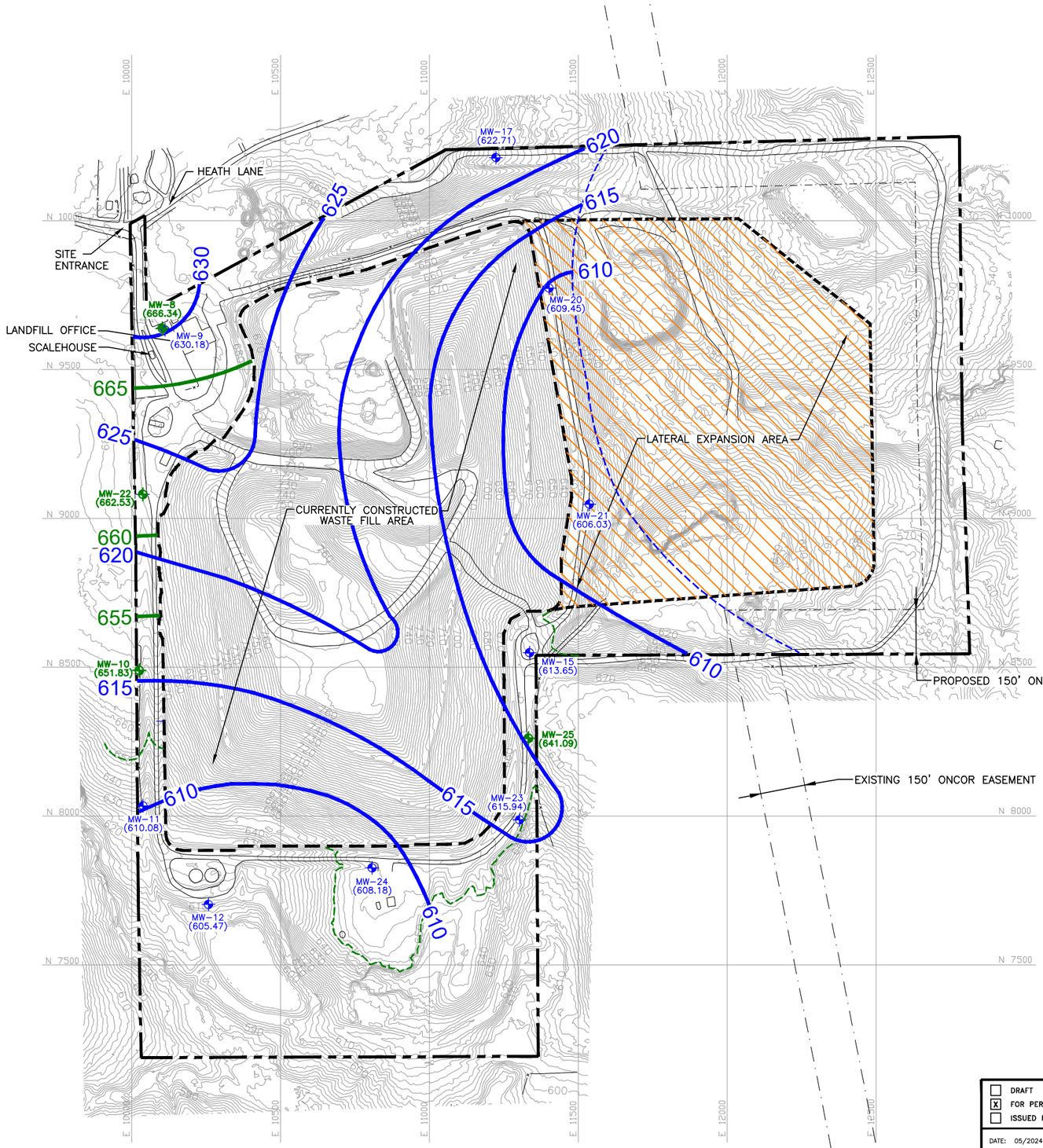


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11143
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05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- MW-8 (666.34) — EXISTING AQUIFER A GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-9 (630.18) — EXISTING AQUIFER B GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 660 — AQUIFER A GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 620 — AQUIFER B GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER A APPROXIMATE OUTCROP BOUNDARY
- AQUIFER B APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
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3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN OCTOBER 2023 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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DESIGN BY: DCS
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# MAJOR PERMIT AMENDMENT
## OCTOBER 2023
## AQUIFERS A AND B
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-2C

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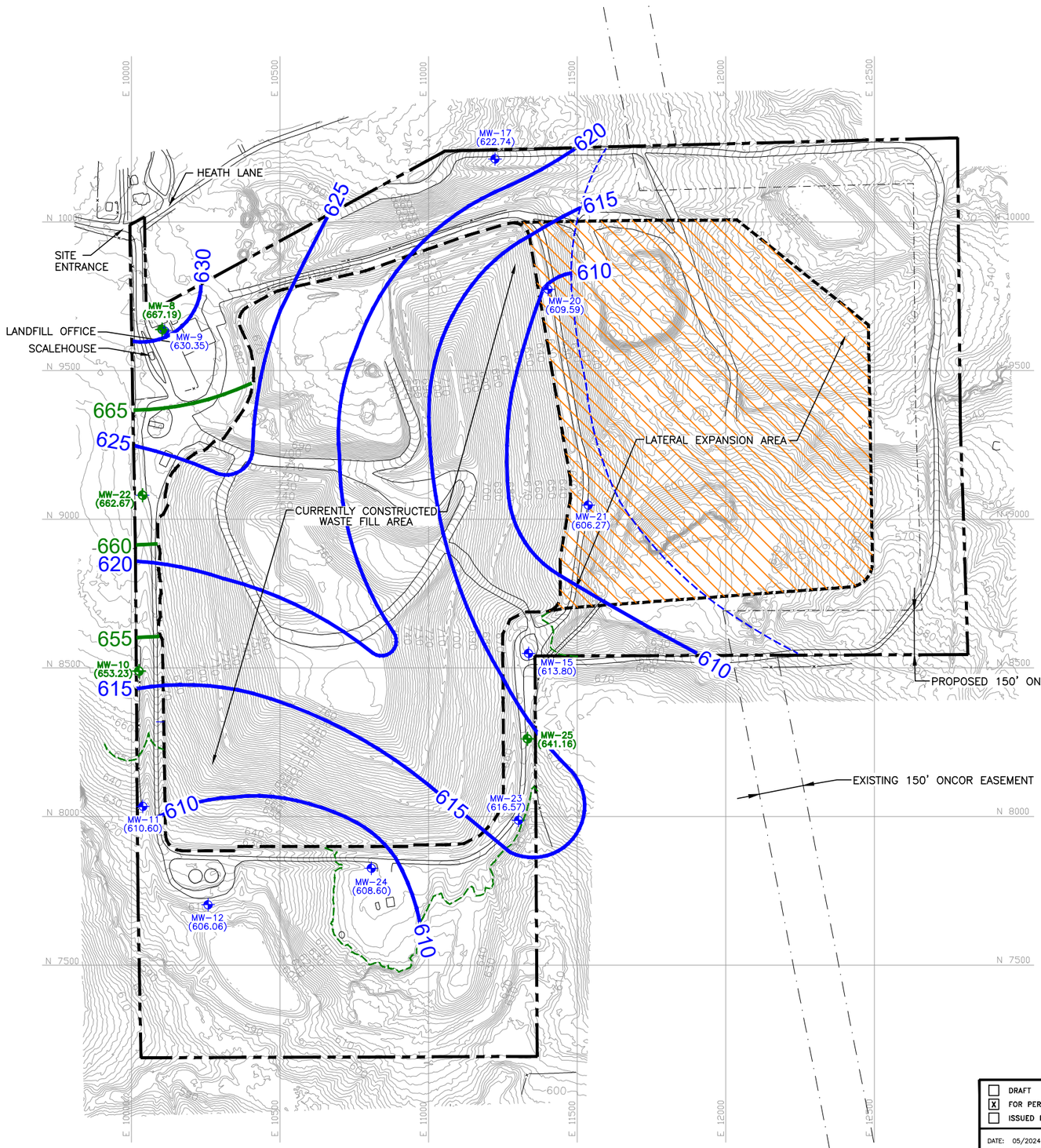


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STATE OF TEXAS
AARON K. EVANS
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LICENSED PROFESSIONAL GEOSCIENTIST

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LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- MW-8 (667.19) — EXISTING AQUIFER A GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-9 (630.35) — EXISTING AQUIFER B GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 660 — AQUIFER A GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 620 — AQUIFER B GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER A APPROXIMATE OUTCROP BOUNDARY
- AQUIFER B APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. EXISTING GROUNDWATER MONITOR WELL LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN NOVEMBER 2023 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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DESIGN BY: DCS
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# MAJOR PERMIT AMENDMENT
## NOVEMBER 2023
## AQUIFERS A AND B
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-2D

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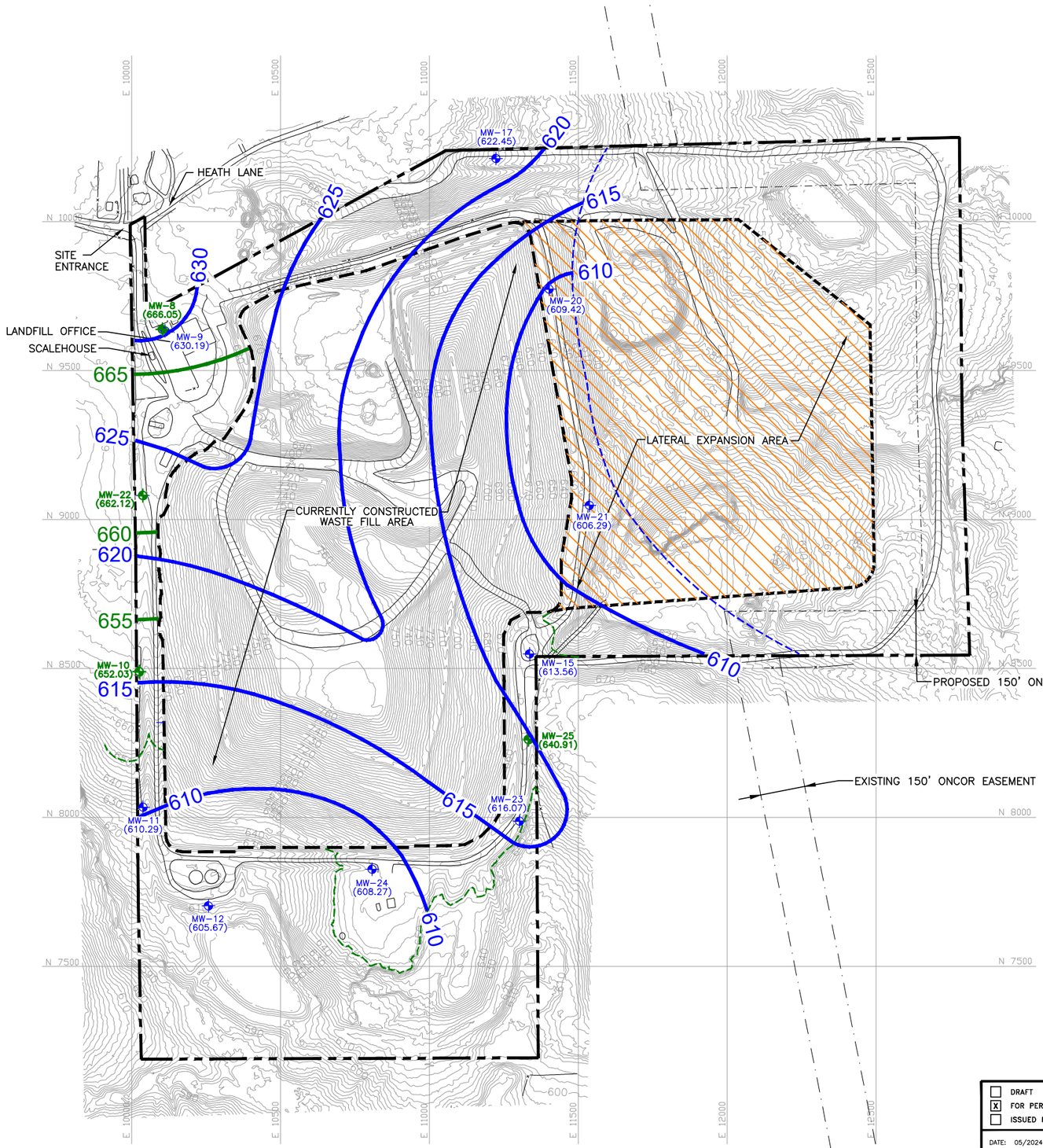


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05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- MW-8 (666.05) — EXISTING AQUIFER A GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-9 (630.19) — EXISTING AQUIFER B GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 660 — AQUIFER A GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 620 — AQUIFER B GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER A APPROXIMATE OUTCROP BOUNDARY
- AQUIFER B APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. EXISTING GROUNDWATER MONITOR WELL LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN DECEMBER 2023 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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DATE: 05/2024
FILE: 0120-076-11
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DRAWN BY: RSF
DESIGN BY: DCS
REVIEWED BY: AKE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
PINE HILL FARMS LANDFILL TX, LP

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# MAJOR PERMIT AMENDMENT
## DECEMBER 2023
## AQUIFERS A AND B
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-2E

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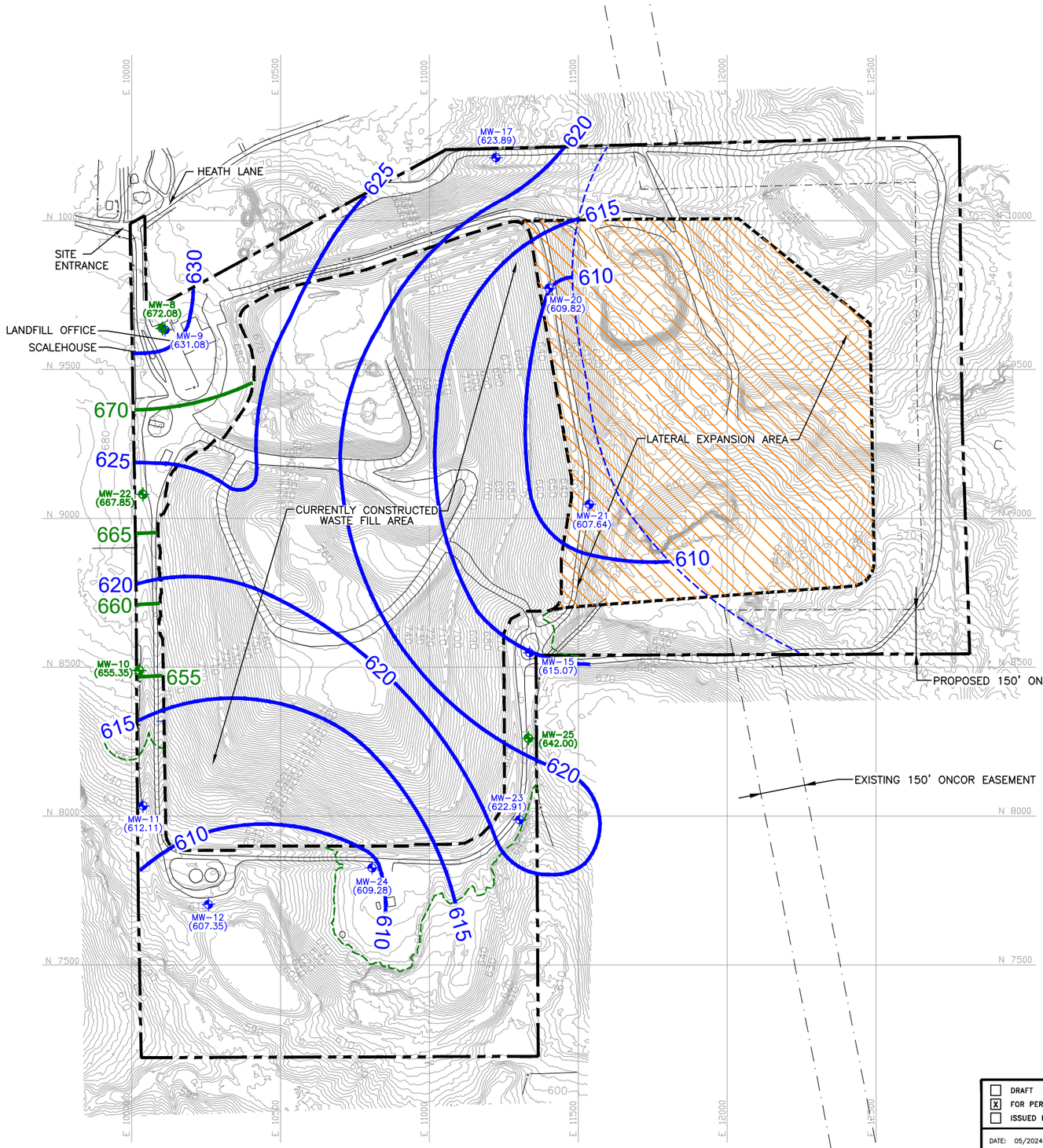


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SCALE IN FEET

STATE OF TEXAS
AARON K. EVANS
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- MW-8 (672.08) — EXISTING AQUIFER A GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-9 (631.08) — EXISTING AQUIFER B GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 660 — AQUIFER A GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 620 — AQUIFER B GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER A APPROXIMATE OUTCROP BOUNDARY
- AQUIFER B APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. EXISTING GROUNDWATER MONITOR WELL LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN JANUARY 2024 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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# MAJOR PERMIT AMENDMENT
## JANUARY 2024
## AQUIFERS A AND B
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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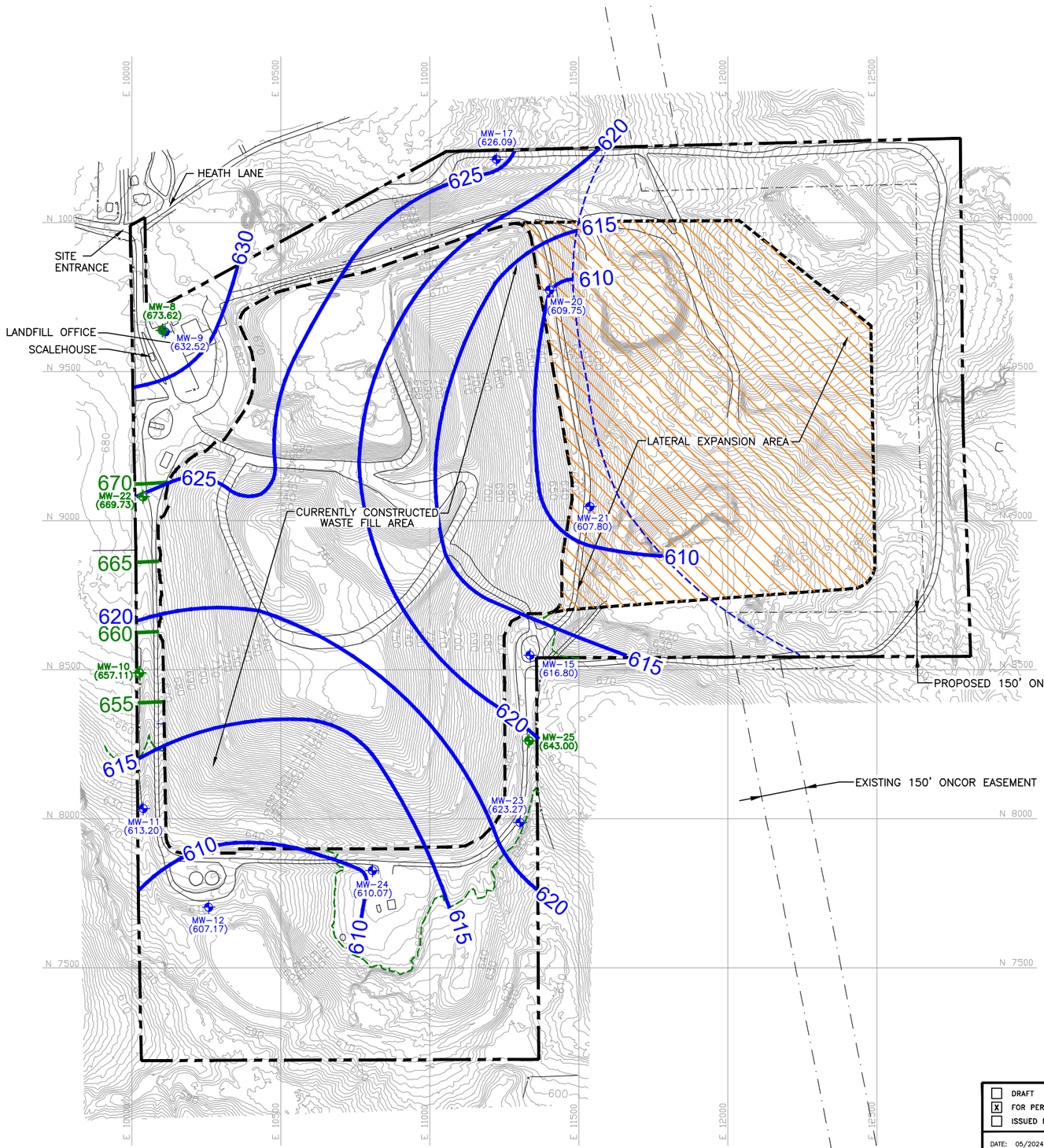
FIGURE IIIG-D-2F

O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-D-2F - AQUIFERS AB JANUARY 2024 GW MAP.dwg, byoung, 1:2

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STATE OF TEXAS
AARON K. EVANS
11143
LICENSED PROFESSIONAL GEOSCIENTIST

05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- MW-8 (673.62) — EXISTING AQUIFER A GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-9 (632.52) — EXISTING AQUIFER B GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 660 — AQUIFER A GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 620 — AQUIFER B GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER A APPROXIMATE OUTCROP BOUNDARY
- AQUIFER B APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. EXISTING GROUNDWATER MONITOR WELL LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN FEBRUARY 2024 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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DRAWN BY: RSF
DESIGN BY: DCS
REVIEWED BY: AKE

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PINE HILL FARMS LANDFILL TX, LP

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# MAJOR PERMIT AMENDMENT
## FEBRUARY 2024
## AQUIFERS A AND B
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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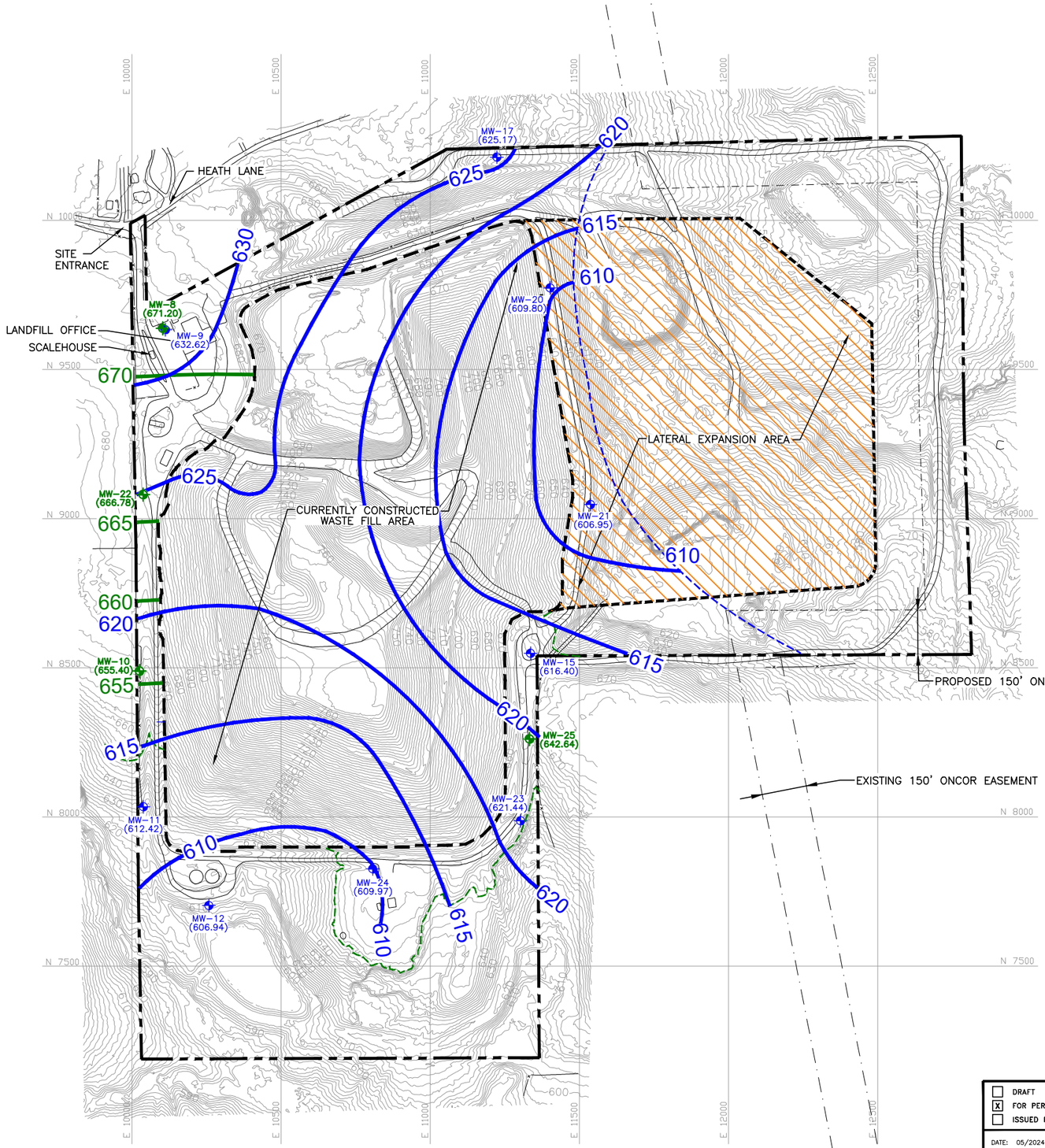
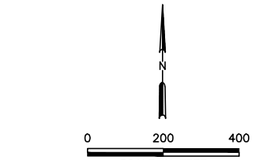
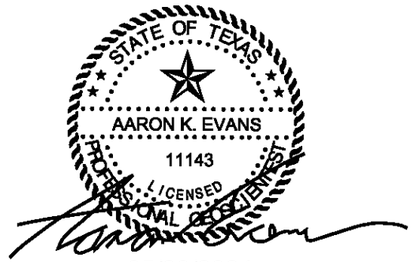
FIGURE IIIG-D-2G

O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-D-2G - AQUIFERS AB FEBRUARY 2024 GW MAP.dwg, byoung, 1:2




05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- MW-8 (671.20) — EXISTING AQUIFER A GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-9 (632.62) — EXISTING AQUIFER B GROUNDWATER MONITOR WELL WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 660 — AQUIFER A GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 620 — AQUIFER B GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER A APPROXIMATE OUTCROP BOUNDARY
- AQUIFER B APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. EXISTING GROUNDWATER MONITOR WELL LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN MARCH 2024 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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DRAWN BY: RSF
DESIGN BY: DCS
REVIEWED BY: AKE

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PREPARED FOR
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# MAJOR PERMIT AMENDMENT
## MARCH 2024
## AQUIFERS A AND B
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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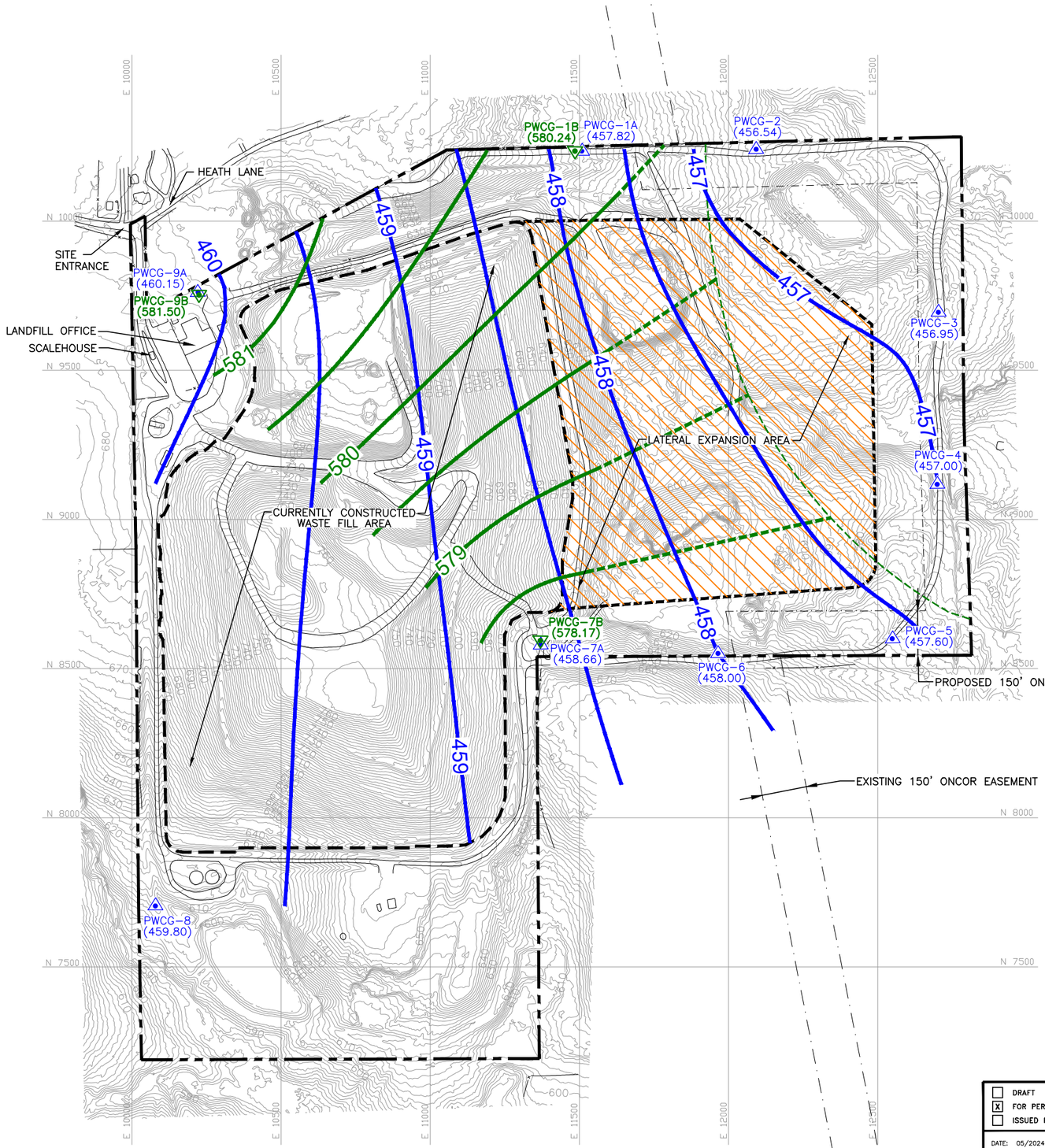
FIGURE IIIG-D-2H

G:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-D-2H - AQUIFERS AB MARCH 2024 GW MAP.dwg, byoung, 1:2

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STATE OF TEXAS
AARON K. EVANS
11143
LICENSED PROFESSIONAL GEOSCIENTIST

05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- PWCG-1B (580.24) — 2023 AQUIFER C EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- PWCG-1A (457.82) — 2023 AQUIFER D EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 581 — AQUIFER C GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 456 — AQUIFER D GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER C APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
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5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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DRAWN BY: SRF
DESIGN BY: DCS
REVIEWED BY: AKE

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PINE HILL FARMS LANDFILL TX, LP

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# MAJOR PERMIT AMENDMENT
## AUGUST 2023
## AQUIFERS C AND D
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-3A

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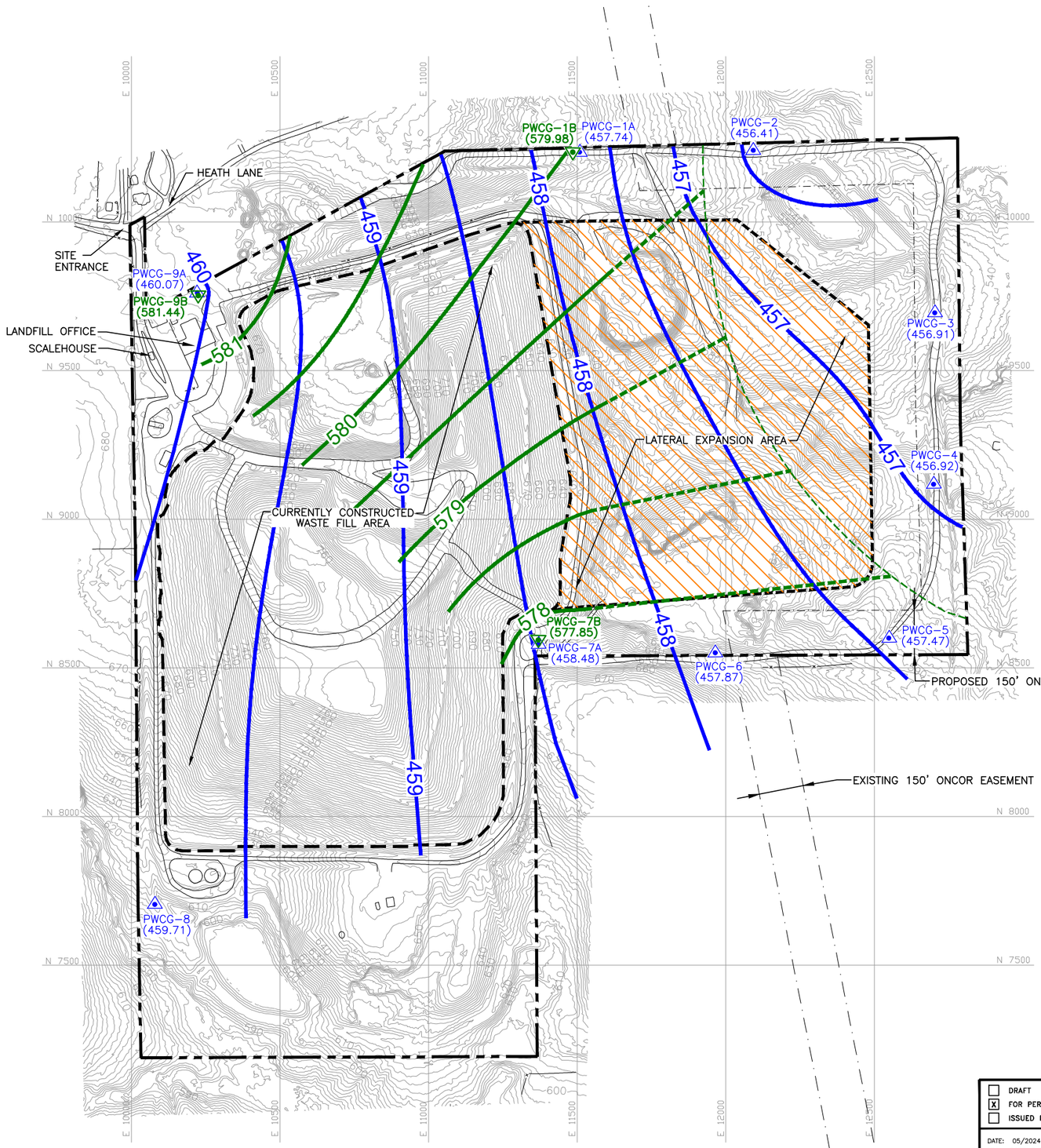


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SCALE IN FEET

STATE OF TEXAS
AARON K. EVANS
11143
LICENSED PROFESSIONAL GEOSCIENTIST

05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- PWCG-1B (579.98) — 2023 AQUIFER C EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- PWCG-1A (457.74) — 2023 AQUIFER D EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 581 — AQUIFER C GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 456 — AQUIFER D GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER C APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
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3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN SEPTEMBER 2023 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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# MAJOR PERMIT AMENDMENT SEPTEMBER 2023 AQUIFERS C AND D GROUNDWATER CONTOUR MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-3B

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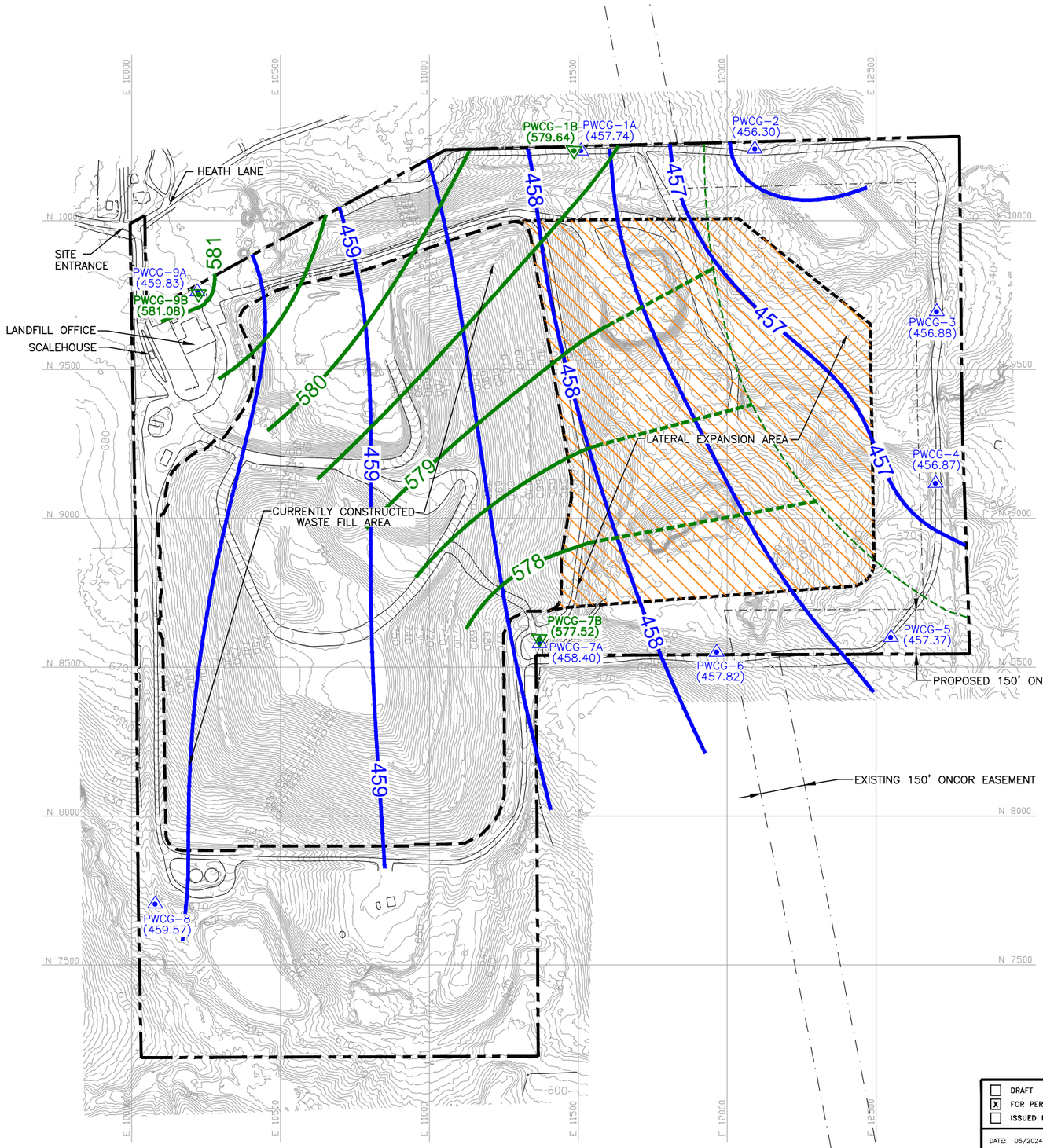


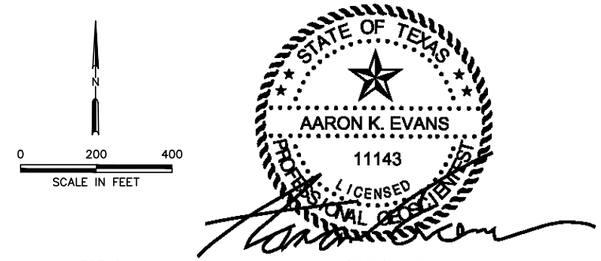


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SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- PWCG-1B (579.64) — 2023 AQUIFER C EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- PWCG-1A (457.74) — 2023 AQUIFER D EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 581 — AQUIFER C GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 456 — AQUIFER D GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER C APPROXIMATE OUTCROP BOUNDARY

NOTES:

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4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN OCTOBER 2023 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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DESIGN BY: DCS
REVIEWED BY: AKE

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PINE HILL FARMS LANDFILL TX, LP

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# MAJOR PERMIT AMENDMENT
## OCTOBER 2023
## AQUIFERS C AND D
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-3C

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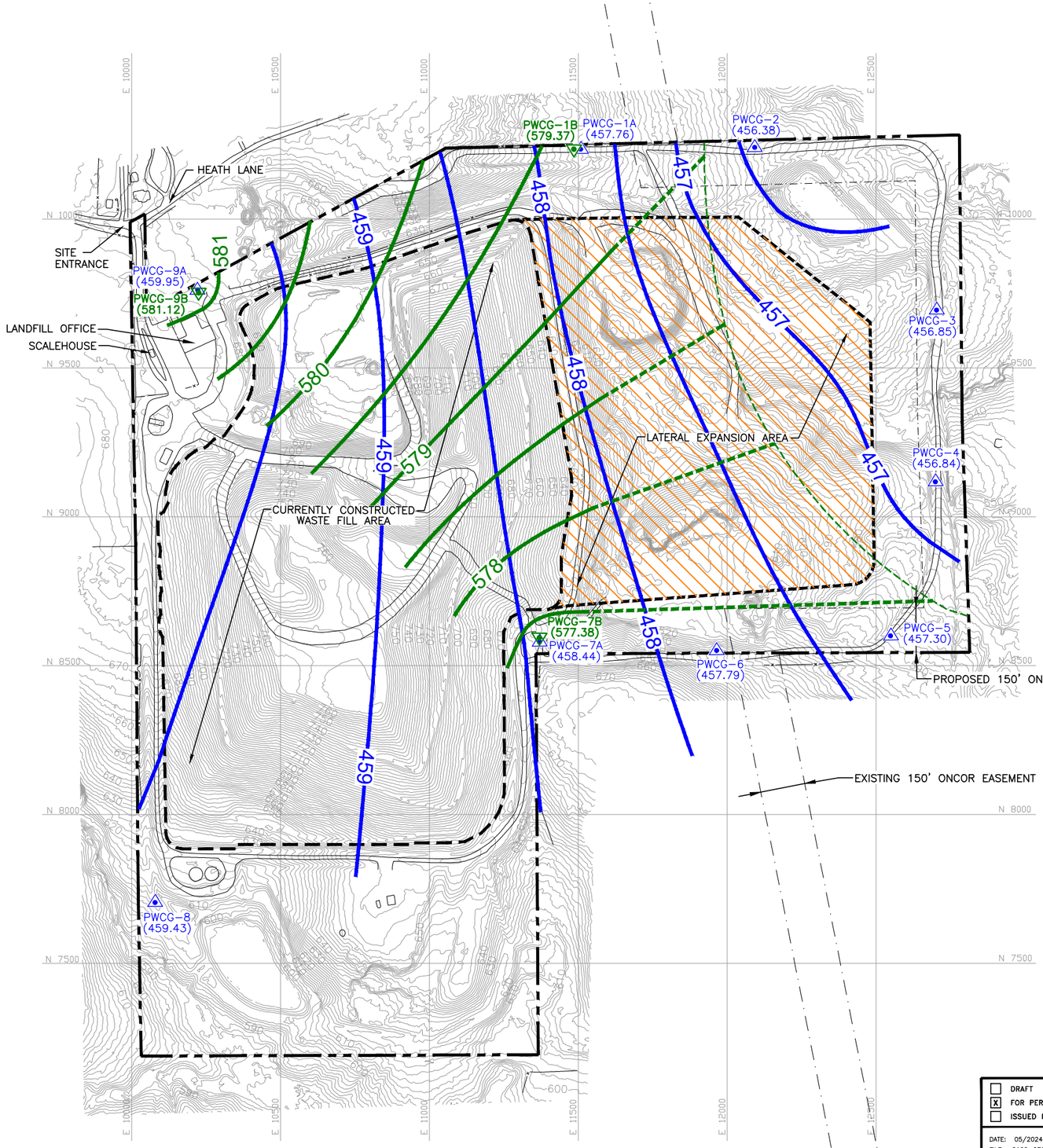


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SCALE IN FEET

STATE OF TEXAS
AARON K. EVANS
11143
LICENSED PROFESSIONAL GEOSCIENTIST

05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- PWCG-1B (579.37) — 2023 AQUIFER C EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- PWCG-1A (457.76) — 2023 AQUIFER D EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 581 — AQUIFER C GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 458 — AQUIFER D GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER C APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. EXISTING GROUNDWATER MONITOR WELL LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN NOVEMBER 2023 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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DATE: 05/2024
FILE: 0120-076-11
CAD: IIIG-D-3D_NOV 23 C/D GW MAP.DWG

DRAWN BY: DCS
DESIGN BY: DCS
REVIEWED BY: AKE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
PINE HILL FARMS LANDFILL TX, LP

| REVISIONS | | |
|---|---|---|
| NO. | DATE | DESCRIPTION |
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# MAJOR PERMIT AMENDMENT
## NOVEMBER 2023
## AQUIFERS C AND D
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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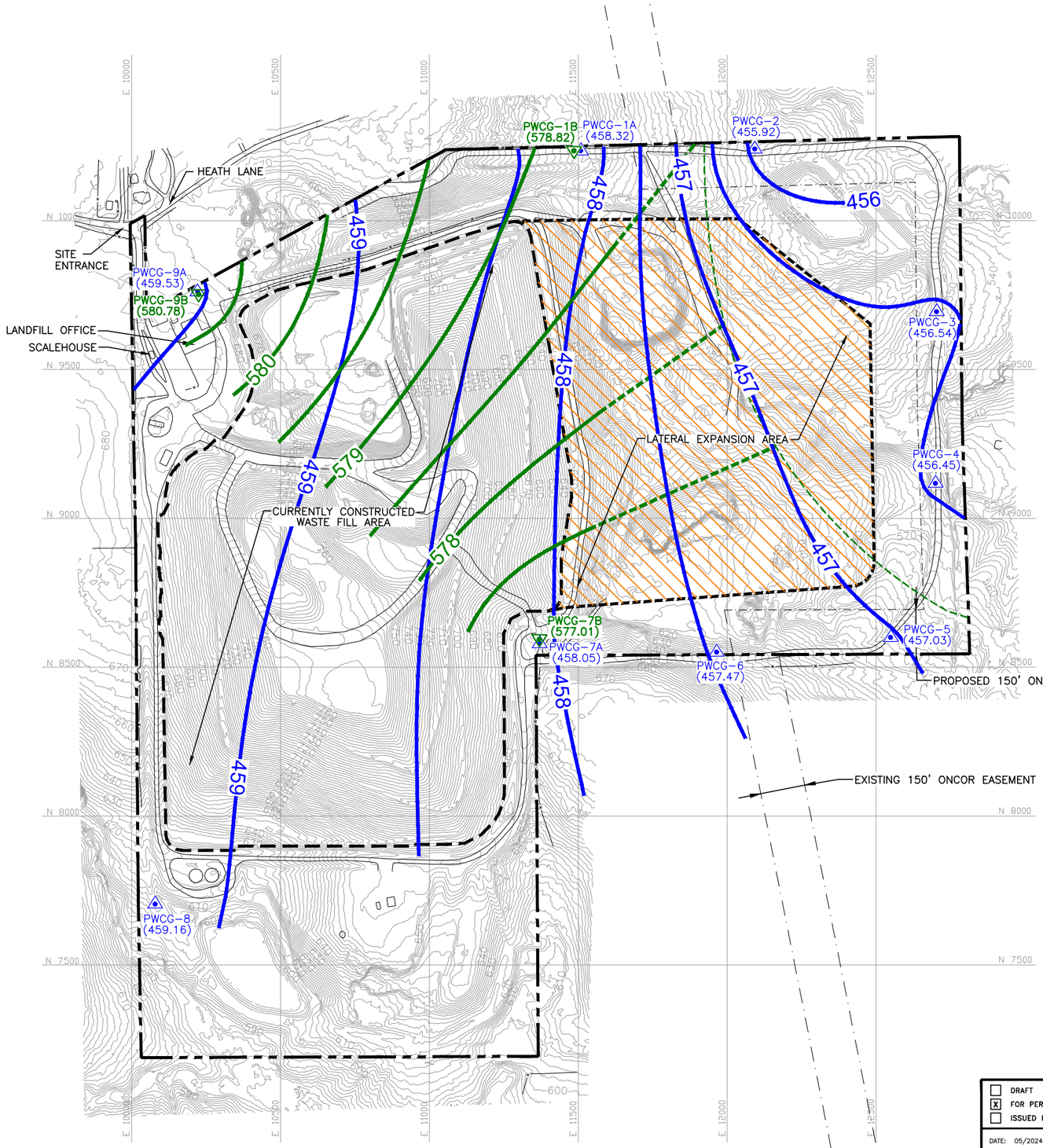
FIGURE IIIG-D-3D

O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-D-3D - AQUIFERS CD NOVEMBER 2023 GW MAP.dwg, byoung, 1:2




0 200 400
SCALE IN FEET

STATE OF TEXAS
AARON K. EVANS
11143
LICENSED PROFESSIONAL GEOSCIENTIST

05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 EXISTING CONTOUR
- N 9500 SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- PWCG-1B (578.82) 2023 AQUIFER C EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- PWCG-1A (458.32) 2023 AQUIFER D EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 580 AQUIFER C GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 458 AQUIFER D GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER C APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
2. EXISTING GROUNDWATER MONITOR WELL LOCATION COORDINATES OBTAINED FROM AUGUST 2023 AS-BUILT SURVEY BY WEAVER CONSULTANTS GROUP.
3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN DECEMBER 2023 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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DATE: 05/2024
FILE: 0120-076-11
CAD: IIIG-D-3E_DEC 23 C/D GW MAP.DWG
DRAWN BY: DCS
DESIGN BY: DCS
REVIEWED BY: AKE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
PINE HILL FARMS LANDFILL TX, LP

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|---|---|---|
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# MAJOR PERMIT AMENDMENT
## DECEMBER 2023
## AQUIFERS C AND D
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-3E

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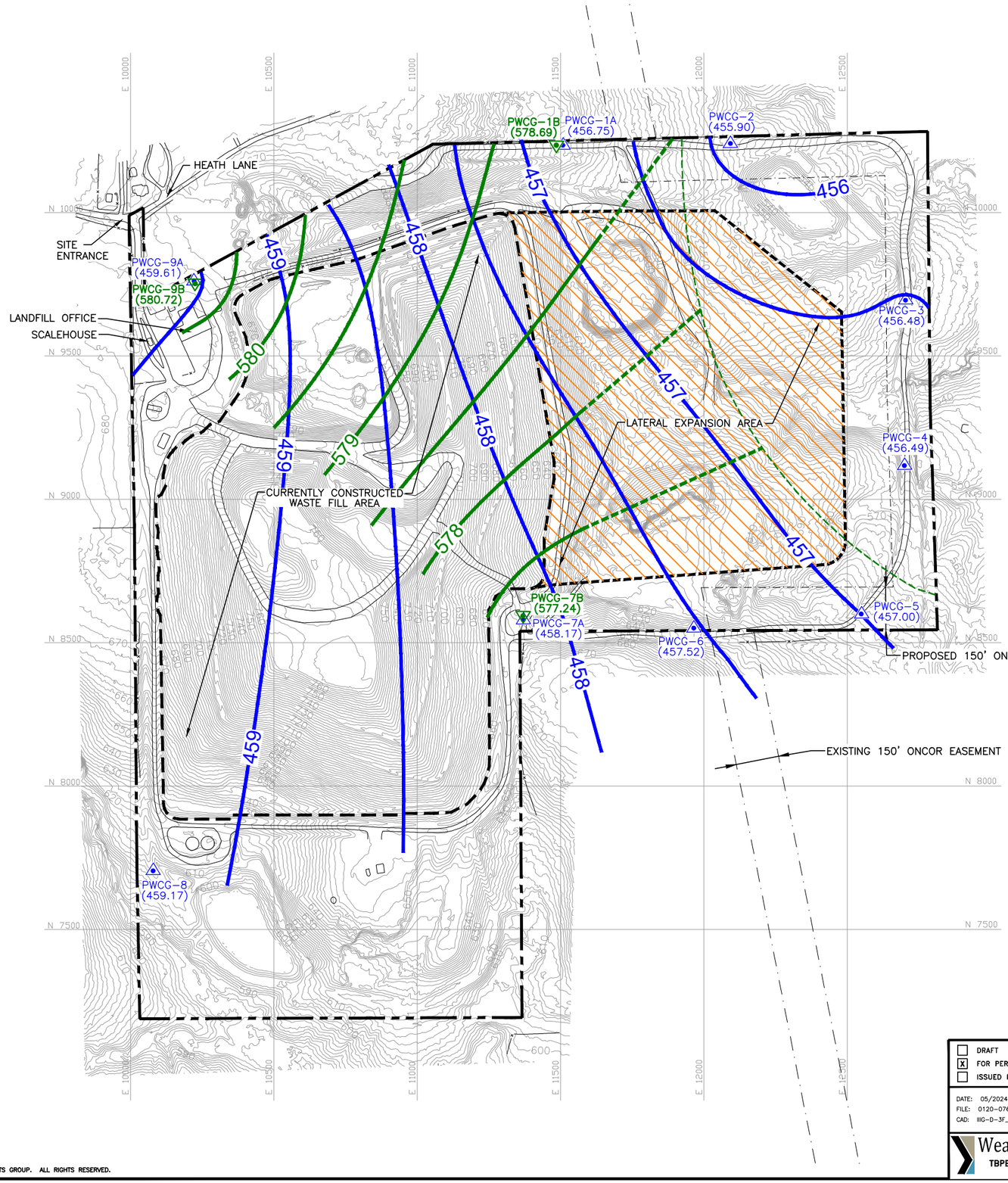
O:\0120\76\EXPANSION 2023\PART III\IIIG-D-3E - AQUIFERS CD DECEMBER 2023 GW MAP.dwg, byoung, 1:2




0 200 400
SCALE IN FEET

STATE OF TEXAS
AARON K. EVANS
11143
LICENSED PROFESSIONAL GEOSCIENTIST

05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 EXISTING CONTOUR
- N 9500 SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- PWCG-1B (578.69) 2023 AQUIFER C EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- PWCG-1A (456.75) 2023 AQUIFER D EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 580 AQUIFER C GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 458 AQUIFER D GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER C APPROXIMATE OUTCROP BOUNDARY

NOTES:

1. EXISTING CONTOURS DEVELOPED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 10, 2022. THE GRID SYSTEM IS BASED ON A SITE GRID SYSTEM. ELEVATIONS ARE BASED ON NAVD 88.
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3. AQUIFER OUTCROP BOUNDARIES APPROXIMATED FROM SUBSURFACE INVESTIGATION LITHOLOGIC LOGS AND WELL SCREENING DATA.
4. GROUNDWATER POTENTIOMETRIC SURFACE ELEVATIONS MEASURED BY WEAVER CONSULTANTS GROUP IN JANUARY 2024 AND POSTED AT EACH MEASUREMENT LOCATION IN FT-MSL.
5. GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS ARE INTERPOLATED BETWEEN MEASUREMENT LOCATIONS; ACTUAL CONDITIONS MAY VARY.

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FILE: 0120-076-11
CAD: IIIG-D-3F_JAN 24 C/D GW MAP.DWG
DRAWN BY: DCS
DESIGN BY: DCS
REVIEWED BY: AKE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
PINE HILL FARMS LANDFILL TX, LP

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# MAJOR PERMIT AMENDMENT
## JANUARY 2024
## AQUIFERS C AND D
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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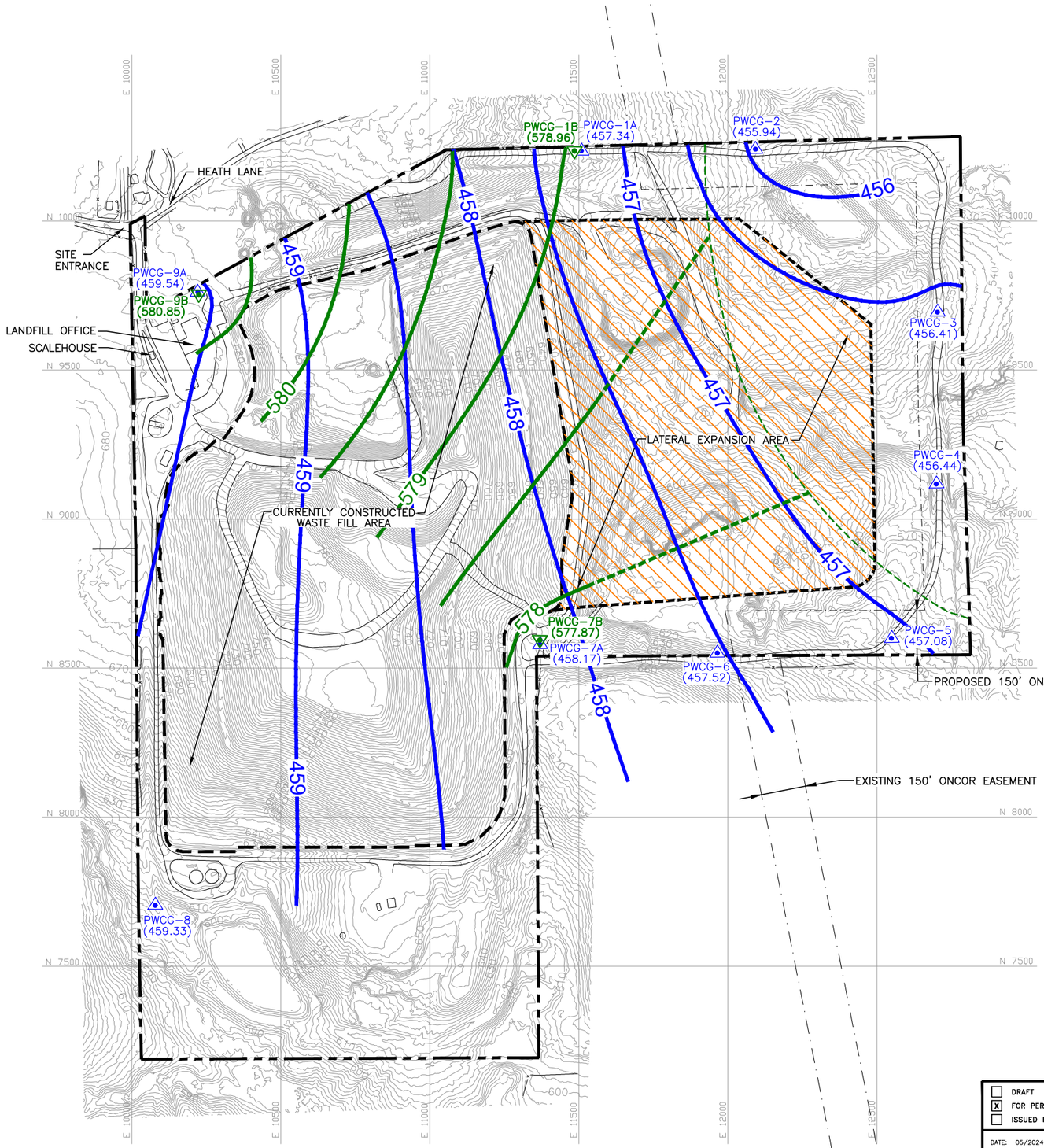
FIGURE IIIG-D-3F

O:\0120\76\EXPANSION 2023\PART III\IIIG\IIIG-D-3F - AQUIFERS CD JANUARY 2024 GW MAP.dwg, byoung, 1:2




0 200 400
SCALE IN FEET

STATE OF TEXAS
AARON K. EVANS
11143
LICENSED PROFESSIONAL GEOSCIENTIST

05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- PWCG-1B (578.96) — 2023 AQUIFER C EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- PWCG-1A (457.34) — 2023 AQUIFER D EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 580 — AQUIFER C GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 458 — AQUIFER D GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER C APPROXIMATE OUTCROP BOUNDARY

NOTES:

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DATE: 05/2024
FILE: 0120-076-11
CAD: IIIG-D-3G_FEB 24 C/D GW MAP.DWG
DRAWN BY: RSF
DESIGN BY: DCS
REVIEWED BY: AKE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
PINE HILL FARMS LANDFILL TX, LP

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# MAJOR PERMIT AMENDMENT
## FEBRUARY 2024
## AQUIFERS C AND D
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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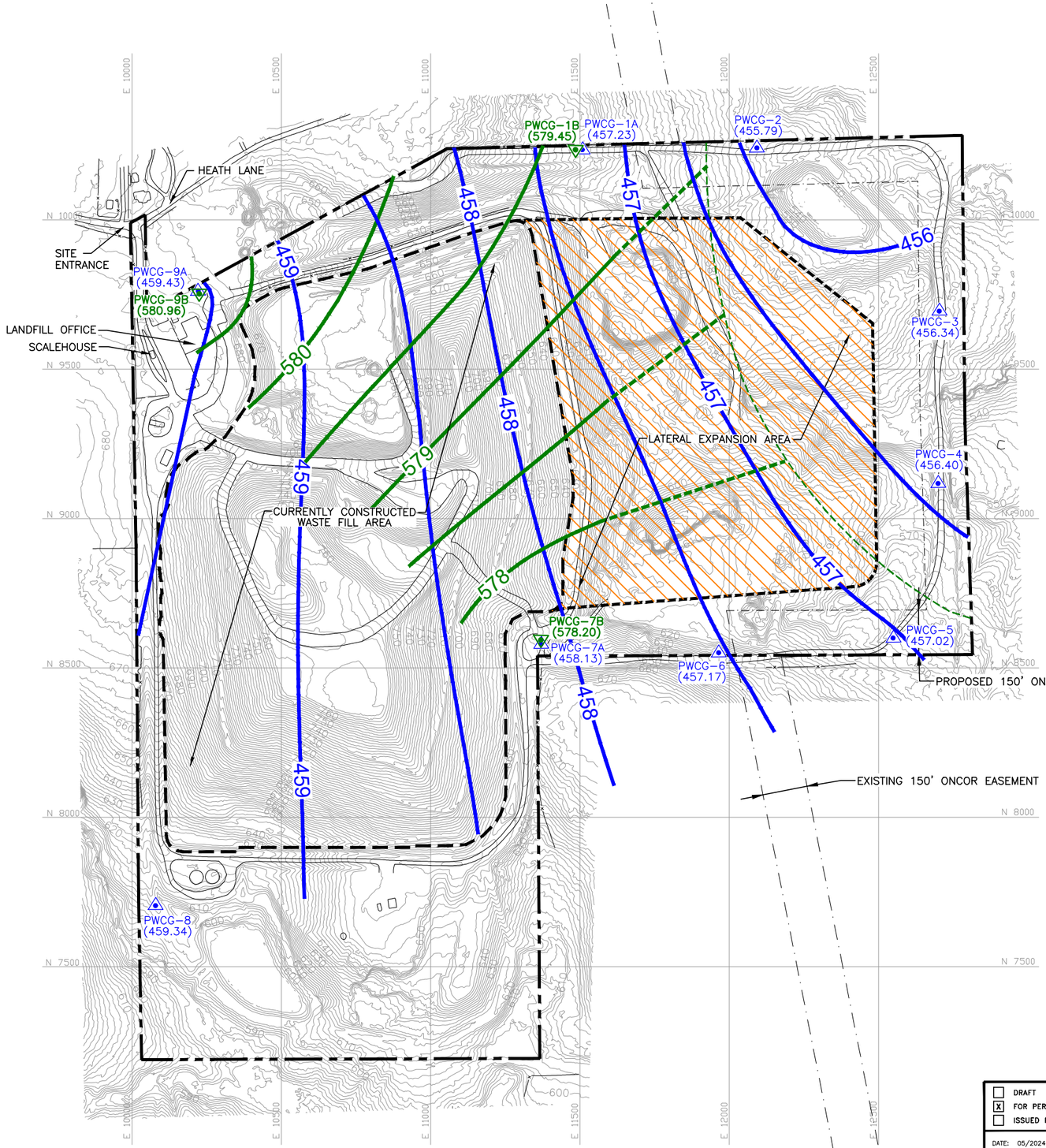
FIGURE IIIG-D-3G

O:\0120\76\EXPANSION 2023\PART III\IIIG-D-3G - AQUIFERS CD FEBRUARY 2024 GW MAP.dwg, byoung, 1:2




0 200 400
SCALE IN FEET

STATE OF TEXAS
AARON K. EVANS
11143
LICENSED PROFESSIONAL GEOSCIENTIST

05/20/2024

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- 630 — EXISTING CONTOUR
- N 9500 — SITE GRID COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- PWCG-1B (579.45) — 2023 AQUIFER C EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- PWCG-1A (457.23) — 2023 AQUIFER D EXPANSION PIEZOMETER WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- 580 — AQUIFER C GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- 458 — AQUIFER D GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR IN FT-MSL
- AQUIFER C APPROXIMATE OUTCROP BOUNDARY

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DATE: 05/2024
FILE: 0120-076-11
CAD: IIIG-D-3H_MARCH 24 C/D GWMAP.DWG
DRAWN BY: RSF
DESIGN BY: DCS
REVIEWED BY: AKE

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PINE HILL FARMS LANDFILL TX, LP

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# MAJOR PERMIT AMENDMENT
## MARCH 2024
## AQUIFERS C AND D
## GROUNDWATER CONTOUR MAP
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE IIIG-D-3H

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O:\0120\76\EXPANSION 2023\PART III\IIIG-D-3H - AQUIFERS CD MARCH 2024 GW MAP.dwg, byoung, 1:2

# 1982 MAXIM DATA PERMEABILITY TEST RESULTS

## PERMEABILITY TEST RESULTS

| Boring Number | Soil Description | Depth | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| B-7 | reddish to yellowish tan clay | 00'-05' (composite) | *$7.6 \times 10^{-8}$ |
| B-10 | yellowish tan clay | 10'-15' (composite) | *$1.5 \times 10^{-7}$ |
| B-12 | yellowish tan clay | 05'-07' | $9.1 \times 10^{-8}$ |
| B-12 | yellowish tan clay | 12'-15' (composite) | *$3.4 \times 10^{-8}$ |
| B-15 | yellowish tan clay | 09'-11' | $3.4 \times 10^{-7}$ |
| B-16 | yellowish tan clay | 23'-27' (composite) | *$7.7 \times 10^{-8}$ |
| B-17 | yellowish tan clay | 13'-14' | $8.7 \times 10^{-8}$ |
| B-18 | yellowish tan clay | 03'-04.5' | $3.3 \times 10^{-8}$ |
| B-20 | yellowish tan clay | 08'-09.5' | $2.6 \times 10^{-8}$ |

*Remolded samples.

# 1993 GOLDER ASSOCIATES
# HISTORICAL GWATER LEVEL DATA

TABLE 2.2.2

LAIDLAW WASTE SYSTEMS, INC.
JACKSONVILLE LANDFILL
JACKSONVILLE, CHEROKEE COUNTY, TEXAS

SUMMARY OF WATER LEVEL DATA

| WELL IDENTIFICATION | DEPTH OF WELL feet bgs | ELEVATION OF REFERENCE POINT ft MSL | DATE OF MEASUREMENT MM/DD/YY | MEASURED DEPTH TO GROUNDWATER feet | GROUNDWATER TABLE ELEVATION ft MSL |
|---|---|---|---|---|---|
| MW-1 | 20 | 661.0 | 03/29/93 | 12.34 | 648.66 |
| | | | 05/26/92 | 14.75 | 646.25 |
| | | | 04/09/92 | 14.00 | 647.00 |
| | | | 03/29/91 | 14.77 | 646.23 |
| | | | 09/28/90 | 10.90 | 650.10 |
| | | | 06/12/90 | 10.40 | 650.60 |
| | | | 04/19/88 | 11.00 | 650.00 |
| | | | 03/09/87 | 10.16 | 650.84 |
| | | | 12/06/85 | 5.00 | 656.00 |
| MW-2 | 30 | 621.0 | 03/29/93 | 6.73 | 614.27 |
| | | | 05/26/92 | 20.66 | 600.34 |
| | | | 04/09/92 | 13.30 | 607.70 |
| | | | 03/29/91 | 11.66 | 609.34 |
| | | | 09/28/90 | 10.30 | 610.70 |
| | | | 06/12/90 | 9.60 | 611.40 |
| | | | 03/28/89 | 16.00 | 605.00 |
| | | | 04/19/88 | 13.00 | 608.00 |
| | | | 03/09/87 | 6.83 | 614.17 |
| | | | 08/29/86 | DRY | --- |
| | | | 02/11/85 | DRY | --- |
| | | | 12/06/85 | 22.00 | 599.00 |
| MW-3 | 30 | 621.0 | 03/29/93 | 8.86 | 612.14 |
| | | | 05/26/92 | 18.46 | 602.54 |
| | | | 04/09/92 | 11.10 | 609.90 |
| | | | 03/29/91 | 9.35 | 611.65 |
| | | | 09/28/90 | 10.60 | 610.40 |
| | | | 06/12/90 | 10.60 | 610.40 |
| | | | 03/28/89 | 12.60 | 608.40 |
| | | | 09/09/88 | 12.10 | 608.90 |
| | | | 04/19/88 | 11.00 | 610.00 |
| | | | 03/09/87 | 9.43 | 611.57 |
| | | | 12/06/85 | 15.00 | 606.00 |

A:\JACKSONWATERLVL

TABLE 2.2.2

LAIDLAW WASTE SYSTEMS, INC.
JACKSONVILLE LANDFILL
JACKSONVILLE, CHEROKEE COUNTY, TEXAS

SUMMARY OF WATER LEVEL DATA

| WELL IDENTIFICATION | DEPTH OF WELL feet bgs | ELEVATION OF REFERENCE POINT ft MSL | DATE OF MEASUREMENT MM/DD/YY | MEASURED DEPTH TO GROUNDWATER feet | GROUNDWATER TABLE ELEVATION ft MSL |
|---|---|---|---|---|---|
| MW-4 | 30 | 621.0 | 03/29/93 | 29.07 | 591.93 |
| | | | 05/26/92 | 26.50 | 594.50 |
| | | | 04/09/92 | 26.50 | 594.50 |
| | | | 03/29/91 | 26.70 | 594.30 |
| | | | 06/12/90 | 28.20 | 592.80 |
| | | | 04/19/88 | 29.00 | 592.00 |
| | | | 08/29/86 | DRY | --- |
| | | | 02/11/85 | DRY | --- |
| | | | 12/06/85 | 22.00 | 599.00 |
| MW-5 | 60 | 573.0 | 03/29/93 | 47.51 | 525.49 |
| | | | 05/26/92 | 45.69 | 527.31 |
| | | | 04/09/92 | 46.20 | 526.80 |
| | | | 03/29/91 | 45.43 | 527.57 |
| | | | 09/28/90 | 45.30 | 527.70 |
| | | | 06/12/90 | 45.50 | 527.50 |
| | | | 03/28/89 | 50.40 | 522.60 |
| | | | 12/02/88 | 50.70 | 522.30 |
| | | | 09/09/88 | 49.30 | 523.70 |
| | | | 04/19/88 | 45.00 | 528.00 |
| MW-6 | 55 | 583.0 | 03/29/93 | 51.54 | 531.46 |
| | | | 05/26/92 | 51.60 | 531.40 |
| | | | 04/09/92 | 46.50 | 536.50 |
| | | | 03/29/91 | 44.32 | 538.68 |
| | | | 09/28/90 | 44.00 | 539.00 |
| | | | 06/12/90 | 43.70 | 539.30 |
| | | | 03/28/89 | 52.60 | 530.40 |
| | | | 12/02/88 | 50.30 | 532.70 |
| | | | 09/09/88 | 53.80 | 529.20 |
| | | | 04/19/88 | 43.00 | 540.00 |

A:\JACKSON\WATERLVL

TABLE 2.2.2

LAIDLAW WASTE SYSTEMS, INC.
JACKSONVILLE LANDFILL
JACKSONVILLE, CHEROKEE COUNTY, TEXAS

SUMMARY OF WATER LEVEL DATA

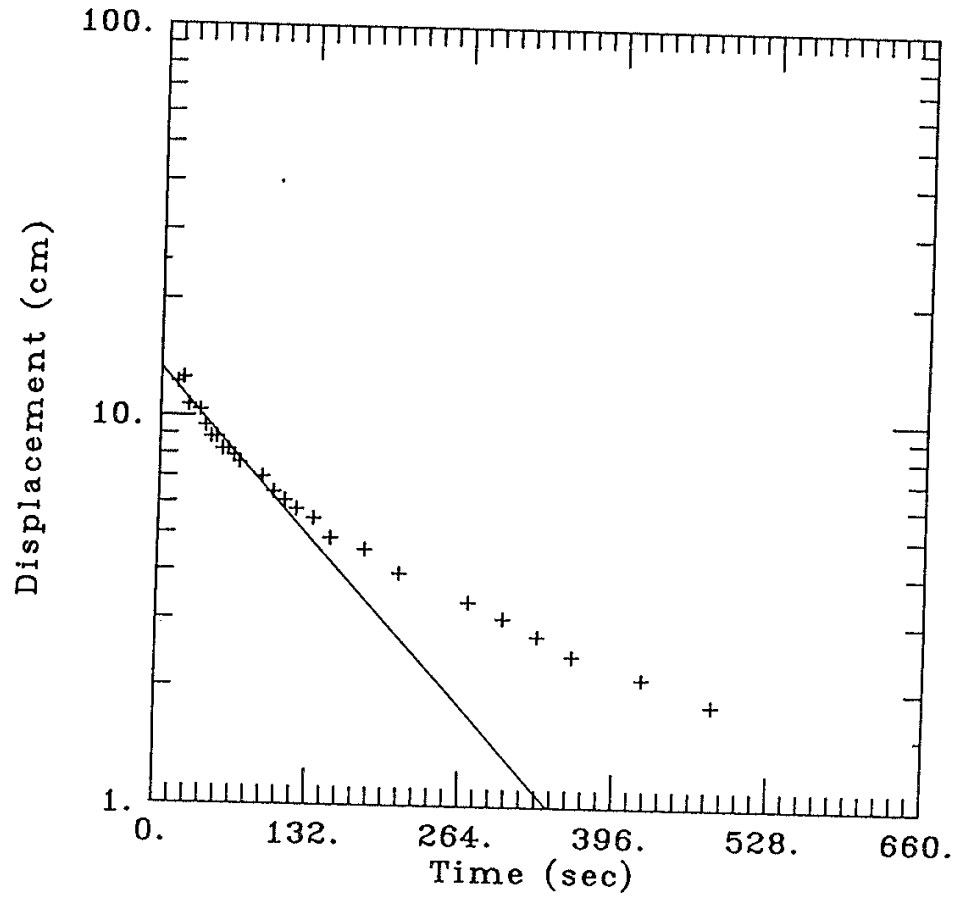
| WELL IDENTIFICATION | DEPTH OF WELL feet bgs | ELEVATION OF REFERENCE POINT ft MSL | DATE OF MEASUREMENT MM/DD/YY | MEASURED DEPTH TO GROUNDWATER feet | GROUNDWATER TABLE ELEVATION ft MSL |
|---|---|---|---|---|---|
| MW-7 | 93 | 533.0 | 03/29/93 | 78.11 | 454.89 |
| | | | 05/26/92 | 75.00 | 458.00 |
| | | | 04/09/92 | 78.40 | 454.60 |
| | | | 03/29/91 | 80.55 | 452.45 |
| | | | 09/28/90 | 85.10 | 447.90 |
| | | | 06/12/90 | 80.10 | 452.90 |
| | | | 03/28/89 | 83.10 | 449.90 |
| | | | 12/02/88 | 91.50 | 441.50 |
| | | | 09/09/88 | 85.50 | 447.50 |
| | | | 04/19/88 | 81.00 | 452.00 |

A:\JACKSON\WATERLVL

# 1994 GROUNDWATER TECHNOLOGIES
# SLUG TEST REPORTS

| Groundwater Technology Inc. | Client: Laidlaw |
|---|---|
| Project No.: 04248-0069 | Location: Royal Oaks Landfill |

# MW-1 Slug Out




DATA SET:
romw1out.dat
01/31/95

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATE:
6/24/94

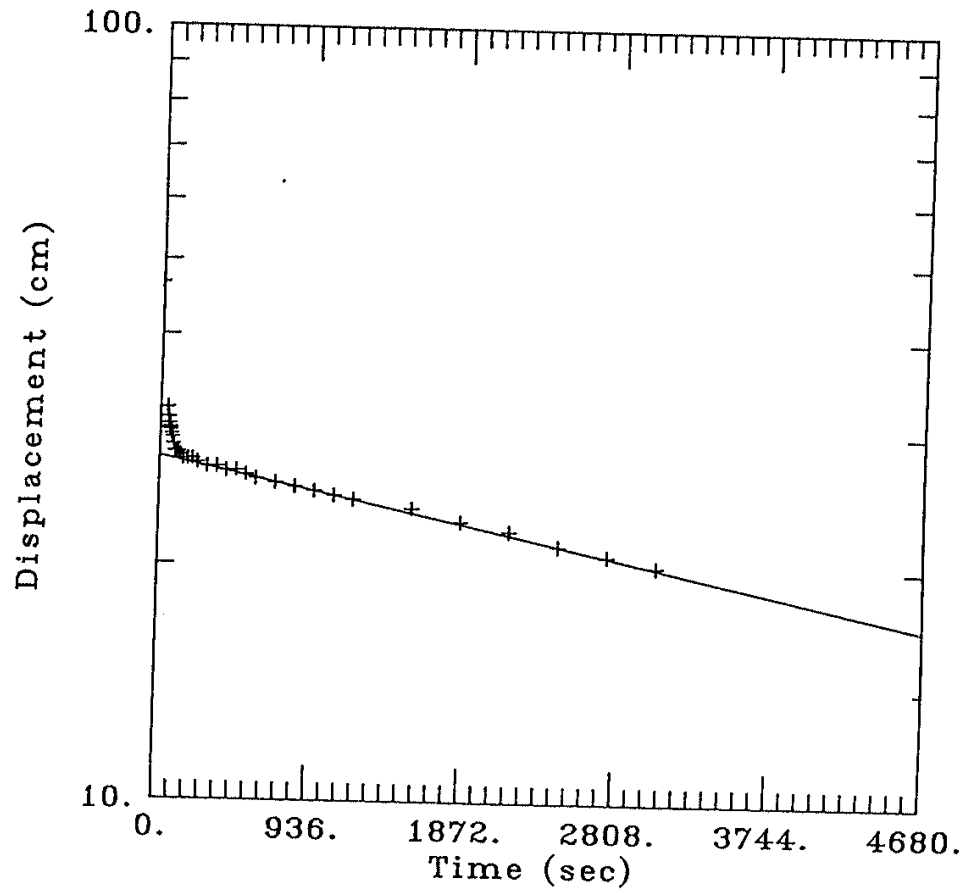
TEST WELL:
MW-1

ESTIMATED PARAMETERS:
K = 0.003516 cm/sec
y0 = 13.25 cm

TEST DATA:
H0 = 24.99 cm
rc = 7.62 cm
rw = 11.58 cm
L = 93.57 cm
b = 93.57 cm
H = 93.57 cm

| Groundwater Technology Inc. | Client: Laidlaw |
|---|---|
| Project No.: 04248-0069 | Location: Royal Oaks Landfill |

# MW-2 Slug Out




DATA SET:
romw2out.dat
01/31/95

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

TEST DATE:
6/23/94

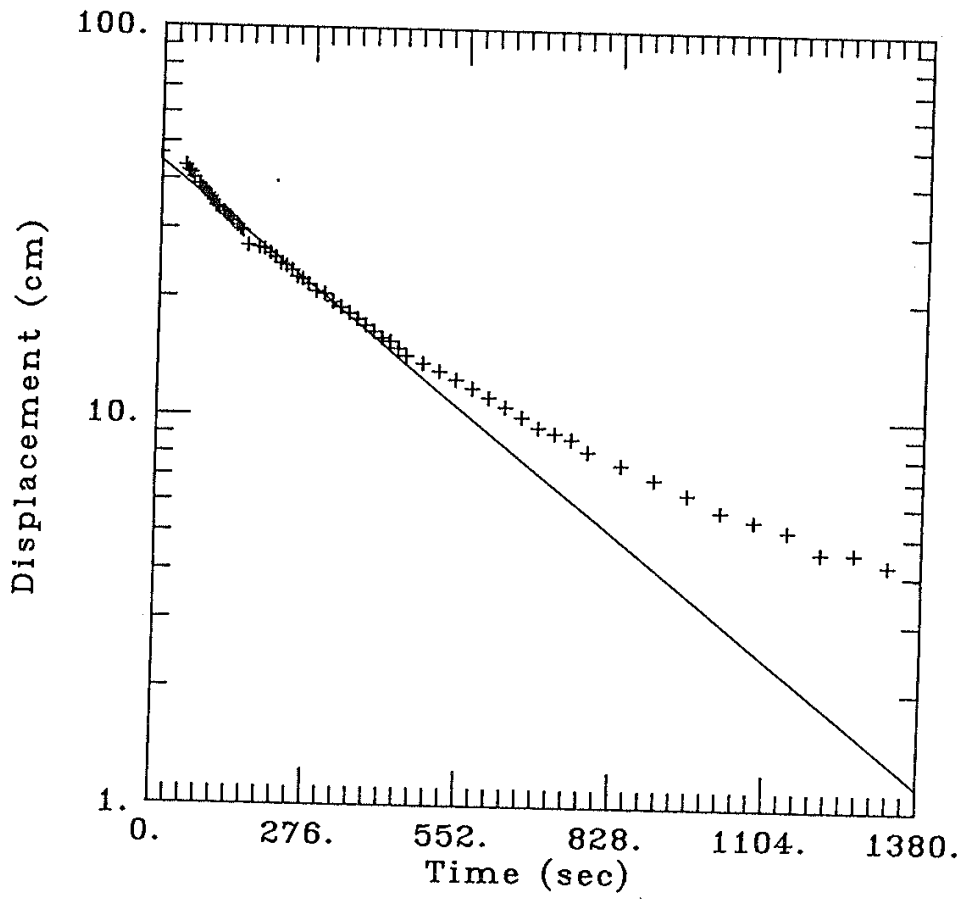
TEST WELL:
MW-2

ESTIMATED PARAMETERS:
K = 1.701E-05 cm/sec
y0 = 27.66 cm

TEST DATA:
H0 = 46.63 cm
rc = 7.62 cm
rw = 11.58 cm
L = 527.3 cm
b = 527.3 cm
H = 527.3 cm

| Groundwater Technology Inc. | Client: Laidlaw |
|---|---|
| Project No.: 042480069 | Location: Royal Oaks Landfill |

# MW-3 Slug Out




DATA SET:
romw3out.dat
01/31/95

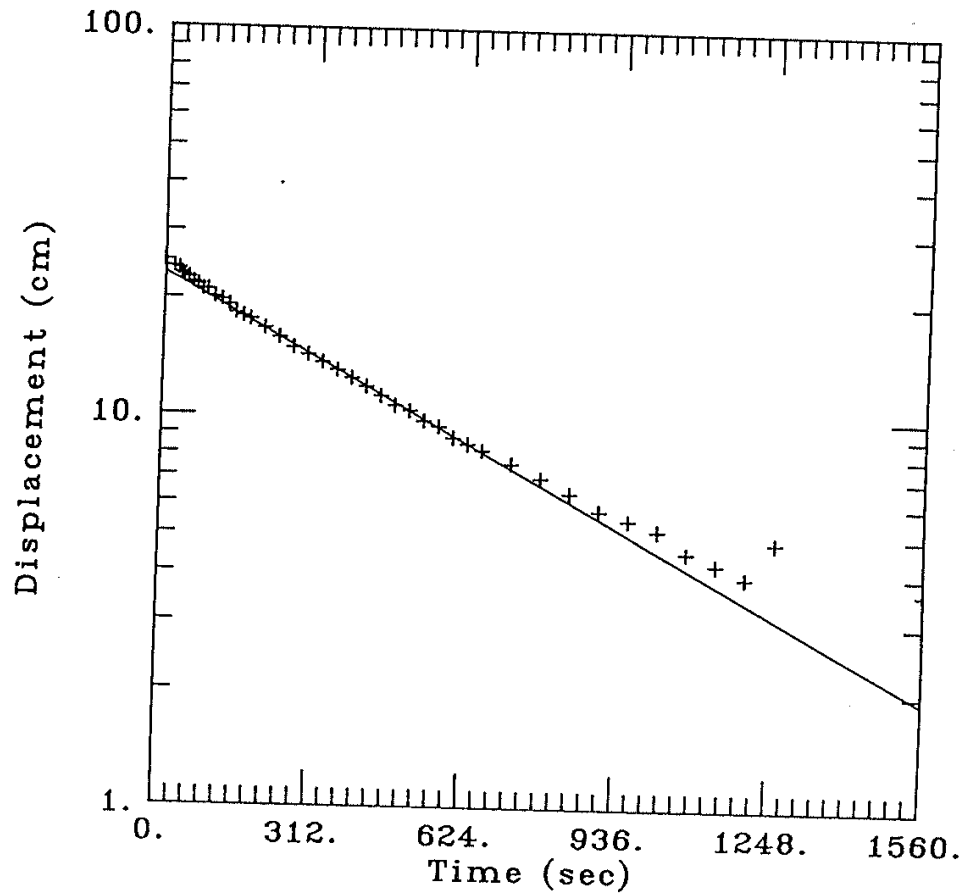
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Bouwer-Rice
TEST DATE:
6/24/94
TEST WELL:
MW-3

ESTIMATED PARAMETERS:
K = 0.0003971 cm/sec
y0 = 44.6 cm

TEST DATA:
H0 = 46.63 cm
rc = 7.62 cm
rw = 11.58 cm
L = 579.7 cm
b = 579.7 cm
H = 579.7 cm

| Groundwater Technology Inc. | Client: Laidlaw |
|---|---|
| Project No.: 04248-0069 | Location: Royal Oaks Landfill |

# MW-5 Slug Out




DATA SET:
romw5out.dat
01/31/95

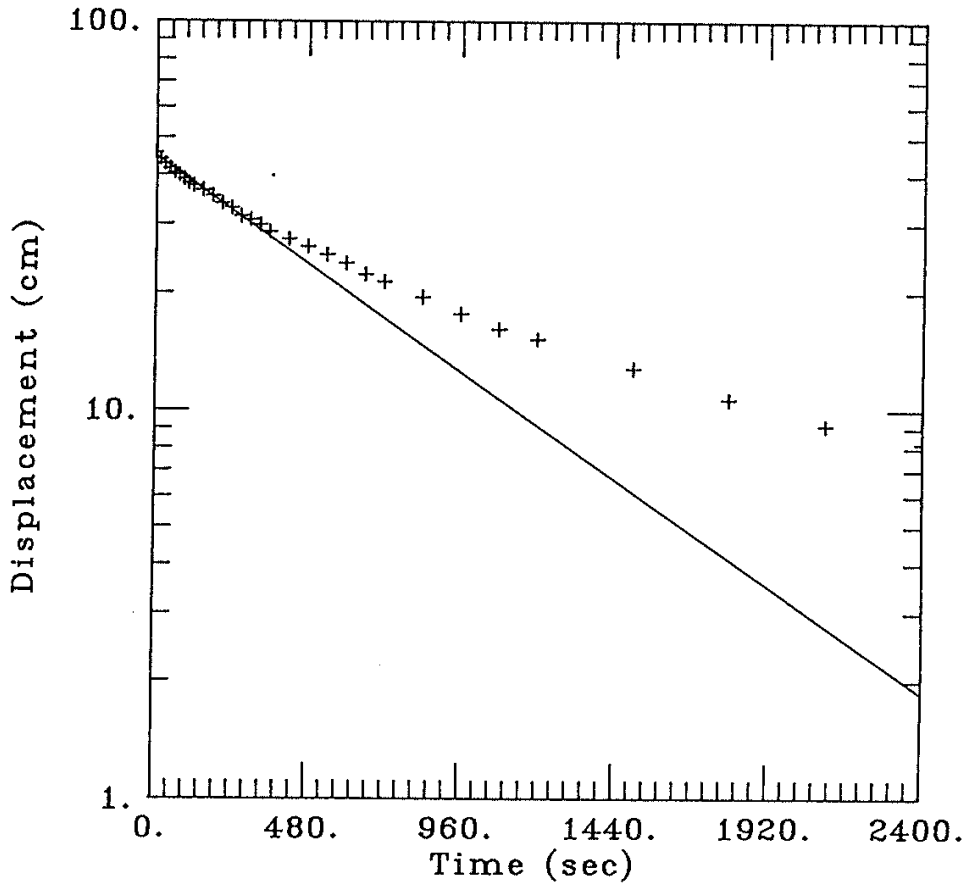
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Bouwer-Rice
TEST DATE:
6/24/94
TEST WELL:
MW-5

