Texas Commission on Environmental Quality

Waste Permits Division Correspondence Cover Sheet

Date: 12/13/2024
Facility Name: City of Stephenville Landfill
Permit or Registration No.: 664

Nature of Correspondence:
☐ Initial/New
☒ Response/Revision to TCEQ Tracking No.: 28474610 (from subject line of TCEQ letter regarding initial submission)

Affix this cover sheet to the front of your submission to the Waste Permits Division. Check appropriate box for type of correspondence. Contact WPD at (512) 239-2335 if you have questions regarding this form.

Table 1 - Municipal Solid Waste Correspondence

Applications	Reports and Notifications
☐ New Notice of Intent	☐ Alternative Daily Cover Report
☐ Notice of Intent Revision	☐ Closure Report
☐ New Permit (including Subchapter T)	☐ Compost Report
☐ New Registration (including Subchapter T)	☐ Groundwater Alternate Source Demonstration
☐ Major Amendment	☐ Groundwater Corrective Action
☐ Minor Amendment	☐ Groundwater Monitoring Report
☒ Limited Scope Major Amendment	☐ Groundwater Background Evaluation
☐ Notice Modification	☐ Landfill Gas Corrective Action
☐ Non-Notice Modification	☐ Landfill Gas Monitoring
☐ Transfer/Name Change Modification	☐ Liner Evaluation Report
☐ Temporary Authorization	☐ Soil Boring Plan
☐ Voluntary Revocation	☐ Special Waste Request
☐ Subchapter T Disturbance Non-Enclosed Structure	☐ Other:
☐ Other:	

Table 2 - Industrial & Hazardous Waste Correspondence

Applications	Reports and Responses
☐ New	☐ Annual/Biennial Site Activity Report
☐ Renewal	☐ CPT Plan/Result
☐ Post-Closure Order	☐ Closure Certification/Report
☐ Major Amendment	☐ Construction Certification/Report
☐ Minor Amendment	☐ CPT Plan/Result
☐ CCR Registration	☐ Extension Request
☐ CCR Registration Major Amendment	☐ Groundwater Monitoring Report
☐ CCR Registration Minor Amendment	☐ Interim Status Change
☐ Class 3 Modification	☐ Interim Status Closure Plan
☐ Class 2 Modification	☐ Soil Core Monitoring Report
☐ Class 1 ED Modification	☐ Treatability Study
☐ Class 1 Modification	☐ Trial Burn Plan/Result
☐ Endorsement	☐ Unsaturated Zone Monitoring Report
☐ Temporary Authorization	☐ Waste Minimization Report
☐ Voluntary Revocation	☐ Other:
☐ 335.6 Notification	
☐ Other:	

BIGGS & MATHEWS ENVIRONMENTAL, INC
TBPE No. F-256 TBPG No. 50222

December 13, 2024

Ms. Charly Fritz, Deputy Director
Ms. Megan Henson, Manager
Office of Waste, Waste Permits Division
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, Texas 78711-3087

Re: City of Stephenville – Erath County
Municipal Solid Waste (MSW) – MSW Permit No. 664
Type IV Permit Application – Addendum 2 to NOD 2 Response
Communication Tracking No. 28474610, RN102214566/CN600627814

Dear Ms. Fritz and Henson:

This Addendum 2 to the NOD 2 response dated May 8, 2024, is submitted on behalf of City of Stephenville for the Type IV Limited Scope Permit Amendment Application submitted March 31, 2023. Below is a list of changes included with this addendum.

- Attachment 4B – Site Geology Report has been provided to present a summary of historic data. The historic geological data and analysis presented in Attachment 4B includes permeability/hydraulic conductivity testing results, piezometer data, and subsurface investigations from 1972-1994. The data demonstrates consistently low permeability clay-dominated geology and area wells utilizing deep groundwater with the majority of the water wells screened approximately 300 feet below ground surface. The data supports the geologist's conclusion in Attachment 4 that the City of Stephenville should be allowed to continue to not monitor groundwater at the facility.

- Page III-5A, Site Development Plan – The last paragraph was revised to state the following:

    - "During the development of cells over the Pre-Subtitle D area, soils will be stripped of vegetation and a geotechnical engineer shall inspect and test the soils for suitable properties. Soils shall meet the requirements for constructed liners in accordance with the approved SLQCP and 30 TAC §330.339. Upon cell completion, a SLER will be submitted in accordance with §330.341."

- Table 8-1, 8-2, Page 8-1-4 and 8-2-2, Attachment 8 – Cost Estimate for Closure and Post Closure Care – LFG probes to be installed during final closure updated.

- Page 12-4-8 and 12-4-9, Appendix 12-4 – Final Cover Quality Control Plan – Sections 3.8.2 and 4.3 were revised to correct section references to Section 3.8.1, 3.8.3.

Sincerely,

BIGGS & MATHEWS ENVIRONMENTAL
TBPE No. F-256 ◆ TBPG No. 50222

Felipe A. Wescoup, P.E.
Senior Engineer

Attachments: City of Stephenville Limited Scope Permit Amendment – Addendum 1 to NOD 2

cc: Mr. Nick Williams, P.E., Director of Public Works, City of Stephenville
Mr. Doug Svien, Mayor, City of Stephenville

Texas Commission on Environmental Quality

Part I Application Form for New Permit, Permit Amendment, or Registration for a Municipal Solid Waste Facility

Application Tracking Information

Facility Name: City of Stephenville Landfill

Permittee or Registrant Name: City of Stephenville

MSW Authorization Number: 664

Initial Submission Date: 03/31/2023

Revision Date: 12/13/2024

Instructions for completing this Part I Application Form are provided in TCEQ 00650-instr[1]. Include a Core Data Form (TCEQ 10400)[2] with the application for the facility owner, and another Core Data Form for the operator if different from the owner. If you have questions, contact the Municipal Solid Waste Permits Section by email to mswper@tceq.texas.gov, or by phone at 512-239-2335.

Application Data

1. Submission Type	
☐ Initial Submission	■ Notice of Deficiency (NOD) Response

2. Authorization Type	
■ Permit	☐ Registration

3. Application Type	
☐ New Permit	
☐ Permit Major Amendment	■ Permit Limited Scope Major Amendment
☐ New Registration	

[1] www.tceq.texas.gov/downloads/permitting/waste-permits/msw/forms/00650-instr.pdf
[2] www.tceq.texas.gov/goto/coredata

Signature Page

Site Operator or Authorized Signatory

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: Nick Williams, PE, CFM Title: Director of Public Works

Email Address: nwilliams@stephenvilletx.gov

Signature: _____ Date: 12/13/2024

Operator or Principal Executive Officer Designation of Authorized Signatory

To be completed by the operator if the application is signed by an authorized representative for the operator.

I hereby designate _____ as my representative and hereby authorize said representative to sign any application, submit additional information as may be requested by the Commission; and/or appear for me at any hearing or before the Texas Commission on Environmental Quality in conjunction with this request for a Texas Water Code or Texas Solid Waste Disposal Act permit. I further understand that I am responsible for the contents of this application, for oral statements given by my authorized representative in support of the application, and for compliance with the terms and conditions of any permit which might be issued based upon this application.

Operator or Principal Executive Officer Name: _____

Email Address: _____

Signature: _____ Date: _____

Notary

SUBSCRIBED AND SWORN to before me by the said Nick Williams

On this 13th day of December, 2024

My commission expires on the 31 day of October, 2027

_____

Notary Public in and for

Erath County, Texas

JACEY KAY WOOD
Notary Public, State of Texas
Comm. Expires 10-31-2027
Notary ID 134627689

Note: Application Must Bear Signature & Seal of Notary Public

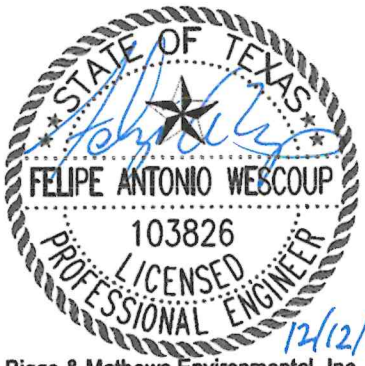
CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
ERATH COUNTY, TEXAS
TCEQ PERMIT NO. MSW 664

PART III
SITE DEVELOPMENT PLAN

Prepared for

City of Stephenville

March 2023
Revised August 2023
Revised May 2024
Revised December 2024



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-256

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

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12/12/2024

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
ERATH COUNTY, TEXAS
TCEQ PERMIT NO. MSW 664

LIMITED SCOPE PERMIT AMENDMENT

PART III
SITE DEVELOPMENT PLAN
NARRATIVE

Prepared for

City of Stephenville

March 2023
Revised August 2023
Revised May 2024
Revised December 2024

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

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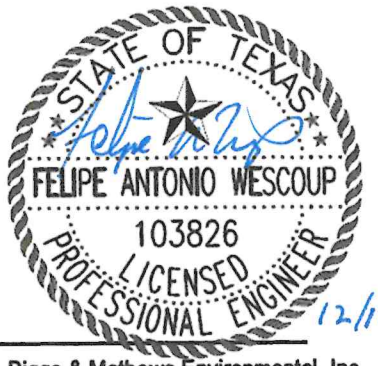
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-256

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

CONTENTS



12/12/2024

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

detailed on the Plan of Final Cover Evaluation Locations. Refer to Appendix IIIB – Historical Information for the existing liner and final cover descriptions and locations.

During the development of cells over the Pre-Subtitle D area, soils will be stripped of vegetation and a geotechnical engineer shall inspect and test the soils for suitable properties. Soils shall meet the requirements for constructed liners in accordance with the approved SLQCP and 30 TAC §330.339. Upon cell completion, a SLER will be submitted in accordance with §330.341.

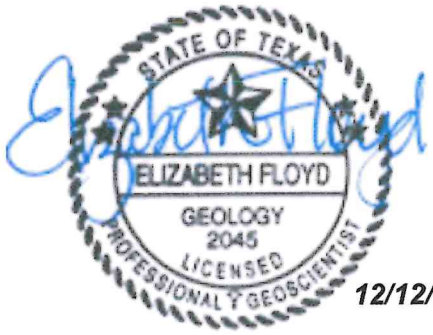
STEPHENVILLE TYPE IV LANDFILL
ERATH COUNTY, TEXAS
TCEQ PERMIT NO. MSW-664

ATTACHMENT 4B
SITE GEOLOGY REPORT

Prepared for

City of Stephenville

December 2024



12/12/2024

Biggs and Mathews Environmental, Inc.
Registration No. 50222

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 ◆ Mansfield, Texas 76063 ◆ 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

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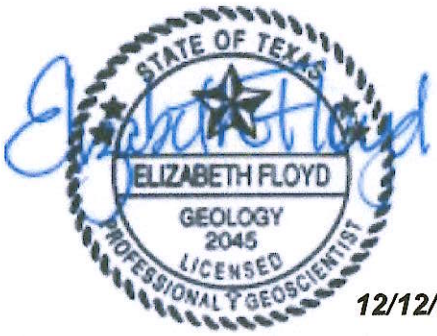
Drawings



12/12/2024

Biggs and Mathews Environmental, Inc.
Registration No. 50222

Appendix A – Historic Documents

1.0 GENERAL SITE GEOLOGY

Biggs and Mathews Environmental, Inc. (BME) constructed four geologic cross sections of the site using an amalgam of subsurface exploration data collected from the years 1972, 1986, 1987, 1990, 1991, and 1994 (Drawings 3 through 6). The cross sections illustrate generalized subsurface conditions at the site and are based on lithologic and stratigraphic data from logs of borings provided in Appendix A – Historic Documents. Drawing 2 shows the locations of the cross sections on a site map.

Generally, clays are found as the predominant material throughout the borings on the site map (Drawings 1 and 2). Clay with silt constitutes the majority of surficial material extending to a depth of approximately 55 feet below ground surface (bgs). Occasional limestone and/or caliche can be found at the surface or interbedded between clays and silty clays near the surface, particularly in the northern portion of the site. Discontinuous and non-correlatable sporadic clay with sand and sand lenses can be observed within the dominant clay with silt material. Granular material is correlatable across the site in borings that terminate at depths which extend beyond approximately 1430 feet below mean sea level (ft/msl). This deeper material was generally classified as sandstone, silt with sand, and clay with sand. Piezometers installed on-site were screened in the deeper granular material. Refer to Appendix A for individual boring logs.

2.0 PERMEABILITY AND HYDRAULIC CONDUCTIVITY

Texas Testing Laboratories (TTL) performed a surface investigation on what was to become the City of Stephenville Landfill. In 1972, TTL drilled six test borings (#1, #2, #3, #4, #5, #6) in an effort to evaluate the site for the potential use as a landfill (Drawing 1 – Facility Site Plan). One soil sample from each boring was tested for permeability using a constant head permeameter. The results from the permeability tests are summarized in Table 1and can also be found in Appendix A. Texas Testing Laboratories opined that the permeability testing results demonstrated sufficiently impervious soil characteristics at the site and the soil would adequately seal the landfill operation from passage of water into the surrounding subsurface. Refer to appended TTL 1972 Surface Investigation Report for more detail about the drilling process, testing analysis, and individual boring logs (Appendix A).

Table 1

TTL 1972 Permeability Testing Summary						
Boring ID	Depth (feet)	Lithology	Soil Class	Plasticity Index	Permeability (cm/sec)	Test Duration
1	16	Sandy clay	CL	24	2.33×10^{-9}	54 hours
2	10	Sandy clay	CL	21	$< 1 \times 10^{-7}$	54 hours
3	17	Sandy clay	CL	27	$< 1 \times 10^{-7}$	54 hours
4	11	Clay	CH	41	2.3×10^{-9}	72 hours
5	16.5	Sandy clay	CL	13	1.2×10^{-7}	48 hours
6	6	Caliche	CL	17	2.84×10^{-7}	24 hours

Southwestern Laboratories (SWL) conducted soil liner evaluation reports (SLER) during the years of 1986 and 1987 at the City of Stephenville Landfill. The 1986 evaluation included three borings (B-1, B-2, B-3) and the 1987 evaluation included four borings (Boring-1 through Boring-4). The locations of these borings can be seen on Drawing 1. The summary of the 1986 and 1987 SLER testing events is represented in Table 2 and can also be found in Appendix A. Individual boring logs for the 1986 and 1987 SLER events can be found in Appendix A.

Table 2

Summary of SLER Tests					
1986					
Boring ID	Depth (feet)	Type of Material	Moisture Content (%)	Plasticity Index	Hydraulic Conductivity (k) (cm/sec)
B-1	2-3	Very silty caliche clay	15	12	-
B-1	4-5	Very silty, sandy clay	11	10	$3.8x10^{-7}$
B-1	9-10	Sandy clay	17	16	$7.8x10^{-9}$
B-1	14-15	Silty clay	18	28	$8.7x10^{-10}$
B-1	24-25	Clay	23	31	-
B-1	34-35	Silty Clay	14	23	$9x10^{-9}$
B-2	4-5	Very silty sandy caliche clay	10	11	$5.5x10^{-8}$
B-2	9-10	clay	19	30	-
B-2	14-15	Silty clay	16	25	$1.1x10^{-9}$
B-2	19-20	Silty clay	18	25	$3.2x10^{-9}$
B-2	29-30	Sandy clay	14	26	-
B-3	4-5	Very silty sandy caliche clay	10	12	$7.2x10^{-8}$
B-3	9-10	Clay	17	30	-
B-3	14-15	Silty clay	14	25	$8.5x10^{-10}$
B-3	24-25	Sandy clay	12	26	$5.7x10^{-9}$
1987					
Boring ID	Depth (feet)	Type of Material	Moisture Content (%)	Plasticity Index	Hydraulic Conductivity (k) (cm/sec)
Boring-1	2-3	Very silty clay	8	13	-
Boring-1	7-8	Very silty clay with limestone	11	12	$8.6x10^{-8}$
Boring-1	19-20	Very silty clay	15	15	-
Boring-1	24-25	Very silty clay	11	-	-
Boring-1	34-35 39-40	Clay	16	37	-
Boring-2	0-1	Sandy clay	8	14	-
Boring-2	19-20	Very silty clay	13	14	$3.3x10^{-9}$
Boring-2	24-25	Very silty clay	11	17	-
Boring-2	29-30	Clay	11	-	-
Boring-3	4-5	Very silty clay with limestone	5	13	-
Boring-3	19-20	Very silty clay with limestone	17	-	-
Boring-3	24-25 29-30	Silty clay with silty sand	11	-	-
Boring-3	34-35 39-40	Clay	13	19	$3.2x10^{-9}$
Boring-4	2-3	Very silty clay	2	10	-
Boring-4	7-8 9-10	Very silty clay and limestone	4	11	-
Boring-4	14-15	Very silty clay	9	12	-
Boring-4	19-20 24-25	Very silty clay with silty sand	10	14	-
Boring-4	29-30	Clay	22	-	-
Boring-4	34-35 39-40	Sandy clay	16	24	$3.5x10^{-8}$

3.0 PIEZOMETERS

Five piezometers were installed on-site under the supervision, and subsequent analysis, of TEAM Consultants, Inc. (TEAM). The installation of five piezometers (P-1, P-2, P-3, P-4, P-5) took place during TEAM's 1991 hydrogeologic field exploration to facilitate static water level observations over an extended period of time for the purpose of evaluating the depth to, and the hydraulic gradient of, the upper most aquifer within the site boundary. The TEAM hydrogeologic report was submitted to the City of Stephenville in January 1992 (Appendix A).