ESTIMATED PARAMETERS:
K = 0.000331 cm/sec
y0 = 23.28 cm

TEST DATA:
H0 = 24.99 cm
rc = 7.62 cm
rw = 11.58 cm
L = 366.4 cm
b = 366.4 cm
H = 366.4 cm

| Groundwater Technology Inc. | Client: Laidlaw |
|---|---|
| Project No.: 04248-0069 | Location: Royal Oaks Landfill |

# MW-8 Slug In




DATA SET:
romw8in.dat
01/31/95

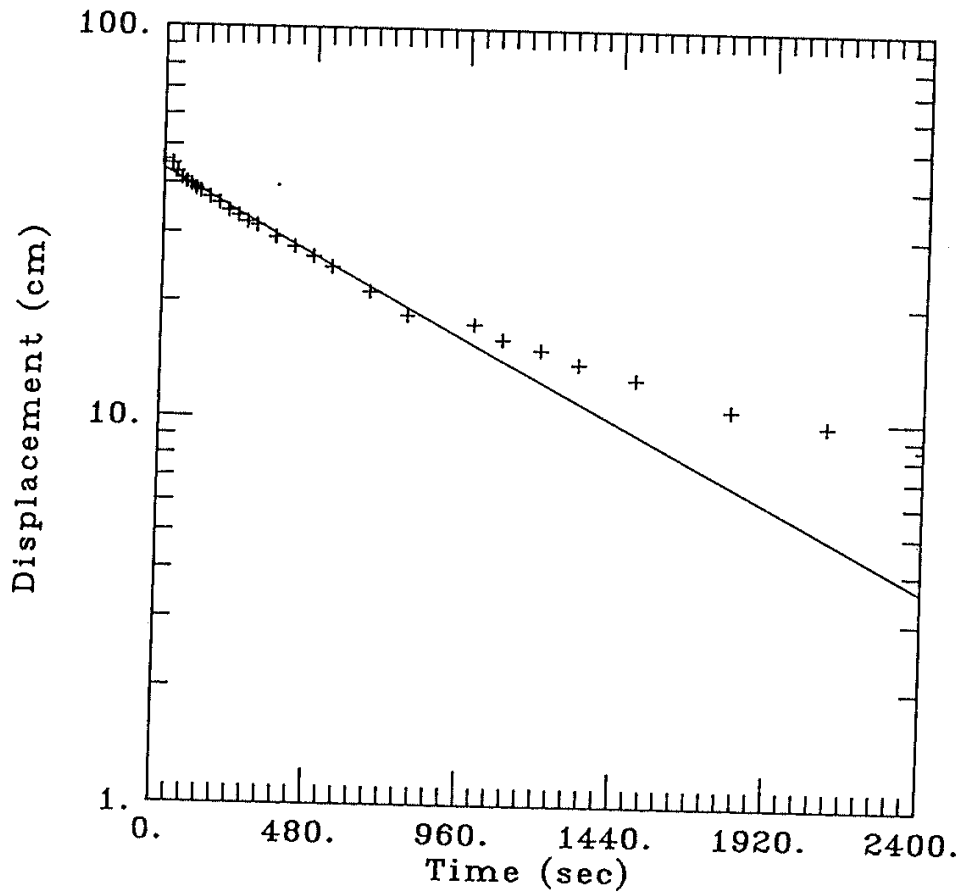
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Bouwer-Rice
TEST DATE:
12/23/94
TEST WELL:
MW-8

ESTIMATED PARAMETERS:
K = 0.0001419 cm/sec
y0 = 44.67 cm

TEST DATA:
H0 = 45.72 cm
rc = 5.081 cm
rw = 14.63 cm
L = 350.5 cm
b = 457.2 cm
H = 868.7 cm

| Groundwater Technology Inc. | Client: Laidlaw |
|---|---|
| Project No.: 04248-0069 | Location: Royal Oaks Landfill |

# MW-8 Slug Out



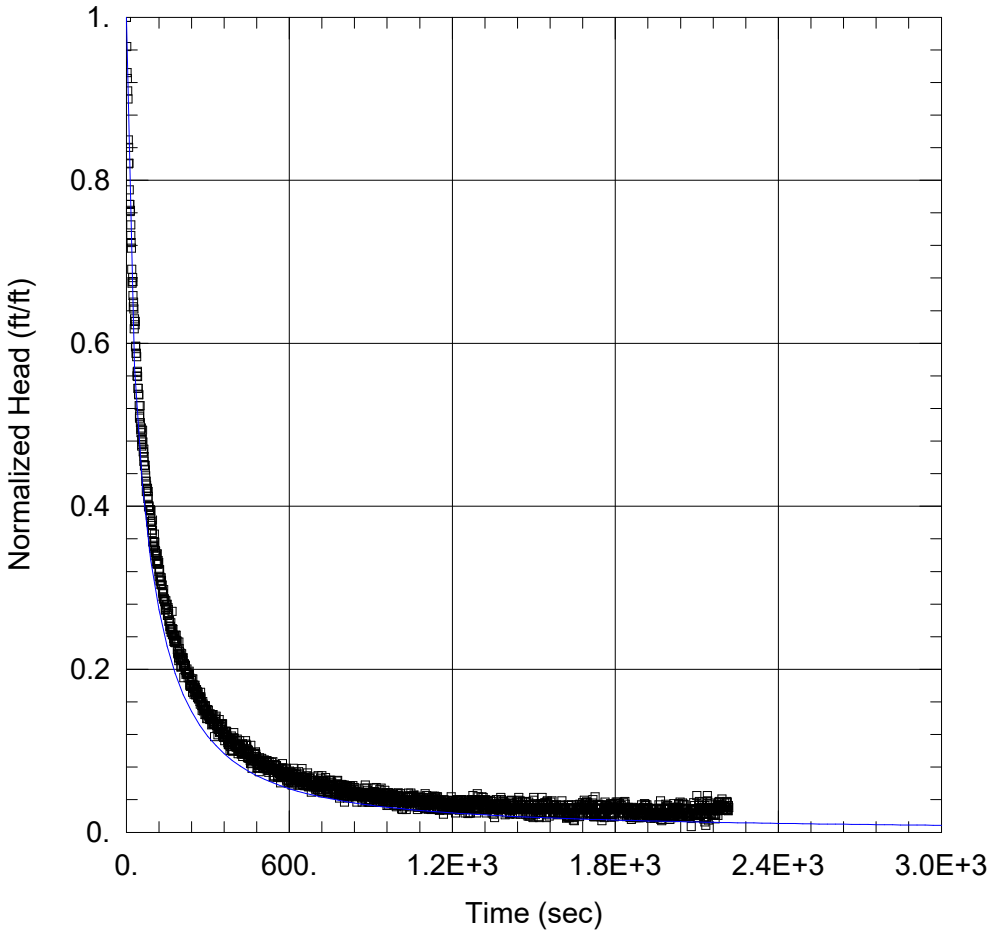

DATA SET:
romw8out.dat
01/31/95

AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Bouwer-Rice
TEST DATE:
12/23/94
TEST WELL:
MW-8

ESTIMATED PARAMETERS:
K = 0.000111 cm/sec
y0 = 43.49 cm

TEST DATA:
H0 = 45.72 cm
rc = 5.081 cm
rw = 14.63 cm
L = 350.5 cm
b = 457.2 cm
H = 868.7 cm

# 2023 WEAVER CONSULTANTS GROUP
# SLUG TEST REPORTS




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-1A.aqt
Date: 12/21/23 Time: 11:35:06

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-1A
Test Date: 8-29-2023

## AQUIFER DATA

Saturated Thickness: 119.4 ft

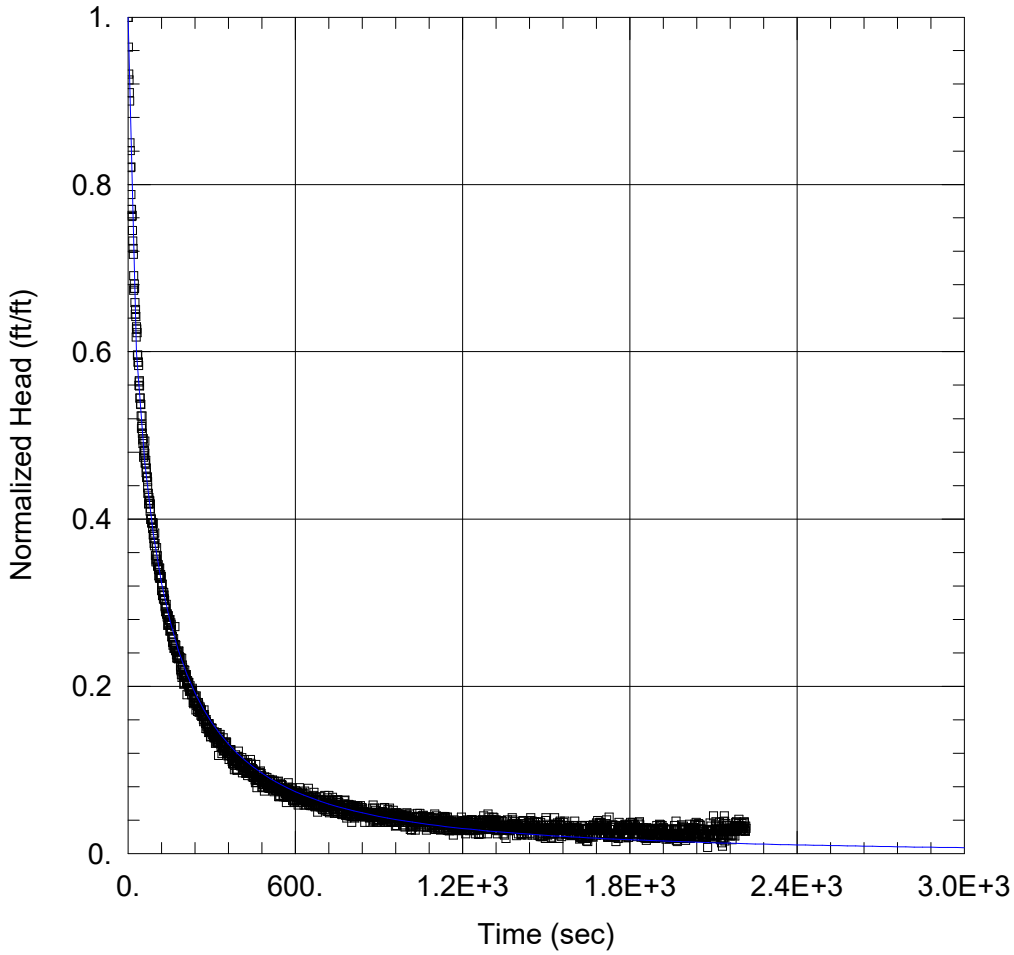
## WELL DATA (PWCG-1A)

Initial Displacement: 1.397 ft
Total Well Penetration Depth: 29.72 ft
Casing Radius: 0.083 ft
Static Water Column Height: 29.72 ft
Screen Length: 20. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.0001092 cm/sec
Kz/Kr = 0.001
Ss = 0.0004753 $ft^{-1}$




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-1B.aqt
Date: 12/21/23 Time: 11:31:42

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-1B
Test Date: 11/16/23

## AQUIFER DATA

Saturated Thickness: 4.5 ft

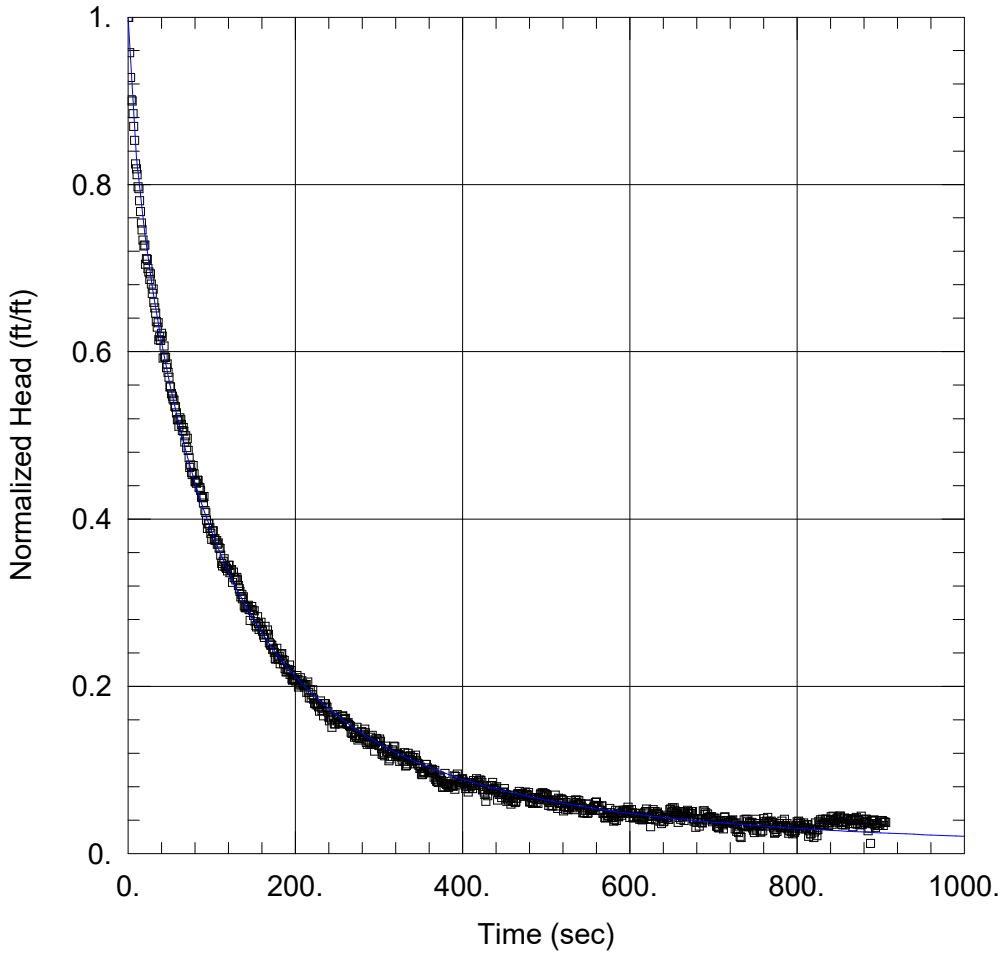
## WELL DATA (PWCG-1B)

Initial Displacement: 1.397 ft
Total Well Penetration Depth: 6.49 ft
Casing Radius: 0.083 ft
Static Water Column Height: 6.49 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.000473 cm/sec
Kz/Kr = 1.
Ss = 0.0007272 $ft^{-1}$




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-2.aqt
Date: 12/21/23 Time: 11:58:25

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-2
Test Date: 8-30-2023

## AQUIFER DATA

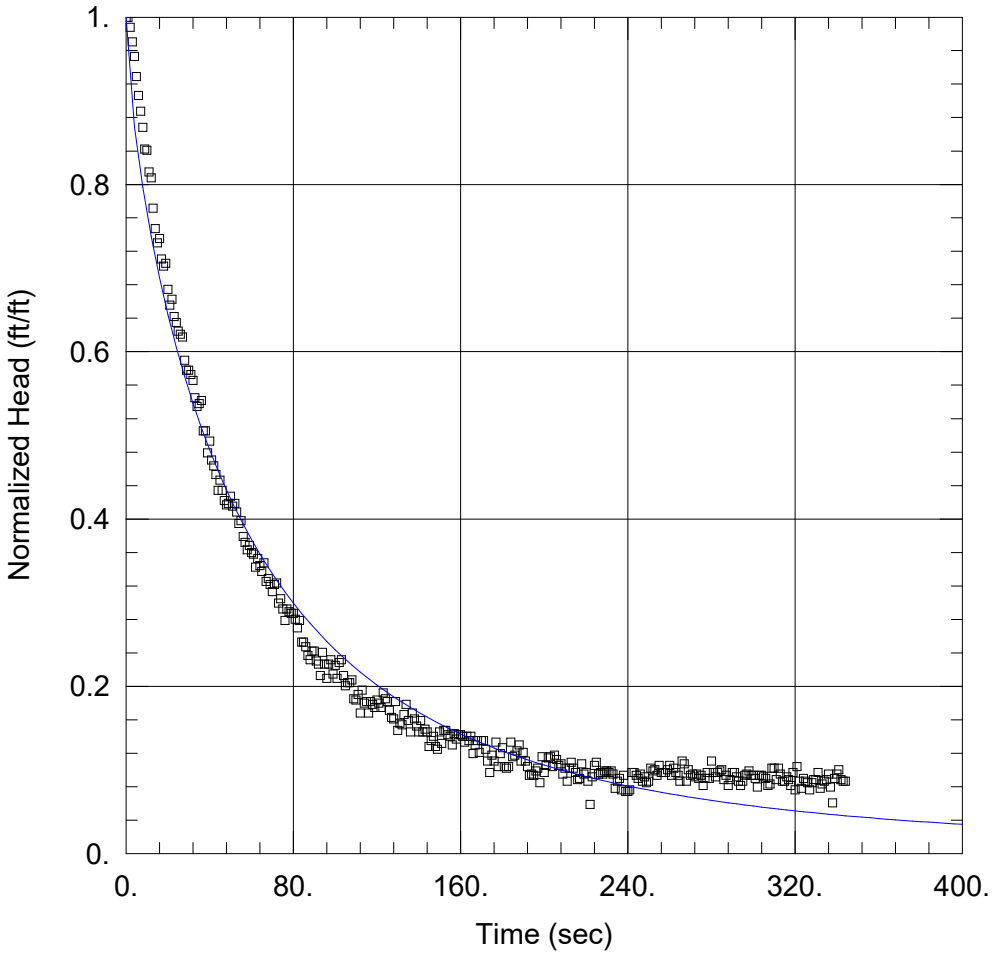
Saturated Thickness: 136.5 ft

## WELL DATA (PWCG-2)

Initial Displacement: 1.317 ft
Total Well Penetration Depth: 26.66 ft
Casing Radius: 0.083 ft
Static Water Column Height: 26.66 ft
Screen Length: 20. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model
Kr = 0.0001193 cm/sec
Kz/Kr = 1.
Ss = 9.021E-5 $ft^{-1}$




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-3.aqt
Date: 12/21/23 Time: 12:10:01

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-3
Test Date: 8-30-2023

## AQUIFER DATA

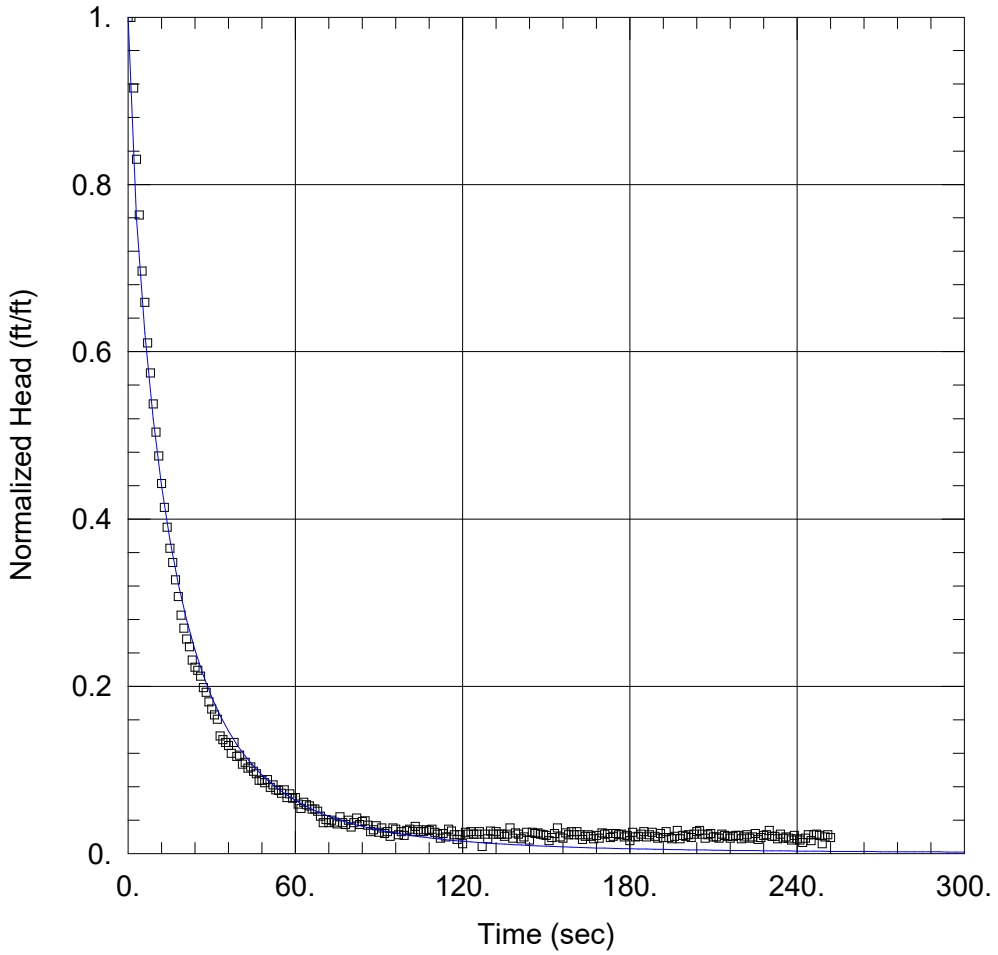
Saturated Thickness: 139.2 ft

## WELL DATA (PWCG-3)

Initial Displacement: 0.578 ft
Total Well Penetration Depth: 28.25 ft
Casing Radius: 0.083 ft
Static Water Column Height: 1.75 ft
Screen Length: 15. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model
Kr = 0.0002728 cm/sec
Kz/Kr = 1.
Ss = 0.0000114 $ft^{-1}$




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-4.aqt
Date: 12/21/23 Time: 12:17:15

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-4
Test Date: 8-30-2023

## AQUIFER DATA

Saturated Thickness: 137. ft

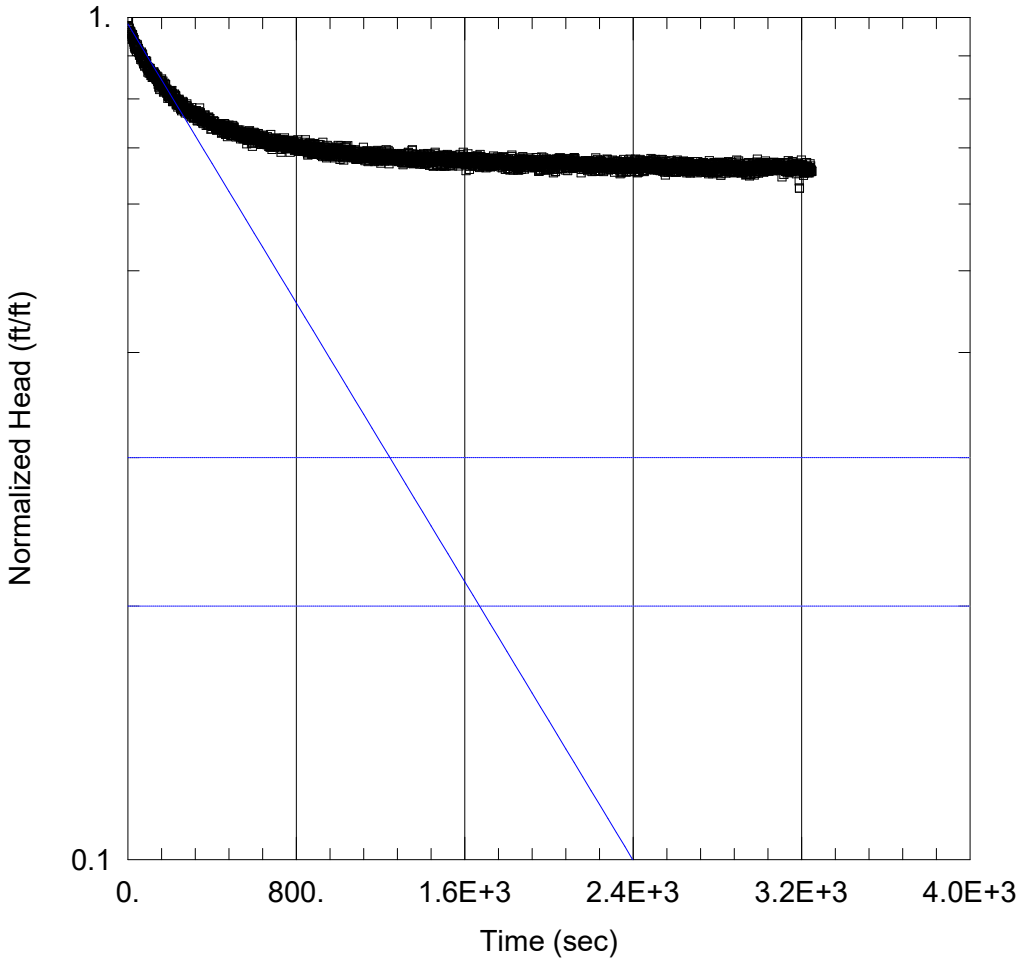
## WELL DATA (PWCG-4)

Initial Displacement: 1.302 ft
Total Well Penetration Depth: 30.68 ft
Casing Radius: 0.083 ft
Static Water Column Height: 30.68 ft
Screen Length: 20. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 0.001031 cm/sec
Kz/Kr = 1.
Ss = 2.384E-5 $ft^{-1}$




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-5.aqt
Date: 12/21/23 Time: 12:26:18

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-5
Test Date: 9-13-2023

## AQUIFER DATA

Saturated Thickness: 137.4 ft Anisotropy Ratio (Kz/Kr): 1.

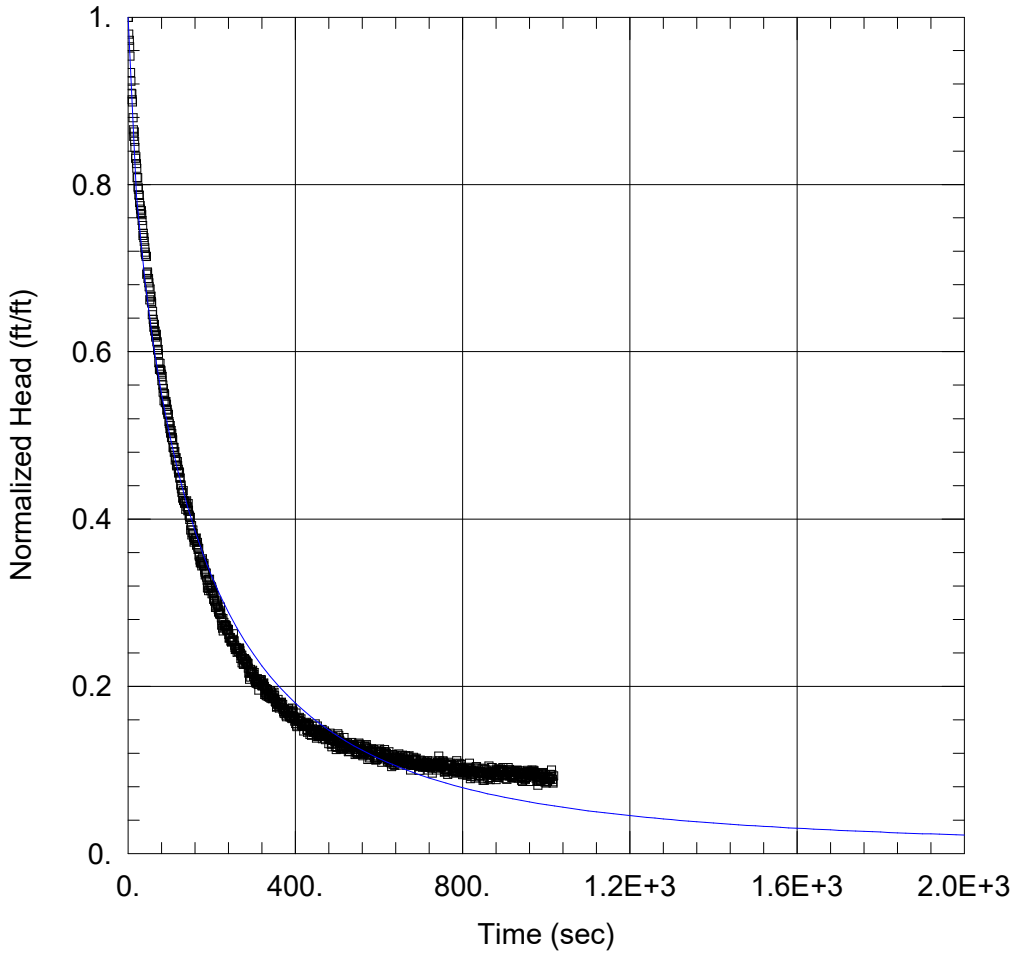
## WELL DATA (PWCG-5)

Initial Displacement: 1.043 ft
Total Well Penetration Depth: 30.12 ft
Casing Radius: 0.083 ft
Static Water Column Height: 30.12 ft
Screen Length: 20. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 1.534E-5 cm/sec y0 = 1.024 ft




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-6.aqt
Date: 12/21/23 Time: 12:30:54

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-6
Test Date: 8-30-2023

## AQUIFER DATA

Saturated Thickness: 154. ft

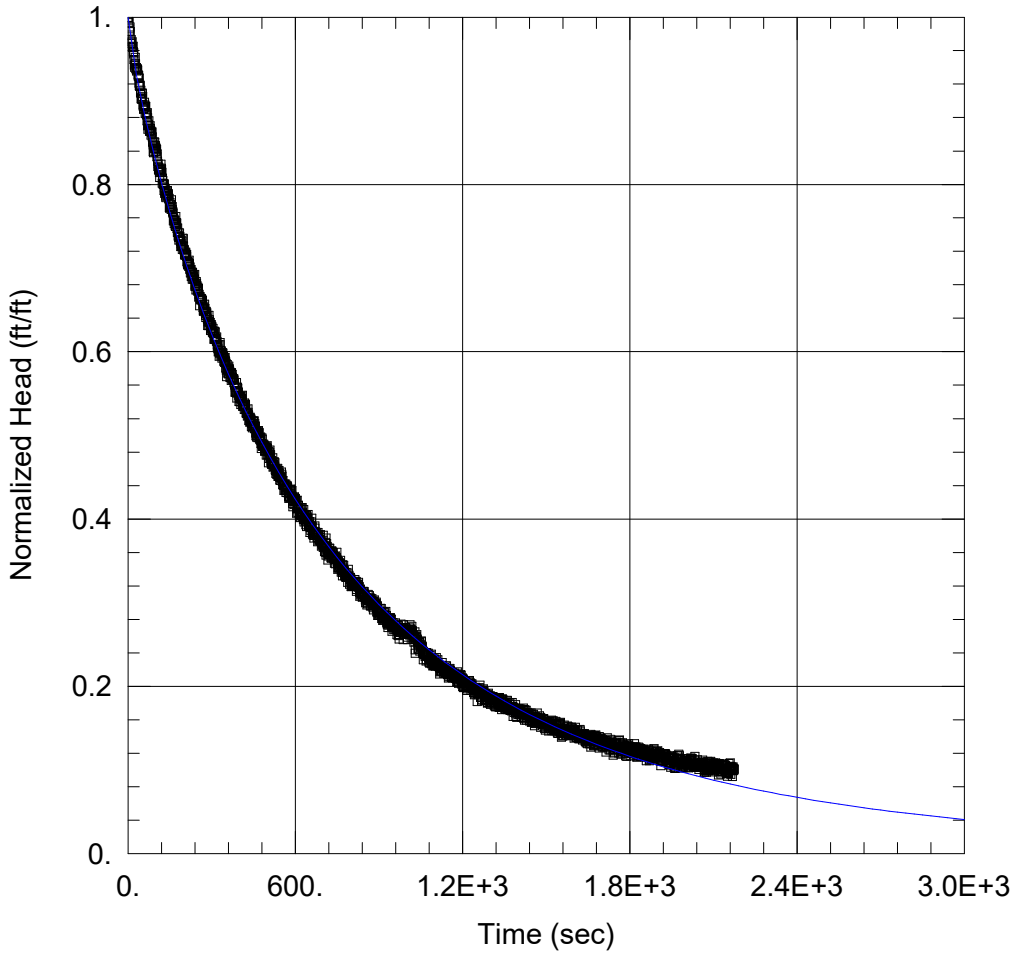
## WELL DATA (PWCG-6)

Initial Displacement: 1.53 ft
Total Well Penetration Depth: 33. ft
Casing Radius: 0.083 ft
Static Water Column Height: 33. ft
Screen Length: 20. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 6.044E-5 cm/sec
Kz/Kr = 1.
Ss = 0.0002167 $ft^{-1}$




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-7A.aqt
Date: 12/21/23 Time: 12:36:22

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-7A
Test Date: 8-30-2023

## AQUIFER DATA

Saturated Thickness: 154.8 ft

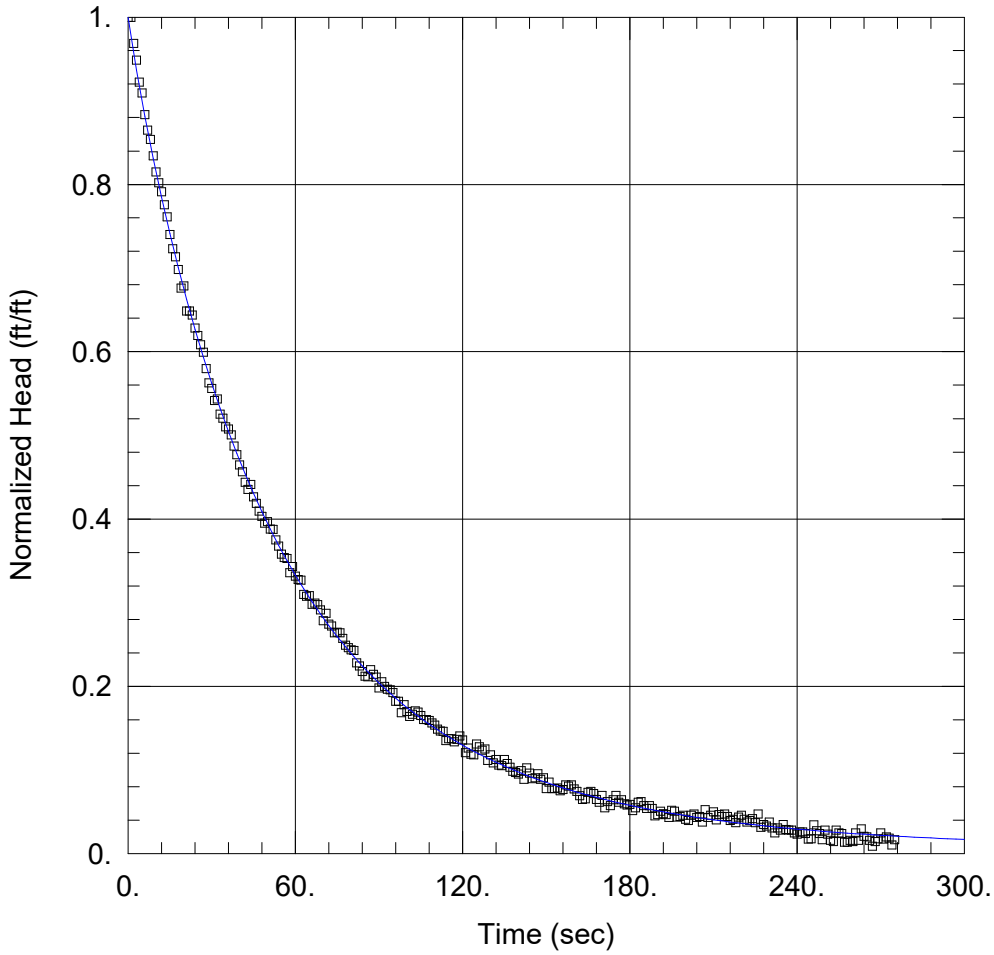
## WELL DATA (PWCG-7A)

Initial Displacement: 1.524 ft
Total Well Penetration Depth: 43.14 ft
Casing Radius: 0.083 ft
Static Water Column Height: 43.14 ft
Screen Length: 20. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model

Kr = 2.509E-5 cm/sec
Kz/Kr = 1.
Ss = 7.354E-6 $ft^{-1}$




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-7B.aqt
Date: 12/21/23 Time: 11:43:40

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-7B
Test Date: 8-30-2023

## AQUIFER DATA

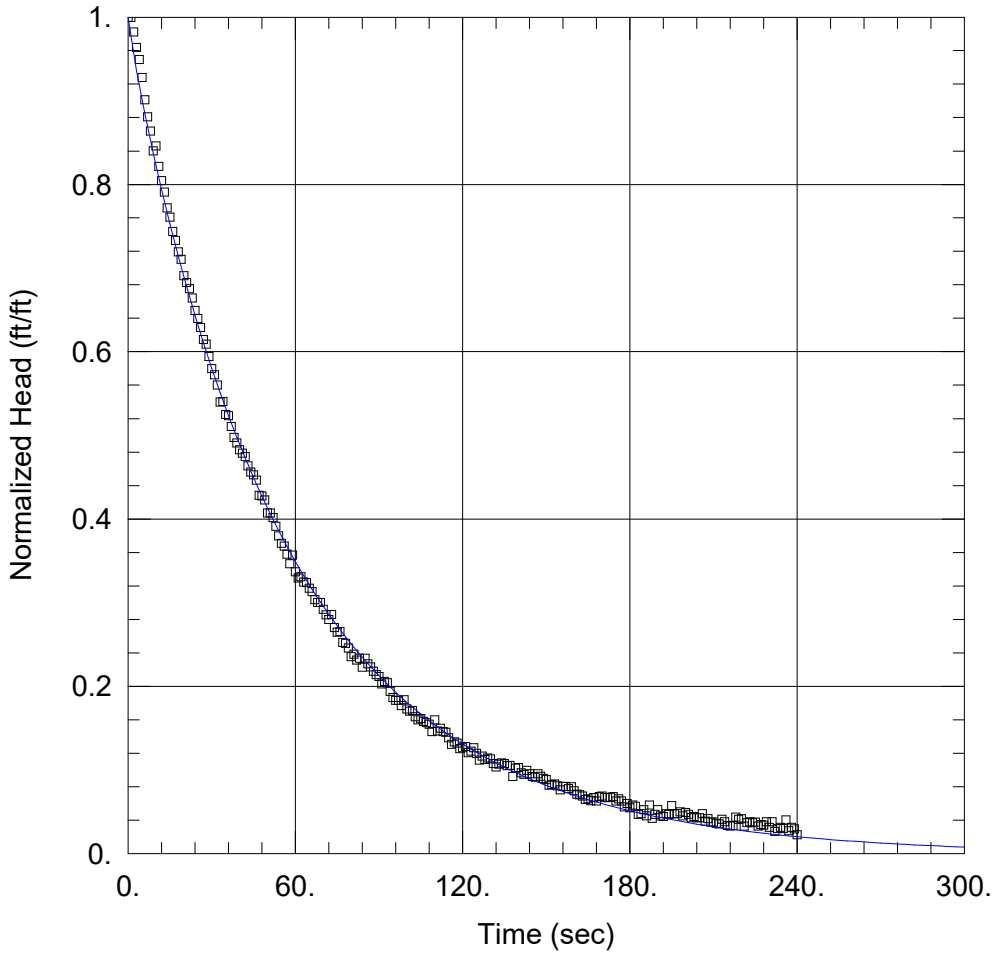
Saturated Thickness: 26. ft

## WELL DATA (PWCG-7B)

Initial Displacement: 1.466 ft
Total Well Penetration Depth: 25.63 ft
Casing Radius: 0.083 ft
Static Water Column Height: 25.63 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model
Kr = 0.0008706 cm/sec
Kz/Kr = 1.
Ss = 6.288E-8 $ft^{-1}$




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-8.aqt
Date: 12/21/23 Time: 12:41:36

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-8
Test Date: 9-13-2023

## AQUIFER DATA

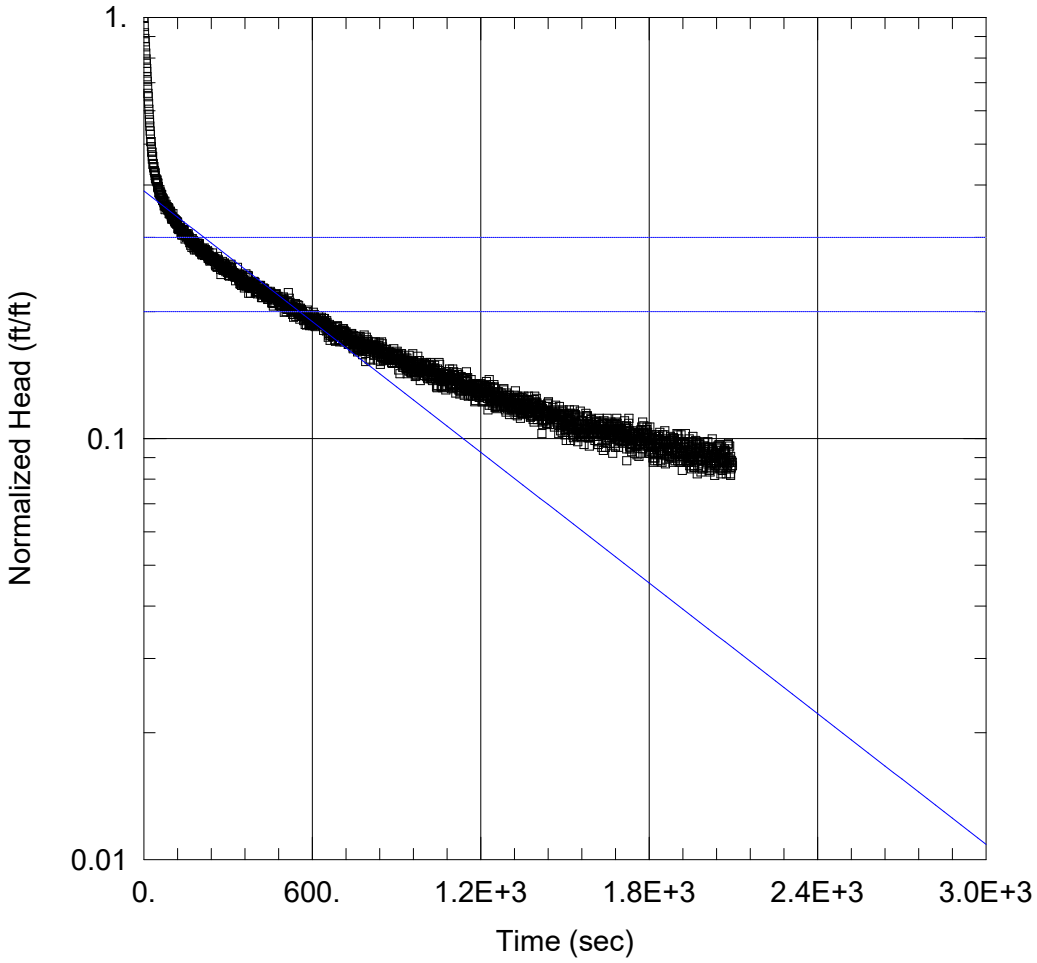
Saturated Thickness: 155.7 ft

## WELL DATA (PWCG-8)

Initial Displacement: 1.469 ft
Total Well Penetration Depth: 45.67 ft
Casing Radius: 0.083 ft
Static Water Column Height: 45.67 ft
Screen Length: 20. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Unconfined
Solution Method: KGS Model
Kr = 0.0003575 cm/sec
Kz/Kr = 1.
Ss = 5.698E-7 $ft^{-1}$




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-9A.aqt
Date: 12/21/23 Time: 12:48:32

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-9A
Test Date: 9-12-2023

## AQUIFER DATA

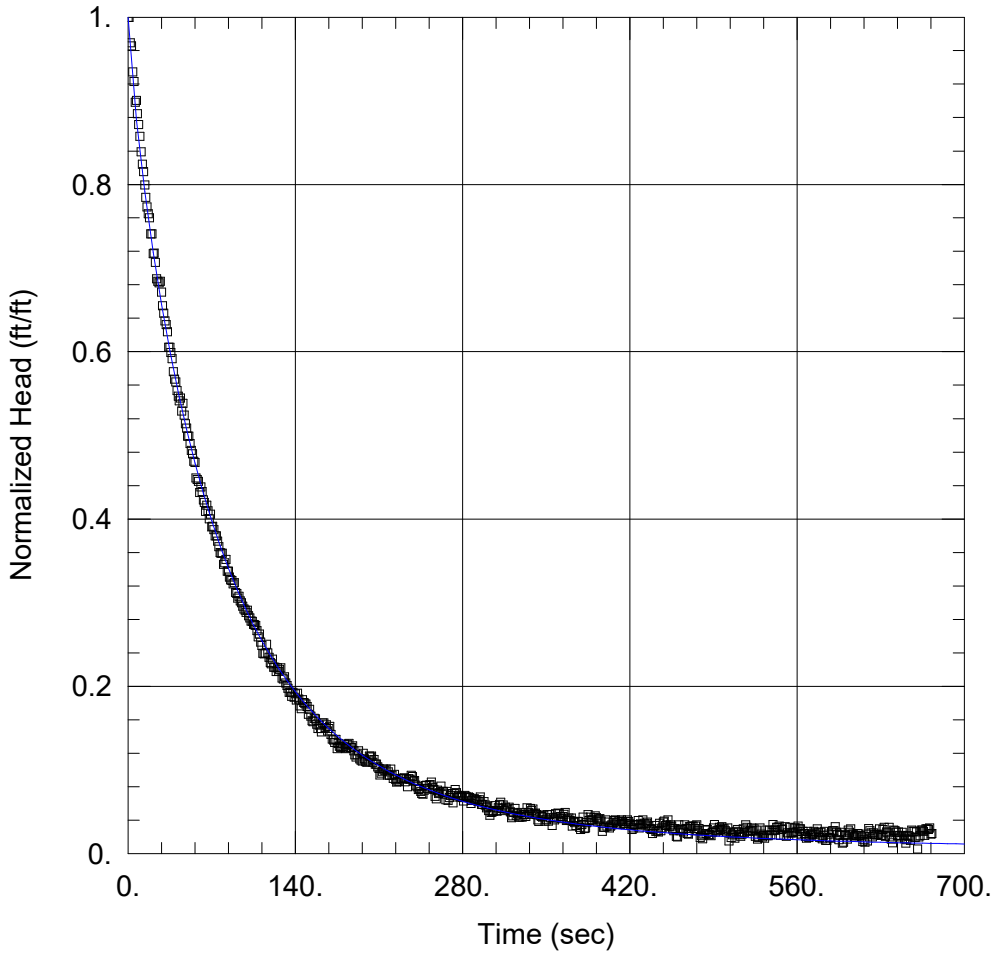
Saturated Thickness: 156.1 ft Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA (PWCG-9A)

Initial Displacement: 1.334 ft
Total Well Penetration Depth: 25.95 ft
Casing Radius: 0.083 ft
Static Water Column Height: 14.05 ft
Screen Length: 20. ft
Well Radius: 0.25 ft

## SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.876E-5 cm/sec
y0 = 0.5165 ft




## WELL TEST ANALYSIS

Data Set: P:\...\PWCG-9B.aqt
Date: 12/21/23 Time: 11:52:21

## PROJECT INFORMATION

Company: Weaver Consultants Group
Client: Republic Waste Services
Location: Royal Oaks Landfill
Test Well: PWCG-9B
Test Date: 9-12-2023

## AQUIFER DATA

Saturated Thickness: 20. ft

## WELL DATA (PWCG-9B)

Initial Displacement: 1.467 ft
Total Well Penetration Depth: 18.83 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.83 ft
Screen Length: 10. ft
Well Radius: 0.25 ft

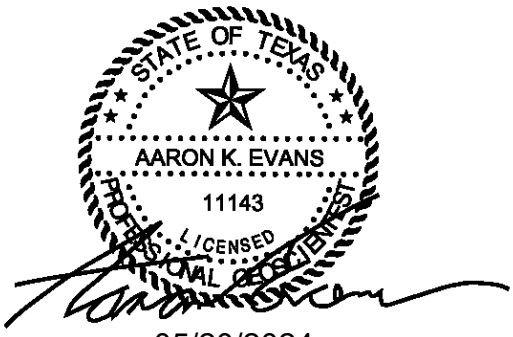
## SOLUTION

Aquifer Model: Confined
Solution Method: KGS Model

Kr = 0.0004427 cm/sec
Kz/Kr = 1.
Ss = 1.419E-5 $ft^{-1}$

# APPENDIX IIIG-E

# 2023 SOIL BORING PLAN AND TCEQ APPROVAL LETTER




05/20/2024

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2023 Soil Boring Plan (Excerpts Only) IIIG-E-4

05/20/2024

# TCEQ 2023 SOIL BORING PLAN APPROVAL LETTER

Jon Niermann, *Chairman*
Emily Lindley, *Commissioner*
Bobby Janecka, *Commissioner*
Erin E. Chancellor, *Interim Executive Director*

# TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

*Protecting Texas by Reducing and Preventing Pollution*

April 20, 2023

Mr. Austin Sparks, P.E.
Environmental Manager
Republic Services, East Texas Area
P.O. Box 1952
Longview, Texas 75606

Via email

Subject: Royal Oak Landfill – Cherokee County
Municipal Solid Waste – Permit No. 1614B
Proposed Site Investigation – Revised Soil Boring Plan
Tracking No. 28479912; RN101927010/CN600129530

Dear Mr. Sparks:

On February 7, 2023, we received a soil boring plan (SBP) dated February 6, 2023, for a proposed expansion of the referenced MSW Type I landfill. On April 7, 2023, we received revisions to the SBP dated April 5, 2023, in response to our email of March 8, 2023. The original SBP and revisions were submitted on your behalf by Mr. Aaron Evans, P.G., of Weaver Consultants Group, Fort Worth, Texas. Our review of the revised plan indicates that it complies with the MSW regulations. This letter constitutes approval of your plan.

The SBP proposes 14 borings of which three are pre-existing, in an approximately 29.1-acre expansion area. All the borings are, or will be, drilled to an elevation of 525 feet above sea level, corresponding to depths at least 5 feet below the elevation of the deepest excavation (EDE), proposed at 530 feet above sea level. Nine of the borings are, or will be, drilled to an elevation of 500 feet above sea level, corresponding to depths at least 30 feet below the EDE.

You indicated that boring at the site began prior to our approval of the boring plan. Please be advised that under Title 30 Texas Administrative Code, Chapter 330, Section 330.63(e)(4), the boring plan, including locations and depths of all proposed borings, shall be approved by the executive director prior to initiation of the work. Borings shall identify the uppermost aquifer, any hydraulically interconnected aquifers, and the underlying confining unit below the site. If the data generated by this SBP prove to be insufficient or inconclusive, additional soil borings or piezometers may be required

If you have questions regarding this letter, please contact me at (512) 239-2305, Mamadou.Balde@tceq.texas.gov, or at the address on our letterhead (please include mail code MC 124 on the first line of our address).

Sincerely,

Mamadou Balde
Municipal Solid Waste Permits Section
Waste Permits Division

MB/gg

cc: Mr. Aaron Evans, P.G., Weaver Consultants Group, Fort Worth

# 2023 SOIL BORING PLAN
# (EXCERPTS ONLY)

REPUBLIC SERVICES

Sustainability in Action

February 6, 2023

Megan Henson
MC 124
Municipal Solid Waste Permits Section
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Re: Soil Boring Plan for Major Permit Amendment
Royal Oaks Landfill – Permit No. MSW-1614B
Cherokee County, Texas

Dear Ms. Henson:

The purpose of this submittal is to provide the Texas Commission on Environmental Quality (TCEQ) with a Soil Boring Plan (SBP) in accordance with Title 30 Texas Administrative Code (TAC) §330.63(e)(4) for the Royal Oaks Landfill. The SBP has been prepared to support the proposed expansion of the facility's existing permitted waste disposal footprint area.

The proposed expansion includes a horizontal increase of the disposal waste footprint by approximately 29.1-acres and an associated increase in the elevation of deepest excavation (EDE) to 530 feet above mean sea level (ft-msl). There are no changes to the permitted permit boundary area or maximum final cover elevation currently approved under TCEQ permit No. MSW-1614A.

The facility's currently approved regional and site-specific geology and hydrogeology characterizations are summarized in the attached SBP. Site plan drawings depicting the currently permitted and proposed site conditions are provided in Appendix A. Site geology figures are provided in Appendix B. Historical site exploration data is provided in Appendix C. Select historical groundwater contour maps of the facility are provided in Appendix D.

A hardcopy of this Soil Boring Plan has been provided for your use and distribution. One copy has been sent to the TCEQ Region 5 office. An electronic copy of this submittal has been sent to mswper@tceq.texas.gov. A copy of this report has been placed in the facility's Site Operating Record.

During the course of your review, if you need additional information or have any questions, please call.

Sincerely,
**Pine Hill Farms Landfill TX, LP**

Austin Sparks. P.E.
Environmental Manager

Attachment: Soil Boring Plan

cc: TCEQ Region 5 Office
Site Operating Record, Royal Oaks Landfill
Adam Hart, Republic Waste Services of Texas, Ltd.
Aaron Evans, P.G., Weaver Consultants Group

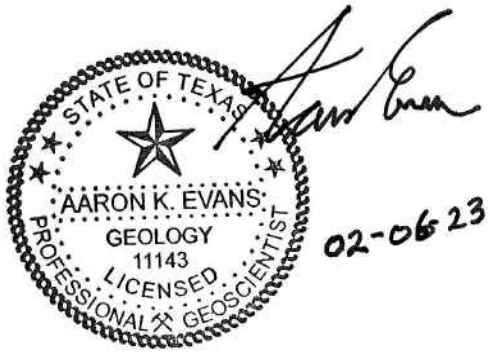
# ROYAL OAKS LANDFILL
# CHEROKEE COUNTY, TEXAS
# TCEQ PERMIT NO. MSW-1614B

## SOIL BORING PLAN

Prepared for

Pine Hill Farms Landfill TX, LP

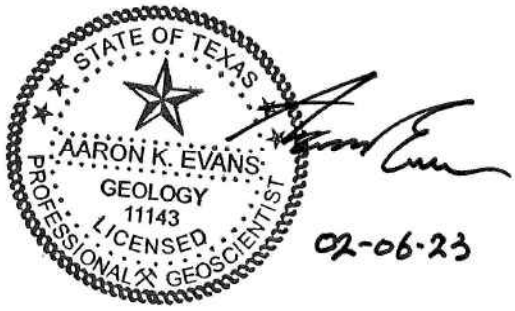
February 2023




Prepared by

**Weaver Consultants Group, LLC**
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 0120-076-14-01

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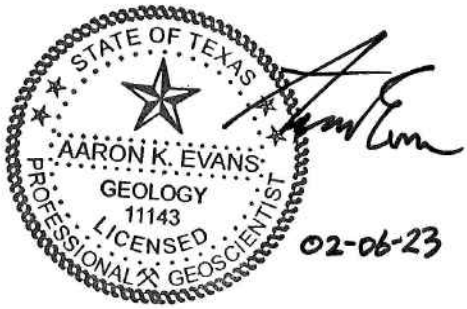


## CONTENTS (continued)

**APPENDIX A – LANDFILL OVERVIEW DRAWINGS**

Figure A-1 Aerial Photographic Map
Figure A-2 Site Plan

**APPENDIX B – GEOLOGY FIGURES**

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Figure B-2 Regional Geologic Cross Sections
Figure B-3 Regional Aquifer Potentiometric Surface Maps
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**APPENDIX C – EXISTING SITE EXPLORATION DATA**

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Geologic Cross Section Drawings by Groundwater Technology
Existing Boring Logs

**APPENDIX D – HISTORICAL GROUNDWATER CONTOUR MAPS**

Select Groundwater Contour Map Excepts

# 1 INTRODUCTION

## 1.1 Purpose

Pine Hill Farms Landfill TX, LP is in the process of developing a major permit amendment application for the Royal Oaks Landfill (Texas Commission on Environmental Quality (TCEQ) Permit No. MSW-1614B) which will include a horizontal expansion of the existing permitted waste disposal footprint area.

The facility's existing and proposed waste disposal areas are shown on Figure A-2 (Site Plan) in Appendix A. The proposed permit amendment will include a horizontal expansion of the facility's existing permitted waste disposal area configuration by approximately 29.1-acres. The proposed expansion will also include an increase in the elevation of deepest excavation (EDE) by approximately 72.0-feet (from 602.0 to 530.0 ft-msl) within the proposed lateral expansion area. The proposed expansion area is located entirely within the existing 144-acre permit boundary area. No increases to the existing permitted maximum final cover elevation (782 ft-msl) is proposed.

The following summarizes each of the drawings provided in Appendix A.

- Figure A-1 (Aerial Photographic Map) shows the permitted landfill area on an aerial photographic map.
- Figure A-2 (Site Plan) shows the existing site condition and delineates the existing and proposed waste disposal areas.

## 1.2 Site History

The Royal Oaks Landfill is an existing Type I municipal solid waste (MSW) landfill facility located in Cherokee County, approximately three miles north of the city of Jacksonville, Texas. A summary of site permitting history follows:

- July 1984 – The facility is permitted as a Type I MSW facility by the City of Jacksonville (City of Jacksonville Landfill, Permit No. 1614).
- December 1988 – The permit is transferred from the City of Jacksonville to Laidlaw Waste Systems, Inc. (Laidlaw).
- August 1994 – A permit modification is granted by the Texas Natural Resource Conservation Commission (TNRCC) on August 22, 1994, which upgraded Permit No. MSW-1614 to comply with the Subtitle D requirements.

- July 1996 – A major permit amendment is granted by the TCEQ on July 19, 1996, which increased the waste disposal footprint and landfill configuration to its currently permitted condition (Permit No. MSW-1614A).
- November 2001 – The permit is transferred to Pine Hill Farms Landfill TX, LP (a subsidiary of Republic Services).

# 2 REGIONAL GEOLOGIC SETTING

## 2.1 Geologic History

Geologic formations in the site vicinity are predominately Eocene-age deposited over the underlying eroded Cretaceous strata. The Site is underlain by the Eocene-age upper Wilcox Group and Claiborne Group sediments. The regional geologic units comprise a gulfward thickening wedge deposited episodically under influence of eustatic sea level change. Erosion of regional surficial sediments produced limited areas of Quaternary alluvium and terrace deposits along stream courses.

## 2.2 Regional Stratigraphy and Structure

Regional stratigraphy consists predominately of Eocene-age Claiborne Group sediments (Sparta, Weches, Queen City, Reklaw, and Carrizo Formations) and underlying Upper Wilcox Group sediments. Stratigraphic positions, general lithologic characteristics, and approximate depths and thicknesses for these groups are summarized in Table 2-1.

According to the Texas Bureau of Economic Geology (BEG), the site is located upon outcrops of the Sparta, Weches, and Queen City formations as shown on Figure B-1 (Regional Geologic Map) and Figure B-2 (Regional Geologic Cross Sections) in Appendix B. The underlying Reklaw Formation outcrops approximately eight miles southeast of the site at closest extent. The Carrizo Formation constitutes the base of the Claiborne Group at an approximate elevation of 125 ft-msl. The underlying Wilcox Group formations are over 1,000 feet thick regionally.

## Table 2-1
## Regional Stratigraphy in the Vicinity of Royal Oaks Landfill

| System | Series | Group | Formation / Unit | Approximate Formation Depth and Thickness (in Feet) | | Lithologic Characteristics |
|---|---|---|---|---|---|---|
| Tertiary | Eocene | Claiborne | Sparta Sand | Depth: | At surface in Site area | Sand, sandstone, with interbeds of clay and lignite, carbonaceous, crossbedded. |
| | | | | Thickness: | 0'-10' in Site area | |
| | | | Weches Formation | Depth: | At surface in Site area | Sand, sandstone, and clay with clay interbeds, crossbedded, with ironstone concretions. |
| | | | | Thickness: | 0'-60' in Site area | |
| | | | Queen City Sand | Depth: | At surface in Site area | Sand, sandstone, clay, lignitic, carbonaceous, crossbedded, with ironstone concretions and ledges. |
| | | | | Thickness: | 400' Regionally | |
| | | | Reklaw Formation | Depth: | 460' in Site area | Sandstone, clay, silty clay, lignitic, crossbedded. |
| | | | | Thickness: | 180' Regionally | |
| | | | Carrizo Sand | Depth: | 640' in Site area | Sandstone and sand, crossbedded. |
| | | | | Thickness: | 100' Regionally | |
| | | Wilcox | Upper Wilcox | Depth: | 740' in Site area | Mudstone, sandstone, clay sand, conglomerate, with lignite and ironstone concretions. |
| | Paleocene | | Middle Wilcox | Thickness: | 1,360' Regionally | |
| | | | Lower Wilcox | | | |
| | | Midway | Undifferentiated | Thickness: | 2,100' Regionally | Clay, silt, sand, mudstone, marl, limestone, grades into overlying Wilcox sediments |

Notes: Modified from Mace et al. (BEG, 2003), Preston et al. (TWDB, 1991), and TWDB Report-150 (TWDB, 1972).
Lithologic characteristics from Barnes et al. (BEG, 1992), Preston et al. (TWDB, 1991) and TWDB Report150 (TWBD, 1972).

## 2.3 Regional Hydrogeology

Regional aquifers beneath the landfill include the Eocene-age Queen City and Carrizo-Wilcox aquifers. These aquifers are separated by approximately 180 feet of low permeability Reklaw Formation sediments and are not hydraulically connected (Zivic et al., 2020). The Reklaw is composed predominately of fine-grained clay and silt sediments and functions as an aquiclude between the overlying Queen City Aquifer and underlying Carrizo Aquifer. The Carrizo Formation and underlying Wilcox Group formations comprise the regional Carrizo-Wilcox Aquifer.

### 2.3.1 Queen City Aquifer

The Queen City is classified by the TWDB as a minor Texas aquifer composed predominately of sand and loosely cemented sandstone interbedded with clay (TWDB, 2016). Queen City groundwater is present under confined conditions in areas of subcrop and under unconfined conditions in areas of outcrop (TWDB, 1972).

The Queen City Aquifer is observed to be as much as 555-feet thick regionally with an approximate thickness of 360-feet in the Site area (TWDB, 1972). The Queen City sediments were deposited by fluvial, destructive deltaic, and high-constructive lobate delta system depositional environments (BEG, 1975 & 1993 and Zivic et al, 2020). As illustrated in Figure B-3, the regional Queen City Aquifer groundwater flow follows the regional dip of the formation toward the south-southeast with a potentiometric head elevation of approximately 450 ft-msl locally. The primary source of recharge to the aquifer is precipitation infiltration on outcrop and through overlying transmissive strata (were present).

### 2.3.2 Carrizo Aquifer

The Carrizo Formation and underlying Wilcox Group constitute the greater Carrizo-Wilcox Aquifer. TWDB classifies the Carrizo-Wilcox Aquifer as a major Texas aquifer. Literary sources on the Carrizo-Wilcox categorize its component geologic and hydrostratigraphic units with varied nomenclature. The Carrizo Formation is interchangeably referred to as the Carrizo Sand, the Carrizo Sand Formation, or hydrostratigraphically referred to as the Carrizo Aquifer or Upper Carrizo-Wilcox Aquifer. According to the TWDB, the Carrizo is composed primarily of cross-bedded, medium-grained sands with lesser interspersed fine-grained sediments (Boghici, 2009). Carrizo Aquifer groundwater is typically present under confined conditions but may be unconfined in areas of outcrop (TWDB, 1972).

The Carrizo Aquifer is observed to be as much as 220 feet thick regionally with an approximate thickness of 100-feet in the Site area (TWDB, 1972). The Carrizo sediments were deposited by fluvial-deltaic depositional environments (BEG, 1975 & 1993 and Zivic et al, 2020). As illustrated in Figure B-3, the regional Carrizo Aquifer groundwater flow follows the regional dip of the formation toward the south-

southeast with a potentiometric head elevation of approximately 150 ft-msl locally. The primary source of recharge to the aquifer is precipitation infiltration on the outcrop and through overlying Quaternary sediments (were present).

According to Zivic et al (TWDB, 2020), Mace et al. (BEG, 2003), and local water well logs, the bottom elevation of the regional Carrizo-Wilcox Aquifer (bottom of the Wilcox Group) in the vicinity of the Site is about -1,400 ft-msl or 2,100 feet below ground surface.

# 3 SITE-SPECIFIC GEOLOGY

## 3.1 Existing Borehole Data

The site has completed several subsurface investigations which are documented in Attachment 4 (Geology Report) of the existing Site Development Plan (SDP) (Permit No. MSW-1614A). The currently approved subsurface characterization of the site's permitted 54.5-acre waste footprint and 144-acre permit boundary is supported by 74 soil borings whose locations are shown on Figure B-4 (Borehole Location Map) in Appendix B. The existing borehole data is summarized I Table C-1 in Appendix C. Geologic cross sections by Groundwater Technology (1994) from the facility's currently approved Geology Report are provided in Appendix C and include a cross section index map and four geologic cross section drawings. The available borehole lithologic logs are also presented in Appendix C.

The site completed three subsurface investigation events between 1981 and 1995, and several drilling events were conducted between 1987 and 2017 pursuant to the installation of groundwater monitoring wells and gas monitoring probes. The earliest investigations were conducted by National Soil Services, Inc (1981) and Maxim Engineers (1984) for the purpose of characterizing subsurface conditions pursuant to the Site's initial permitting as a landfill facility. Subsequent investigations have further characterized the Site's 144-acre permit boundary area.

## 3.2 Site-Specific Stratigraphy

The currently permitted site-specific subsurface characterization is detailed in Attachment 4 (Geology Report) of the approved Site Development Plan (Permit No. MSW-1614A). The permitted characterization delineates site-specific strata on the basis of predominate sediment composition and hydrogeological characteristics into five units listed in order of depth from surface as the (1) Sparta Sand, (2) Clay Above Aquifer A, (3) Unit A, (4) Unit B, and (5) Sediments Below Basal Clay B.

The uppermost four site-specific units are isolated to the westernmost permit boundary area where they comprise the lateral extent of a knoll extending from the west with an approximate 100-foot drop in surface elevation from the top of the Sparta Sand unit to the base of Unit B. Portions of these uppermost units have been removed by excavation from within the developed facility areas with the remaining sediments present in the areas between the limits of waste and the western permit boundary. Site-specific units are further discussed below.

### 3.2.1 Sparta Sand

The uppermost site-specific unit is the Sparta Sand, composed predominately of loose sand with thin interbeds of clay and silt that correlate with the regional Sparta Sand Formation outcrop. This unit is isolated to the westernmost facility area where residual Sparta Formation sediments outcrop above an elevation of about 660 ft-msl. Predevelopment, this unit ranged in thickness up to about 20-feet within the landfill permit boundary with the majority of area outcrop containing about 10-feet or less of surficial Sparta Sand sediments. According to the existing borehole data, the Sparta Sand is not a significant zone of saturation due to variable moisture content, lack of regional area outcrop, and limited vertical extent.

### 3.2.2 Clay Above Aquifer A

This unit lies below the Sparta Sand and is composed predominately of silty clay deposits of the uppermost Weches Formation. Predevelopment, this unit ranged in thickness up to about 15-feet within the landfill permit boundary with the majority of area outcrop containing about 10-feet of unit sediments. According to the existing borehole data, this unit is predominately dry to moist.

### 3.2.3 Unit A

Unit A is composed of lower Weches Formation sediments with a transmissive subunit designated Aquifer A and basal aquiclude subunit designated Basal Clay A. Predevelopment, Unit A ranged in thickness up to about 55-feet within the landfill permit boundary with the majority of Unit A sediments about 40-foot in total thickness.

Aquifer A is the first saturated zone and the shallowest aquifer at the Site and is composed predominately of loose saturated sand. Aquifer A groundwater generally flows from the northwest toward the south and east above the Basal Clay A aquitard. The Basal Clay A aquitard is composed predominately of moist, low permeability, silty clay sediments. Four existing groundwater monitoring wells are screened in Aquifer A and are gauged and sampled semiannually as part of the facility's routine groundwater detection monitoring program. Aquifer A groundwater elevations range from about 675 to 640 ft-msl where present onsite.

### 3.2.4 Unit B

Unit B is composed of Queen City Formation sediments with a transmissive subunit designated Aquifer B and a basal aquiclude subunit designated Basal Clay B. Predevelopment, Unit B ranged in thickness up to about 40-feet within the landfill permit boundary with the majority of Unit B sediments about 30-foot in total thickness.

Aquifer B is described as the second saturated zone and the permitted Upper Aquifer at the Site composed predominately of moist to wet sand and sandstone with iron concretions. Aquifer B groundwater generally flows from the northwest toward the south and east above the Basal Clay B aquitard. The Basal Clay B aquitard is composed predominately of moist, low permeability, silty clay sediments and comprises the permitted Lower Confining Unit. Aquifer B is characterized as semi-confined where present across most the facility area but exhibits unconfined characteristics near the Unit B outcrop where surface elevation drops below the top of the Basal Clay B aquitard around elevation of 600 to 610 ft-msl. The Basal Clay B subunit occurs between elevation range of about 580 to 610 ft-msl with an average aquiclude thickness of about 25-feet. The Basal Clay B subunit laterally continuous beneath the permitted waste disposal unit. Nine existing groundwater monitoring wells are screened in Aquifer B and are gauged and sampled semiannually as part of the facility's routine groundwater detection monitoring program. Aquifer B groundwater elevations range from about 635 to 600 ft-msl onsite.

### 3.2.5 Sediments Below Basal Clay B

This unit is composed predominately of silty sand and silt clay of the Queen City Formation. This unit is the only characterized site-specific unit that is laterally continuous across the facility permit boundary. The top of this unit occurs between an elevation range of about 570 to 590 ft-msl. This bottom unit outcrops in the easternmost facility area where surface elevations drop below about 590 ft-msl.

## 3.3 Hydrogeologic Interpretation

The facility's currently permitted site-specific subsurface hydrogeologic characterization is detailed in Attachment 4 of the approved Site Development Plan (Permit No. MSW-1614A). Historical groundwater potentiometric surface contour maps produced by Hydrex Environmental from routine semiannual groundwater gauging events from 2012 to 2022 are provided in Appendix D. As indicated by these figures, groundwater in the Uppermost Aquifer largely mimics predevelopment surface topography and flows from the northwest toward the south and east. Groundwater at the site is contained within two site-specific units (Unit A and Unit B). The first groundwater encountered occurs within Aquifer A (Unit A) sediments of the Weches Formation. A second groundwater zone occurs within Aquifer B (Unit B) sediments of the deeper Queen City Formation.

## 3.4 Existing Groundwater Monitoring Systems

The currently permitted and installed groundwater monitoring system consists of 13 existing groundwater monitoring wells that monitor two groundwater zones. Four wells are screened within site-specific Unit A and monitor Aquifer A (Weches Formation) groundwater (MW-8, MW-10, MW-22, and MW-25). Additionally, nine

wells are screened within site-specific Unit B and monitor Aquifer B (Queen City Formation) groundwater (MW-9, MW-11, MW-12, MW-15, MW-17, MW-20, MW-21, MW-23, and MW-24). The groundwater monitoring well locations are shown on Figures A-2 (Site Map) in Appendix A, Figure B-4 (Borehole Location Map) in Appendix B, and on the groundwater contour maps provided in Appendix D.

# 4 EXISTING AND PROPOSED SITE EXPLORATIONS

## 4.1 Existing Site Explorations

Subsurface conditions for the site have been evaluated from the results of 74 boreholes advanced during nine drilling events. Three subsurface exploration drilling events conducted from 1981 to 1994 yielded 29 geotechnical borings. Groundwater monitoring well and landfill gas probe installations conducted from 1987 to 2017 provide additional subsurface characterization data from 45 onsite borings. A summary of each drilling event conducted at the site is provided below:

- A 1981 subsurface investigation by National Soil Services Inc. included the advancement of five initial geotechnical borings (B-1 through B-5) to preliminarily evaluate subsurface conditions beneath the Site.
- A 1982 subsurface investigation by Maxim Engineers advanced 15 additional geotechnical borings (B-6 through B-20) to further evaluate subsurface conditions beneath the 144-acre Site.
- A 1987 drilling project by East Texas Testing Laboratory Inc. included the drilling and installation of seven onsite groundwater monitoring wells (MW-1 through MW-7).
- A 1993 drilling project by Golder Associates included the drilling and installation of 15 onsite gas monitoring probes (GP-1 through GP-15).
- A 1994 subsurface investigation by Groundwater Technology Inc. advanced nine additional onsite borings (B-21 through B-29) and drilled and installed eight additional groundwater monitoring wells (MW-8 through MW-15) to further characterize subsurface conditions and provide additional groundwater data.
- A 2002 drilling project by Weaver Boos and Gordon included the drilling and installation of gas monitoring probe GP-8A.
- A 2003 drilling project by Weaver Boos Consultants included the installation of three additional onsite groundwater monitoring wells (MW-16, MW-17, and MW-19) and five additional onsite gas monitoring probes (GP-16, GP-17, GP-20, GP-21, and GP-22).
- A 2009 drilling project by The Carel Corporation included the drilling and installation of five additional onsite groundwater monitoring wells (MW-21 through MW-25).

- A 2017 drilling project by Hydrex Environmental Inc. included the drilling and installation of onsite groundwater monitoring well MW-20.

Soil boring locations are shown on Figure B-4 (Borehole Location Map) in Appendix B. Logs of the borings are provided in Appendix C including a table summarizing the borehole details (Table C-1). Based on review of the previous permit applications, geotechnical reports, and lithologic logs, the previously completed soil borings appear to have been conducted in general accordance with established field exploration methods as specified by Title 30 TAC §330.63(e)(4)(C).

## 4.2 Proposed Site Exploration

The existing and proposed soil boring locations are shown on Figure B-4 (Borehole Location Map) in Appendix B. The site has previously received TCEQ approval of its geologic and hydrogeologic characterization based on the currently permitted EDE (602 ft-msl), waste disposal footprint area (54.5-acres), and 144-acre permit boundary area (TCEQ Permit No. MSW-1614A). The proposed major permit amendment will include an additional approximately 29.1-acre area horizontal expansion of the waste disposal footprint with a proposed EDE of 530 ft-msl. No changes to the existing permit boundary area or maximum elevation are proposed.

### 4.2.1 Requirements by Title 30 TAC §330.63(e)(4)(B)

Previous subsurface investigations and drilling events have advanced 74 total onsite borings, including three borings advanced greater than 5-foot below the proposed EDE (B-24CC, MW-5, and MW-7), of which one boring was advanced greater than 30-foot below the proposed EDE (MW-7).

Title 30 TAC §330.63(e)(4)(B) indicates that a minimum of 12 borings should be advanced to characterize a 29.1-acre waste management unit area, with all 12 borings advanced at least 5-foot below the proposed EDE and seven borings advanced at least 30-foot below the proposed EDE. Based on this requirement, and with the inclusion of existing borings B-24(CC), MW-5, and MW-7, an additional nine geotechnical borings are needed to characterize subsurface conditions for the proposed 29.1-acre expansion area with all nine borings advanced at least 5-foot below the proposed EDE and a minimum of seven borings advanced at least 30-foot below the proposed EDE.

### 4.2.2 Requirements by Title 30 TAC §330.63(e)(4)(A)

Title 30 TAC §330.63(e)(4)(A) requires that a sufficient number of borings be advanced to establish subsurface stratigraphy and to determine the geotechnical properties of soils beneath the facility. Previous subsurface investigations have advanced numerous borings located within, and adjacent to, the proposed

expansion area, including three borings advanced greater than 5-foot below the proposed EDE (B-24CC, MW-5, and MW-7). subsurface data from these three borings will be utilized to evaluate subsurface lithologic and hydrogeological conditions in conjunction with numerous other borings in the vicinity of the expansion area and the totality of subsurface data obtained from previously completed onsite borings and local water wells.

In addition to utilizing information from the previously completed borings, 11 new geotechnical borings and nine groundwater piezometer installations are proposed to investigate subsurface conditions for the proposed 29.1-acre expansion area and to assess geotechnical and hydrogeological properties across the Site. The details for the existing and proposed expansion borings are summarized in Table 4-1.

**Table 4-1**
**Proposed Expansion Boring Summary**

| Boring Number | Surface Elevation (ft-msl)[1] | Total Depth (ft-bgs) | Boring Bottom Elevation (ft-msl) | Depth Below Proposed EDE (ft) | Piezometer to be Installed | Boring Advanced 5-Feet Below EDE | Boring Advanced 30-Feet Below EDE |
|---|---|---|---|---|---|---|---|
| **Existing Borings To Be Used for Expansion Area Characterization** | | | | | | | |
| B-24(CC) | 651.0 | 130.0 | 521.0 | 9.0 | - | X | |
| MW-5 | 573.0 | 66.0 | 507.0 | 23.0 | Former Well | X | |
| MW-7 | 533.0 | 60.0 | 473.0 | 57.0 | Former Well | X | X |
| **Proposed 2023 Expansion Borings & Piezometers** | | | | | | | |
| PWCG-1 | 628.0 | 130.0 | 498.0 | 32.0 | X | X | X |
| PWCG-2 | 566.0 | 68.0 | 498.0 | 32.0 | X | X | X |
| PWCG-3 | 558.0 | 35.0 | 523.0 | 7.0 | X | X | |
| PWCG-4 | 556.0 | 33.0 | 523.0 | 7.0 | X | X | |
| PWCG-5 | 592.0 | 94.0 | 498.0 | 32.0 | X | X | X |
| PWCG-6 | 630.0 | 107.0 | 523.0 | 7.0 | X | X | |
| PWCG-7 | 660.0 | 162.0 | 498.0 | 32.0 | X | X | X |
| PWCG-8 | 620.0 | 97.0 | 523.0 | 7.0 | X | X | |
| PWCG-9 | 682.0 | 159.0 | 523.0 | 7.0 | X | X | |
| WCG-10 | 624.0 | 126.0 | 498.0 | 32.0 | | X | X |
| WCG-11 | 570.0 | 72.0 | 498.0 | 32.0 | | X | X |
| | | | | | **Boring Totals:** | 14 | 7 |
| | | | | | **Borings Required for 29.1-Acre Area per Title 30 TAC §330.63(e)(4)(B):** | 12 | 7 |

Notes: Surface elevations for proposed borings estimated from 2021 topographic contours.
Proposed Expansion Area EDE = 530.0 ft-msl.

### 4.2.3 Borehole Drilling and Piezometer Installation

The proposed borings will be drilled, continuously sampled, and completed in accordance with established field exploration methods and soil samples will be collected and tested to determine geotechnical properties of each strata in accordance with Title 30 TAC §330.63(e)(4).

Representative geotechnical soil samples of each soil type encountered will be retained for geotechnical properties testing in accordance with Title 30 TAC §330.63(e)(5). The proposed groundwater piezometers will be screened within the Uppermost Aquifer at their location and installed to groundwater monitoring well specifications to allow for potential future conversion to groundwater monitoring wells. Total piezometer depth will be determined at time of drilling based on lithology encountered and Uppermost Aquifer depth and may require drilling deeper than the drilling depths listed in Table 4-1.

The piezometers will be utilized in conjunction with the facility's existing groundwater monitoring wells to evaluate hydrogeological conditions including potentiometric head, hydraulic gradient, hydraulic conductivity and estimated flow rate of the Uppermost Aquifer in the vicinity of the proposed expansion areas and sitewide. Proposed piezometer borings PWCG-8 and PWCG-9 are positioned in the southwestern and northwestern areas of the Site to allow for the identification of groundwater encountered beneath the currently characterized site-specific stratigraphic units and to aid in assessing hydraulic interconnectivity potential between multiple groundwater units.

Borings not completed as groundwater piezometers will be plugged and abandoned by a licensed well driller in accordance with applicable TAC and Texas Department of Licensing and Regulation (TDLR) well plugging requirements.

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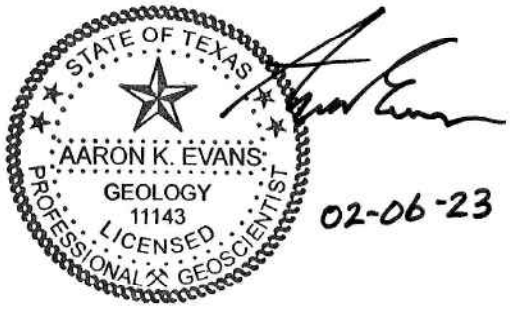
# APPENDIX A

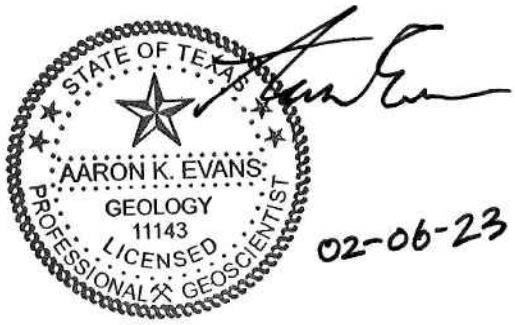
# LANDFILL OVERVIEW DRAWINGS



# CONTENTS

**FIGURES**

Figure A-1 Aerial Photographic Map
Figure A-2 Site Plan



N

0 1000 2000

UNITS

LEGEND

PERMIT BOUNDARY

PERMITTED LIMITS OF WASTE

PROPOSED LIMITS OF WASTE

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

02-06-23

NOTES:

1. AERIAL IMAGERY PROVIDED BY GOOGLE EARTH OBTAINED DECEMBER 2022.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2023
FILE: 0120-076-14
CAD: A-1-AERIAL PHOTOGRAPH.DWG

DRAWN BY: AAA
DESIGN BY: BS
REVIEWED BY: AKE

Weaver Consultants Group
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SOIL BORING PLAN
AERIAL PHOTOGRAPHIC MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE A-1

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P:\Groundwater\Projects\Royal Oaks\2023 Expansion\SBP\Appendix A\FIG A-1 AERIAL PHOTO MAP.dwg, 2/6/2023 11:37:39 AM, \\wcc-fsw-prnt\TWIP

FIG-E-28

0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- 630 EXISTING CONTOUR
- N 9500 STATE PLANE COORDINATE
- MW-25 EXISTING GROUNDWATER MONITORING WELL
- GP-1 EXISTING GAS MONITORING PROBE

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST
02-08-23

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY COOPER AERIAL SURVEYS, CO. FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 20, 2021.
2. LOCATION COORDINATES AND SURFACE ELEVATIONS OBTAINED FROM SUBSURFACE INVESTIGATION AND INSTALLATION REPORT LITHOLOGIC LOGS, SUMMARY TABLES, AND LOCATION MAPS.

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DATE: 02/2023
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CAD: FIG A-2-SITE PLAN.DWG
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DESIGN BY: CS
REVIEWED BY: AKE

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TBPE REGISTRATION NO. F-3727

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PINE HILL FARMS LANDFILL TX, LP

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SOIL BORING PLAN
SITE PLAN

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE A-2

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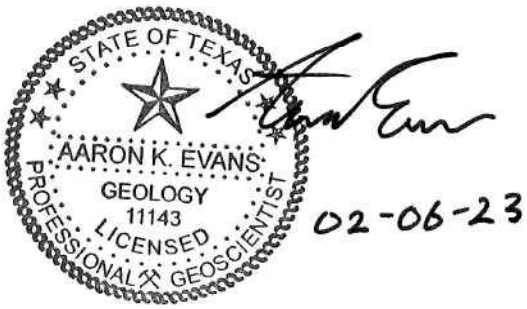
P:\Groundwater\Republic\Royal Oaks\2023 Expansion\SBP\Appendix A\PSE A-2-SITE PLAN.dwg, 2/6/2023 11:37:37 AM, \\wc-fs-prn\TWF51 - HP Color LaserJet M553

# APPENDIX B

# GEOLOGY FIGURES



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**FIGURES**


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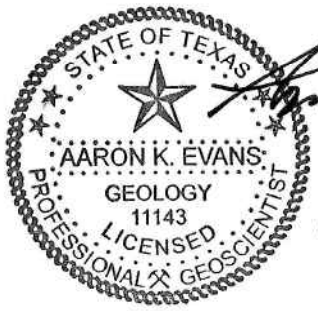
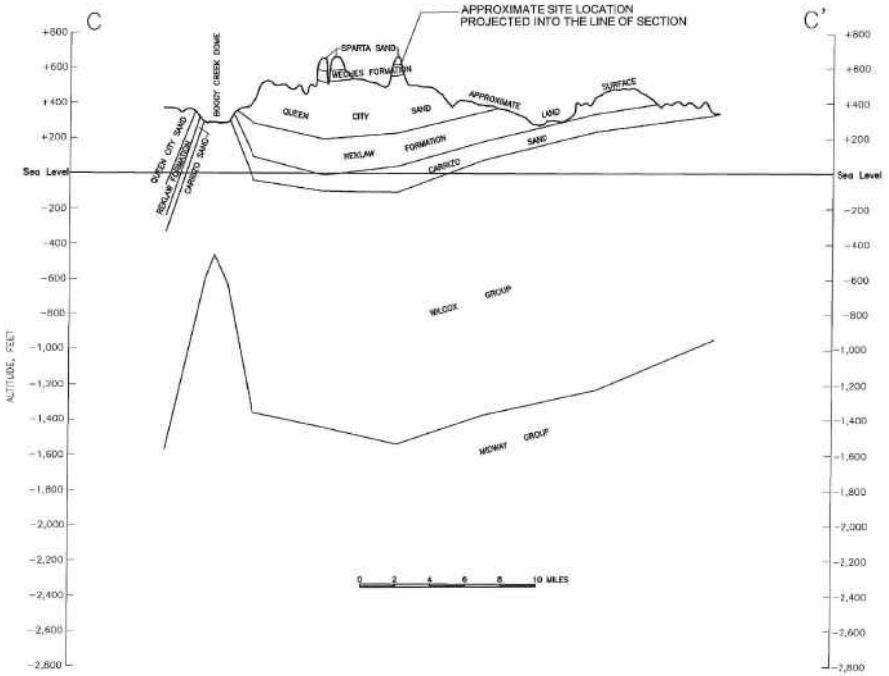
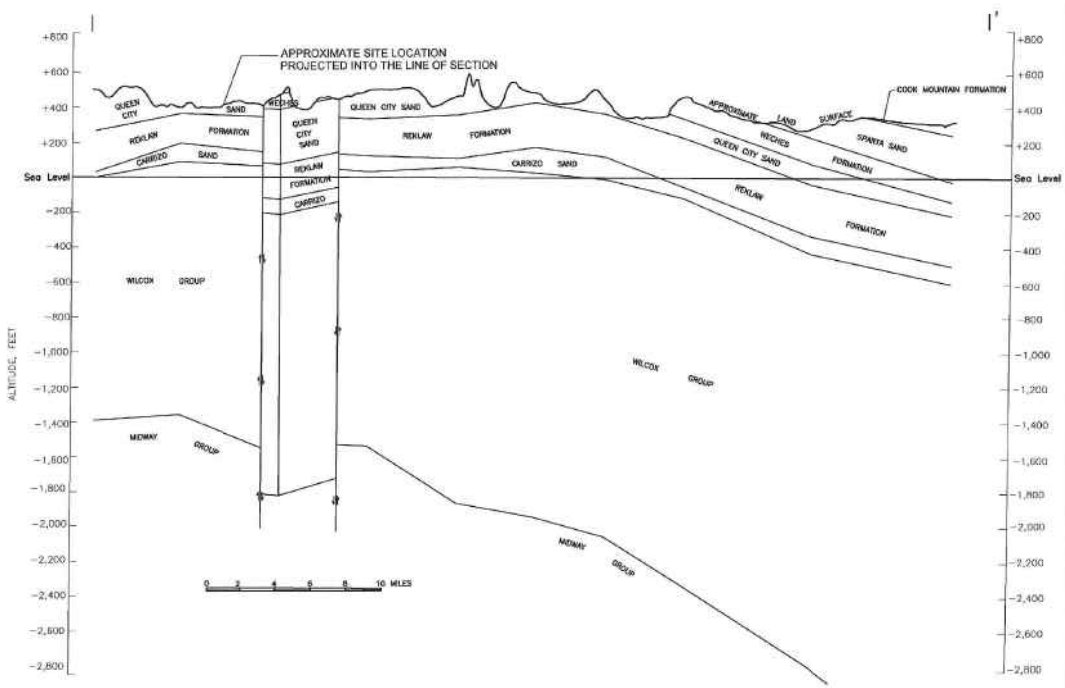
|---|---|
| Figure B-1 | Regional Geologic Map |
| Figure B-2 | Regional Geologic Cross Sections |
| Figure B-3 | Regional Aquifer Potentiometric Surface Maps |
| Figure B-4 | Borehole Location Map |

APPROXIMATE SITE LOCATION
SMITH COUNTY
CHEROKEE COUNTY
ANDERSON COUNTY
HENDERSON COUNTY
RUSK COUNTY
JACKSONVILLE SALT DOME
PALESTINE SALT DOME
BOGGY CREEK SALT DOME
PERORY CREEK SALT DOME
Jacksonville
Palestine
Rusk
Frankston
Mount Selman Gas Field
Mount Selman Oil Field
Gahlon Oil Field
Bullard Oil Field
Mount Prairie Gas Field
Mount Prairie Oil Field
Bullard Gas Field
Tennessee Colony Oil Field
Lake Jacksonville
Lake Palestine
Lake Tyler
Lake Striker
Lake Striker Creek Reservoir
Lake Tyler East
Lake Tyler North
Lake Tyler South
Lake Tyler Annex
Lake Jacksonville
Lake Palestine
Lake Loakum



INDEX MAP
NTS

NOTES:

1. CROSS SECTIONS ADAPTED FROM GROUNDWATER CONDITIONS IN ANDERSON, CHEROKEE, FREESTONE, AND HENDERSON COUNTIES, TEXAS WATER DEVELOPMENT BOARD REPORT 150, AUGUST 1972.

STATE OF TEXAS
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PROFESSIONAL GEOSCIENTIST
02-06-23

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SOIL BORING PLAN
REGIONAL GEOLOGIC CROSS SECTIONS

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE B-2

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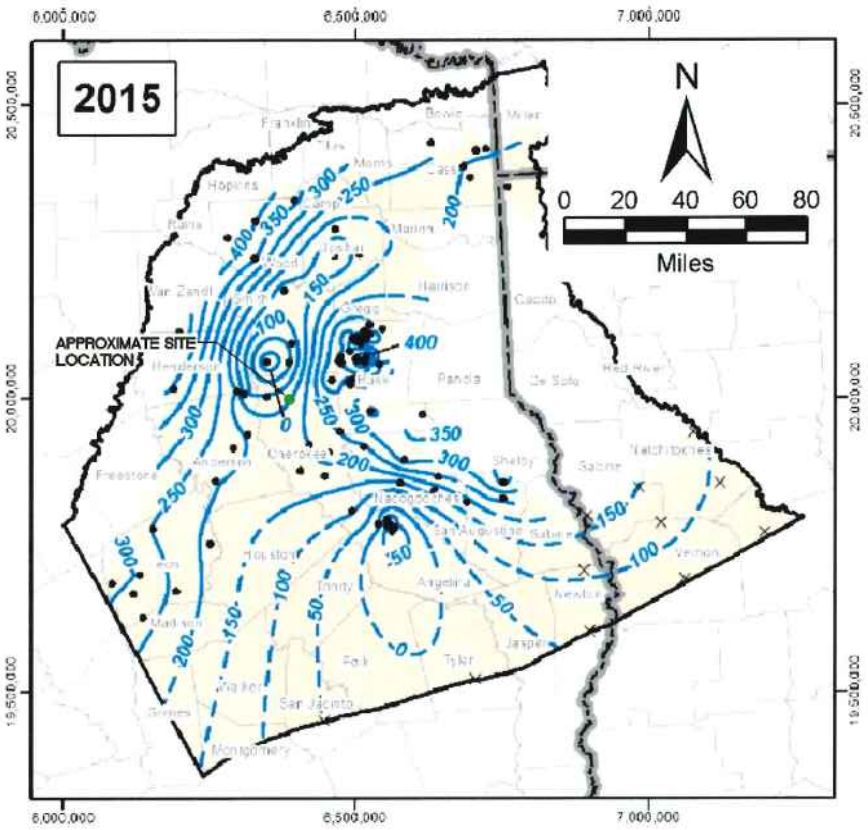
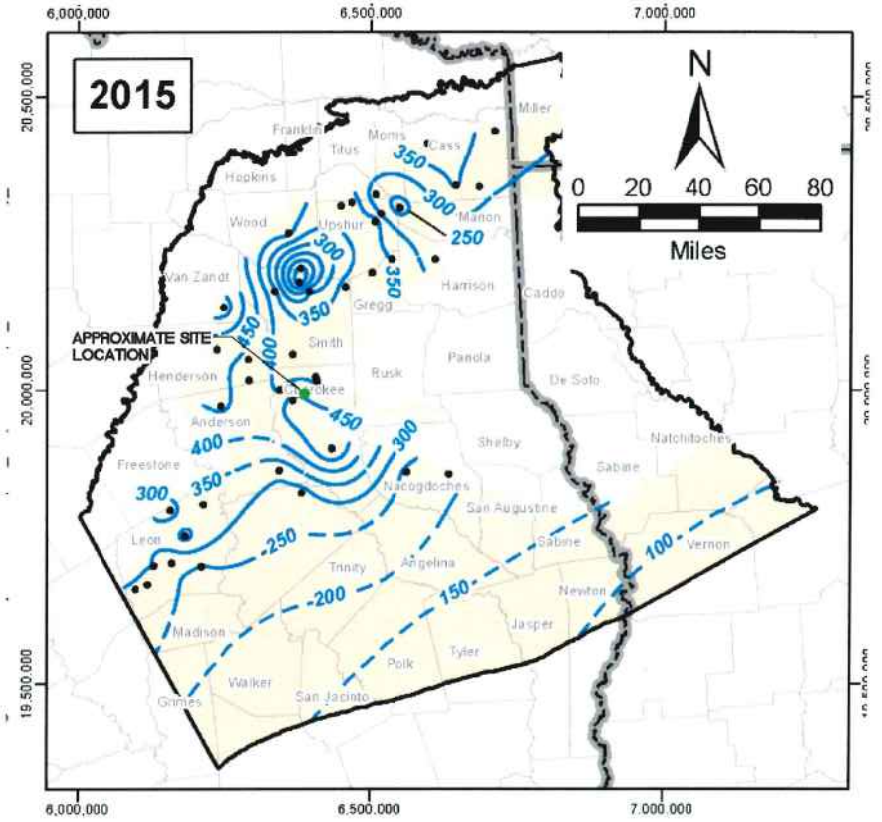
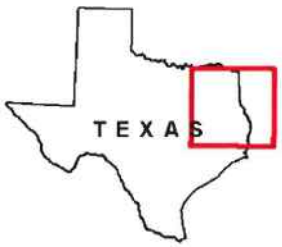
P:\Groundwater\Republic\Royal Oaks\2023 Expansion\SBP\Appendix B\FIG B-2 - GEOLOGY CROSS SECTIONS.dwg, 2/6/2023 11:41:34 AM, \\wc-fsw-pr...




CARRIZO AQUIFER GROUNDWATER ELEVATION CONTOURS




QUEEN CITY AQUIFER GROUNDWATER ELEVATION CONTOURS




## EXPLANATION

- Location of Measurement
- —150— Groundwater Level Elevation Contour, in feet amsl (dashed where approximate). Contour interval: 50 feet
- Extent of Unit
- Study Area
- County/Parish

NOTES:

1. REGIONAL QUEEN CITY AQUIFER AND CARIZZO AQUIFER GROUNDWATER CONTOUR MAPS BASED ON POTENTIOMETRIC SURFACE ELEVATIONS MEASURED IN 2015 BY THE TEXAS WATER DEVELOPMENT BOARD.
2. GROUNDWATER ELEVATION CONTOUR MAP MODIFIED FROM ZIVIC ET AL., 2020, GROUNDWATER AVAILABILITY MODEL FOR NORTHERN PORTION OF THE QUEEN CITY, SPARTA, AND CARRIZO–WILCOX AQUIFERS, TEXAS WATER DEVELOPMENT BOARD.

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DESIGN BY: AKE
REVIEWED BY: AKE

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SOIL BORING PLAN
REGIONAL AQUIFER
POTENTIOMETRIC SURFACE MAPS
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

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FIGURE B-3

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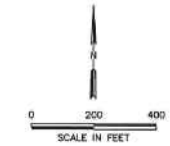


LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- 630 EXISTING CONTOUR
- N 9500 STATE PLANE COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- B-3 (660.0) PREVIOUSLY ADVANCED BOREHOLE LOCATION
- MW-1 (661.0) FORMER GROUNDWATER MONITORING WELL LOCATION
- GP-8 (686.0) FORMER GAS MONITORING PROBE LOCATION
- MW-25 (663.2) EXISTING GROUNDWATER MONITORING WELL LOCATION
- GP-1 (686.0) EXISTING GAS MONITORING PROBE LOCATION
- PWCG-1 (628.0) PROPOSED EXPANSION BOREHOLE & PIEZOMETER LOCATION
- WCG-10 (624.0) PROPOSED EXPANSION BOREHOLE LOCATION

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY COOPER AERIAL SURVEYS, CO. FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 20, 2021.
2. LOCATION COORDINATES AND SURFACE ELEVATIONS OBTAINED FROM SUBSURFACE INVESTIGATION AND INSTALLATION REPORT LITHOLOGIC LOGS, SUMMARY TABLES, AND LOCATION MAPS.




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DESIGN BY: DS
REVIEWED BY: AKE

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SOIL BORING PLAN
BOREHOLE LOCATION MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE B-4

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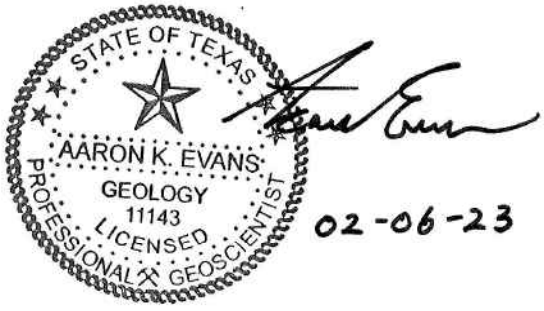
P:\Groundwater\Republic\Royal Oaks\2023 Expansion\SBP\Appendix B\FIG B-4 - BOREHOLE LOCATION MAP.dwg 2/6/2023 11:51:42 AM \\wc-fnv-ir\Groups\CAD\750 PKL 6

# APPENDIX C

# EXISTING SITE EXPLORATION DATA



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## TABLES

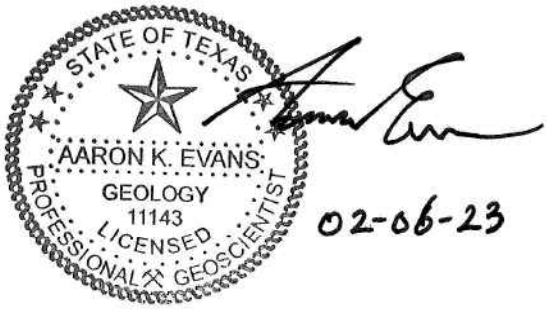
Table C-1 Summary of Existing Borehole Depths and Elevations

## CROSS SECTION DRAWINGS

Geologic Cross Section Drawings by Groundwater Technology

## BOREHOLE LOGS

1981 Borehole Logs by National Soil Services
1982 Borehole Logs by Maxim Engineers
1987 Borehole Logs by East Texas Testing Laboratory
1993 Borehole Logs by Golder Associates
1994 Borehole Logs by Groundwater Technology
2002 Borehole Log by Weaver Boos and Gordon
2003 Borehole Logs by Weaver Boos Consultants
2009 Borehole Logs by The Carel Corporation
2017 Borehole Log by Hydrex Environmental

# Table C-1
## Summary of Existing Borehole Depths and Elevations

| Borehole Number | Northing | Easting | Surface Elevation | Total Depth | Bottom Elevation | Proposed EDE | Depth Above (+) or Below (-) EDE |
|---|---|---|---|---|---|---|---|
| | | | (ft-msl) | (ft-bgs) | (ft-msl) | (ft-msl) | (ft) |
| **1981 Boreholes by National Soil Services, Inc.** | | | | | | | |
| B-1 | 7953.00 | 10833.00 | 670.0 | 20.0 | 650.0 | 530.0 | 120.0 |
| B-2 | 8749.00 | 10598.00 | 675.0 | 20.0 | 655.0 | 530.0 | 125.0 |
| B-3 | 9572.00 | 10605.00 | 660.0 | 20.0 | 640.0 | 530.0 | 110.0 |
| B-4 | 10045.00 | 11738.00 | 595.0 | 40.0 | 555.0 | 530.0 | 25.0 |
| B-5 | 10029.00 | 12376.00 | 555.0 | 25.0 | 530.0 | 530.0 | 0.0 |
| **1982 Boreholes by Maxim Engineers** | | | | | | | |
| B-6 | 8594.00 | 10257.00 | 680.0 | 20.0 | 660.0 | 530.0 | 130.0 |
| B-7 | 7749.00 | 10965.00 | 672.0 | 40.0 | 632.0 | 530.0 | 102.0 |
| B-8 | 8053.00 | 10957.00 | 673.0 | 25.0 | 648.0 | 530.0 | 118.0 |
| B-9 | 7616.00 | 10550.00 | 635.0 | 25.0 | 610.0 | 530.0 | 80.0 |
| B-10 | 8275.00 | 10676.00 | 672.0 | 25.0 | 647.0 | 530.0 | 117.0 |
| B-11 | 7990.00 | 10246.00 | 636.0 | 25.0 | 611.0 | 530.0 | 81.0 |
| B-12 | 8935.00 | 10758.00 | 664.0 | 25.0 | 639.0 | 530.0 | 109.0 |
| B-13 | 8753.00 | 11040.00 | 675.0 | 40.0 | 635.0 | 530.0 | 105.0 |
| B-14 | 9518.00 | 11230.00 | 600.0 | 25.0 | 575.0 | 530.0 | 45.0 |
| B-15 | 9805.00 | 10880.00 | 675.0 | 25.0 | 650.0 | 530.0 | 120.0 |
| B-16 | 9311.00 | 10267.00 | 686.0 | 40.0 | 646.0 | 530.0 | 116.0 |
| B-17 | 9670.00 | 12125.00 | 564.0 | 25.0 | 539.0 | 530.0 | 9.0 |
| B-18 | 9468.00 | 11860.00 | 568.0 | 25.0 | 543.0 | 530.0 | 13.0 |
| B-19 | 8878.00 | 12485.00 | 575.0 | 25.0 | 550.0 | 530.0 | 20.0 |
| B-20 | 8822.00 | 11850.00 | 655.0 | 40.0 | 615.0 | 530.0 | 85.0 |
| **1987 Boreholes by East Texas Testing Laboratory, Inc.** | | | | | | | |
| MW-1 | 9692.00 | 10252.00 | 661.0 | 20.0 | 641.0 | 530.0 | 111.0 |
| MW-2 | 7243.00 | 10074.00 | 621.0 | 30.0 | 591.0 | 530.0 | 61.0 |
| MW-3 | 7298.00 | 10616.00 | 621.0 | 30.0 | 591.0 | 530.0 | 61.0 |
| MW-4 | 7319.00 | 11022.00 | 621.0 | 30.0 | 591.0 | 530.0 | 61.0 |
| MW-5 | 8895.00 | 12647.00 | 573.0 | 60.0 | 513.0 | 530.0 | -17.0 |
| MW-6 | 9780.00 | 12647.00 | 583.0 | 55.0 | 528.0 | 530.0 | -2.0 |
| MW-7 | 10214.00 | 12641.00 | 533.0 | 90.0 | 443.0 | 530.0 | -87.0 |

Borehole coordinates and surface elevations obtained from available lithologic logs, data forms, and site map drawings.

# Table C-1 (Continued)
## Summary of Existing Borehole Depths and Elevations

| Borehole Number | Northing | Easting | Surface Elevation | Total Depth | Bottom Elevation | Proposed EDE | Depth Above (+) or Below (-) EDE |
|---|---|---|---|---|---|---|---|
| | | | (ft-msl) | (ft-bgs) | (ft-msl) | (ft-msl) | (ft) |
| **1993 Boreholes by Golder Engineers** | | | | | | | |
| GP-1 | 9659.70 | 10013.20 | 685.8 | 15.0 | 670.8 | 530.0 | 140.8 |
| GP-2 | 9394.90 | 10018.30 | 685.6 | 15.0 | 670.6 | 530.0 | 140.6 |
| GP-3 | 9140.30 | 10018.00 | 685.4 | 15.0 | 670.4 | 530.0 | 140.4 |
| GP-4 | 8855.40 | 10024.20 | 682.0 | 25.0 | 657.0 | 530.0 | 127.0 |
| GP-5 | 8593.70 | 10036.00 | 674.2 | 25.0 | 649.2 | 530.0 | 119.2 |
| GP-6 | 7810.50 | 10054.30 | 613.7 | 10.0 | 603.7 | 530.0 | 73.7 |
| G9-7 | 7244.10 | 10750.40 | 612.1 | 10.0 | 602.1 | 530.0 | 72.1 |
| GP-8 | 7932.00 | 11087.10 | 665.8 | 25.0 | 640.8 | 530.0 | 110.8 |
| GP-9 | 8569.50 | 11334.60 | 660.6 | 10.0 | 650.6 | 530.0 | 120.6 |
| GP-10 | 8580.80 | 12387.50 | 597.2 | 10.0 | 587.2 | 530.0 | 57.2 |
| GP-11 | 9381.90 | 12683.50 | 538.6 | 10.0 | 528.6 | 530.0 | -1.4 |
| GP-12 | 10239.90 | 12062.20 | 568.1 | 10.0 | 558.1 | 530.0 | 28.1 |
| GP-13 | 10199.40 | 11009.10 | 676.4 | 10.0 | 666.4 | 530.0 | 136.4 |
| GP-14 | 9917.40 | 10516.80 | 664.0 | 10.0 | 654.0 | 530.0 | 124.0 |
| GP-15 | 9750.30 | 10188.70 | 683.1 | 10.0 | 673.1 | 530.0 | 143.1 |
| **1994 Boreholes by Groundwater Technology, Inc.** | | | | | | | |
| B-21(CC) | 9692.00 | 10311.00 | 680.0 | 146.0 | 534.0 | 530.0 | 4.0 |
| B-22 | 9309.00 | 11099.00 | 651.0 | 115.0 | 536.0 | 530.0 | 6.0 |
| B-23 | 8506.00 | 11234.00 | 662.0 | 125.0 | 537.0 | 530.0 | 7.0 |
| B-24(CC) | 7864.00 | 11090.00 | 651.0 | 130.0 | 521.0 | 530.0 | -9.0 |
| B-25 | 7327.00 | 11010.00 | 624.0 | 56.0 | 568.0 | 530.0 | 38.0 |
| B-26 | 7268.00 | 10594.00 | 600.0 | 46.0 | 554.0 | 530.0 | 24.0 |
| B-27 | 7209.00 | 10103.00 | 614.0 | 46.0 | 568.0 | 530.0 | 38.0 |
| B-28 | 7774.00 | 10056.00 | 612.0 | 79.0 | 533.0 | 530.0 | 3.0 |
| B-29 | 9231.00 | 10064.00 | 685.0 | 150.0 | 535.0 | 530.0 | 5.0 |
| MW-8 | 9638.43 | 10103.40 | 685.5 | 40.0 | 645.5 | 530.0 | 115.5 |
| MW-9 | 9633.49 | 10112.17 | 685.6 | 78.0 | 607.6 | 530.0 | 77.6 |
| MW-10 | 8489.50 | 10025.58 | 670.9 | 35.0 | 635.9 | 530.0 | 105.9 |
| MW-11 | 8034.16 | 10038.34 | 629.4 | 30.0 | 599.4 | 530.0 | 69.4 |
| MW-12 | 7703.47 | 10258.17 | 611.5 | 18.0 | 593.5 | 530.0 | 63.5 |
| MW-13 | 7610.00 | 10702.70 | 652.3 | 58.0 | 594.3 | 530.0 | 64.3 |
| MW-14 | 8561.00 | 11335.60 | 660.9 | 26.0 | 634.9 | 530.0 | 104.9 |
| MW-15 | 8548.90 | 11336.10 | 661.4 | 60.0 | 601.4 | 530.0 | 71.4 |

Borehole coordinates and surface elevations obtained from available lithologic logs, data forms, and site map drawings.

## Table C-1 (Continued)
## Summary of Existing Borehole Depths and Elevations

| Borehole Number | Northing | Easting | Surface Elevation | Total Depth | Bottom Elevation | Proposed EDE | Depth Above (+) or Below (-) EDE |
|---|---|---|---|---|---|---|---|
| | | | (ft-msl) | (ft-bgs) | (ft-msl) | (ft-msl) | (ft) |
| **2002 Borehole by Weaver Boos and Gordon** | | | | | | | |
| GP-8A | 7754.69 | 10988.41 | 658.6 | 55.0 | 603.6 | 530.0 | 73.6 |
| **1981 Boreholes by Weaver Boos Consultants** | | | | | | | |
| GP-16 | 9692.56 | 10074.54 | 687.9 | 70.0 | 617.9 | 530.0 | 87.9 |
| GP-17 | 8822.17 | 10037.12 | 684.3 | 66.0 | 618.3 | 530.0 | 88.3 |
| GP-20 | 8589.77 | 11321.29 | 664.8 | 50.0 | 614.8 | 530.0 | 84.8 |
| GP-21 | 10207.33 | 11020.53 | 678.1 | 59.0 | 619.1 | 530.0 | 89.1 |
| GP-22 | 9915.42 | 10494.19 | 669.2 | 55.0 | 614.2 | 530.0 | 84.2 |
| MW-16 | 10203.24 | 11227.56 | 641.1 | 18.0 | 623.1 | 530.0 | 93.1 |
| MW-17 | 10212.05 | 11222.93 | 642.8 | 38.0 | 604.8 | 530.0 | 74.8 |
| MW-19 | 8817.83 | 11819.77 | 625.7 | 69.0 | 556.7 | 530.0 | 26.7 |
| **1981 Boreholes by The Carel Corporation** | | | | | | | |
| MW-21 | 9002.71 | 11530.14 | 629.9 | 31.0 | 598.9 | 530.0 | 68.9 |
| MW-22 | 9078.11 | 10051.98 | 686.5 | 39.0 | 647.5 | 530.0 | 117.5 |
| MW-23 | 7958.67 | 11292.29 | 655.0 | 55.0 | 600.0 | 530.0 | 70.0 |
| MW-24 | 7807.48 | 10802.67 | 657.5 | 69.0 | 588.5 | 530.0 | 58.5 |
| MW-25 | 8243.55 | 11336.39 | 663.2 | 35.0 | 628.2 | 530.0 | 98.2 |
| **1981 Borehole by Hydrex Environmental** | | | | | | | |
| MW-20 | 9721.78 | 11404.56 | 632.3 | 30.0 | 602.3 | 530.0 | 72.3 |

Borehole coordinates and surface elevations obtained from available lithologic logs, data forms, and site map drawings.

# GEOLOGIC CROSS SECTION DRAWINGS
# BY GROUNDWATER TECHNOLOGY

NOTES: 1. Survey grid is based on site grid coordinates established by Stenger Surveying Company, Tyler, Texas.
2. Topography digitized from aerial photography, Metropolitan Aerial Survey, Inc., Fort Worth, Texas: Town February 1, 1994.
EXPLANATION
MW-8 Monitoring Well Location
MW-1 Plugged and Abandoned Well Location
B-22 Geotechnical Boring
B-24 (CC) Continuous Core
GP-1 Geo Monitor Probe
Fence
Vegetation Line
Waste Management Unit Boundary
Property Boundary
Relevant Point of Compliance
Surface Water Boundary
Line of Geologic Cross Section
Flowing Stream
Ephemeral Stream
630 Topographic Contour Interval = 2 feet.
GROUNDWATER MONITORING WELL NETWORK
Upgradient | Downgradient
aquifer A | aquifer B | aquifer A | aquifer B
MW-8 | MW-9 | MW-10 | MW-11
MW-14 | MW-12
MW-13
MW-15
GROUNDWATER TECHNOLOGY
LANDLAW
LANDLAW WASTE SYSTEMS, INC.
SITE MAP
NOVAL OAKS LANDFILL
DESIGNED BY: DCM | DRAWN BY: DK | CHECKED BY:
DRAWING DATE: 1/25/95 | ACAD FILE: COMSIN12
PROJECT NO.: 0424B0069 | REVISION:
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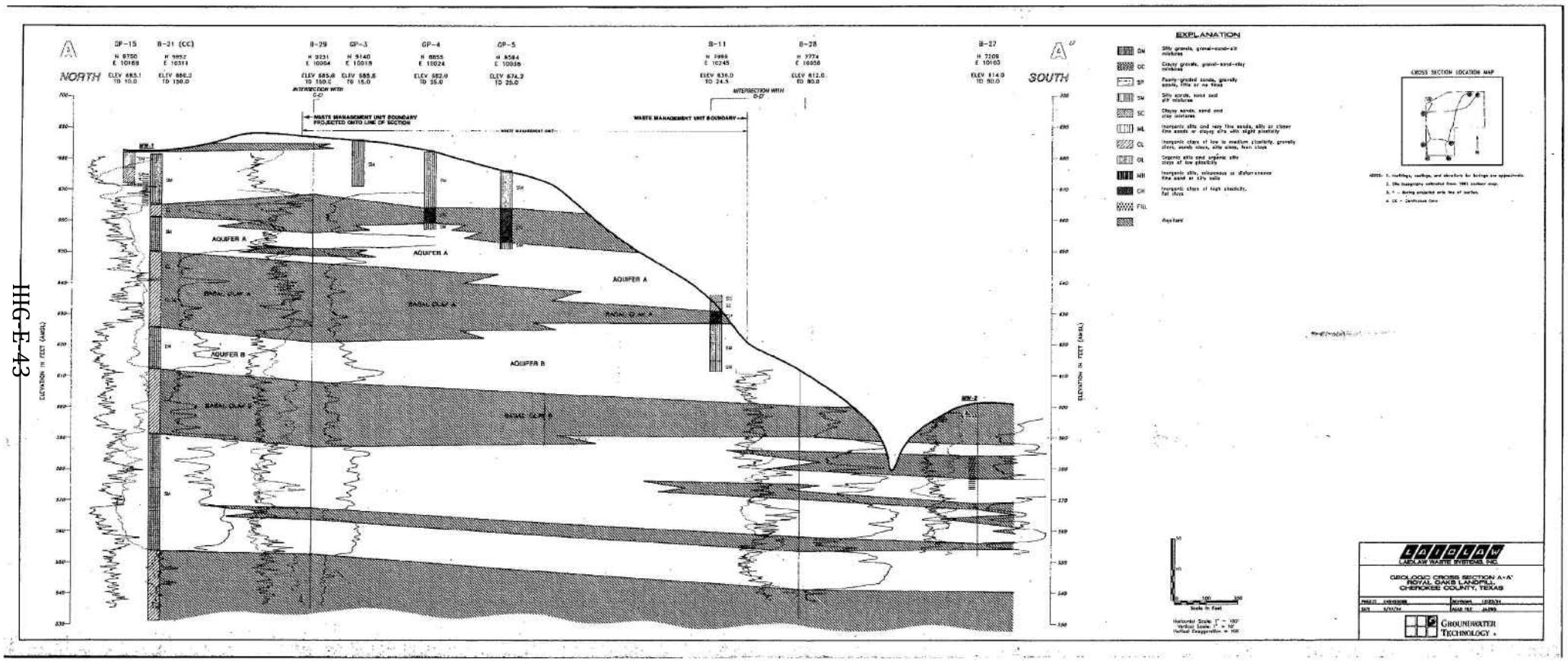
A
NORTH
A'
SOUTH
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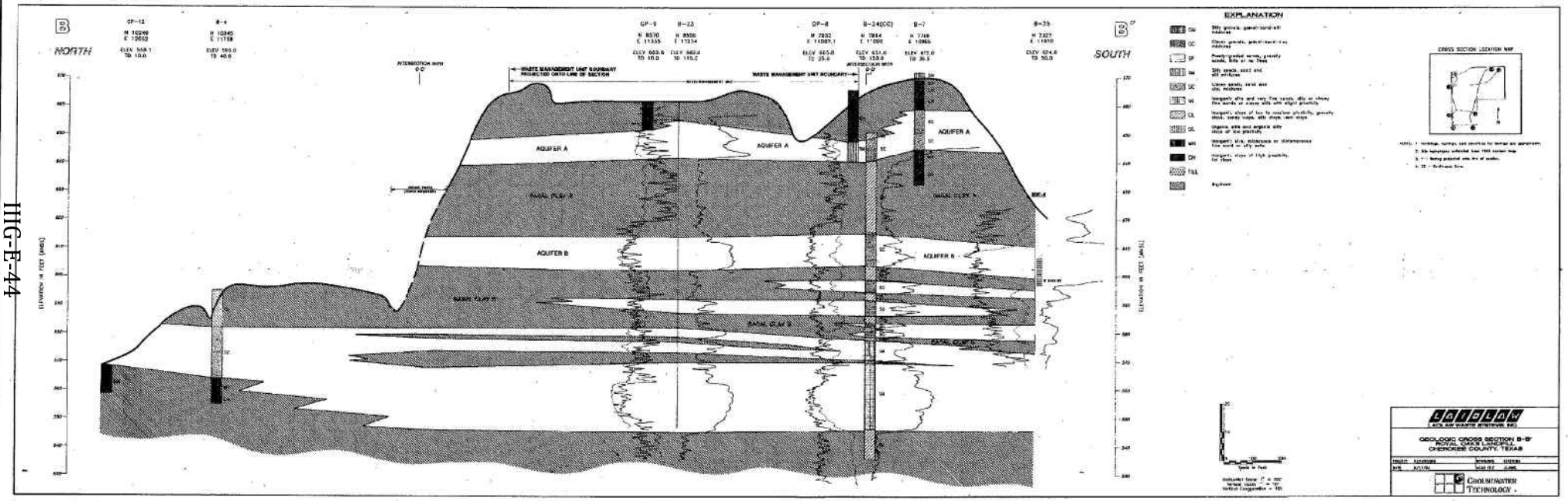
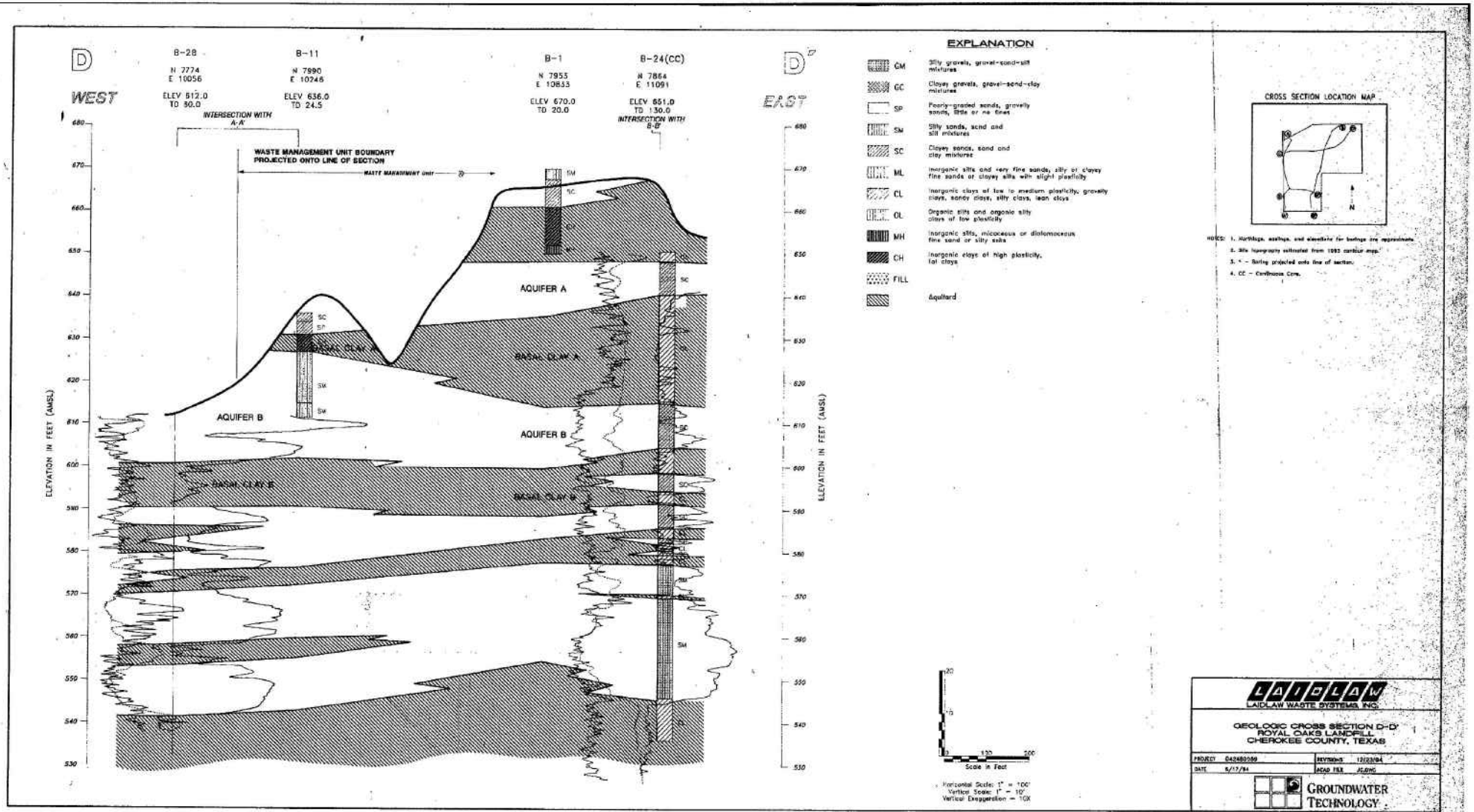
B-21 (CC)
B-29
GP-3
GP-4
GP-5
B-11
B-28
B-27
WASTE MANAGEMENT UNIT BOUNDARY
PROJECTED ONTO LINE OF SECTION
WASTE MANAGEMENT UNIT BOUNDARY
AQUIFER A
AQUIFER B
BASAL CLAY A
BASAL CLAY B
MW-1
MW-2
ELEVATION IN FEET (MSL)
EXPLANATION
GW
GC
SP
SM
SC
ML
CL
OL
MH
CH
FILL
Fault
CROSS SECTION LOCATION MAP
Scale in Feet
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 10'
Vertical Exaggeration = 10X
LAIDLAW
LAIDLAW WASTE SYSTEMS, INC.
GEOLOGIC CROSS SECTION A-A'
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS
GROUNDWATER TECHNOLOGY

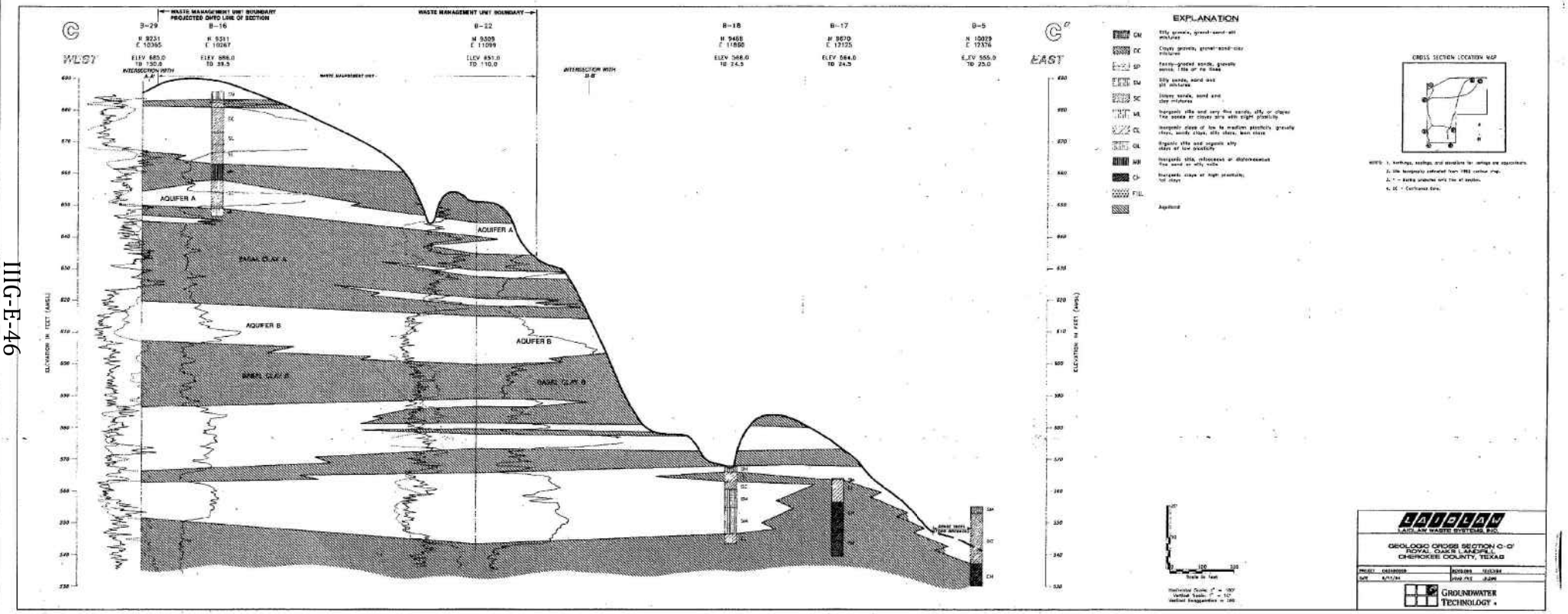
HIG-E-43


B
NORTH
B'
SOUTH
AQUIFER A
AQUIFER B
BASAL CLAY A
BASAL CLAY B
WASTE MANAGEMENT UNIT BOUNDARY
EXPLANATION
CROSS SECTION LOCATION MAP
GEOLOGIC CROSS SECTION B-B'
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS
GROUNDWATER TECHNOLOGY

IIIG-E-44


D
WEST
B-28
N 7774
E 10056
ELEV 512.0
TD 80.0
B-11
N 7990
E 10248
ELEV 636.0
TD 24.5
B-1
N 7953
E 10853
ELEV 670.0
TD 20.0
B-24(CC)
N 7864
E 11091
ELEV 651.0
TD 130.0
D'
EAST
INTERSECTION WITH A-A'
INTERSECTION WITH B-B'
WASTE MANAGEMENT UNIT BOUNDARY PROJECTED ONTO LINE OF SECTION
WASTE MANAGEMENT UNIT
AQUIFER A
AQUIFER B
BASAL CLAY A
BASAL CLAY B
ELEVATION IN FEET (AMSL)
EXPLANATION
GM Silty gravels, gravel-sand-silt mixtures
GC Clayey gravels, gravel-sand-clay mixtures
SP Poorly-graded sands, gravelly sands, little or no fines
SM Silty sands, sand and silt mixtures
SC Clayey sands, sand and clay mixtures
ML Inorganic silts and very fine sands, silty or clayey fine sands or clayey silts with slight plasticity
CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
OL Organic silts and organic silty clays of low plasticity
MH Inorganic silts, micaceous or diatomaceous fine sand or silty soils
CH Inorganic clays of high plasticity, fat clays
FILL
Aquitard
CROSS SECTION LOCATION MAP
N
NOTES: 1. Northings, eastings, and elevations for borings are approximate.
2. Site topography estimated from 1983 contour map.
3. * - Boring projected onto line of section.
4. CC - Continuous Core.
Scale in Feet
Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 10'
Vertical Exaggeration = 10X
LAIDLAW
LAIDLAW WASTE SYSTEMS, INC.
GEOLOGIC CROSS SECTION D-D'
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS
PROJECT 042480059
DATE 6/17/94
REVISIONS 12/23/94
ACAD FILE JG.DWG
GROUNDWATER TECHNOLOGY

IIIG-E-45

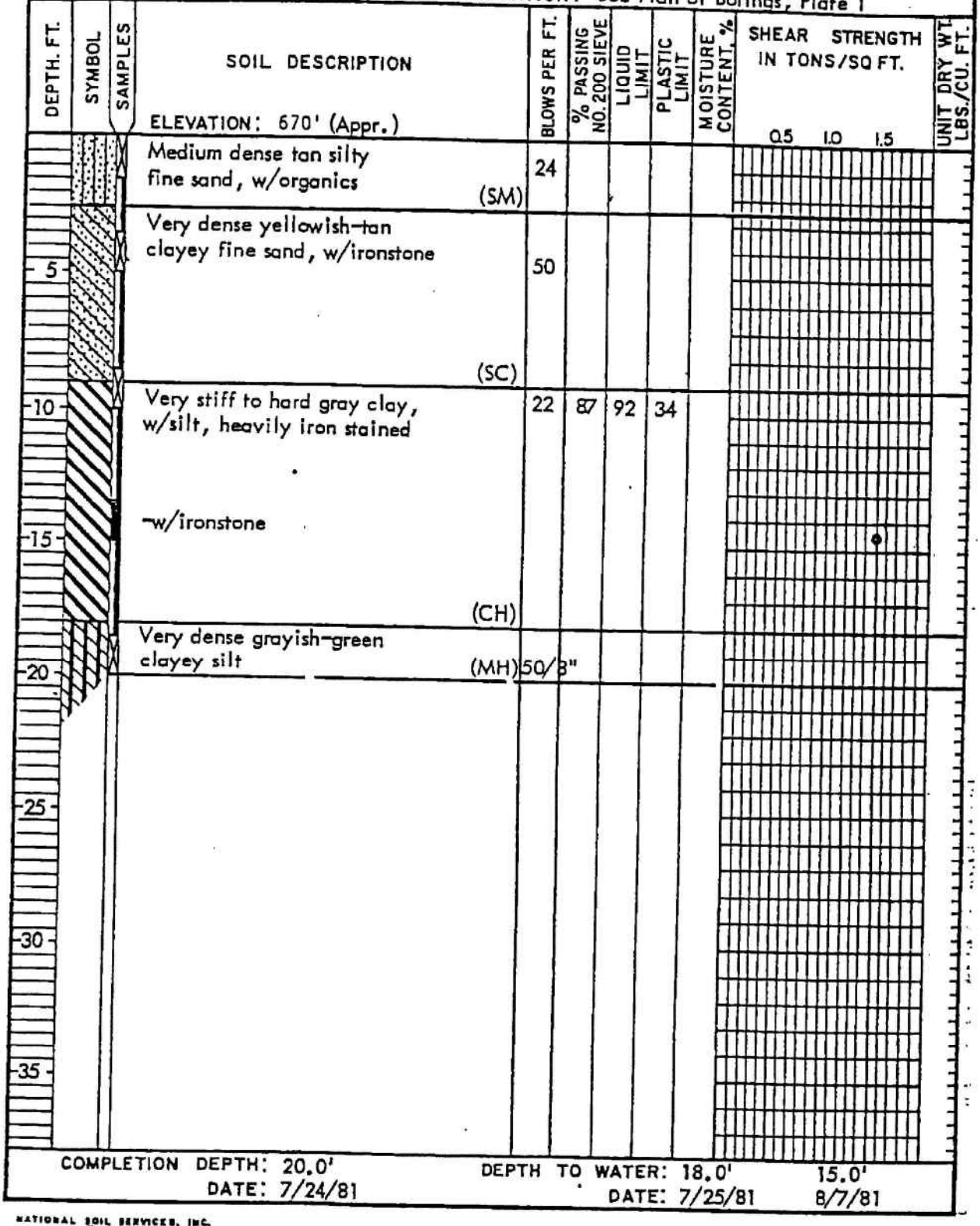

C
WEST
C'
EAST
WASTE MANAGEMENT UNIT BOUNDARY
PROJECTED DIRECTION OF SECTION
WASTE MANAGEMENT UNIT BOUNDARY
B-29
N 8231
E 10365
ELEV 685.0
TD 130.0
B-16
N 9321
E 10067
ELEV 686.0
TD 39.5
B-22
N 9309
E 11099
ELEV 651.0
TD 110.0
B-18
N 9456
E 11680
ELEV 568.0
TD 24.5
B-17
N 8670
E 12125
ELEV 564.0
TD 24.5
B-5
N 10033
E 12376
ELEV 555.0
TD 25.0
INTERSECTION WITH A-A'
INTERSECTION WITH B-B'
AQUIFER A
AQUIFER B
BASAL CLAY A
BASAL CLAY B
ELEVATION IN FEET (AMSL)
EXPLANATION
GM
GC
SP
SM
SC
ML
CL
OL
MH
CH
FILL
Aquifers
CROSS SECTION LOCATION MAP
LAIDLAW
LAIDLAW WASTE SYSTEMS, INC.
GEOLOGIC CROSS SECTION C-C'
ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS
GROUNDWATER TECHNOLOGY

IIIG-E-46

# 1981 BOREHOLE LOGS
# BY NATIONAL SOIL SERVICES

LOG OF BORING NO. B-1
PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed LOCATION: See Plan of Borings, Plate 1




COMPLETION DEPTH: 20.0'
DATE: 7/24/81

DEPTH TO WATER: 18.0' 15.0'
DATE: 7/25/81 8/7/81

NATIONAL SOIL SERVICES, INC.
CONSULTING ENGINEERS.

# LOG OF BORING NO. B-2

PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed LOCATION: See Plan of Borings, Plate 1

| DEPTH, FT. | SYMBOL | SAMPLES | SOIL DESCRIPTION | BLOWS PER FT. | % PASSING NO. 200 SIEVE | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE CONTENT, % | SHEAR STRENGTH IN TONS/SQ FT. (0.5 1.0 1.5) | UNIT DRY WT. LBS./CU. FT. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | ELEVATION: 675' (Appr.) | | | | | | | |
| | | | Loose tan silty fine sand, w/organics (SM) | 4 | | | | | | |
| 5 | | | Medium dense yellowish-tan clayey fine sand, w/ironstone (SC) | 18 | | | | | | |
| 10 | | | Very dense reddish-tan clayey sand, w/iron ore fragments (SC) | 50 | | | | | | |
| 15 | | | Very stiff tan clay, w/iron ore fragments and silt (CL) | | 88 | 108 | 45 | 44 | $k_v = 9.0 \times 10^{-9}$ cm/sec | 9 |
| 20 | | | Medium dense grayish-green sandy silt, w/iron ore fragments (MH) | | 43 | 76 | 50 | | | |
| 25 | | | | | | | | | | |
| 30 | | | | | | | | | | |
| 35 | | | | | | | | | | |

COMPLETION DEPTH: 20.0'
DATE: 7/25/81

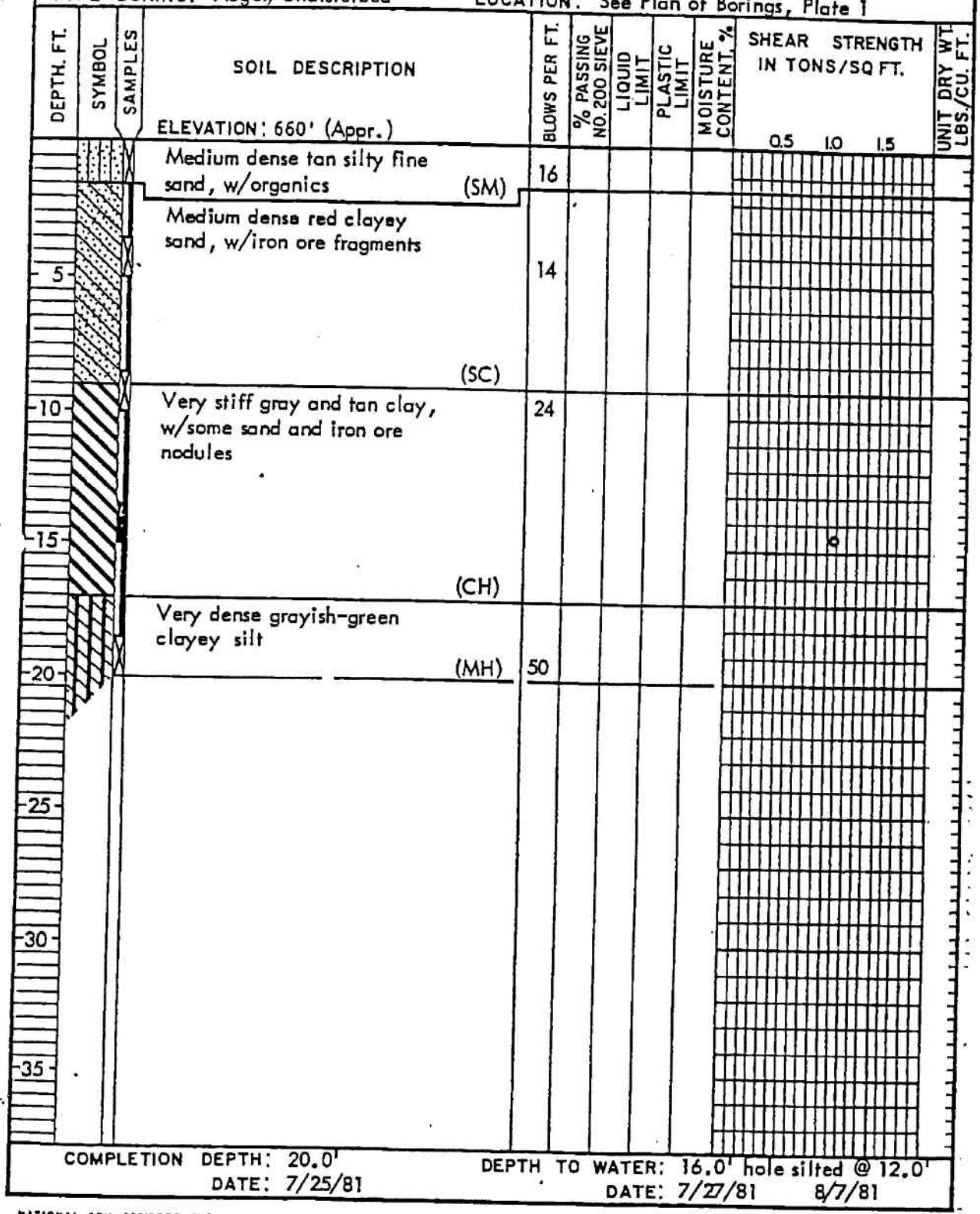
DEPTH TO WATER: 17.5' 14.0'
DATE: 7/27/81 8/7/81

NATIONAL SOIL SERVICES, INC.
CONSULTING ENGINEERS.

# LOG OF BORING NO. B-3

PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed LOCATION: See Plan of Borings, Plate 1




COMPLETION DEPTH: 20.0'
DATE: 7/25/81

DEPTH TO WATER: 16.0' hole silted @ 12.0'
DATE: 7/27/81 8/7/81

NATIONAL SOIL SERVICES, INC.
CONSULTING ENGINEERS.

LOG OF BORING NO. B-4
PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed LOCATION: See Plan of Borings, Plate 1

| DEPTH, FT. | SYMBOL | SAMPLES | SOIL DESCRIPTION<br>ELEVATION: 595' (Appr.) | BLOWS PER FT. | % PASSING NO. 200 SIEVE | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE CONTENT, % | SHEAR STRENGTH IN TONS/SQ FT. (0.5 1.0 1.5) | UNIT DRY WT. LBS./CU. FT. |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | | | Very stiff red sandy clay, w/iron ore nodules and clayey sand pockets, some organics | 26 | | | | | | |
| | | | | 21 | 51 | 46 | 16 | | | |
| 10 | | | (CL) | | | | | | | |
| 15 | | | Dense to very dense gray and yellowish-tan clayey fine sand, w/silt and iron stains | | | | | | | |
| 20 | | | -increase clay content | 83 | | | | | | |
| 25 | | | -w/tannish-gray clay pockets and iron ore nodules | | 35 | 27 | 25 | 24 | $k_v = 1.5 \times 10^{-5}$ cm/sec | 96 |
| 30 | | | -decrease clay content | 50 | | | | | | |
| | | | (SC) | | | | | | | |
| 35 | | | Very dense grayish-green sandy silt | 50 | 21 | | | 23 | | |

(Continued)

NATIONAL SOIL SERVICES, INC.
CONSULTING ENGINEERS.

LOG OF BORING NO. B-4 (Cont'd.)
PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed
LOCATION: See Plan of Borings, Plate 1

| DEPTH, FT. | SYMBOL | SAMPLES | SOIL DESCRIPTION | BLOWS PER FT. | % PASSING NO. 200 SIEVE | LIQUID LIMIT | PLASTIC LIMIT | MOISTURE CONTENT, % | SHEAR STRENGTH IN TONS/SQ FT. 0.5 1.0 1.5 | UNIT DRY WT. LBS./CU. FT. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | (MH) | | | | | | | |
| 40 | | | Hard dark gray clay, w/gray silty clay laminations (CH) | 65 | | | | | | |
| 45 | | | | | | | | | | |
| 50 | | | | | | | | | | |
| 55 | | | | | | | | | | |
| 60 | | | | | | | | | | |
| 65 | | | | | | | | | | |
| 70 | | | | | | | | | | |

COMPLETION DEPTH: 40.0'
DATE: 7/25/81

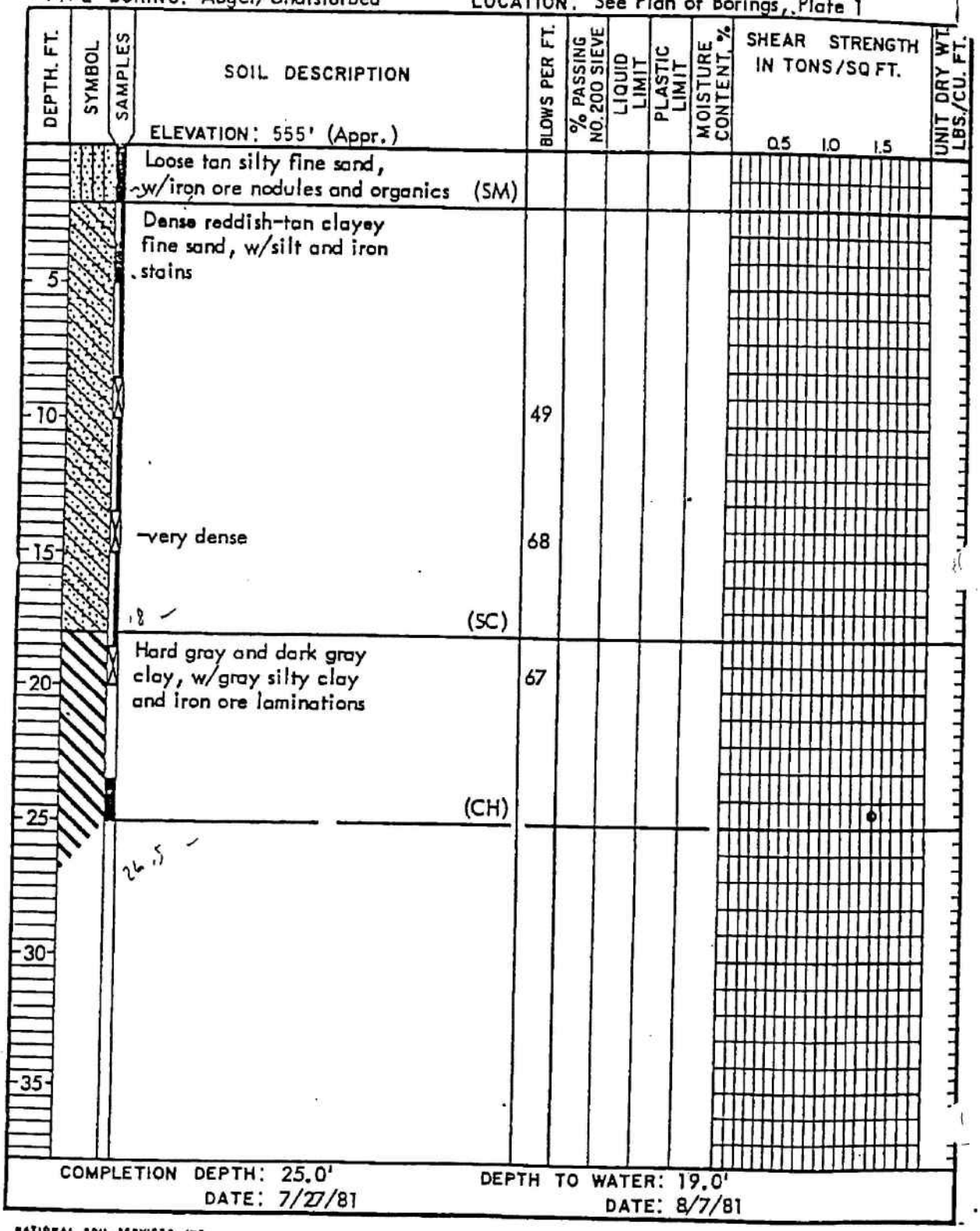
DEPTH TO WATER: 24.0' - Caved at 25.5'
DATE: 7/27/81

NATIONAL SOIL SERVICES, INC.
CONSULTING-ENGINEERS.

# LOG OF BORING NO. B 5

PRELIMINARY STUDY
SANITARY LANDFILL
JACKSONVILLE, TEXAS

TYPE BORING: Auger/Undisturbed LOCATION: See Plan of Borings, Plate 1




COMPLETION DEPTH: 25.0' DEPTH TO WATER: 19.0'
DATE: 7/27/81 DATE: 8/7/81

NATIONAL SOIL SERVICES, INC.
CONSULTING ENGINEERS.

# 1982 BOREHOLE LOGS
# BY MAXIM ENGINEERS

## Log of Boring

Number: B-6

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 680'

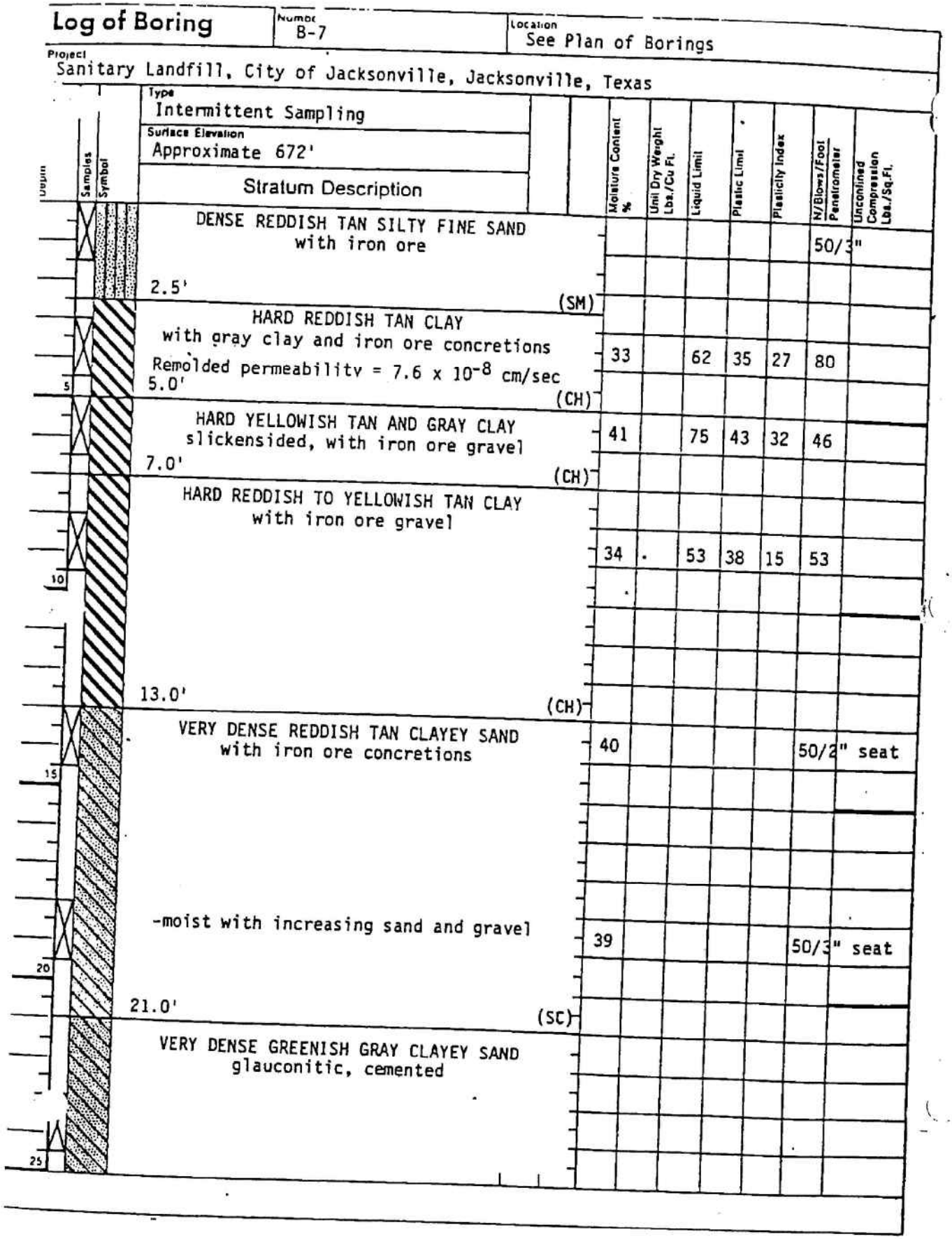
| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | LOOSE TAN SILTY FINE SAND with organics (top 2" is topsoil) | | | | | | 5 | |
| | | | 2.0' (SM) | | | | | | | |
| | | | MEDIUM DENSE YELLOWISH TAN SILTY FINE SAND slightly clayey | | | | | | | |
| | | | | 12 | | | | | 11 | |
| 5 | | | | | | | | | | |
| | | | 6.0' (SM) | | | | | | | |
| | | | MEDIUM DENSE YELLOWISH TAN CLAYEY SAND with gray clay pockets and iron ore concretions | | | | | | 22 | |
| | | | -with iron ore concretions | 16 | | 26 | 15 | 11 | 65 | |
| 10 | | | | | | | | | | |
| | | | 11.0' (SC) | | | | | | | |
| | | | HARD YELLOWISH TAN AND GRAY SANDY CLAY with some iron ore nodules | | | | | | | |
| | | | | 21 | | | | | 40 | |
| 15 | | | | | | | | | | |
| | | | 16.5' (CL) | | | | | | | |
| | | | HARD YELLOWISH TAN SILTY CLAY moist, with some iron ore | | | | | | | |
| | | | 19.5' (CH) | 28 | | 73 | 50 | 46 | 27 | |
| 20 | | | | | | | | | | |
| 25 | | | | | | | | | | |

Completion Depth: 19.5'

Date: 12/21/82

Water Observations: Water level at 10.0' and caved at 14.5' upon completion. Water level at 7.0' and caved at 8.0' on 12/28/82.

Maxim Engineers



Log of Boring

Number B-7

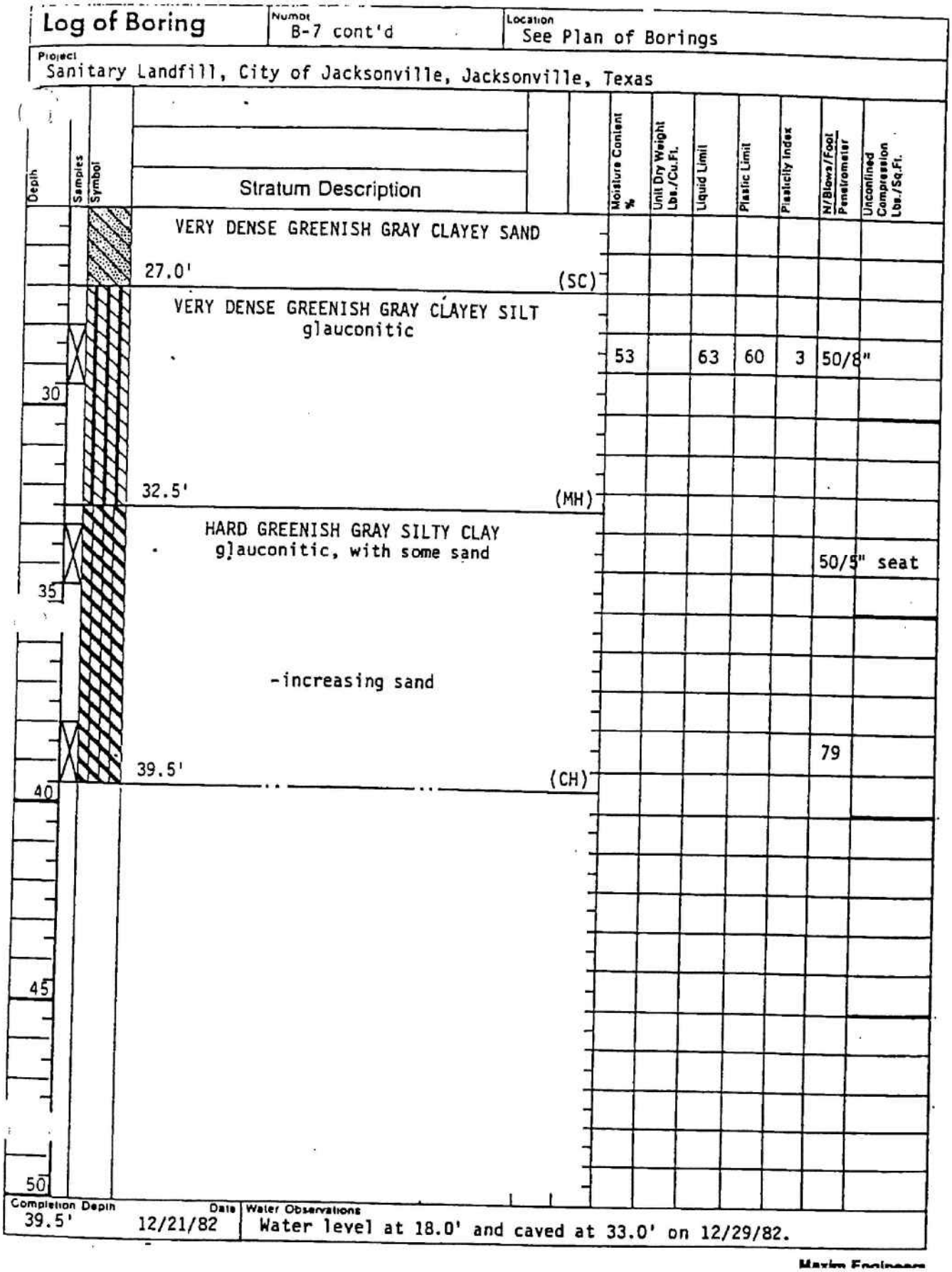
Location See Plan of Borings

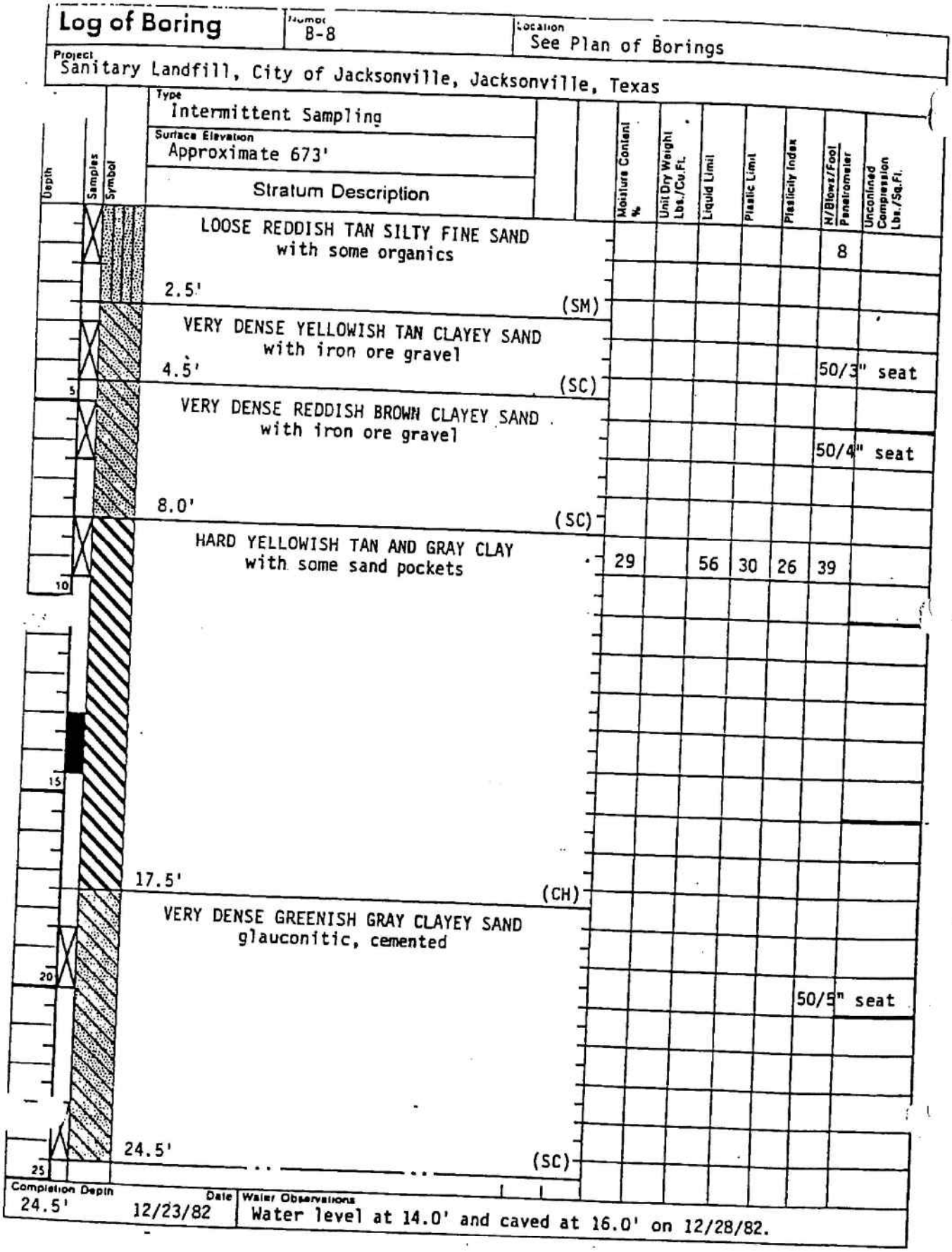
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

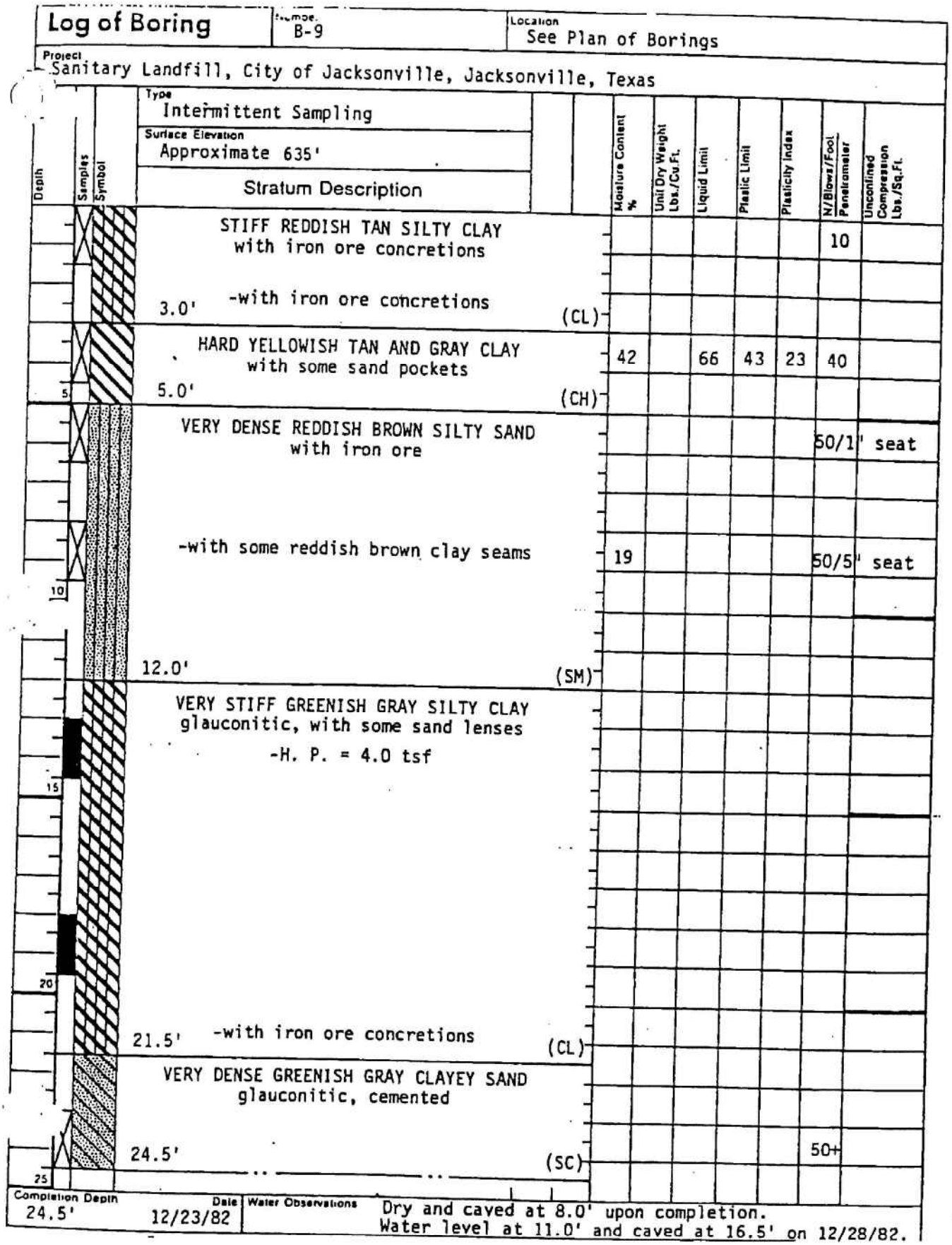
Type Intermittent Sampling

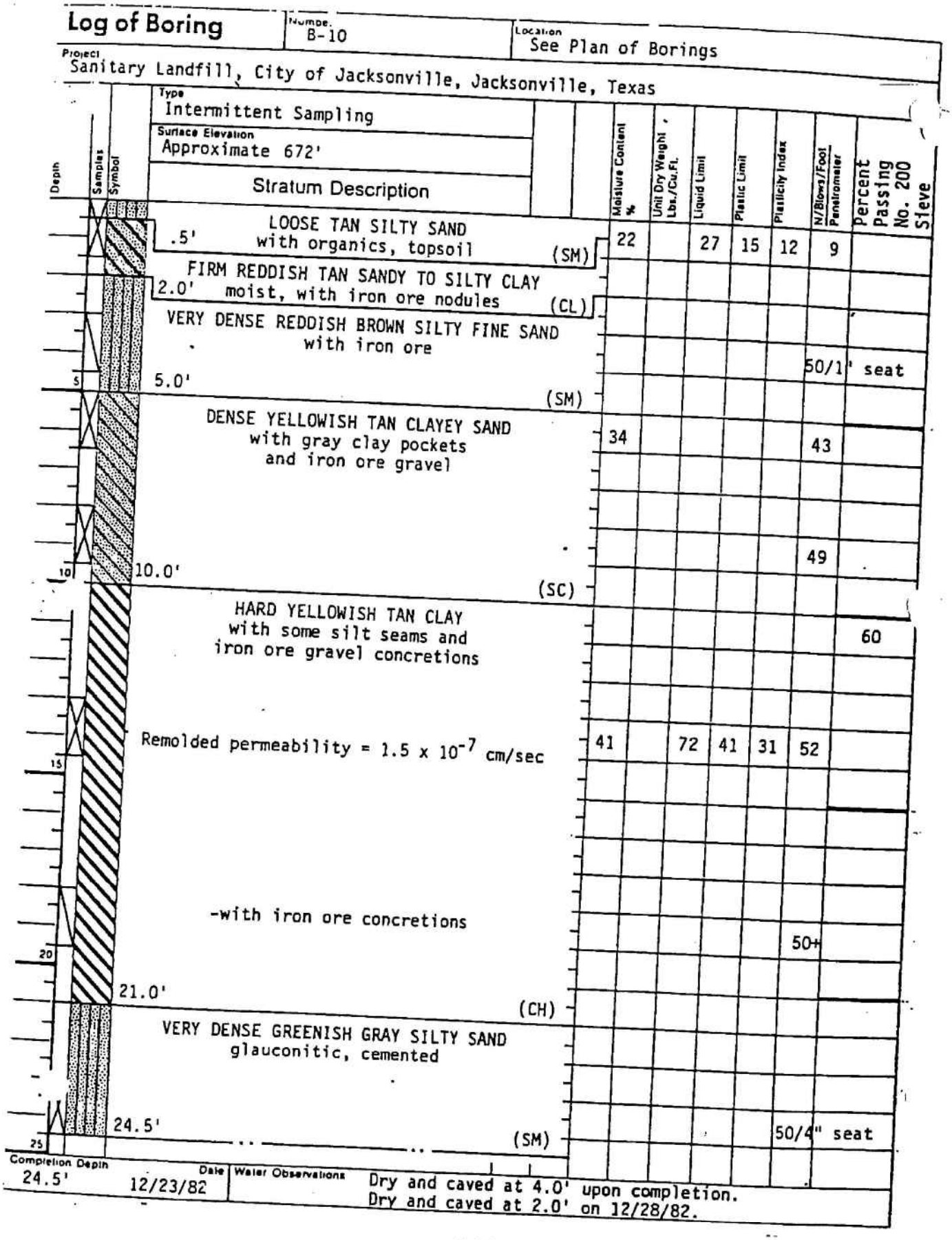
Surface Elevation Approximate 672'

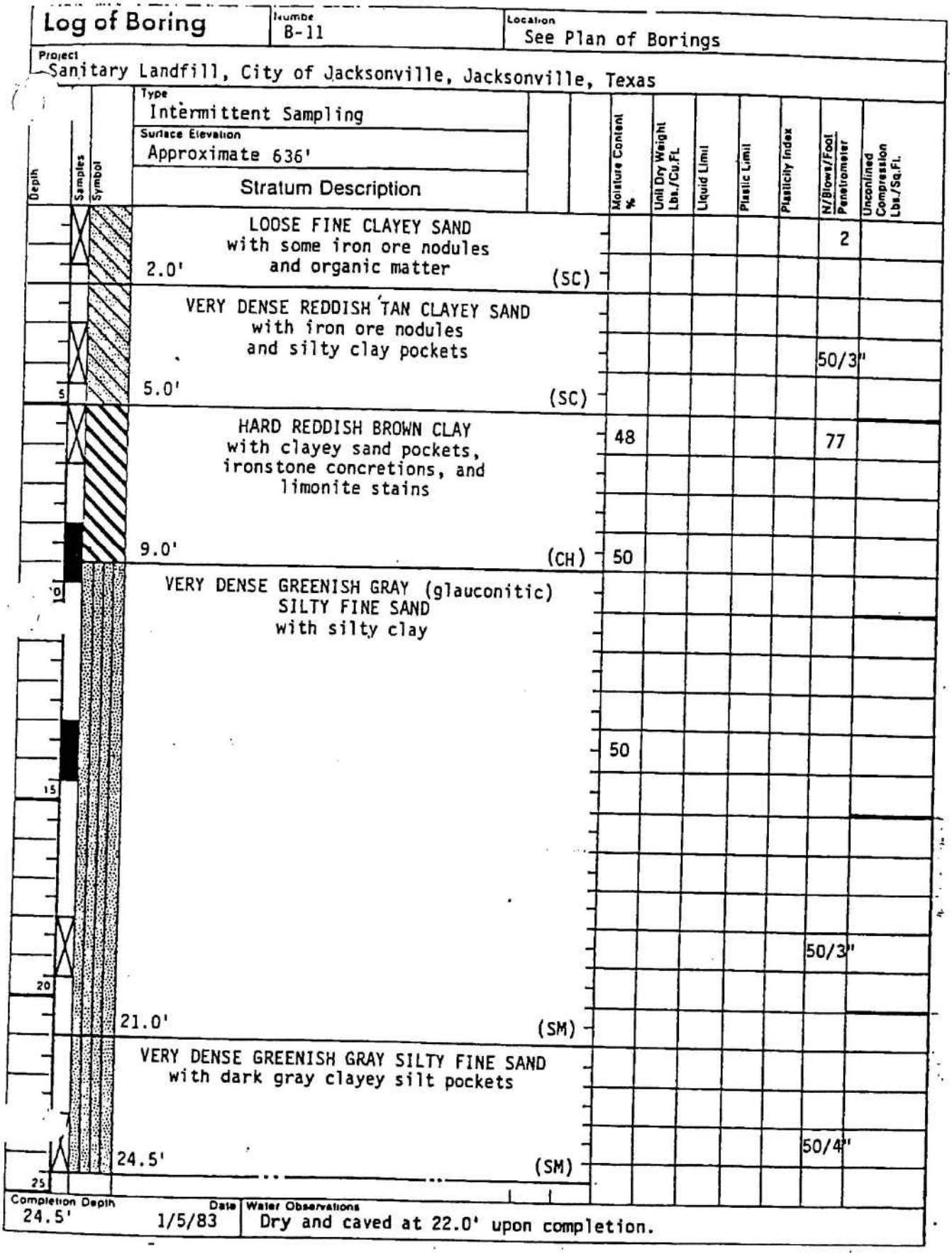
| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DENSE REDDISH TAN SILTY FINE SAND with iron ore | | | | | | 50/3" | |
| | | | 2.5' (SM) | | | | | | | |
| | | | HARD REDDISH TAN CLAY with gray clay and iron ore concretions | 33 | | 62 | 35 | 27 | 80 | |
| | | | Remolded permeability = 7.6 x $10^{-8}$ cm/sec | | | | | | | |
| 5 | | | 5.0' (CH) | | | | | | | |
| | | | HARD YELLOWISH TAN AND GRAY CLAY slickensided, with iron ore gravel | 41 | | 75 | 43 | 32 | 46 | |
| | | | 7.0' (CH) | | | | | | | |
| | | | HARD REDDISH TO YELLOWISH TAN CLAY with iron ore gravel | 34 | | 53 | 38 | 15 | 53 | |
| 10 | | | | | | | | | | |
| | | | 13.0' (CH) | | | | | | | |
| | | | VERY DENSE REDDISH TAN CLAYEY SAND with iron ore concretions | 40 | | | | | 50/2" | seat |
| 15 | | | | | | | | | | |
| | | | -moist with increasing sand and gravel | 39 | | | | | 50/3" | seat |
| 20 | | | | | | | | | | |
| | | | 21.0' (SC) | | | | | | | |
| | | | VERY DENSE GREENISH GRAY CLAYEY SAND glauconitic, cemented | | | | | | | |
| 25 | | | | | | | | | | |

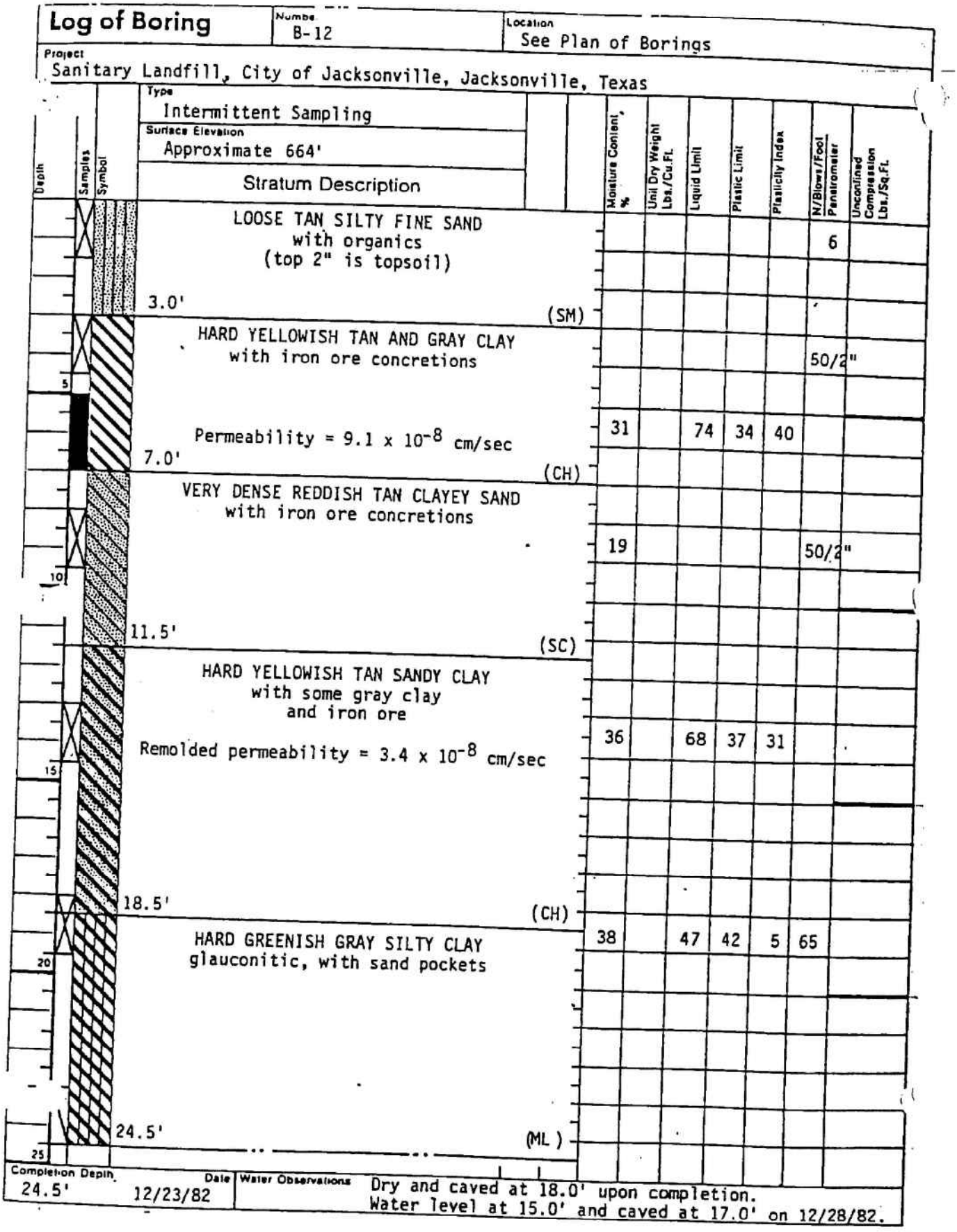

Log of Boring
Number B-7 cont'd
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Depth
Samples
Symbol
Stratum Description
Moisture Content %
Unit Dry Weight Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Unconfined Compression Lbs./Sq.Ft.
VERY DENSE GREENISH GRAY CLAYEY SAND
27.0'
(SC)
VERY DENSE GREENISH GRAY CLAYEY SILT
glauconitic
53
63
60
3
50/8"
30
32.5'
(MH)
HARD GREENISH GRAY SILTY CLAY
glauconitic, with some sand
50/5" seat
35
-increasing sand
79
39.5'
(CH)
40
45
50
Completion Depth 39.5'
Date 12/21/82
Water Observations
Water level at 18.0' and caved at 33.0' on 12/29/82.
Maxim Engineers

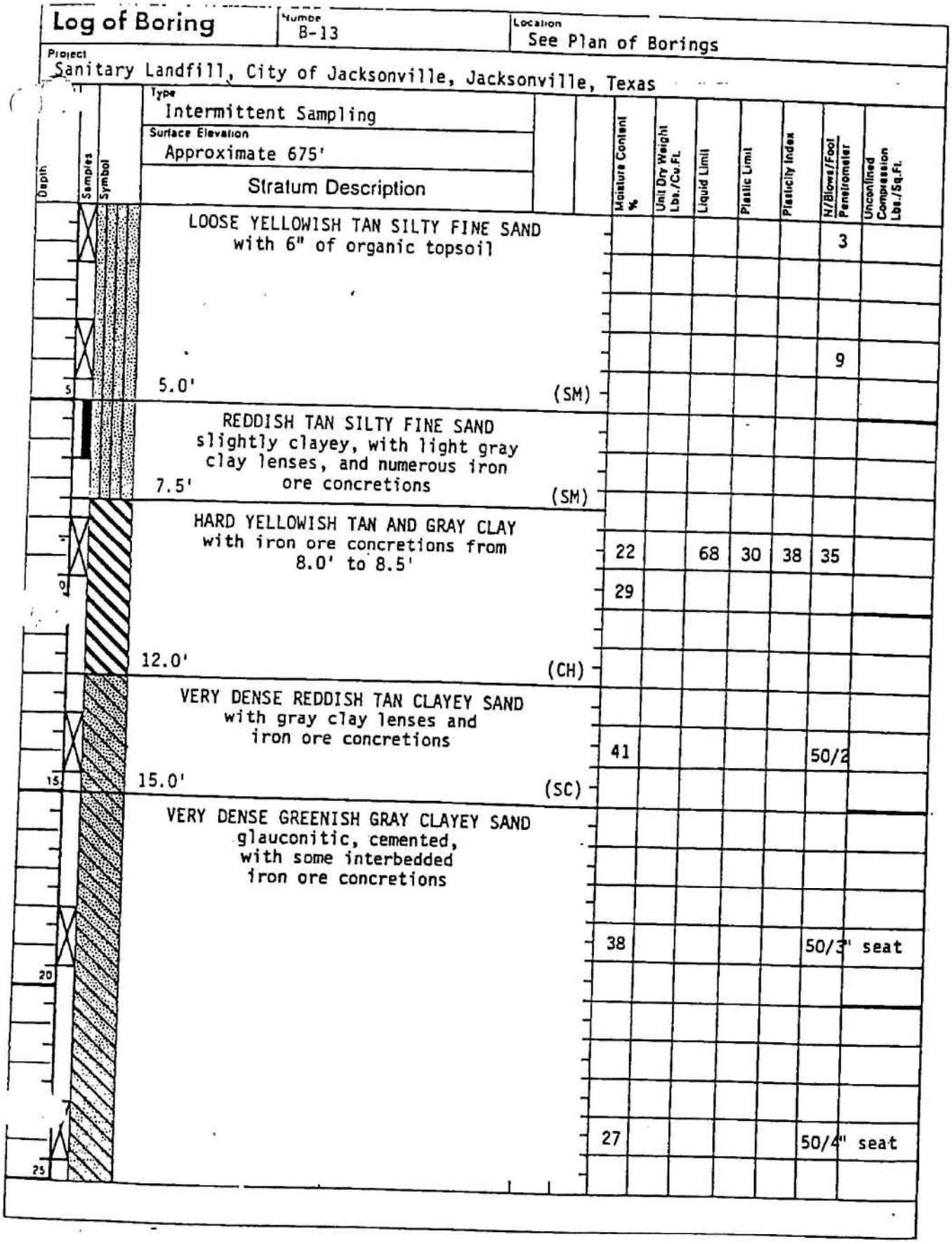

Log of Boring
Number B-8
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Type Intermittent Sampling
Surface Elevation Approximate 673'
Stratum Description
Depth
Samples
Symbol
Moisture Content %
Unit Dry Weight Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Unconfined Compression Lbs./Sq.Ft.
LOOSE REDDISH TAN SILTY FINE SAND with some organics
8
2.5'
(SM)
VERY DENSE YELLOWISH TAN CLAYEY SAND with iron ore gravel
4.5'
50/3" seat
(SC)
5
VERY DENSE REDDISH BROWN CLAYEY SAND with iron ore gravel
50/4" seat
8.0'
(SC)
HARD YELLOWISH TAN AND GRAY CLAY with some sand pockets
29
56
30
26
39
10
15
17.5'
(CH)
VERY DENSE GREENISH GRAY CLAYEY SAND glauconitic, cemented
20
50/5" seat
24.5'
(SC)
25
Completion Depth 24.5'
Date 12/23/82
Water Observations
Water level at 14.0' and caved at 16.0' on 12/28/82.