During the initial drilling of the five piezometers, which took place in April of 1991, "groundwater was not observed; however, water was indicated to be present in all the piezometers prior to drilling depth termination" (Appendix A – TEAMS Report). Recovered drilling samples were classified visually. Soil tests and hydraulic conductivity testing were not proposed or performed as part of the TEAM hydrogeologic field exploration.

The on-site placement of the piezometers included four boundary piezometers (P-1, P-2, P-4, P-5), and one piezometer located approximately at the center of the site (P-3) (Drawing 1). The piezometers were screened between elevations approximately 1427 and 1403 ft/msl (35 to 80 feet bgs) in strata generally described as silty sand or clayey sand. Five or ten-foot screens were utilized in the piezometers. Piezometer details are represented in Table 3; for a more detailed description of the materials encountered during drilling refer to Appendix A.

Table 3

1991 City of Stephenville Landfill Piezometers				
Piezometer ID	Lithology	Surface Elevation (ft/msl)	Screen Length (ft)	Screened Interval (ft/msl)
P-1	Clay with sand	1452.1	10	1427.1 - 1417.1
P-2	Sand with silt	1448.5	5	1413.5 - 1408.5
P-3	Sand with silt	1481.3	5	1421.3 -1416.3
P-4	Sand with silt	1483.4	5	1408.4 - 1403.4
P-5	Sand with silt	1453.5	5	1408.5 - 1403.5

Water levels were taken at each piezometer from May 1991 through November 1991 with two water level events completed in July and none completed in October. Minute fluctuations in water levels were recorded during aforementioned six-month period. Recorded water level data from 1991 is included in Appendix A.

TEAM constructed two potentiometric surface maps (one which was revised and one which was submitted) both for September 1991 at the time of their exploration (both included in Appendix A); BME generated potentiometric surface maps in 2024 that are representative of each month with recorded water level data from 1991 (Drawings 7 through 13). TEAM's hydrogeologic report and BME's potentiometric surface maps indicate a site-specific down-gradient groundwater flow towards the west/northwest extending quasi-radially from up-gradient piezometer P-1 which is located on the east/southeast boundary of the site.

The on-site piezometers were also utilized for the testing of on-site groundwater quality. Groundwater sampling events took place in September 1991 and December 1991. The groundwater was analyzed for chemical constituents consistent with the 1991 Texas Department of Health parameters for Groups 3 and 4. For the full suite of chemical analysis of the on-site groundwater samples refer to Appendix A.

The five piezometers on-site were decommissioned and plugged in 1994 at the request of the City of Stephenville's 1994 Director of Utilities – Mr. Danny Johnson. The plugging of piezometers P-1 through P-5 were done in general accordance with the Texas Natural Resource and Conservation Commission requirements in 1994. Refer to Appendix A for plugging reports.

4.0 ON-SITE WATER WELLS

At present, no known water wells are located on-site at the City of Stephenville Landfill. Historic documents indicate that four water wells were potentially located on-site; however, applicable water well reports and drilling logs for the site provide ambiguous correlatability data for the water wells. A drilling log for "Well #25" dated September 1975 and described as "Water Well at City Landfill," was recovered during a City of Stephenville Landfill information search. The handwritten notes included on the log indicate a termination depth at or near 356 feet bgs, a static water level of nearly 290 feet bgs, and a 20 foot screen that started at 300 feet bgs. No precise location for this water well was included on the log. The location of this water well is presently unknown, and the current status of this water well is unknown. The depths and dates indicated on the drilling log do not correlate with other water well search data obtained (Appendix A).

A handwritten drilling log and equipment list dated October 1, 1975, and titled "Landfill Well," was located during a City of Stephenville Landfill information search. The termination depth of this water well was 372 feet bgs. Screened intervals were not indicated on the log. The location of this water well is presently unknown, and the current status of this water well is unknown. The depths and dates indicated on the drilling log do not correlate with other water well search data obtained (Appendix A).

One State of Texas Well Report, dated December 7, 1979, indicates that a water well owned by the City of Stephenville and located, "three miles west of Stephenville," could be, or could have been, present on the site. The termination depth of this water well was indicated to be 395 feet bgs. This water well could corelate to a State of Texas Plugging Report found during the same City of Stephenville information search. The termination depth, location description, and owner coincide with the plugging report for water well identified as "Landfill #2" (see discussion below and Appendix A).

Two State of Texas Plugging Reports, both dated September 1990, were located during a City of Stephenville Landfill information search. The reports indicate the water wells were owned by the City of Stephenville, were located, "three miles west of Stephenville," and were identified as "Landfill #1" and "Landfill #2." Water well Landfill #1 likely terminated at a depth of 358 feet bgs; water well Landfill #2 terminated at a depth of 395 feet bgs. The screened intervals of either water well were not indicated on the reports. The original water well drilling report for Landfill #2 could correlate to the one State of Texas Well Report discussed above. The original water well drilling report for Landfill #1 was not discovered. The depths and dates indicated on the Landfill #1 report do not correlate with other water well search data obtained (Appendix A).

5.0 REFERENCES

Southwestern Laboratories. (1986). SLER evaluation for City of Stephenville.

Southwestern Laboratories. (1987). SLER evaluation for City of Stephenville.

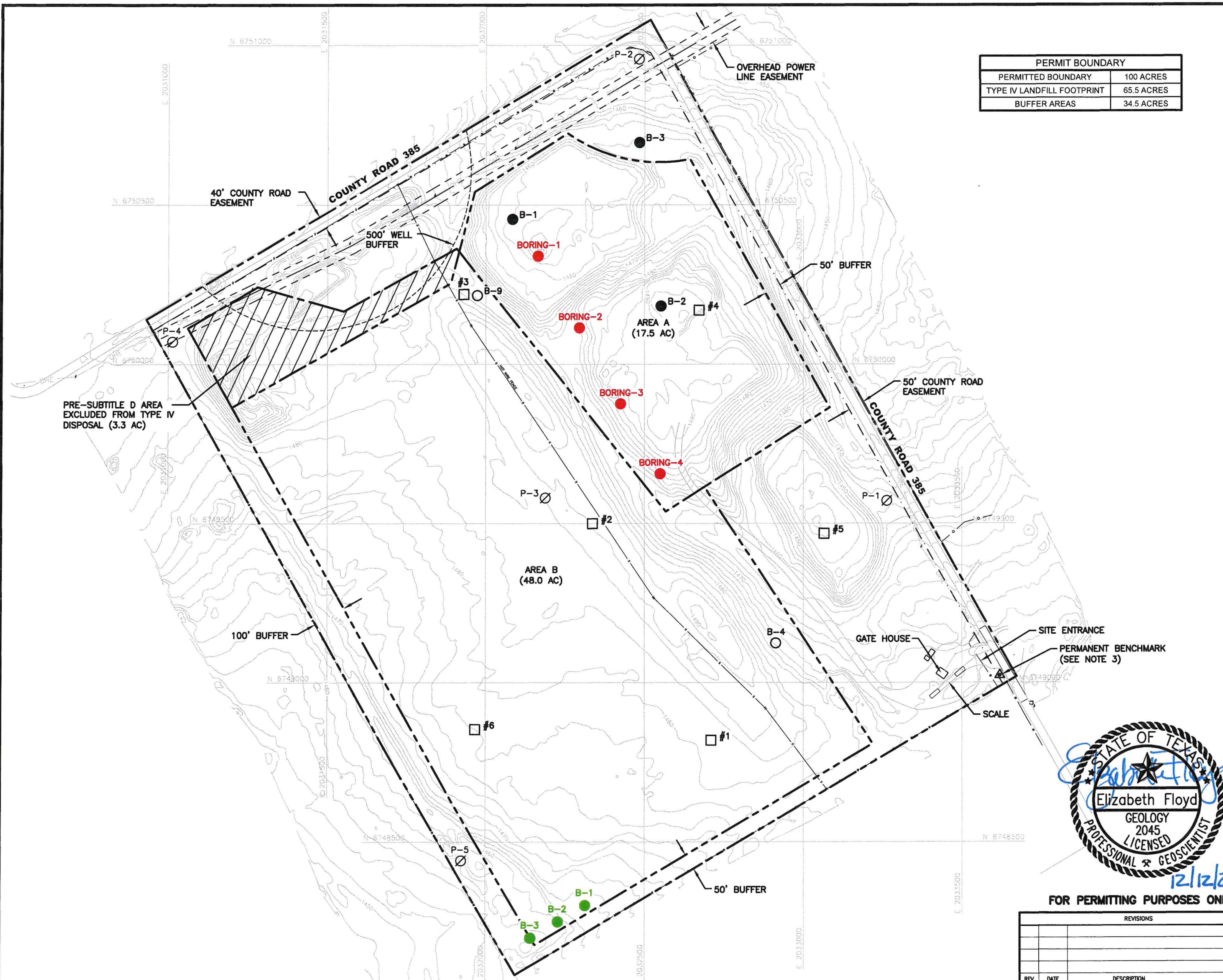
TEAM Consultants, Inc. (1990). Exploratory Sample Borings with Boring Log Numbers B-4 and B-9.

TEAM Consultants, Inc. (1992). (report for City of Stephenville). *Revised Preliminary Hydrogeologic Site Assessment.*

TEAM Consultants, Inc. (1994). Exploratory Sample Borings with Boring Log Numbers B-1 and B-3.

Texas Testing Laboratories. (1972). (reported to Homer A. Hunter Associates). *Surface Investigation.*

DRAWINGS



PERMIT BOUNDARY	
PERMITTED BOUNDARY	100 ACRES
TYPE IV LANDFILL FOOTPRINT	65.5 ACRES
BUFFER AREAS	34.5 ACRES

0 150 300
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- TYPE IV LANDFILL FOOTPRINT
- PRE-SUBTITLE D AREA EXCLUDED FROM TYPE IV DISPOSAL
- STATE PLANE GRID
- EXISTING CONTOUR
- OVERHEAD ELECTRICAL EASEMENT
- ROADWAY EASEMENT
- PERMANENT BENCHMARK
- 1994 SOIL BORING
- 1990 SOIL BORING
- 1972 SOIL BORING
- 1986 SLER BORING
- 1987 SLER BORING
- 1991 PIEZOMETER

NOTES:

1. PROPERTY LINE AND PERMIT BOUNDARY INFORMATION PROVIDED BY BRITTAIN & CRAWFORD, OCTOBER 6, 2022.
2. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
3. PERMANENT BENCHMARK:
   N: 6749021.981
   E: 2033620.055
   ELEV: 1477.54 FT-MSL
4. AREA A HAS EXISTING TYPE IV LINER SYSTEM CONSTRUCTED.
5. AREA B HAS EXISTING PRE-SUBTITLE D FINAL COVER SYSTEM CONSTRUCTED.
6. NORTHINGS, EASTINGS, AND SURFACE ELEVATIONS FOR BORINGS DATED 1994, 1990, 1972, 1988, AND 1987 WERE EXTRAPOLATED FROM THE 1965 BUNYAN, TX 7.5 MINUTE QUADRANGLE TOPOGRAPHIC MAP.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
LICENSED
PROFESSIONAL GEOSCIENTIST
12/12/2024

FOR PERMITTING PURPOSES ONLY

REVISIONS			
REV	DATE	DESCRIPTION	DWN BY

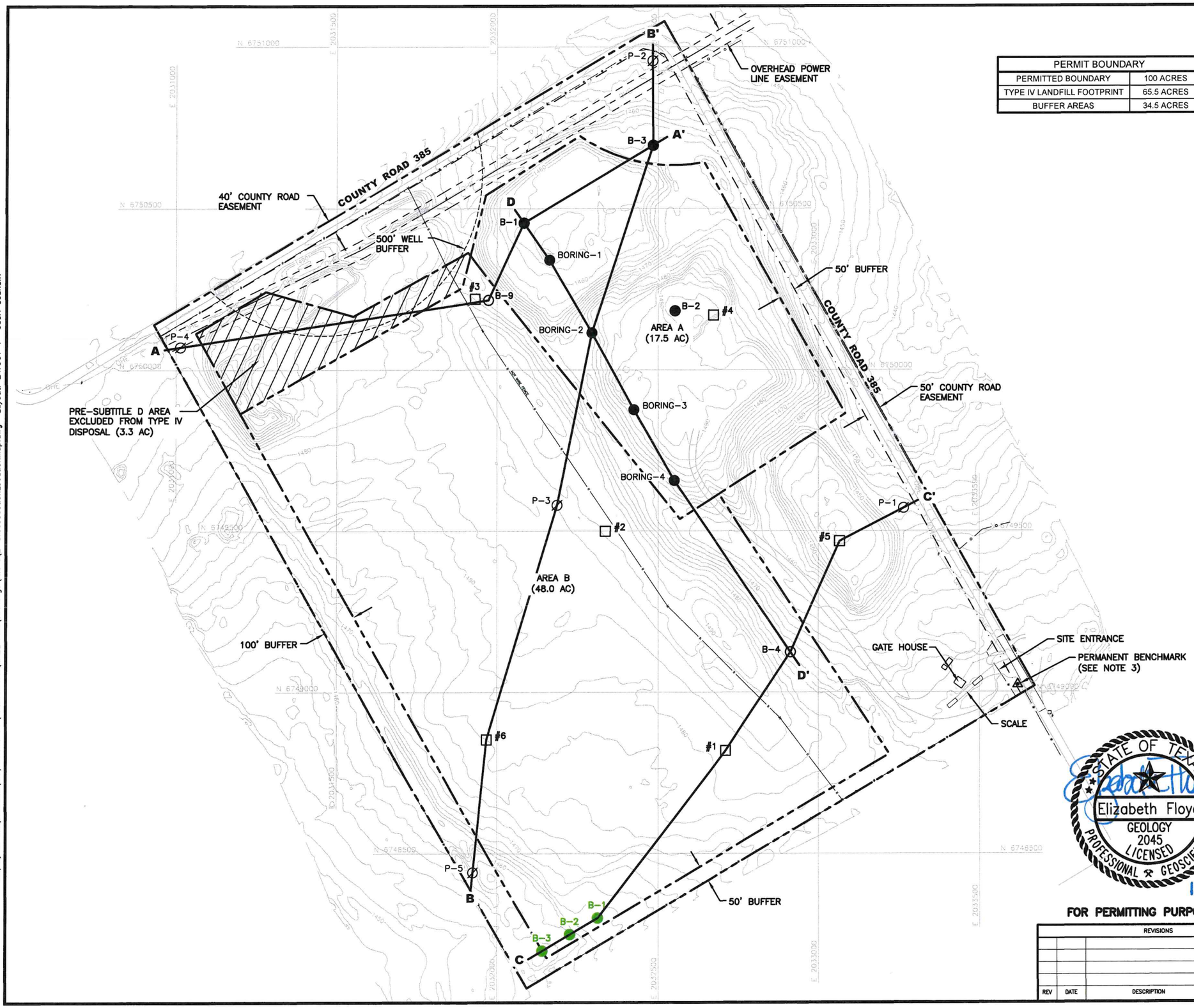
FACILITY SITE PLAN

CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
LIMITED SCOPE AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
1



PERMIT BOUNDARY	
PERMITTED BOUNDARY	100 ACRES
TYPE IV LANDFILL FOOTPRINT	65.5 ACRES
BUFFER AREAS	34.5 ACRES

0 150 300
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- TYPE IV LANDFILL FOOTPRINT
- PRE-SUBTITLE D AREA EXCLUDED FROM TYPE IV DISPOSAL
- STATE PLANE GRID
- EXISTING CONTOUR
- OVERHEAD ELECTRICAL EASEMENT
- ROADWAY EASEMENT
- PERMANENT BENCHMARK
- 1994 SOIL BORING
- 1990 SOIL BORING
- 1972 SOIL BORING
- 1986 SLER BORING
- 1987 SLER BORING
- 1991 PIEZOMETER

NOTES:

1. PROPERTY LINE AND PERMIT BOUNDARY INFORMATION PROVIDED BY BRITTAIN & CRAWFORD, OCTOBER 6, 2022.
2. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
3. PERMANENT BENCHMARK:
   N: 6749021.981
   E: 2033620.055
   ELEV: 1477.54 FT-MSL
4. ELEVATION OF DEEPEST EXCAVATION = 1437 FT-MSL.
5. NORTHINGS, EASTINGS, AND SURFACE ELEVATIONS FOR BORINGS DATED 1994, 1990, 1972, 1988, AND 1987 WERE EXTRAPOLATED FROM THE 1965 BUNYAN, TX 7.5 MINUTE QUADRANGLE TOPOGRAPHIC MAP.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
LICENSED
PROFESSIONAL GEOSCIENTIST

12/12/2024

FOR PERMITTING PURPOSES ONLY

REVISIONS			
REV	DATE	DESCRIPTION	DWN BY

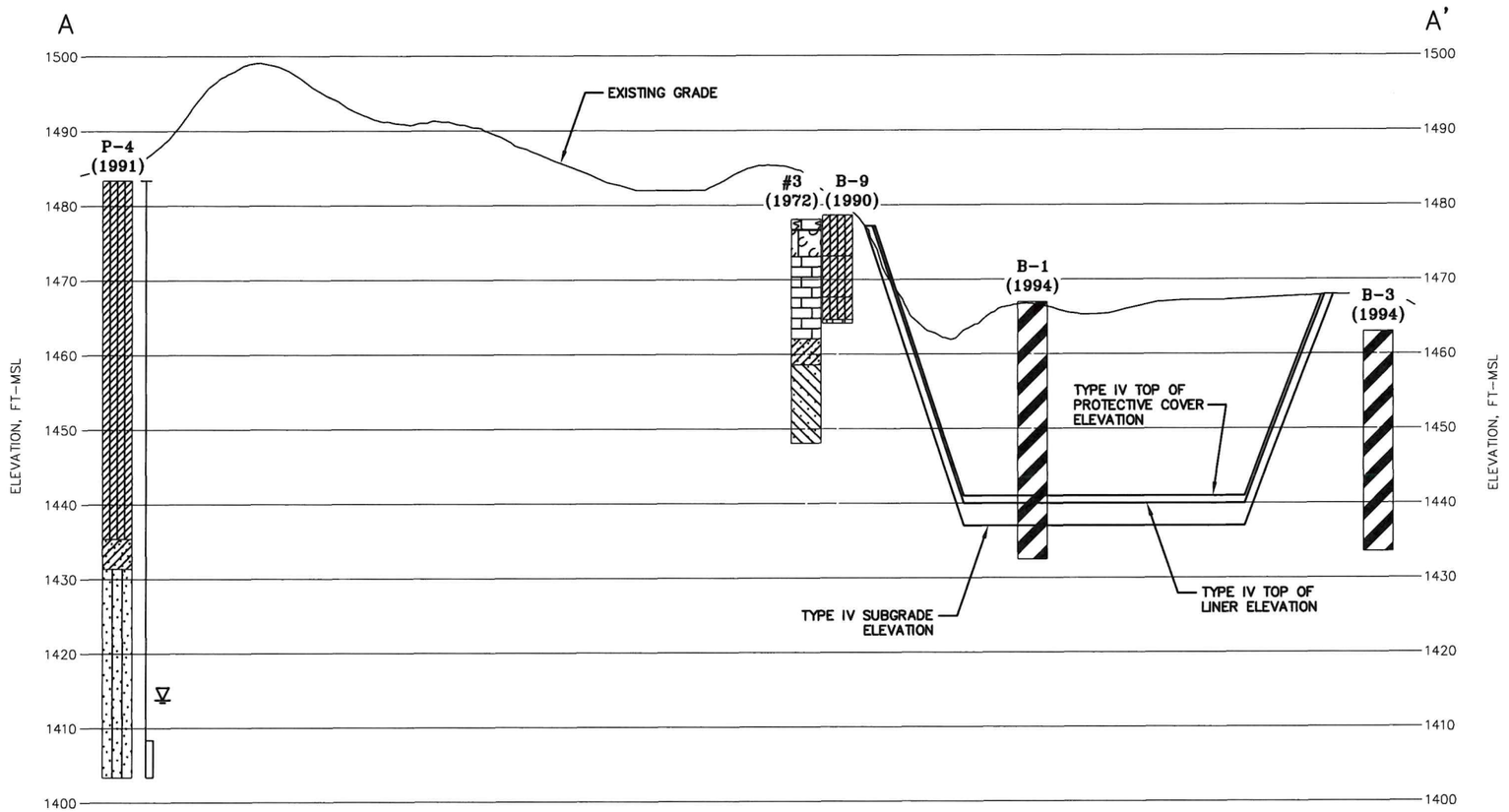
CROSS SECTION LOCATION MAP

CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
LIMITED SCOPE AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

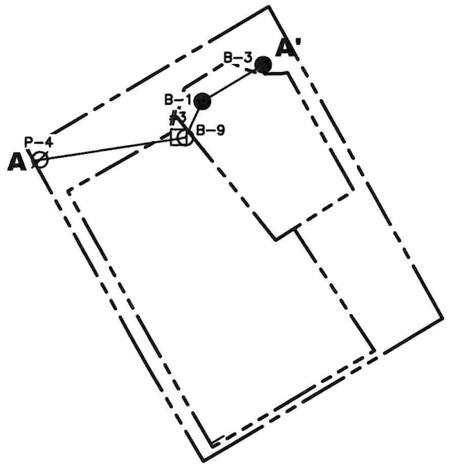
DRAWING
2



SECTION A (A)

0 100 200
HORIZONTAL SCALE IN FEET

0 10 20
VERTICAL SCALE IN FEET



KEY MAP

LEGEND

- CLAY (CH)
- CLAY W/SAND
- CLAY W/SILT
- CALICHE
- LIMESTONE
- LIMESTONE WEATHERED
- SAND W/CLAY
- SAND W/SILT
- PIEZOMETER SCREENED INTERVAL
- WATER LEVEL ELEVATION TAKEN SEPTEMBER 1991

NOTE:

1. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
2. NORTHINGS, EASTINGS, AND SURFACE ELEVATIONS FOR BORINGS DATED 1994, 1990, 1972, 1988, AND 1987 WERE EXTRAPOLATED FROM THE 1965 BUNYAN, TX 7.5 MINUTE QUADRANGLE TOPOGRAPHIC MAP.

STATE OF TEXAS
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12/12/2024

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REVISIONS			
REV	DATE	DESCRIPTION	DWN BY

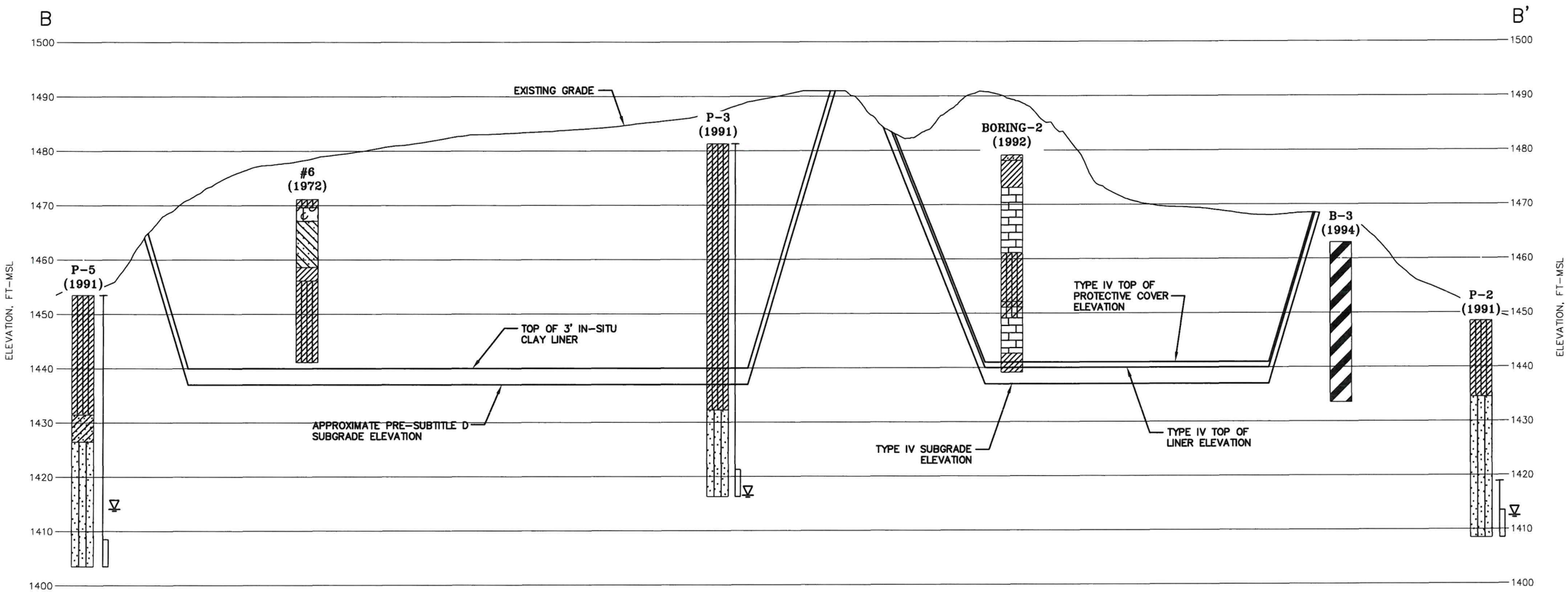
CROSS SECTION A

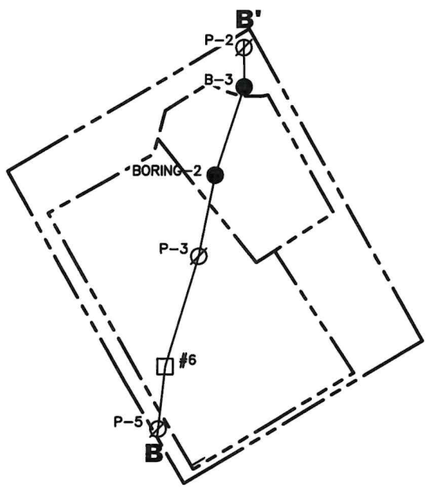
CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
LIMITED SCOPE AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING 3





KEY MAP

SECTION B B

0 100 200
HORIZONTAL SCALE IN FEET

0 10 20
VERTICAL SCALE IN FEET

LEGEND

- CLAY (CL)
- CLAY W/SAND
- CLAY W/SILT
- CALICHE
- LIMESTONE
- SAND W/CLAY
- SAND W/SILT
- PIEZOMETER SCREENED INTERVAL
- WATER LEVEL ELEVATION TAKEN SEPTEMBER 1991

STATE OF TEXAS
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GEOLOGY
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REVISIONS			
REV	DATE	DESCRIPTION	DWN BY

NOTE:

1. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
2. NORTHINGS, EASTINGS, AND SURFACE ELEVATIONS FOR BORINGS DATED 1994, 1990, 1972, 1988, AND 1987 WERE EXTRAPOLATED FROM THE 1965 BUNYAN, TX 7.5 MINUTE QUADRANGLE TOPOGRAPHIC MAP.

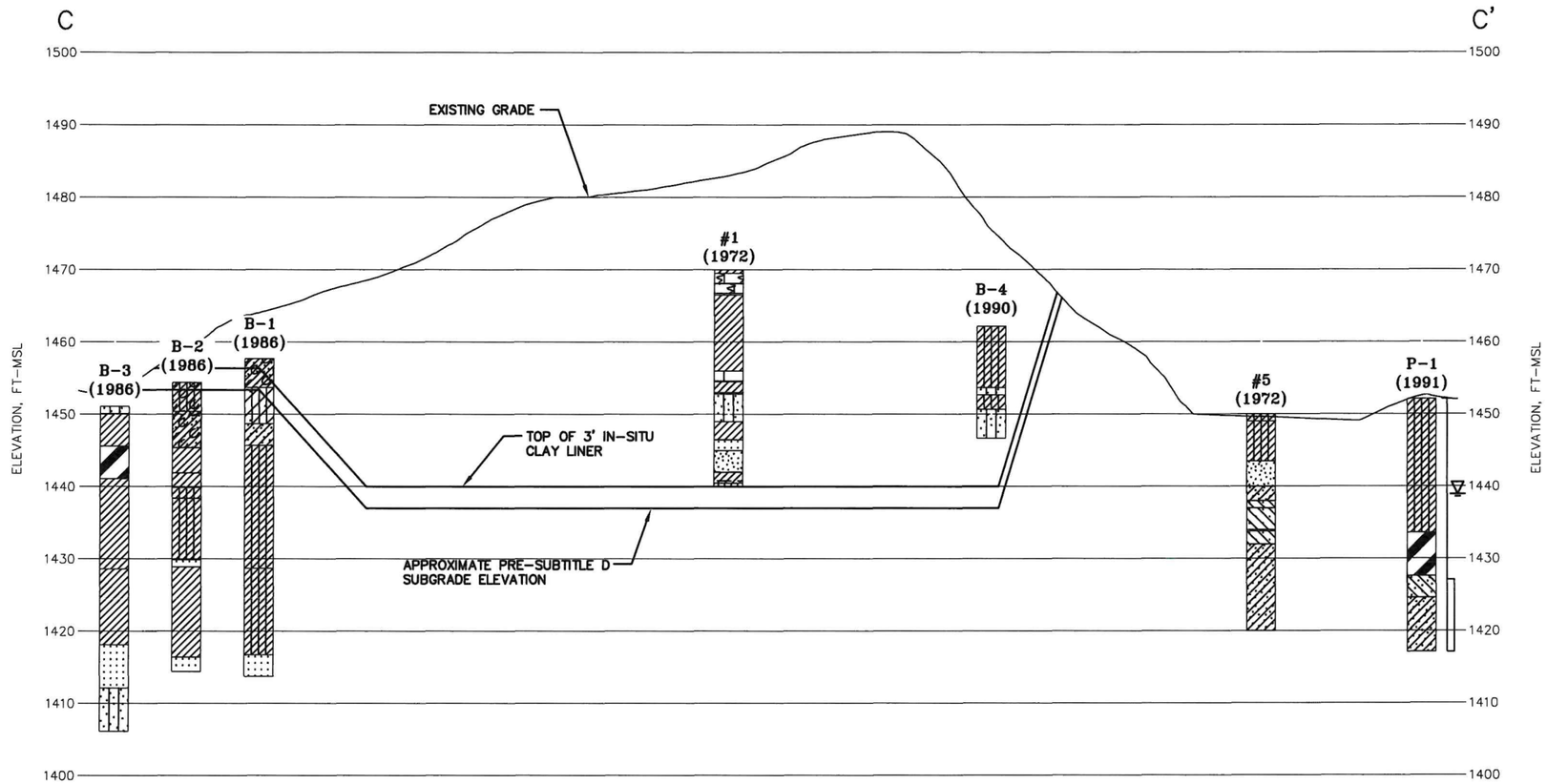
CROSS SECTION B

CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
LIMITED SCOPE AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

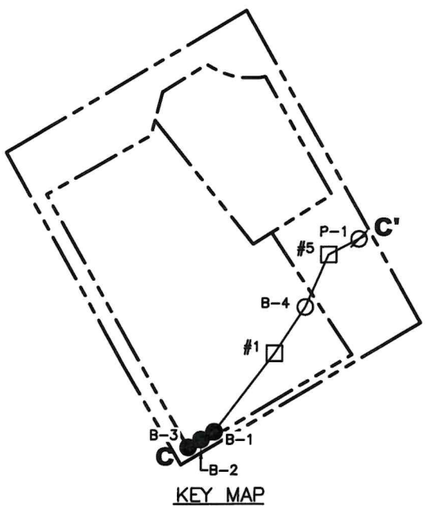
DRAWING 4



SECTION C

0 100 200
HORIZONTAL SCALE IN FEET

0 10 20
VERTICAL SCALE IN FEET



KEY MAP

LEGEND

- CLAY (CH)
- CLAY (CL)
- CLAY W/SAND
- CLAY W/SAND & CALICHE
- CLAY W/SHALE
- CLAY W/SILT
- CLAY W/SILT & SAND
- CLAY W/SILT & CALICHE
- LIMESTONE
- LIMESTONE WEATHERED
- SAND
- SAND W/CLAY
- SAND W/SILT
- SANDSTONE
- PIEZOMETER SCREENED INTERVAL
- WATER LEVEL ELEVATION TAKEN SEPTEMBER 1991

NOTE:

1. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
2. NORTHINGS, EASTINGS, AND SURFACE ELEVATIONS FOR BORINGS DATED 1994, 1990, 1972, 1988, AND 1987 WERE EXTRAPOLATED FROM THE 1965 BUNYAN, TX 7.5 MINUTE QUADRANGLE TOPOGRAPHIC MAP.