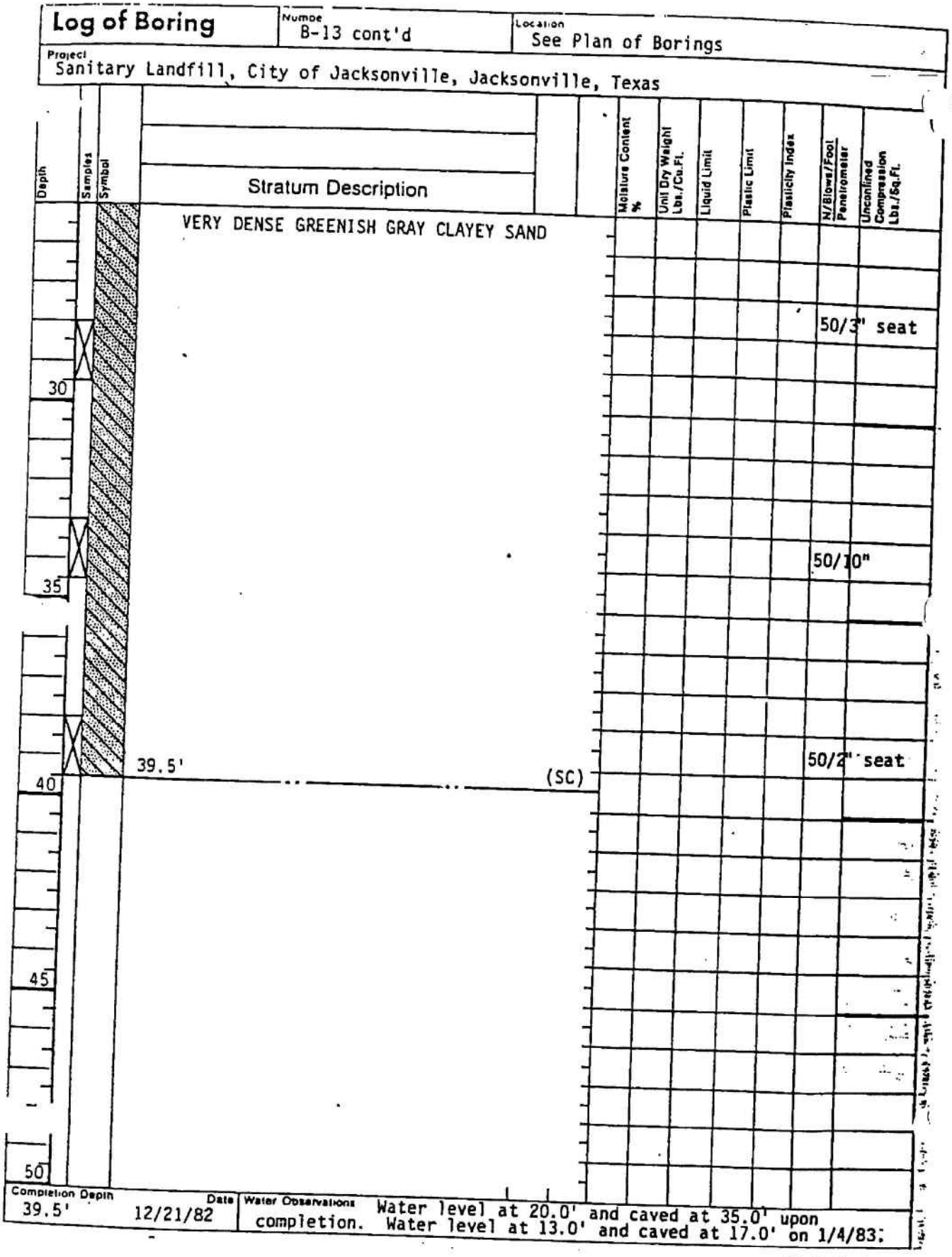

Log of Boring
Number B-9
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Type Intermittent Sampling
Surface Elevation Approximate 635'
Depth
Samples
Symbol
Stratum Description
Moisture Content %
Unit Dry Weight Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Unconfined Compression Lbs./Sq.Ft.
STIFF REDDISH TAN SILTY CLAY
with iron ore concretions
10
-with iron ore concretions
3.0'
(CL)
HARD YELLOWISH TAN AND GRAY CLAY
with some sand pockets
42
66
43
23
40
5.0'
(CH)
VERY DENSE REDDISH BROWN SILTY SAND
with iron ore
50/1" seat
-with some reddish brown clay seams
19
50/5" seat
12.0'
(SM)
VERY STIFF GREENISH GRAY SILTY CLAY
glauconitic, with some sand lenses
-H. P. = 4.0 tsf
21.5'
-with iron ore concretions
(CL)
VERY DENSE GREENISH GRAY CLAYEY SAND
glauconitic, cemented
24.5'
50+
(SC)
Completion Depth 24.5'
Date 12/23/82
Water Observations
Dry and caved at 8.0' upon completion.
Water level at 11.0' and caved at 16.5' on 12/28/82.


Log of Boring
Number B-10
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Type Intermittent Sampling
Surface Elevation Approximate 672'
Stratum Description
Depth
Samples
Symbol
Moisture Content %
Unit Dry Weight, Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Percent Passing No. 200 Sieve
LOOSE TAN SILTY SAND with organics, topsoil
.5'
(SM)
22
27
15
12
9
FIRM REDDISH TAN SANDY TO SILTY CLAY moist, with iron ore nodules
2.0'
(CL)
VERY DENSE REDDISH BROWN SILTY FINE SAND with iron ore
50/1" seat
5.0'
(SM)
DENSE YELLOWISH TAN CLAYEY SAND with gray clay pockets and iron ore gravel
34
43
49
10.0'
(SC)
HARD YELLOWISH TAN CLAY with some silt seams and iron ore gravel concretions
60
Remolded permeability = 1.5 x 10-7 cm/sec
41
72
41
31
52
-with iron ore concretions
50+
21.0'
(CH)
VERY DENSE GREENISH GRAY SILTY SAND glauconitic, cemented
24.5'
(SM)
50/4" seat
Completion Depth 24.5'
Date 12/23/82
Water Observations
Dry and caved at 4.0' upon completion.
Dry and caved at 2.0' on 12/28/82.


Log of Boring
Number B-11
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Type Intermittent Sampling
Surface Elevation Approximate 636'
Stratum Description
Depth
Samples
Symbol
Moisture Content %
Unit Dry Weight Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Unconfined Compression Lbs./Sq.Ft.
LOOSE FINE CLAYEY SAND with some iron ore nodules and organic matter
2.0'
(SC)
2
VERY DENSE REDDISH TAN CLAYEY SAND with iron ore nodules and silty clay pockets
5.0'
(SC)
50/3"
HARD REDDISH BROWN CLAY with clayey sand pockets, ironstone concretions, and limonite stains
9.0'
(CH)
48
77
50
VERY DENSE GREENISH GRAY (glauconitic) SILTY FINE SAND with silty clay
50
50/3"
21.0'
(SM)
VERY DENSE GREENISH GRAY SILTY FINE SAND with dark gray clayey silt pockets
24.5'
(SM)
50/4"
Completion Depth 24.5'
Date 1/5/83
Water Observations Dry and caved at 22.0' upon completion.


Log of Boring
Number B-12
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Type Intermittent Sampling
Surface Elevation Approximate 664'
Stratum Description
Depth
Samples
Symbol
Moisture Content, %
Unit Dry Weight Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Unconfined Compression Lbs./Sq.Ft.
LOOSE TAN SILTY FINE SAND
with organics
(top 2" is topsoil)
3.0'
(SM)
6
HARD YELLOWISH TAN AND GRAY CLAY
with iron ore concretions
50/2"
Permeability = 9.1 x 10-8 cm/sec
7.0'
(CH)
31 74 34 40
VERY DENSE REDDISH TAN CLAYEY SAND
with iron ore concretions
19
50/2"
11.5'
(SC)
HARD YELLOWISH TAN SANDY CLAY
with some gray clay
and iron ore
Remolded permeability = 3.4 x 10-8 cm/sec
36 68 37 31
18.5'
(CH)
HARD GREENISH GRAY SILTY CLAY
glauconitic, with sand pockets
38 47 42 5 65
24.5'
(ML)
Completion Depth 24.5'
Date 12/23/82
Water Observations
Dry and caved at 18.0' upon completion.
Water level at 15.0' and caved at 17.0' on 12/28/82.


Log of Boring
Number B-13
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Type Intermittent Sampling
Surface Elevation Approximate 675'
Stratum Description
Depth
Samples
Symbol
Moisture Content %
Unit Dry Weight Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Unconfined Compression Lbs./Sq.Ft.
LOOSE YELLOWISH TAN SILTY FINE SAND with 6" of organic topsoil
5.0'
(SM)
REDDISH TAN SILTY FINE SAND slightly clayey, with light gray clay lenses, and numerous iron ore concretions
7.5'
(SM)
HARD YELLOWISH TAN AND GRAY CLAY with iron ore concretions from 8.0' to 8.5'
12.0'
(CH)
VERY DENSE REDDISH TAN CLAYEY SAND with gray clay lenses and iron ore concretions
15.0'
(SC)
VERY DENSE GREENISH GRAY CLAYEY SAND glauconitic, cemented, with some interbedded iron ore concretions
3
9
22
68
30
38
35
29
41
50/2
38
50/3" seat
27
50/4" seat
5
10
15
20
25


Log of Boring
Number B-13 cont'd
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Depth
Samples
Symbol
Stratum Description
Moisture Content %
Unit Dry Weight Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Unconfined Compression Lbs./Sq.Ft.
VERY DENSE GREENISH GRAY CLAYEY SAND
50/3" seat
30
50/10"
35
39.5'
(SC)
50/2" seat
40
45
50
Completion Depth 39.5'
Date 12/21/82
Water Observations Water level at 20.0' and caved at 35.0' upon completion. Water level at 13.0' and caved at 17.0' on 1/4/83.

## Log of Boring

Number: B-14

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 600'

| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Percent Passing No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | HARD REDDISH BROWN SILTY CLAY with organics | 28 | | 51 | 32 | 19 | 47 | |
| | | | 2.5' (CH) | | | | | | | |
| 5 | | | MEDIUM DENSE REDDISH BROWN TO YELLOWISH TAN SILTY FINE SAND with clay, organics, and hematite stains | 19 | | | | | | |
| | | | 8.0' (SM) | | | | | | | |
| | | | STIFF GRAY SILTY CLAY with silty fine sand laminations and hematite stains | 25 | | | | | | |
| | | | 11.0' (CL) | | | | | | | |
| | | | HARD DARK GRAYISH BROWN SILTY CLAY with silty fine sand laminations | 22 | | 33 | 20 | 13 | 50/7" | 50 |
| 15 | | | 15.0' (CL) | | | | | | | |
| | | | GRAY SILTY FINE SAND seepage | | | | | | | |
| | | | 17.0' (SM) | | | | | | | |
| | | | HARD DARK GRAYISH BROWN SILTY CLAY with silty fine sand laminations | 25 | | 35 | 25 | 10 | | |
| 20 | | | | | | | | | | |
| | | | 24.5' (CL) | | | | | | | |
| 25 | | | | | | | | | | |

Completion Depth: 24.5'

Date: 1/4/83

Water Observations: Moist and caved at 5.0' on 1/5/83.

# Log of Boring

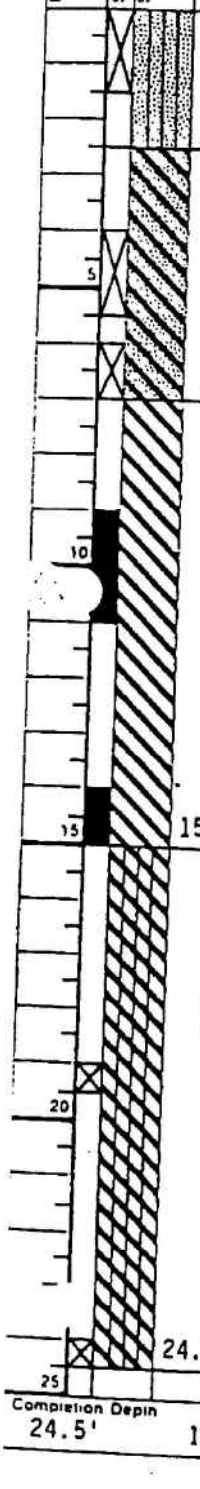
Number: B-15

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 675'



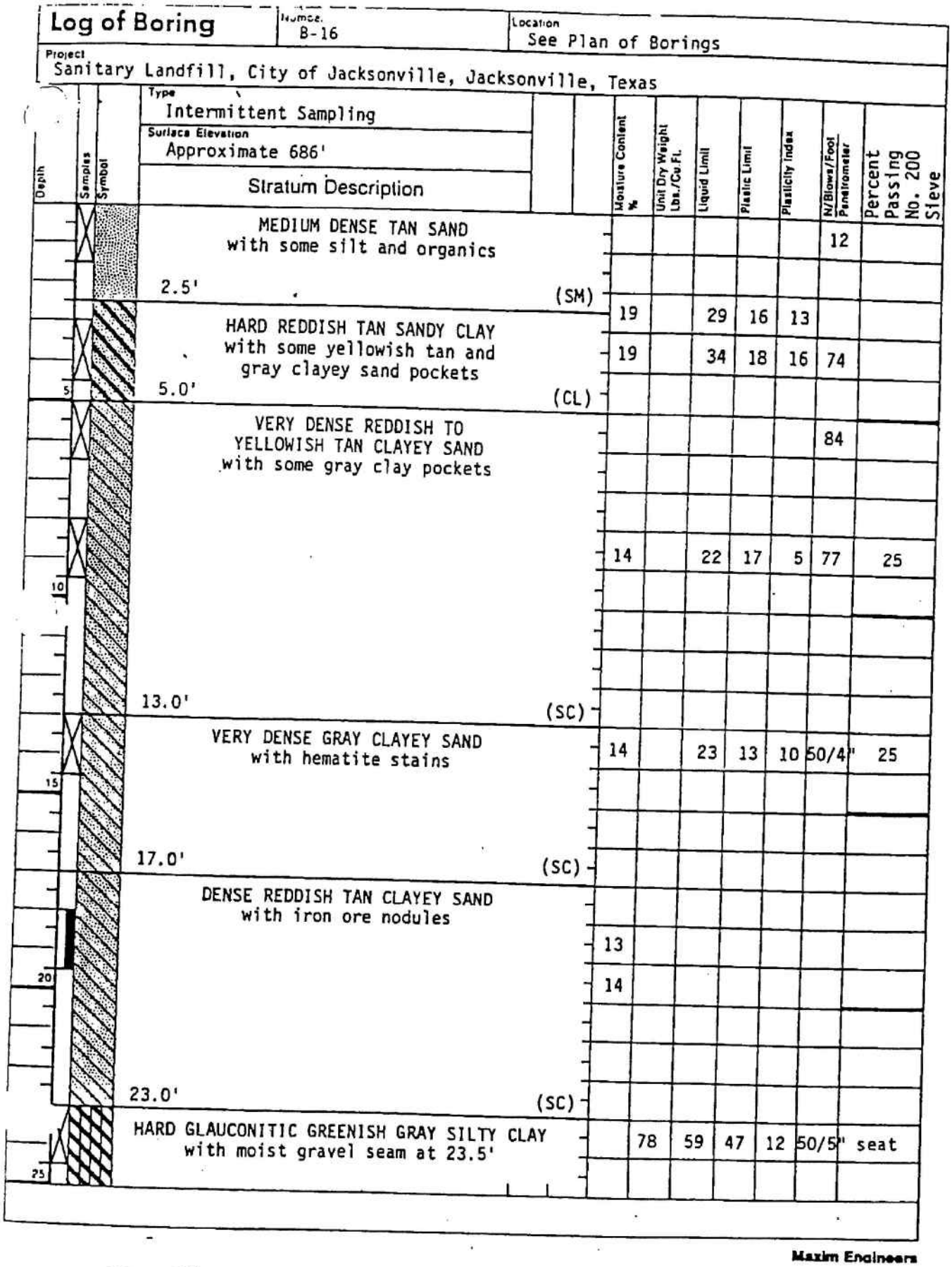
| Depth | Samples | Symbol | Stratum Description | | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Unconfined Compression Lbs./Sq.Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MEDIUM DENSE TAN SILTY FINE SAND with organics, topsoil | | | | | | | 16 | |
| | | | 2.5' | (SM) | | | | | | | |
| | | | HARD YELLOWISH TAN SANDY CLAY with ironstone concretions | | | | | | | | |
| 5 | | | | | 28 | | 52 | 32 | 20 | 50/5" | |
| | | | 7.0' | (CH) | | | | | | 50/6" | |
| | | | HARD YELLOWISH TAN CLAY with iron ore concretions and hematite stains | | | | | | | | |
| 10 | | | Permeability = $3.4 \times 10^{-7}$ cm/sec | | 40 | 92 | 65 | 39 | 26 | | |
| | | | -ironstone ledge at 13.0' and 15.0' | | | | | | | | |
| 15 | | | 15.0' | (CH) | | | | | | | |
| | | | HARD YELLOWISH TAN SILTY CLAY with some cemented sand lenses | | | | | | | | |
| 20 | | | | | | | | | | 50/5" seat | |
| | | | 24.5' -cemented and moist | (CH) | | | | | | | |
| 25 | | | | | | | | | | 50/2" seat | |

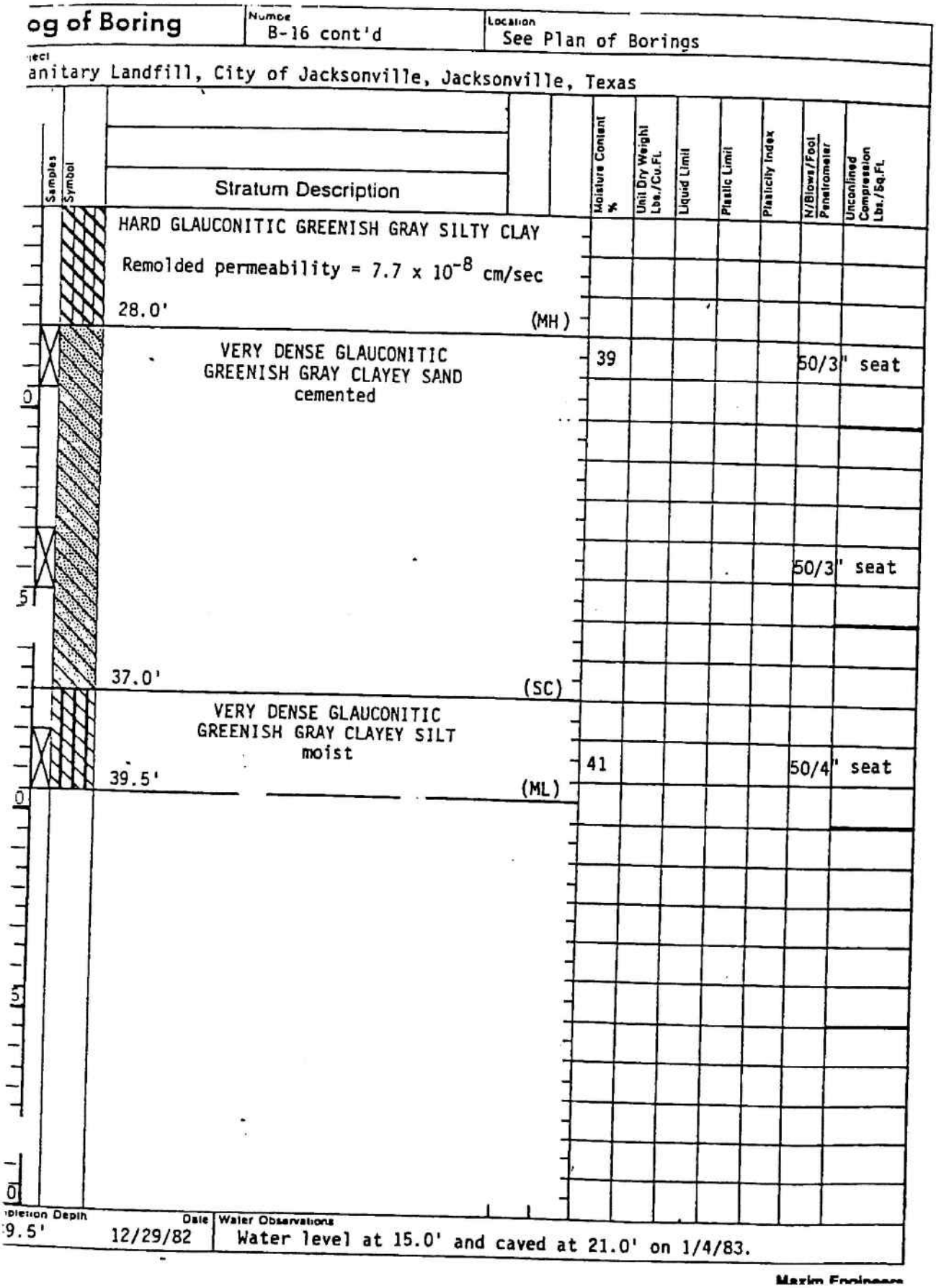
Completion Depth: 24.5'

Date: 12/30/82

Water Observations: Water level at 15.0' and caved at 18.3' upon completion. Water level at 13.5' and caved at 17.0' on 1/4/83.

Maxim Engineers


Log of Boring
Number B-16
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Type Intermittent Sampling
Surface Elevation Approximate 686'
Stratum Description
Depth
Samples
Symbol
Moisture Content %
Unit Dry Weight Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Percent Passing No. 200 Sieve
MEDIUM DENSE TAN SAND with some silt and organics
2.5'
(SM)
HARD REDDISH TAN SANDY CLAY with some yellowish tan and gray clayey sand pockets
5.0'
(CL)
VERY DENSE REDDISH TO YELLOWISH TAN CLAYEY SAND with some gray clay pockets
13.0'
(SC)
VERY DENSE GRAY CLAYEY SAND with hematite stains
17.0'
(SC)
DENSE REDDISH TAN CLAYEY SAND with iron ore nodules
23.0'
(SC)
HARD GLAUCONITIC GREENISH GRAY SILTY CLAY with moist gravel seam at 23.5'
Maxim Engineers


og of Boring
Number
B-16 cont'd
Location
See Plan of Borings
anitary Landfill, City of Jacksonville, Jacksonville, Texas
Samples
Symbol
Stratum Description
Moisture Content %
Unit Dry Weight Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Unconfined Compression Lbs./Sq.Ft.
HARD GLAUCONITIC GREENISH GRAY SILTY CLAY
Remolded permeability = 7.7 x 10-8 cm/sec
28.0'
(MH)
VERY DENSE GLAUCONITIC GREENISH GRAY CLAYEY SAND cemented
39
50/3" seat
50/3" seat
37.0'
(SC)
VERY DENSE GLAUCONITIC GREENISH GRAY CLAYEY SILT moist
41
50/4" seat
39.5'
(ML)
pletion Depth
9.5'
Date
12/29/82
Water Observations
Water level at 15.0' and caved at 21.0' on 1/4/83.

# Log of Boring

Number: B-17

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 564'

| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Percent Passing No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | MEDIUM DENSE TAN SILTY FINE SAND with organics, topsoil (SM) | | | | | | 22 | |
| | | | .5' HARD REDDISH TAN SANDY CLAY with some yellowish tan clayey sand pockets and hematite and limonite stains | | | | | | | |
| | | | | 16 | | 41 | 24 | 17 | 59 | 65 |
| 5 | | | -with ironstone concretions | | | | | | | |
| | | | | 15 | | 33 | 15 | 18 | 51 | 64 |
| | | | 7.5' (CL) | | | | | | | |
| | | | HARD RED AND BROWNISH GRAY CLAY slickensided, with hematite and limonite stains | | | | | | | |
| 10 | | | | 24 | | 50 | 25 | 25 | 43 | 98 |
| | | | -with some yellowish tan silty fine sand lenses | | | | | | | |
| | | | -H. P. = 4.5 tsf | | | | | | | |
| 15 | | | Permeability = $8.7 \times 10^{-8}$ cm/sec | | | | | | | |
| | | | 17.0' (CH) | | | | | | | |
| | | | HARD GRAYISH BROWN CLAY with numerous silty fine sand laminations and hematite stains | | | | | | | |
| | | | | 32 | | | | | | |
| 20 | | | | | | | | | | |
| | | | 24.5' -with ironstone concretions (CH) | | | | | | | |
| 25 | | | | | | | | | | |

Completion Depth: 24.5'

Date: 12/29/82

Water Observations: Dry and caved at 8.5' on 1/4/83.

Maxim Engineers

## Log of Boring

Number: B-18

Location: See Plan of Borings

Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 568'

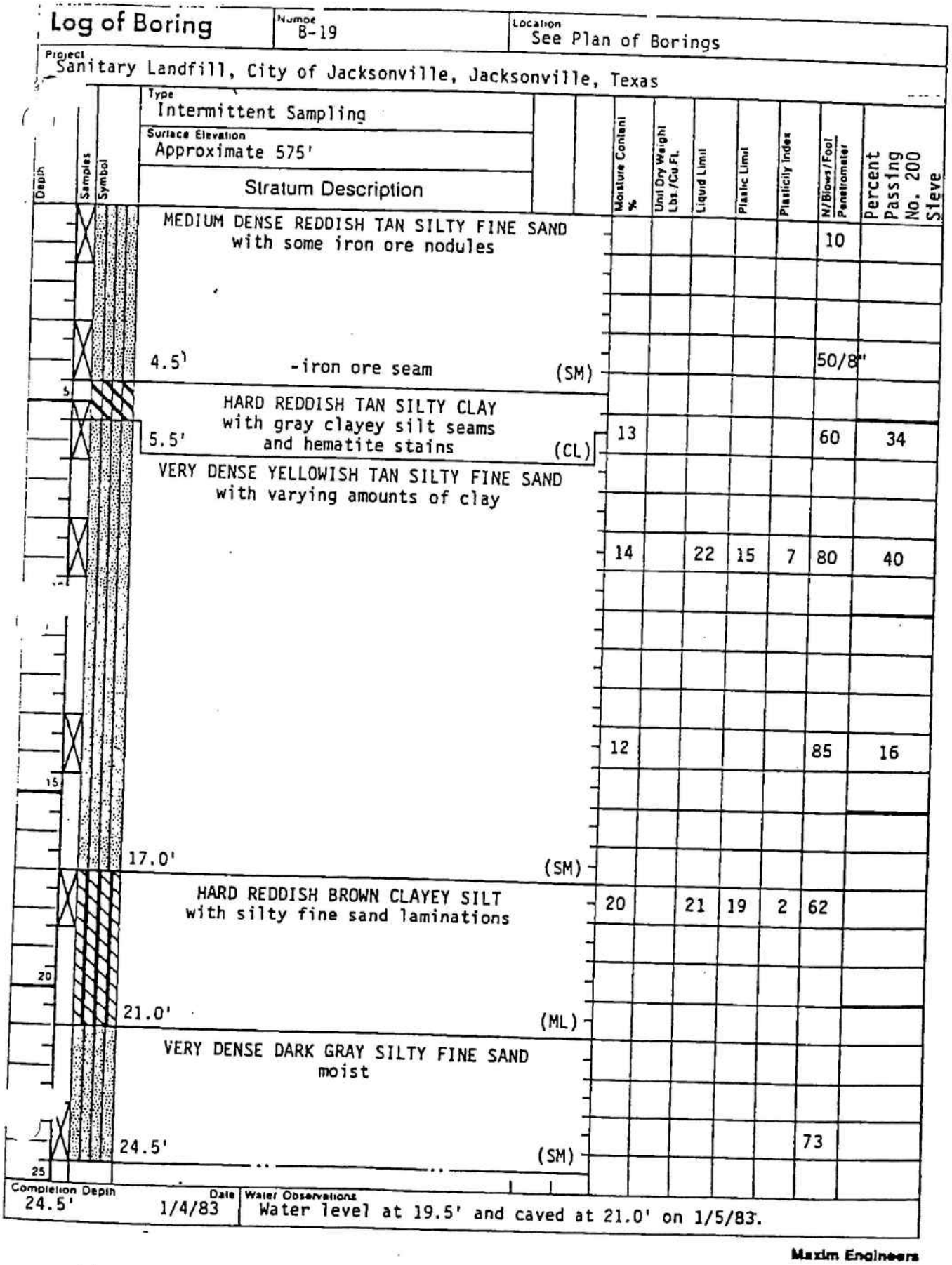
| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Percent Passing No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | MEDIUM DENSE REDDISH BROWN SILTY FINE SAND with clay and iron ore nodules | | | | | 1 | 18 | |
| | | | 2.0' (SM) | | | | | | | |
| | | | VERY STIFF REDDISH TAN SANDY TO SILTY CLAY with iron ore nodules | | | | | | | |
| | | | Permeability = $3.3 \times 10^{-8}$ cm/sec | 21 | 96 | 41 | 24 | 17 | | |
| 5 | | | 5.0' (CL) | | | | | | | |
| | | | DENSE REDDISH TAN AND YELLOWISH TAN CLAYEY SAND with iron ore concretions | | | | | | 38 | |
| | | | 7.5' (SC) | | | | | | | |
| | | | MEDIUM DENSE LIGHT GRAY AND TAN SILTY FINE SAND moist, with hematite stains | 25 | | | | | | 16 |
| 10 | | | 13.0' (SM) | | | | | | | |
| | | | VERY DENSE DARK BROWNISH GRAY SILTY FINE SAND moist | 27 | | | | | 62 | |
| 15 | | | | | | | | | | |
| | | | | | | | | | 50+ | |
| 20 | | | 21.5' (SM) | | | | | | | |
| | | | HARD DARK GRAY SILTY CLAY with sandy silt laminations | | | | | | | |
| | | | -H. P. = 4.5 tsf | 24 | | 37 | 25 | 12 | | |
| 25 | | | | | | | | | | |

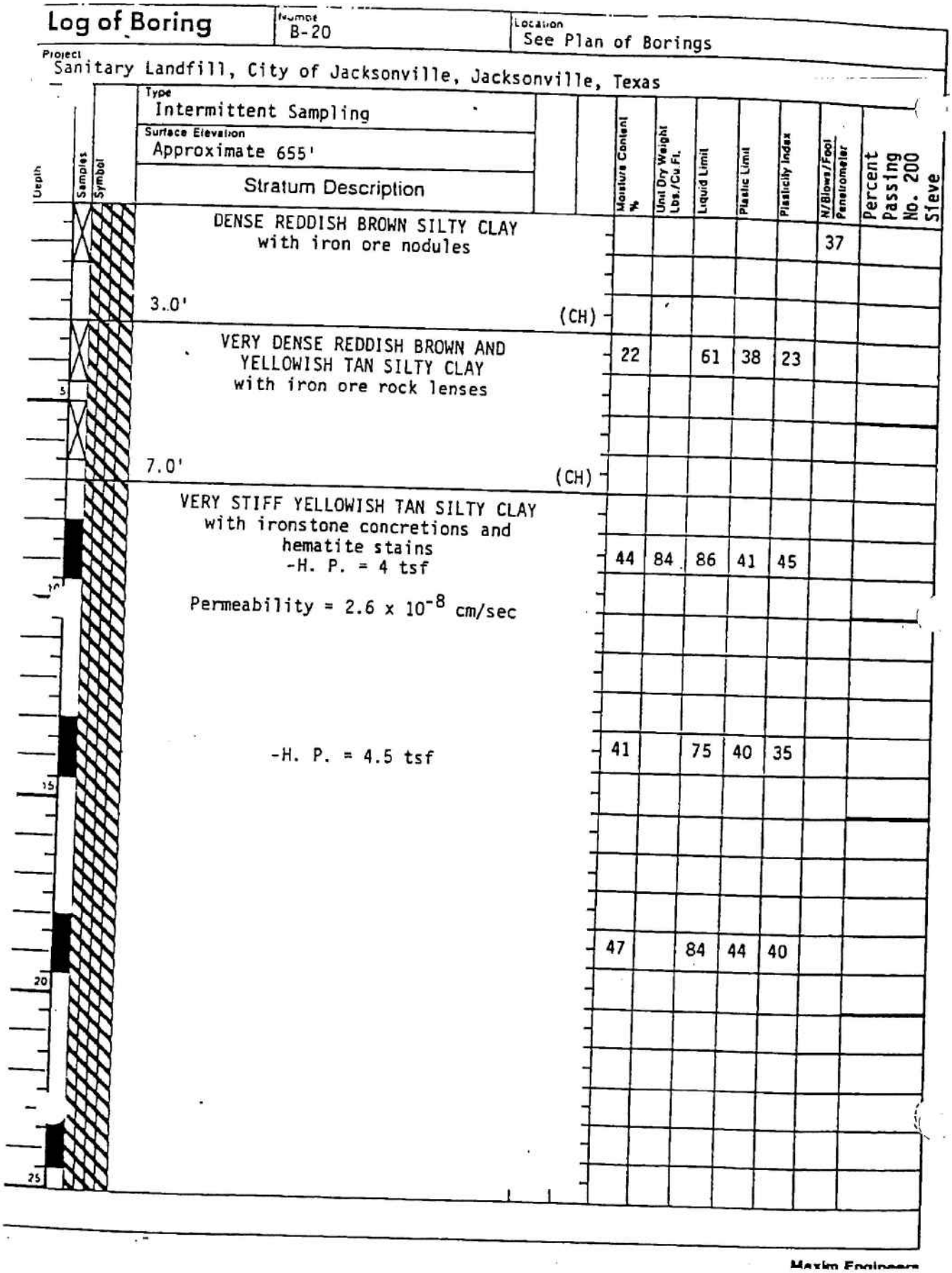
Completion Depth: 24.5'

Date: 1/5/83

Water Observations: Water level at 7.0' and caved at 11.0' upon completion.

Maxim Engineers


Log of Boring
Number B-19
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Type Intermittent Sampling
Surface Elevation Approximate 575'
Stratum Description
Depth
Samples
Symbol
Moisture Content %
Unit Dry Weight Lbs./Cu.Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Percent Passing No. 200 Sieve
MEDIUM DENSE REDDISH TAN SILTY FINE SAND with some iron ore nodules
10
4.5'
-iron ore seam
(SM)
50/8"
5
HARD REDDISH TAN SILTY CLAY with gray clayey silt seams and hematite stains
5.5'
(CL)
13
60
34
VERY DENSE YELLOWISH TAN SILTY FINE SAND with varying amounts of clay
14
22
15
7
80
40
12
85
16
15
17.0'
(SM)
HARD REDDISH BROWN CLAYEY SILT with silty fine sand laminations
20
21
19
2
62
20
21.0'
(ML)
VERY DENSE DARK GRAY SILTY FINE SAND moist
24.5'
(SM)
73
25
Completion Depth 24.5'
Date 1/4/83
Water Observations
Water level at 19.5' and caved at 21.0' on 1/5/83.
Maxim Engineers



## Log of Boring

Number: B-20

Location: See Plan of Borings

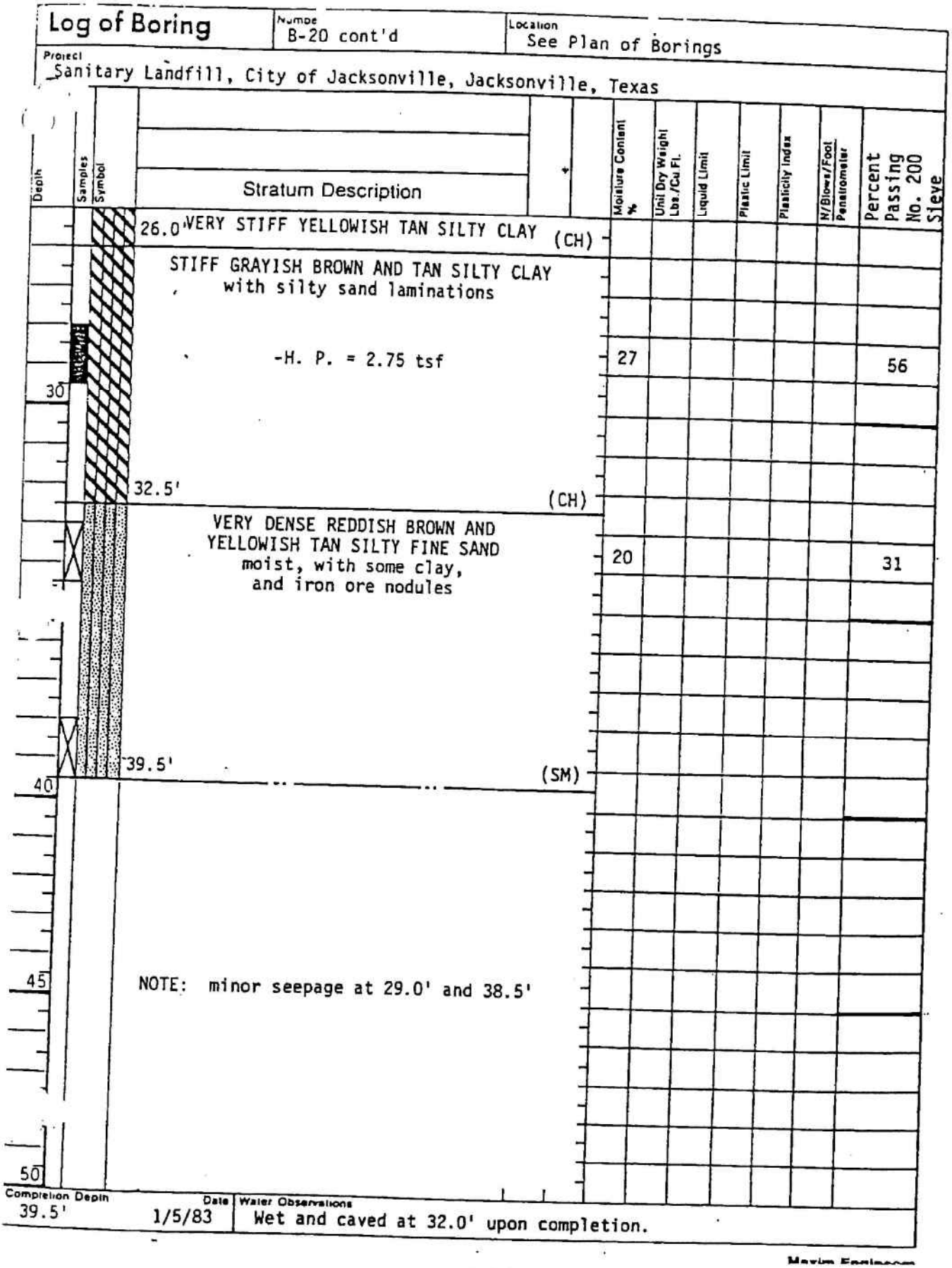
Project: Sanitary Landfill, City of Jacksonville, Jacksonville, Texas

Type: Intermittent Sampling

Surface Elevation: Approximate 655'

| Depth | Samples | Symbol | Stratum Description | Moisture Content % | Unit Dry Weight Lbs./Cu.Ft. | Liquid Limit | Plastic Limit | Plasticity Index | N/Blows/Foot Penetrometer | Percent Passing No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | DENSE REDDISH BROWN SILTY CLAY with iron ore nodules | | | | | | 37 | |
| | | | 3.0' (CH) | | | | | | | |
| 5 | | | VERY DENSE REDDISH BROWN AND YELLOWISH TAN SILTY CLAY with iron ore rock lenses | 22 | | 61 | 38 | 23 | | |
| | | | 7.0' (CH) | | | | | | | |
| 10 | | | VERY STIFF YELLOWISH TAN SILTY CLAY with ironstone concretions and hematite stains -H. P. = 4 tsf | 44 | 84 | 86 | 41 | 45 | | |
| | | | Permeability = $2.6 \times 10^{-8}$ cm/sec | | | | | | | |
| 15 | | | -H. P. = 4.5 tsf | 41 | | 75 | 40 | 35 | | |
| 20 | | | | 47 | | 84 | 44 | 40 | | |
| 25 | | | | | | | | | | |

Maxim Engineers


Log of Boring
Number B-20 cont'd
Location See Plan of Borings
Project Sanitary Landfill, City of Jacksonville, Jacksonville, Texas
Depth
Samples
Symbol
Stratum Description
Moisture Content %
Unit Dry Weight Lbs./Cu Ft.
Liquid Limit
Plastic Limit
Plasticity Index
N/Blows/Foot Penetrometer
Percent Passing No. 200 Sieve
26.0 VERY STIFF YELLOWISH TAN SILTY CLAY (CH)
STIFF GRAYISH BROWN AND TAN SILTY CLAY
with silty sand laminations
-H. P. = 2.75 tsf
27
56
30
32.5'
(CH)
VERY DENSE REDDISH BROWN AND
YELLOWISH TAN SILTY FINE SAND
moist, with some clay,
and iron ore nodules
20
31
39.5'
(SM)
40
NOTE: minor seepage at 29.0' and 38.5'
45
50
Completion Depth 39.5'
Date 1/5/83
Water Observations
Wet and caved at 32.0' upon completion.

# 1987 BOREHOLE LOGS
# BY EAST TEXAS TESTING LABORATORY

## LOG OF BORING NO. 3
MW#5

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

JOB NO. G706-87

LOCATION: See Plan of Borings TYPE: Rotary Wash

DATE: 5 [illegible] 87

DEPTH TO WATER: ELEV.

GROUND ELEV.

| DEPTH (ft.) | SYMBOL | SAMPLES | STANDARD PENETRATION (blows/ft.) | HAND PENETROMETER (tons/ft²) | STRATUM DESCRIPTION | |
|---|---|---|---|---|---|---|
| 5 | | | | | Red clayey sand w/iron ore gravel | (SC) |
| 10 | | | | | 12.0' | |
| 15 | | | | | Red and tan silty sand w/traces of iron ore gravel | (SM) |
| 20 | | | | | 22.0' | |
| 25 | | | | | Red and gray sandy clay w/traces of iron ore gravel and limonite stains | (CL) |
| 30 | | | | | 27.0' | |
| | | | | | Brown and gray elastic silt w/seams of iron ore gravel and gray and tan sandy silt | (ML) |
| | | | | | 31.5' | |
| 35 | | | | | Dark gray clay w/layers of gray silt fine sand 4" or less | (CL) |
| | | | | | 35.0' | |
| | | | | | (CONTINUED) | |

East Texas Testing Laboratory, Inc.

# LOG OF BORING NO. 3
MW#5

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

LOCATION: See Plan of Borings TYPE: Rotary Wash DATE: 11/11/87 & 12/24/87

DEPTH TO WATER: ELEV.

| DEPTH (ft.) | SYMBOL | SAMPLES | STANDARD PENETROMETER (blows/ft.) | HAND PENETROMETER (tons/ft.²) | STRATUM DESCRIPTION | |
|---|---|---|---|---|---|---|
| | | | | | GROUND ELEV. | |
| 40 | | | | | Dark gray clay layered w/gray sand 2" or less and traces of lignite | (CL) |
| 45 | | | | | 47.0' | |
| 50 | | | | | Dark gray clay w/sand seams and traces of lignite | (SP-CL) |
| 55 | | | | | 60.0' | |
| 60 | | | | | Boring terminated @ 60.0' | |
| 65 | | | | | | |
| 70 | | | | | | |

East Texas Testing Laboratory, Inc.

## LOG OF BORING NO. 2
MW#6

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

JOB NO. G706-87

LOCATION: See Plan of Borings

TYPE: Rotary Wash

DATE: 11/12/87 & 12/24/87

DEPTH TO WATER: ELEV.

GROUND ELEV.

| DEPTH (ft) | SYMBOL | SAMPLES | STANDARD PENETRATION (blows/ft.) | PLATE PENETRATION (tons/ft²) | STRATUM DESCRIPTION | |
|---|---|---|---|---|---|---|
| 5 | | | | | Red and tan silty sand w/traces of iron ore gravel | (SM) |
| | | | | | 6.5' | |
| 10 | | | | | Gray and brown silt layered w/tan and red silty sand 1½" or less | (ML) |
| 15 | | | | | 17.0' | |
| 20 | | | | | Brown and gray elastic silt w/traces of silty sand seams and iron ore gravel seams | (ML) |
| | | | | | 21.5' | |
| 25 | | | | | Dark gray clay w/gray sand seams 2" or less | (CL) |
| 30 | | | | | | |
| 35 | | | | | 35.0' | |

(CONTINUED)

East Texas Testing Laboratory, Inc.

# LOG OF BORING NO. 2
MW #6

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

LOCATION: See Plan of Borings TYPE: Rotary Wash DATE: 11-11-87 & 12-24-87

ELEV.

DEPTH TO WATER:

GROUND ELEV.

| DEPTH (ft) | SYMBOL | SAMPLES | STANDARD PENETROMETER (blows/ft) | HAND PENETROMETER (tons/ft²) | STRATUM DESCRIPTION | |
|---|---|---|---|---|---|---|
| 40 | | | | | Dark gray clay w/layers of gray sand | (CL) |
| 45 | | | | | | |
| | | | | | 47.5' | |
| | | | | | Gray and brown sand w/seams of elastic silt and limonite stains | (SP) |
| 50 | | | | | 50.0' | |
| | | | | | Tan and gray silty sand | (SM) |
| 55 | | | | | 55.0' | |
| | | | | | Boring terminated @ 55.0' | |
| 60 | | | | | | |
| 65 | | | | | | |
| 70 | | | | | | |

East Texas Testing Laboratory, Inc.

# LOG OF BORING NO. 1
MW#7

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

LOCATION: See Plan of Borings

TYPE: Rotary Wash

DATE: 11/11/87 &12/24/87

JOB NO.: G706-87

ELEV.

DEPTH TO WATER:

GROUND ELEV.

| DEPTH (ft) | SYMBOL | SAMPLES | STANDARD PENETROMETER (blows/ft) | FIELD PENETROMETER (tons/ft²) | STRATUM DESCRIPTION | |
|---|---|---|---|---|---|---|
| 5 | | | / | | Red and tan sandy silt | (ML) |
| | | | | | 6.5' | |
| 10 | | | ✓ | | Red and tan silty sand w/iron ore gravel | (SM) |
| | | | | | 11.5' | |
| 15 | | | / | | Red, gray and tan clayey sand w/iron ore gravel seams | (SC) |
| | | | | | 16.5' | |
| 20 | | | | / | Tan silty sand w/seams of gray and red silty clay and trace of iron ore gravel | (SM) |
| | | | | | 22.0' | |
| 25 | | | | | Light gray san w/seams of brown elastic silt | (SP) |
| 30 | | | | / | | |
| 35 | | | | | 35.0' | |

(CONTINUED)

East Texas Testing Laboratory, Inc.

# LOG OF BORING NO. 1
MW#7

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

LOCATION: See Plan of Borings TYPE: Rotary Wash

DEPTH TO WATER: ELEV.

| DEPTH (ft) | SYMBOL | SAMPLES | SYNTHETIC PENETROMETER (blows/ft.) | HAND PENETROMETER (tons/ft²) | STRATUM DESCRIPTION |
|---|---|---|---|---|---|
| | | | | | GROUND ELEV. |
| 40 | | | | | Light gray sand w/seams of brown elastic silt 2" or less (SP) |
| | | | | | 40.0' |
| 45 | | | | | Gray silty sand w/brown elastic silt and limonite stains (SM) |
| 50 | | | | | |
| 55 | | | | | |
| 60 | | | | | |
| 65 | | | | | |
| 70 | | | | | 70.0' |
| | | | | | (CONTINUED) |

East Texas Testing Laboratory, Inc.

## LOG OF BORING NO. 1 CONT.

MW#7

PROJECT: Monitor Well Installation
Sanitary Landfill
Jacksonville, Texas

LOCATION: See Plan of Borings TYPE: Rotary Wash DATE:

DEPTH TO WATER: ELEV.

GROUND ELEV.

| DEPTH (ft.) | SYMBOL | SAMPLES | STANDARD PENETROMETER (blows/ft.) | HAND PENETROMETER (tons/ft²) | STRATUM DESCRIPTION |
|---|---|---|---|---|---|
| 75 | | | | | Light gray silty sand (SM) |
| 80 | | | | | |
| 85 | | | | | |
| 90 | | | | | 90.0' Boring terminated @ 90.0' |
| 95 | | | | | |
| 100 | | | | | |
| 105 | | | | | |

East Texas Testing Laboratory, Inc.

# Monitor Well Data Sheet

Monitor Well I.D. No. 1 Permit No. 1614

Latitude : W 95°15.80' Longitude : N 32°00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 660 Report all Depths from Surface Elevation

Well Depth : 20' Water Level Elevation : 655

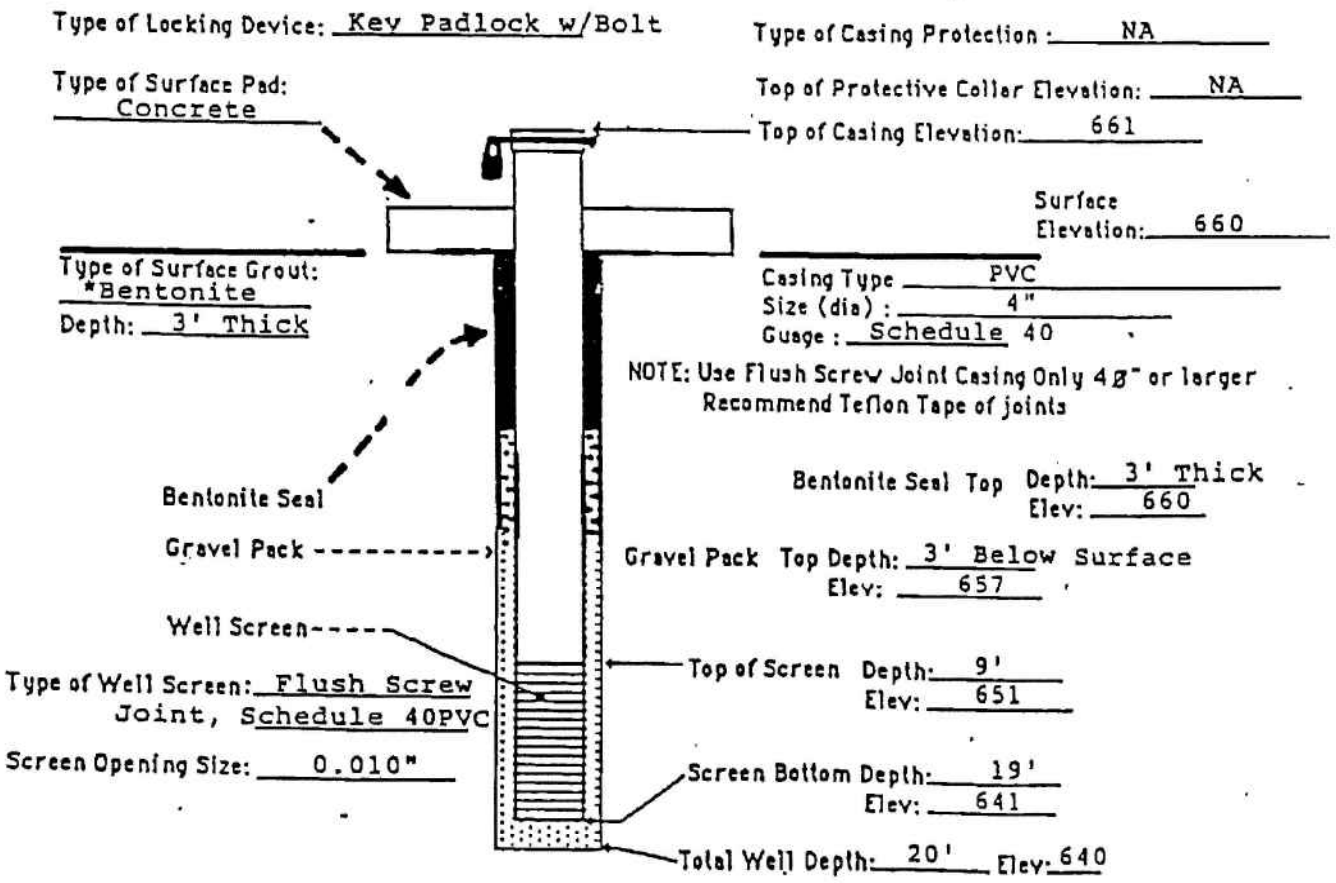
Screen Bottom:

(1) Depth : 19' (2) Elevation : 641

Gravel Pack

(1) Depth : 17' (2) Elevation : 657

SKETCH:




* - Bentonite seal was set at the top in an attempt to catch any "perched" groundwater.

# Monitor Well Data Sheet

Monitor Well I.D. No. 2 Permit No. 1614

Latitude : W 95° 15.80' Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 620 Report all Depths from Surface Elevation

Well Depth : 30' Water Level Elevation : 598

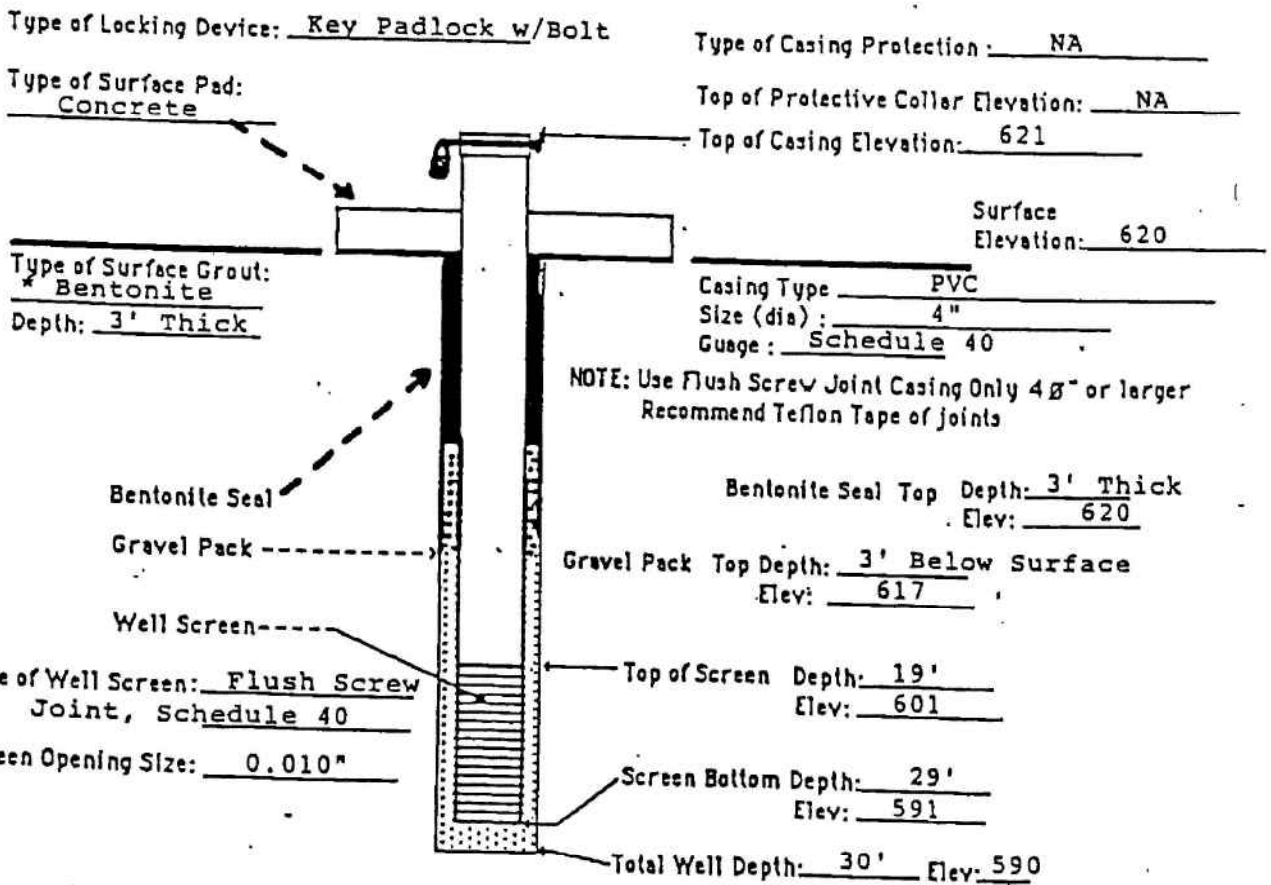
Screen Bottom:

(1) Depth : 29' (2) Elevation : 591

Gravel Pack

(1) Depth : 27' (2) Elevation : 617

SKETCH:




* - Bentonite seal was set at the top in an attempt to catch any "perched" groundwater.

# Monitor Well Data Sheet

Monitor Well I.D. No. 3 Permit No. 1614

Latitude : W 95° 15.80' Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 620

Report all Depths from Surface Elevation

Well Depth : 30' Water Level Elevation : 595

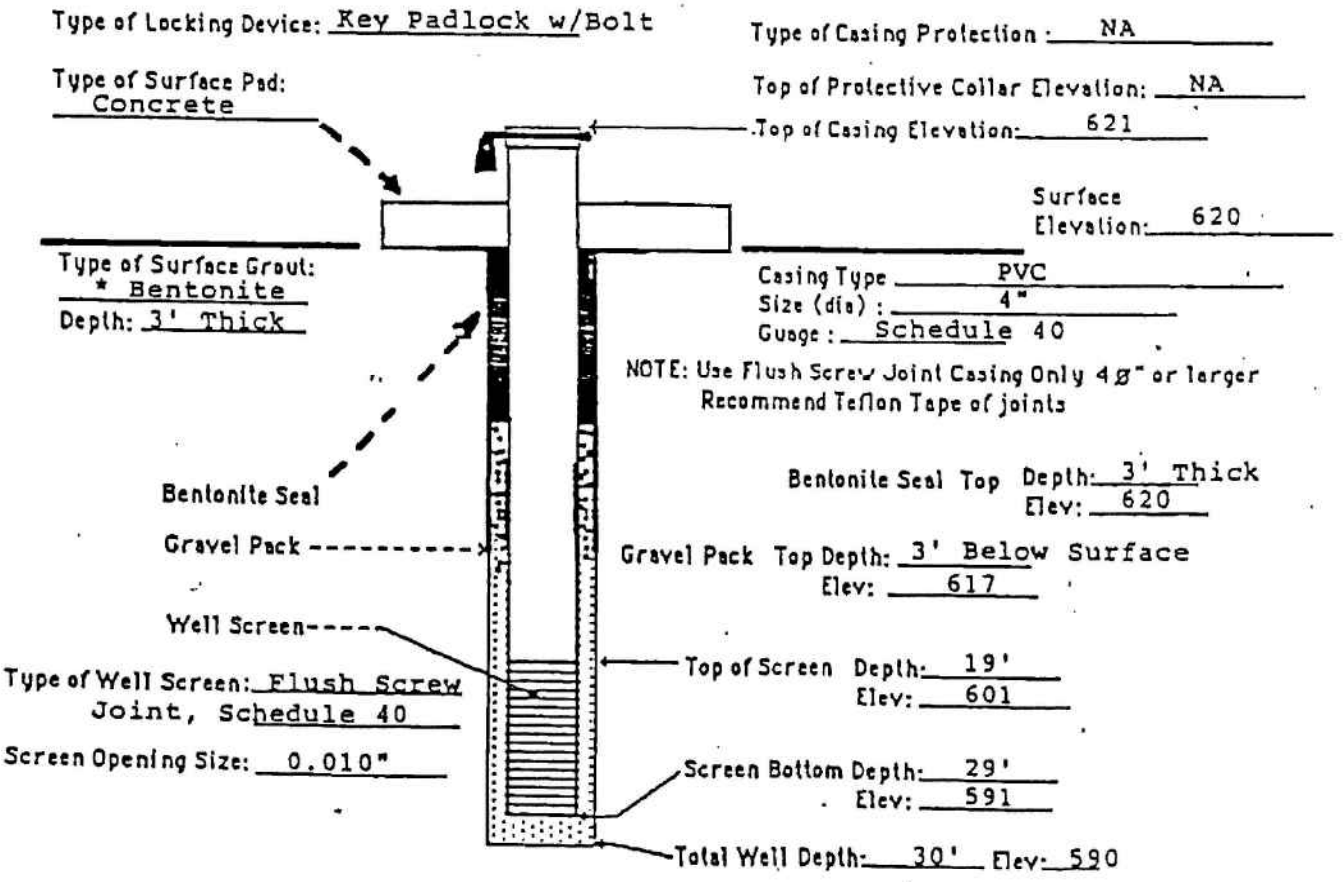
Screen Bottom:

(1) Depth : 29' (2) Elevation : 591

Gravel Pack

(1) Depth : 27' (2) Elevation : 617

SKETCH:




* - Bentonite seal was set at the top in an attempt to catch any "perched" groundwater

# Monitor Well Data Sheet

Monitor Well I.D. No. 4 Permit No. 1614

Latitude : W 95° 15.80' Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 620

Report all Depths from Surface Elevation

Well Depth : 30' Water Level Elevation : 598

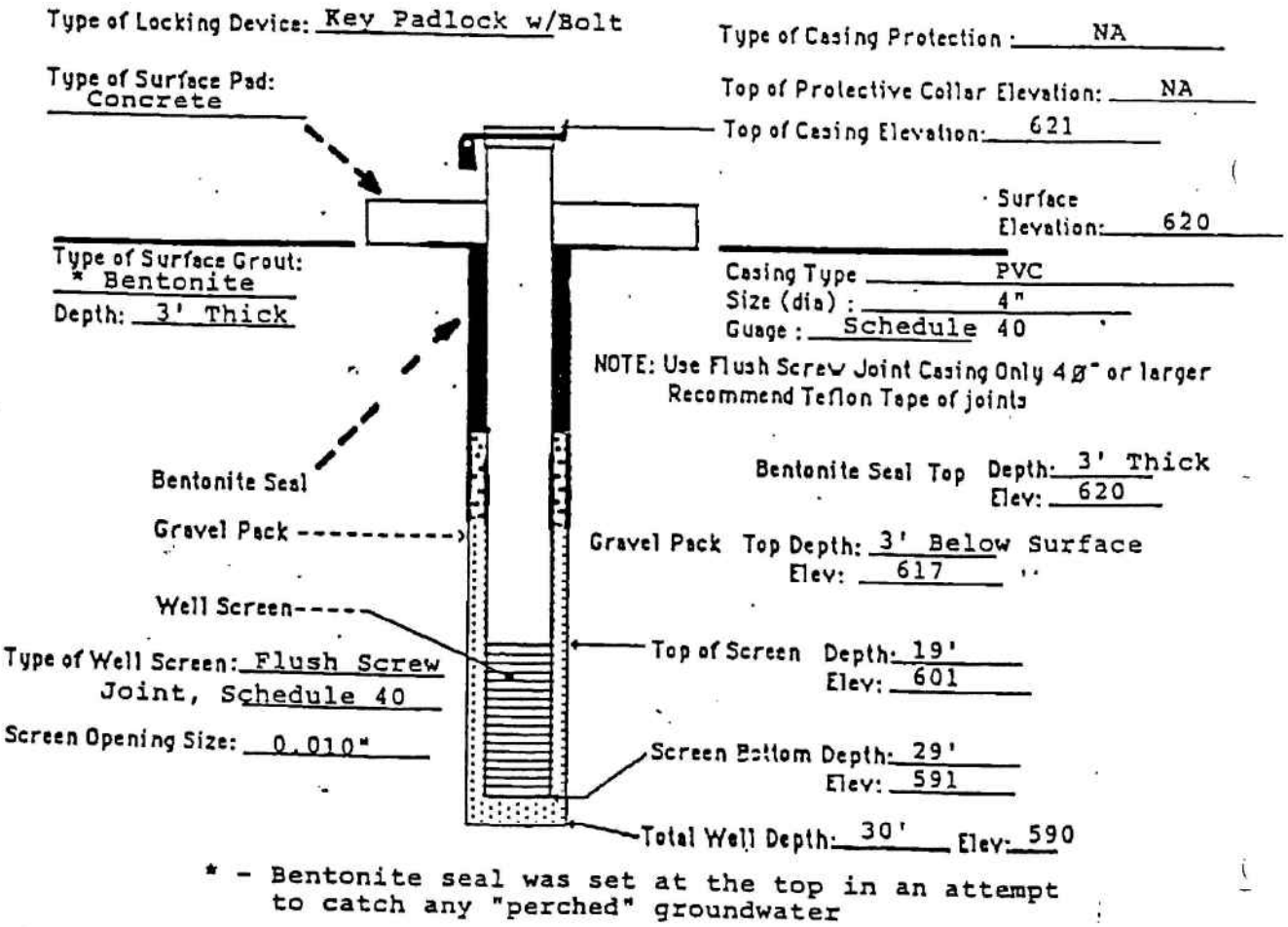
Screen Bottom:

(1) Depth : 29' (2) Elevation : 591

Gravel Pack

(1) Depth : 27' (2) Elevation : 617

SKETCH:




* - Bentonite seal was set at the top in an attempt to catch any "perched" groundwater

# Monitor Well Data Sheet

Monitor Well I.D. No. 5

Permittee or Site Name: Jacksonville Landfill
Permit No. 1614

Latitude : W 95° 15.80'

Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 570

Report all Depths from Surface Elevation

Well Depth : 60'

Water Level Elevation : 525

Screen Bottom:
(1) Depth : 60'
(2) Elevation : 510

Gravel Pack
(1) Depth : 47'
(2) Elevation : 557

SKETCH:

Name of Geologic Formation(s) in which well is completed: Queen City

Type of Locking Device:

Type of Casing Protection :

Type of Surface Pad:

Top of Protective Collar Elevation:

Top of Casing Elevation: 573

Surface Elevation: 570

Type of Surface Grout:

Depth:

Backfill Material: Cement Bentonite Grout

Casing Type PVC
Size (dia) : 4"
Guage : Sch 40

NOTE: Use Flush Screw Joint Casing Only 4" or larger
Recommend Teflon Tape of Joints

Bentonite Seal --------

Bentonite Seal Top Depth: 4' Thick
Elev: 541

Gravel Pack ----------

Gravel Pack Top Depth: 47'
Elev: ~~557~~ 523

Well Screen-----

Type of Well Screen: Flush Screen Sch. 40 PVC

Top of Screen Depth: 50'
Elev: 520

Screen Opening Size: 0.010"

Screen Bottom Depth: 60'
Elev: 510

Total Well Depth: 60' Elev: 510

NOTE: Except for the locking cap which is recommended for security reasons, the above sketch should be considered the minimum required for monitor well instal

# Monitor Well Data Sheet

Monitor Well I.D. No. 6

Permittee or Site Name: Jacksonville Landfill

Permit No. 1614

Latitude : W 95° 15.80'

Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 580

Report all Depths from Surface Elevation

Well Depth : 55'

Water Level Elevation : 537

Screen Bottom:

(1) Depth : 55'

(2) Elevation : 525

Gravel Pack

(1) Depth : 43'

(2) Elevation : 567

SKETCH:

Name of Geologic Formation(s) in which well is completed: QUEEN CITY

Type of Locking Device:

Type of Casing Protection :

Type of Surface Pad:

Top of Protective Collar Elevation:

Top of Casing Elevation: 583

Surface Elevation: 580

Type of Surface Grout:

Depth:

Backfill Material: Cement Bentonite Grout

Casing Type PVC

Size (dia) : 4"

Guage : Sch. 40

NOTE: Use Flush Screw Joint Casing Only 4" or larger
Recommend Teflon Tape of joints

Bentonite Seal

Bentonite Seal Top Depth: 4' Thick
Elev: 571

Gravel Pack

Gravel Pack Top Depth: 43'
Elev: 567 537

Well Screen

Type of Well Screen: Flush Screen Sch 40 PVC

Top of Screen Depth: 45'
Elev: 535

Screen Opening Size: 0.010"

Screen Bottom Depth: 55'
Elev: 525

Total Well Depth: 55' Elev: 525

NOTE: Except for the locking cap which is recommended for security reasons, the above sketch should be considered the minimum required for monitor well install.

# Monitor Well Data Sheet

Monitor Well I.D. No. 7

Permittee or Site Name: Jacksonville Landfill

Permit No. 1614

Latitude : W 95° 15.80'

Longitude : N 32° 00.00'

Well Boring Diameter : 8" to 9"

Ground Surface Elevation : 530

Report all Depths from Surface Elevation

Well Depth : 93'

Water Level Elevation : 449'

Screen Bottom:

(1) Depth : 92'

(2) Elevation : 438

Gravel Pack

(1) Depth : 63' (Top)

(2) Elevation : 467

SKETCH:

Name of Geologic Formation(s) in which well is completed: QUEEN CITY

Type of Locking Device:

Type of Casing Protection :

Type of Surface Pad:

Top of Protective Collar Elevation:

Top of Casing Elevation: 533

Surface Elevation: 530

Type of Surface Grout:

Depth:

Casing Type PVC

Size (dia) : 4"

Guage : Sch. 40

Backfill Material: Cement Bentonite Grout

NOTE: Use Flush Screw Joint Casing Only 4" or larger
Recommend Teflon Tape of Joints

Bentonite Seal ---------> Bentonite Seal Top Depth: 4" Thick
Elev: 471

Gravel Pack ----------> Gravel Pack Top Depth: 63'
Elev: 467

Well Screen----- Top of Screen Depth: 67'
Elev: 463

Type of Well Screen: Flush Screen Sch. 40 PVC

Screen Opening Size: 0.010"

Screen Bottom Depth: 92'
Elev: 438

Total Well Depth: 93' Elev: 437

NOTE: Except for the locking cap which is recommended for security reasons, the above sketch should be considered the minimum required for monitor well instal

# 1993 BOREHOLE LOGS
# BY GOLDER ASSOCIATES

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-1

BORING DATE: 9/27/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | | | | 685.80 / 0.00 | | | | | | | Cement / Bentonite |
| | | Orange-tan Silty SAND. | SM | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 5 | | | | | | | | | | | | |
| | | | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 10 | | - ferrous gravel, 11 ft to 12 ft. | | | 673.80 / 12.00 | | | | | | | |
| | | Orange-tan CLAY with ferrous gravel and sand pockets. | CH | | | 3 | 3" ST | PUSH | | 24/24 | | |
| 15 | | Boring terminated at 15-ft-penetration. | | | 670.80 / 15.00 | | | | | | No water level detected, 1230, 9/29/93. | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/27/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-2

BORING DATE: 9/27/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Light brown Silty SAND. | SM | | 685.60 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| 5 | | | | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 10 | | - ferrous sand pockets at 9 ft. | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 15 | | Boring terminated at 15-ft-penetration. | | | 670.60 / 15.00 | 3 | 3" ST | PUSH | | 0/24 | No recovery with Shelby tube. | |
| | | | | | | 4 | 2" SS | 50/ 1/4" | | 0/ 1/4 | No recovery with split-spoon. | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/27/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-3

BORING DATE: 9/29/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4 25"-ID Augers | Red and tan Silty SAND. | SM | | 685.40 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| | | - with ferrous stains below 3 ft. | | | | | | | | | | |
| 5 | | - with ferrous gravel at 4 ft. | | | | 1 | 3" ST | PUSH | | 18/24 | | |
| | | | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 10 | | | | | | | | | | | | |
| 15 | | Boring terminated at 15-ft-penetration. | | | 670.40 / 15.00 | 3 | 3" ST | PUSH | | 24/24 | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/27/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-4

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Light tan to red Silty SAND. | | | 682.00 / 0.00 | | | | | | | Cement; Bentonite |
| 5 | | - with ferrous stains at 4 ft. | | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 10 | | - clayey sand with trace of ferrous gravel at 9 ft. | SM | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 15 | | - with ferrous gravel at 14 ft. | | | | 3 | 3" ST | PUSH | | 24/24 | Hard to drill at 10 ft. | |
| 20 | | Yellow-brown CLAY with ferrous gravel seams. | CH | | 684.00 / 18.00 | 4 | 3" ST | PUSH | | 18/24 | | 1230 9/28/93 |
| 25 | | Green glauconitic Silty SAND with red ferrous gravel. | SM | | 659.00 / 23.00 | 5 | 3" ST | PUSH | | 24/24 | | |
| 30 | | Boring terminated at 25-ft-penetration. | | | 657.00 / 25.00 | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: PCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-5

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25" ID Augers | | | | 674.20 / 0.00 | | | | | | | Cement; Bentonite |
| | | Red and tan Clayey SAND to Silty SAND with ferrous stains. | SM | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 5 | | | | | | | | | | | | |
| | | - light grey at 9 ft. | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 10 | | - ferrous gravel layer, 11 ft to 12 ft. | | | 662.20 / 12.00 | | | | | | | |
| | | Tan and light grey CLAY with ferrous gravel pockets and seams. | CH | | | 3 | 3" ST | PUSH | | 24/24 | | |
| 15 | | | | | | | | | | | | |
| | | | | | | 4 | 3" ST | PUSH | | 24/24 | | 1230 9/29/93 |
| 20 | | | | | 651.20 / 23.00 | | | | | | | |
| | | Green glauconitic Silty SAND. | SM | | | 5 | 3" ST | PUSH | | 24/24 | | |
| 25 | | Boring terminated at 25-ft-penetration. | | | 649.20 / 25.00 | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

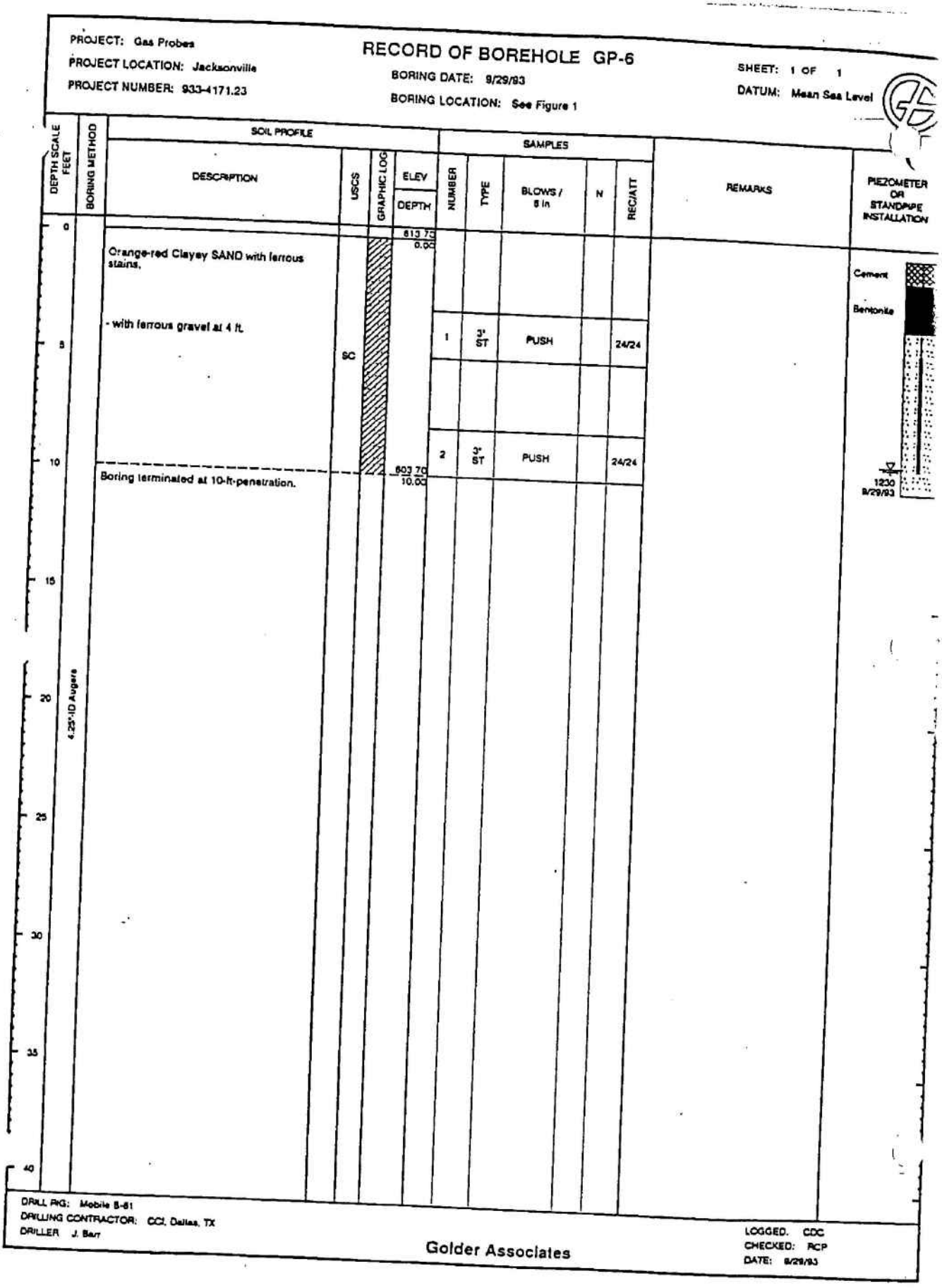
LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-6

BORING DATE: 9/29/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level




DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/29/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-7

BORING DATE: 9/29/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | | | | 812.10 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| | | Red-orange Silty SAND to Clayey SAND. | SM | | | | | | | | | |
| | | | | | | 1 | SS | PUSH | | 18/24 | | |
| 5 | | | | | | | | | | | | |
| | | -clayey sand with ferrous gravel at 9 ft. | SC | | | | | | | | | |
| | | | | | | 2 | SS | PUSH | | 24/24 | | |
| 10 | | | | | 802.10 / 10.00 | | | | | | | |
| | | Boring terminated at 10-ft-penetration. | | | | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, Tx
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/29/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-8

BORING DATE: 9/27/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4 1/2" ID Augers | Brownish-red to yellow-brown CLAY. | CH | | 685.80 / 0.00 | | | | | | | Cement |
| 5 | | - with fine ferrous gravel at 4 ft. | | | | 1 | 3" ST | PUSH | | 24/24 | | Bentonite |
| 10 | | - with ferrous silt and gravel seams at 9 ft. | | | | 2 | 3" ST | PUSH | | 24/24 | | |
| 15 | | Tan and light grey CLAY with ferrous gravel pockets and seams. - with hard ferrous seams at 14 ft. | | | | 3 | 3" ST | PUSH | | 18/24 | | 1230 9/28/93 |
| 20 | | Dark green glauconitic Silty SAND. | SM | | 647.80 / 18.00 | 4 | 2" SS | 50/6" | 100 | 6/6 | Hard to drill at 18 ft. | |
| 25 | | Boring terminated at 25-ft-penetration. | | | 640.80 / 25.00 | 5 | 3" ST | PUSH | | 24/24 | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/27/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-9

BORING DATE: 9/27/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25" ID Augers | Yellow-brown CLAY with fine ferrous gravel. | CH | | 660.60 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| 5 | | -with ferrous silt partings at 4 ft. | | | | 1 | 3" ST | PUSH | | 24/24 | | |
| | | | | | | 2 | 3" ST | PUSH | | 24/24 | | |
| 10 | | Boring terminated at 10-ft-penetration. | | | 650.60 / 10.00 | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: PCP
DATE: 9/27/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-10

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Red CLAY. | CH | | 597.20 / 0.00 | | | | | | No water level detected. 1230, 9/29/93. | Cement |
| 5 | | -with silt and sand pockets at 4 ft. | | | | 1 | 3" ST | PUSH | | 24/24 | | Bentonite |
| 10 | | -with sand seams at 9 ft. | | | | 2 | 3" ST | PUSH | | 24/24 | | |
| 15 | | Boring terminated at 10-ft-penetration. | | | 587.20 / 10.00 | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-11

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4 1/2" ID Augers | Organic silt with fine sand, wood and root fragments. (Topsoil) | ML | | 538.60 / 0.00 | | | | | | | Cement; Bentonite |
| 5 | | | | | | 1 | 3" ST | PUSH | | 24/24 | | |
| 10 | | Boring terminated at 10-ft-penetration. | | | 528.60 / 10.00 | 2 | 3" ST | PUSH | | 24/24 | | 1230 9/29/93 |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-12

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | | | | 568.10 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| | | Red and gray CLAY with ferrous stains. | CH | | | 1 | ST 3"/4 | PUSH | | 24/24 | | |
| 5 | | | | | | | | | | | | |
| | | | | | | 2 | ST 3" | PUSH | | 18/24 | | |
| 10 | | · with silt pockets and ferrous gravel at 9 ft. | | | 558.10 / 10.00 | | | | | | | |
| | | Boring terminated at 10-ft-penetration. | | | | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCL Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-13

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25"-ID Augers | Yellow-brown Gravelly CLAY to Red fine to medium Clayey GRAVEL. | CL / GC | | 676.40 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| 5 | | | | | | 1 | 3" ST | PUSH | | 18/24 | | |
| 10 | | Boring terminated at 10-ft-penetration. | | | 666.40 / 10.00 | 2 | 3" ST | PUSH | | 18/24 | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCF
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-14

BORING DATE: 9/28/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25" ID Augers | | | | 664.00 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| | | Yellow-brown CLAY. | CH | | | | | | | | | |
| 5 | | - hard ferrous seams at 4 ft. | | | | 1 | 3" ST | PUSH | | 24/24 | | |
| | | | | | | | | | | | | |
| 10 | | - brown and with ine ferrous gravel at 9 ft. | | | | 2 | 3" ST | PUSH | | 24/24 | | |
| | | | | | 654.00 / 10.00 | | | | | | | |
| | | Boring terminated at 10-ft-penetration. | | | | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCP
DATE: 9/28/93

PROJECT: Gas Probes
PROJECT LOCATION: Jacksonville
PROJECT NUMBER: 933-4171.23

# RECORD OF BOREHOLE GP-15

BORING DATE: 9/27/93
BORING LOCATION: See Figure 1

SHEET: 1 OF 1
DATUM: Mean Sea Level

| DEPTH SCALE FEET | BORING METHOD | SOIL PROFILE: DESCRIPTION | USCS | GRAPHIC LOG | ELEV / DEPTH | SAMPLES: NUMBER | TYPE | BLOWS / 6 in | N | REC/ATT | REMARKS | PIEZOMETER OR STANDPIPE INSTALLATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4.25" ID Augers | Light orange Silty SAND to orange and tan Clayey SAND. | SM | | 683.10 / 0.00 | | | | | | No water level detected, 1230, 9/29/93. | Cement; Bentonite |
| 5 | | | | | | 1 | 3" ST | PUSH | | 18/24 | | |
| | | | SC | | | | | | | | | |
| | | - with ferrous gravel and stains at 9 ft. | | | | 2 | 3" ST | PUSH | | 18/24 | | |
| 10 | | Boring terminated at 10-ft-penetration. | | | 673.10 / 10.00 | | | | | | | |
| 15 | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | |

DRILL RIG: Mobile B-61
DRILLING CONTRACTOR: CCI, Dallas, TX
DRILLER: J. Barr

Golder Associates

LOGGED: CDC
CHECKED: RCF
DATE: 9/27/93

# 1994 BOREHOLE LOGS
# BY GROUNDWATER TCHNOLOGIES

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: B-21(CC)/Royal Oaks

Page 1 of 4

Project: Groundwater Monitoring Plan for Subtitle D Project No.: 042480069

Client: Royal Oaks Landfill, Cherokee County, Texas

Start Date: 06/06/94

Finish Date: 06/06/94

## DRILLING DATA

Inspector: Eric Matzner

Contractor: Groundwater Technology, Inc.

Equipment: Failing 1500 Rig

Method: Mud Rotary

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | NA | SHELBY | CHRISTIANSEN |
| Diameter: | NA | 3" | 2" |
| Other: | NA | NA | NA |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | | |
| Diameter (ID): | | |
| Coupling: | | |

WELL DEVELOPMENT

Method:

Duration:

Gals. Purged:

Slug Test: (cm/sec)

SURVEY DATA DATUM

Grade: 680.00

TWC:

TPC:

North: 9692

East: 10311

Geophysical Log ☑ yes ☐ no

Comments:

| Depth (feet) | WELL CONSTRUCTION | Soil / Rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | 1 | | 2.3 | | | Silty Sand, SM, reddish yellow, red mottles and yellow staining, medium stiff to hard, dry to slightly moist, fine-grained, subangular well sorted quartz, occasional hard streaks | – Sparta Fm |
| 5 | | | D.O. | | D.O. | | | | |
| | | | 2 | | 1.0 | | | | |
| 10 | | | D.O. | | D.O. | | | | |
| 15 | | | | | | | | Top of Weches Formation<br>Clayey Silt; CL; interbedded clayey silt and silt sand | – Weches Fm |
| 20 | | | 3 | | 2.3 | | | | |
| 25 | | | 4 | | 7.3 | | | Glauconitic Silty Sand; SM; very dark olive gray, indurated to somewhat friable, fine- to medium-grained subangular, moderately sorted glauconite and quartz, occasional marine fossils | |
| 30 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: B-21(CC)/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/06/94*

Finish Date: *06/06/94*

| Depth (feet) | WELL CONSTRUCTION | Soil / rock | SAMPLE DATA: Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 30 | | | 4 | | 7.3 | | | Clayey Silt; CL; black, very hard, dry, blocky, low plasticity, few borings | |
| 35 | | | 5 | | 9.2 | | | | |
| 40 | | | | | | | | | |
| 45 | | | | | | | | Sandy, Silty Clay; CLSC; very dark grayish-green and black, low plasticity, dry to slightly moist, glauconitic, occasional marine fossils, occasional indurated thin silty sand beds | |
| 50 | | | 6 | | 9.0 | | | | |
| 55 | | | 7 | | 6.5 | | | Top of Queen City Formation<br>Silty Sand; SM; very dark grayish-brown, occasional glauconitic filled burrows, occasional thin beds of glauconitic sandy silt, occasional carbonaceous material, 5% white mica | Queen City Fm |
| 60 | | | | | | | | | |
| 65 | | | 8 | | 0.5 | | | | |
| 70 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: B-21(CC)/Royal Oaks

Page 3 of 4

Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/06/94*

Finish Date: *06/06/94*

(CONTINUATION)

| Depth (feet) | WELL CONSTRUCTION | Soil/rock | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 70 | | | | | | | | | |
| 75 | | | 9 | | NR | | | Silty Clay; CL, very dark gray, hard, low plasticity, dry, interbedded with very thin beds of clayey silt, light yellowish-brown, and occasional medium beds of clayey silt, very dark gray, unconsolidated, friable, 10-20% white mica, abundant marine burrows | |
| 80 | | | | | | | | | |
| 85 | | | 10 | | 4.7 | | | | |
| 90 | | | | | | | | | |
| 95 | | | 11 | | 6.5 | | | Silty Sand; SM, very dark greyish brown, black banding, very stiff, slightly indurated, very fine- to fine-grained, subrounded, well sorted quartz sand, 10% white mica, approx. 40% quartz and 40% dark minerals, possible crossbedding, occasional thin beds of silty clay | |
| 100 | | | | | | | | | |
| 105 | | | 12 | | 6.6 | | | | |
| 110 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: B-21(CC)/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/06/94*

Finish Date: *06/06/94*

| Depth (feet) | WELL CONSTRUCTION | Soil / Rock | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 110 | | | | | | | | | |
| 115 | | | 13 | | 8.0 | | | Silty Sand; SM, very dark grayish brown, black banding, very stiff, slightly indurated, very fine- to fine-grained, subrounded, well sorted quartz sand, 10% white mica, approx. 40% quartz and 40% dark minerals, possible crossbedding, occasional thin beds of silty clay | |
| 120 | | | | | | | | | |
| 125 | | | 14 | | 8.5 | | | | |
| 130 | | | | | | | | Silty Clay; CL, very dark gray, light gray banding, very stiff to hard, low plasticity with highly plastic clay interbeds, interbedded with very thin beds of fat clay, and thin beds of silty sand, dark gray, 10% white mica | |
| 135 | | | 15 | | 7.5 | | | | |
| 140 | | | | | | | | | |
| 145 | | | 16 | | 5.0 | | | | |
| 150 | | | | | | | | End of Continuous Core at 146.0 Feet | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: B-24(CC)/Royal Oaks



Project: Groundwater Monitoring Plan for Subtitle D Project No.: 042480069
Client: Royal Oaks Landfill, Cherokee County, Texas

Start Date: 06/07/94
Finish Date: 06/07/94

## DRILLING DATA

Inspector: Eric Matzner
Contractor: Groundwater Technology, Inc.
Equipment: Failing 1500 Rig
Method: Mud Rotary

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | NA | SHELBY | CHRISTENSEN |
| Diameter: | NA | 3" | 2" |
| Other: | NA | NA | NA |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | | |
| Diameter (ID): | | |
| Coupling: | | |

WELL DEVELOPMENT
Method:
Duration:
Gals. Purged:
Slug Test: (cm/sec)

SURVEY DATA DATUM
Grade: 651.00
TWC:
TPC:
North: 7864
East: 11090

Geophysical Log ☑ yes ☐ no
Comments:

| Depth (feet) | WELL CONSTRUCTION | Soil / rock | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | 1 | | 1.0 | | | Clayey Silt, CL, yellowish-brown, very stiff, low plasticity, occasional beds of ironstone | — Weches Fm |
| 5 | | | D.O. | | D.O. | | | Sandy Clay; SC, yellowish-brown | |
| | | | 2 | | 0.5 | | | | |
| 10 | | | D.O. | | D.O. | | | | |
| | | | 3 | | 1.7 | | | Clayey Silt, CL, greenish-black, very stiff, low plasticity to friable, occasional thin beds of hard siltstone, abundant glauconite | |
| 15 | | | D.O. | | D.O. | | | | |
| 20 | | | 4 | | 8.0 | | | | |
| 25 | | | 5 | | 7.5 | | | | |
| 30 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: B-24(CC)/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/07/94*
Finish Date: *06/07/94*

(CONTINUATION)

| Depth (feet) | WELL CONSTRUCTION | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 30 | | 5 | | 7.5 | | | | |
| 35 | | | | | | | Top of Queen City Formation | Queen City Fm |
| 40 | | 6 | | 6.2 | | | Clayey Silty Sand, SC, very dark brown, very stiff to hard, low plasticity, 10% white mica, occasional vugs filled with glauconite material, occasional pyritic material | |
| 45 | | | | | | | | |
| 50 | | 7 | | 1.7 | | | Clayey Silt, CL, very dark grayish-brown, hard, low plasticity, abundant mica flakes, occasional very thin beds of organic material | |
| 55 | | | | | | | Silty Sand, SM, very dark grayish-brown, friable, soft, fine-grained, well sorted quartz | |
| 60 | | 8 | | 3.8 | | | Silty Clay, CL, very dark brown, very hard, interbeds of sandy silt | |
| 65 | | | | | | | Clayey Sand, SC, dark grayish-brown | |
| 70 | | 9 | | 4.7 | | | Clayey Silt, CL, very dark brown, very hard<br>Silty Sand, SM, very dark brown<br>Silty Clay, CL | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: **B-24(CC)/Royal Oaks**

Page 3 of 4

Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/07/94*

Finish Date: *06/07/94*

| Depth (feet) | WELL CONSTRUCTION | soil / rock | Samp. No. | Blows/ 6 in. | Rec. (ft.) | USCS | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 70 | | | Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | | | |
| | | | 9 | | 4.7 | | | Clayey Sand; SC | |
| | | | | | | | | Silty Clay; CL | |
| 75 | | | | | | | | Silty Sand; SM, very dark grayish-brown, crossbedded, friable, fine-grained, well sorted quartz, 5-10% white mica, 20% dark minerals | |
| 80 | | | 10 | | 8.4 | | | | |
| | | | | | | | | Silty Clay; CL, dark brown, very stiff | |
| 85 | | | | | | | | Silty Sand; SM, very dark grayish-brown, occasional crossbeds, stiff, friable, fine-grained, well sorted quartz, 5-10% white mica | |
| 90 | | | 11 | | 5.0 | | | | |
| 95 | | | | | | | | | |
| 100 | | | 12 | | 4.0 | | | | |
| 105 | | | | | | | | | |
| | | | 13 | | 6.0 | | | Silty Clay; CL, very dark brown, dark gray banding, low plasticity, interbedded with thin beds of silty sands and clays | |
| 110 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

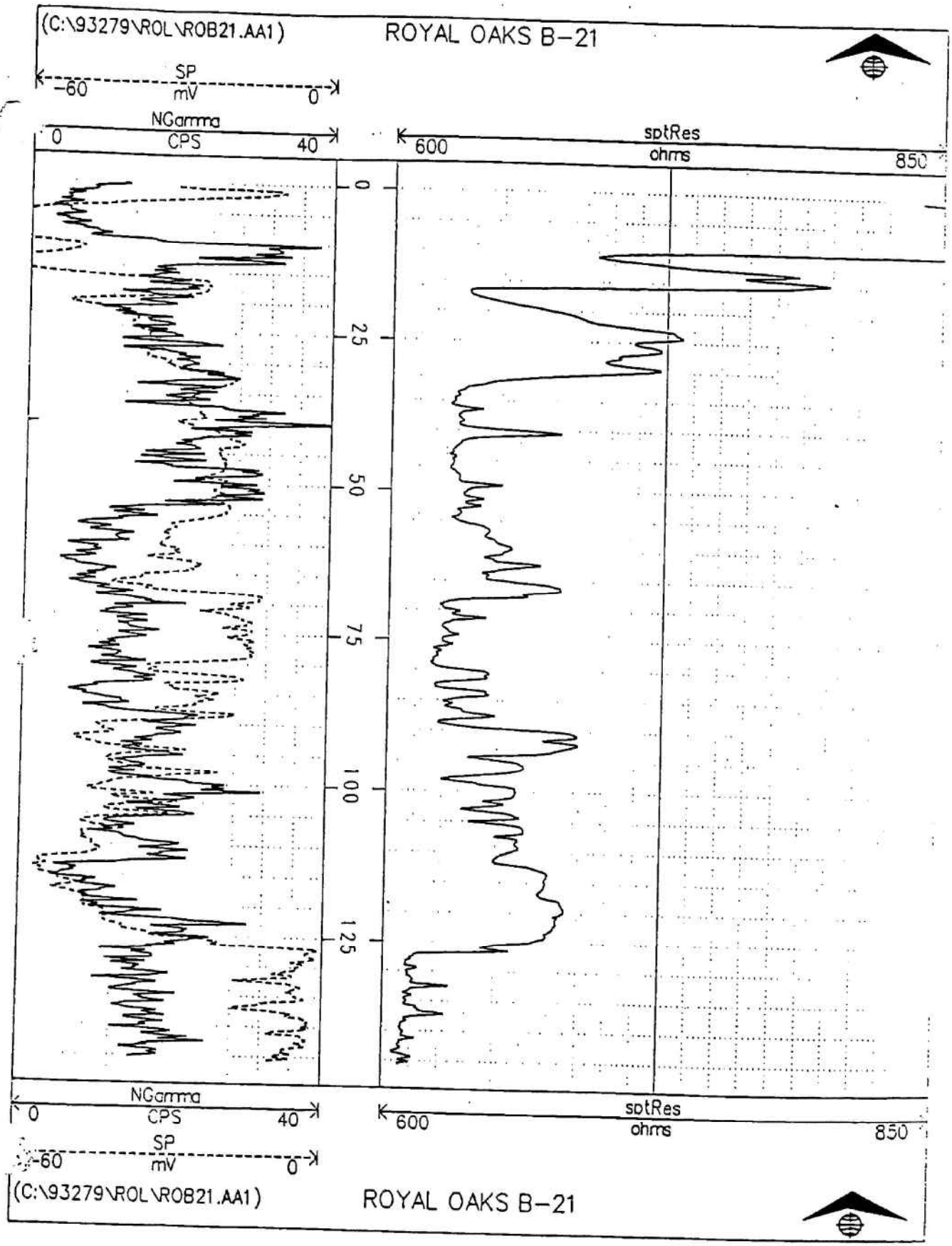
Well Name/Location: B-24(CC)/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *06/07/94*
Finish Date: *06/07/94*

| Depth (feet) | WELL CONSTRUCTION | soil / rock | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 110 | | | 13 | | 6.0 | | | | |
| 115 | | | | | | | | | |
| 120 | | | 14 | | 10.0 | | | | |
| 125 | | | | | | | | | |
| 130 | | | 15 | | NR | | | End of Continuous Core at 130.0 Feet | |
| 135 | | | | | | | | | |
| 140 | | | | | | | | | |
| 145 | | | | | | | | | |
| 150 | | | | | | | | | |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mV
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NGamma
0
CPS
40
600
sptRes
ohms
850
0
25
50
75
100
125
NGamma
0
CPS
40
600
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ohms
850
SP
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mV
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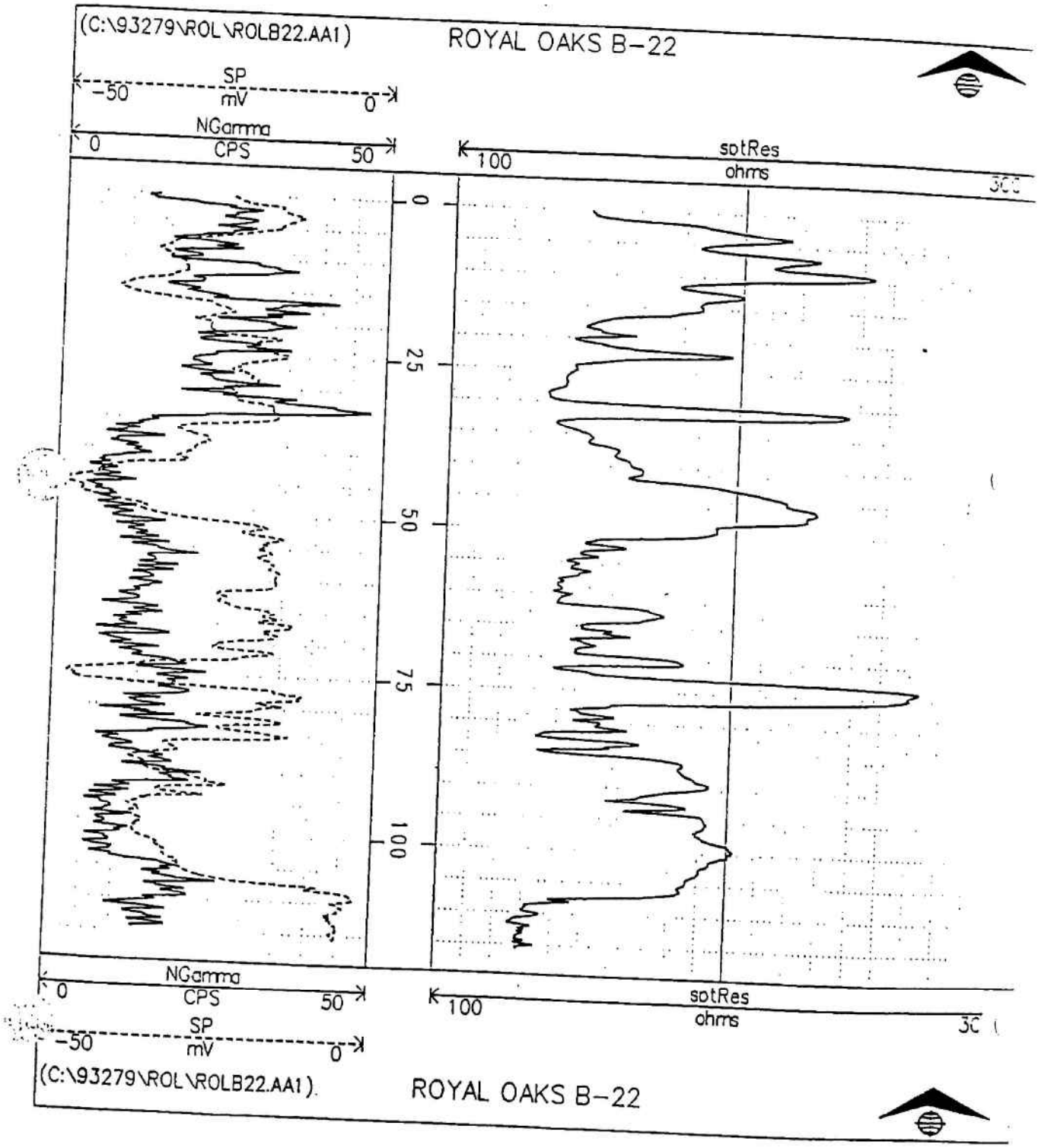
ROYAL OAKS B-21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mV
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NGamma
0
CPS
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100
sotRes
ohms
0
25
50
75
100
NGamma
0
CPS
50
100
sotRes
ohms
SP
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mV
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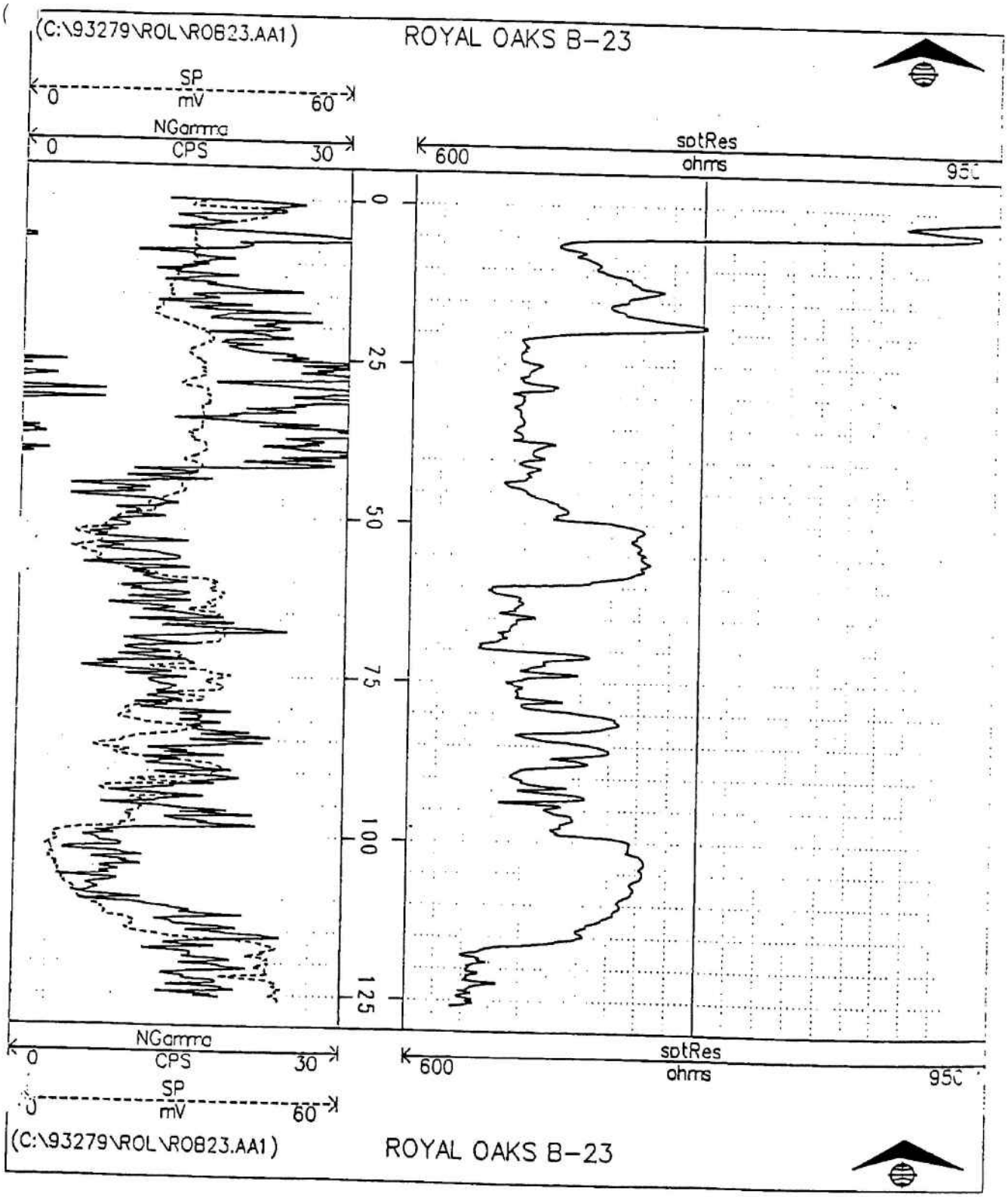
ROYAL OAKS B-22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25
50
75
100
125
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CPS
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ohms
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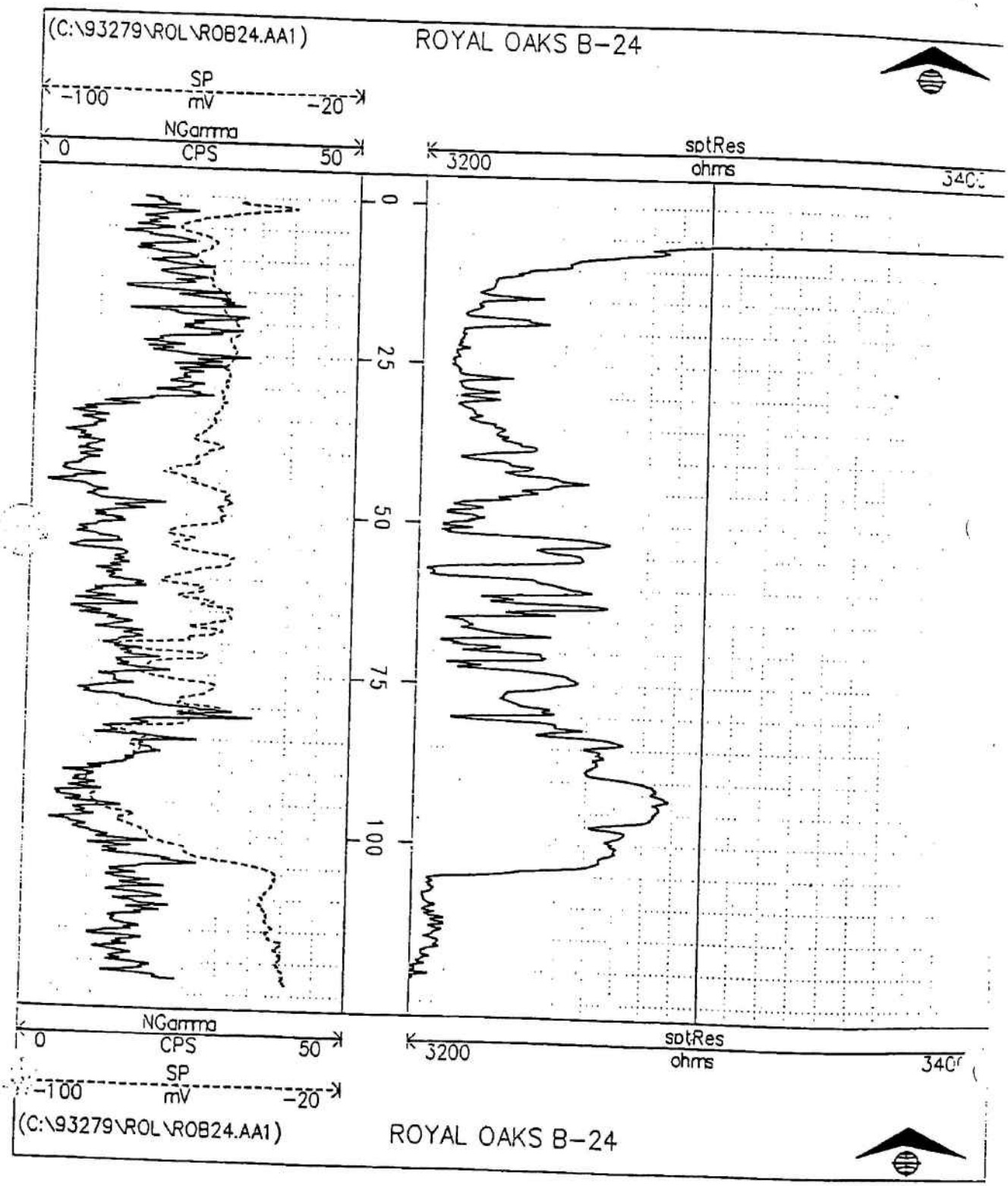
ROYAL OAKS B-23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CPS
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SP
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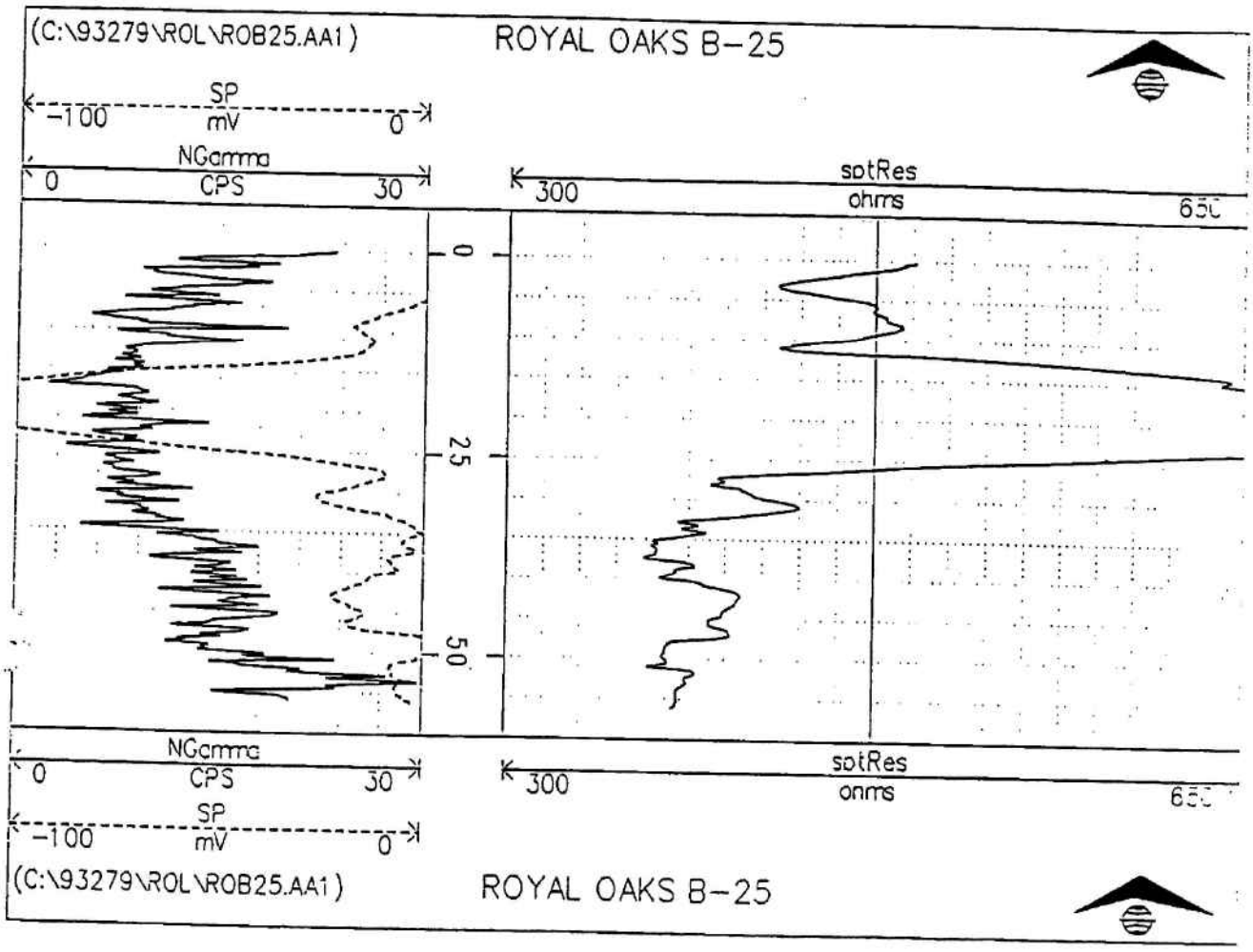
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CPS
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satRes
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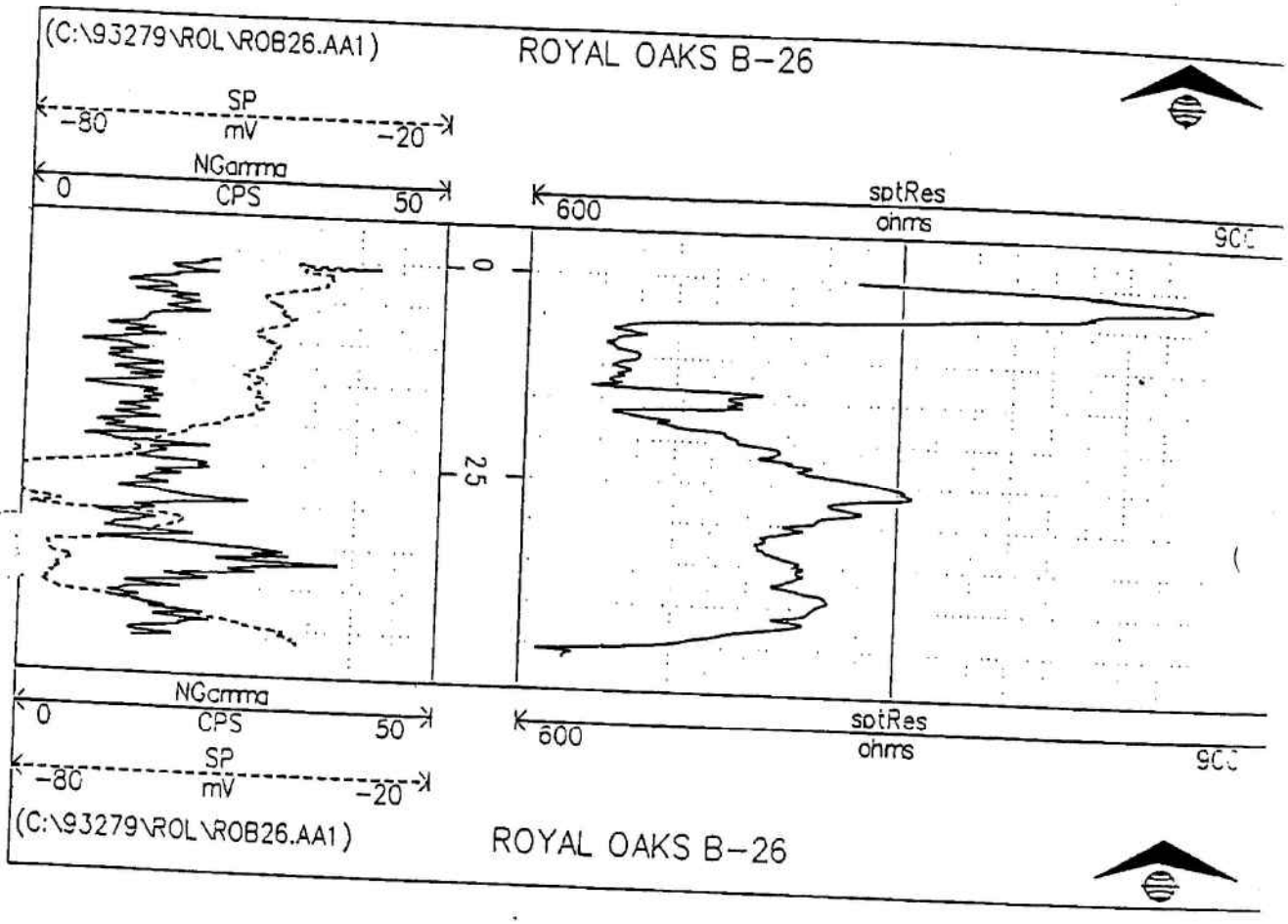
ROYAL OAKS B-25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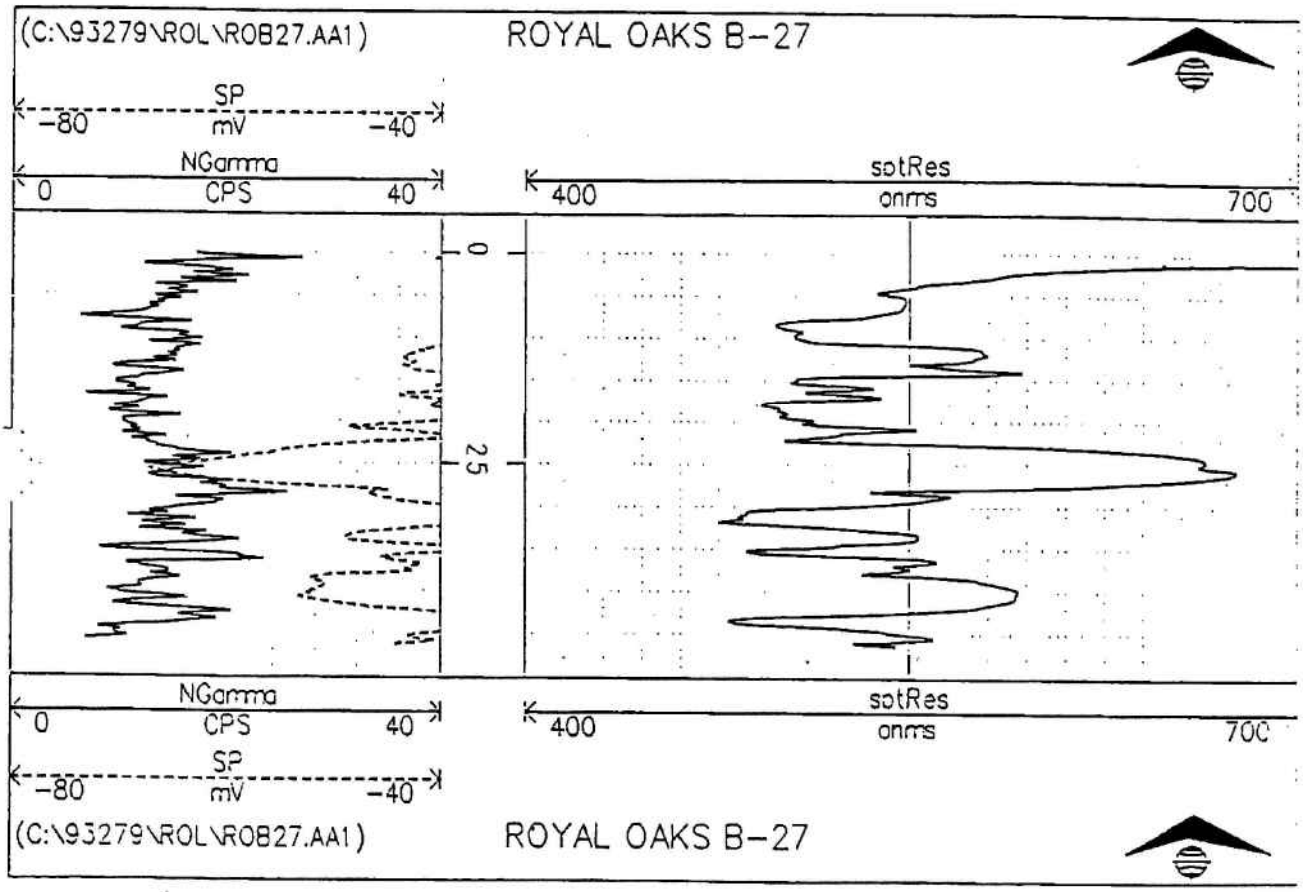
ROYAL OAKS B-26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mV
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CPS
40
sptRes
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ohms
700
0
25
NGamma
0
CPS
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mV
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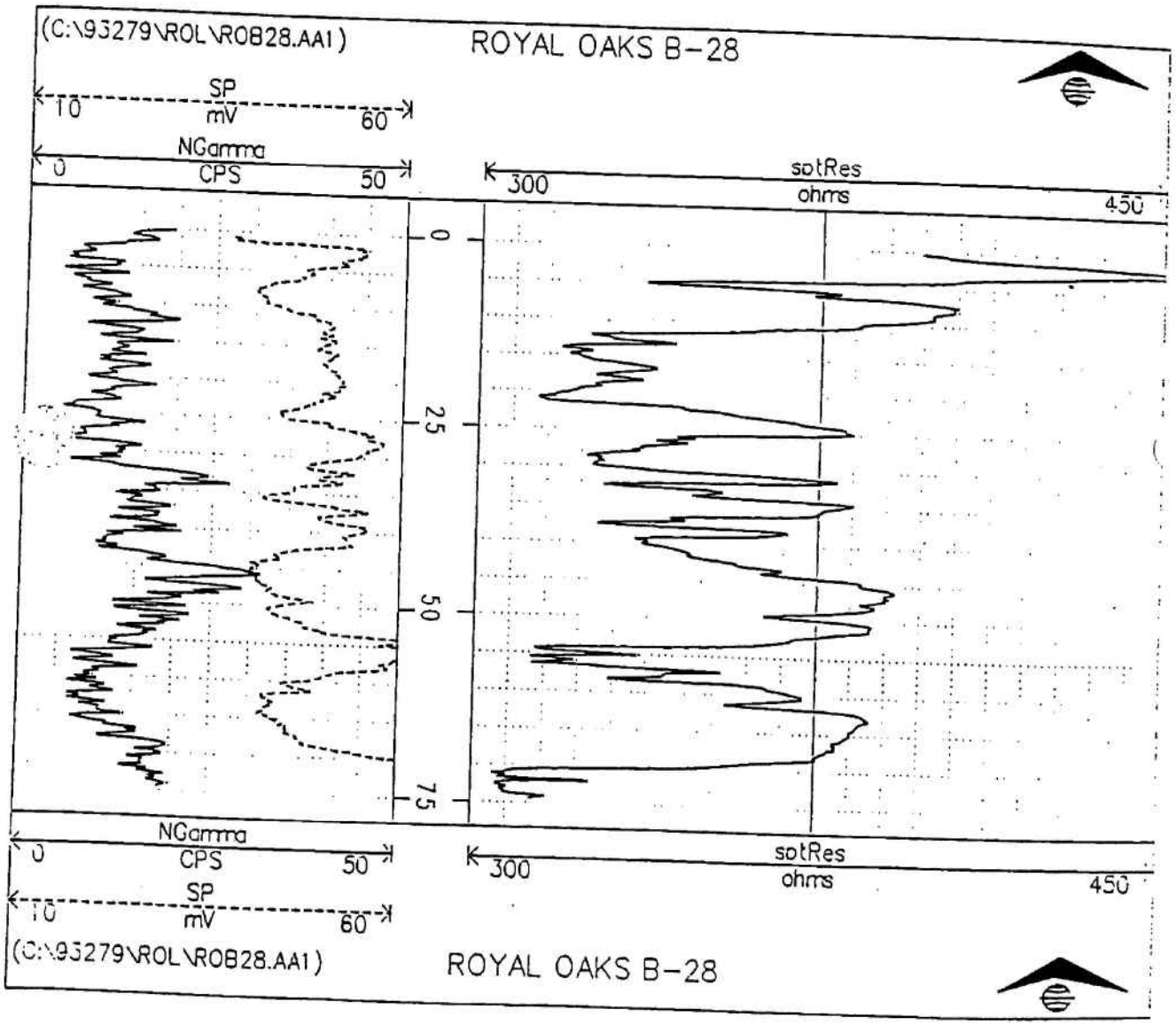
ROYAL OAKS B-27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mV
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CPS
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ohms
450
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50
75
NGamma
0
CPS
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mV
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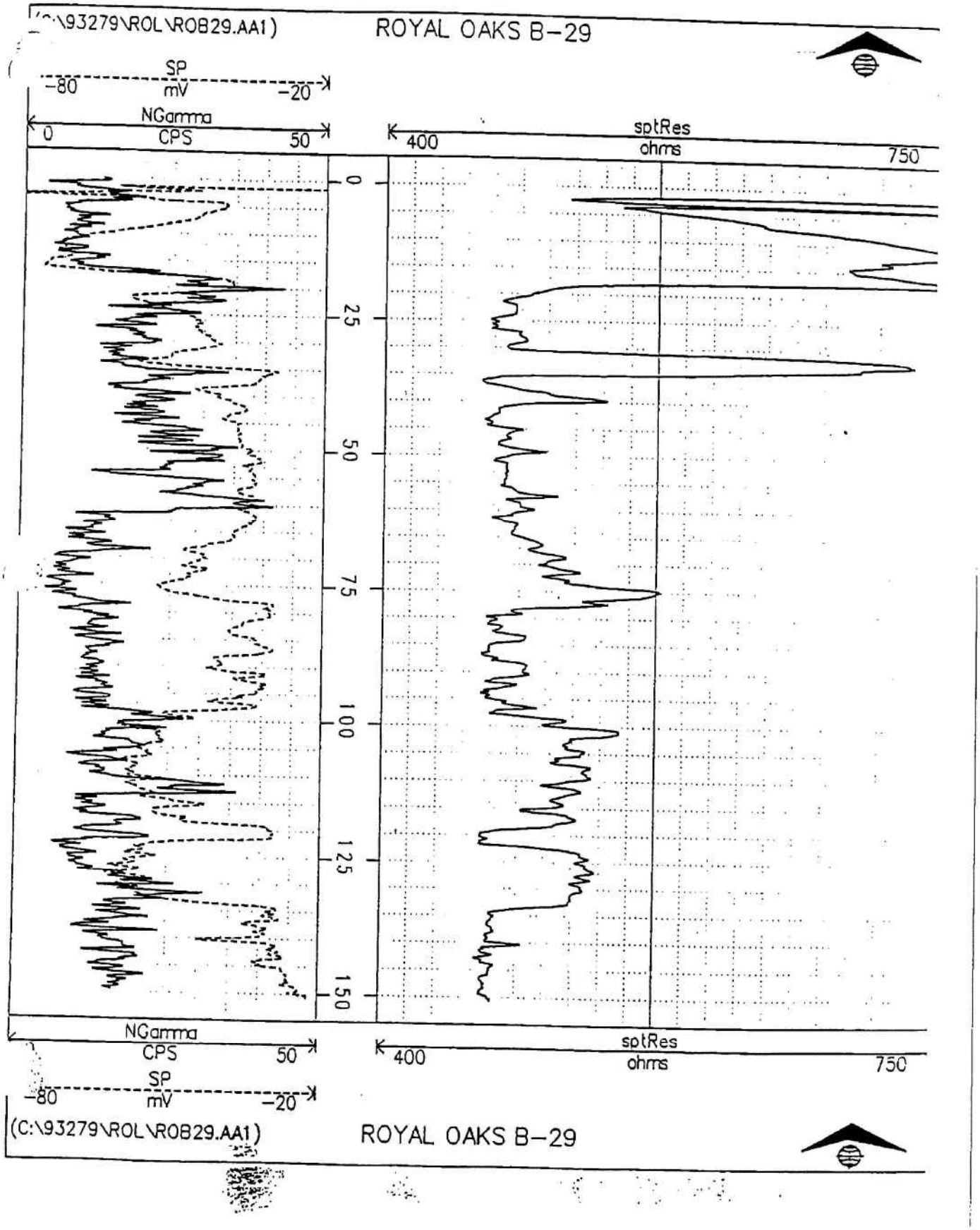
ROYAL OAKS B-28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mV
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0
CPS
50
sptRes
400
ohms
750
0
25
50
75
100
125
150
NGamma
CPS
50
sptRes
400
ohms
750
SP
-80
mV
-20
(C:\93279\ROL\R0B29.AA1)
ROYAL OAKS B-29

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-8/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/05/94*
Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

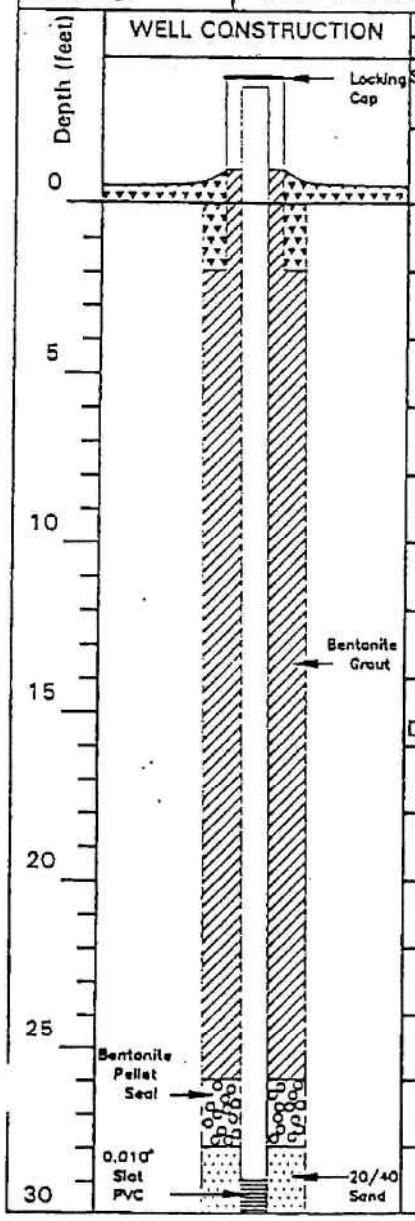
## WELL DEVELOPMENT

Method: *Surge/Purge*
Duration: *6 hours*
Gals. Purged: *240 gallons*
Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *685.53*
TWC: *688.41*
TPC: *688.77*
North: *9638.43*
East: *10103.40*

Geophysical Log: ☐ yes ☑ no
Comments:




| Run No. | Samp. No. | Blows/6 in. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | USCS | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Silty Sand; SM; tan to strong brown, soft, friable, dry, very fine-grained, moderately sorted, quartz sand | Sparta Fm |
| 1 | | | | 2.0 | | | | | |
| 2 | | | | 2.0 | | | | | |
| 3 | | | | 2.0 | | | | | |
| 4 | | | | 2.0 | | | | Clayey Sand; SC; brown, yellow and red banding, very stiff, low plasticity, dry to slightly moist, occasional hard streaks | |
| 5 | | | | 1.75 | | | | | |
| 6 | | | | 1.0 | | | | Silty Sand; SM; brown, yellowish-red and gray banding, stiff, slightly moist, fine-grained quartz, occasional very thin beds of ironstone | |
| 7 | | | | 1.5 | | | | | |
| D.O. | | | | D.O. | | | | Ironstone layers, hard, indurated sand, iron cemented | Drilled out |
| | | | | | | | | Top of Weches Formation | Weches Fm |
| 8 | | | | 2.0 | | | | Silty Clay; CL; yellowish-brown, strong brown bandings, hard, low plasticity, slightly moist, abundant ironstone fragments | |
| 9 | | | | 2.0 | | | | | |
| 10 | | | | 2.0 | | | | | |
| 11 | | | | 2.0 | | | | Clay; CH; dk gray-green, med. stiff, high plasticity, moist, glauconitic | Wet |
| 12 | | | | 1.5 | | | | Clayey Sand; SC; dk gray-green, fine-grained quartz and glauconite, wet | |
| 13 | | | | 2.0 | | | | Silt and Sand; SMML; dark gray-green, hard, friable, dry to slightly moist | Hard streak<br>Dry to moist |
| 14 | | | | 2.0 | | | | Clayey Sand; SC; very dark grayish green, stiff, wet, glauconitic | Wet |

LAIDLAW WASTE SYSTEMS, INC.

Subsurface Boring Log

Well Name/Location: MW-8/Royal Oaks

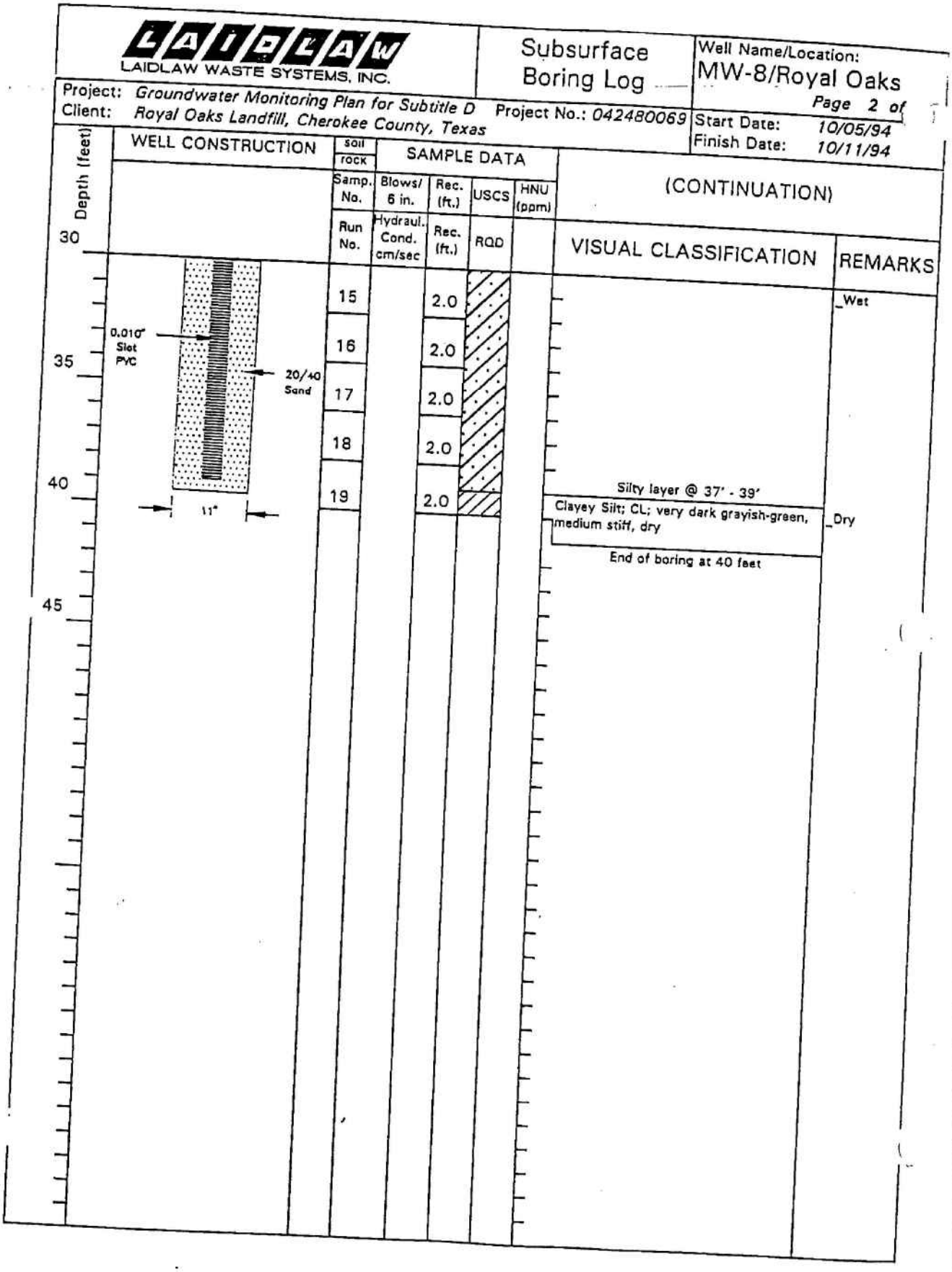
Page 2 of

Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/05/94*

Finish Date: *10/11/94*



LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-9/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/07/94*
Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

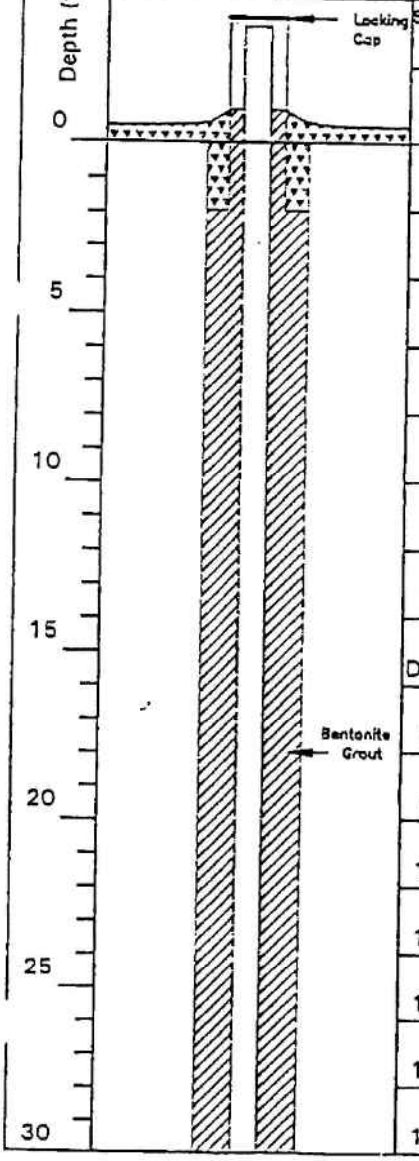
## WELL DEVELOPMENT

Method: *Surge/Purge*
Duration: *6 hours*
Gals. Purged: *390 gallons*
Slug Test: *NA* (cm/sec)

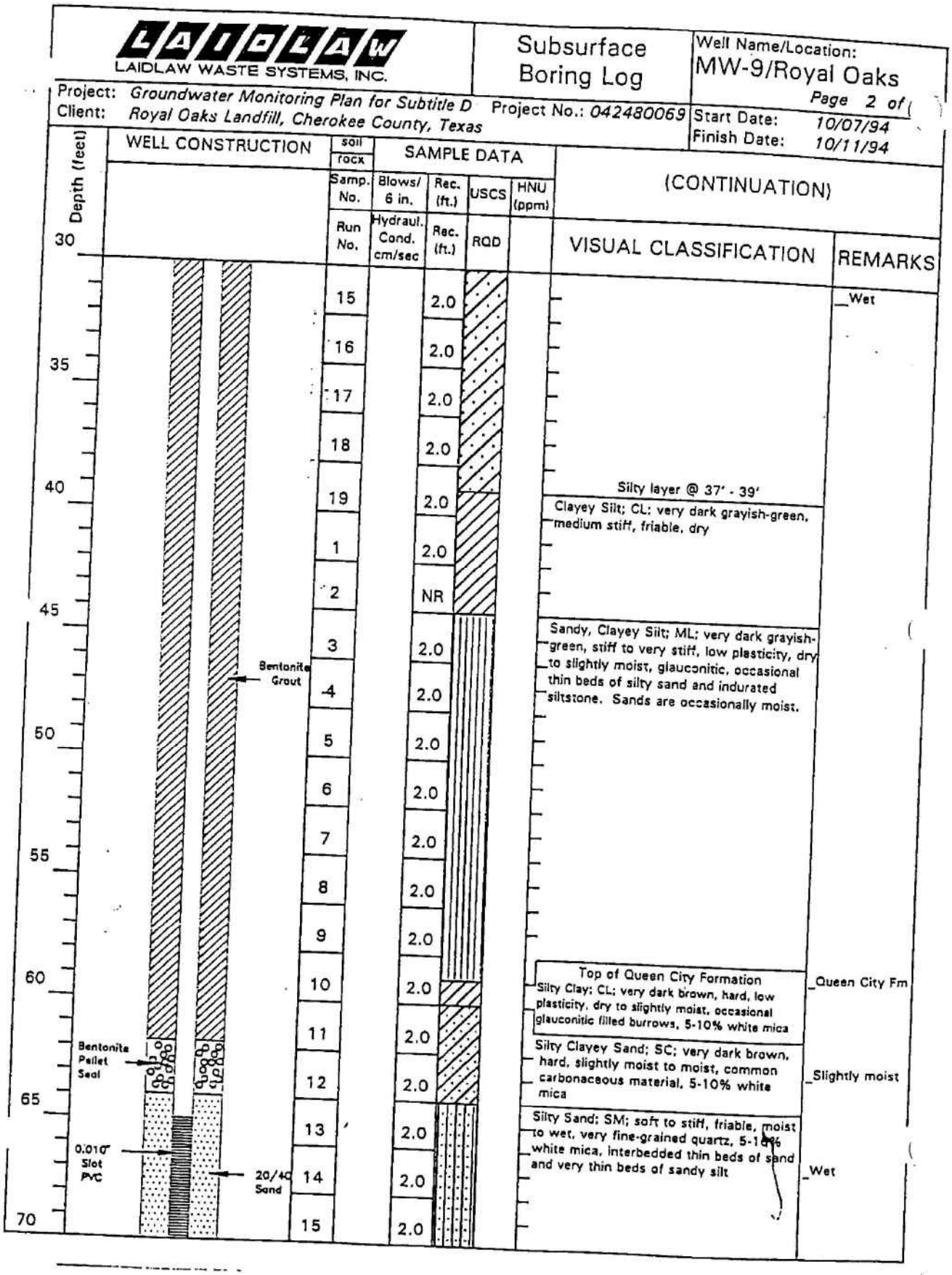
## SURVEY DATA DATUM

Grade: *685.63*
TWC: *688.59*
TPC: *688.87*
North: *9633.49*
East: *10112.17*

Geophysical Log: ☐ yes ☑ no
Comments:




| Run No. | Samp. No. | Blows/ 6 in. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | USCS | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Silty Sand: SM; tan to strong brown, soft, friable, dry, very fine-grained, moderately sorted, quartz sand | Sparta Fm |
| 1 | | | | 2.0 | | | | | |
| 2 | | | | 2.0 | | | | | |
| 3 | | | | 2.0 | | | | | |
| 4 | | | | 2.0 | | | | Clayey Sand; SC; brown, yellow and red banding, very stiff, low plasticity, dry to slightly moist, occasional hard streaks | |
| 5 | | | | 1.75 | | | | | |
| 6 | | | | 1.0 | | | | Silty Sand; SM; brown, yellowish-red and gray banding, stiff, slightly moist, fine-grained quartz, occasional very thin beds of ironstone | |
| 7 | | | | 1.5 | | | | | |
| D.O. | | | | D.O. | | | | Ironstone layers, hard, indurated sand, iron cemented | Drilled out |
| 8 | | | | 2.0 | | | | Top of Weches Formation<br>Silty Clay; CL; yellowish-brown, strong brown bandings, hard, plasticity, slightly moist, abundant ironstone fragments | Weches Fm |
| 9 | | | | 2.0 | | | | | |
| 10 | | | | 2.0 | | | | | |
| 11 | | | | 2.0 | | | | Clay; CH; dk gray-green, med. stiff, high plasticity, moist, glauconitic | Wet |
| 12 | | | | 1.5 | | | | Clayey Sand; SC; dk gray-green, fine-grained quartz and glauconite, wet | |
| 13 | | | | 2.0 | | | | Silt and Sand; SMML; dark gray-green, hard, friable, dry to slightly moist | Hard streak<br>Dry to moist |
| 14 | | | | 2.0 | | | | Clayey Sand; SC; very dark grayish green, stiff, wet, glauconitic | Wet |


LAIDLAW WASTE SYSTEMS, INC.
Subsurface Boring Log
Well Name/Location: MW-9/Royal Oaks
Page 2 of
Project: Groundwater Monitoring Plan for Subtitle D
Project No.: 042480069
Client: Royal Oaks Landfill, Cherokee County, Texas
Start Date: 10/07/94
Finish Date: 10/11/94
WELL CONSTRUCTION
soil
rock
SAMPLE DATA
Samp. No.
Blows/ 6 in.
Rec. (ft.)
USCS
HNU (ppm)
Run No.
Hydraul. Cond. cm/sec
Rec. (ft.)
RQD
(CONTINUATION)
VISUAL CLASSIFICATION
REMARKS
Depth (feet)
30
35
40
45
50
55
60
65
70
15
16
17
18
19
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
2.0
2.0
2.0
2.0
2.0
2.0
NR
2.0
2.0
2.0
2.0
2.0
2.0
2.0
2.0
2.0
2.0
2.0
Wet
Silty layer @ 37' - 39'
Clayey Silt; CL: very dark grayish-green, medium stiff, friable, dry
Sandy, Clayey Silt; ML; very dark grayish-green, stiff to very stiff, low plasticity, dry to slightly moist, glauconitic, occasional thin beds of silty sand and indurated siltstone. Sands are occasionally moist.
Top of Queen City Formation
Silty Clay: CL; very dark brown, hard, low plasticity, dry to slightly moist, occasional glauconitic filled burrows, 5-10% white mica
Queen City Fm
Silty Clayey Sand; SC; very dark brown, hard, slightly moist to moist, common carbonaceous material, 5-10% white mica
Slightly moist
Silty Sand; SM; soft to stiff, friable, moist to wet, very fine-grained quartz, 5-10% white mica, interbedded thin beds of sand and very thin beds of sandy silt
Wet
Bentonite Grout
Bentonite Pellet Seal
0.010" Slot PVC
20/40 Sand

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-9/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* · Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/07/94*

Finish Date: *10/11/94*

(CONTINUATION)

| Depth (feet) | WELL CONSTRUCTION | Soil / Rock | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 70 | | | | | | | | | Wet |
| | 0.010" Slot PVC; 20/40 Sand; 11" | | 16 | | 2.0 | | | | |
| 75 | | | 17 | | 2.0 | | | | |
| | | | 18 | | 2.0 | | | Clayey Sandy Silt; ML; very dark brown, stiff, low plasticity, moist to slightly moist, interbedded clays and silts | |
| | | | 19 | | NR | | | | |
| 80 | | | | | | | | End of boring at 78 feet | |
| 85 | | | | | | | | | |
| 90 | | | | | | | | | |
| 95 | | | | | | | | | |
| 100 | | | | | | | | | |
| 105 | | | | | | | | | |
| 110 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-10/Royal Oaks

Page 1 of 2

Project: Groundwater Monitoring Plan for Subtitle D  Project No.: 042480069

Client: Royal Oaks Landfill, Cherokee County, Texas

Start Date: 10/04/94

Finish Date: 10/11/94

## DRILLING DATA

Inspector: Eric Matzner

Contractor: Groundwater Technology, Inc.

Equipment: Mobil B-61

Method: 6-5/8" ID Hollow-Stem Auger

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | CME | NA | NA |
| Diameter: | 2" | NA | NA |
| Other: | NA | NA | NA |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | Sch. 40 PVC | Sch. 40 PVC |
| Diameter (ID): | 4-inch | 4-inch, 0.010" slot |
| Coupling: | Flush-Threaded | Flush-Threaded |

## WELL DEVELOPMENT

Method: Surge/Purge

Duration: 6 hours

Gals. Purged: 140 gallons

Slug Test: (cm/sec) NA

## SURVEY DATA DATUM

Grade: 670.91

TWC: 673.91

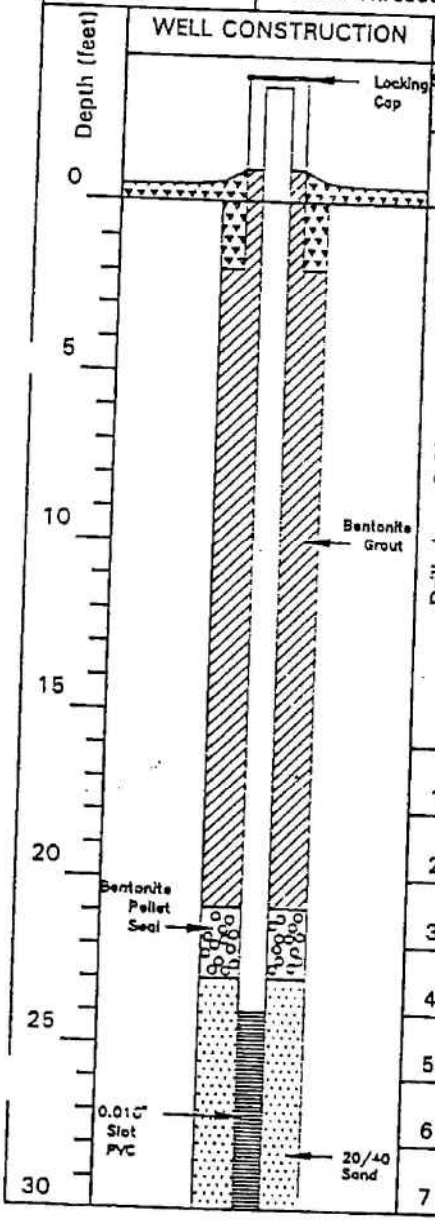
TPC: 674.32

North: 8489.50

East: 10025.58

Geophysical Log: ☐ yes ☑ no

Comments:




| WELL CONSTRUCTION | soil / rock | SAMPLE DATA | | | | | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | Samp. No. | Blows/ 6 in. | Rec. (ft.) | USCS | HNU (ppm) | | | |
| | Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | | | | |
| | | | | | | | Silty Sand; SM; tan, friable, dry, occasional hard ironstone layers | Sparta Fm |
| | | | | | | | Top of Weches Formation<br>Clayey Silt; CL; brown, dry, occasional ironstone layers | Weches Fm |
| | 1 | | 2.0 | | | | Clay; CH; white with tan mottles, very hard high plasticity, dry, occasional thin beds of clayey silt and ironstone | |
| | 2 | | 2.0 | | | | Silty Clay; CL; brown, low plasticity, slightly moist, occasional ironstone fragments | |
| | 3 | | 2.0 | | | | Silty Sand; SM; very dark grayish-green, glauconitic, very hard, friable, very fine-grained sand, poorly sorted, occasional hard streaks | Dry<br>Slightly moist |
| | 4 | | 2.0 | | | | | |
| | 5 | | 2.0 | | | | | |
| | 6 | | 2.0 | | | | | Moist |
| | 7 | | 2.0 | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: MW-10/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/04/94*

Finish Date: *10/11/94*

| Depth (feet) | WELL CONSTRUCTION | soil / rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 30 | | | | | | | | | |
| | 0.010" Slot PVC; 20/40 Sand; 11" | | 8 | | 2.0 | | | | |
| | | | 9 | | 2.0 | | | | |
| 35 | | | 10 | | 1.0 | | | Silty Clay; CL; very dark grayish-green, glauconitic, very hard, low plasticity, slightly moist | |
| | | | | | | | | End of boring at 35 feet | |
| 40 | | | | | | | | | |
| 45 | | | | | | | | | |
| 50 | | | | | | | | | |
| 55 | | | | | | | | | |
| 60 | | | | | | | | | |
| 65 | | | | | | | | | |
| 70 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-11/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/06/94*

Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*

Contractor: *Groundwater Technology, Inc.*

Equipment: *Mobil B-61*

Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

## WELL DEVELOPMENT

Method: *Surge/Purge*

Duration: *6 hours*

Gals. Purged: *138 gallons*

Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *629.40*

TWC: *631.96*

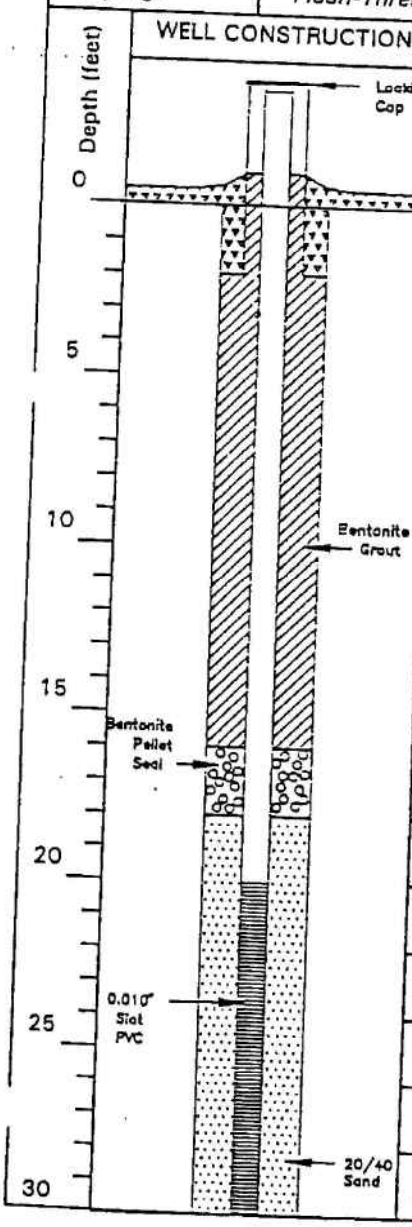
TPC: *632.38*

North: *8034.16*

East: *10038.34*

Geophysical Log: ☐ yes ☑ no

Comments:




| Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|
| 1 | | 2.0 | | | Sandy Silty Clay; CL; red to brown with depth, soft near surface, becoming hard around 4', friable to low plasticity, dry to slightly moist, high plasticity around 8' to 10', common ironstone fragments | |
| 2 | | 2.0 | | | | |
| 3 | | 2.0 | | | | |
| 4 | | 2.0 | | | | |
| 5 | | 2.0 | | | | |
| 6 | | 2.0 | | | –glauconitic sandy silt at 11.7' | |
| 7 | | 2.0 | | | Sandy Clayey Silt; CL/ML; very dark bluish-green, becoming brown with depth, soft to hard, low plasticity, slightly moist, interbedded silts and clays | |
| 8 | | 2.0 | | | Top of Queen City Formation<br>Silty Sand; SM; very dark brown, very stiff, friable to low plasticity, moist to wet, very fine-grained quartz, 5-10% white mica, interbedded very thin beds of silts and sands, occasional carbonaceous material | Queen City Fm<br>Moist<br>Wet |
| 9 | | 2.0 | | | | |
| 10 | | 2.0 | | | | |
| 11 | | 2.0 | | | | |
| 12 | | 2.0 | | | Sand; SP; very dark brown, medium stiff, friable, wet, 5% dark minerals, very fine-grained quartz | |
| 13 | | 2.0 | | | Silty Sand; SM; very dark brown, medium stiff, friable, wet, interbedded silt and sand | |
| 14 | | 2.0 | | | Sand; SP; very dark brown, wet, common carbonaceous material, 10% white mica | |
| 15 | | 2.0 | | | Sandy Silt; ML; dark brown, hard, dry, interbedded silt and clay | Dry |

LAIDLAW WASTE SYSTEMS, INC.

**Subsurface Boring Log**

Well Name/Location: MW-11/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/06/94*

Finish Date: *10/11/94*

| Depth (feet) | WELL CONSTRUCTION | soil / rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 30 | 20/40 Sand, 11" | | | | | | | End of boring at 30 feet | |
| 35 | | | | | | | | | |
| 40 | | | | | | | | | |
| 45 | | | | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-12/Royal Oaks

Page 1 of

Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/04/94*

Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*

Contractor: *Groundwater Technology, Inc.*

Equipment: *Mobil B-61*

Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

## WELL DEVELOPMENT

Method: *Surge/Purge*

Duration: *6 hours*

Gals. Purged: *111 gallons*

Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *611.49*

TWC: *614.39*

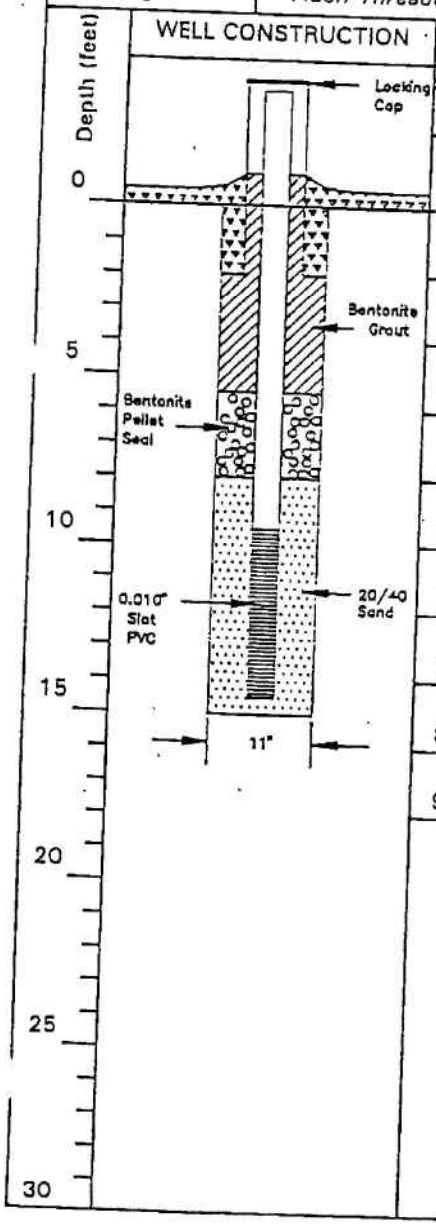
TPC: *614.77*

North: *7703.47*

East: *10258.17*

Geophysical Log: ☐ yes ☑ no

Comments:




| WELL CONSTRUCTION | soil / rock | Samp. No. | Blows/ 6 in. | Rec. (ft.) | USCS | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | 1 | | 2.0 | | | Silty Clay; CL; red; dry occasional ironstone pebbles | Queen City Fm |
| | | 2 | | 2.0 | | | Clayey Silt; ML; yellow, red banding; slightly moist; friable | |
| | | 3 | | 2.0 | | | Silty Sand to Sandy Silt; SM; iron stained; very fine grained sand; very moist | |
| | | 4 | | 2.0 | | | | Very moist |
| | | 5 | | 2.0 | | | | |
| | | 6 | | 2.0 | | | Sand; SP; dark brown; very fine- to fine-grained; well sorted friable becomes clayey with depth; occasional carbonaceous material | Wet |
| | | 7 | | 2.0 | | | | |
| | | 8 | | 2.0 | | | Silty Clayey Sand; SM; brown, with very thin beds of sandy silt; slightly moist | |
| | | 9 | | 2.0 | | | | |
| | | | | | | | End of boring at 18 feet | |

| SAMPLE DATA | Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD |
|---|---|---|---|---|

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-13/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *11/11/94*
Finish Date: *11/18/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

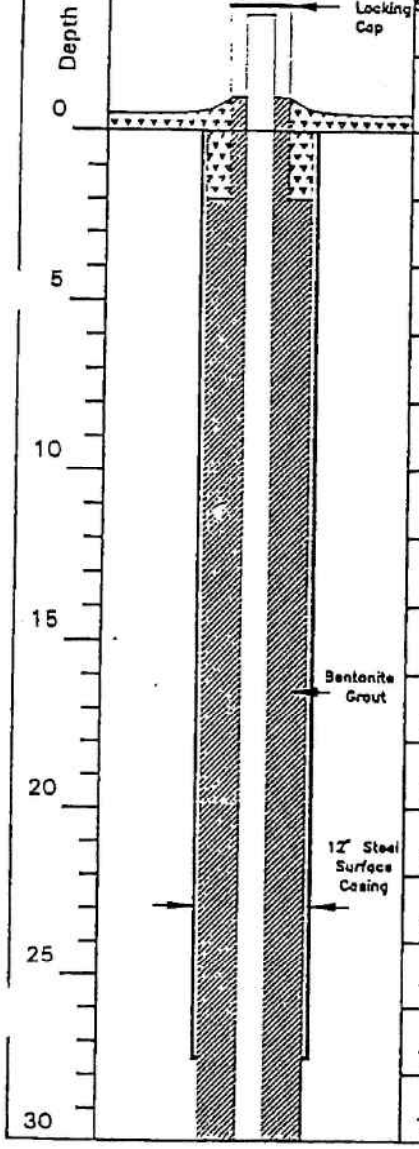
## WELL DEVELOPMENT

Method: *Surge/Purge*
Duration: *3.0 hours*
Gals. Purged: *92 gallons*
Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *652.30*
TWC: *655.13*
TPC: *655.49*
North: *7610.0*
East: *10702.7*

Geophysical Log: ☐ yes ☑ no
Comments:




| WELL CONSTRUCTION | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|
| | 1 | | 2.0 | | | Clayey Silt; CL; brown, hard, friable to low plasticity, slightly moist, occasional ironstone fragments | Weches Fm |
| | 2 | | 2.0 | | | | |
| | 3 | | 2.0 | | | | |
| | 4 | | 2.0 | | | | |
| | 5 | | 2.0 | | | | |
| | 6 | | 2.0 | | | | |
| | 7 | | 2.0 | | | | |
| | 8 | | 2.0 | | | | |
| | 9 | | 2.0 | | | Clayey Silt; CL/ML; dark grayish-green, very stiff, friable, slightly moist, glauconitic, occasional streaks of blocky silt | |
| | 10 | | 2.0 | | | | |
| | 11 | | 2.0 | | | | |
| | 12 | | 2.0 | | | | |
| | 13 | | 2.0 | | | | |
| | 14 | | 2.0 | | | | |
| | 15 | | 2.0 | | | | 12-inch steel surface casing from 0-27.5' |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-13/Royal Oaks

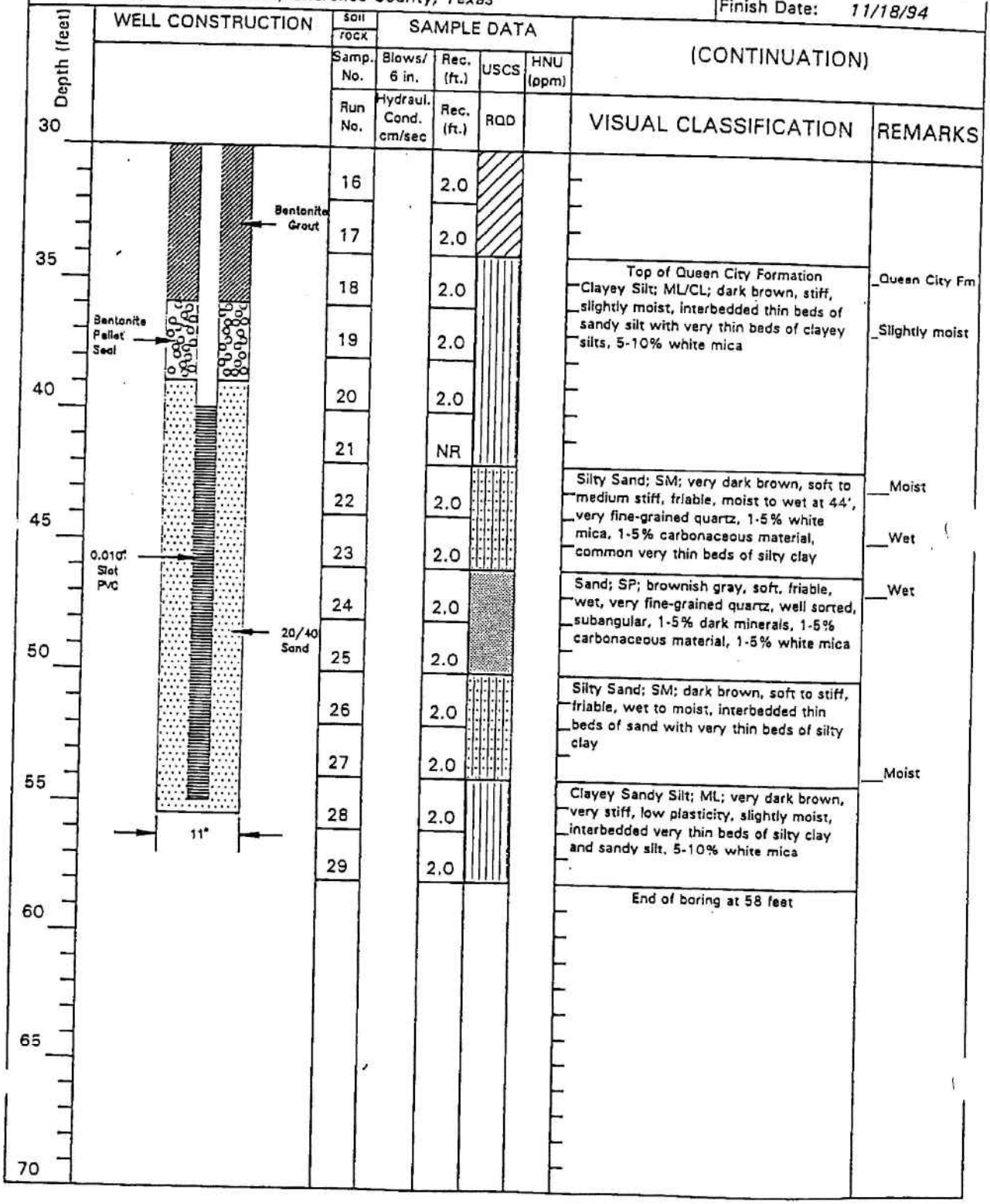


Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *11/11/94*

Finish Date: *11/18/94*




| WELL CONSTRUCTION | Soil / Rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | (CONTINUATION) VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | 16 | | 2.0 | | | | |
| | | 17 | | 2.0 | | | | |
| | | 18 | | 2.0 | | | Top of Queen City Formation<br>Clayey Silt; ML/CL; dark brown, stiff, slightly moist, interbedded thin beds of sandy silt with very thin beds of clayey silts, 5-10% white mica | Queen City Fm<br>Slightly moist |
| | | 19 | | 2.0 | | | | |
| | | 20 | | 2.0 | | | | |
| | | 21 | | NR | | | | |
| | | 22 | | 2.0 | | | Silty Sand; SM; very dark brown, soft to medium stiff, friable, moist to wet at 44', very fine-grained quartz, 1-5% white mica, 1-5% carbonaceous material, common very thin beds of silty clay | Moist |
| | | 23 | | 2.0 | | | | Wet |
| | | 24 | | 2.0 | | | Sand; SP; brownish gray, soft, friable, wet, very fine-grained quartz, well sorted, subangular, 1-5% dark minerals, 1-5% carbonaceous material, 1-5% white mica | Wet |
| | | 25 | | 2.0 | | | | |
| | | 26 | | 2.0 | | | Silty Sand; SM; dark brown, soft to stiff, friable, wet to moist, interbedded thin beds of sand with very thin beds of silty clay | |
| | | 27 | | 2.0 | | | | Moist |
| | | 28 | | 2.0 | | | Clayey Sandy Silt; ML; very dark brown, very stiff, low plasticity, slightly moist, interbedded very thin beds of silty clay and sandy silt, 5-10% white mica | |
| | | 29 | | 2.0 | | | | |
| | | | | | | | End of boring at 58 feet | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-14/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*
Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *10/04/94*
Finish Date: *10/11/94*

## DRILLING DATA

Inspector: *Eric Matzner*
Contractor: *Groundwater Technology, Inc.*
Equipment: *Mobil B-61*
Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

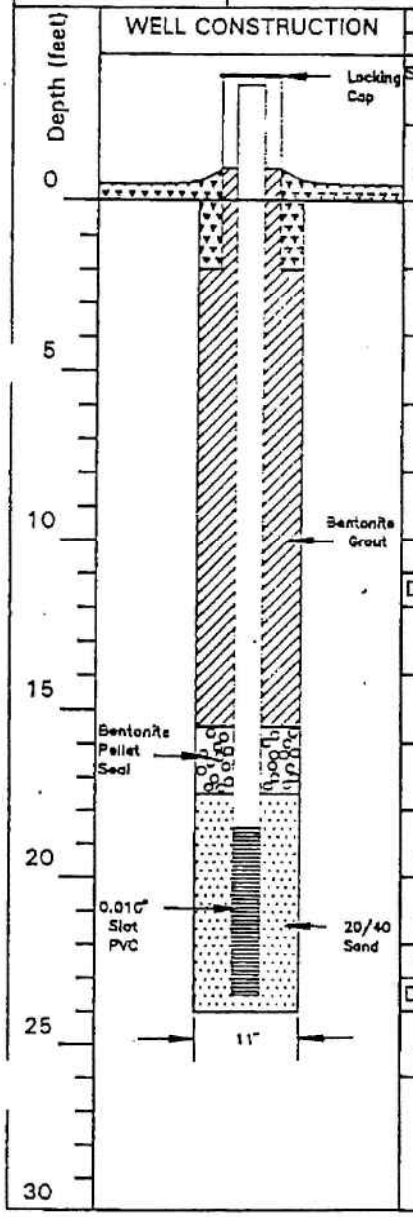
## WELL DEVELOPMENT

Method: *Surge/Purge*
Duration: *6.5 hours*
Gals. Purged: *59 gallons*
Slug Test: *NA* (cm/sec)

## SURVEY DATA DATUM

Grade: *611.49*
TWC: *614.39*
TPC: *614.77*
North: *7703.47*
East: *10258.17*

Geophysical Log: ☐ yes ☑ no
Comments: Geophysical log within 100 feet




| WELL CONSTRUCTION | soil/rock | Samp. No. / Run No. | Blows/ 6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | 1 | | 2.0 | | | Clayey Silt; CL; brown to reddish-brown, yellow mottles and red and white banding, stiff, low plasticity, dry to slightly moist, occasional ironstone fragments and very thin beds | Weches Fm |
| | | 2 | | 2.0 | | | | Dry to slightly moist |
| | | 3 | | 2.0 | | | | |
| | | 4 | | 2.0 | | | | Moist |
| | | 5 | | 2.0 | | | | |
| | | 6 | | 1.0 | | | | Hard streak drilled out |
| | | D.O. | | D.O. | | | | |
| | | 7 | | 2.0 | | | Sandy Silt; ML; dark grayish-green, soft, friable, moist | |
| | | 8 | | 2.0 | | | Silty Sand; SM; dark grayish-green, medium stiff, friable, moist, occasional hard streaks, sediments become clayier with depth | Moist |
| | | 9 | | 2.0 | | | | |
| | | 10 | | 2.0 | | | | |
| | | 11 | | 2.0 | | | Clayey Silt; CL; dark grayish-green, glauconitic, hard, low plasticity, slightly moist | |
| | | 12 | | 1.0 | | | | Hard streaks |
| | | D.O. | | D.O. | | | | |
| | | 13 | | 2.0 | | | | |
| | | | | | | | End of boring at 26 feet | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-15/Royal Oaks

Page 1 of

Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *11/10/94*

Finish Date: *11/18/94*

## DRILLING DATA

Inspector: *Eric Matzner*

Contractor: *Groundwater Technology, Inc.*

Equipment: *Mobil B-61*

Method: *6-5/8" ID Hollow-Stem Auger*

## SAMPLING METHODS

| | Sampler | Tube | Core |
|---|---|---|---|
| Type: | *CME* | *NA* | *NA* |
| Diameter: | *2"* | *NA* | *NA* |
| Other: | *NA* | *NA* | *NA* |

## WELL CONSTRUCTION

| | Riser | Screen |
|---|---|---|
| Material: | *Sch. 40 PVC* | *Sch. 40 PVC* |
| Diameter (ID): | *4-inch* | *4-inch, 0.010" slot* |
| Coupling: | *Flush-Threaded* | *Flush-Threaded* |

## WELL DEVELOPMENT

Method: *Surge/Purge*

Duration: *6.0 hours*

Gals. Purged: *122 gallons*

Slug Test: (cm/sec) *NA*

## SURVEY DATA DATUM

Grade: *661.38*

TWC: *664.21*

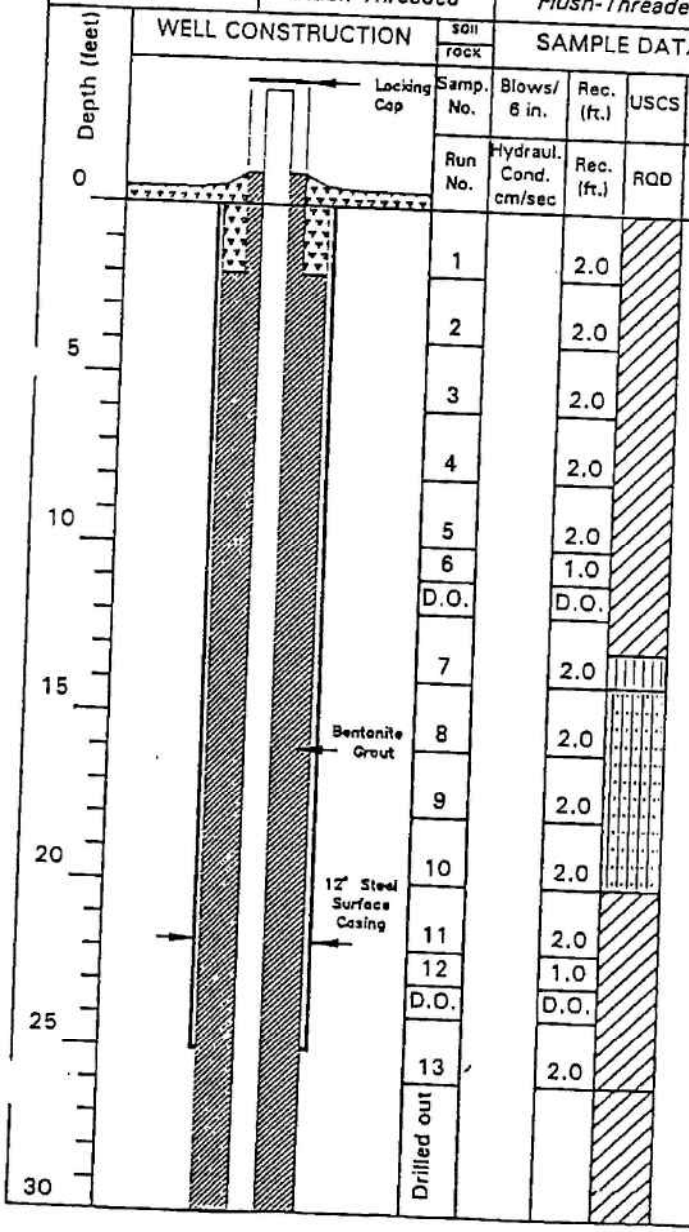
TPC: *664.58*

North: *8548.9*

East: *11336.1*

Geophysical Log: ☐ yes ☑ no

Comments:




| WELL CONSTRUCTION | SAMPLE DATA (soil) | | | | | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|
| | Samp. No. | Blows/ 6 in. | Rec. (ft.) | USCS | HNU (ppm) | | |
| | Run No. | Hydraul. Cond. cm/sec | Rec. (ft.) | RQD | | | |
| | 1 | | 2.0 | | | Clayey Silt; CL; brown to reddish brown, with yellow mottles and red and white banding, stiff, low plasticity, dry to slightly moist, ocasional ironstone fragments and very thin beds | Weches Fm |
| | 2 | | 2.0 | | | | Dry to slightly moist |
| | 3 | | 2.0 | | | | |
| | 4 | | 2.0 | | | | |
| | 5 | | 2.0 | | | | Moist |
| | 6 | | 1.0 | | | | Hard streak drilled out |
| | D.O. | | D.O. | | | | |
| | 7 | | 2.0 | | | Sandy Silt; ML; dark grayish-green, soft, friable, moist | |
| | 8 | | 2.0 | | | Silty Sand: SM; dark grayish-green, medium stiff, friable, moist, occasional hard streaks, sediments become clayier with depth | Moist |
| | 9 | | 2.0 | | | | |
| | 10 | | 2.0 | | | | |
| | 11 | | 2.0 | | | Clayey Silt; CL; dark grayish-green, glauconitic, hard, low plasticity, slightly moist | |
| | 12 | | 1.0 | | | | Hard streaks |
| | D.O. | | D.O. | | | | |
| | 13 | | 2.0 | | | | 12-inch steel surface casing 0-25' |
| | Drilled out | | | | | | |

LAIDLAW WASTE SYSTEMS, INC.