STATE OF TEXAS
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REVISIONS			
REV	DATE	DESCRIPTION	DWN BY

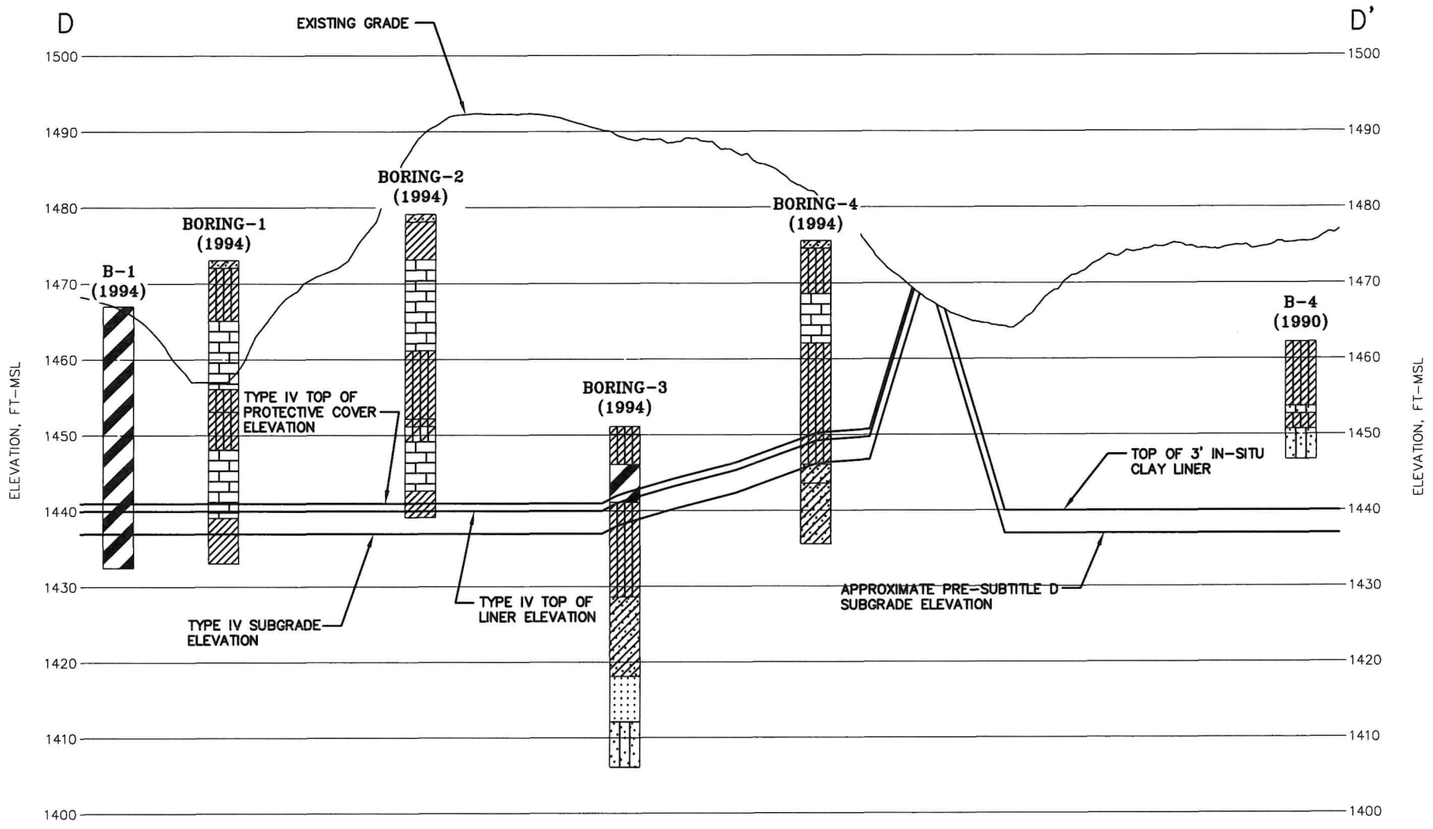
CROSS SECTION C

CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
LIMITED SCOPE AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

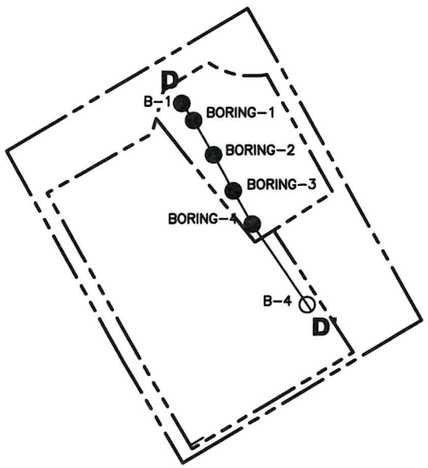
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING 5



SECTION D D'

0 100 200
HORIZONTAL SCALE IN FEET
0 10 20
VERTICAL SCALE IN FEET



KEY MAP

LEGEND

- CLAY (CH)
- CLAY (CL)
- CLAY W/SAND
- CLAY W/SAND & CALICHE
- CLAY W/SHALE
- CLAY W/SILT
- CLAY W/SILT & SAND
- CLAY W/SILT & CALICHE
- LIMESTONE
- SAND
- SAND W/CLAY
- SAND W/SILT
- SANDSTONE

NOTE:

1. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
2. NORTHINGS, EASTINGS, AND SURFACE ELEVATIONS FOR BORINGS DATED 1994, 1990, 1972, 1988, AND 1987 WERE EXTRAPOLATED FROM THE 1965 BUNYAN, TX 7.5 MINUTE QUADRANGLE TOPOGRAPHIC MAP.

STATE OF TEXAS
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GEOLOGY
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12/12/2024

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REVISIONS			
REV	DATE	DESCRIPTION	DWN BY

CROSS SECTION D

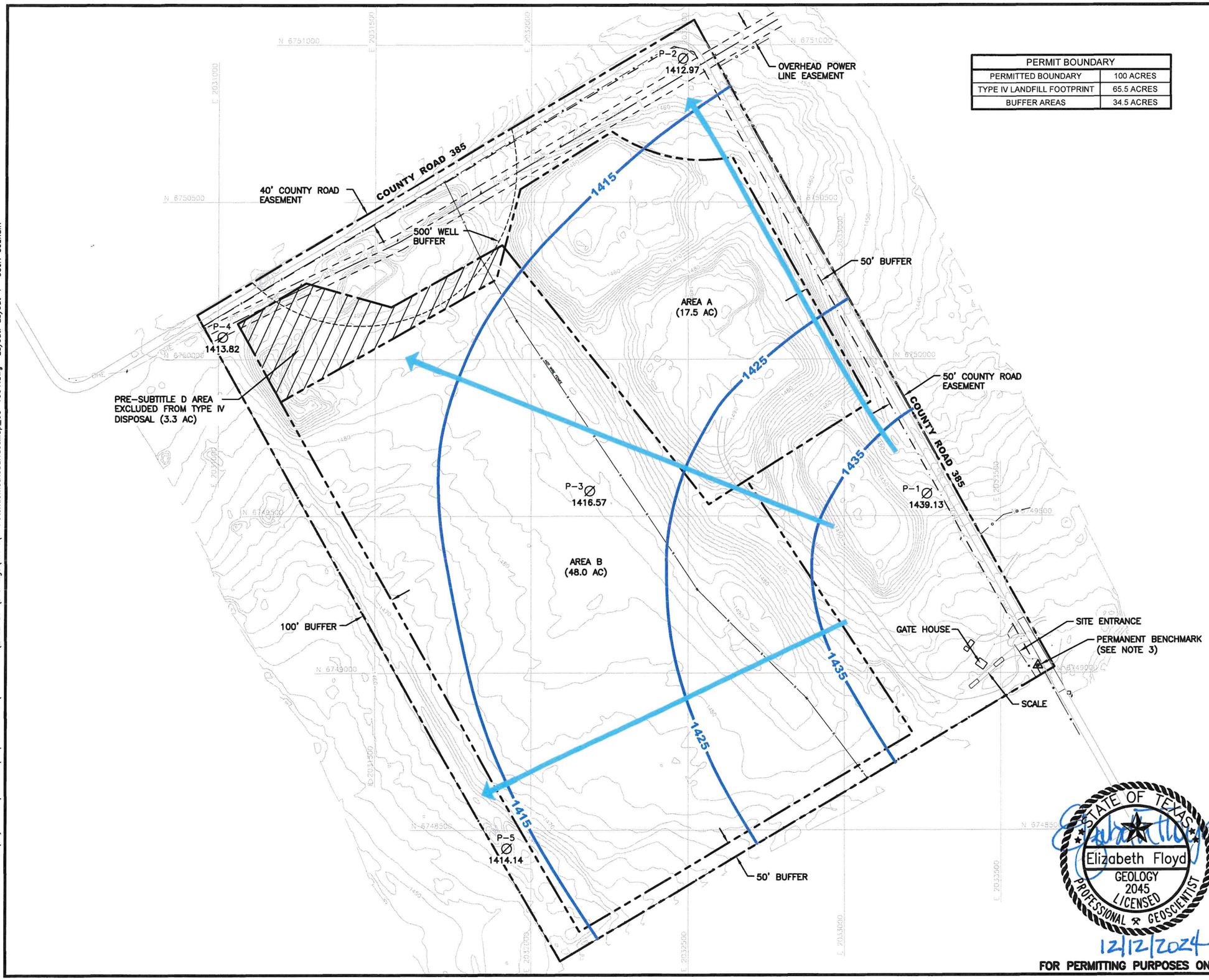
CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
LIMITED SCOPE AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
6

PERMIT BOUNDARY	
PERMITTED BOUNDARY	100 ACRES
TYPE IV LANDFILL FOOTPRINT	65.5 ACRES
BUFFER AREAS	34.5 ACRES



0 150 300
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- TYPE IV LANDFILL FOOTPRINT
- PRE-SUBTITLE D AREA EXCLUDED FROM TYPE IV DISPOSAL
- N 675000 — STATE PLANE GRID
- 1490 — EXISTING CONTOUR
- OHE — OVERHEAD ELECTRICAL EASEMENT
- ROADWAY EASEMENT
- PERMANENT BENCHMARK
- ∅ 1991 PIEZOMETER
- 1425 — CONTOURS OF POTENTIOMETRIC SURFACE (10' CONTOUR)
- APPARENT DIRECTION OF GROUNDWATER FLOW
- 1439.13 — WATER LEVEL ELEVATION (FEET ABOVE MEAN SEA LEVEL)

NOTES:

1. PROPERTY LINE AND PERMIT BOUNDARY INFORMATION PROVIDED BY BRITTAIN & CRAWFORD, OCTOBER 6, 2022.
2. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
3. PERMANENT BENCHMARK:
   N: 6749021.981
   E: 2033620.055
   ELEV: 1477.54 FT-MSL
4. AREA A HAS EXISTING TYPE IV LINER SYSTEM CONSTRUCTED.
5. AREA B HAS EXISTING PRE-SUBTITLE D FINAL COVER SYSTEM CONSTRUCTED.
6. PIEZOMETERS WERE INSTALLED IN 1991 AND THEN DECOMMISSIONED AND PLUGGED IN 1994.

STATE OF TEXAS
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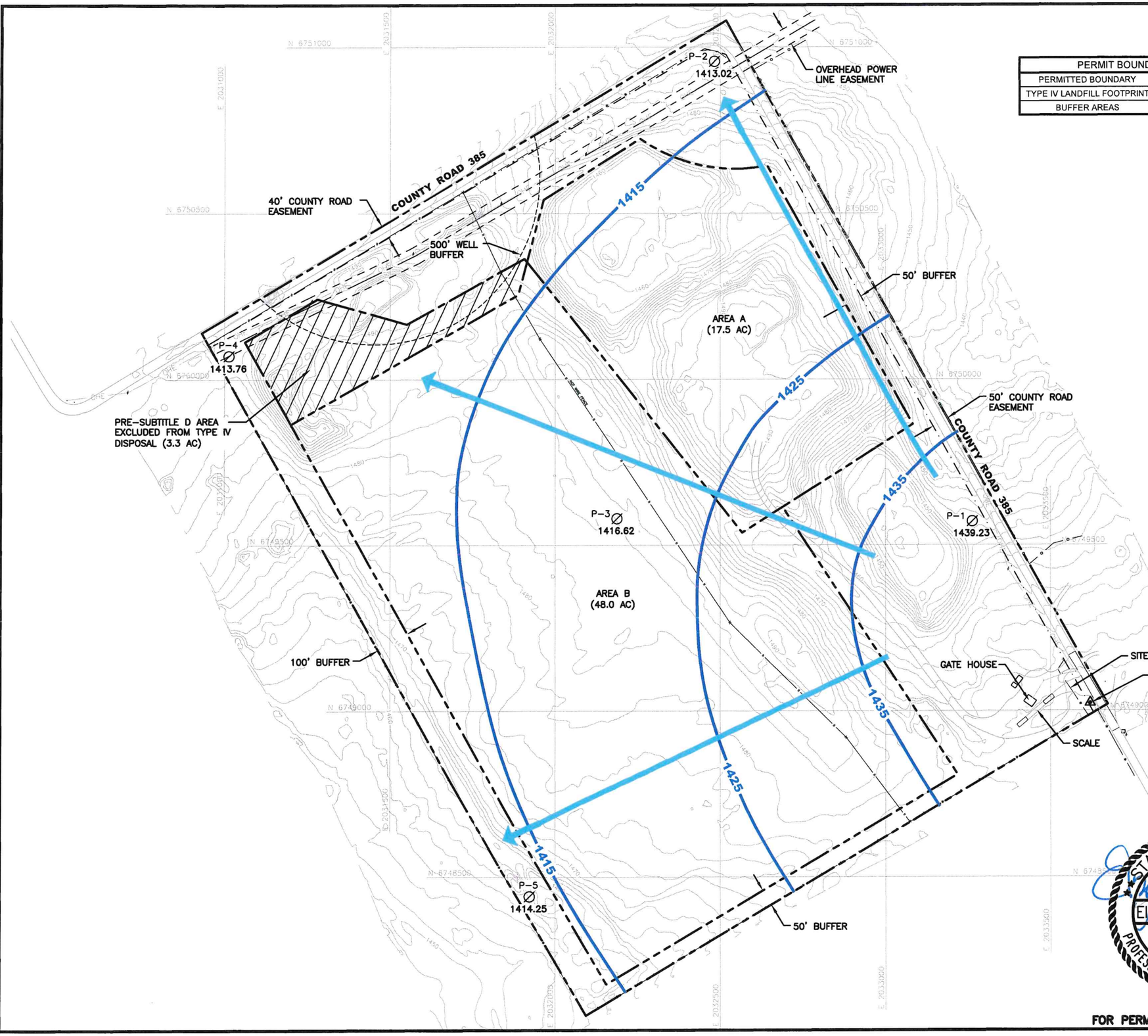
POTENTIOMETRIC SURFACE MAP MAY 1991

CITY OF STEPHENVILLE CITY OF STEPHENVILLE LANDFILL LIMITED SCOPE AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING 7



PERMIT BOUNDARY	
PERMITTED BOUNDARY	100 ACRES
TYPE IV LANDFILL FOOTPRINT	65.5 ACRES
BUFFER AREAS	34.5 ACRES

0 150 300
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- TYPE IV LANDFILL FOOTPRINT
- PRE-SUBTITLE D AREA EXCLUDED FROM TYPE IV DISPOSAL
- N 675000 — STATE PLANE GRID
- 1480 — EXISTING CONTOUR
- OHE — OVERHEAD ELECTRICAL EASEMENT
- ROADWAY EASEMENT
- PERMANENT BENCHMARK
- ∅ — 1991 PIEZOMETER
- 1425 — CONTOURS OF POTENTIOMETRIC SURFACE (10' CONTOUR)
- APPARENT DIRECTION OF GROUNDWATER FLOW
- 1439.23 — WATER LEVEL ELEVATION (FEET ABOVE MEAN SEA LEVEL)