# Subsurface Boring Log

Well Name/Location: MW-15/Royal Oaks



Project: *Groundwater Monitoring Plan for Subtitle D* Project No.: *042480069*

Client: *Royal Oaks Landfill, Cherokee County, Texas*

Start Date: *11/10/94*

Finish Date: *11/18/94*

(CONTINUATION)

| Depth (feet) | WELL CONSTRUCTION | Samp. No. / Run No. | Blows/6 in. / Hydraul. Cond. cm/sec | Rec. (ft.) / Rec. (ft.) | USCS / RQD | HNU (ppm) | VISUAL CLASSIFICATION | REMARKS |
|---|---|---|---|---|---|---|---|---|
| 30 | | Drilled out 26'-36' | | | | | | |
| 35 | Bentonite Grout | 1 | | 2.0 | | | Clayey Silt; CL/ML; dark grayish-green, medium soft to stiff, friable, dry to slightly moist, glauconitic, occasional siltstone rock fragments | Dry |
| 40 | | 2 | | 2.0 | | | | |
| | | 3 | | 2.0 | | | | |
| | | 4 | | 2.0 | | | Top of Queen City Formation<br>Clayey Sandy Silt; ML; very dark brown, stiff, friable, dry to moist with depth, occasional glauconitic silt-filled burrows, 1-5% white mica | Queen City Fm<br>Moist |
| 45 | Bentonite Pellet Seal | 5 | | 2.0 | | | | |
| | | 6 | | 2.0 | | | Silt and Sand; SM/ML; dark brown, soft, friable, moist to very moist to wet at 58.0', very fine-grained quartz, 5-10% white mica, occasional nodules of indurated sand, occasional thin beds of clayey silt and sandy silt | Moist |
| 50 | | 7 | | 1.0 | | | | |
| | | 8 | | 2.0 | | | | |
| | | 9 | | 2.0 | | | | Very moist |
| 55 | 0.010" Slot PVC / 20/40 Sand | 10 | | 2.0 | | | | |
| | | 11 | | 2.0 | | | | Wet |
| 60 | 11" | 12 | | 2.0 | | | Silty Clay; CL; dark brown, very hard, low plasticity, dry, interbedded very thin beds of silty clay and laminae of sandy silt | |
| | | | | | | | End of boring at 60 feet | |
| 65 | | | | | | | | |
| 70 | | | | | | | | |

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

MSW PERMIT NO: 1614

County: Cherokee County

Monitor Well I.D. No.: MW-8

Date of Monitor Well Installation: 10/06/94

Date of Monitor Well Development: 10/17/94

Monitor Well: Latitude: 32°00'05.0" Longitude: 95°16'03.1"

Monitor Well Groundwater Gradient: Upgradient X Downgradient ____

Monitor Well Driller Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

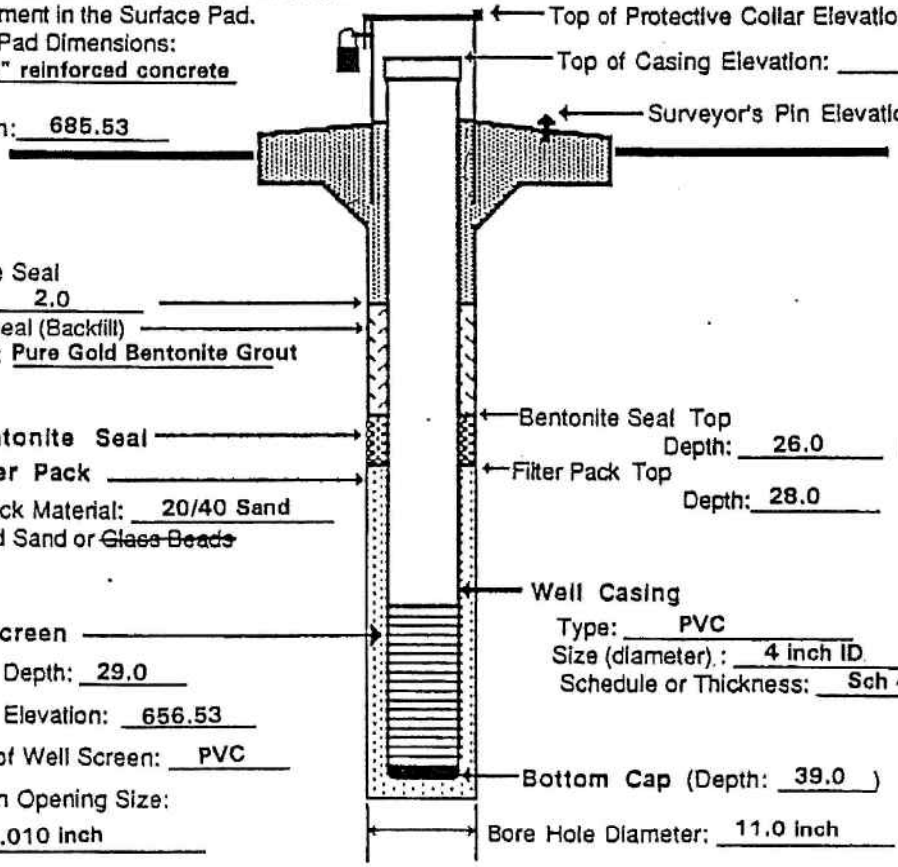
Static Water Level Elevation (with respect to MSL) after Well Developement : 673.25

Name of Geologic Formation(s) in which Well is completed: Weches

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete
Surface Elevation: 685.53



# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill
County: Cherokee County
Date of Monitor Well Installation: 10/08/94
Monitor Well: Latitude: 32°00'05.0" Longitude: 95°16'03.0"
Monitor Well Groundwater
Gradient: Upgradient X Downgradient ____

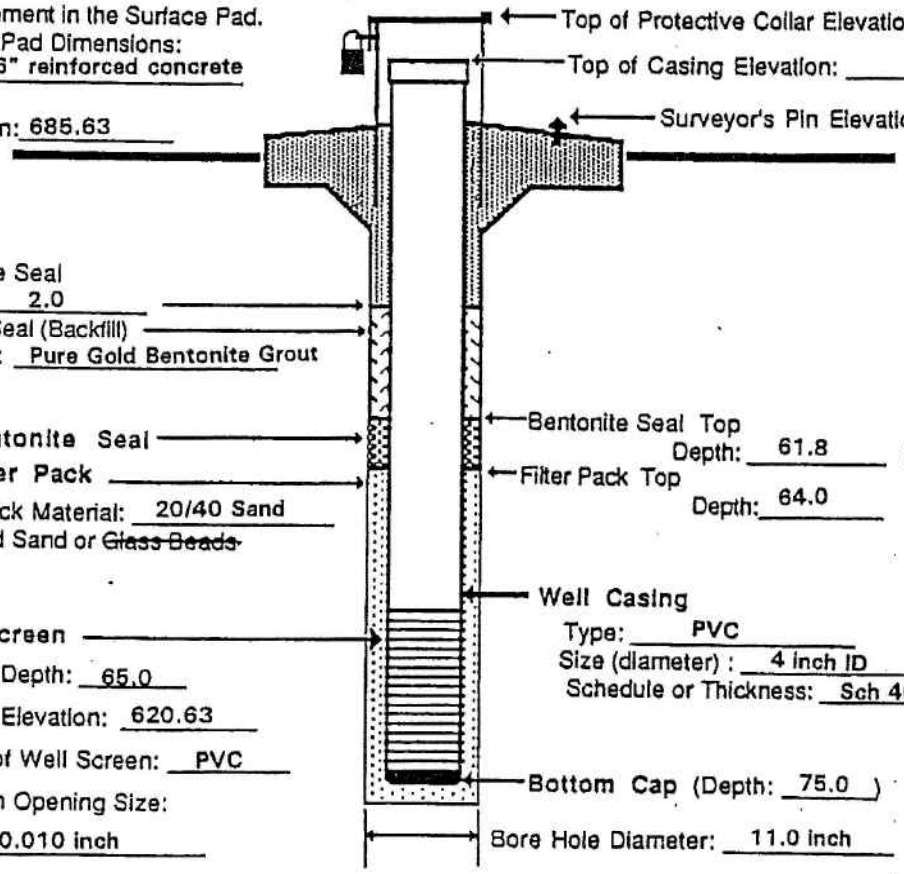
MSW PERMIT NO: 1614
Monitor Well I.D. No.: MW-9
Date of Monitor Well Development: 10/17/94
Monitor Well Driller
Name: Benny Hinojosa
License No.: 3127M

NOTE:
(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner
Static Water Level Elevation (with respect to MSL) after Well Development: 632.16
Name of Geologic Formation(s) in which Well is completed: Queen City

Type of Locking Device: pad lock
Type of Casing Protection: 6" x 5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete
Surface Elevation: 685.63



Top of Protective Collar Elevation: 688.87
Top of Casing Elevation: 688.59
Surveyor's Pin Elevation: 685.97

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal
Filter Pack
Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top Depth: 61.8 Elevation: 623.83
Filter Pack Top Depth: 64.0 Elevation: 621.63

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Well Screen
Top Depth: 65.0
Top Elevation: 620.63
Type of Well Screen: PVC
Screen Opening Size:
0.010 inch

Bottom Cap (Depth: 75.0 )
Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

County: Cherokee County

Date of Monitor Well Installation: 10/05/94

Monitor Well: Latitude: 31°59'53.7" Longitude: 95°16'04.1"

Monitor Well Groundwater

Gradient: Upgradient ___ Downgradient X

MSW PERMIT NO: 1614

Monitor Well I.D. No.: MW-10

Date of Monitor Well Development: 10/18/94

Monitor Well Driller

Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

Static Water Level Elevation (with respect to MSL) after Well Developement : 654.33

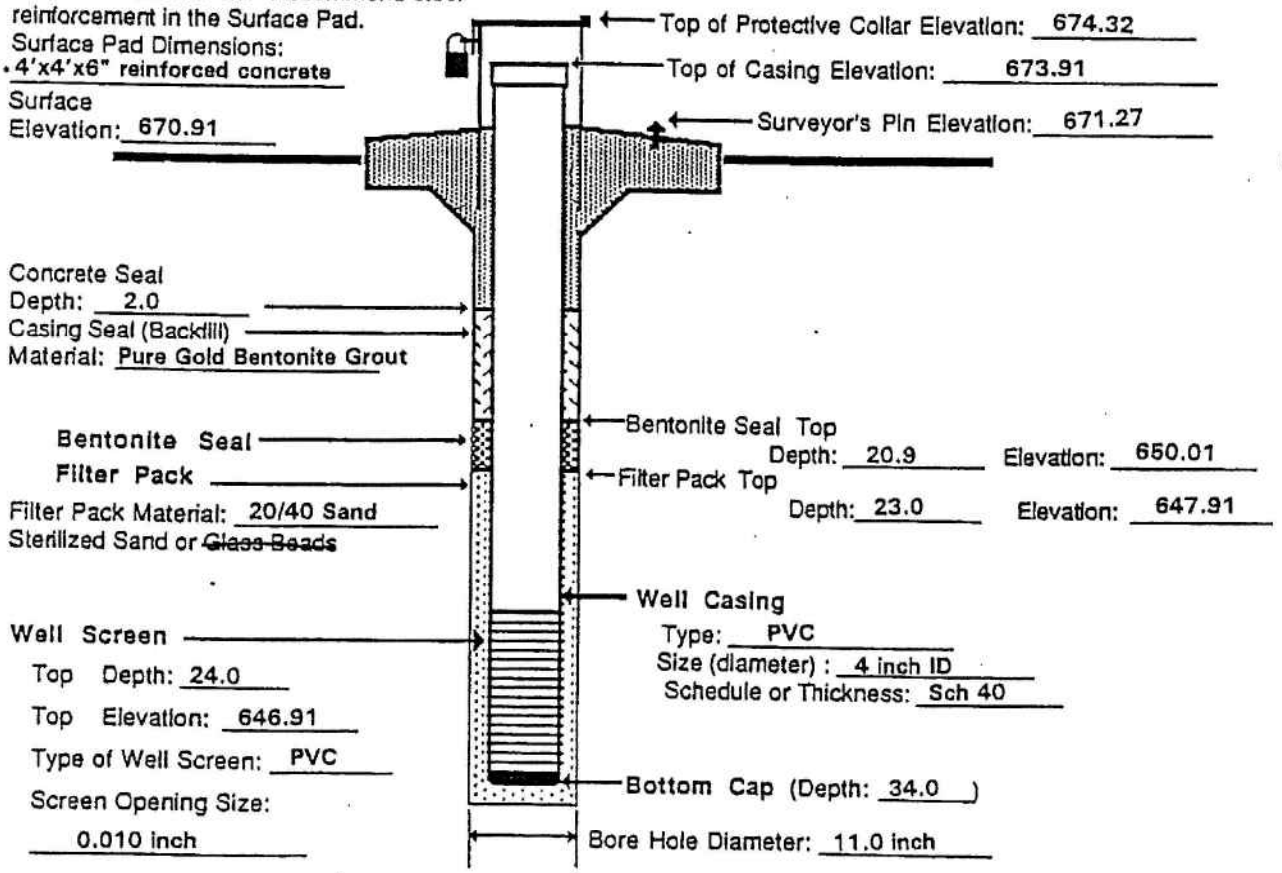
Name of Geologic Formation(s) in which Well is completed: Weches

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete

Surface Elevation: 670.91



Top of Protective Collar Elevation: 674.32

Top of Casing Elevation: 673.91

Surveyor's Pin Elevation: 671.27

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal

Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top
Depth: 20.9 Elevation: 650.01

Filter Pack Top
Depth: 23.0 Elevation: 647.91

Well Screen

Top Depth: 24.0

Top Elevation: 646.91

Type of Well Screen: PVC

Screen Opening Size:
0.010 inch

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Bottom Cap (Depth: 34.0 )

Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

MSW PERMIT NO: 1614

County: Cherokee County

Monitor Well I.D. No.: MW-11

Date of Monitor Well Installation: 10/06/94

Date of Monitor Well Development: 10/18/94

Monitor Well: Latitude: 31°59'49.2" Longitude: 95°16'04.0"

Monitor Well Groundwater Gradient: Upgradient ___ Downgradient X

Monitor Well Driller Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A) The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

Static Water Level Elevation (with respect to MSL) after Well Development: 611.6

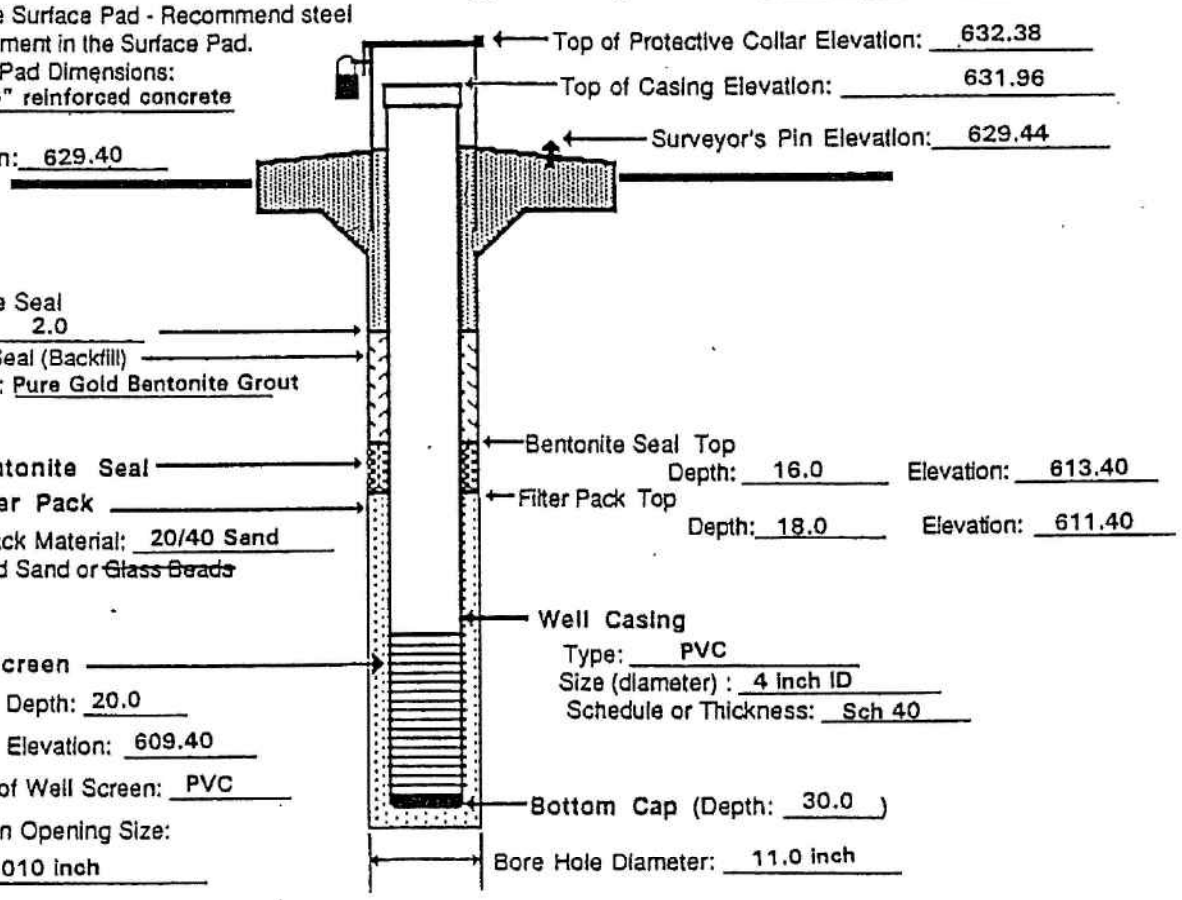
Name of Geologic Formation(s) in which Well is completed: Queen City

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
- 4'x4'x6" reinforced concrete

Surface Elevation: 629.40



Top of Protective Collar Elevation: 632.38

Top of Casing Elevation: 631.96

Surveyor's Pin Elevation: 629.44

Concrete Seal Depth: 2.0

Casing Seal (Backfill) Material: Pure Gold Bentonite Grout

Bentonite Seal

Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top Depth: 16.0 Elevation: 613.40

Filter Pack Top Depth: 18.0 Elevation: 611.40

Well Screen
Top Depth: 20.0
Top Elevation: 609.40
Type of Well Screen: PVC
Screen Opening Size: 0.010 inch

Well Casing
Type: PVC
Size (diameter): 4 inch ID
Schedule or Thickness: Sch 40

Bottom Cap (Depth: 30.0 )

Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

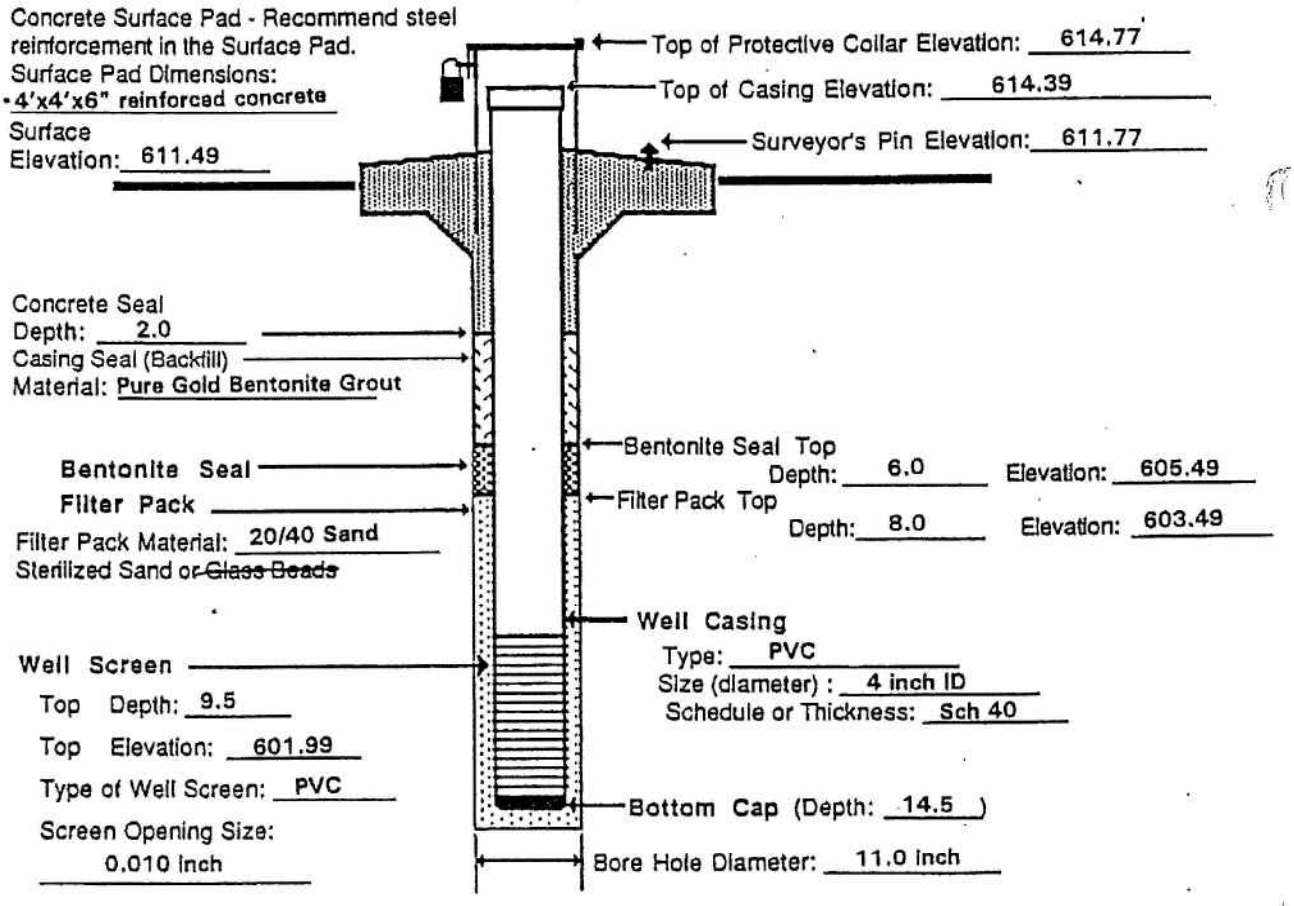
Permittee or Site Name: Royal Oaks Landfill
MSW PERMIT NO: 1614
County: Cherokee County
Monitor Well I.D. No.: MW-12
Date of Monitor Well Installation: 10/04/94
Date of Monitor Well Development: 02/02/95
Monitor Well: Latitude: 31°59'45.9" Longitude: 95°16'01.5"
Monitor Well Groundwater Gradient: Upgradient ___ Downgradient X
Monitor Well Driller Name: Benny Hinojosa
License No.: 3127M

NOTE:

(A) The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner
Static Water Level Elevation (with respect to MSL) after Well Developement: 607.31
Name of Geologic Formation(s) in which Well is completed: Queen City

Type of Locking Device: pad lock
Type of Casing Protection: 6"x5' round, anodized aluminum



# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

MSW PERMIT NO: 1614

County: Cherokee County

Monitor Well I.D. No.: MW-13

Date of Monitor Well Installation: 11/18/94

Date of Monitor Well Development: 12/02/94

Monitor Well: Latitude: 31°59'44.9" Longitude: 95°15'56.3"

Monitor Well Groundwater Gradient: Upgradient ___ Downgradient X

Monitor Well Driller Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

Static Water Level Elevation (with respect to MSL) after Well Developement : 610.26

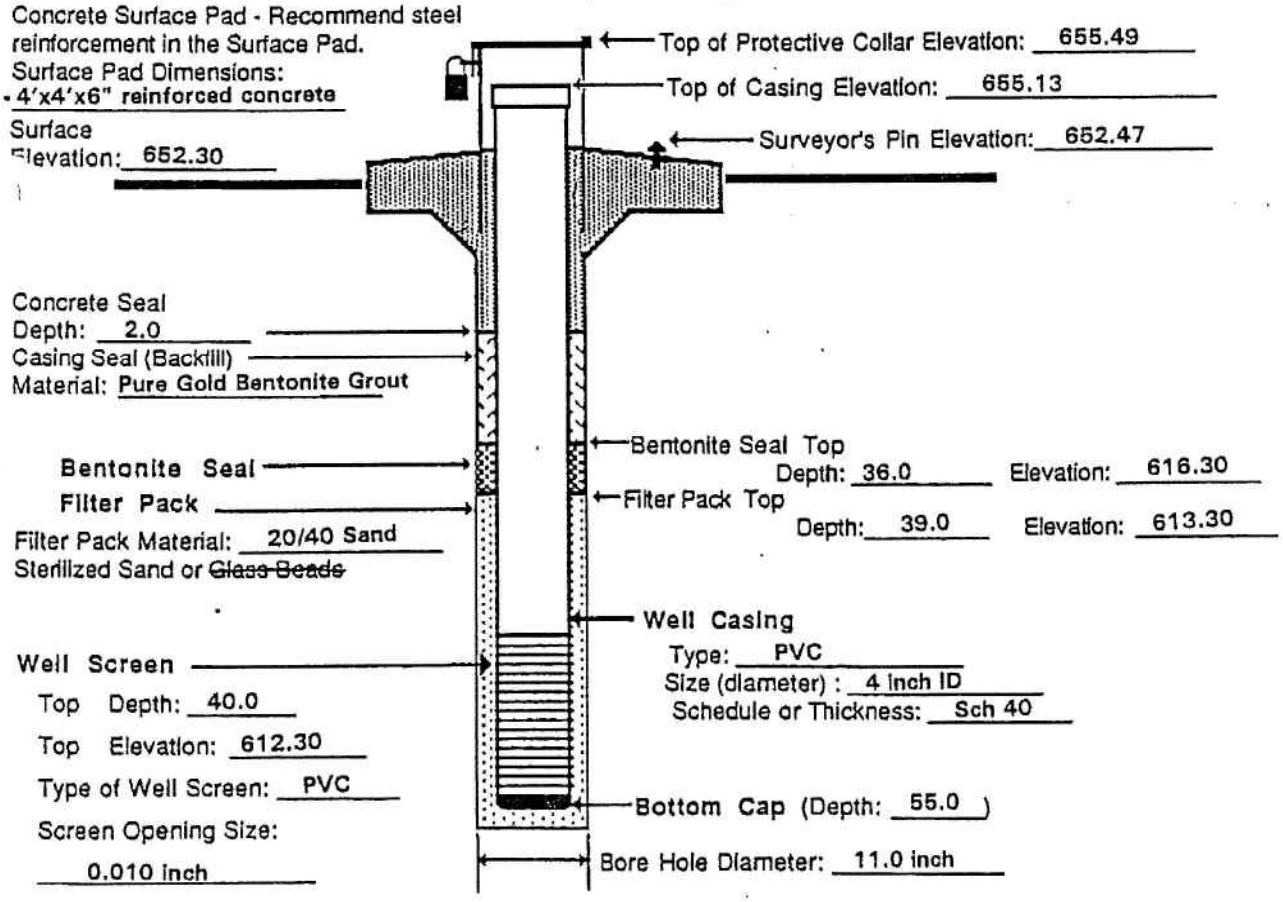
Name of Geologic Formation(s) in which Well is completed: Queen City

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions: 4'x4'x6" reinforced concrete

Surface Elevation: 652.30



← Top of Protective Collar Elevation: 655.49
← Top of Casing Elevation: 655.13
← Surveyor's Pin Elevation: 652.47

Concrete Seal Depth: 2.0
Casing Seal (Backfill) Material: Pure Gold Bentonite Grout

Bentonite Seal
Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

← Bentonite Seal Top Depth: 36.0 Elevation: 616.30
← Filter Pack Top Depth: 39.0 Elevation: 613.30

← Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Well Screen
Top Depth: 40.0
Top Elevation: 612.30
Type of Well Screen: PVC
Screen Opening Size: 0.010 inch

← Bottom Cap (Depth: 55.0 )

← Bore Hole Diameter: 11.0 inch

# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

MSW PERMIT NO: 1614

County: Cherokee County

Monitor Well I.D. No.: MW-14

Date of Monitor Well Installation: 10/05/94

Date of Monitor Well Development: 02/02/95

Monitor Well: Latitude: 31°59'53.3" Longitude: 95°15'48.9"

Monitor Well Groundwater Gradient: Upgradient ___ Downgradient X

Monitor Well Driller Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

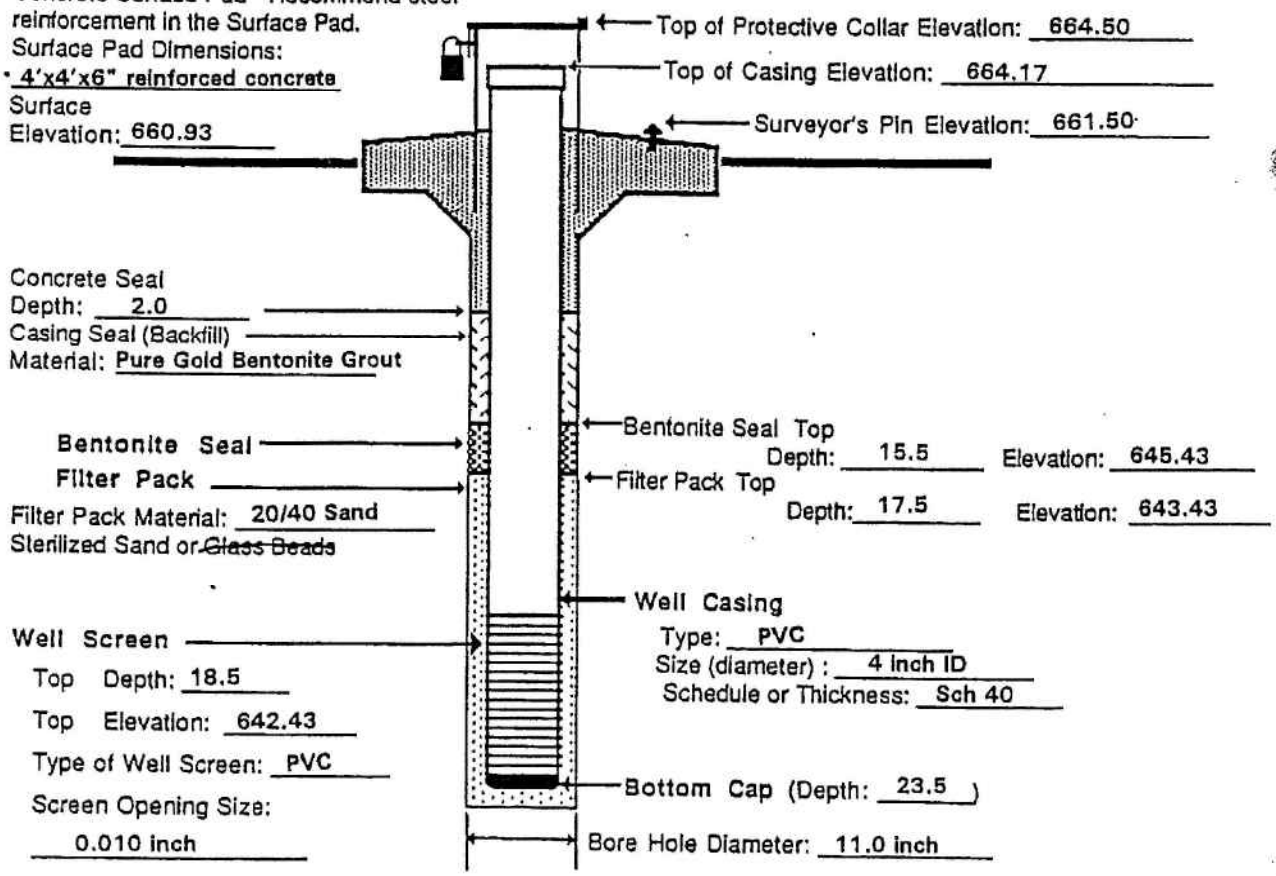
Static Water Level Elevation (with respect to MSL) after Well Developement : 647.79

Name of Geologic Formation(s) in which Well is completed: Weches

Type of Locking Device: pad lock

Type of Casing Protection: 8"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete
Surface Elevation: 660.93



# A. Monitor Well Data Sheet

TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MSWD-SE67

Permittee or Site Name: Royal Oaks Landfill

MSW PERMIT NO: 1614

County: Cherokee County

Monitor Well I.D. No.: MW-15

Date of Monitor Well Installation: 11/18/94

Date of Monitor Well Development: 11/18/94

Monitor Well: Latitude: 31°59'54.7" Longitude: 95°16'03.7"

Monitor Well Groundwater Gradient: Upgradient ___ Downgradient X

Monitor Well Driller Name: Benny Hinojosa

License No.: 3127M

NOTE:

(A)The information shown in the sketch below should be considered the minimum required for an installed ground-water monitor well.
(B) Report All Depths from Surface Elevation and all Elevations relative to Mean Sea Level.
(C) The minimun distance between the inside wall of the Bore Hole and the outside of the Well Casing shall be 3".
(D) Use Flush Screw Joint Casing only, 2" diameter or larger. Recommend 4" diameter minimum & Teflon Taping Casing Joints.
(E) Well development should continue until water is clear, and pH and conductivity are stable.

Geologist, Hydrologist or Engineer Supervising Well Installation: Eric C. Matzner

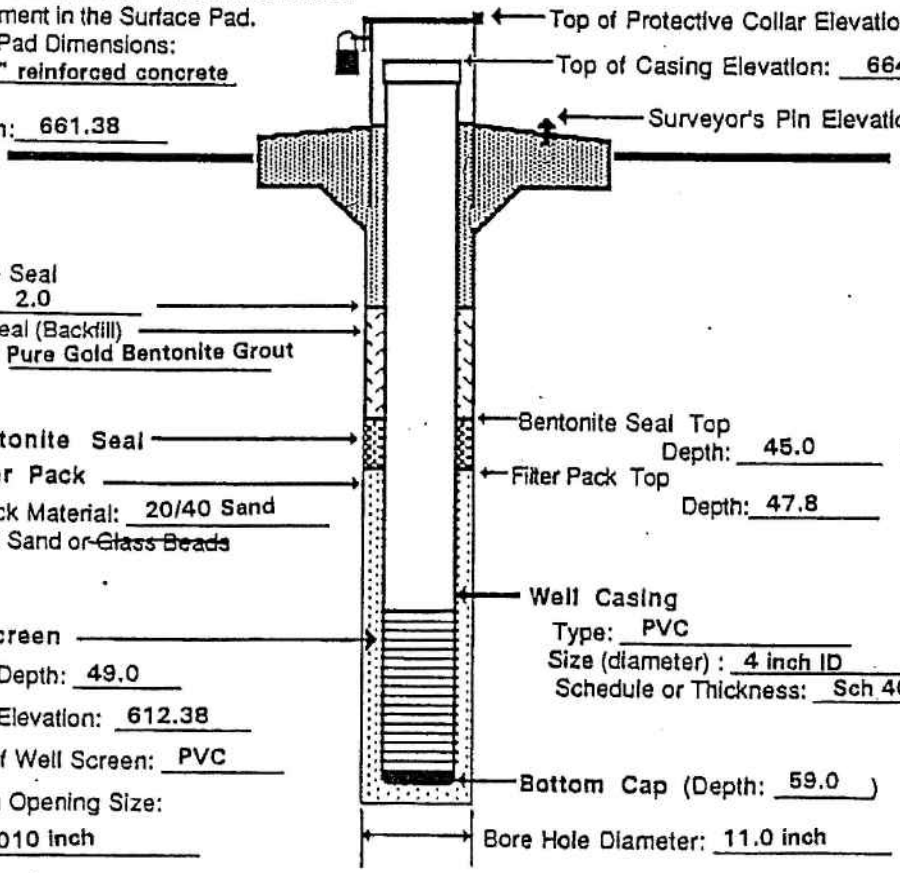
Static Water Level Elevation (with respect to MSL) after Well Developement : 618.44

Name of Geologic Formation(s) in which Well is completed: Queen City

Type of Locking Device: pad lock

Type of Casing Protection: 6"x5' round, anodized aluminum

Concrete Surface Pad - Recommend steel reinforcement in the Surface Pad.
Surface Pad Dimensions:
4'x4'x6" reinforced concrete
Surface Elevation: 661.38



Top of Protective Collar Elevation: 664.58

Top of Casing Elevation: 664.21

Surveyor's Pin Elevation: 661.72

Concrete Seal
Depth: 2.0
Casing Seal (Backfill)
Material: Pure Gold Bentonite Grout

Bentonite Seal

Filter Pack

Filter Pack Material: 20/40 Sand
Sterilized Sand or ~~Glass Beads~~

Bentonite Seal Top
Depth: 45.0 Elevation: 616.38

Filter Pack Top
Depth: 47.8 Elevation: 613.58

Well Casing
Type: PVC
Size (diameter) : 4 inch ID
Schedule or Thickness: Sch 40

Well Screen
Top Depth: 49.0
Top Elevation: 612.38
Type of Well Screen: PVC
Screen Opening Size:
0.010 inch

Bottom Cap (Depth: 59.0 )

Bore Hole Diameter: 11.0 inch

and original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

ttention Owner: *Confidentiality*
*rivilege Notice on Reverse Side*

# State of Texas
# WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 757

:) LOCATION OF WELL:
County CHEROKEE , 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply
☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check): ☐ Driven
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored
☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-8
Date Drilling:
Started: 10/5 19 94
Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (in.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 40 |
| | | |
| | | |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other
If gravel packed, give interval . . . from 28 ft. to 40 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 16 | Tan to brown silty clayey sand |
| 16 | 23 | Brown to green silty clay |
| 23 | 39 | Dark grey/green glauconitic clayey sand |
| 39 | 40 | Dark grey/green clayey silt |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casting Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 29 | |
| 4 | N | SCH. 40 PVC SCREEN | 29 | 39 | 0.010 |
| | | | | | |
| | | | | | |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 28 ft. No of Sacks Used _____

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

12) Packers: Type Depth

3) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

4) WELL TESTS : NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

5) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

Signed) Benny Hinojosa (Licensed Water Well Driller) (Signed) _____ (Registered Driller Trainee)

Benny Hinojosa

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

end original copy by certified mail to: Texas Water Commission, P O. Box 13087, Austin, Texas 78711 — Please use black ink.

Attention Owner: *Confidentiality Privilege Notice on Reverse Side*

# State of Texas WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 75766 (Zip)

1) LOCATION OF WELL:
County CHEROKEE , 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☒ SEE ATTACHED MAP

2) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check): ☐ Driven
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

3) Well Log: MW-9
Date Drilling: Started: 10/7 19 94 Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (In.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 78 |
| | | |
| | | |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other
If gravel packed, give interval . . . from 64 ft. to 78 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 16 | Tan to brown silty clayey sand |
| 16 | 23 | Brown to green silty clay |
| 23 | 39 | Dark grey/green glauconitic clayey sand |
| 39 | 44 | Dark grey/green clayey silt |
| 44 | 59 | Dark grey/green sandy clayey silt |
| 59 | 60 | Dark brown silty clay |
| 60 | 74 | Dark brown silty clayey sand |
| 74 | 78 | Dark brown clayey sandy silt |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casting Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 65 | |
| 4 | N | SCH. 40 PVC SCREEN | 65 | 75 | 0.010 |
| | | | | | |
| | | | | | |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 64 ft. No of Sacks Used _____

6) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

12) Packers: Type Depth

14) WELL TESTS : NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) Benny Hinojosa (Licensed Water Well Driller) (Signed) _____ (Registered Driller Trainee)

Benny Hinojosa

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

end original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

Attention Owner: *Confidentiality Privilege Notice on Reverse Side*

# State of Texas
# WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

1) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 7578[illegible] (Zip)

2) LOCATION OF WELL:
County CHEROKEE, 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check):
☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-10
Date Drilling: Started: 10/4 19 94 Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (In.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 35 |

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 9 | Tan silty sand |
| 9 | 16 | Brown claey silt |
| 16 | 19 | Tan to brown silty clay |
| 19 | 34 | Dark grey/green silty sand |
| 34 | 35 | Dark grey/green silty clay |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other
If gravel packed, give interval . . . from 23 ft. to 35 ft.

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casting Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 24 | |
| 4 | N | SCH. 40 PVC SCREEN | 24 | 34 | 0.010 |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 23 ft. No of Sacks Used _____

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

12) Packers: Type Depth

13) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

Signed) Benny Hinojosa (Licensed Water Well Driller) (Signed) _____ (Registered Driller Trainee)

Benny Hinojosa

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 05-16-90) TEXAS WATER COMMISSION COPY

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

Attention Owner: *Confidentiality Privilege Notice on Reverse Side*

# State of Texas
# WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

1) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 75766 (Zip)

2) LOCATION OF WELL: County CHEROKEE, 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description: Section No. ____ Block No. ____ Township ____ Abstract No. ____ Survey Name ____

Distance and direction from two intersecting section or survey lines ____

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check): ☐ Driven
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-11
Date Drilling: Started: 10/6 19 94 Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (In.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 30 |
| | | |
| | | |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other
If gravel packed, give interval . . . from 18 ft. to 30 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 12 | Red to brown sandy silty clay |
| 12 | 14 | Green to brown sandy claey silt |
| 14 | 29 | Dark brown silty sand |
| 29 | 30 | dark brown sandy silt |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casting Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 20 | |
| 4 | N | SCH. 40 PVC SCREEN | 20 | 30 | 0.010 |
| | | | | | |
| | | | | | |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used ____
Bentonite 2 ft. to 18 ft. No of Sacks Used ____

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level ____ ft. below land surface. Date: ____
Artesian flow ____ gpm. Date: ____

12) Packers: Type Depth

13) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ____
Depth to pump bowls, cylinder, jet, etc., ____ ft.

14) WELL TESTS: NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) Benny Hinojosa (Licensed Water Well Driller) (Signed) ____ (Registered Driller Trainee)

Benny Hinojosa

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. ____ Located on map ____

AWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

Attention Owner: *Confidentiality Privilege Notice on Reverse Side*

# State of Texas
# WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

1) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 7518 (Zip)

2) LOCATION OF WELL:
County CHEROKEE, 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description:
Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____
Distance and direction from two intersecting section or survey lines _____
☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check):
☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-12
Date Drilling: Started: 10/4 19 94 Completed: 10/11 19 94

| DIAMETER OF HOLE | | |
|---|---|---|
| Dia. (In.) | From (ft.) | To (ft.) |
| 11 | Surface | 18 |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other
If gravel packed, give interval . . . from 8 ft. to 18 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 2 | Red silty clay |
| 2 | 4 | Yellow claey silt |
| 4 | 10 | Red silty sand |
| 10 | 14 | Brown sand |
| 14 | 18 | Brown silty claey sand |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (In.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casting Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 9.5 | |
| 4 | N | SCH. 40 PVC SCREEN | # | 14.5 | 0.010 |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 8 ft. No of Sacks Used _____

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

12) Packers: Type Depth

13) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder ☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) Benny Hinojosa (Licensed Water Well Driller) (Signed) _____ (Registered Driller Trainee)

Benny Hinojosa

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

Attention Owner: *Confidentiality Privilege Notice on Reverse Side*

# State of Texas
# WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

1) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 75766 (Zip)

2) LOCATION OF WELL: County CHEROKEE, 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description: Section No. ____ Block No. ____ Township ____ Abstract No. ____ Survey Name ____

Distance and direction from two intersecting section or survey lines ____

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check):
☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-13
Date Drilling: Started: 11/11 19 94 Completed: 11/18 19 94

DIAMETER OF HOLE

| Dia. (in.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 58 |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other
If gravel packed, give interval . . . from 39 ft. to 58 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 42 | Brown/green claet silt |
| 42 | 54 | Brown silty sand |
| 54 | 58 | Brown claey sandy silt |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (in.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casing | Gage Screen |
|---|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 40 | | |
| 4 | N | SCH. 40 PVC SCREEN | 40 | 55 | | 0.010 |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used ____
Bentonite 2 ft. to 39 ft. No of Sacks Used ____

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level ____ ft. below land surface. Date: ____
Artesian flow ____ gpm. Date: ____

12) Packers: Type Depth

13) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder ☐ Other ____
Depth to pump bowls, cylinder, jet, etc., ____ ft.

14) WELL TESTS: NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowldege and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) Benny Hinojosa (Licensed Water Well Driller) Benny Hinojosa

(Signed) ____ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. ____ Located on map ____

WWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711 — Please use black ink.

Attention Owner: *Confidentiality*
*Privilege Notice on Reverse Side*

# State of Texas
# WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, TX 78711

Royal Oaks Landfill

1) OWNER: LAIDLAW WASTE SYSTEMS INC. (Name) ADDRESS: Heath Lane (Street or RFD) Jacksonville (City) TX (State) 7570[illegible] (Zip)

2) LOCATION OF WELL: County CHEROKEE, 1.5 miles in NW (NE, SW, etc.) direction from Jacksonville Tx. (Town)

Driller must complete the legal description below with distance from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ Legal Description: Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____

Distance and direction from two intersecting section or survey lines _____

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-watering

5) DRILLING METHOD (Check):
☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored ☐ Air Rotary ☐ Cable Tool ☒ Other HSA

6) Well Log: MW-14
Date Drilling: Started: 10/4 19 94 Completed: 10/11 19 94

DIAMETER OF HOLE

| Dia. (In.) | From (ft.) | To (ft.) |
|---|---|---|
| 11 | Surface | 26 |

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other
If gravel packed, give interval . . . from 18 ft. to 26 ft.

| From (ft.) | To (ft.) | Description and color of formation material |
|---|---|---|
| 0 | 13 | Brown clayey silt |
| 13 | 14 | Grey/green sandy silt |
| 14 | 20 | Grey/green silty sand |
| 20 | 26 | Grey/green clayey silt |

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

| Dia (In.) | New or Used | Steel, Plastic, etc. Perf., slotted, etc. Screen Mfg., if commercial | Setting (ft.) From | Setting (ft.) To | Gage Casting Screen |
|---|---|---|---|---|---|
| 4 | N | SCH. 40 PVC RISER | 0 | 19 | |
| 4 | N | SCH. 40 PVC SCREEN | 19 | 24 | 0.010 |

9) CEMENTING DATA (Rule 287.44(1))
Cemented from 0 ft. to 2 ft. No of Sacks Used _____
Bentonite 2 ft. to 17.5 ft. No of Sacks Used _____

10) SURFACE COMPLETION
☐ Specified Surface Slab Installed (Rule 287.44 (2) (A))
☐ Specified Steel Sleeve Installed (Rule 287.44 (3)(A))
☐ Pitless Adapter Used (rule 287.44(3)(B))
☒ Approved Alternative Procedure Used (Rule 287.71)

11) WATER LEVEL: NONE TAKEN
Static level _____ ft. below land surface. Date: _____
Artesian flow _____ gpm. Date: _____

12) Packers: Type Depth

13) TYPE PUMP: NONE
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS: NONE
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each an all of the statements herein are true to the best knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the logs(s) being returned for completion and resubmittal.

COMPANY NAME GEOPROJECTS INTERNATIONAL, INC (Type or print) WELL DRILLER'S LICENSE NO. 3127M

ADDRESS 8834 CIRCLE DRIVE (Street or RFD) AUSTIN (City) TX (State) 78736 (Zip)

(Signed) _____ (Licensed Water Well Driller) *Benny Hinojosa*

(Signed) _____ (Registered Driller Trainee)

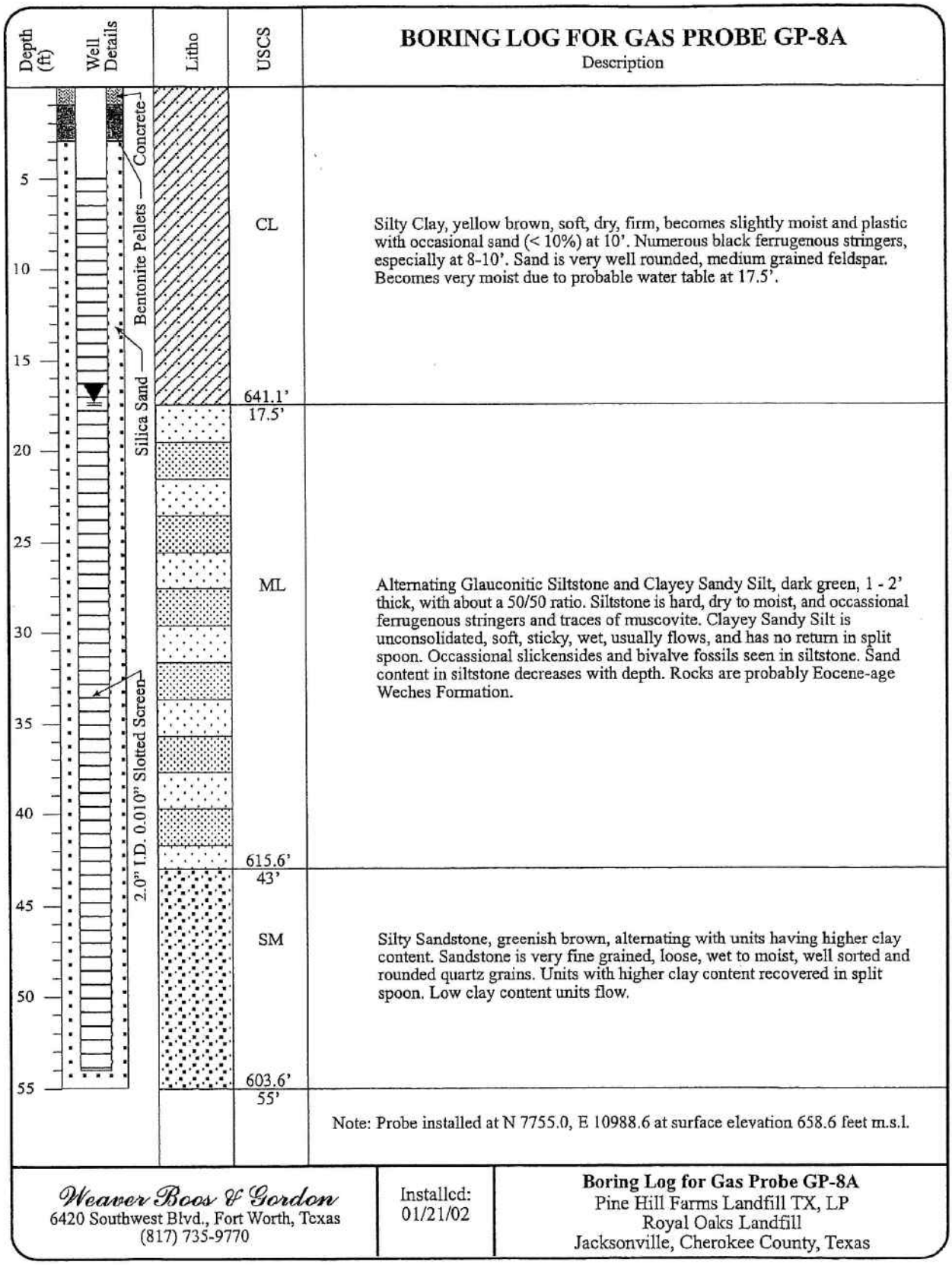
Please attach electric log, chemical analysis, and other pertinent information, if available

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 05-18-90) TEXAS WATER COMMISSION COPY

# 2002 BOREHOLE LOG
# BY WEAVER BOOS AND GORDON

# BORING LOG FOR GAS PROBE GP-8A




| | | |
|---|---|---|
| *Weaver Boos & Gordon*<br>6420 Southwest Blvd., Fort Worth, Texas<br>(817) 735-9770 | Installed:<br>01/21/02 | **Boring Log for Gas Probe GP-8A**<br>Pine Hill Farms Landfill TX, LP<br>Royal Oaks Landfill<br>Jacksonville, Cherokee County, Texas |

# 2003 BOREHOLE LOGS
# BY WEAVER BOOS CONSULTANTS

WEAVER BOOS CONSULTANTS

# LOG OF BORING NO. MW-16

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/31/2003 Northing: 10203.24 ft.
Boring End Date: 7/31/2003 Easting: 11227.56 ft.
TOC Elevation: 643.6 Ground Elevation: 641.08 ft.

Remarks: Well is dry.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Field Tests | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Sand, silty, clay, dry, ironstone fragments, red brown (10R3/4). 639.1 | | | | Laboratory Tests | | | | | | | | |
| | | | Clay, silty slightly sandy, moderately moist, moderately plastic, red brown (10R 4/6) with ironstone fragments. 636.1 | | | | | | | | | | | | |
| 5 | C | | Silt, clayey, sandy, moderately moist, with red brown layers and ironstone fragments. - increased clay content. | | | | | | | | | | | 632.1 | |
| 10 | C | | - increased silt, sand, abundant ironstone fragments. 628.1 | | | | | | | | | | | 629.1 628.1 | |
| 15 | C | | Sand, clayey, silty, very moist, medium to fine grained, unconsolidated, banded tan and dark brown (10YR 6/2 to 10YR 4/2). 623.1 | | | | | | | | | | | 623.1 | |
| 20 | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | |

WELL VERSION 3.0_RO ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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# LOG OF BORING NO. MW-17

WEAVER BOOS CONSULTANTS

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/31/2003 Northing: 10212.05 ft.
Boring End Date: 7/31/2003 Easting: 11222.93 ft.
TOC Elevation: 645.07 Ground Elevation: 642.82 ft.

Remarks: Water at 30 feet at time of drilling, 23.73 feet BTOC after 24 hours. Additional above ground casing and new protective cover installed 6 days after original completion. Orginal above ground casing was approximately 26 inches AGL.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Sand, silty, clay, dry, ironstone fragments, red brown (10R3/4). 640.8 | | | | | | | | | | | |
| | | | Clay, silty slightly sandy, moderately moist, moderately plastic, red brown (10R 4/6) with ironstone fragments. 637.8 | | 0.5 | | | | | | | | | |
| 5 | C | | Silt, clayey, sandy, moderately moist, with red brown layers and ironstone fragments. | | | | | | | | | | | |
| | | | - increased clay content. | | 3.0 | | | | | | | | | |
| 10 | C | | - increased silt, sand, abundant ironstone fragments. 629.8 | | 4.0 | | | | | | | | | |
| | | | Sand, clayey, silty, very moist, medium to fine grained, unconsolidated, banded tan and dark brown (10YR 6/2 to 10YR 4/2). | | | | | | | | | | | |
| 15 | C | | | | | | | | | | | | | |
| 20 | C | | - hard.<br>- color change to yellow, becomes loose. | | | | | | | | | | | |
| 25 | C | | - wet. | | | | | | | | | | 618.8<br>616.8<br>614.8 | |
| 30 | C | | 612.8<br>Sand/Clay, moist, alternating layers of olive grey sand, (5Y 4/1) and dark brown plastic clay (10YR 2/2). Sand is medium to fine grained, slightly silty, clayey. Clay is firm, plastic, sandy. | | | | | | | | | | | |
| 35 | C | | 604.8 | | | | | | | | | | 604.8 | |

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WEAVER BOOS CONSULTANTS

# LOG OF BORING NO. MW-19

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 8/1/2003 Northing: 8817.83 ft.
Boring End Date: 8/1/2003 Easting: 11819.77 ft.
TOC Elevation: 629.02 Ground Elevation: 625.65 ft.

Remarks: Water at 45 feet at tiem of drilling, 50.02 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Clay, sandy, plastic, w/ ironstone fragments, pale yellow (10YR 8/1), damp. 622.7 | | 4.0 | | | | | | | | | |
| 5 | C | | Sand, clayey, silty, w/ ironstone fragments. 618.7 | | | | | | | | | | | |
| | | | - color change to dark grey-brown (10YR 4/2). 615.7 | | 3.0 | | | | | | | | | |
| 10 | C | | - color- pale brown (5YR 5/2). 611.7 | | 3.5 | | | | | | | | | |
| | | | Lignite, silty, sandy, damp with disseminated pyrite, and pyrite intergrowths and replacements. 610.7 | | | | | | | | | | | |
| 15 | C | | Sand, interbedded with coal (lignite), yellow - brown (10 YR 6/2, 10YR 6/6). 605.7 | | | | | | | | | | | |
| 20 | C | | Clay, w/ interbedded sands. 55% clay, 45% sand. Clay is slightly plastic, silty, moist, with lenses of very plastic clay, sand is very fine grained silty, moist. dark olive grey (5G 3/1) 600.7 | | | | | | | | | | | |
| 25 | C | | Interbedded sandy clay and claycy sand, with occasional clean sand lenses, moist. Sand is fine to very fine grained, unconsolidated. Clay is moderately plastic, slightly silty. Olive grey (5Y 3/2). | | | | | | | | | | | |
| 30 | C | | 591.7 | | | | | | | | | | | |
| 35 | C | | Sand, with interbedded clay, 55% sand, 45% clay, sand is very fine grained, unconsolidated, clay is moderately plastic, silty. Olive grey (5Y 3/2). | | | | | | | | | | | |

WELL VERSION 3.0 RO ROYALOAKS.GPJ WEAVER BOOS FW.GDT 9/27/03

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WEAVER BOOS CONSULTANTS

# LOG OF BORING NO. MW-19

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 8/1/2003 Northing: 8817.83 ft.
Boring End Date: 8/1/2003 Easting: 11819.77 ft.
TOC Elevation: 629.02 Ground Elevation: 625.65 ft.

Remarks: Water at 45 feet at tiem of drilling, 50.02 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Field Tests | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | 584.7 | | | | | | | | | | | | |
| | | | Clay, plastic, moist, with interbedded sands, 60% clay 40% sand, dark olive grey (5G 4/1 to 5G 3/1). | | | | | | | | | | | | |
| | | | 581.7 | | | | | | | | | | | | |
| 45 | C | | Sand, very fine grained silty, limonitic layers and some ironstone, tan (10R 6/2). | | | | | | | | | | | | |
| 50 | C | | | | | | | | | | | | | | |
| 55 | C | | | | | | | | | | | | | 571.7 | |
| | | | | | | | | | | | | | | 568.7 | |
| | | | | | | | | | | | | | | 566.7 | |
| 60 | C | | 565.7 | | | | | | | | | | | | |
| | | | Clay, with interbeded sand 70% clay 30% sand, slightly plastic, moist, stiff, dark olive grey (5G 3/1). | | | | | | | | | | | | |
| | | | 562.7 | | | | | | | | | | | | |
| 65 | C | | Sand, fine to very fine grained, glauconitic, silty, olive grey (5G 2/1). | | | | | | | | | | | | |
| | | | 556.7 | | | | | | | | | | | 556.7 | |
| 70 | | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | | |

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WEAVER BOOS CONSULTANTS

# LOG OF BORING NO. GP-16

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 8/1/2003 Northing: 9692.56 ft.
Boring End Date: 8/1/2003 Easting: 10074.54 ft.
TOC Elevation: 687.94 Ground Elevation: 684.92 ft.

Remarks: Water at 45 feet at time of drilling, 56.57 BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/Ft | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | C | | Sand, clayey, silty, fine grained, red, orange, dry. 681.9 | | 0.5 | | | | | | | | | |
| 5 | C | | Sand, fine to very fine grained, loose, slightly moist, yellow-orange (10YR 6/2). 674.9 | | 3.5 | | | | | | | | | |
| 10 | C | | Ironstone, hard, hematitic. 673.9 | | | | | | | | | | | |
| | | | Sand, clayey, silty, w/ ironstone fragments,dry, unconsolidated, light brown (5YR 6/6). 668.9 | | 2.5 | | | | | | | | | |
| 15 | C | | Clay, silty, slightly sandy, non-plastic, medium brown (5YR 4/4). 660.4 | | 4.0 | | | | | | | | | |
| 20 | C | | | | | | | | | | | | | |
| 25 | C | | Sand, clayey, silty, glauconitic, fine grained, moist, medium grey green (5BG 4/2). - color change to brown-dark brown (5YR 4/3 - 5YR 2/2), very moist. 654.9 | | | | | | | | | | | |
| 30 | A | | Clay, silty, plastic, firm, dark brown (5YR 2/2). 650.9 | | | | | | | | | | | |
| 35 | A | | Sand, silty, glauconitic, fine to very fine grained, WET, grey-green (10G 4/2). 644.9 | | | | | | | | | | | |

WELL VERSION 3.0_RO_ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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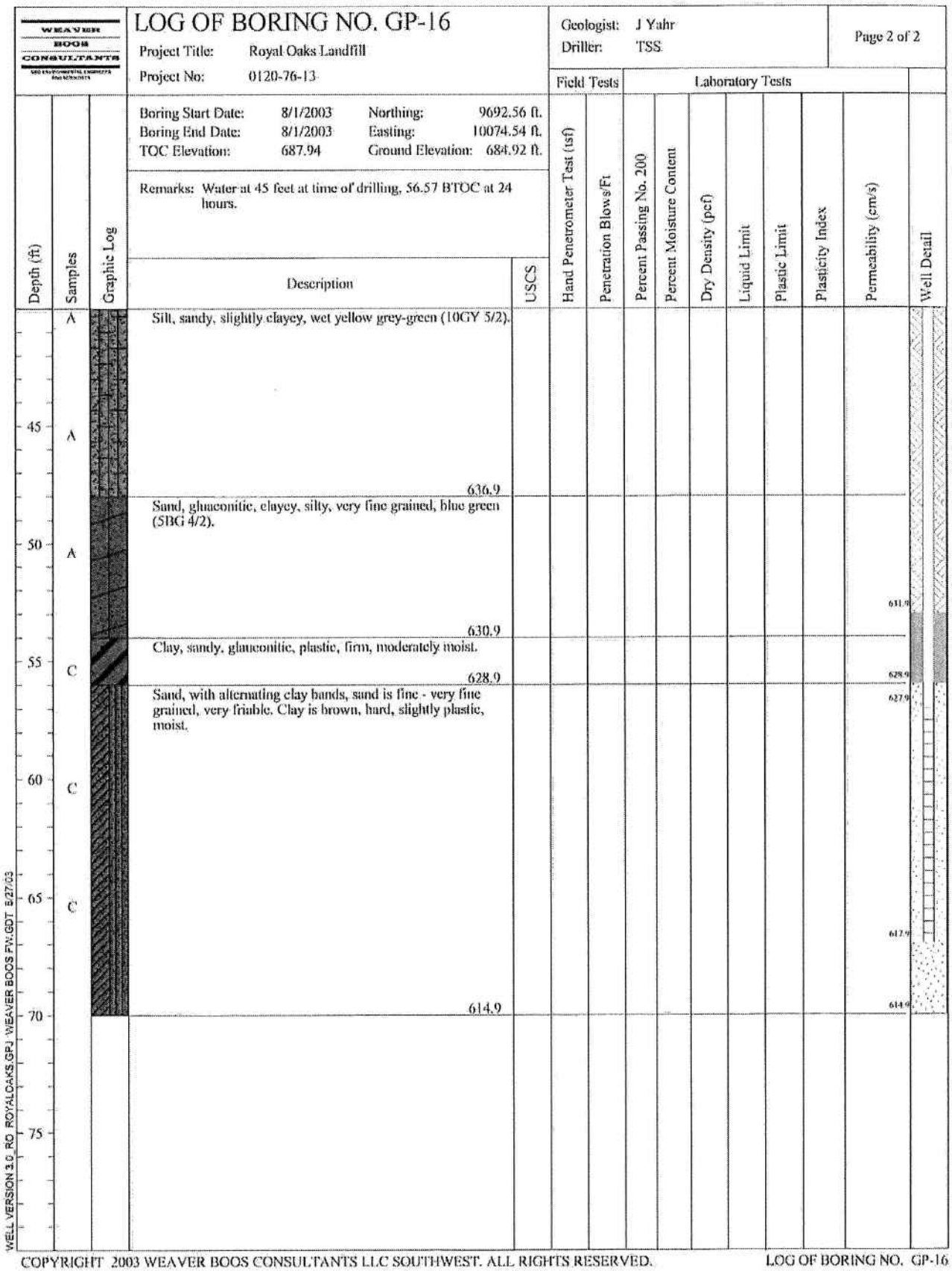


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LOG OF BORING NO. GP-16

WEAVER BOOS CONSULTANTS

# LOG OF BORING NO. GP-17

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/29/2003 Northing: 8822.17 ft.
Boring End Date: 7/29/2003 Easting: 10037.12 ft.
TOC Elevation: 684.29 Ground Elevation: 680.72 ft.

Remarks: Water at 40 feet at time of drilling, 57.28 BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/Ft | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | C | | Sand, loose, slightly moist, medium to fine grained, yellow-brown, (10YR 6/2). Possible fill. | | 5.0 | | | | | | | | | |
| 5 | C | | 674.7 | | | | | | | | | | | |
| | | | Sand, slightly silty, friable, medium grained, angular, reddish brown, (10R 4/6). | | 3.5 | | | | | | | | | |
| | | | 671.7 | | | | | | | | | | | |
| 10 | C | | Sand, loose, moist, w/ grey banded layers. | | 0.5 | | | | | | | | | |
| 15 | C | | 663.7 | | 0.5 | | | | | | | | | |
| | | | Clay, very plastic, firm, moist, light grey, bentonitic. | | | | | | | | | | | |
| | | | 662.7 | | | | | | | | | | | |
| 20 | C | | Sand, friable, medium to fine grained, angular, w/ ironstone fragments. | | | | | | | | | | | |
| | | | 660.7 | | | | | | | | | | | |
| | | | Clay, very silty, sandy, moist, interbedded clay (55%) and sandy silt (45%), dark grey-green (5G 2/1). | | | | | | | | | | | |
| | | | 656.7 | | | | | | | | | | | |
| 25 | C | | Sand, silty, clayey, very fine to fine grained, dark grey to grey green (5G 2/1 - 10G 6/2) some interbedded clays. 24-25 very hard, wet @ 26'. | | | | | | | | | | | |
| 30 | C | | - more clay, plastic, silty, moist<br>- more silty sand, very wet, green grey (10G 6/2) | | | | | | | | | | | |
| | | | 648.7 | | | | | | | | | | | |
| | | | Clay, silty, plastic, wet, grey-green (10G 6/2). | | | | | | | | | | | |
| | | | 646.7 | | | | | | | | | | | |
| 35 | C | | Interbedded layers of silt sand and clay. Layers are approx 1 foot thick, silty sandy clay, sandy clayey silt, and clayey silty sand. dark grey-green (5G 3/2). | | | | | | | | | | | |
| | C | | | | | | | | | | | | | |

WELL VERSION 3.0_RO_ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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WEAVER BOOS CONSULTANTS

# LOG OF BORING NO. GP-17

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/29/2003 Northing: 8822.17 ft.
Boring End Date: 7/29/2003 Easting: 10037.12 ft.
TOC Elevation: 684.29 Ground Elevation: 680.72 ft.

Remarks: Water at 40 feet at time of drilling, 57.28 BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/Ft | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | C | | Interbedded layers of silt sand and clay. Layers are approx 1" thick, silty sandy clay, sandy clayey silt, and clayey silty sand. dark grey-green (5G 3/2). | | | | | | | | | | | |
| 50 | C | | | | | | | | | | | | 627.7 | |
| 55 | C | | 626.7<br>Clay, sandy, silty, glauconitic, moderately plastic, firm, moist, dark green - grey (5G 3/2) | | | | | | | | | | 625.7<br>624.7 | |
| 60 | C | | 620.7<br>Sand, fine to very fine grained, with interbedded clays, friable,slightly moist, brown sands (5YR 4/1)) - dark brown (clays (10YR 2/2)). | | | | | | | | | | | |
| 65 | C | | 614.7 | | | | | | | | | | 614.7 | |
| 70 | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | |

WELL VERSION 3.0 RO_ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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WEAVER BOOS CONSULTANTS

# LOG OF BORING NO. GP-20

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/30/2003 Northing: 8589.77 ft.
Boring End Date: 7/30/2003 Easting: 11321.29 ft.
TOC Elevation: 664.82 Ground Elevation: 661.12 ft.

Remarks: Water at 35 feet at time of drilling, 43.31 feet BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/Ft | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | Clay, very plastic, slightly moist, bentonitic, w/ iron staining, light grey (5Y 8/1). 660.9 | | | | | | | | | | | |
| | | | Sand, clayey, silty, very fine grained, slightly moist, iron staining. 656.1 | | 4.0 | | | | | | | | | |
| 5 | C | | Clay, plastic, bentonitic, dry, light iron staining, light grey (5Y 8/1). 654.1 | | | | | | | | | | | |
| | | | Sand, silty, clayey, very fine grained, w/ hard ironstone layers, brown (10YR 5/4). 645.1 | | 4.5 | | | | | | | | | |
| 10 | C | | | | | 3.0 | | | | | | | | |
| 15 | C | | | | | | | | | | | | | |
| | | | Silt, clayey, sandy, dark grey, (5G 2/1). 639.1 | | | | | | | | | | | |
| 20 | C | | Clay, very silty, sandy, moist, firm, very plastic, dark grey (5G 2/1). 637.1 | | | | | | | | | | | |
| | | | Silt, clayey, with thin sand laminations, moderately moist, dark grey green (5G 3/2), shaley. 631.1 | | | | | | | | | | | |
| 25 | C | | | | | | | | | | | | | |
| 30 | C | | Clay, very silty, firm, moist, moderately plastic. 629.1 | | | | | | | | | | | |
| | | | Silt, with interbedded clay and sand layers, glauconitic, dark grey green (5G 3/2). 622.6 | | | | | | | | | | 621.1 | |
| 35 | C | | | | | | | | | | | | | |
| | | | Sand, with sandstone and silt, fine to very fine grained, medium green (10G4/2). | | | | | | | | | | 622.1 621.1 | |

WELL VERSION 3.0 RO ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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WEAVER BOOS CONSULTANTS

# LOG OF BORING NO. GP-20

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/30/2003 Northing: 8589.77 ft.
Boring End Date: 7/30/2003 Easting: 11321.29 ft.
TOC Elevation: 664.82 Ground Elevation: 661.12 ft.

Remarks: Water at 35 feet at time of drilling, 43.31 feet BTOC at 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/Ft | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | | 619.1 | | | | | | | | | | | |
| 45 | C | | Sand, interbedded clean brown (5YR 4/1) and silty dark green (5G 3/2) sands, friable, slightly moist. | | | | | | | | | | 611.1 | |
| 50 | | | 611.1 | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | | |
| 70 | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | |

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# LOG OF BORING NO. GP-21

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/28/2003 Northing: 10207.33 ft.
Boring End Date: 7/28/2003 Easting: 11020.53 ft.
TOC Elevation: 678.1 Ground Elevation: 674.72 ft.

Remarks: Water at 35 feet at time of drilling, 35.19 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Field Tests | | | | Laboratory Tests | | | | | | | |
| 0 | C | | Clay, slightly silty, low plasticity, dry, mottled light brown (5YR 5/6) and yellow orange (10YR 6/6). | | 4.0 | | | | | | | | | |
| 5 | C | | | | 4.0 | | | | | | | | | |
| 10 | C | | | | 4.0 | | | | | | | | | |
| 15 | C | | 657.7 | | | | | | | | | | | |
| 20 | C | | Sand, silty, slightly clayey, fine grained, glauconitic, greyish green (5G 5/2). | | | | | | | | | | | |
| 25 | C | | | | | | | | | | | | | |
| 30 | C | | 644.7 Clay, silty, plastic, firm, WET, dark grey (5G 2/1). | | | | | | | | | | | |
| 35 | C | | 639.7 Clay, silty, plastic, slightly sandy, slightly glauconitic, dark grey green (10G 2/2). | | | | | | | | | | | |
| | | | 635.7 Silt, clayey, slightly moist, dark grey green (10G 2/2). | | | | | | | | | | | |

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# LOG OF BORING NO. GP-21

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/28/2003 Northing: 10207.33 ft.
Boring End Date: 7/28/2003 Easting: 11020.53 ft.
TOC Elevation: 678.1 Ground Elevation: 674.72 ft.

Remarks: Water at 35 feet at time of drilling, 35.19 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Field Tests | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Laboratory Tests | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | C | | Silt, clayey, slightly moist, dark grey green (10G 2/2). | | | | | | | | | | | | 628.7 | |
| | C | | 626.7 | | | | | | | | | | | | 626.4 | |
| 50 | C | | Sand, slightly clayey, with rare clay lenses, very fine grained, moist, olive grey - olive black (5Y 4/1 - 5Y 2/1). | | | | | | | | | | | | 625.7 | |
| 55 | C | | 615.4 | | | | | | | | | | | | 615.4 | |
| 60 | | | | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | | | | |
| 70 | | | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | | | |

WELL VERSION 3.0_RD_ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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# LOG OF BORING NO. GP-22

WEAVER BOOS CONSULTANTS

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/28/2003 Northing: 9915.42 ft.
Boring End Date: 7/28/2003 Easting: 10494.19 ft.
TOC Elevation: 669.23 Ground Elevation: 665.64 ft.

Remarks: Water at 40 at time of drilling, 34.40 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Field Tests: Hand Penetrometer Test (tsf) | Field Tests: Penetration Blows/Ft | Laboratory Tests: Percent Passing No. 200 | Laboratory Tests: Percent Moisture Content | Laboratory Tests: Dry Density (pcf) | Laboratory Tests: Liquid Limit | Laboratory Tests: Plastic Limit | Laboratory Tests: Plasticity Index | Laboratory Tests: Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | C | | Clay, silty, moist, w/ thin bands of reddish ironstone, dark yellow orange (10YR 6/6). | | 4.0 | | | | | | | | | |
| 5 | C | | | | 4.0 | | | | | | | | | |
| 10 | C | | 654.1 | | 0.5 | | | | | | | | | |
| | | | Clay, hard, plastic, silty, dark green (5G 3/2). 653.6 | | | | | | | | | | | |
| 15 | C | | Clay, silty, micaceous, dark grey green (5G 3/2). 649.6 | | 0.5 | | | | | | | | | |
| 20 | C | | Sand, silty, clayey, very fine - fine grained, glauconitic. | | | | | | | | | | | |
| 25 | C | | 640.6 | | | | | | | | | | | |
| 30 | C | | Clay, silty, moderately plastic, dark grey green (5G 3/1). 634.6 | | | | | | | | | | | |
| | | | Sand, silty, hard, very fine grained, pale green (10G 6/2). 632.6 | | | | | | | | | | | |
| 35 | C | | Clay, plastic, greenish black (5GY 2/1). | | | | | | | | | | | |

WELL VERSION 3.0_RO ROYALOAKS.GPJ WEAVER BOOS FW.GDT 8/27/03

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WEAVER BOOS CONSULTANTS

# LOG OF BORING NO. GP-22

Project Title: Royal Oaks Landfill
Project No: 0120-76-13

Geologist: J Yahr
Driller: TSS



Boring Start Date: 7/28/2003 Northing: 9915.42 ft.
Boring End Date: 7/28/2003 Easting: 10494.19 ft.
TOC Elevation: 669.23 Ground Elevation: 665.64 ft.

Remarks: Water at 40 at time of drilling, 34.40 feet BTOC after 24 hours.

| Depth (ft) | Samples | Graphic Log | Description | USCS | Hand Penetrometer Test (tsf) | Penetration Blows/Ft | Field Tests | Percent Passing No. 200 | Percent Moisture Content | Dry Density (pcf) | Liquid Limit | Plastic Limit | Plasticity Index | Laboratory Tests | Permeability (cm/s) | Well Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Clay, plastic, greenish black (5GY 2/1). 622.6 | | | | | | | | | | | | 623.6 | |
| 45 | C | | Sand, clayey, micaceous, very fine to fine grained, slightly moist, olive grey (5Y 5/2). | | | | | | | | | | | | 621.6<br>620.6 | |
| 50 | C | | | | | | | | | | | | | | | |
| 55 | C | | 610.6 | | | | | | | | | | | | 610.6 | |
| 60 | | | | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | | | | |
| 70 | | | | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | | | | |

WELL VERSION 3.6_RO ROYALOAKS.GPJ WEAVER BOOS FW.GDT 5/27/03

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# 2009 BOREHOLE LOGS
# BY THE CAREL CORPORATION

LOG OF MONITOR WELL NO. MW-21

Project Description: 2009 Monitor Well Installations

CAREL

Location: Royal Oaks Landfill

Surface El.: 629.9 feet
Completion Depth: 31 feet
Date Boring Started: 9/24/2009
Date Boring Completed: 9/29/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| 0 | | | Silty CLAY, dark brown, dry | | Concrete from 0 to 2' bgs |
| | | | SILT, red to brown | | |
| | | | GRAVEL with some silt, reddish rusty brown, gravel is subangular and poorly sorted with iron nodules, dry | | |
| 5 | | | CLAY, reddish brown | | |
| | | | Silty CLAY with some mixed gravel, subangular and poorly sorted gravel | | |
| | | | Silty CLAY, reddish orange, slightly moist | | |
| 10 | | | Silty CLAY, reddish orange, friable, dry | | Bentonite grout from 2' to 20.5' bgs |
| 15 | | | SILT, reddish orange, friable with some dry clay particles, dry, clay particles have white silt stringers | | |
| | | | slightly moist at 18 feet below ground surface | | |
| 20 | | | moist at 20 feet below ground surface | | Bentonite seal from 20.5' to 23.5' bgs |
| | | | Silty SAND, light gray, sand is very fine grained, subrounded, and well sorted, wet | | 20/40 Silica sand from 23.5' to 31' bgs |
| 25 | | | Silty SAND, medium gray, sand is very fine grained and subrounded, wet | | 0.010" Slotted screen from 25.5' to 28' bgs |
| | | | SILT, medium to dark gray, moist | | |
| 30 | | | CLAY, dark gray to brown, hard | | |
| 35 | | | | | |
| 40 | | | | | |

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
M152
LICENSED
PROFESSIONAL GEOSCIENTIST

10/28/09

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

| Groundwater Observations | |
|---|---|
| Date | Depth |
| 9/25/09 | 23.00 |
| 9/29/09 | 21.96 |

Remarks: 10 inch borehole diameter

LOG OF MONITOR WELL NO. MW-21
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual

▽ Water level at time of drilling.
▽ Water level at end of drilling.
▼ Water level after drilling.

MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/16/09

LOG OF MONITOR WELL NO. MW-22

Project Description: 2009 Monitor Well Installations

CAREL

Location: Royal Oaks Landfill

Surface El.: 686.5 feet
Completion Depth: 39 feet
Date Boring Started: 9/21/2009
Date Boring Completed: 9/28/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| | | | Silty CLAY, red to brown | | Concrete from 0 to 2' bgs |
| | | | SAND, very fine to fine grained, tan, moderately well sorted | | |
| 5 | | | SAND, red to brown, black iron stone staining | | |
| | | | Silty SAND, red to brown (rusty) silt to very fine grained sand, well sorted | | |
| | | | Tight and hard at 10 feet below ground surface | | |
| 10 | | | Silty SAND, red to brown (rusty), silt to very fine grained sand, well sorted, soft friable sand, moist | | Bentonite grout from 2' to 21' bgs |
| | | | Silty SAND, yellow, red to brown hard drilling at 16 feet below ground surface | | |
| 15 | | | SAND, brown to light brown, silt to very fine grained sand, well sorted, wet to moist | | |
| | | | SILTSTONE, iron-some limonite | | |
| 20 | | | CLAY, gray to green, some glauconite | | Bentonite seal from 21' to 24' bgs |
| | | | GRAVEL with some sand, iron, yellow brown, limonite, gravel is rusty brown and poorly sorted, wet | | 20/40 Silica sand from 24' to 39' bgs |
| 25 | | | CLAY, dry, gray to green, gray to black glauconite | | |
| | | | Silty CLAY with sand, silty to fine grained sand, clay is grayish green with some glauconite, dry to damp | | |
| 30 | | | | | 0.010" Slotted screen from 26' to 36' bgs |
| | | | Sandy GRAVEL, black to brown, poorly sorted, wet | | |
| 35 | | | Silty SAND with clay, reddish orange to brown, silty sand | | |
| | | | GRAVEL and sand, orange brown | | 3' sump |
| | | | CLAY, gray to green, glauconite, very plastic, wet | | |
| 40 | | | | | |
| 45 | | | | | |

STATE OF TEXAS
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PROFESSIONAL GEOSCIENTIST

10/28/09

MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/28/09

| | |
|---|---|
| Drilling Contractor: | Sunbelt Services |
| Drilling Method: | HSA |
| Sampling Method: | Split Spoon |
| Geologist/Engineer: | Michael Hull |
| Project No.: | 09-07-17 |

| Groundwater Observations | |
|---|---|
| Date | Depth |
| 9/21/09 | 24.00 |
| 9/28/09 | 22.85 |

Remarks: 10 inch borehole diameter

LOG OF MONITOR WELL NO. MW-22
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

LOG OF MONITOR WELL NO. MW-23

Project Description: 2009 Monitor Well Installations

CAREL

Location: Royal Oaks Landfill

Surface El.: 655 feet
Completion Depth: 55 feet
Date Boring Started: 9/24/2009
Date Boring Completed: 9/29/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| 0 | | | Silty CLAY, dark brown, dry | | Concrete from 0 to 2' bgs |
| 5 | | | dark gray, greenish black with some glauconite | | |
| 10 | | | dark brown | | |
| | | | dark gray to green | | |
| 15 | | | Silty SAND, reddish brown, with gravel at base, silty to gravel, dry | | Bentonite grout from 2' to 35' bgs |
| | | | Silty CLAY, dark gray to green with glauconite | | |
| 20 | | | Silty SAND, dark gray to green, sand is silty to very fine grained and subrounded, moderately sorted with some glauconite, dry | | |
| 25 | | | with clay, gray to brown, moist | | |
| 30 | | | red to rusty brown, with some limonite | | |
| | | | SILT, light gray to white, moist | | |
| 35 | | | Silty SAND, light gray to white, sand is silty to very fine grained and subrounded, moderately well sorted, wet | | Bentonite seal from 35' to 39' bgs |
| 40 | | | light brown<br>yellow to orange-brown | | 20/40 Silica sand from 39' to 55' bgs |
| 45 | | | brown, moist | | 0.010" Slotted screen from 42' to 52' bgs |
| 50 | | | gray brown | | |
| | | | Silty CLAY, gray brown and brown mixed layer, dry, hard | | 3' sump |
| 55 | | | | | |
| 60 | | | | | |
| 65 | | | | | |

Michael J. Hull 10/28/09

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
#152
LICENSED
PROFESSIONAL GEOSCIENTIST

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

Groundwater Observations

| Date | Depth |
|---|---|
| 9/24/09 | 35.00 |
| 9/29/09 | 38.02 |

Remarks: 10 inch borehole diameter

MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/28/09

LOG OF MONITOR WELL NO. MW-23
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

LOG OF MONITOR WELL NO. MW-24

Project Description: 2009 Monitor Well Installations

CAREL

Location: Royal Oaks Landfill

Surface El.: 657.5 feet
Completion Depth: 69 feet
Date Boring Started: 9/22/2009
Date Boring Completed: 9/28/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| 0 | | | Silty CLAY, red to brown | | Concrete from 0 to 2' bgs |
| 2 | | | GRAVEL, sand, dark brown to black, gravel is poorly sorted with iron and limonite | | |
| 5 | | | CLAY, yellow to brown, silty, limonite stain | | |
| | | | SILT, dark gray to green, gray black with glauconite | | |
| | | | Silty CLAY, yellow to brown with limonite staining carbonaceous | | |
| 10 | | | Silt and CLAY, dark gray to brown with glauconite inclusions, friable | | |
| 15 | | | Silty CLAY, silt dark gray to green with glauconite, friable, slightly moist | | |
| 20 | | | SILT, light gray to green with clay, hard, dry | | |
| 25 | | | Silty CLAY, dark gray to green, soft, friable with glauconite | | Bentonite grout from 2' to 49' bgs |
| 30 | | | | | |
| 35 | | | SILTSTONE, light gray to green, hard, dry | | |
| | | | Silty CLAY, dark gray to green, soft, friable, with glauconite, carbonaceous | | |
| 40 | | | | | |

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
4152
LICENSED
PROFESSIONAL GEOSCIENTIST

10/28/09

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

| Groundwater Observations | |
|---|---|
| Date | Depth |
| 9/22/09 | 53.00 |
| 9/28/09 | 49.82 |

Remarks: 10 inch borehole diameter

MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/28/09

LOG OF MONITOR WELL NO. MW-24
PAGE 1 of 2

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

LOG OF MONITOR WELL NO. MW-24

Project Description: 2009 Monitor Well Installations

CAREL

Location: Royal Oaks Landfill

Surface El.: 657.5 feet
Completion Depth: 69 feet
Date Boring Started: 9/22/2009
Date Boring Completed: 9/28/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| 45 | | | CLAY, dark brown, silty, slightly moist to moist with light gray silt stringer, soft, friable towards base, moist | | |
| | | | Silty SAND, brown, sand is silty to very fined grained, moderately sorted, soft, friable, moist | | |
| 50 | | | light gray, moist to wet | | Bentonite seal from 49' to 54' bgs |
| 55 | | | Sandy SILT, brown to gray, sand is very fine grained and subrounded, moderately well sorted, wet | | 20/40 Silica sand from 54' to 69' bgs |
| | | | Silty CLAY, brown to gray, moist | | |
| 60 | | | CLAY, dark brown, dry | | 0.010" Slotted screen from 56' to 66' bgs |
| | | | SILT, dark gray to brown, moist | | |
| 65 | | | Silt/Silty SAND, dark brown, subrounded to rounded, well sorted, moist | | 3' sump |
| 70 | | | | | |
| 75 | | | | | |
| 80 | | | | | |

STATE OF TEXAS
MICHAEL J. HULL
GEOLOGY
#4152
LICENSED
PROFESSIONAL GEOLOGIST

10/28/09

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

| Groundwater Observations | |
|---|---|
| Date | Depth |
| 9/22/09 | 53.00 |
| 9/28/09 | 49.82 |

Remarks: 10 inch borehole diameter

MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/28/09

LOG OF MONITOR WELL NO. MW-24
PAGE 2 of 2

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

LOG OF MONITOR WELL NO. MW-25

Project Description: 2009 Monitor Well Installations

CAREL

Location: Royal Oaks Landfill

Surface El.: 663.2 feet
Completion Depth: 35 feet
Date Boring Started: 9/23/2009
Date Boring Completed: 9/29/2009

| Depth, feet | Samples | Symbol/USCS | MATERIAL DESCRIPTION | Monitor Well Construction Details | Monitor Well Description |
|---|---|---|---|---|---|
| 0 | | | Sandy SILT, dark gray to green, black, silt, subrounded, well sorted, hard, dry | | Concrete from 0 to 2' bgs |
| | | | CLAY, white, plastic, moist | | |
| 5 | | | SANDY Silt, red to rusty brown, sand is very fine grained and subrounded, moderately sorted with iron nodules, dry to slightly moist | | |
| 10 | | | Sandy SILT, red (rusty) brown and gray to green, silt to very fine grained, subrounded, moderately well sorted, inter bedded with glauconite, dry | | Bentonite grout from 2' to 21' bgs |
| 15 | | | dark gray to green, fissile and soft with glauconite and slightly wet at 12' bgs | | |
| | | | Silty SAND, dark gray to green, sand is silt to very fine grained and is subrounded, moderately sorted, fissile and soft with glauconite, moist | | |
| 20 | | | CLAY, gray to green, glauconite, plastic, slightly moist | | |
| | | | Silt SAND, dark gray to green, sand is silt to very fine grained and subrounded, moderately sorted with glauconitic and fissile, moist | | Bentonite seal from 21' to 24' bgs |
| 25 | | | slightly wet to wet at 24' bgs | | 20/40 Silica sand from 24' to 35' bgs |
| | | | moist at 28' bgs | | |
| 30 | | | SILTSTONE, silicified, light gray to white, hard streak, moist | | 0.010" Slotted screen from 27' to 32' bgs |
| | | | CLAY, dark gray to green | | 3' sump |
| 35 | | | | | |
| 40 | | | | | |
| 45 | | | | | |

STATE OF TEXAS
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GEOLOGY
4152
LICENSED
PROFESSIONAL GEOLOGIST

Michael J. Hull 10/28/09

Drilling Contractor: Sunbelt Services
Drilling Method: HSA
Sampling Method: Split Spoon
Geologist/Engineer: Michael Hull
Project No.: 09-07-17

| Groundwater Observations | |
|---|---|
| Date | Depth |
| 9/23/09 | 24.00 |
| 9/29/09 | 21.62 |

Remarks: 10 inch borehole diameter

LOG OF MONITOR WELL NO. MW-25
PAGE 1 of 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual

▽ Water level at time of drilling.
▼ Water level at end of drilling.
▼ Water level after drilling.