NOTES:

1. PROPERTY LINE AND PERMIT BOUNDARY INFORMATION PROVIDED BY BRITTAIN & CRAWFORD, OCTOBER 6, 2022.
2. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
3. PERMANENT BENCHMARK:
   N: 6749021.981
   E: 2033620.055
   ELEV: 1477.54 FT-MSL
4. AREA A HAS EXISTING TYPE IV LINER SYSTEM CONSTRUCTED.
5. AREA B HAS EXISTING PRE-SUBTITLE D FINAL COVER SYSTEM CONSTRUCTED.
6. PIEZOMETERS WERE INSTALLED IN 1991 AND THEN DECOMMISSIONED AND PLUGGED IN 1994.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
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PROFESSIONAL GEOSCIENTIST

12/12/2024

FOR PERMITTING PURPOSES ONLY

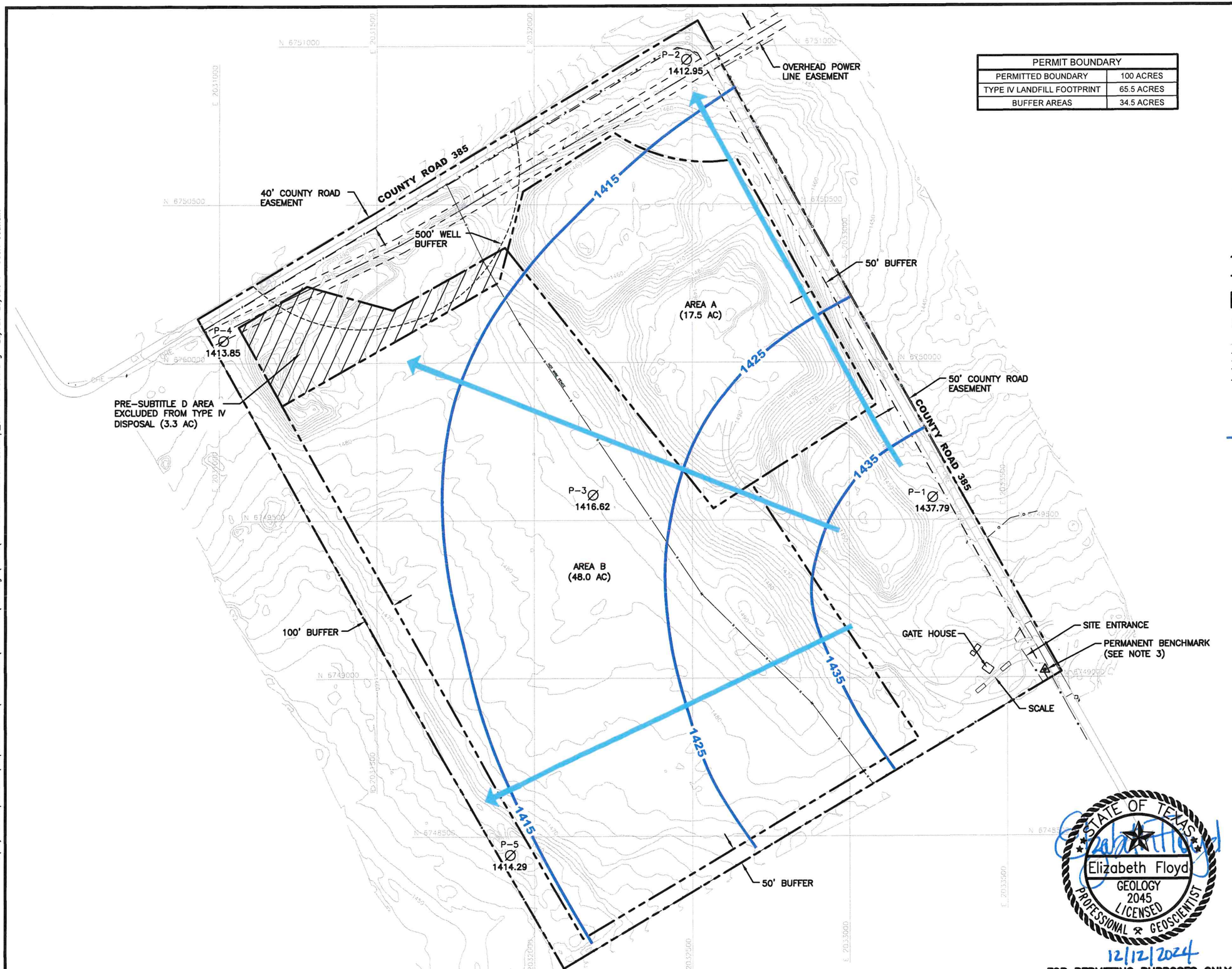
POTENTIOMETRIC SURFACE MAP JUNE 1991

CITY OF STEPHENVILLE CITY OF STEPHENVILLE LANDFILL LIMITED SCOPE AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING 8



PERMIT BOUNDARY	
PERMITTED BOUNDARY	100 ACRES
TYPE IV LANDFILL FOOTPRINT	65.5 ACRES
BUFFER AREAS	34.5 ACRES

0 150 300
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- TYPE IV LANDFILL FOOTPRINT
- PRE-SUBTITLE D AREA EXCLUDED FROM TYPE IV DISPOSAL
- N: 675000 STATE PLANE GRID
- 1490 EXISTING CONTOUR
- OHE OVERHEAD ELECTRICAL EASEMENT
- ROADWAY EASEMENT
- PERMANENT BENCHMARK
- ∅ 1991 PIEZOMETER
- 1425 CONTOURS OF POTENTIOMETRIC SURFACE (10' CONTOUR)
- APPARENT DIRECTION OF GROUNDWATER FLOW
- 1437.79 WATER LEVEL ELEVATION (FEET ABOVE MEAN SEA LEVEL)

NOTES:

1. PROPERTY LINE AND PERMIT BOUNDARY INFORMATION PROVIDED BY BRITTAIN & CRAWFORD, OCTOBER 6, 2022.
2. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
3. PERMANENT BENCHMARK:
   N: 6749021.981
   E: 2033620.055
   ELEV: 1477.54 FT-MSL
4. AREA A HAS EXISTING TYPE IV LINER SYSTEM CONSTRUCTED.
5. AREA B HAS EXISTING PRE-SUBTITLE D FINAL COVER SYSTEM CONSTRUCTED.
6. PIEZOMETERS WERE INSTALLED IN 1991 AND THEN DECOMMISSIONED AND PLUGGED IN 1994.

STATE OF TEXAS
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12/12/2024

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POTENTIOMETRIC SURFACE MAP JULY 11, 1991

CITY OF STEPHENVILLE CITY OF STEPHENVILLE LANDFILL LIMITED SCOPE AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING 9

PERMIT BOUNDARY	
PERMITTED BOUNDARY	100 ACRES
TYPE IV LANDFILL FOOTPRINT	65.5 ACRES
BUFFER AREAS	34.5 ACRES

0 150 300
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- TYPE IV LANDFILL FOOTPRINT
- PRE-SUBTITLE D AREA EXCLUDED FROM TYPE IV DISPOSAL
- N 6750000 STATE PLANE GRID
- 1490 EXISTING CONTOUR
- OHE OVERHEAD ELECTRICAL EASEMENT
- ROADWAY EASEMENT
- PERMANENT BENCHMARK
- ∅ 1991 PIEZOMETER
- 1425 CONTOURS OF POTENTIOMETRIC SURFACE (10' CONTOUR)
- APPARENT DIRECTION OF GROUNDWATER FLOW
- 1435.93 WATER LEVEL ELEVATION (FEET ABOVE MEAN SEA LEVEL)

NOTES:

1. PROPERTY LINE AND PERMIT BOUNDARY INFORMATION PROVIDED BY BRITTAIN & CRAWFORD, OCTOBER 6, 2022.
2. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
3. PERMANENT BENCHMARK:
   N: 6749021.981
   E: 2033620.055
   ELEV: 1477.54 FT-MSL
4. AREA A HAS EXISTING TYPE IV LINER SYSTEM CONSTRUCTED.
5. AREA B HAS EXISTING PRE-SUBTITLE D FINAL COVER SYSTEM CONSTRUCTED.
6. PIEZOMETERS WERE INSTALLED IN 1991 AND THEN DECOMMISSIONED AND PLUGGED IN 1994.

STATE OF TEXAS
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12/12/2024
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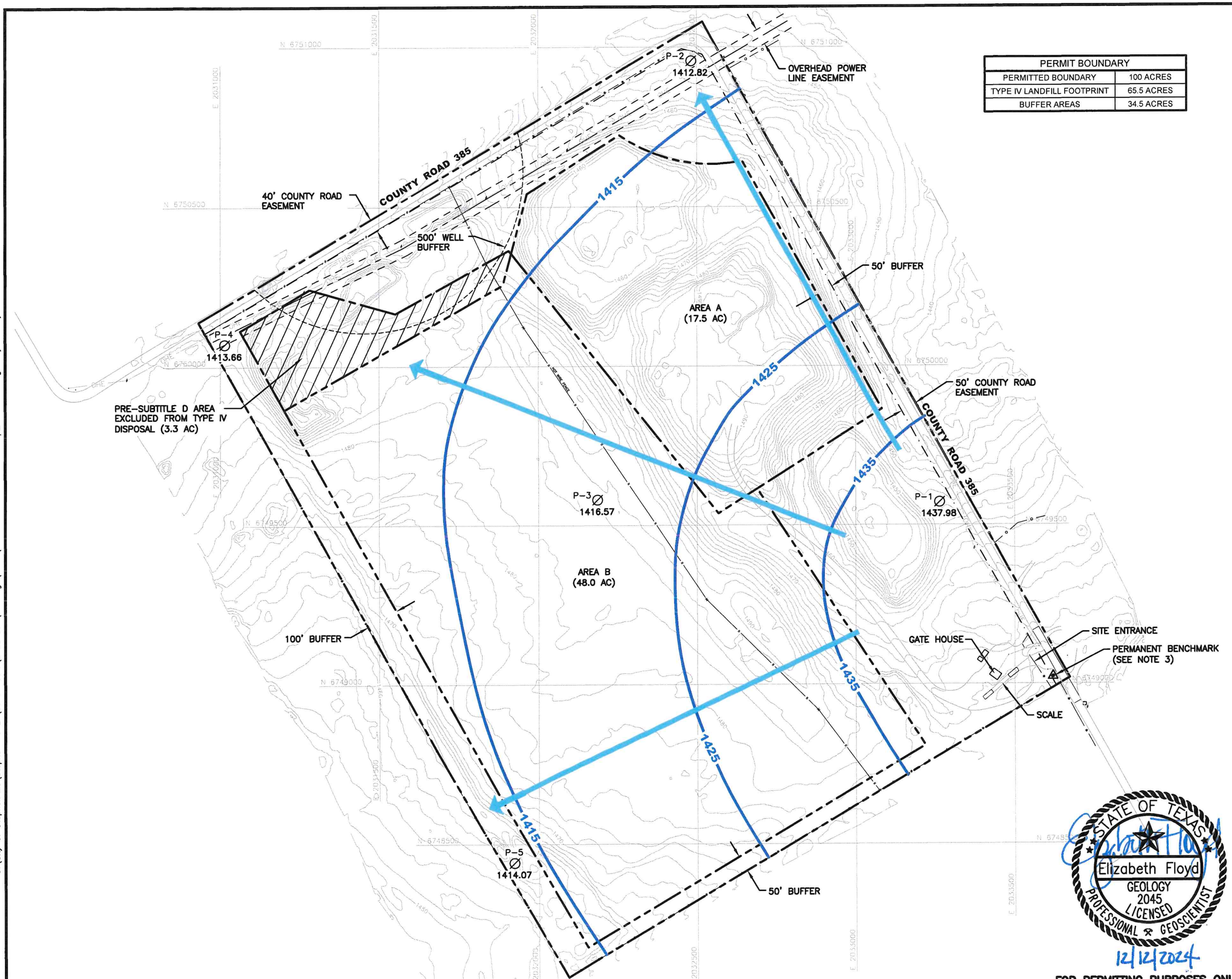
POTENTIOMETRIC SURFACE MAP JULY 31, 1991

CITY OF STEPHENVILLE CITY OF STEPHENVILLE LANDFILL LIMITED SCOPE AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING 10



PERMIT BOUNDARY	
PERMITTED BOUNDARY	100 ACRES
TYPE IV LANDFILL FOOTPRINT	65.5 ACRES
BUFFER AREAS	34.5 ACRES

LEGEND

- PERMIT BOUNDARY
- TYPE IV LANDFILL FOOTPRINT
- PRE-SUBTITLE D AREA EXCLUDED FROM TYPE IV DISPOSAL
- N 675000 — STATE PLANE GRID
- 1490 — EXISTING CONTOUR
- OHE — OVERHEAD ELECTRICAL EASEMENT
- ROADWAY EASEMENT
- PERMANENT BENCHMARK
- 1991 PIEZOMETER
- 1425 — CONTOURS OF POTENTIOMETRIC SURFACE (10' CONTOUR)
- APPARENT DIRECTION OF GROUNDWATER FLOW
- 1437.98 — WATER LEVEL ELEVATION (FEET ABOVE MEAN SEA LEVEL)

NOTES:

1. PROPERTY LINE AND PERMIT BOUNDARY INFORMATION PROVIDED BY BRITTAIN & CRAWFORD, OCTOBER 6, 2022.
2. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
3. PERMANENT BENCHMARK:
   N: 6749021.981
   E: 2033620.055
   ELEV: 1477.54 FT-MSL
4. AREA A HAS EXISTING TYPE IV LINER SYSTEM CONSTRUCTED.
5. AREA B HAS EXISTING PRE-SUBTITLE D FINAL COVER SYSTEM CONSTRUCTED.
6. PIEZOMETERS WERE INSTALLED IN 1991 AND THEN DECOMMISSIONED AND PLUGGED IN 1994.

STATE OF TEXAS
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GEOLOGY
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12/12/2024

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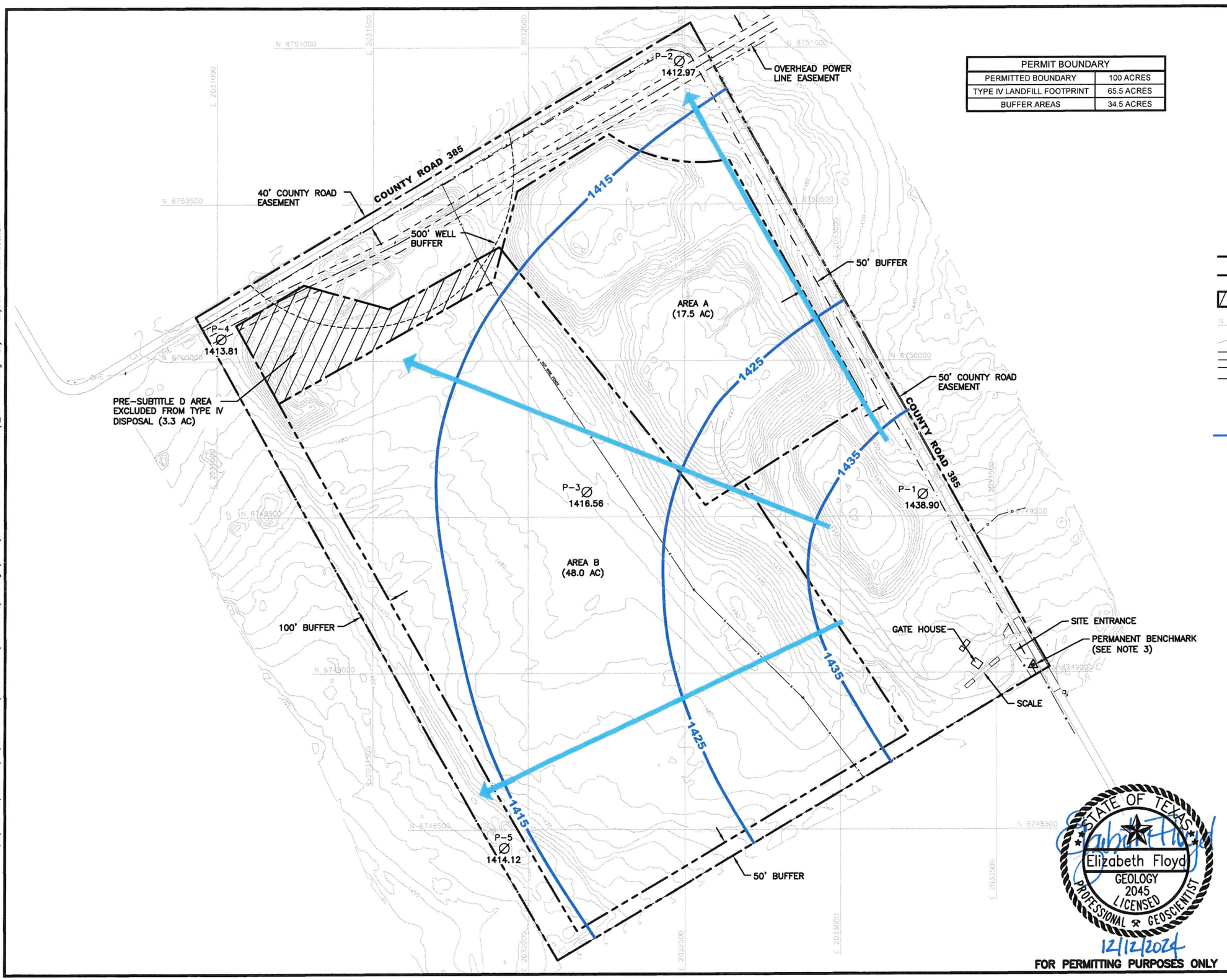
POTENTIOMETRIC SURFACE MAP AUGUST 1991

CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
LIMITED SCOPE AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
11



PERMIT BOUNDARY	
PERMITTED BOUNDARY	100 ACRES
TYPE IV LANDFILL FOOTPRINT	65.5 ACRES
BUFFER AREAS	34.5 ACRES

0 150 300
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- TYPE IV LANDFILL FOOTPRINT
- PRE-SUBTITLE D AREA EXCLUDED FROM TYPE IV DISPOSAL
- N 675000 — STATE PLANE GRID
- 1490 — EXISTING CONTOUR
- OHE — OVERHEAD ELECTRICAL EASEMENT
- ROADWAY EASEMENT
- PERMANENT BENCHMARK
- ∅ 1991 PIEZOMETER
- 1425 — CONTOURS OF POTENTIOMETRIC SURFACE (10' CONTOUR)
- APPARENT DIRECTION OF GROUNDWATER FLOW
- 1438.90 — WATER LEVEL ELEVATION (FEET ABOVE MEAN SEA LEVEL)

NOTES:

1. PROPERTY LINE AND PERMIT BOUNDARY INFORMATION PROVIDED BY BRITTAIN & CRAWFORD, OCTOBER 6, 2022.
2. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
3. PERMANENT BENCHMARK:
   N: 6749021.981
   E: 2033620.055
   ELEV: 1477.54 FT-MSL
4. AREA A HAS EXISTING TYPE IV LINER SYSTEM CONSTRUCTED.
5. AREA B HAS EXISTING PRE-SUBTITLE D FINAL COVER SYSTEM CONSTRUCTED.
6. PIEZOMETERS WERE INSTALLED IN 1991 AND THEN DECOMMISSIONED AND PLUGGED IN 1994.

STATE OF TEXAS
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GEOLOGY
2045
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12/12/2024

FOR PERMITTING PURPOSES ONLY

POTENTIOMETRIC SURFACE MAP SEPTEMBER 1991

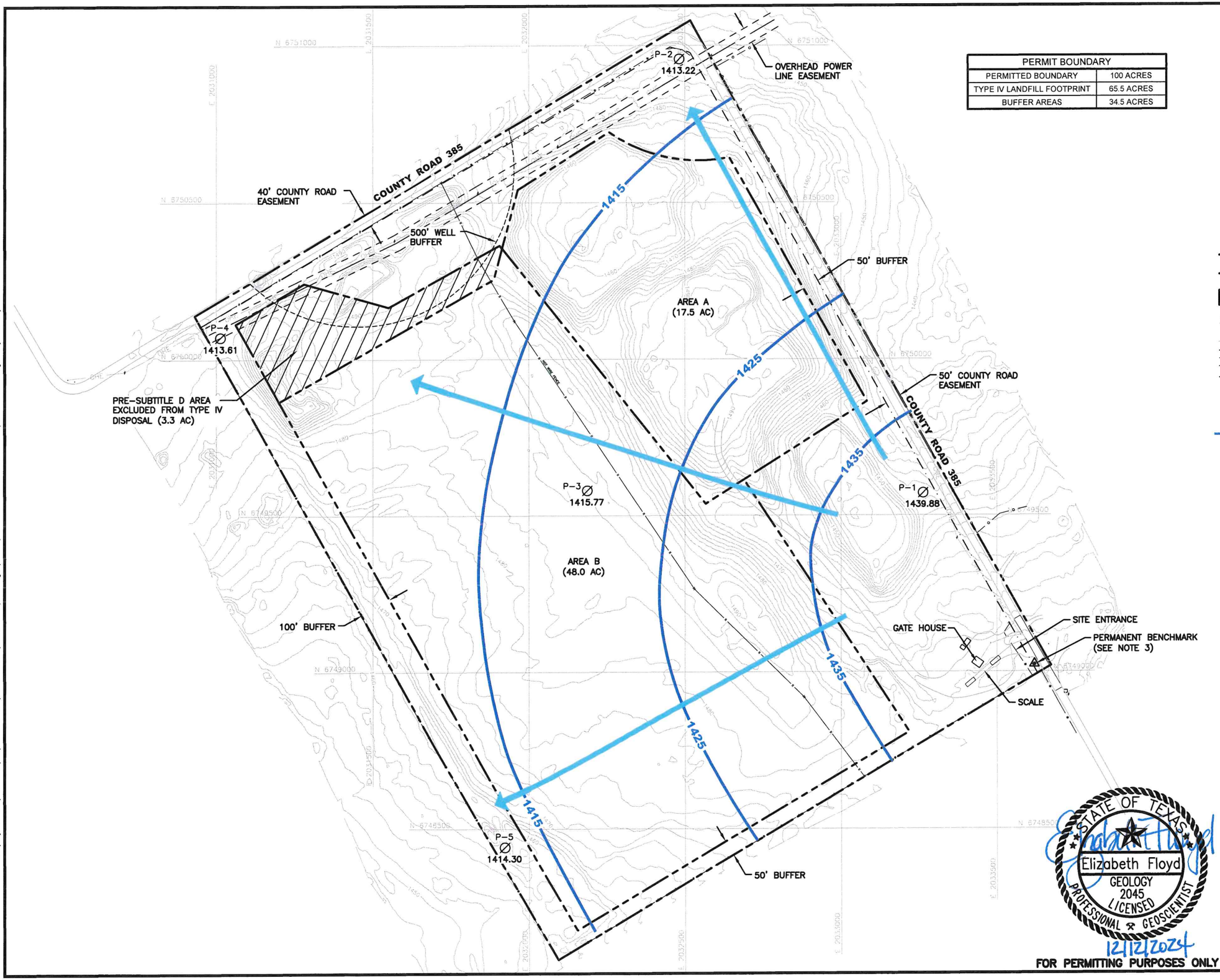
CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
LIMITED SCOPE AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING 12

O:\City of Stephenville\Stephenville LF\Solid Waste\2022 LSA\Drawings\ATT I\12-PotentiometricSurfaceMap_09-1991.dwg Layout: Layout 1 User: scundiff

PERMIT BOUNDARY	
PERMITTED BOUNDARY	100 ACRES
TYPE IV LANDFILL FOOTPRINT	65.5 ACRES
BUFFER AREAS	34.5 ACRES



0 150 300
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- TYPE IV LANDFILL FOOTPRINT
- PRE-SUBTITLE D AREA EXCLUDED FROM TYPE IV DISPOSAL
- STATE PLANE GRID
- EXISTING CONTOUR
- OVERHEAD ELECTRICAL EASEMENT
- ROADWAY EASEMENT
- PERMANENT BENCHMARK
- 1991 PIEZOMETER
- 1425 — CONTOURS OF POTENTIOMETRIC SURFACE (10' CONTOUR)
- APPARENT DIRECTION OF GROUNDWATER FLOW
- 1439.88 — WATER LEVEL ELEVATION (FEET ABOVE MEAN SEA LEVEL)

NOTES:

1. PROPERTY LINE AND PERMIT BOUNDARY INFORMATION PROVIDED BY BRITTAIN & CRAWFORD, OCTOBER 6, 2022.
2. EXISTING GRADES COMPILED FROM DRONE TOPOGRAPHIC DATA COLLECTED BY BIGGS AND MATHEWS ENVIRONMENTAL ON OCTOBER 25, 2022.
3. PERMANENT BENCHMARK:
   N: 6749021.981
   E: 2033620.055
   ELEV: 1477.54 FT-MSL
4. AREA A HAS EXISTING TYPE IV LINER SYSTEM CONSTRUCTED.
5. AREA B HAS EXISTING PRE-SUBTITLE D FINAL COVER SYSTEM CONSTRUCTED.
6. PIEZOMETERS WERE INSTALLED IN 1991 AND THEN DECOMMISSIONED AND PLUGGED IN 1994.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
LICENSED
PROFESSIONAL GEOSCIENTIST
12/12/2024

FOR PERMITTING PURPOSES ONLY

POTENTIOMETRIC SURFACE MAP NOVEMBER 1991

CITY OF STEPHENVILLE
CITY OF STEPHENVILLE LANDFILL
LIMITED SCOPE AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING 13

APPENDIX A
Historic Documents

SUBSURFACE INVESTIGATION

For

SANITARY LANDFILL SITES
WEST OF STEPHENVILLE, TEXAS
AND NORTH OF STEPHENVILLE

Report to

HOMER A. HUNTER ASSOCIATES
DALLAS, TEXAS

By

TEXAS TESTING LABORATORIES, INC.
DALLAS, TEXAS

T.T.L. Job No. 72.1166

November 29, 1972

INTRODUCTION

On November 9 and 10, 1972, Texas Testing Laboratories drilled exploratory test borings on two separate tracts of land that were to be considered for locating a sanitary landfill for the City of Stephenville, Texas.

The site that was drilled on November 9, was located approximately 10 miles west of downtown Stephenville, and north of U.S. 377. This tract was about 100 acres in area, and six test borings were drilled to evaluate the site for potential use as a sanitary landfill.

A tract of land adjoining the present sanitary landfill site on the east, was also investigated. This property was judged to be not acceptable after the first two borings, and no further testing of the site or the soil samples was warranted.

No test borings drawing is included in this report, since no plot of tracts of land were available. The test boring locations can be located on a map or drawing, if it becomes necessary to more closely define the investigation.

EXPLORATION

Six test borings were drilled at the western site using a continuous flight, hollow stem auger operated from a truck mounted rotary drill. Two

test borings were drilled at the east site, adjoining the present landfill.

Samples of the subsurface soils were obtained either with a thin wall Shelby tube sampler or auger cuttings were taken for soil identification and classification. Some soils were too dry and friable to be sampled in an undisturbed manner using the thin wall Shelby tube.

Each sample was sealed in a polyethelene bag to retain the in-situ moisture condition, and packed in a protective wooden box for transporting to the Dallas soils laboratory.

LABORATORY TESTING

Each soil sample was visually inspected by an experienced soils technician, and classified according to the Unified Soils Classification System.

Undisturbed soil samples were trimmed, measured, and weighed to determine in-place density and moisture content.

Representative samples of each soil type encountered in the drilling of the test borings were tested for Atterberg Limit values.

Since the primary thrust of the investigation was to locate and test those soils that were generally impermeable to the passage of water, samples were selected for the permeability test that appeared to be sufficiently im-

permeable and near the ground surface. A constant head apparatus was used, and a head pressure of 23.1 feet (10 psi) was applied to the soil sample in the Harvard compaction mold.

SUMMARY

Permeability tests conducted on the soil samples showed the following results:

Boring	Depth feet	Description	Class.	Plasticity Index	Permeability cm/sec	Duration of test
1	16	Tan sandy clay	CL	24	2.33×10^{-9}	54 hours
2	10	Orange & grey sandy clay	CL	21	Less than 1×10^{-7}	54 hours
3	17	Orange & grey sandy clay	CL	27	Less than 1×10^{-7}	54 hours
4	11	Purple clay	CH	41	2.3×10^{-9}	72 hours
5	16.5	Light grey sandy clay	CL	13	1.2×10^{-7}	48 hours
6	6	Tan caliche	CL	17	2.84×10^{-7}	24 hours

The description of the permeability test results as being "less than 1×10^{-7} centimeters per second", is based on experience with other soil samples subjected to less head pressure and showing passage of water through the sample in less time than 48 hours. These samples were not fully saturated after the test period, and this in itself, indicates very little permeability. A week or two would be required to determine true permeability, and it would be in the range of 1×10^{-10} cm/sec.

There is a sufficient quantity of impervious soil available at this site to adequately seal the landfill operation from passage of water into the surrounding subsurface.

Respectfully submitted:

C. Darrow Hooper

C. Darrow Hooper, P.E.
Foundation Engineer
Texas 18137

RECOMMENDATIONS

Referring to the logs of borings and the results of laboratory investigation, it can be seen that adequate impervious material is available to place refuse material upon.

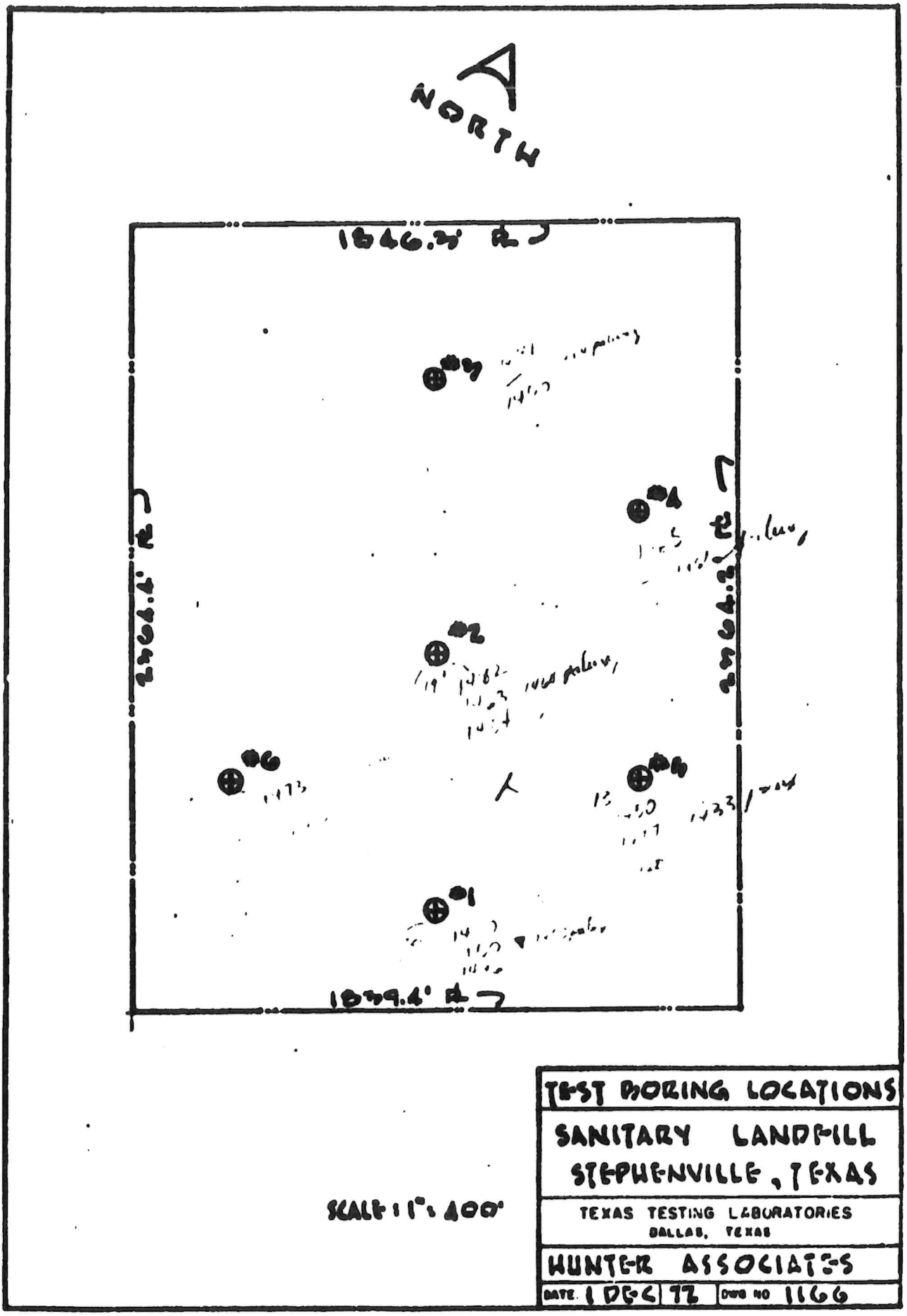
It is recommended that operations begin in the Western portion of the property in the vicinity of boring No. 6. Excavation should be carried to the light grey clay which has a very low permeability. This would require a minimum of twelve feet of excavation. Operations could continue along the western half of the property excavating into the described grey or purple clay.