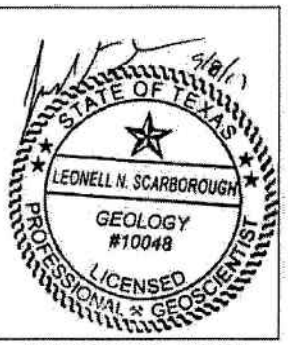
MW WITH WELL DETAILS AND LOGO ROYAL_OAKS.GPJ CAREL.GDT 10/28/09

# 2017 BOREHOLE LOG
# BY HYDREX ENVIRONMENTAL

Hydrex ENVIRONMENTAL

# Monitor Well

Monitor Well No.: **MW-20**




| PROJECT INFORMATION | | DRILLING INFORMATION | |
|---|---|---|---|
| PROJECT: | Royal Oaks Landfill | DRILLER: | Thomas Daniel Cook |
| PROJECT NO.: | L-04-1144 | DRILLER'S LICENSE NO.: | 2853 |
| LOGGED BY: | Stephen Rowland, Dillon Bybee | RIG TYPE: | D-50 |
| SUPERVISING PG: | Leonell N. Scarborough | METHOD OF DRILLING: | Hollow Stem Auger |
| COMPLETION: | 7/18/17 | SAMPLING METHODS: | Split Barrel Sampler |
| DEVELOPMENT: | 7/21/17 | TOP OF CASING ELEV. | 635.61' |
| SITE LOCATION: | Jacksonville, Texas | HOLE DIAMETER: | 8.25" |
| WELL OWNER: | Royal Oaks Landfill | LATITUDE: 32.001907 | LONGITUDE: -95.263573 |

■ Sample ▼ Water level after completion ▽ Water level while drilling

TBPG Firm No. 50027

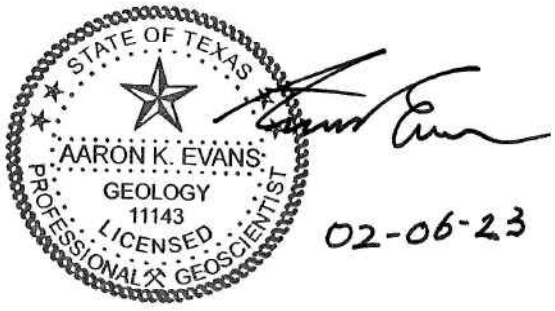
| DESCRIPTION | USCS | SOIL SYMBOLS | DEPTH | SAMPLE | WATER LEVEL | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|
| | | | -4 to 30 | | | 4.5' X 4.5' X6" Sloped Concrete Pad; Surface Casing With Capped 4" Well Inside |
| SILTY CLAY - Road base and fill, reddish-brown silty clay, dry<br>-@ 2'-4', some iron oxide concretions and fine-grained brown quartz sand<br>-@ 4'-6', color change to dark greenish-black | CL | | | | | Cement |
| CLAY - Dark green clay, very dense, shell fragments throughout, dry | CH | | | | | Bentonite |
| SILTY CLAY - Dark greenish-brown silty clay with some fine-grained quartz sand and iron oxide concretions, dry<br>-@ 12', zone of increased iron oxide concretions<br>-@ 13.8', white silty clay lens | CL | | | | | 4" Sch. 40 PVC Riser |
| SILTY SAND - Very fine reddish-yellow sand with some silt, iron oxide streaks and white silty sand lenses throughout | SM | | | | | 20/40 Silica Sand |
| SILTY SAND - Alternating bands of greyish-yellow and white medium-grained quartz sand with lenses of brownish-red silty clay, wet at 21' | SM | | | | ▼ 21' | 0.010" Slotted 4" Sch. 40 PVC Well Screen |
| CLAY - Dark brownish-black clay, very dense, with white silt laminations throughout, increasing silt with depth, dry | CH | | | | | 4" PVC Bottom Cap @ 27.5' |

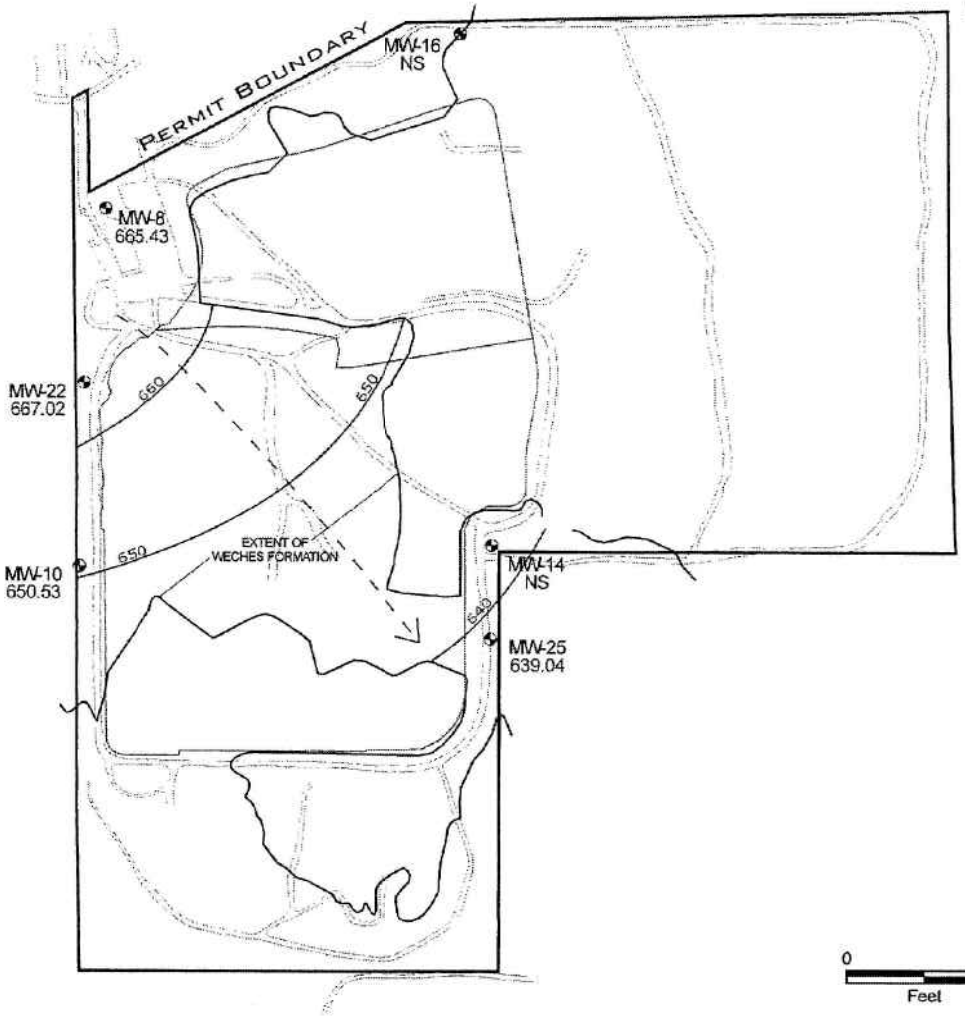
NOTES: Log should not be used separately from original report. USCS Description based on field classification.

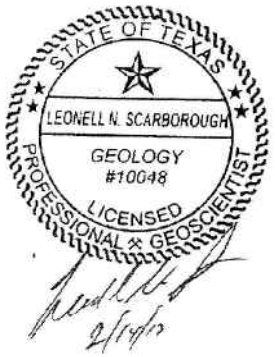
Page 1 of 1

# APPENDIX D

# HISTORICAL GROUNDWATER CONTOUR MAPS








| LEGEND | |
|---|---|
| ● | Monitor Well |
| 620.25 | Groundwater Elevation |
| NS | Well Not Sampled |
| ——— | Groundwater Contour |
| - - -> | Approx. Groundwater Flow Direction |
| ——— | Permit Boundary |

*Elevations in Feet, (MSL)*

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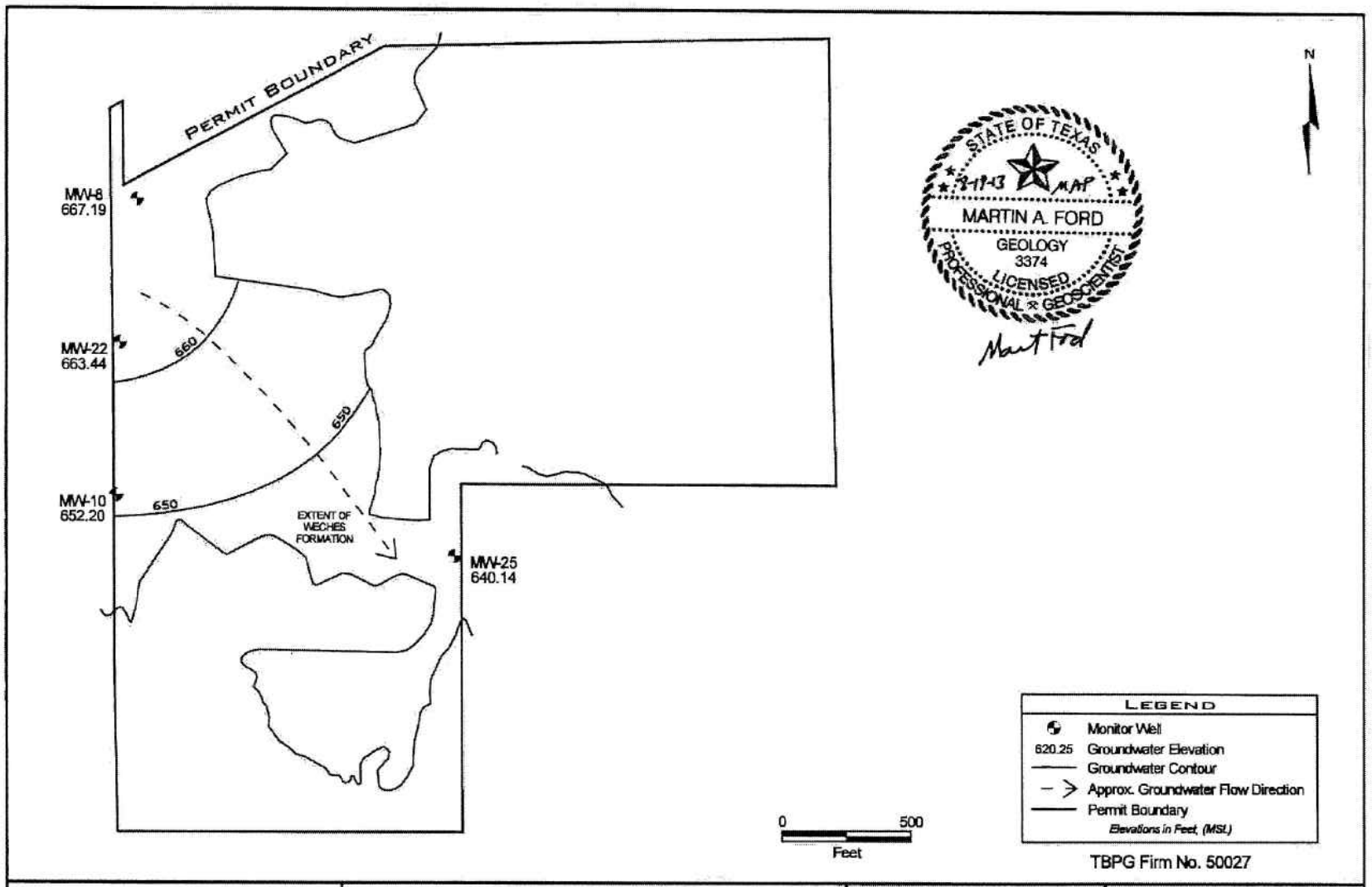
# Groundwater Elevation Map (Weches Formation)

Water Levels Measured 12/3/2012

| Figure 1 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2012 | Graphics: MDR |

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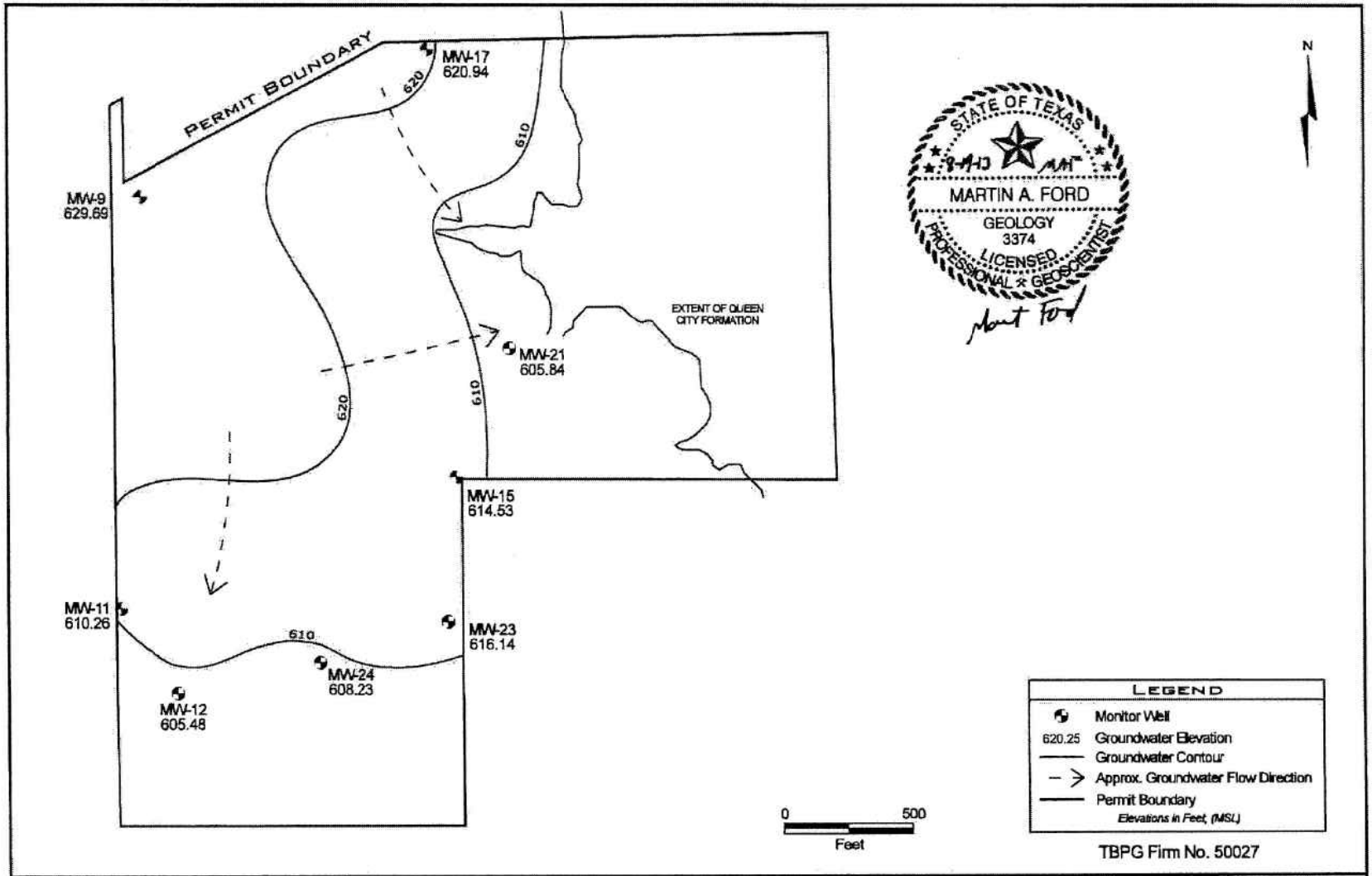
# Groundwater Elevation Map (Weches Formation)

Water Levels Measured 06/11/2013

| Figure 1 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2013 | Graphics: MDR |

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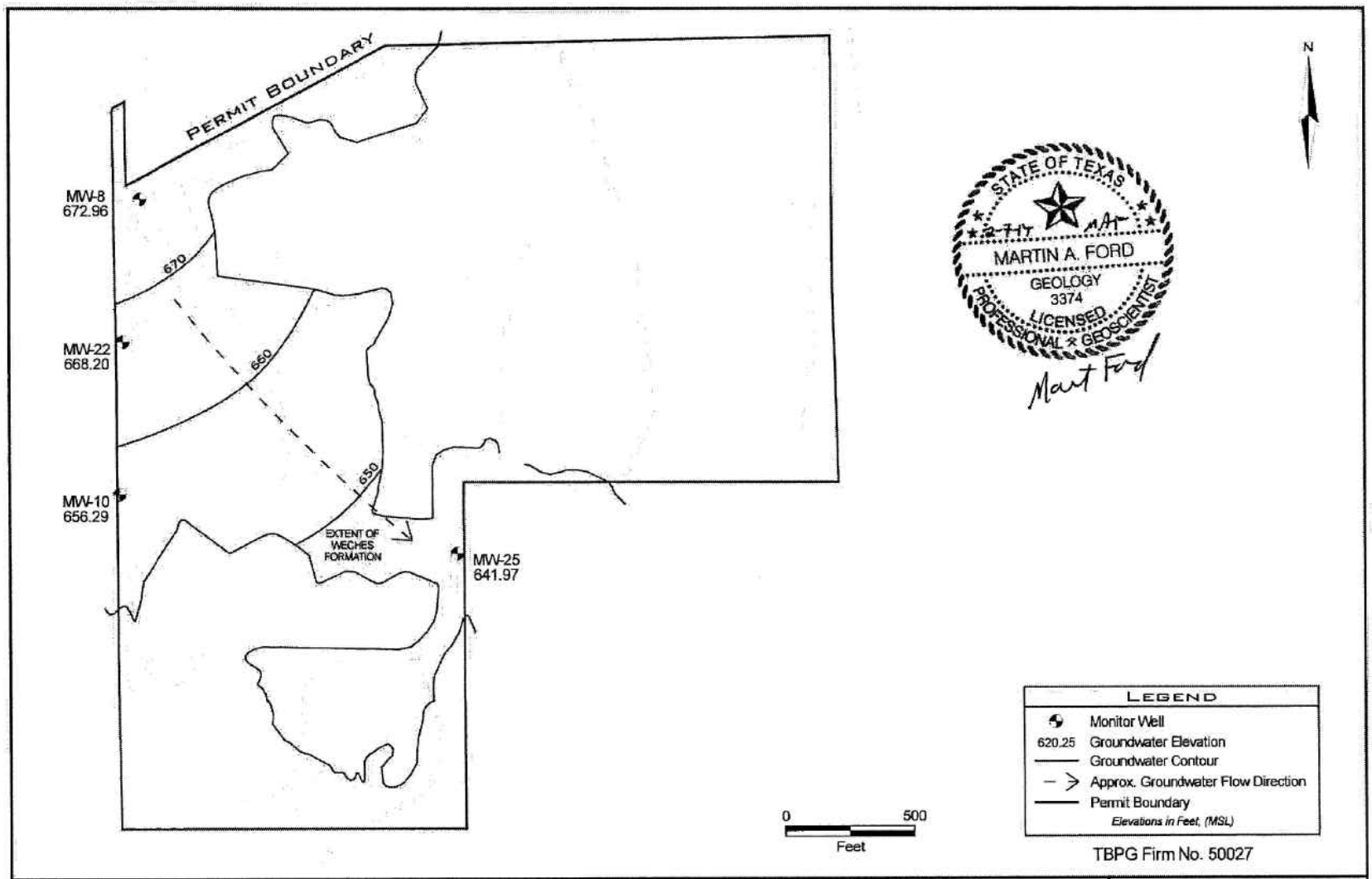
# Groundwater Elevation Map (Queen City Formation)

Water Levels Measured 06/11/2013

| Figure 2 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2013 | Graphics: MDR |

IIIG-E-182

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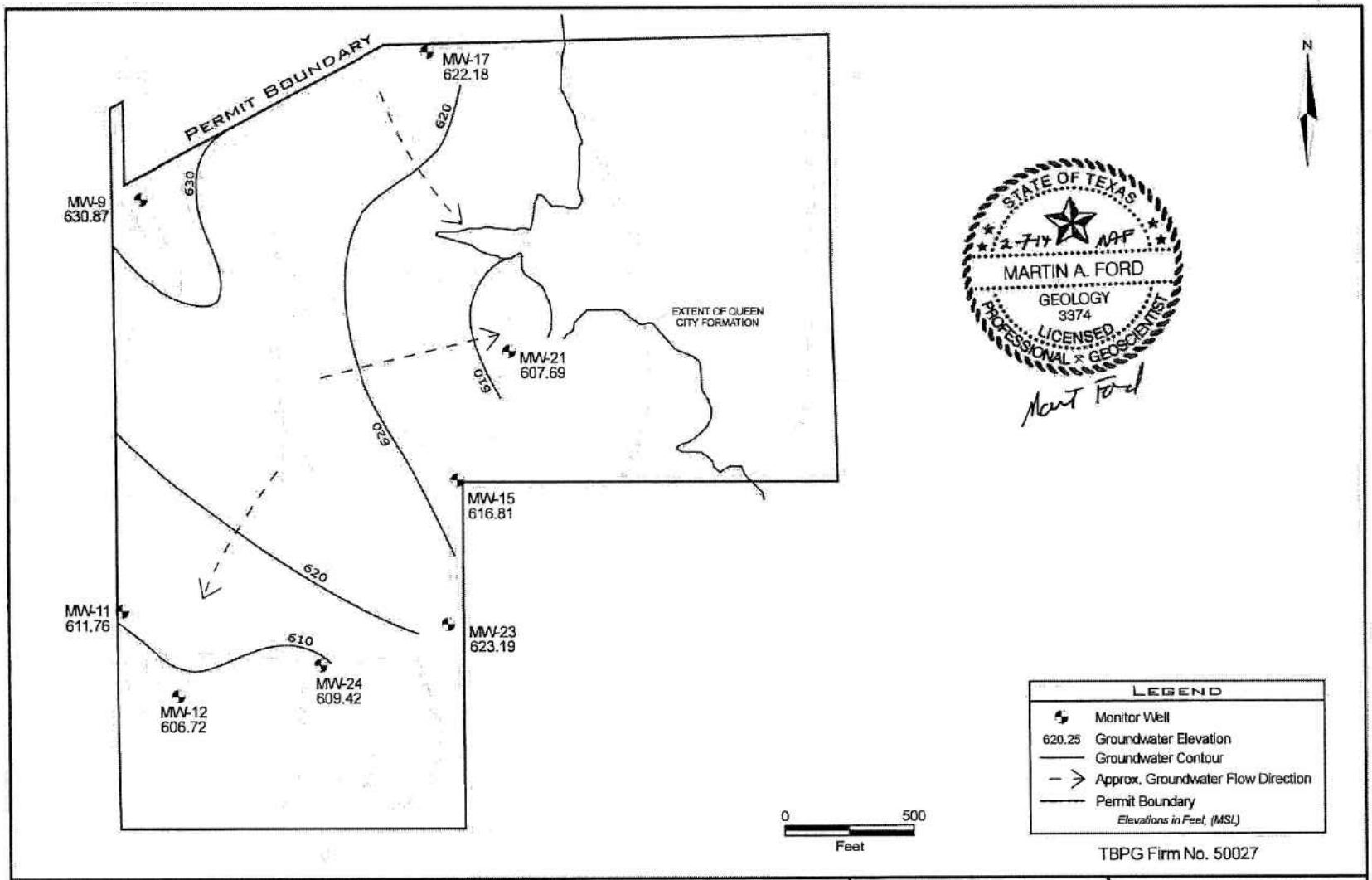
# Groundwater Elevation Map (Weches Formation)

Water Levels Measured 12/3-4/2013

| Figure 3 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2013 | Graphics: MDR |

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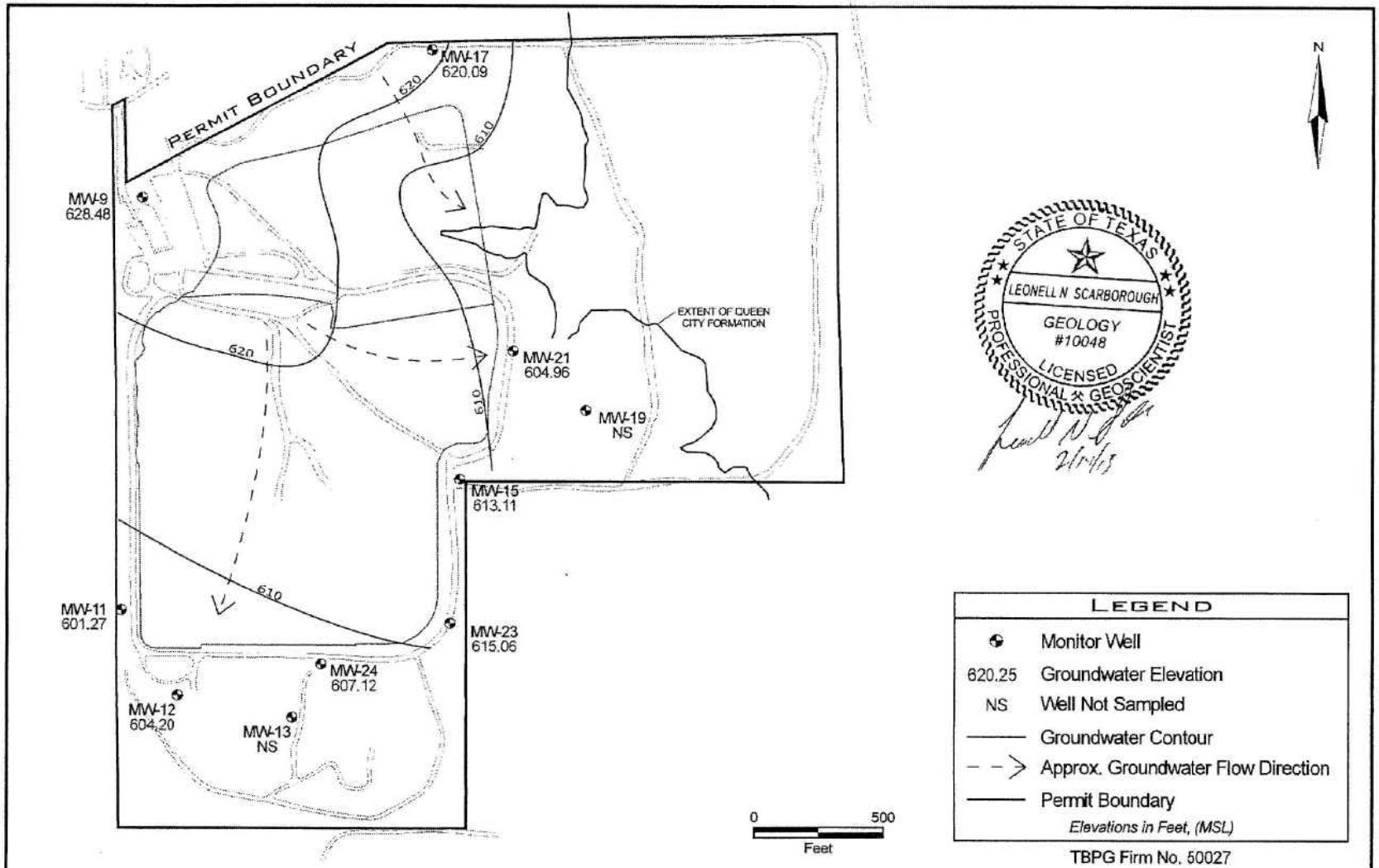
# Groundwater Elevation Map (Queen City Formation)

Water Levels Measured 12/3-4/2013

| Figure 4 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2013 | Graphics: MDR |




IIIG-E-184

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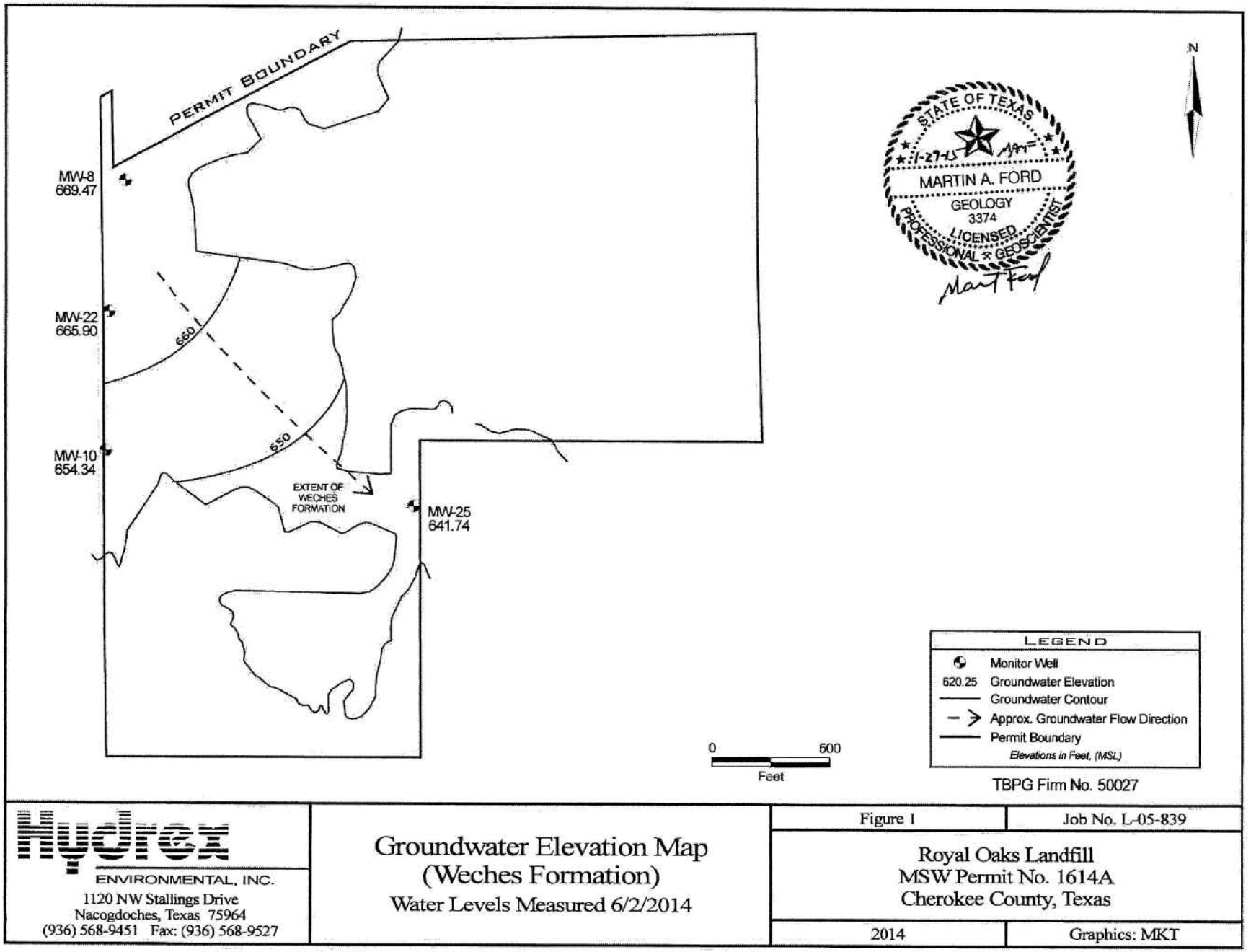
# Groundwater Elevation Map (Queen City Formation)

Water Levels Measured 12/3/2012

| Figure 2 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2012 | Graphics: MDR |

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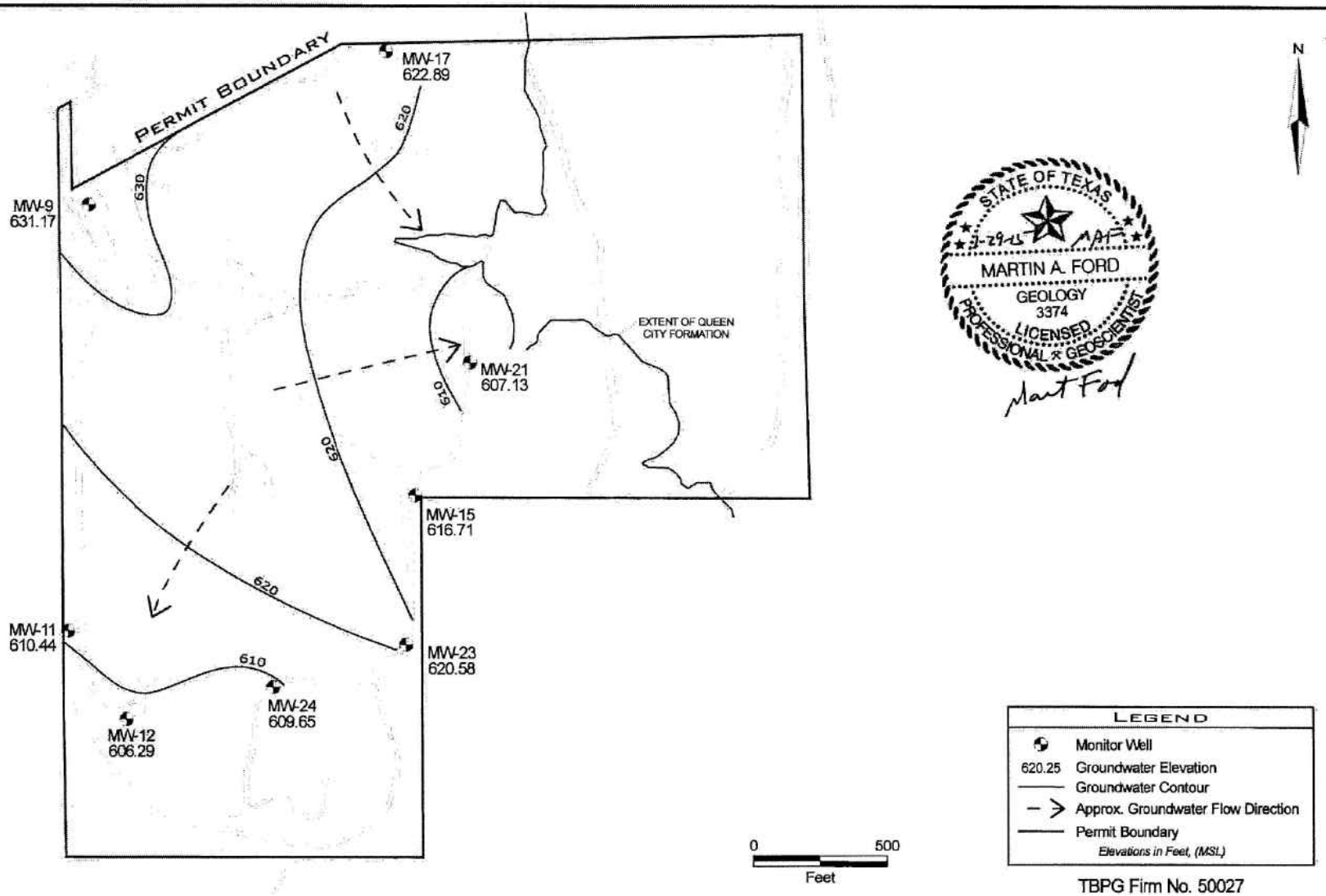
# Groundwater Elevation Map (Weches Formation)

Water Levels Measured 6/2/2014

| Figure 1 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2014 | Graphics: MKT |

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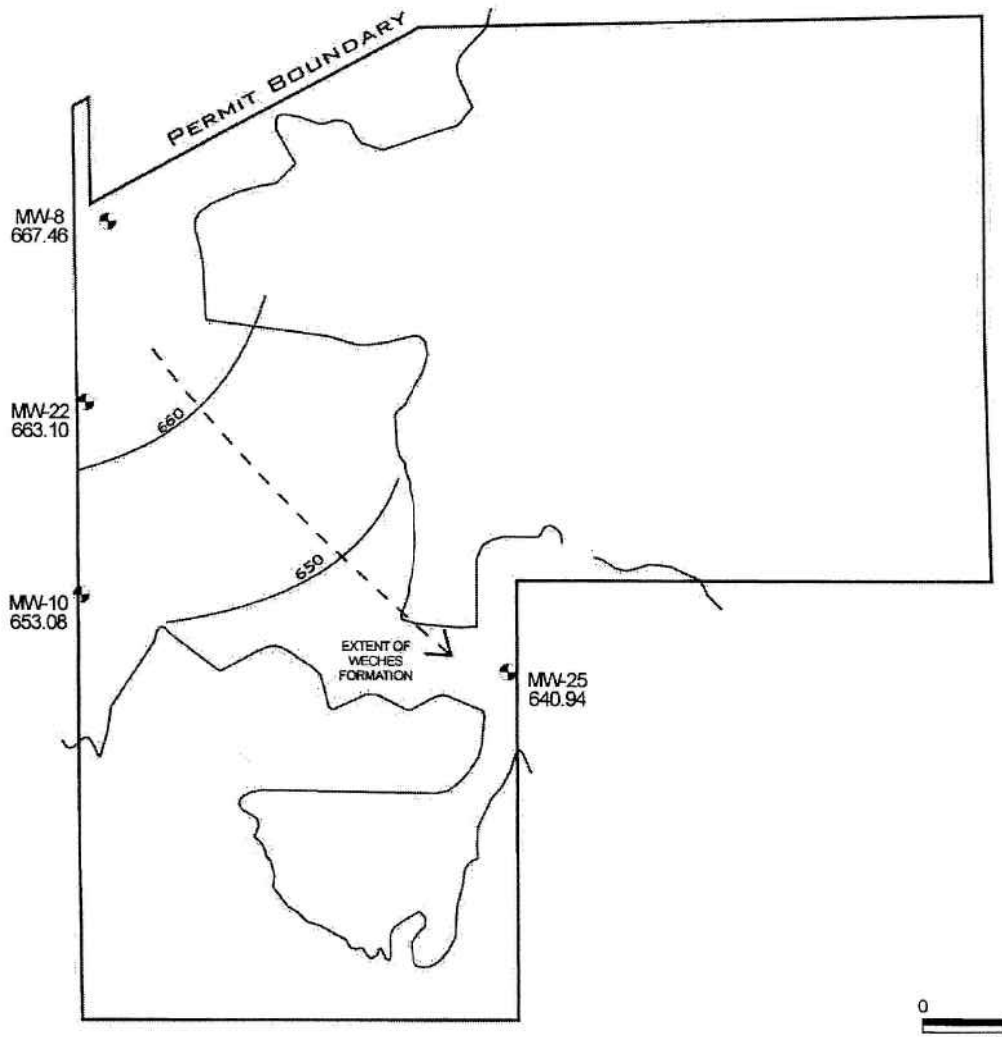
# Groundwater Elevation Map (Queen City Formation)

Water Levels Measured 6/2/2014

| Figure 2 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2014 | Graphics: MKT |




STATE OF TEXAS
MARTIN A. FORD
GEOLOGY
3374
LICENSED PROFESSIONAL GEOSCIENTIST

| LEGEND | |
|---|---|
| | Monitor Well |
| 620.25 | Groundwater Elevation |
| | Groundwater Contour |
| | Approx. Groundwater Flow Direction |
| | Permit Boundary |
| | *Elevations in Feet, (MSL)* |

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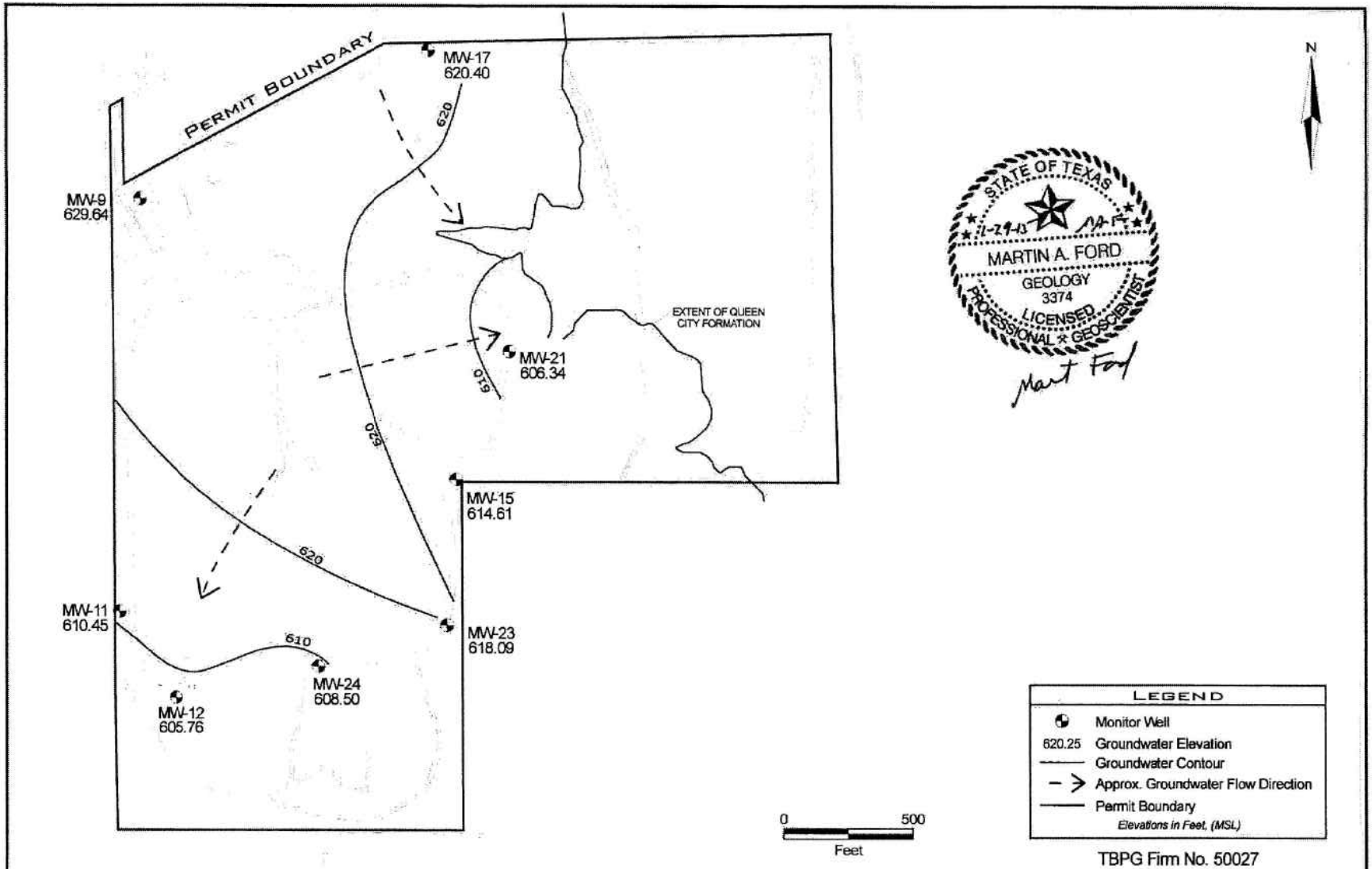
# Groundwater Elevation Map (Weches Formation)

Water Levels Measured 12/1/2014

| Figure 3 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2014 | Graphics: MKT |

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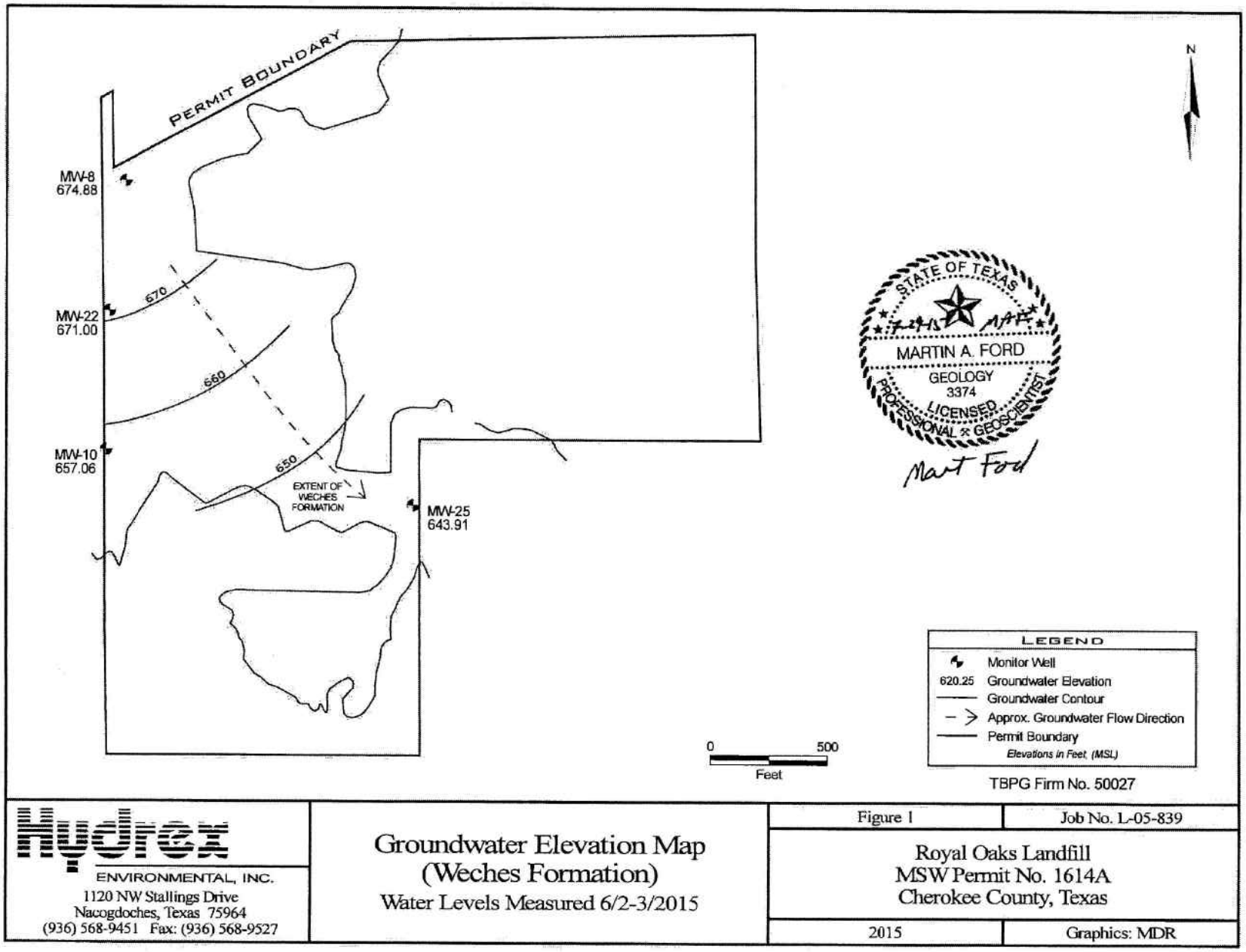
# Groundwater Elevation Map (Queen City Formation)

Water Levels Measured 12/1/2014

| Figure 4 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2014 | Graphics: MKT |

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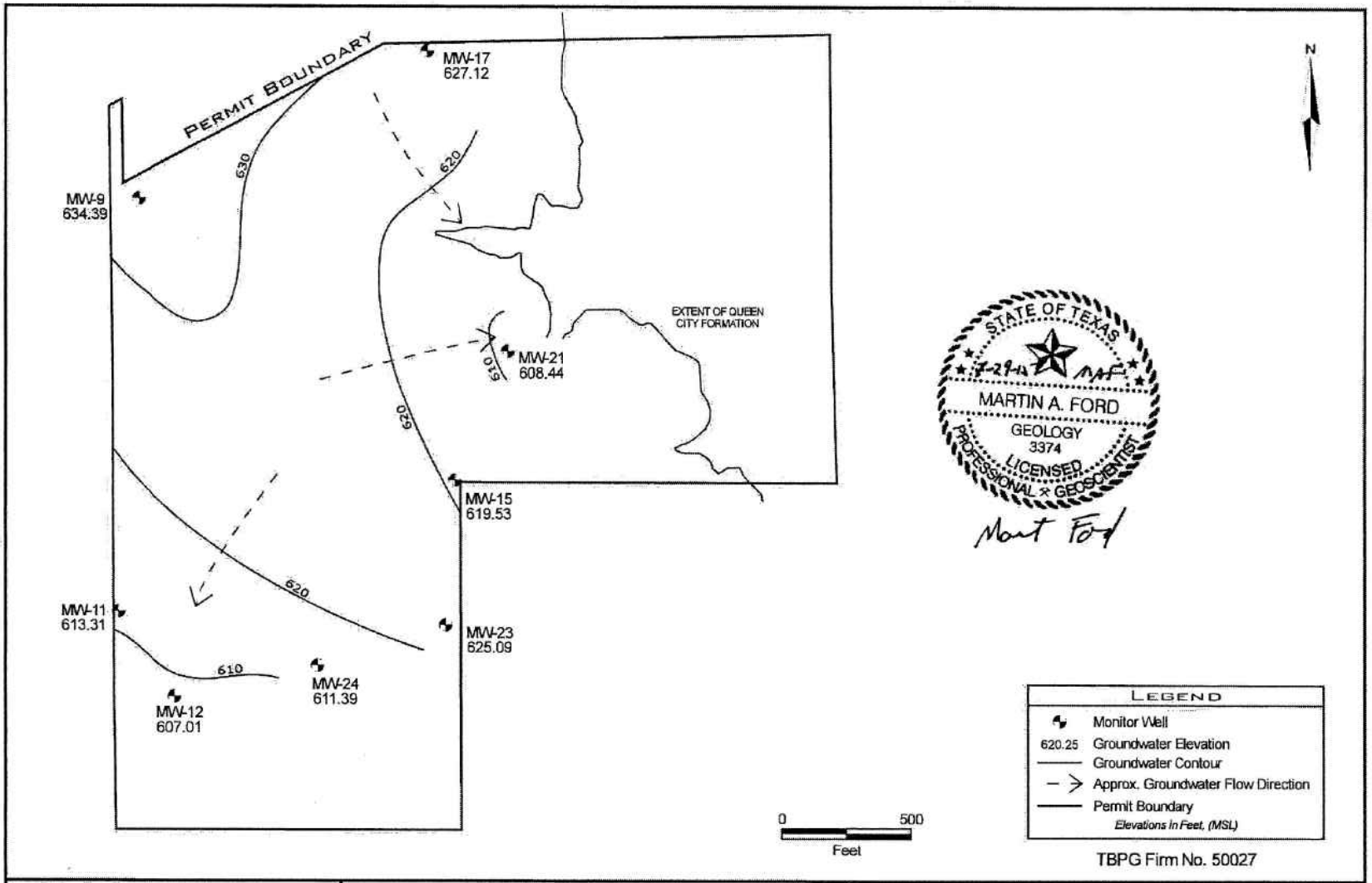
## Groundwater Elevation Map (Weches Formation)

Water Levels Measured 6/2-3/2015

| Figure 1 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2015 | Graphics: MDR |

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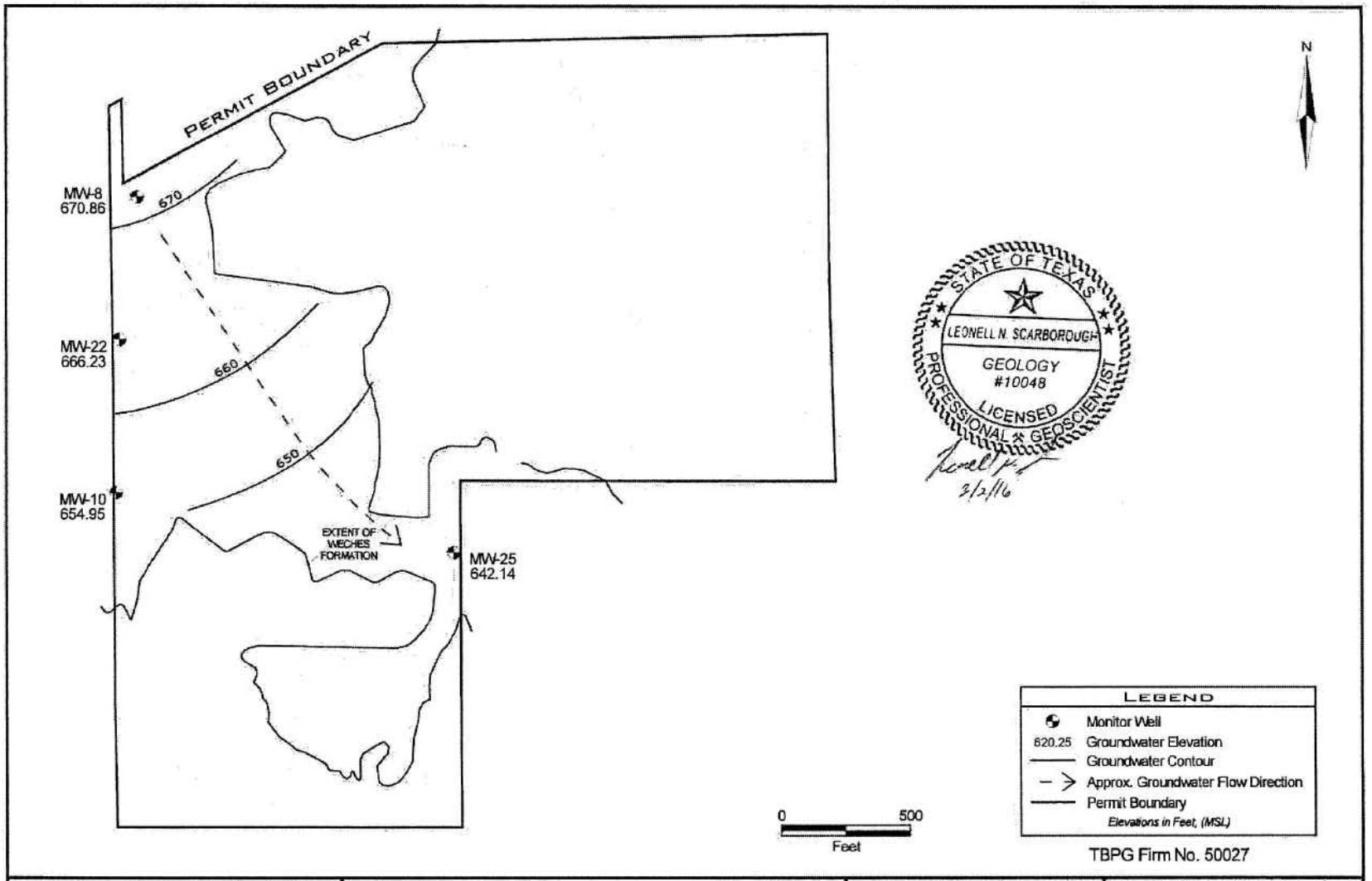
# Groundwater Elevation Map (Queen City Formation)

Water Levels Measured 6/2-3/2015

| Figure 2 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2015 | Graphics: MDR |



IIIG-E-191

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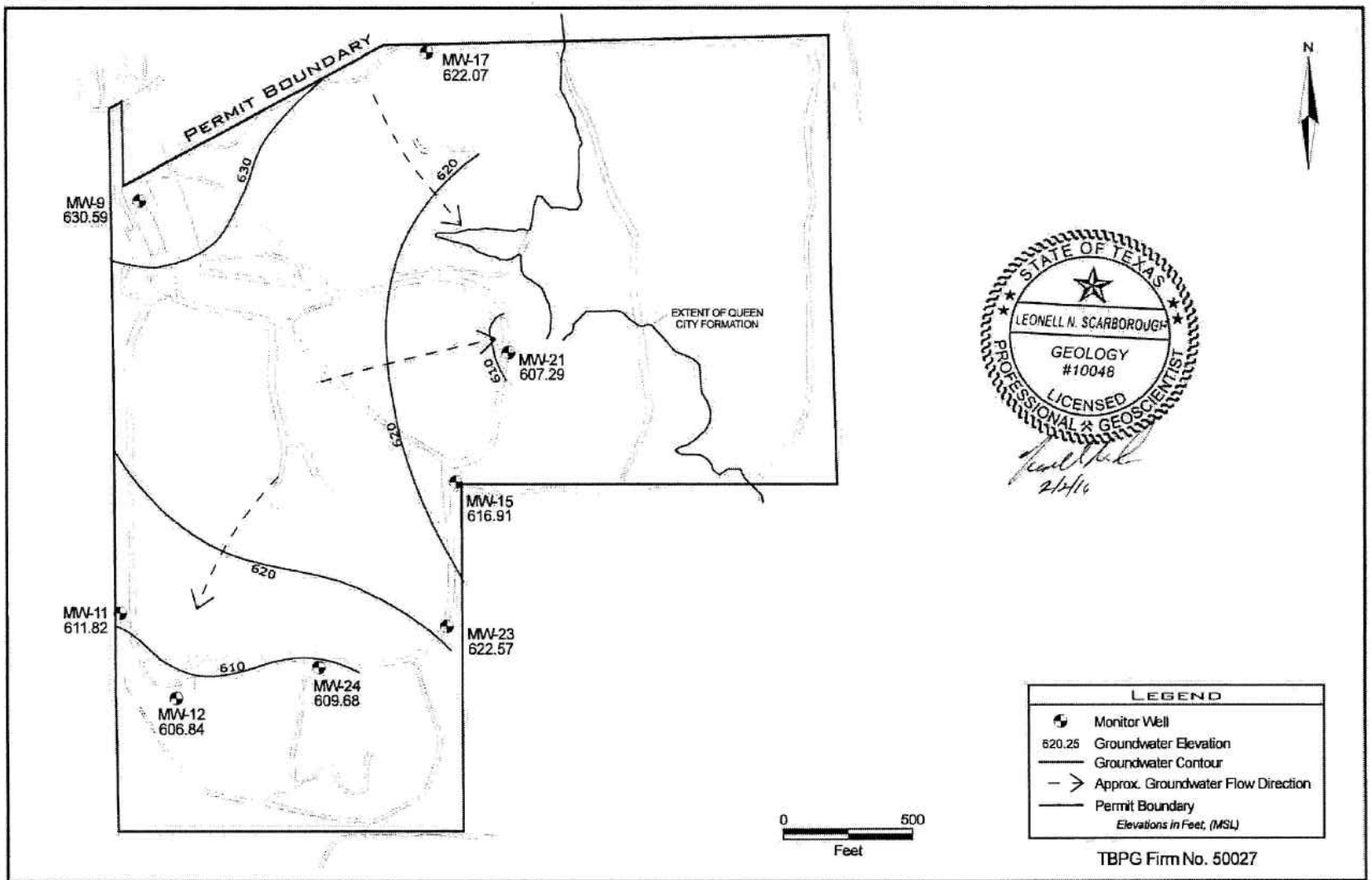
# Groundwater Elevation Map (Weches Formation)

Water Levels Measured 12/7/2015

| Figure 3 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2015 | Graphics: MDR |

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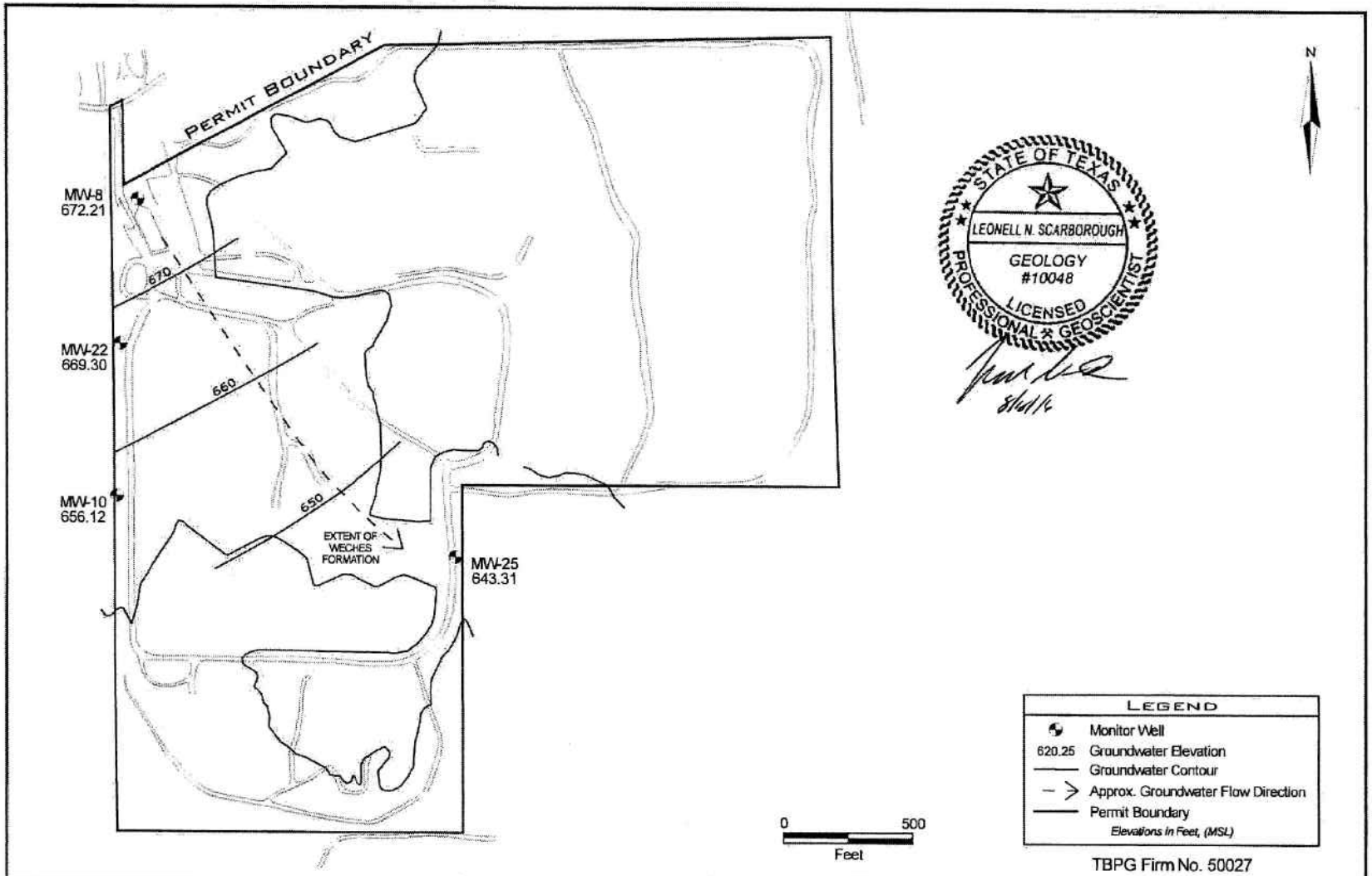
# Groundwater Elevation Map (Queen City Formation)

Water Levels Measured 12/7/2015

| Figure 4 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2015 | Graphics: MDR |

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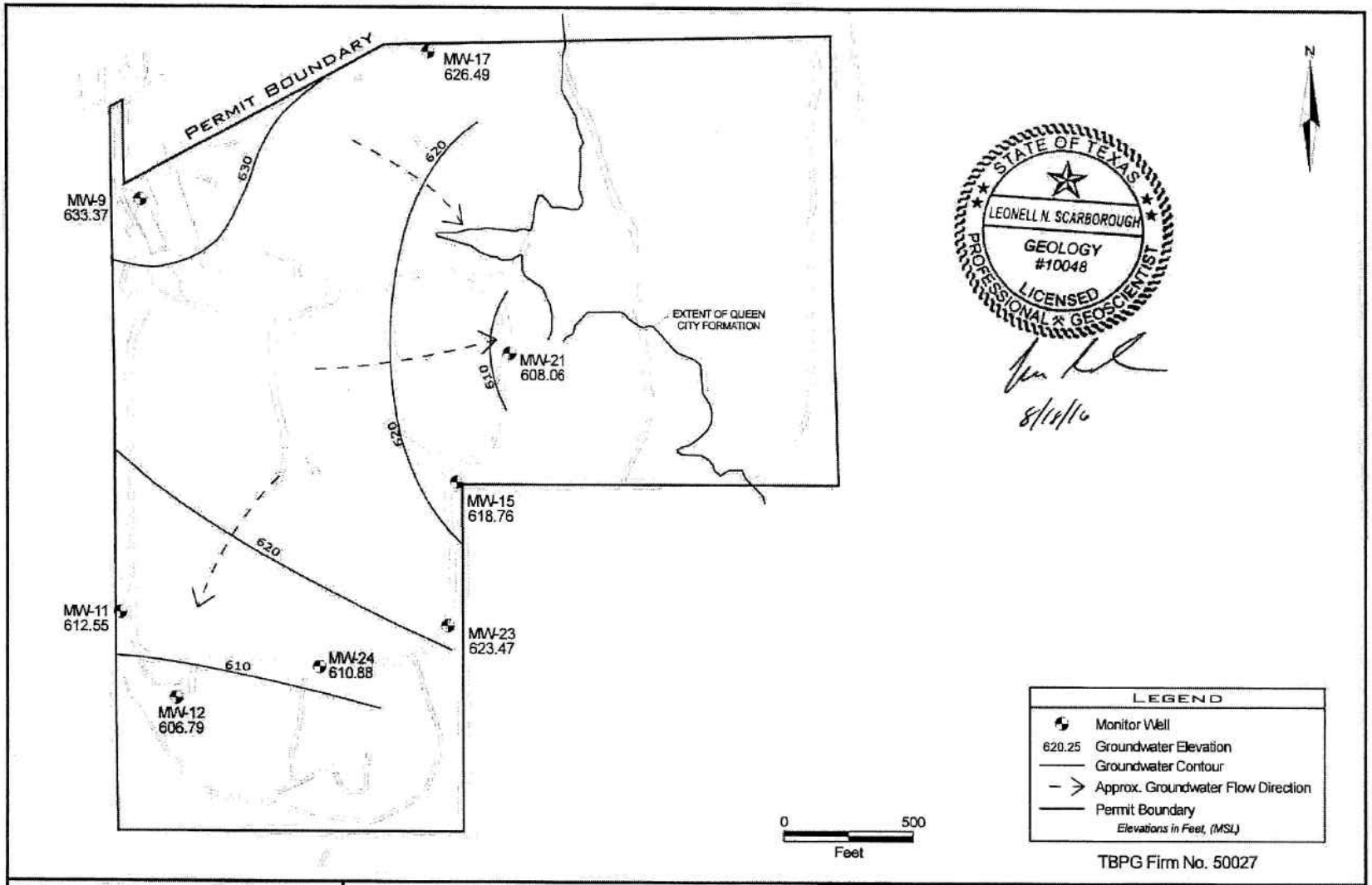
# Groundwater Elevation Map (Weches Formation)

Water Levels Measured 6/20-21/2016

| Figure 1 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2016 | Graphics: MKT |

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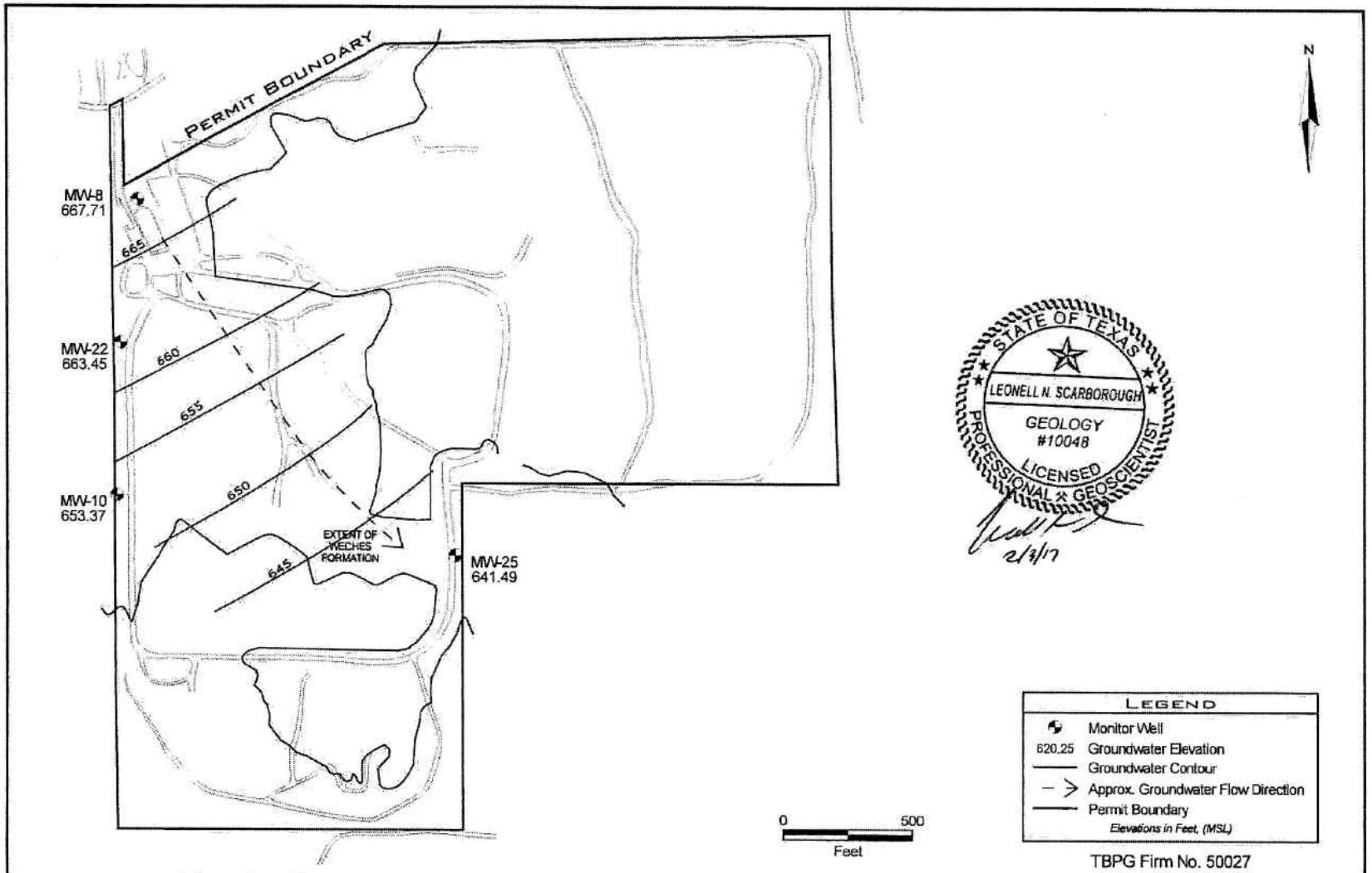
# Groundwater Elevation Map (Queen City Formation)

Water Levels Measured 6/20-21/2016

| Figure 2 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2016 | Graphics: MKT |

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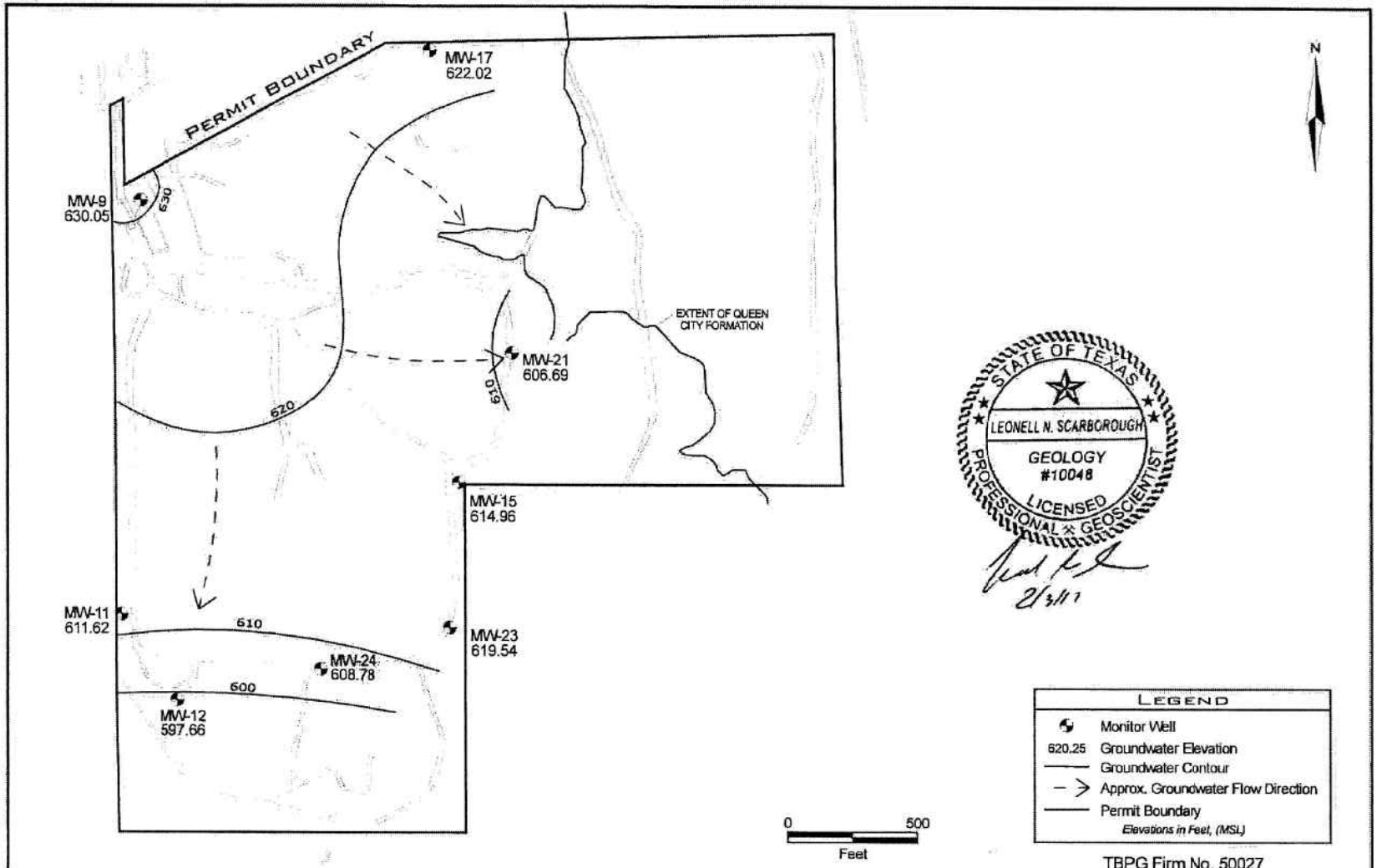
## Groundwater Elevation Map (Weches Formation)

Water Levels Measured 12/6/2016

| Figure 3 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2016 | Graphics: MKT |




TBPG Firm No. 50027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# Groundwater Elevation Map (Queen City Formation)

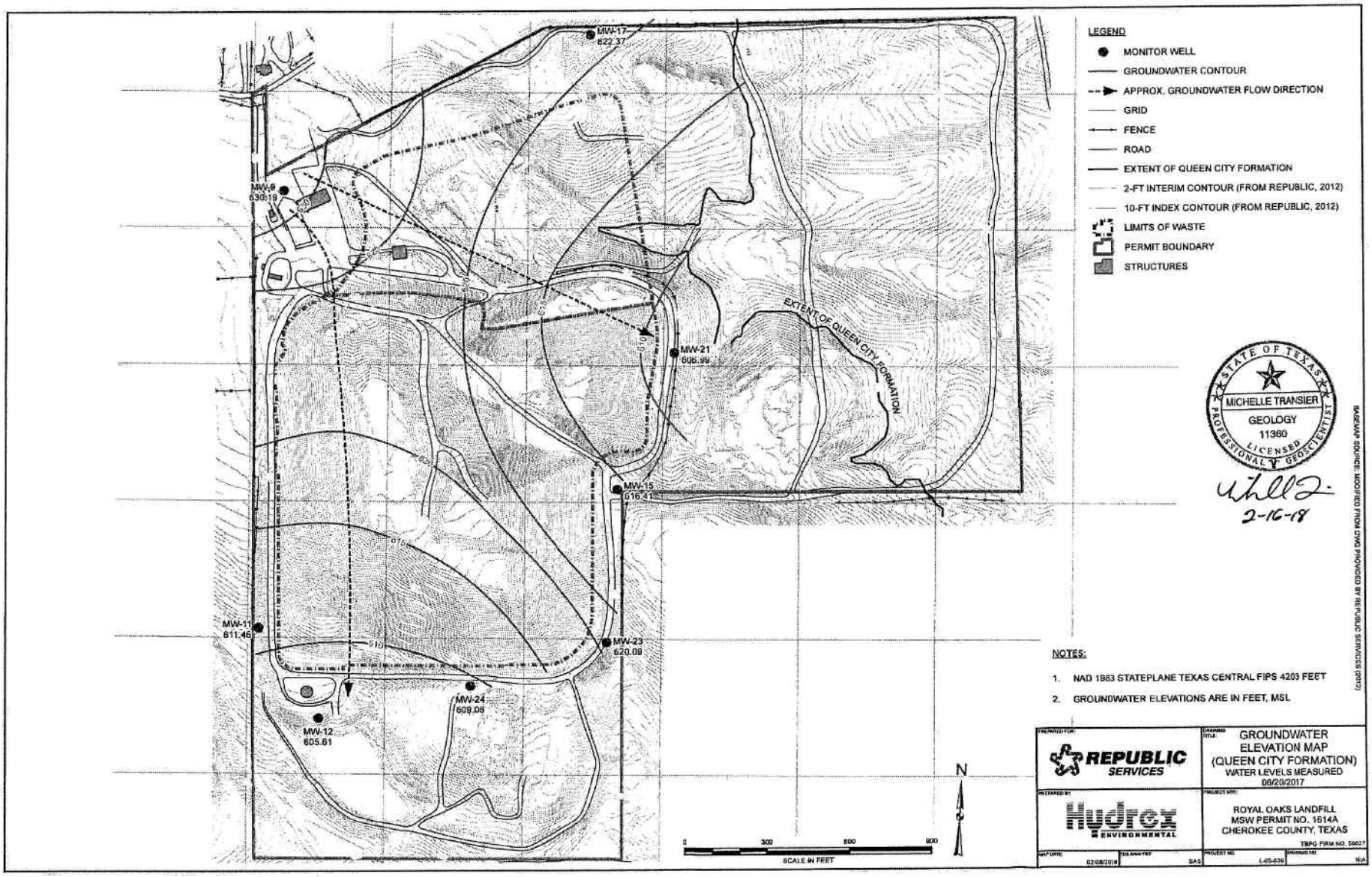
Water Levels Measured 12/6/2016

| Figure 4 | Job No. L-05-839 |
|---|---|
| Royal Oaks Landfill<br>MSW Permit No. 1614A<br>Cherokee County, Texas | |
| 2016 | Graphics: MKT |




IIIG-E-197

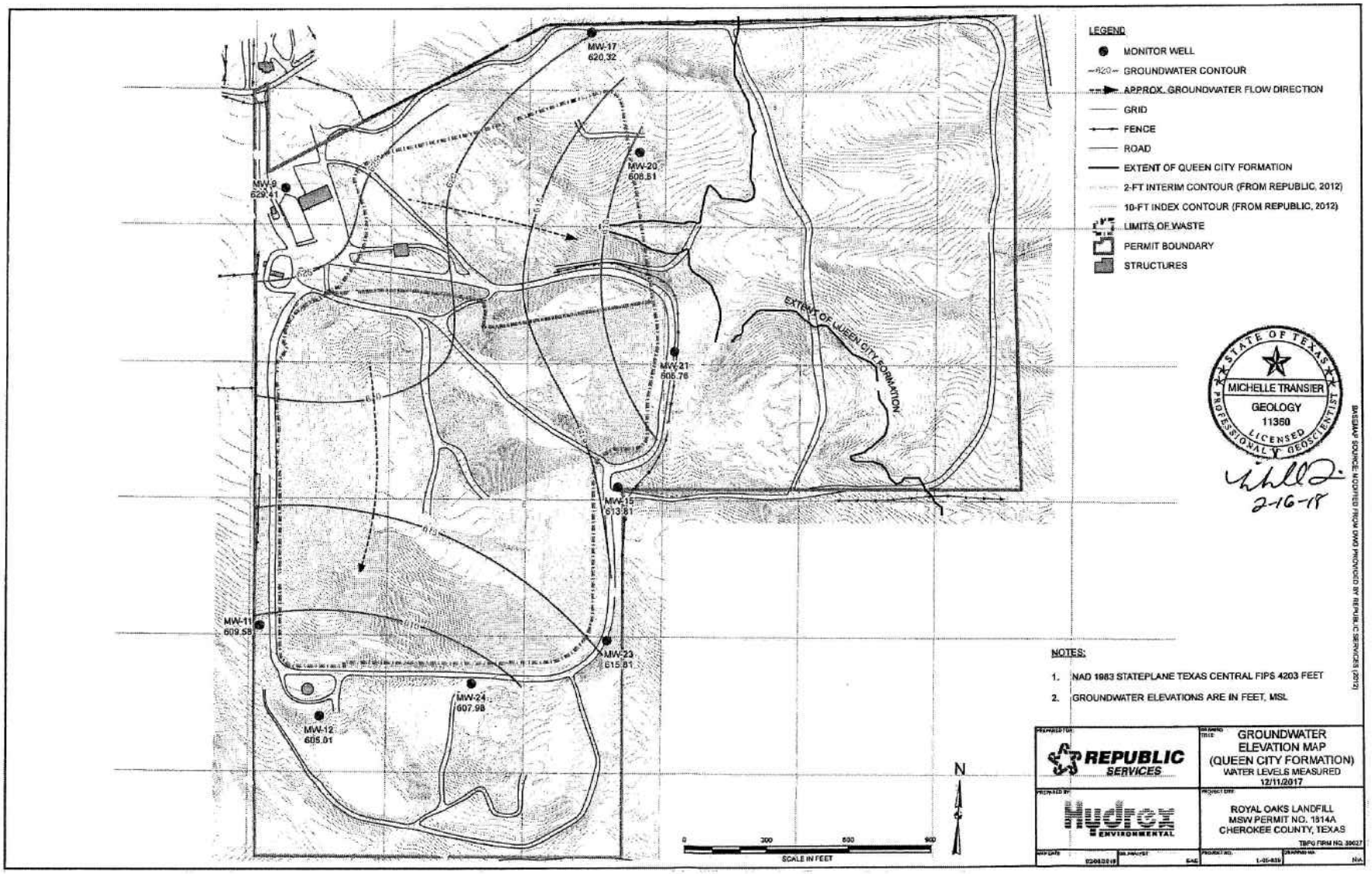
LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF WECHES FORMATION
2-FT INTERIM CONTOUR (FROM REPUBLIC, 2012)
10-FT INDEX CONTOUR (FROM REPUBLIC, 2012)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-8
669.51
MW-22
667.30
MW-10
654.76
MW-25
641.84
EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
2-16-18
BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2012)
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
REPUBLIC SERVICES
GROUNDWATER ELEVATION MAP
(WECHES FORMATION)
WATER LEVELS MEASURED
06/20/2017
Hydrex ENVIRONMENTAL
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50027
01/25/2018
L-03-830
N/A
0
300
600
900
SCALE IN FEET
N


MW-17
622.37
MW-9
630.19
MW-21
608.99
MW-15
616.41
MW-11
611.46
MW-23
620.08
MW-24
609.08
MW-12
605.61
EXTENT OF QUEEN CITY FORMATION
LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT INTERIM CONTOUR (FROM REPUBLIC, 2012)
10-FT INDEX CONTOUR (FROM REPUBLIC, 2012)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
2-16-18
BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2012)
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
N
0
300
600
900
SCALE IN FEET
REPUBLIC SERVICES
GROUNDWATER ELEVATION MAP
(QUEEN CITY FORMATION)
WATER LEVELS MEASURED
06/20/2017
Hydrex ENVIRONMENTAL
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50027
02/08/2018
SAS
L-05-036
N/A