When operations were completed in the Western portion of the property, the Eastern half could be utilized. A light grey clay was found in both borings 4 and 5 which would be excellent material to base the landfill upon. Excavation should be carried into this grey clay or into the purple clay found in boring No. 4

The North 500 feet of the property should not be utilized due to the well located North of the property and also the possibility of

some hard rock in the area. Rock was also encountered in boring No. 1 and 2 along the center of the property.

It is felt that a portion of the center of the property could be utilized particularly around boring No. 1. If excavation was less than 20 feet in the area of boring No. 2 it might be necessary to use some of the clay material from other areas to line the bottom of the excavation to insure 3 feet of impervious material. Adequate clay is available on site to do this if necessary.



TEST BORING LOCATIONS		
SANITARY LANDFILL STEPHENVILLE, TEXAS		
TEXAS TESTING LABORATORIES DALLAS, TEXAS		
HUNTER ASSOCIATES		
DATE 1 DEC 72	DWG NO 1166	

TEXAS TESTING LABORATORIES, INC.

LOG OF BORING

PROJECT: Sanitary Landfill
FOR: City of Stephenville

BORING NO: 1
LOCATION: West of Stephenville

DATE: 11/9/72 JOB NO: 72.1166 BORING TYPE: Hollow Stem Auger
DRILLER: Gray SOIL ENGINEER: - GROUND ELEV:

LEGEND

S-SHELBY TUBE D-DENISON BARREL P-PENETRATION TEST J-JAR
■-CORE ▨-PENETRATION SAMPLE ▯-NO RECOVERY
▽-STATIC WATER TABLE ▼-HYDROSTATIC WATER TABLE

DEPTH IN FEET	SAMPLE TYPE & SAMPLE NO.	PENETROMETER READING, TSF	BLOWS/FOOT	DESCRIPTION OF STRATUM	
				Brown Clay, Dry & Hard	0.5'
				Weathered Tan Limestone & Caliche, Dry & Hard	3.5'
5		4.5+		Orange & Light Grey Clay with Calcareous Particles, Dry & Hard and Thin Layers of Hard Tan Limestone	
10					14'
15				Tan Limestone, Hard	15.5'
				Orange Clay, Moist & Stiff	17'
				Thin Layer of Tan Limestone	17'2"
20				Grey Silty Sand with Thin Layers of Red & Light Grey Clay, Moist & Hard	21'
		4.5+		Grey Clay, Dry & Hard ▼	22.5'
					23.5'
25				Grey Sandstone, Dry & Medium Hardness	25'
				Grey Fine Sand with Sandstone Particles, Moist & Dense	28'
				Grey Shaley Clay with Thin Lenses of Light Grey Sand, Dry & Hard	29.5'
30		4.5+		Grey Sandstone, Hard	

End of Boring 30'

A.9

TEXAS TESTING LABORATORIES, INC.

LOG OF BORING

PROJECT: Sanitary Landfill
FOR: City of Stephenville

BORING NO: 2
LOCATION: West of Stephenville

DATE: 11/9/72 JOB NO: 72.1166 BORING TYPE: Hollow Stem Auger
DRILLER: Gray SOIL ENGINEER: - GROUND ELEV:

LEGEND

S-SHELBY TUBE D-DENISON BARREL P-PENETRATION TEST J-JAR
C-CORE B-PENETRATION SAMPLE N-NO RECOVERY
▽-STATIC WATER TABLE ▼-HYDROSTATIC WATER TABLE

DEPTH IN FEET	PHOTO STRIP & SAMPLE NO.	PENETROMETER READING, TSF	BLOWS/FOOT	DESCRIPTION OF STRATUM	
				Brown Clay, Dry & Hard	0.25'
				Tan Caliche with Thin Layers of Weathered Limestone, Dry & Dense	4'
5				Tan Limestone, Hard & Dry	5'
				Tan Silty Clay	5.5'
				Tan Limestone, Hard	6'
				Tan Silty Clay	6.5'
				Tan Limestone	7.0'
10				Tan Silty Clay	8'
				Sandstone	8.2'
				Orange & Red Clayey Sand	9'
				Orange & Light Grey Sandy Clay	11'
15				Light Grey & Orange Fine Sand, Moist & Dense	15'
				Light Grey & Orange Fine Sand with thin Lenses of Grey Clay	17'
				Light Grey Silty Cemented Sand ▽	19'
20				Tan Fine Sand, Wet & Dense	20'
				Orange Sandy Clay with Sandstone Particles	28'
25					
30				Light Grey Clay mottled with Purple, Moist & Hard	
				End of Boring 30'	

1463

A-10

TEXAS TESTING LABORATORIES, INC.

LOG OF BORING

PROJECT: Sanitary Landfill
FOR: City of Stephenville

BORING NO: 3
LOCATION: West of Stephenville

DATE: 11/9/72 JOB NO: 72.1166 BORING TYPE: Hollow Stem Auger
SOIL ENGINEER: - GROUND ELEV: 1161

LEGEND

S-SHELBY TUBE D-DENISON BARREL P-PENETRATION TEST J-JAR
C-CORE B-PENETRATION SAMPLE N-NO RECOVERY
▽-STATIC WATER TABLE ▽-HYDROSTATIC WATER TABLE

DEPTH IN FEET	SAMPLE TYPE & SAMPLE No.	PENETROMETER READING, TSF	BLOWS/FOOT	DESCRIPTION OF STRATUM	
				Weathered Limestone with Brown Clay	1.5'
				Tan & White Caliche, Dry & Hard	5'
5				Tan Limestone Layers (1"-3"), Hard & Soft	
10				(Harder Layers @ 11')	
15					16'
				Orange & Light Grey Sandy Clay, Moist & Hard	19.5'
20				Light Grey & Orange Clayey Sand, Moist & Hard	
25					
30				End of Boring 30'	

TEXAS TESTING LABORATORIES, INC.

LOG OF BORING

PROJECT: Sanitary Landfill
FOR: City of Stephenville

BORING NO: 4
LOCATION: West of Stephenville

DATE: 11/9/72
DRILLER: Gray

JOB NO: 72.1166
SOIL ENGINEER: -

BORING TYPE: Hollow Stem Auger
GROUND ELEV:

LEGEND

S-SHELBY TUBE D-DENISON BARREL P-PENETRATION TEST J-JAR
■-CORE ⊠-PENETRATION SAMPLE ⊡-NO RECOVERY
▽-STATIC WATER TABLE ▼-HYDROSTATIC WATER TABLE

DEPTH IN FEET	SAMPLE TYPE & SAMPLE NO.	PENETROMETER READING, TSF	BLOWS/FOOT	DESCRIPTION OF STRATUM	
				Brown Sandy Clay, Moist & Hard	1.5'
5				Tan & Orange Silty Clay with Calcareous Pockets (Caliche)	5.5'
				Orange & Light Grey Silty Clay, Moist	10'
10				Purple Clay, Moist & Hard	14'
15				Tan, White, Orange & Purple Clayey Sand, Dry & Dense	
20					
25					26'
				Light Grey Sandy Clay, Moist & Hard	28'
30				Light Grey Clayey Sand, Moist & Dense	
				End of Boring 30'	

TEXAS TESTING LABORATORIES, INC.

LOG OF BORING

PROJECT: Sanitary Landfill
FOR: City of Stephenville

BORING NO: 5
LOCATION: West of Stephenville

DATE: 11/10/72 JOB NO: 72.1166 BORING TYPE: Hollow Stem Auger
DRILLER: Gray SOIL ENGINEER: - GROUND ELEV: ~ '

LEGEND

S-SHELBY TUBE D-DENISON BARREL P-PENETRATION TEST J-JAR
■-CORE ⊠-PENETRATION SAMPLE ⊡-NO RECOVERY
▽-STATIC WATER TABLE ▼-HYDROSTATIC WATER TABLE

DEPTH IN FEET	SAMPLE TYPE & SAMPLE NO.	PENETROMETER READING, TSF	BLOWS/FOOT	DESCRIPTION OF STRATUM	
				Brown Silty Clay, Dry & Hard	1'
5				Tan Silty Clay with Thin Layers of Hard Limestone, Dry & Hard (Caliche)	6.5'
				Light Grey Sand, Moist & Dense	10'
10				Light Grey Sandy Clay, Moist	12'
				Grey Clayey Sand	13'
	walnut			Orange, Tan & Red Clayey Sand @ 16.5' PI 13	16'
15				Limestone	16.2'
				Light Grey Clayey Sand	18'
20	Palestine			Light Grey Sandy Clay with Thin Layers of Light Grey Sand	
25					
30				End of Boring 30'	

TEXAS TESTING LABORATORIES, INC.

LOG OF BORING

PROJECT: Sanitary Landfill
FOR: City of Stephenville

BORING NO: 6
LOCATION: West of Stephenville

DATE: 11/10/72 JOB NO: 72.1166 BORING TYPE: Hollow Stem Auger
DRILLER: GRAY SOIL ENGINEER: - GROUND ELEV:

LEGEND

S-SHELBY TUBE D-DENISON BARREL P-PENETRATION TEST J-JAR
■-CORE ▩-PENETRATION SAMPLE ▯-NO RECOVERY
▽-STATIC WATER TABLE ▼-HYDROSTATIC WATER TABLE

DEPTH IN FEET	SAMPLE TYPE & SAMPLE NO.	PENETROMETER READING, TSF	BLOWS/FOOT	DESCRIPTION OF STRATUM	
				Brown Silty Clay	1.5'
				Tan Caliche with Thin Layers of Tan Limestone	4'
5				Orange and Light Grey Clayey Sand	
10					12.5'
15				Light Grey Clay	15'
20				Purple and Light Grey Silty Clay	
25					
30				End of Boring 30'	

SUMMARY OF LABORATORY TEST RESULTS

Job No. 72.1166
Date: 11/18/72

Atterberg Limits

Boring No.	Depth feet	Class.	Liquid Limit	Linear Shrinkage	Plasticity Index
1	16	CL	38	15.4	24
1	22	CH	54	13.4	20
2	10	CL	29	14.0	21
2	21	CL	28	8.2	10
3	17	CL	40	16.6	27
3	21.5	CL	36	9.6	13
4	11	CH	52	22.2	41
4	26	CL	32	12.4	18
5	16.5	CL	29	9.8	13
5	29	CL	41	14.7	23
6	6	CL	32	12.0	17
6	12.5	CH	54	21.0	37
6	29	CL	37	13.5	20

SOUTHWESTERN LABORATORIES

SUMMARY OF TESTS

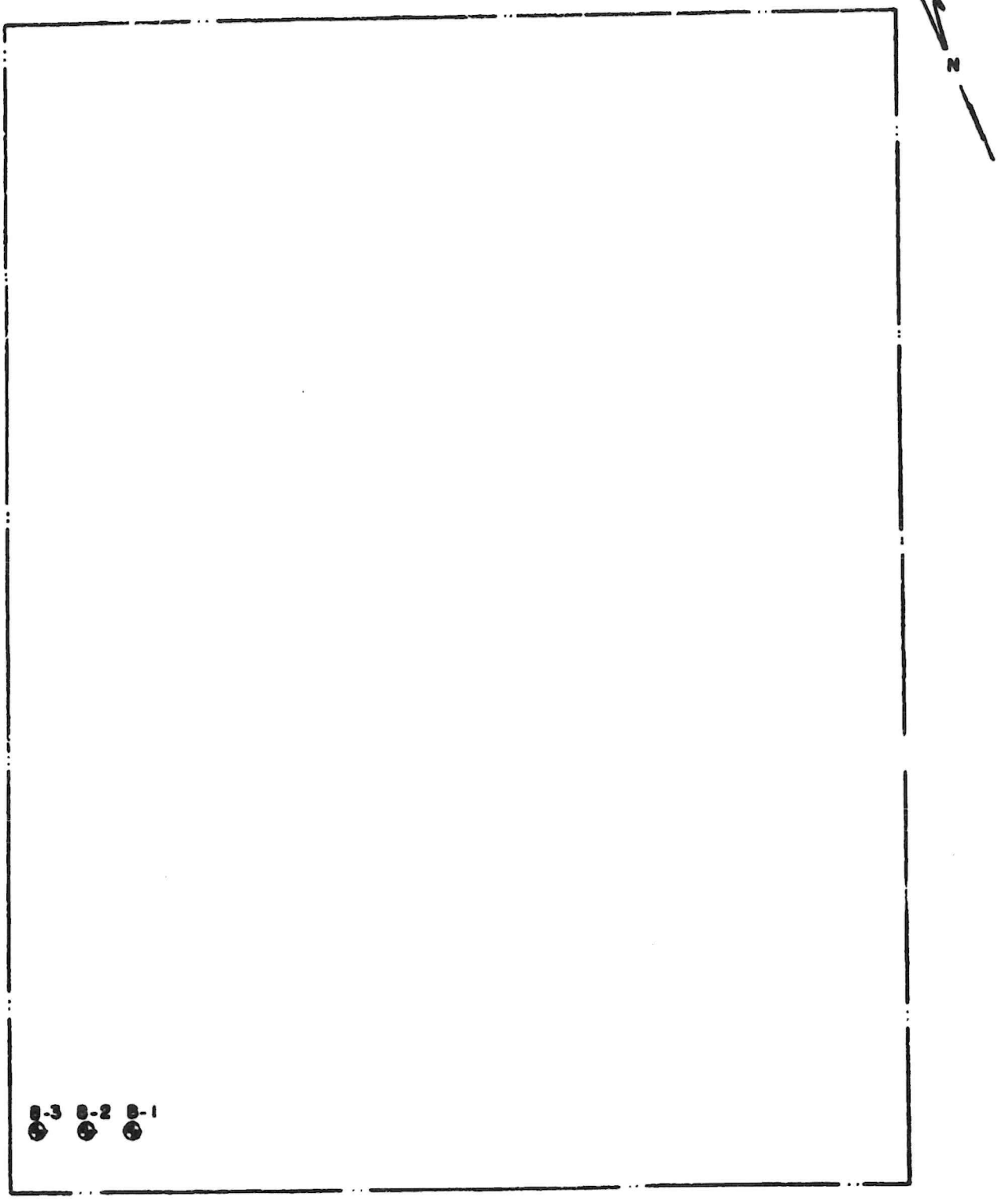
PROJECT: Landfill Borings & Test

CLIENT: City of Stephenville

DATE: 7-9-86

BORING NUMBER	DEPTH (FEET)	TYPE OF MATERIAL	% silt & clay	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS LL	PL	PI	LINEAR SHRINKAGE (%)	COMPRESSIVE STRENGTH (psf)	CONFINING PRESSURE (psi)	STRAIN (%)
1	2-3	Tan and gray very silty caliche clay	96	15		28	16	12	7	4.0		
	4-5	Tan and light gray very silty, sandy clay	80	11	110	26	16	10	5	$k=3.8\times10^{-7}$ cm/sec		
	9-10	Yellow and tan sandy clay	79	17	111	33	17	16	9	$k=7.8\times10^{-9}$ cm/sec		
	14-15	Purple silty clay	93	18	112	46	18	28	14	$k=8.7\times10^{-10}$ cm/sec		
	24-25	Tan and gray clay	82	23	99	53	22	31	16			
	34-35	Tan and gray silty clay	85	14	115	41	18	23	13	$k=4.9\times10^{-9}$ cm/sec		
2	4-5	Tan and gray very silty sandy caliche clay	87	10	125	27	16	11	5	$k=5.5\times10^{-8}$ cm/sec		
	9-10	Tan and gray clay	86	19	107	50	20	30	16			
	14-15	Gray silty clay	79	16	109	43	18	25	13	$k=1.1\times10^{-9}$ cm/sec		
	19-20	Purple silty clay	82	18		43	18	25	13	$k=3.1\times10^{-9}$ cm/sec		
	29-30	Tan sandy clay	89	14	116	44	18	26	12			
3	4-5	Tan and gray very silty sandy caliche clay	82	10		28	16	12	5	$k=7.2\times10^{-8}$ cm/sec		
	9-10	Tan and gray clay	73	17	109	50	20	30	15			
	14-15	Purple silty clay	79	14		43	18	25	13	$k=8.5\times10^{-10}$ cm/sec		
	24-25	Tan and gray sandy clay	68	12		44	18	26	12	$k=5.7\times10^{-9}$ cm/sec		