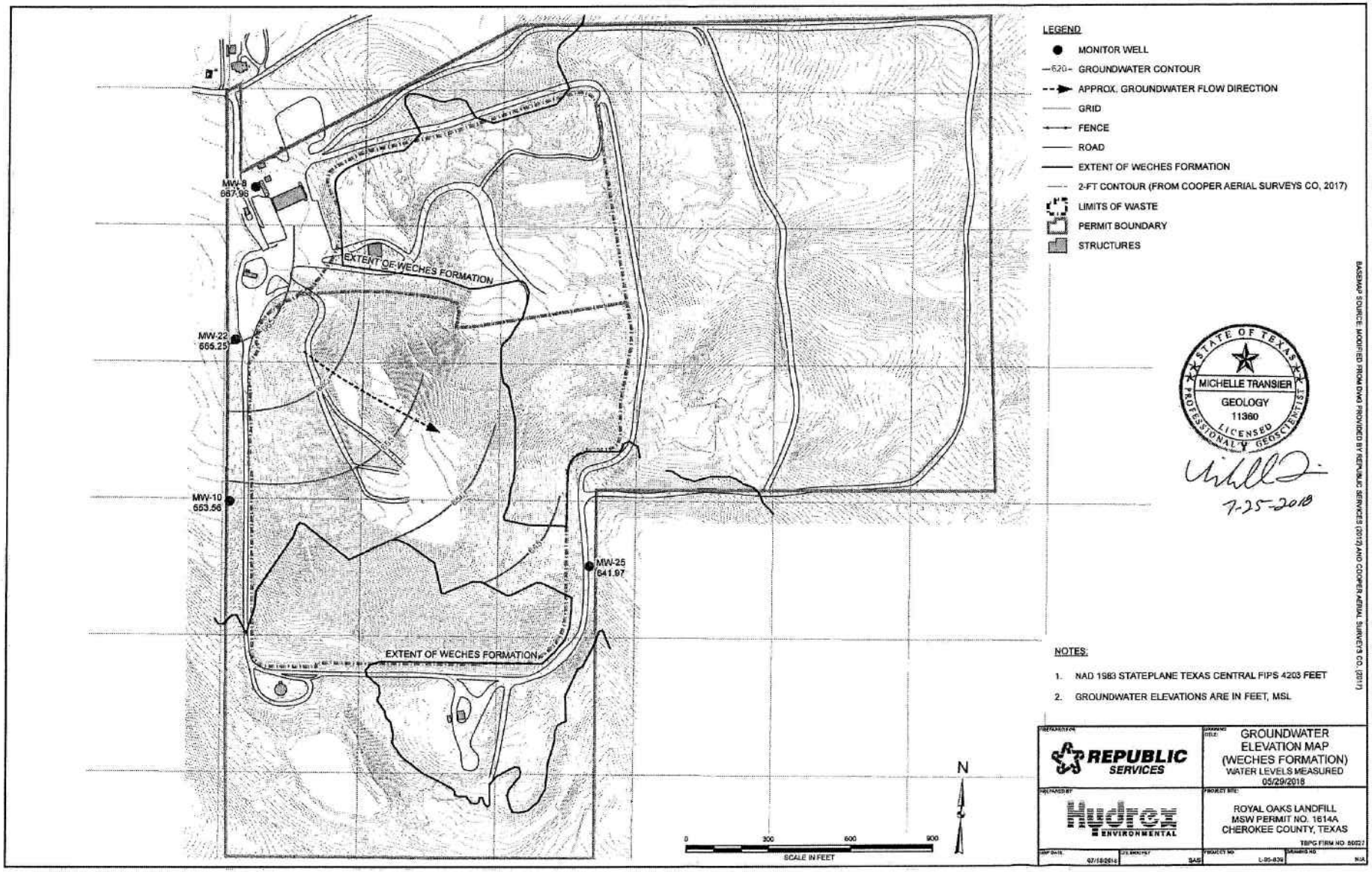
IIIG-E-199

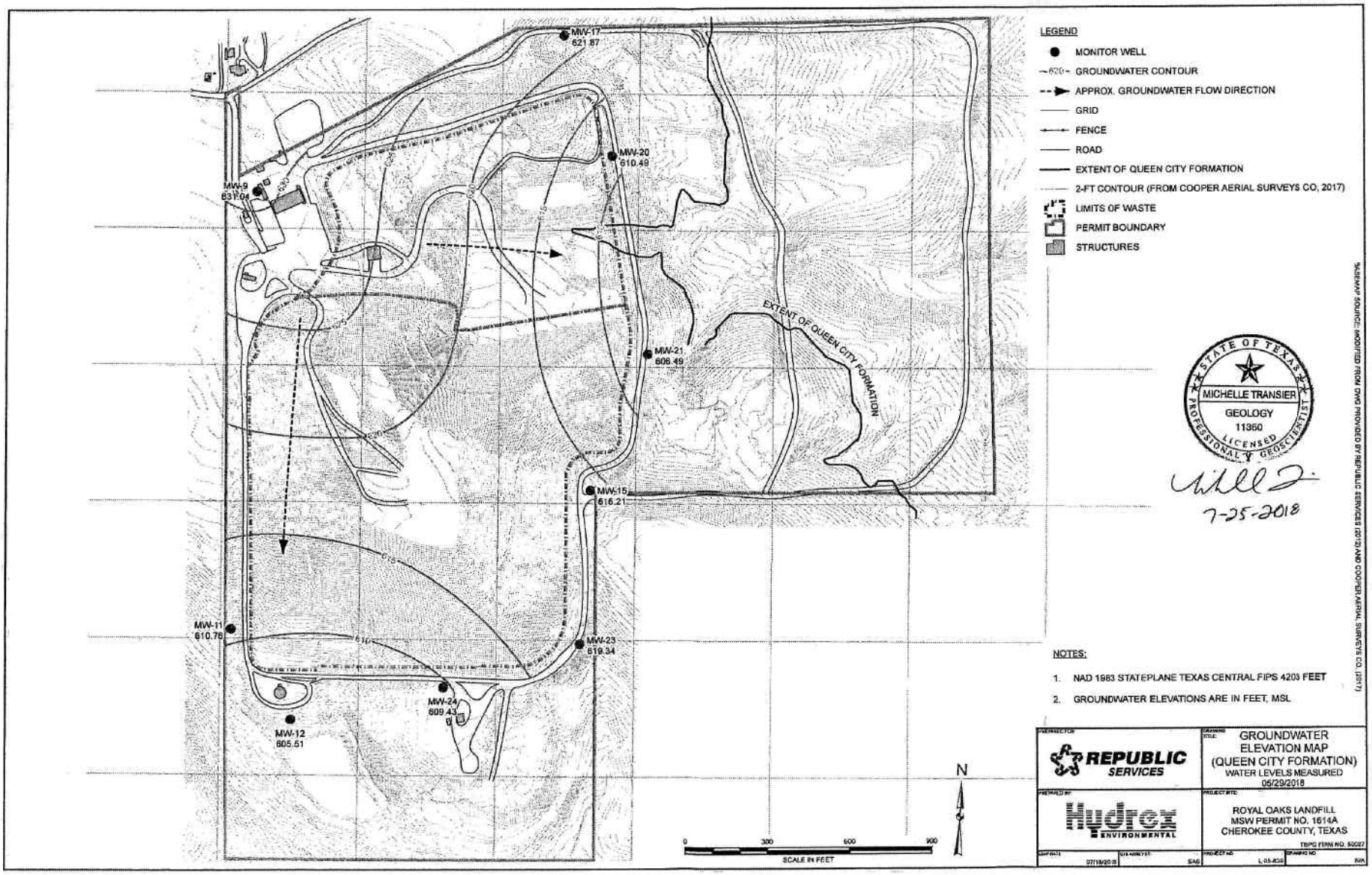
LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF WECHES FORMATION
2-FT INTERIM CONTOUR (FROM REPUBLIC, 2012)
10-FT INDEX CONTOUR (FROM REPUBLIC, 2012)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-8
666.26
MW-22
663.07
MW-10
651.61
MW-25
640.49
EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
N
0
300
600
900
SCALE IN FEET
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
2-16-18
BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2017)
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
REPUBLIC SERVICES
Hydrotex ENVIRONMENTAL
GROUNDWATER ELEVATION MAP (WECHES FORMATION)
WATER LEVELS MEASURED 12/11/2017
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50027
L-01-838
N/A

IIIG-E-200

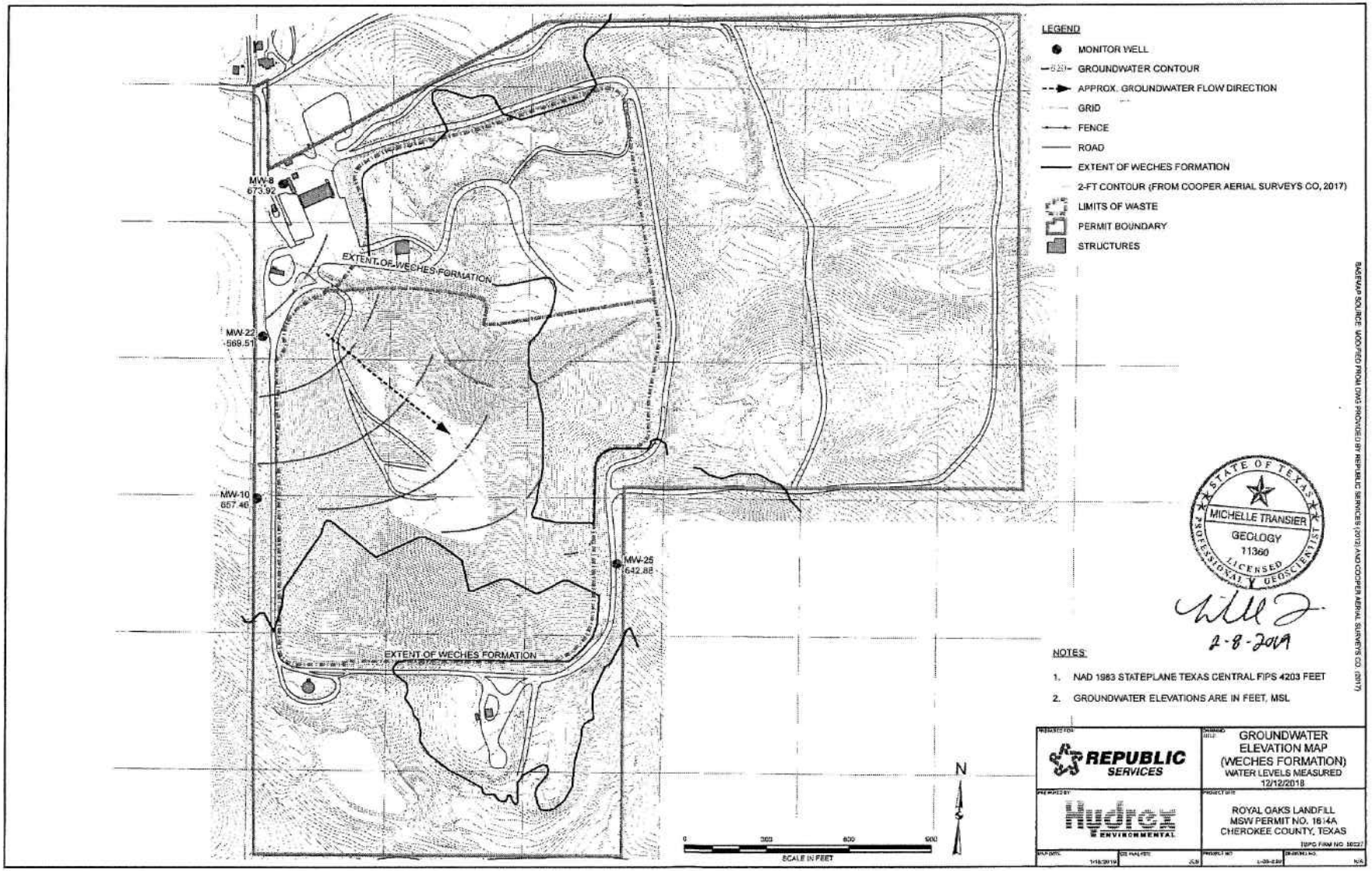

LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT INTERIM CONTOUR (FROM REPUBLIC, 2012)
10-FT INDEX CONTOUR (FROM REPUBLIC, 2012)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-17 620.32
MW-20 608.51
MW-9 629.41
MW-21 605.76
EXTENT OF QUEEN CITY FORMATION
MW-15 613.81
MW-11 609.58
MW-23 615.81
MW-24 607.98
MW-12 605.01
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
2-16-18
BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2012)
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
0 300 600 900
SCALE IN FEET
N
REPUBLIC SERVICES
GROUNDWATER ELEVATION MAP (QUEEN CITY FORMATION)
WATER LEVELS MEASURED 12/11/2017
Hudson ENVIRONMENTAL
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1514A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50027

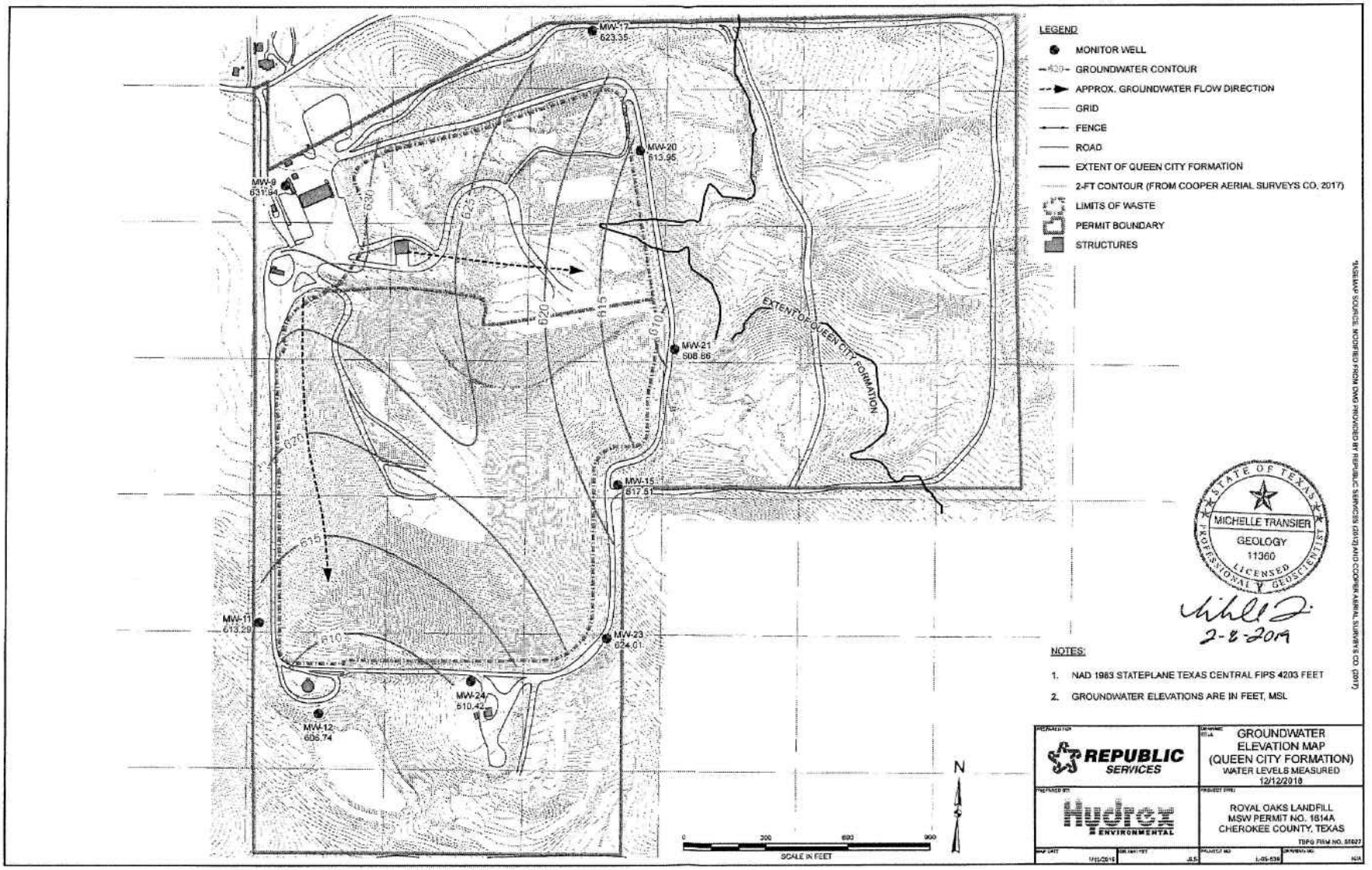
IIIG-E-201


LEGEND
MONITOR WELL
620 GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF WECHES FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-8
667.98
MW-22
655.25
MW-10
653.56
MW-25
641.97
EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
N
0
300
600
900
SCALE IN FEET
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
7-25-2018
BASEMAP SOURCE MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2012) AND COOPER AERIAL SURVEYS CO. (2017)
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
REPUBLIC SERVICES
GROUNDWATER ELEVATION MAP
(WECHES FORMATION)
WATER LEVELS MEASURED
05/29/2018
Hydrox ENVIRONMENTAL
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50027
07/18/2018
SAS
L-05-829
N/A

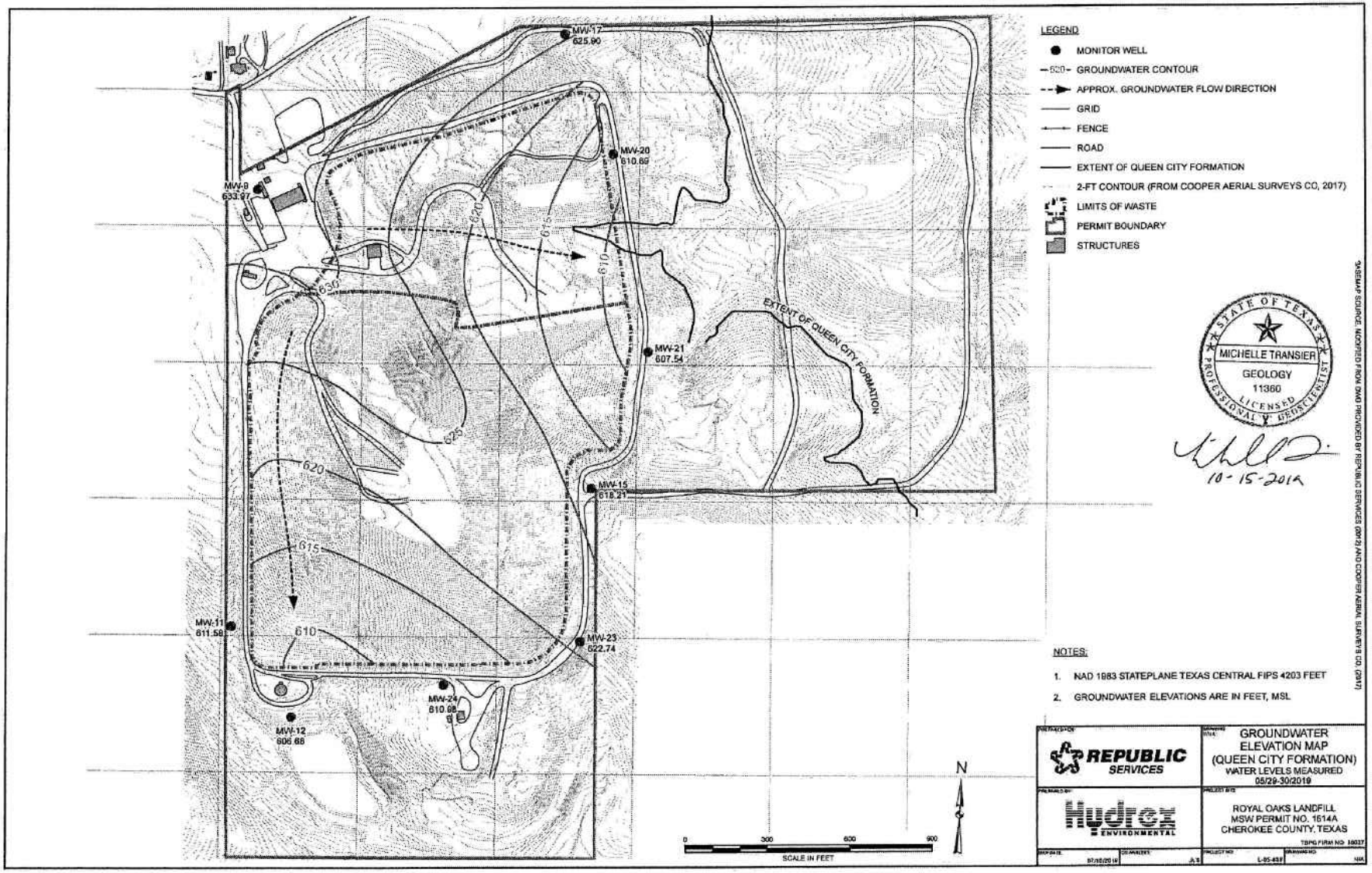

MW-17
621.87
MW-20
610.49
MW-9
631.04
MW-21
606.49
MW-15
616.21
MW-11
610.76
MW-23
619.34
MW-24
609.43
MW-12
605.51
EXTENT OF QUEEN CITY FORMATION
LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2018) AND COOPER AERIAL SURVEYS CO. (2017)
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
7-25-2018
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
N
0
300
600
900
SCALE IN FEET
REPUBLIC SERVICES
Hydrex ENVIRONMENTAL
GROUNDWATER ELEVATION MAP
(QUEEN CITY FORMATION)
WATER LEVELS MEASURED
05/29/2018
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50027
07/18/2018
SAG
L-05-838
N/A

IIIG-E-203

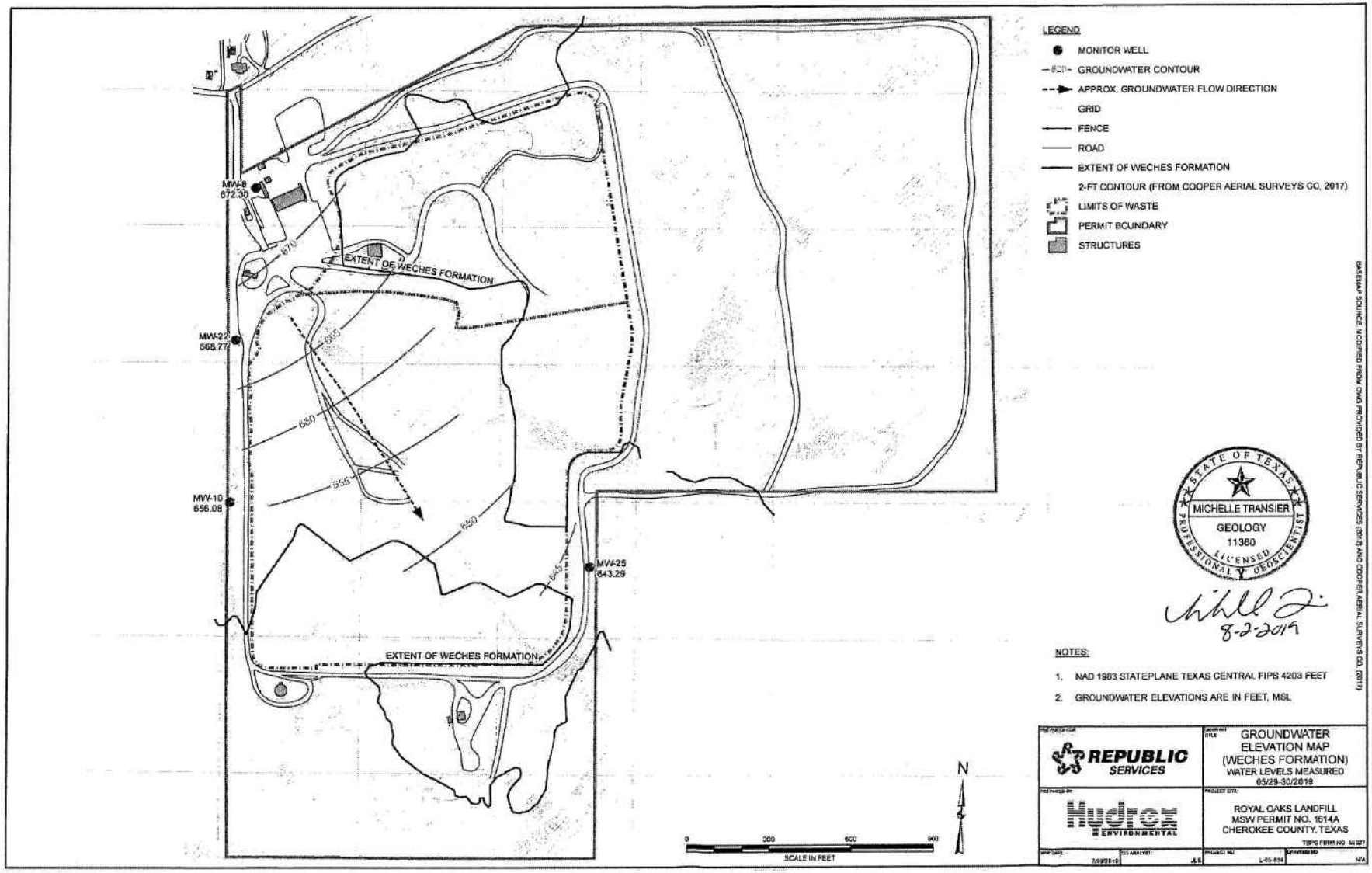

LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF WECHES FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-8
673.92
MW-22
589.51
MW-10
657.46
MW-25
642.88
EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2012) AND COOPER AERIAL SURVEYS CO. (2017)
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
2-8-2019
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
REPUBLIC SERVICES
GROUNDWATER ELEVATION MAP (WECHES FORMATION)
WATER LEVELS MEASURED 12/12/2018
Hydrex ENVIRONMENTAL
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50227
N
0
300
600
900
SCALE IN FEET

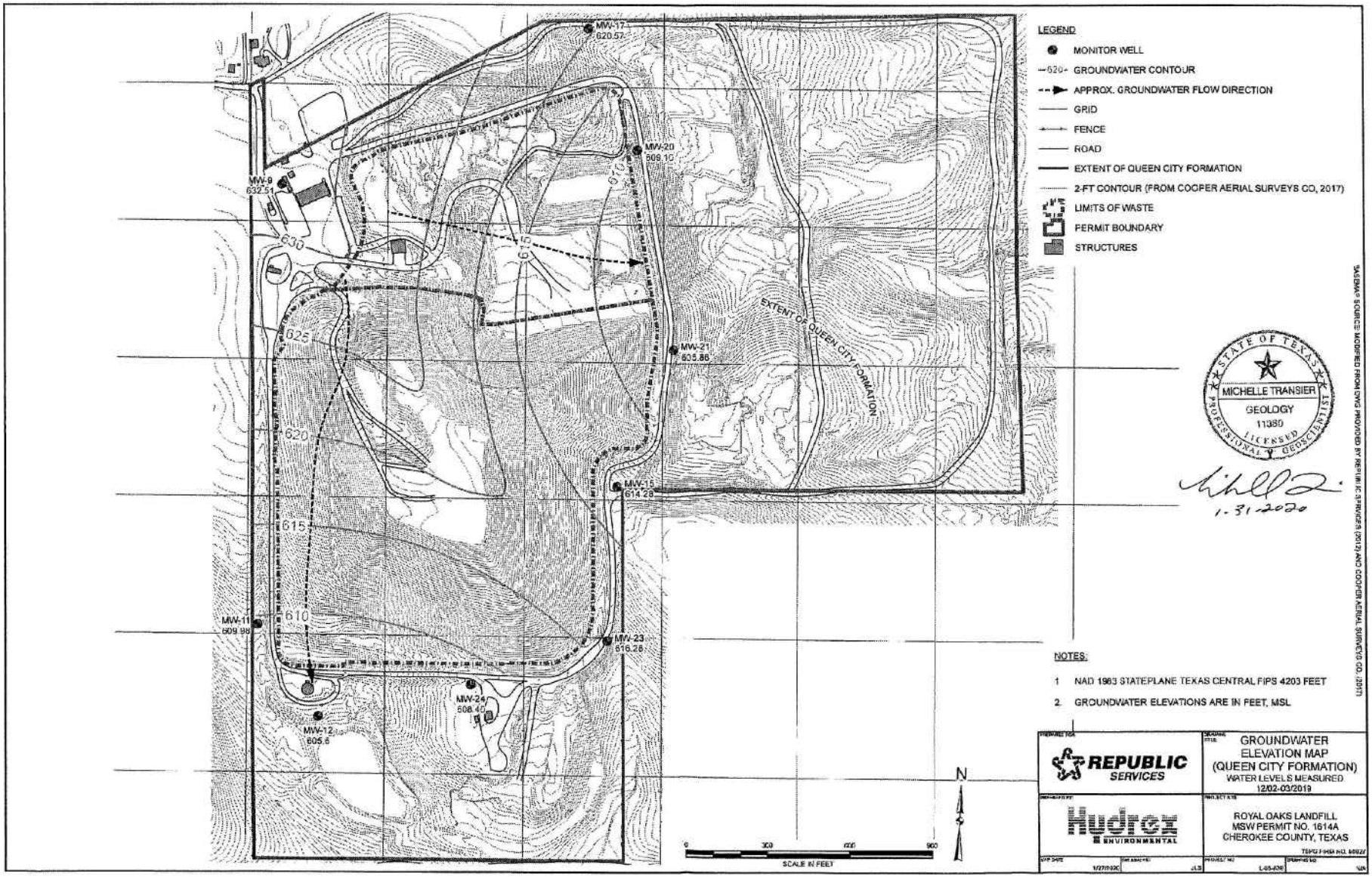

MW-17
623.35
MW-20
613.95
MW-9
631.94
MW-21
608.86
MW-15
617.51
MW-11
613.29
MW-23
624.01
MW-24
610.42
MW-12
606.74
EXTENT OF QUEEN CITY FORMATION
LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
*BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2018) AND COOPER AERIAL SURVEYS CO. (2017)
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
2-8-2019
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
0
300
600
900
SCALE IN FEET
N
REPUBLIC SERVICES
Hydrex ENVIRONMENTAL
GROUNDWATER ELEVATION MAP (QUEEN CITY FORMATION)
WATER LEVELS MEASURED 12/12/2018
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50027
1/11/2019
JLS
L-05-536
N/A

IIIG-E-205

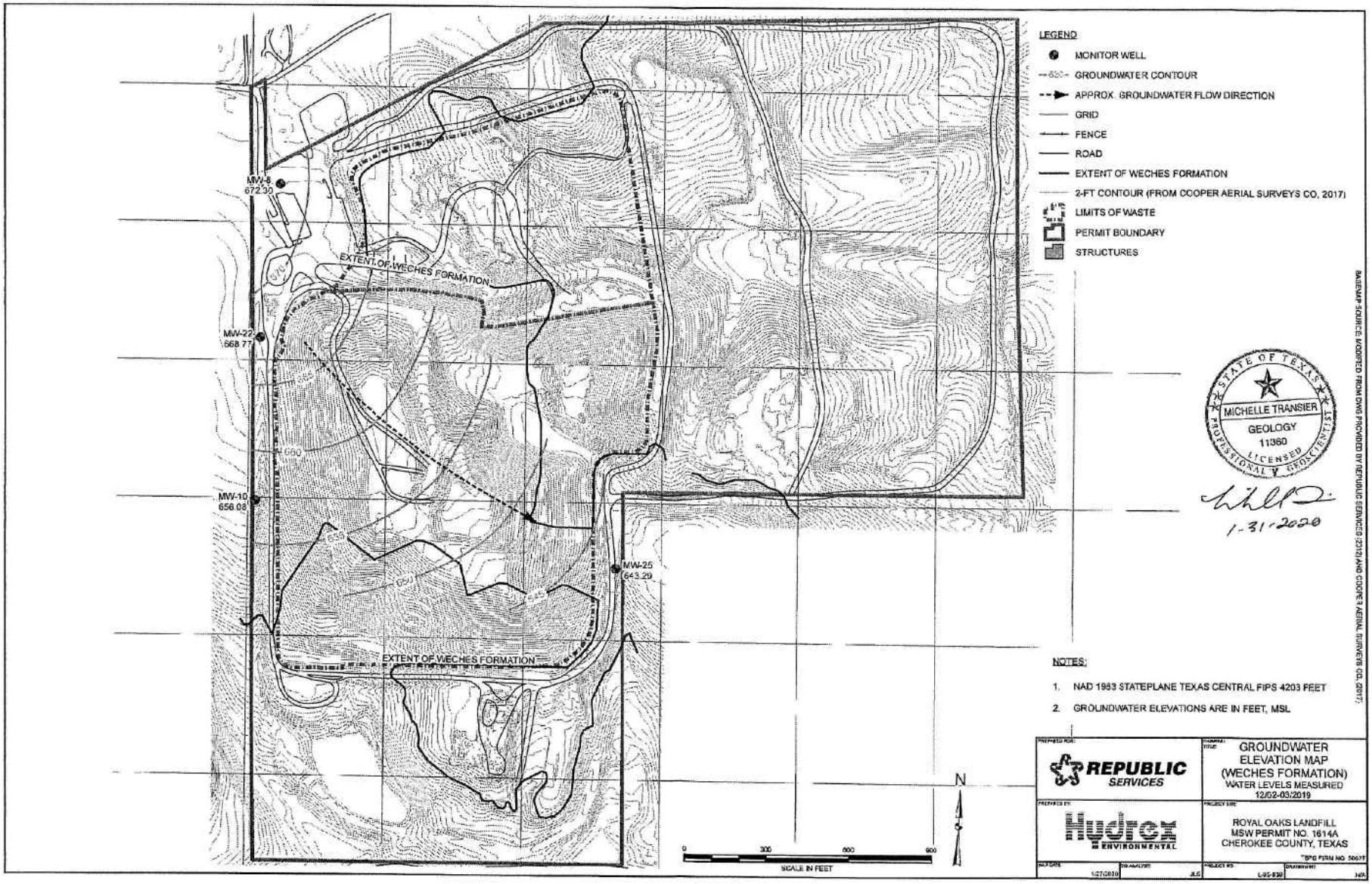

LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-17 625.90
MW-20 610.69
MW-9 633.97
MW-21 607.54
MW-15 618.21
MW-11 611.58
MW-23 622.74
MW-24 610.08
MW-12 606.88
EXTENT OF QUEEN CITY FORMATION
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
10-15-2019
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
SCALE IN FEET
N
REPUBLIC SERVICES
Hydrotex ENVIRONMENTAL
GROUNDWATER ELEVATION MAP
(QUEEN CITY FORMATION)
WATER LEVELS MEASURED
05/29-30/2019
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1514A
CHEROKEE COUNTY, TEXAS

IIIG-E-206

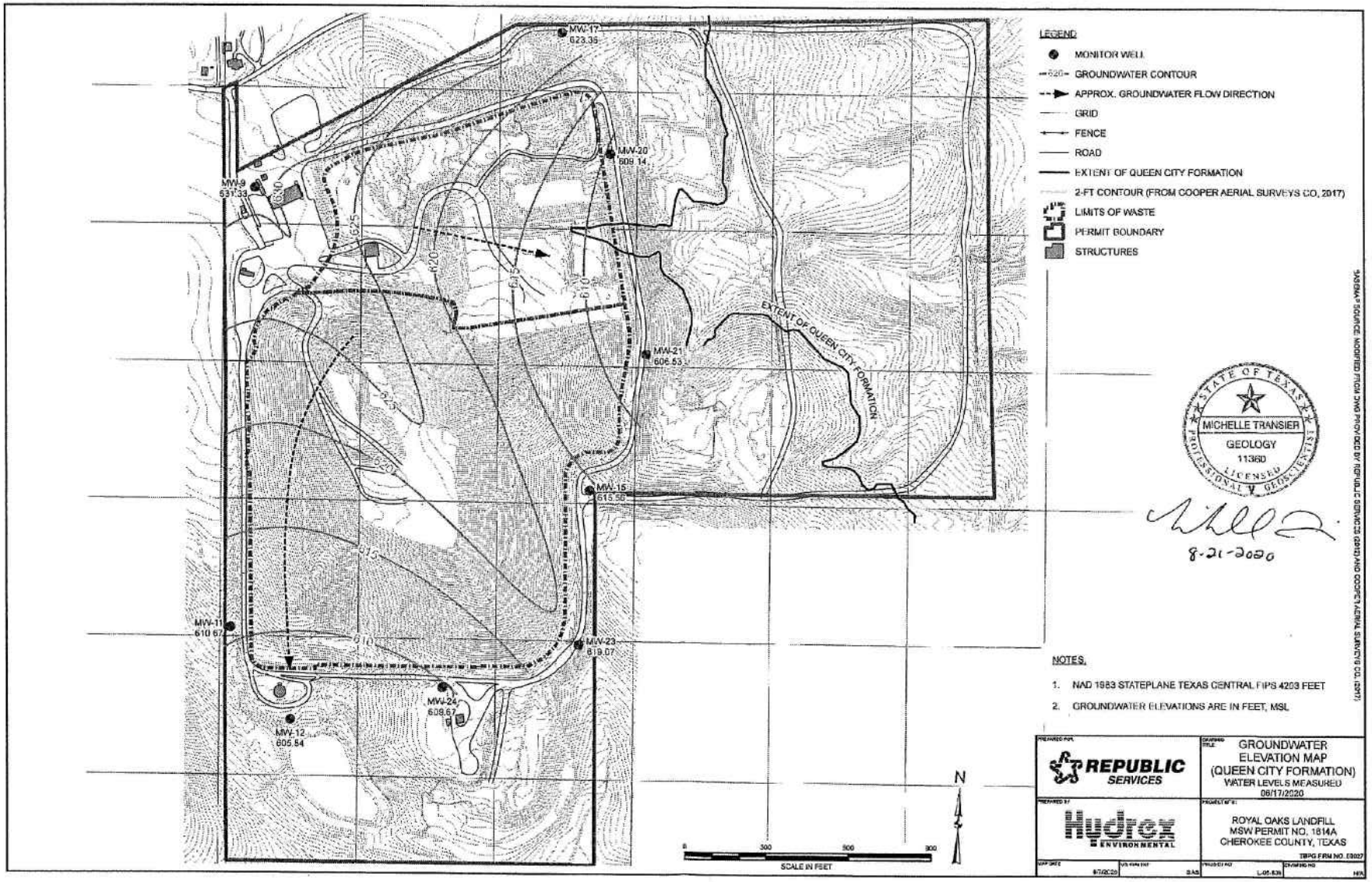

LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF WECHES FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-8
672.30
MW-22
668.77
MW-10
656.08
MW-25
643.29
EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
670
665
660
655
650
645
N
0
300
600
900
SCALE IN FEET
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
8-2-2019
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2019) AND COOPER AERIAL SURVEYS CO. (2017)
REPUBLIC SERVICES
Hydrotex ENVIRONMENTAL
GROUNDWATER ELEVATION MAP (WECHES FORMATION)
WATER LEVELS MEASURED 05/29-30/2019
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50327
7/9/2019
JLS
L-05-836
N/A


LEGEND
MONITOR WELL
620 GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-17 620.57
MW-20 609.10
MW-9 632.51
MW-21 605.86
MW-15 614.28
MW-11 609.90
MW-23 616.28
MW-24 608.40
MW-12 605.6
EXTENT OF QUEEN CITY FORMATION
630
625
620
615
610
MICHELLE TRANSIER
GEOLOGY
11380
LICENSED
PROFESSIONAL GEOSCIENTIST
STATE OF TEXAS
1-31-2020
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
SCALE IN FEET
N
REPUBLIC SERVICES
Hydrex ENVIRONMENTAL
GROUNDWATER ELEVATION MAP (QUEEN CITY FORMATION)
WATER LEVELS MEASURED 12/02-03/2019
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS

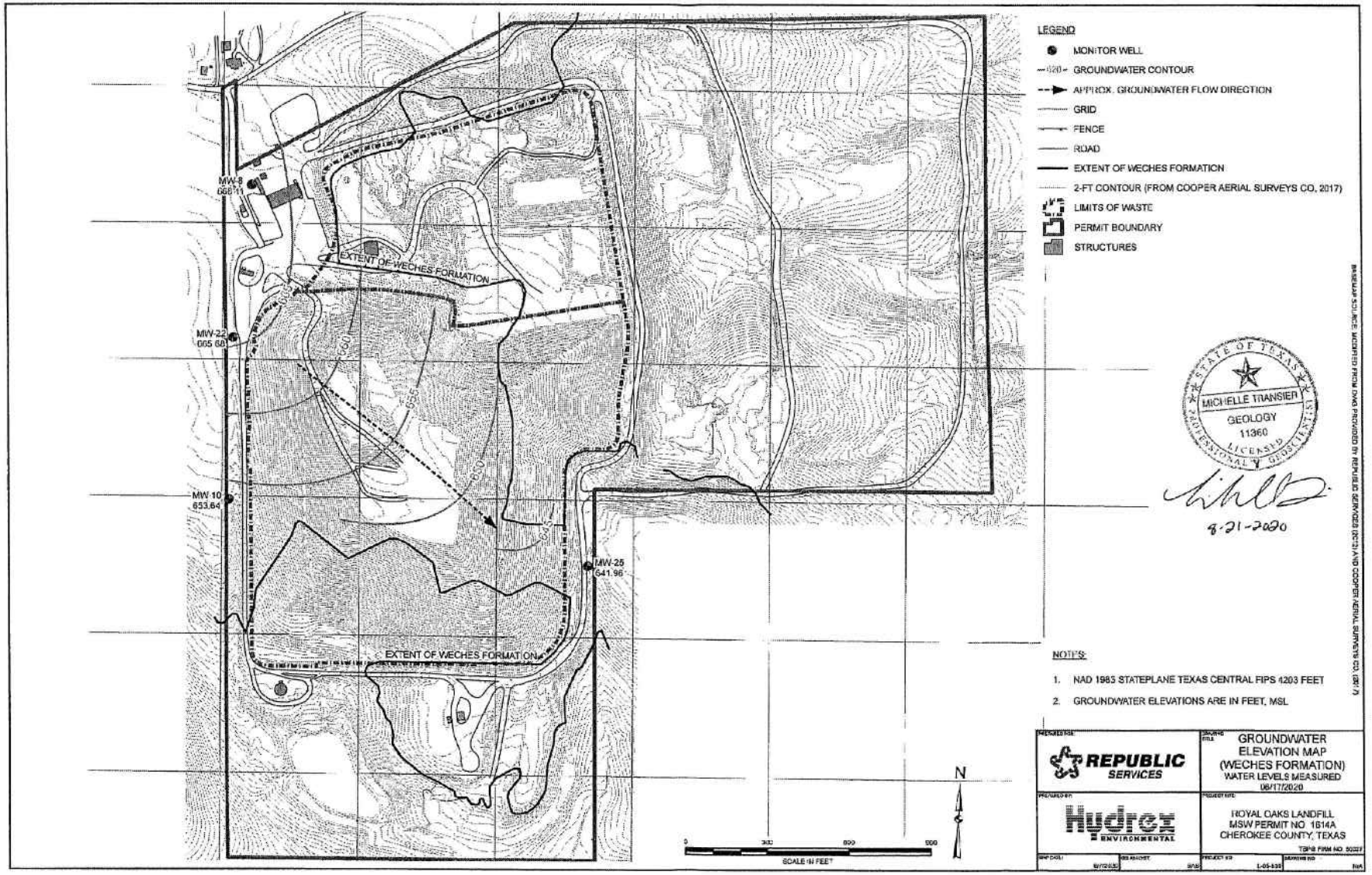
IIIG-E-208

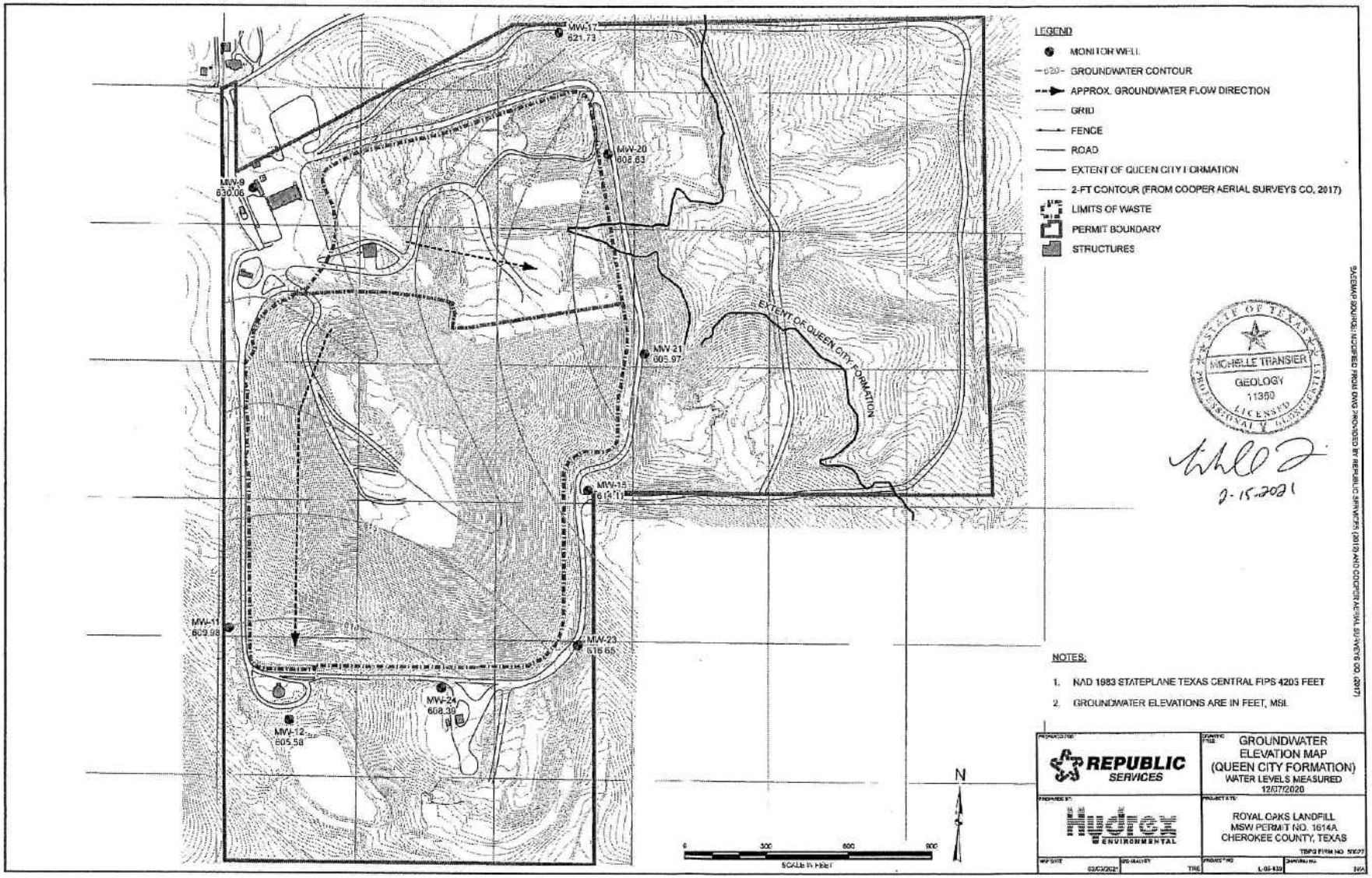

LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF WECHES FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-8
672.30
MW-22
668.77
MW-10
656.08
MW-25
643.29
EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
670
680
650
650
0
300
600
900
SCALE IN FEET
N
BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2212) AND COOPER AERIAL SURVEYS CO. (2017).
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
1-31-2020
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
REPUBLIC SERVICES
GROUNDWATER ELEVATION MAP (WECHES FORMATION)
WATER LEVELS MEASURED 12/02-03/2019
Hydrex ENVIRONMENTAL
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50031
12/7/2019
JLG
L05-830
N/A

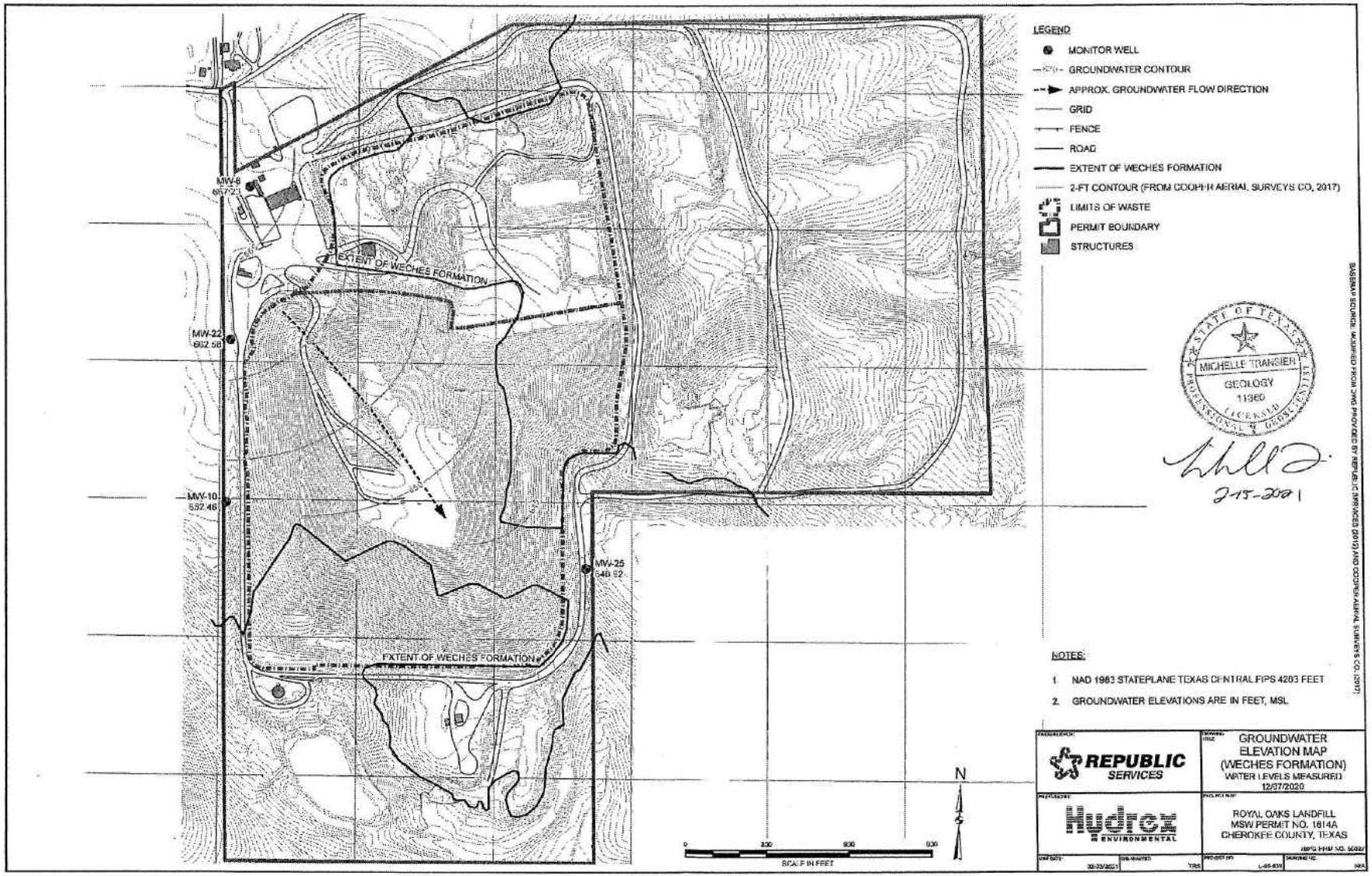
IIIG-E-209


MW-17
623.35
MW-20
609.14
MW-9
631.33
MW-21
606.53
MW-15
613.56
MW-11
610.67
MW-23
619.07
MW-24
608.67
MW-12
605.84
EXTENT OF QUEEN CITY FORMATION
LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
BASEMAP SOURCE MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2019) AND COOPER AERIAL SURVEYS CO. (2017)
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
8-21-2020
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
N
0
300
600
900
SCALE IN FEET
REPUBLIC SERVICES
Hydrex ENVIRONMENTAL
GROUNDWATER ELEVATION MAP (QUEEN CITY FORMATION)
WATER LEVELS MEASURED 08/17/2020
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1814A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50027
8/18/20
SAS
L-05-636
HFA

IIIG-E-210


LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF WECHES FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-8
668.11
MW-22
665.68
MW-10
653.64
MW-25
641.96
EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
650
655
660
665
670
675
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
STATE OF TEXAS
8-21-2020
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
REPUBLIC SERVICES
GROUNDWATER ELEVATION MAP
(WECHES FORMATION)
WATER LEVELS MEASURED
06/17/2020
Hydrex ENVIRONMENTAL
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
N
0
300
600
900
SCALE IN FEET


MW-17
621.73
MW-20
608.63
MW-9
630.06
MW-21
605.97
EXTENT OF QUEEN CITY FORMATION
MW-15
614.71
MW-11
609.98
MW-23
616.65
MW-24
608.39
MW-12
605.58
LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
BASEMAP SOURCED, MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2019) AND COOPER AERIAL SURVEYS CO. (2017)
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
2-15-2021
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
N
0
300
600
900
SCALE IN FEET
REPUBLIC SERVICES
Hydrex ENVIRONMENTAL
GROUNDWATER ELEVATION MAP (QUEEN CITY FORMATION)
WATER LEVELS MEASURED 12/07/2020
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50327
02/03/2021
TRE
L-05-839
N/A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GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF WECHES FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
MW-8
MW-22
552.58
MW-10
552.46
MW-25
548.52
EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
2-15-2021
BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2019) AND COOPER AERIAL SURVEYS CO. (2017)
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1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
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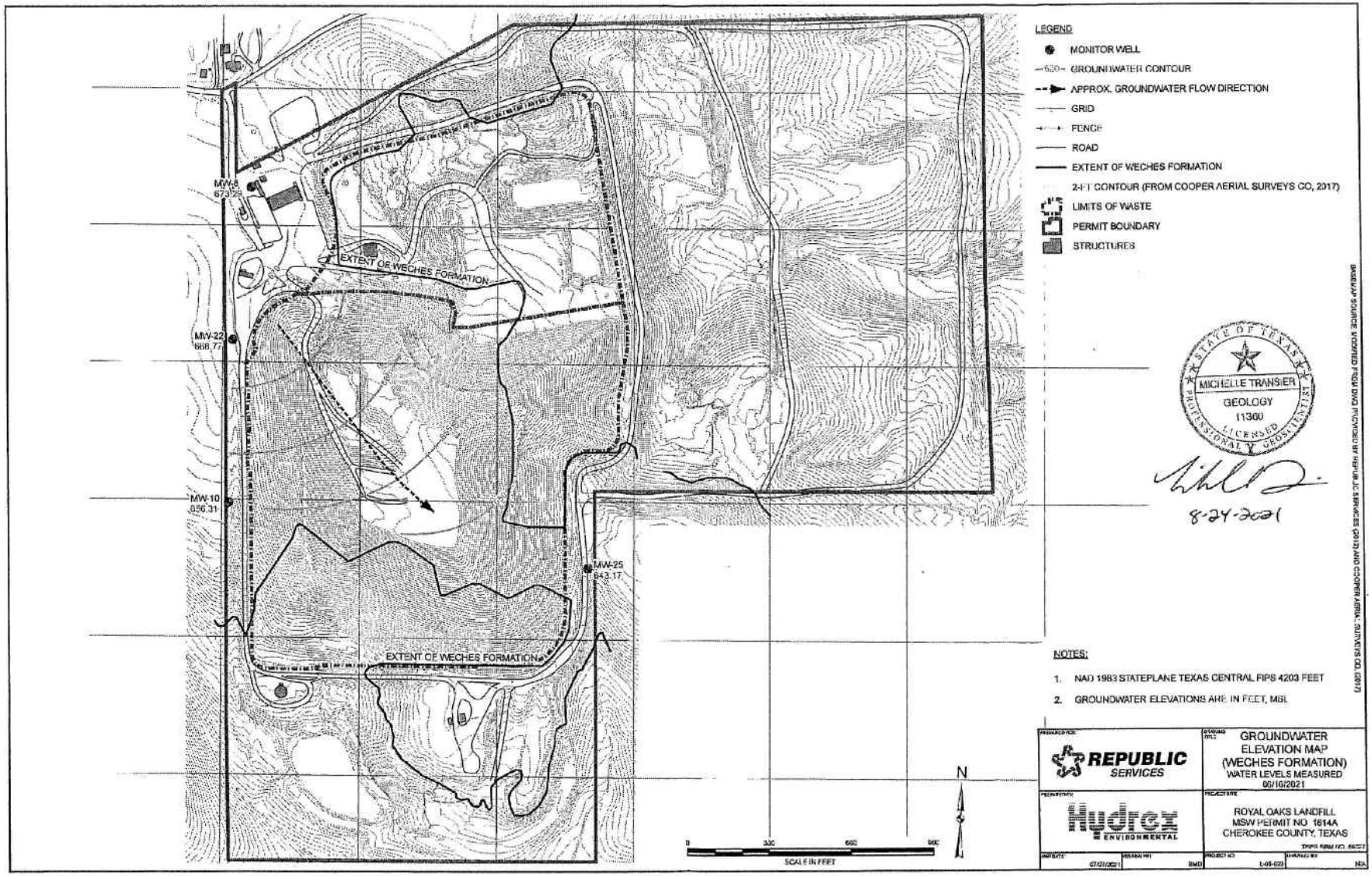
SCALE IN FEET
REPUBLIC SERVICES
Hydrex ENVIRONMENTAL
GROUNDWATER ELEVATION MAP
(WECHES FORMATION)
WATER LEVELS MEASURED
12/07/2020
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1814A
CHEROKEE COUNTY, TEXAS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FENCE
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EXTENT OF WECHES FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
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643.17
EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
N
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300
600
900
SCALE IN FEET
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
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8-24-2021
BASEMAP SOURCE: GEORREFED FROM DWG PROVIDED BY REPUBLIC SERVICES (2012) AND COOPER AERIAL SURVEYS CO. (2017)
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2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
REPUBLIC SERVICES
GROUNDWATER ELEVATION MAP (WECHES FORMATION)
WATER LEVELS MEASURED 06/16/2021
Hydrex ENVIRONMENTAL
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
07/07/2021
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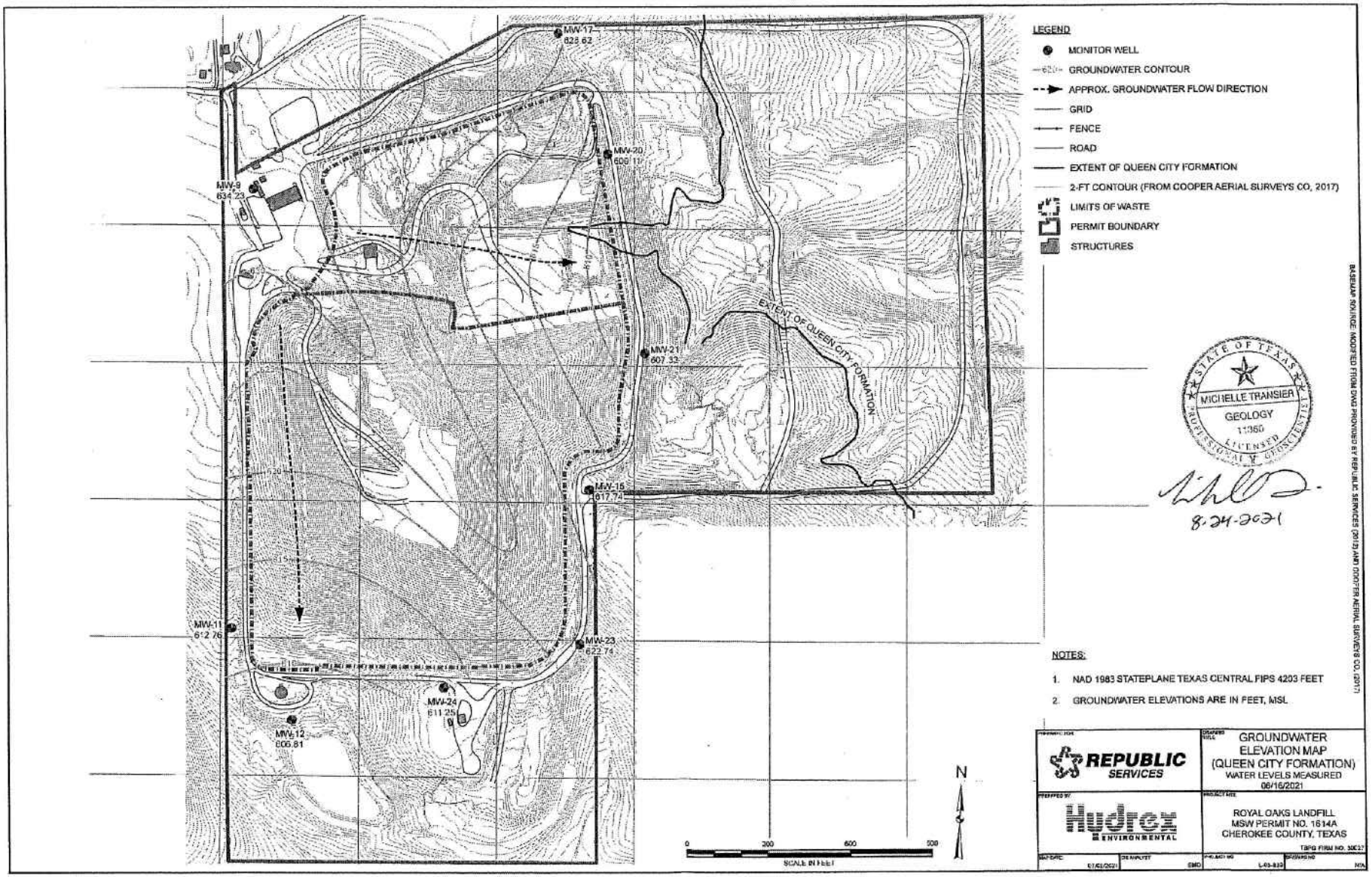
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MW-23
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MW-24
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MW-12
606.81
EXTENT OF QUEEN CITY FORMATION
LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
BASEMAP SOURCE: MODIFIED FROM DWG PROVIDED BY REPUBLIC SERVICES (2019) AND COOPER AERIAL SURVEYS CO. (2017)
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
8-24-2021
NOTES:
1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
0
200
600
800
SCALE IN FEET
N
REPUBLIC SERVICES
Hudson ENVIRONMENTAL
GROUNDWATER ELEVATION MAP (QUEEN CITY FORMATION)
WATER LEVELS MEASURED 06/16/2021
ROYAL OAKS LANDFILL
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CHEROKEE COUNTY, TEXAS
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8/24/2021
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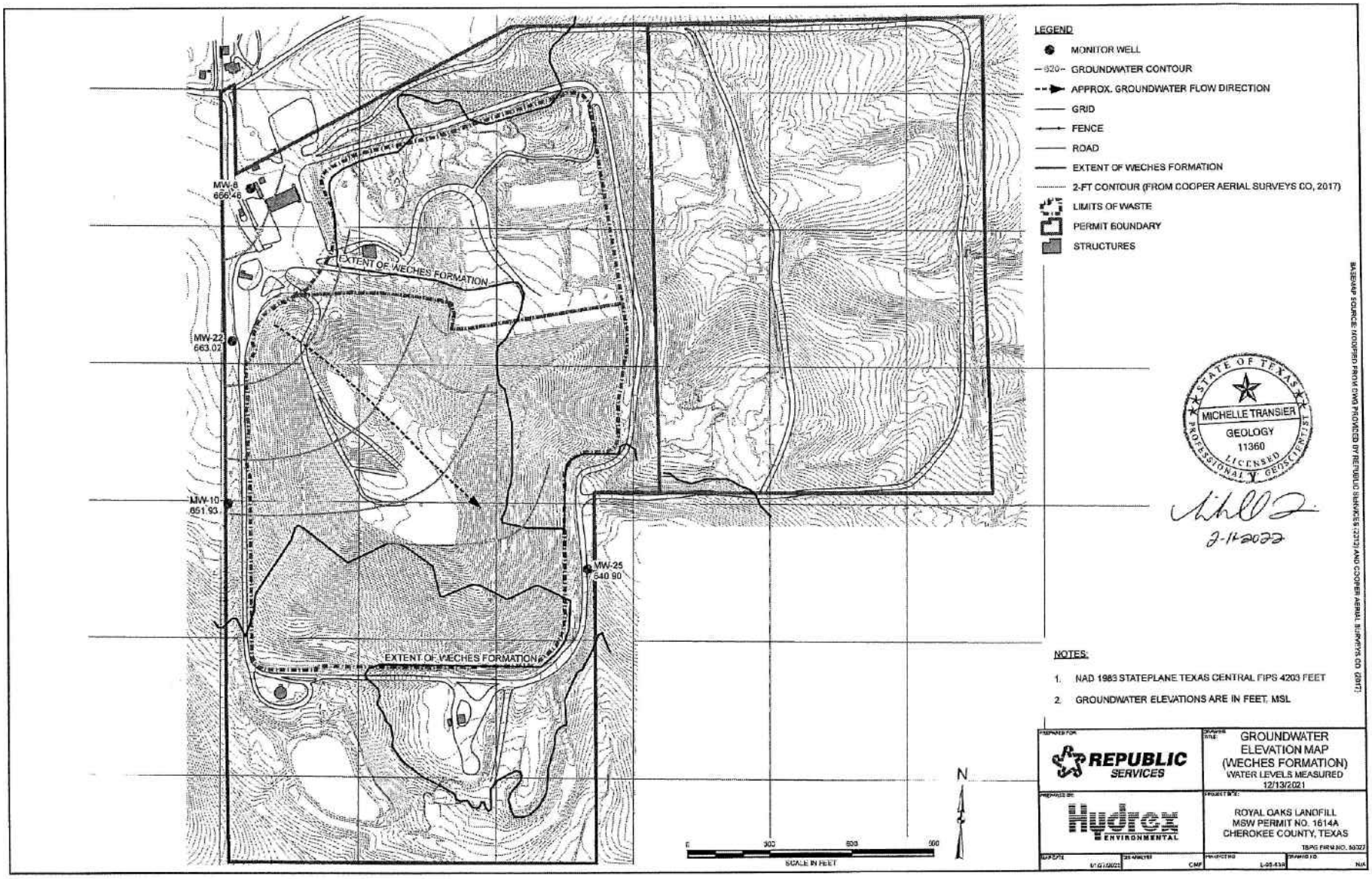
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APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF WECHES FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
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EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
STATE OF TEXAS
MICHELLE TRANSIER
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2-14-2022
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600
900
SCALE IN FEET
REPUBLIC SERVICES
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WATER LEVELS MEASURED 12/13/2021
Hydrex ENVIRONMENTAL
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CHEROKEE COUNTY, TEXAS
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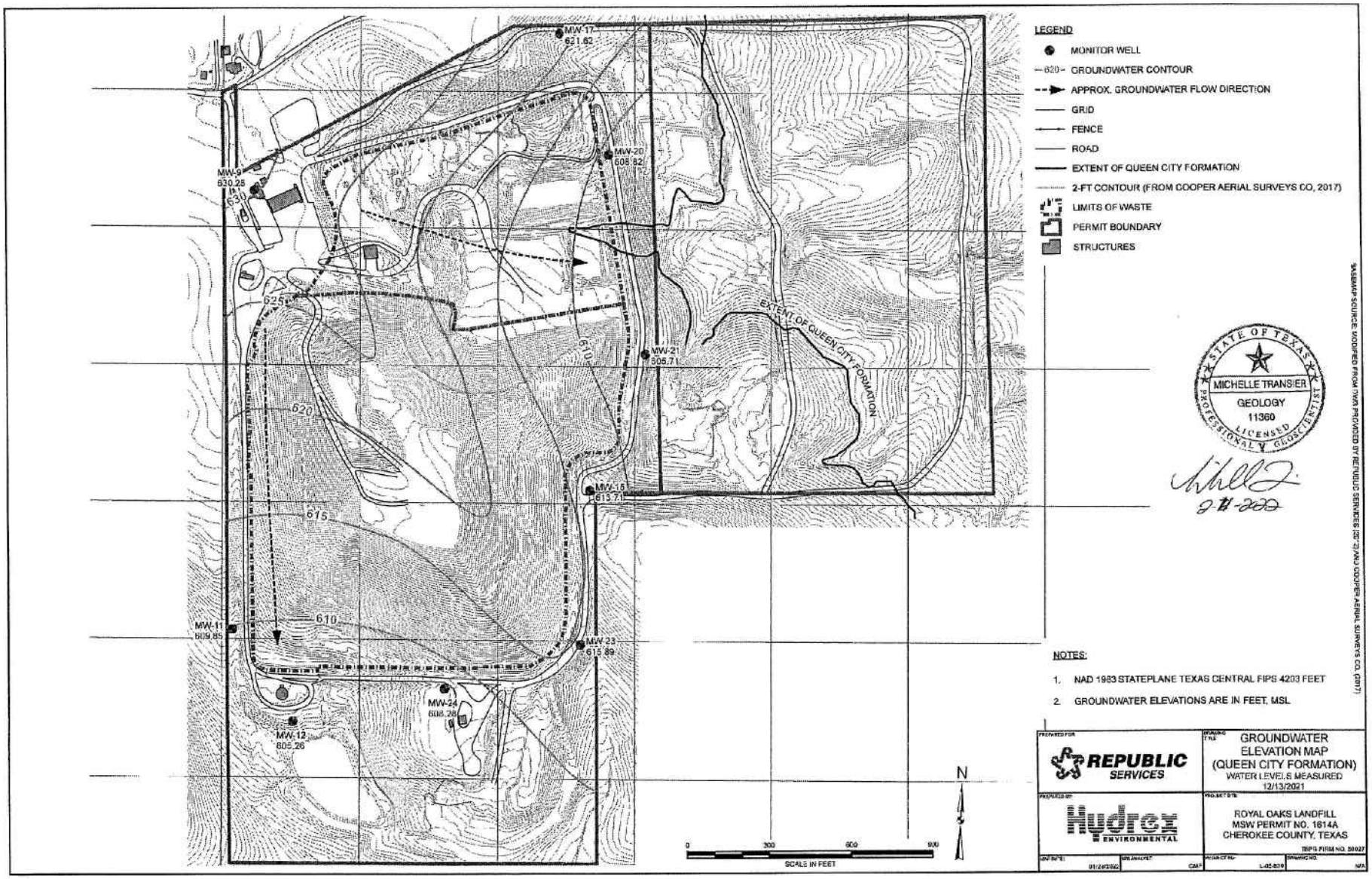
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MW-12
605.26
625
620
615
610
630
EXTENT OF QUEEN CITY FORMATION
LEGEND
MONITOR WELL
620 GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
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MICHELLE TRANSIER
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0 300 600 900
SCALE IN FEET
N
PREPARED FOR
REPUBLIC SERVICES
GROUNDWATER ELEVATION MAP (QUEEN CITY FORMATION)
WATER LEVELS MEASURED 12/13/2021
PREPARED BY:
Hydrex ENVIRONMENTAL
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPE FIRM NO. 50927
01/24/2022
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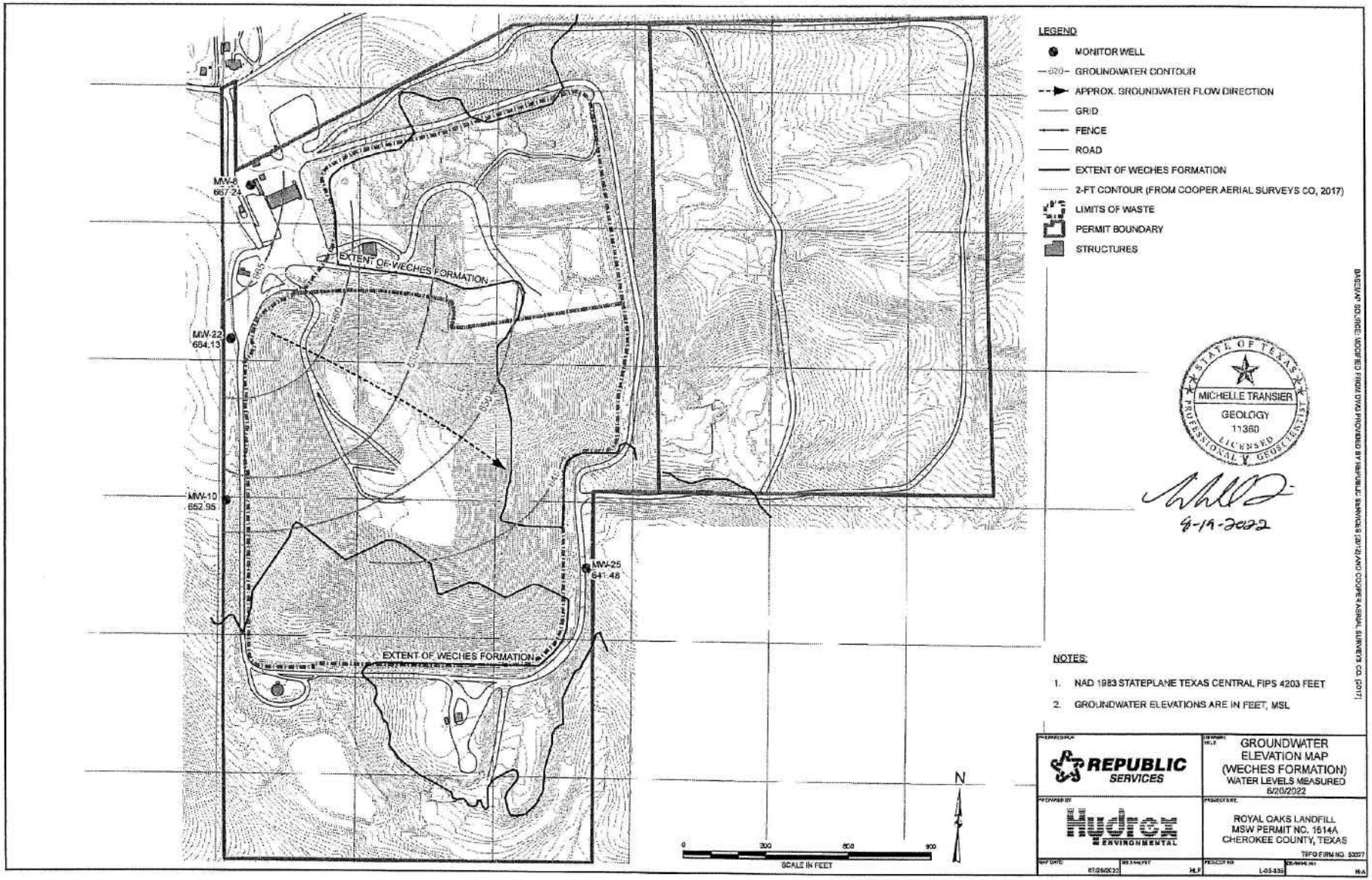
IIIG-E-217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ROAD
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2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
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641.48
EXTENT OF WECHES FORMATION
EXTENT OF WECHES FORMATION
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
9-19-2022
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REPUBLIC SERVICES
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WATER LEVELS MEASURED 6/20/2022
Hydrex ENVIRONMENTAL
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
TBPG FIRM NO. 50027
07/29/2022
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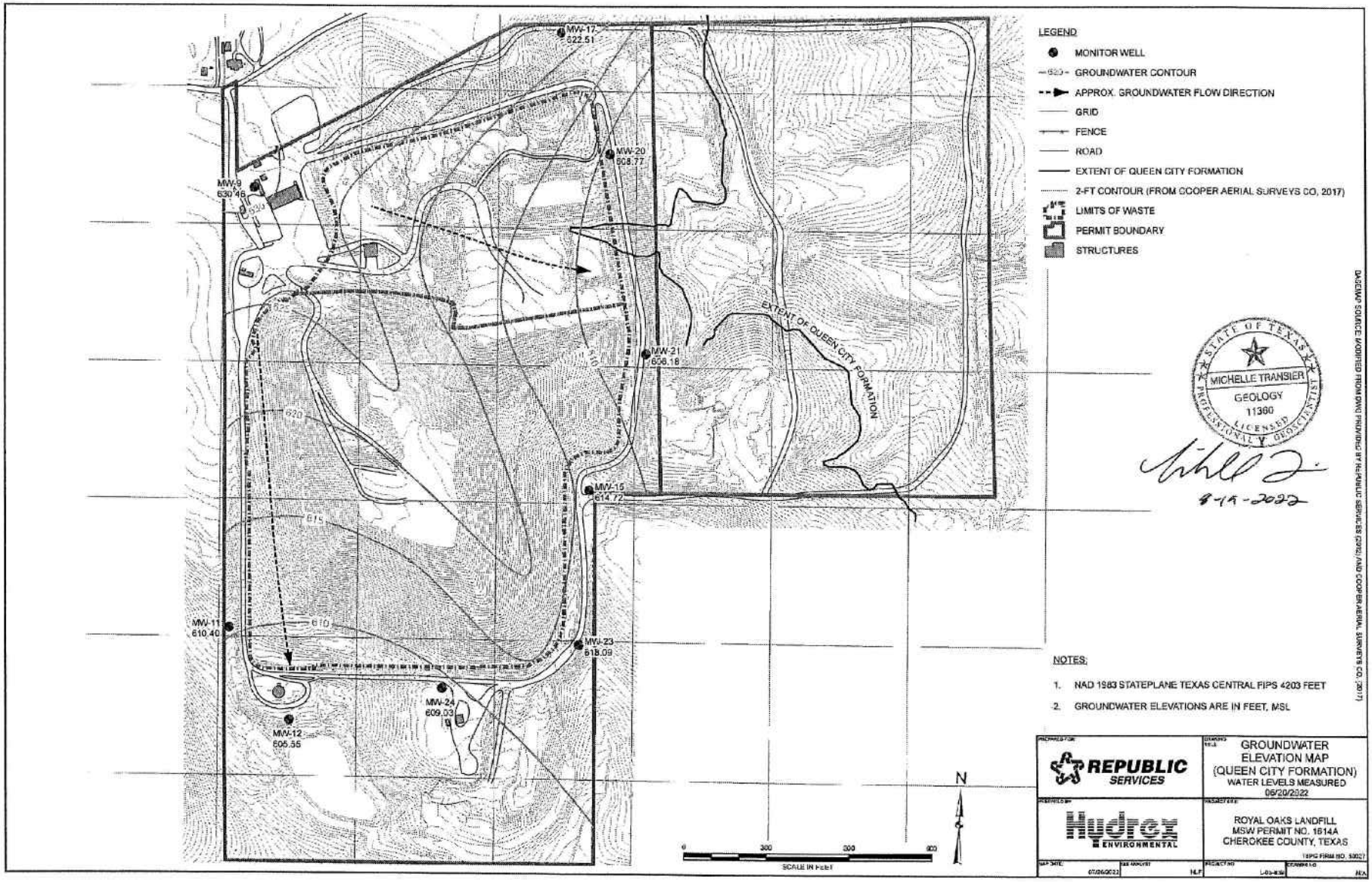
SCALE IN FEET

IIIG-E-218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MW-12
605.55
EXTENT OF QUEEN CITY FORMATION
LEGEND
MONITOR WELL
GROUNDWATER CONTOUR
APPROX. GROUNDWATER FLOW DIRECTION
GRID
FENCE
ROAD
EXTENT OF QUEEN CITY FORMATION
2-FT CONTOUR (FROM COOPER AERIAL SURVEYS CO, 2017)
LIMITS OF WASTE
PERMIT BOUNDARY
STRUCTURES
BASEMAP SOURCE MODIFIED FROM DWG FILE(S) BY HUDREX SERVICES (2022) AND COOPER AERIAL SURVEYS CO. (2017)
STATE OF TEXAS
MICHELLE TRANSIER
GEOLOGY
11360
LICENSED
PROFESSIONAL GEOSCIENTIST
8-19-2022
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1. NAD 1983 STATEPLANE TEXAS CENTRAL FIPS 4203 FEET
2. GROUNDWATER ELEVATIONS ARE IN FEET, MSL
N
0
300
600
900
SCALE IN Feet
REPUBLIC SERVICES
Hudrex ENVIRONMENTAL
GROUNDWATER ELEVATION MAP
(QUEEN CITY FORMATION)
WATER LEVELS MEASURED
06/20/2022
ROYAL OAKS LANDFILL
MSW PERMIT NO. 1614A
CHEROKEE COUNTY, TEXAS
07/26/2022
MLP
N/A

IIIG-E-219

Weaver Consultants Group

April 5, 2023
Project No. 0120-076-11

Mr. Mamadou Balde
Municipal Solid Waste Permits – MC 124
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Re: Notice of Deficiency Response – Soil Boring Plan for Major Permit Amendment
Royal Oaks Landfill – MSW Permit No. 1614A
Cherokee County, Texas
Tracking No. 28298392; CN600129530/RN101927010

Dear Mr. Balde:

On behalf of Pine Hill Farms Landfill TX, LP, please find enclosed one original and two copies of the replacement pages for the referenced Soil Boring Plan (SBP). The attached replacement pages were developed to incorporate comments included in the Notice of Deficiency (NOD) email dated March 8, 2023.

This response letter contains the items identified in the March 8, 2023, NOD email (in bold) with a response following each comment.

1. **Acknowledge that the subsurface investigations will be conducted only after executive director approval of the soil boring plan.**

**Response:**

The facility acknowledges that TCEQ-acceptance of the SBP is a prerequisite for approval of the subsurface characterization pursuant to the Major Permit Amendment application.

The full scope of proposed subsurface investigation activities are anticipated to take several months to complete. Due to scheduling and driller availability constraints, subsurface investigation activities began the week of March 6, 2023.

2. **Add to Figures A-2, B-4, and other applicable drawings the size (in acres) of the permitted and expansion areas and the locations of all the proposed boreholes.**

**Response:**

As requested, Figure A-2 (Site Plan) and Figure B-4 (Borehole Location Map) have been revised to indicate the size (in acres) of the permitted and proposed waste disposal unit areas.

Figure A-2 (Site Plan) serves to illustrate the facility's existing condition. However, the proposed borehole locations, and the locations of previously completed borings, are shown on Figure B-4 (Borehole Location Map).

3. **Consider additional borings to further characterize the subsurface of the expansion area, in accordance with Table of Borings (§330.63(e)(4)(B)). If borehole data was augmented by geophysical data such that additional borings was deemed unnecessary, summarize the complementary information that was obtained, referencing the method(s) and point locations of the geophysical investigation(s).**

**Response:**

Section 4.2.2 of the SBP discusses the number and depths of proposed expansion borings. Table 4-1 of the SBP summarizes the proposed expansion boring information. Title 30 of Texas Administrative Code (TAC) §330.63(e)(4)(C) (Table of Borings) indicates that a total of 12 borings (advanced to at least five feet below the EDE) are needed to characterize a 29.1-acre waste disposal area, with seven of the 12 borings advanced at least 30-feet below the EDE.

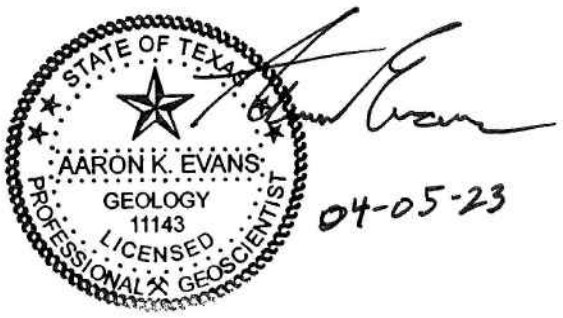
A total of 14 borings are proposed to characterize the geological and hydrogeologic subsurface conditions for the proposed lateral expansion area. This includes utilizing three previously-completed onsite borings (MW-5, MW-7, and B-24CC), advancing seven borings/piezometers around the expansion area (PWCG-1 through PWCG-7), advancing two borings/piezometers near the southwest and northwest extents of the facility Permit Boundary area (PWCG-8 and PWCG-9), and advancing two deep borings within the centermost portion of the expansion area (WCG-10 and WCG-11). The proposed piezometers (PWCG-1 through PWCG-9) will be utilized to characterize site-specific hydrogeological conditions beneath the expansion area and the greater Permit Boundary area. No geophysical investigations are proposed.

Site-specific data indicate that subsurface conditions are fairly uniform with Queen City Formation sediments outcropping across the majority of the expansion area and a vertical thickness of about 400-feet regionally.

The proposed plan allows for the evaluation of subsurface lithologic and hydrogeologic conditions for the proposed expansion area and the greater Permit Boundary area. During the course of subsurface investigation activities, if observations indicate that additional borings and/or piezometers are needed, the facility will notify TCEQ and complete the additional work as needed to adequately characterize subsurface conditions in accordance with regulatory requirements and pursuant to the proposed Major Permit Amendment application.

During the course of your review, if you need additional information or have any questions, please do not hesitate to call (817-735-9770).

Sincerely,
**Weaver Consultants Group, LLC**




Aaron Evans, P.G.
Senior Hydrogeologist

Attachments: Soil Boring Plan Replacement Pages

cc: TCEQ Region 5 Office
Site Operating Record, Royal Oaks Landfill
Adam Hart, Republic Waste Services of Texas, Ltd.
Austin Sparks, P.E., Republic Waste Services of Texas, Ltd.

# ATTACHMENT

# SOIL BORING PLAN REPLACEMENT PAGES

# ROYAL OAKS LANDFILL
# CHEROKEE COUNTY, TEXAS
# TCEQ PERMIT NO. MSW-1614B

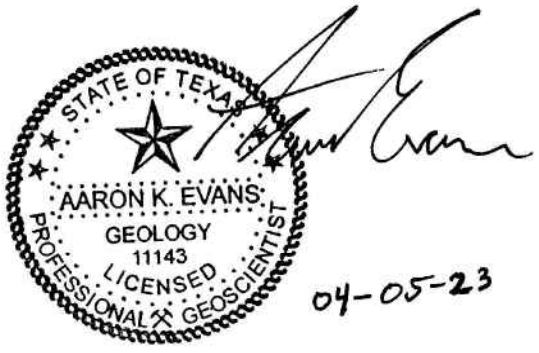
## SOIL BORING PLAN

Prepared for

Pine Hill Farms Landfill TX, LP

February 2023

Revised April 2023



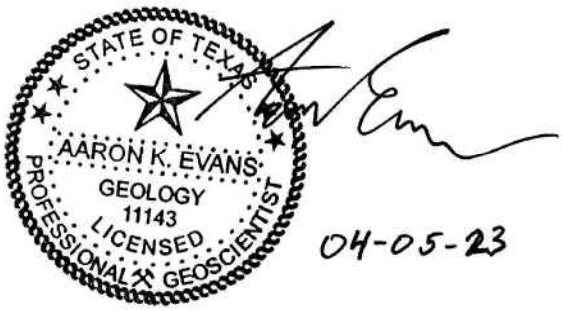

Prepared by

**Weaver Consultants Group, LLC**
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 0120-076-14-01

# APPENDIX A

# LANDFILL OVERVIEW DRAWINGS



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- 630 EXISTING CONTOUR
- N 9500 STATE PLANE COORDINATE
- MW-25 EXISTING GROUNDWATER MONITORING WELL
- GP-1 EXISTING GAS MONITORING PROBE
- ⚠ INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY COOPER AERIAL SURVEYS, CO. FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 20, 2021.
2. LOCATION COORDINATES AND SURFACE ELEVATIONS OBTAINED FROM SUBSURFACE INVESTIGATION AND INSTALLATION REPORT LITHOLOGIC LOGS, SUMMARY TABLES, AND LOCATION MAPS.

LIST OF REVISIONS:

1. REVISED CALLOUTS TO INDICATE THE SIZE OF THE PERMITTED AND PROPOSED WASTE DISPOSAL FOOTPRINT AREAS.

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

04-05-23

LIST OF REVISIONS:

1. ADDED EXISTING WASTE INFORMATION.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2023
FILE: 0120-074-11
CAD: FIG A-2-SITE PLAN.DWG
DRAWN BY: KAA
DESIGN BY: DS
REVIEWED BY: AKE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
PINE HILL FARMS LANDFILL TX, LP

| REVISIONS | | |
|---|---|---|
| NO. | DATE | DESCRIPTION |
| 1 | 04/2023 | SEE LIST OF REVISIONS |

SOIL BORING PLAN
SITE PLAN

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

WWW.WCGRP.COM

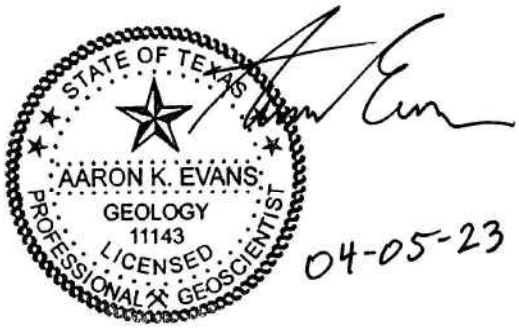
FIGURE A-2

COPYRIGHT © 2023 WEAVER CONSULTANTS GROUP. ALL RIGHTS RESERVED.

P:\Groundwater\Republic\Royal Oaks\2023 Expansion\SBP NOD\Appendix A\FIG A-2 SITE PLAN - RL50.dwg, 4/5/2023 3:02:31 AM, \\wc-fw-prn\W

# APPENDIX B

# GEOLOGY FIGURES



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- 630 EXISTING CONTOUR
- N 9500 STATE PLANE COORDINATE
- PROPOSED LATERAL EXPANSION AREA
- B-3 (650.0) PREVIOUSLY ADVANCED BOREHOLE LOCATION
- MW-1 (661.0) FORMER GROUNDWATER MONITORING WELL LOCATION
- GP-8 (666.0) FORMER GAS MONITORING PROBE LOCATION
- MW-25 (663.2) EXISTING GROUNDWATER MONITORING WELL LOCATION
- GP-1 (688.0) EXISTING GAS MONITORING PROBE LOCATION
- PWCG-1 (626.0) PROPOSED EXPANSION BOREHOLE & PIEZOMETER LOCATION
- WCG-10 (624.0) PROPOSED EXPANSION BOREHOLE LOCATION
- ⚠ INDICATES REVISION (SEE LIST OF REVISIONS)

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

04-05-23

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY COOPER AERIAL SURVEYS, CO. FROM AERIAL PHOTOGRAPHY FLOWN NOVEMBER 20, 2021.
2. LOCATION COORDINATES AND SURFACE ELEVATIONS OBTAINED FROM SUBSURFACE INVESTIGATION AND INSTALLATION REPORT LITHOLOGIC LOGS, SUMMARY TABLES, AND LOCATION MAPS.

LIST OF REVISIONS:

1. REVISED CALLOUTS TO INDICATE THE SIZE OF THE PERMITTED AND PROPOSED WASTE DISPOSAL FOOTPRINT AREAS.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 03/2023
FILE: 0120-076-11
CAD: FIG B-4-BOREHOLE LOCATION MAPLOWG

DRAWN BY: RAA
DESIGN BY: DS
REVIEWED BY: AKE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR:
PINE HILL FARMS LANDFILL TX, LP

| NO. | DATE | DESCRIPTION |
|---|---|---|
| 1 | 04/2023 | SEE LIST OF REVISIONS |

# SOIL BORING PLAN
# BOREHOLE LOCATION MAP

ROYAL OAKS LANDFILL
CHEROKEE COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE B-4

COPYRIGHT © 2023 WEAVER CONSULTANTS GROUP. ALL RIGHTS RESERVED.

P:\Groundwater\Republic\Royal Oaks\2023 Expansion\SAP NOV\Appendix B\FIG B-4 - BOREHOLE LOCATION MAP - RLSD.dwg, 4/5/2023 9:06:38 AM, Lasser MFP9 PC_6