SOUTHWESTERN LABORATORIES



PROJECT / TITLE

STEPHANVILLE LANDFILL

BORING LOCATION DIAGRAM		SITE LOCATION: STEPHANVILLE, TEXAS	
SWL 86 - 832	SCALE: 1" = 300'	DATE: 7 / 29 / 86	DRAWN BY: CD

LOG OF BORING

PROJECT: Stephenville Landfill
CLIENT: City of Stephenville

BORING NO. 1
LOCATION: Stephenville, TX

DATE: 7-7-86 TYPE: Samples CASED TO GROUND ELEVATION:

LEGEND
■ SAMPLE
X STANDARD PENETRATION
▼ WATER

WATER INFORMATION: No water encountered

DEPTH IN FEET	SYMBOL	SAMPLE	STANDARD PENETRATION BLOWS/ft	HAND PEN tsf	DESCRIPTION OF STRATUM	
					Tan and gray sandy clay with caliche	CL
5					Tan and light gray very silty sandy clay	CL
10					Yellow and tan sandy clay	CL
15					Purple silty clay (tan and gray sandy clay seams - 1'6" at 17')	CL with some CH
20						
25					(tan and gray clay layer 2'6" at 24' to 26.5')	
30					Tan and gray silty clay	CL
35						
40						
					Tan sandstone	Rock
45					Boring terminated at 44'	
50						

LOG OF BORING

PROJECT: Stephenville Landfill
CLIENT: City of Stephenville

BORING NO. 2
LOCATION: Stephenville, TX

DATE 7-7-86 TYPE: Samples CASED TO GROUND ELEVATION

LEGEND
■ SAMPLE
X STANDARD PENETRATION
▼ WATER

WATER INFORMATION
No water encountered

DEPTH IN FEET	SYMBOL	SAMPLE	STANDARD PENETRATION BLOWS/ft.	HAND PEN tsf	DESCRIPTION OF STRATUM	USCS
					Silty clayey caliche	CL
5					Tan and gray very silty sandy caliche clay	CL
10					Tan and gray clay (Light purple limestone seam - 6" thick at 12')	CH
					Purple clay	CH
15					Gray silty clay	CL
20					Purple silty clay with gray silty clay seams Gray seam at 18')	CL with CH
25					Sandstone	ROCK
					Purple clay	CL
30					Tan sandy clay	
35					- 6" layer of sandstone at 36'	
40					Sandstone	Rock
					Boring terminated at 40'	
45						
50						

LOG OF BORING

PROJECT Stephenville Landfill
CLIENT: City of Stephenville

BORING NO. 5
LOCATION Stephenville, TX

DATE 7-7-86 TYPE Sample CASED TO GROUND ELEVATION

LEGEND
■ SAMPLE
X STANDARD PENETRATION
▼ WATER

WATER INFORMATION
Seepage below 39'

DEPTH IN FEET	SYMBOL	SAMPLE	STANDARD PENETRATION BLOWS/ft.	HAND PEN tsf	DESCRIPTION OF STRATUM	USCS
					Tan very silty clay	SM
5					Tan and gray very silty sandy clay	CL
					Tan and gray clay (6" purple limestone layer at 9')	CH
10						
					Purple silty clay with light gray seams	CL with CH
15						
20					- (1'6" gray silty clay seam at 19' to 20.5')	
25					Tan and gray sandy clay	CL
30						
35					Gray sandstone	ROCK
40					Cemented silty sand	SM (soft rock)
45					Boring terminated at 45'	
50						

SOUTHWESTERN LABORATORIES

SUMMARY OF TESTS

PROJECT: Landfill Borings & Tests

CLIENT: City of Stephenville

DATE: 9/18/87

BORING NUMBER	DEPTH (FEET)	TYPE OF MATERIAL	% Silt and Clay	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS LL	PL	PI	LINEAR SHRINKAGE (%)	COMPRESSIVE STRENGTH (psf)	CONFINING PRESSURE (psi)	STRAIN (%)
1	2-3	Tan very silty clay	87.4	8		30	17	13	7			
	7-8	Tan very silty clay w/limestone	67.7	11		29	17	12	5	k=8.6x10^{-}		
	19-20	Tan & light gray very silty clay	90.9	15		32	17	15	7			
	24-25	Reddish tan & gray very silty clay	85.4	11		30	17	13	5			
	34-35 39-40	Purple clay	77.2	16		63	26	37	16			
2	0-1	Brown sandy clay	57.4	8		31	17	14	7			
	19-20	Tan & gray very silty clay	91.4	13		31	17	14	7	k=3.3x10^{-}		cm/sec
	24-25	Tan & gray very silty clay	83.1	11		35	18	17	7			
	29-30	Tan & light gray silty clay	79.2	11								
3	4-5	Tan very silty clay w/limestone	54.6	5		29	16	13	6			
	19-20	Tan very silty clay w/limestone	95.0	17								
	24-25 29-30	Tan & light gray silty clay w/silty sand partings	79.1	11		37	18	19	8			
	34-35 39-40	Purple clay		13						k=3.2x10^{-}		cm/sec

SWL FORM 8-68

SOUTHWESTERN LABORATORIES

SUMMARY OF TESTS

Swl. Report No. 87-1138

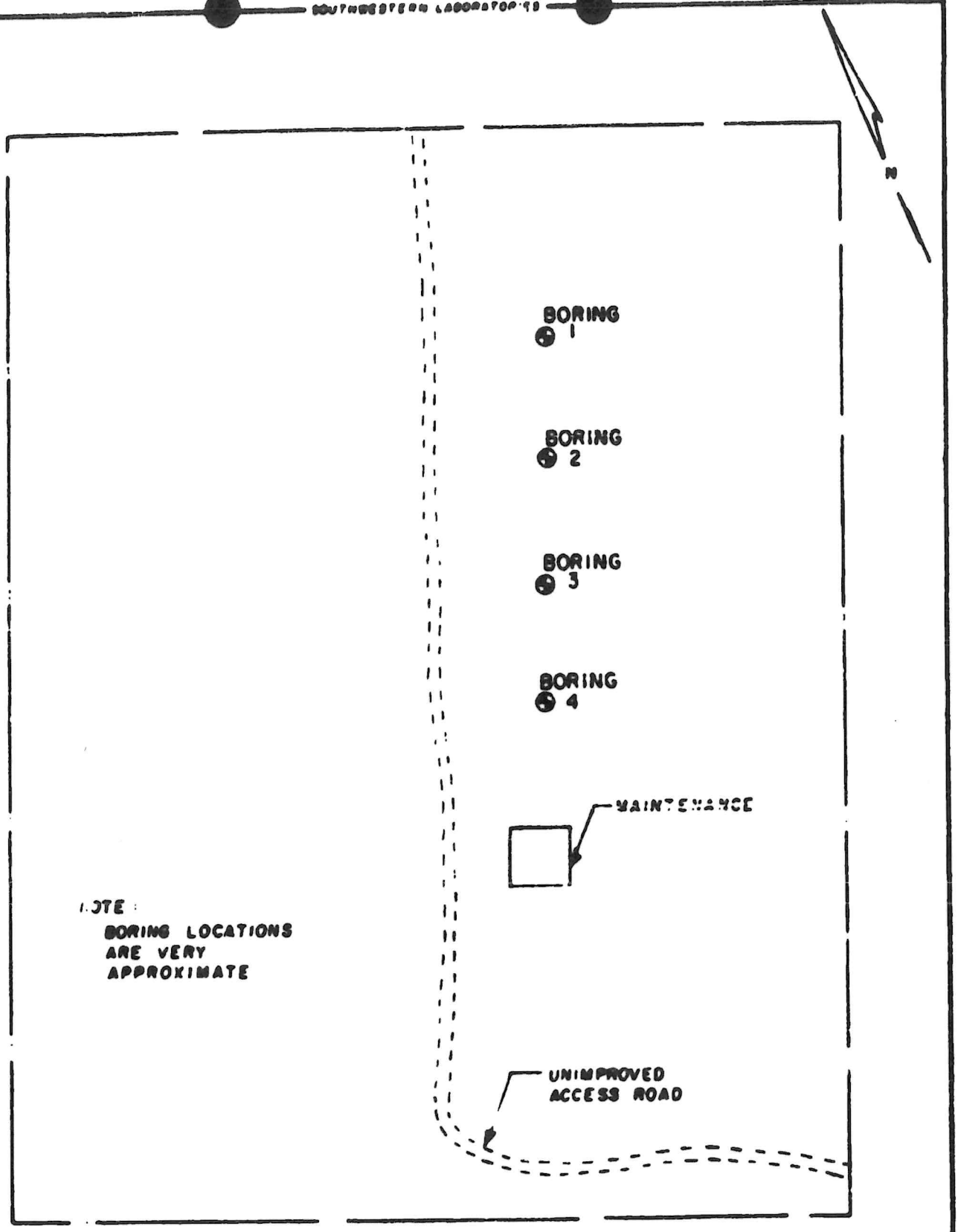
PROJECT: Landfill Borings & Tests

CLIENT: City of Stephenville

DATE: 9/18/87

BORING NUMBER	DEPTH (FEET)	TYPE OF MATERIAL	% Silt and Clay	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	ATTERBERG LIMITS PI	LINEAR SHRINKAGE (%)	COMPRESSIVE STRENGTH (psf)	CONFINING PRESSURE (psf)	STRAIN (%)
4	2-3	Tan very silty clay	55.5	2		27	17	10	4			
	7-8											
	9-10	Tan very silty clay and limestone	34.9	4		30	17	13	7			
	14-15	Tan & gray very silty clay	90.7	9		29	17	12	5			
	19-20											
	24-25	Tan & gray very silty clay w/silty sand partings	73.4	10		30	16	14	6			
	29-30	Purple clay	91.4	22								
	34-35 39-40	Tan sandy clay	64.9	16		42	18	24	10	3.5x10-8 cm/sec		

SWL FORM 8 88



STEPHENVILLE LANDFILL

BORING LOCATION DIAGRAM		STEPHENVILLE, TEXAS	
SWL 87-1138	SCALE 1" = 300'	DATE 10/ 9 /87	DRAWN BY CD

Swl Report No. 87-1138

LOG OF BORING

PROJECT Landfill Borings & Tests-US 377 South — BORING NO 1

CLIENT City of Stephenville — LOCATION Stephenville, Tx.

DATE 9/16/87 — TYPE Core — CASED TO — GROUND ELEVATION

LEGEND: ■ SAMPLE; X STANDARD PENETRATION; ▼ WATER

WATER INFORMATION: Seepage at 19'; water at 24' after 3.8 hours

DEPTH IN FEET	SYMBOL	SAMPLE	STANDARD PENETRATION BLOWS/ft	HAND PEN tsf	DESCRIPTION OF STRATUM
		■			Brown & tan sandy clay
5		■			Tan very silty clay w/limestone seams & layers
10		X	100/1"		Tan limestone w/tan silty clay layers & seams
15		X	100/½"		
20		■			Tan & light gray very silty clay
25		■			Reddish tan, tan & gray very silty clay
30		■			Gray limestone
35		X	50/5"		Purple clay
40		X	50/4"		Boring terminated at 40'
45					*TMD - Cone Penetrometer Test
50					

SwL Report No. 87-1138

LOG OF BORING

PROJECT Landfill Borings & Tests-US 377 South — BORING NO 2

CLIENT City of Stephenville — LOCATION Stephenville, Tx.

DATE 9/16/87 — TYPE Core — CASED TO — GROUND ELEVATION

LEGEND: ■ SAMPLE; X STANDARD PENETRATION; ▼ WATER

WATER INFORMATION: No water encountered during drilling; water at 36.5' after 2.8 hours

DEPTH IN FEET	SYMBOL	SAMPLE	STANDARD PENETRATION BLOWS/ft	HAND PEN tsf	DESCRIPTION OF STRATUM
0		■			Brown sandy clay
5					Tan clay w/limestone seams & layers
10					Tan limestone w/tan very silty clay seams & layers
15					
20		■			Tan & gray very silty clay w/very thin silty sand partings
25		■			
					Tan silty clay
30		X	50/3"		Tan & light gray silty clay w/very thin silty sand partings
					Gray limestone w/dark gray shale layers
35		X	100/1"*		
					Purple clay
40		X	50/3"		
					Boring terminated at 40'
45					*THD - Cone Penetrometer Test
50					

LOG OF BORING

Swl Report No. 87-1138
PROJECT Landfill Borings & Tests-US 377 South — BORING NO. 3
CLIENT City of Stephenville — LOCATION Stephenville, Tx.

DATE 9/16/87 TYPE Core CASED TO GROUND ELEVATION:

LEGEND
■ SAMPLE
X STANDARD PENETRATION
▼ WATER

WATER INFORMATION

Seepage at 19'; water at 33' after 1.41 hours

DEPTH IN FEET	SYMBOL	SAMPLE	STANDARD PENETRATION BLOWS/ft	HAND PEN tsf	DESCRIPTION OF STRATUM
					Brown sandy clay w/broken limestone & tan clay mixed
5					Tan very silty clay w/tan limestone seams & layers
10					Tan limestone w/tan very silt clay seams & layers
15					
					Tan silty clay w/hard rock layer 4" thick
20		X	50/3"		Reddish tan silty clay
25		X	50/3"		Tan & light gray silty clay w/very thin silty sand partings
30		X	50/2½"		
					Gray limestone
35		X	50/5"		Purple clay
40		X	50/2"		
					Boring terminated at 40'
45					*THD - Cone Penetrometer Test
50					

SOUTHWESTERN LABORATORIES

SwL Report No. 87-1138

LOG OF BORING

PROJECT: Landfill Borings & Tests-US 377 South
CLIENT: City of Stephenville

BORING NO. 4
LOCATION: Stephenville, Tx.

DATE: 9/16/87 TYPE: Core CASED TO: GROUND ELEVATION:

LEGEND: ■ SAMPLE, X STANDARD PENETRATION, ▼ WATER

WATER INFORMATION: No seepage encountered

DEPTH IN FEET	SYMBOL	SAMPLE	STANDARD PENETRATION BLOWS/ft.	HAND PEN tsf	DESCRIPTION OF STRATUM
		■			Brown sandy clay
5		■			Tan very silty clay w/limestone seams & layers
10		■			Tan limestone w/tan very silty clay seams & layrs
15		■			Tan & gray very silty clay w/very thin silty sand partings
20		X	50/4"		
25		X	50/5"		
		X	50/3"		
30		X			Purple caly w/thin sand seams
35		X	50/2"		Tan sandy clay w/clayey sand
		X	50/3"		
40					Boring terminated at 40'
45					
50					

REVISED PRELIMINARY HYDROGEOLOGICAL
SITE ASSESSMENT REPORT
STEPHENVILLE SANITARY LANDFILL
PERMIT NO. 664
STEPHENVILLE, ERATH COUNTY, TEXAS

To

City of Stephenville
Stephenville, Texas

By

TEAM Consultants, Inc.
Arlington, Texas
January, 1992

TEAM CONSULTANTS, INC.

Geotechnical, Environmental, Construction Materials Testing

January 31, 1992
TEAM Project No. 91201

Mr. Carroll Gentzel
City of Stephenville
354 North Belknap
Stephenville, Texas 76401

REVISED PRELIMINARY HYDROGEOLOGICAL SITE ASSESSMENT REPORT
STEPHENVILLE SANITARY LANDFILL - PERMIT NO. 664
STEPHENVILLE, ERATH COUNTY, TEXAS

Gentlemen:

Presented herein is our revised preliminary report of the hydrogeological site assessment performed at the existing permitted sanitary landfill. This investigation was performed in general accordance with our proposal number PN957 dated January 22, 1991, and was authorized by City Council action on February 5, 1991. This revision corrects groundwater potentiometric surface level interpretations reported in our report No. 91201 dated November 6, 1991. Those interpretations reflected the estimated surface piezometer elevations rather than the actual surveyed elevations.

We appreciate the opportunity to be of service on this project. Should you have any questions or need further assistance, please call.

Very truly yours,

TEAM Consultants, Inc.

William Prikryl, P.E.

STATE OF TEXAS
WILLIAM PRIKRYL
51910
REGISTERED
PROFESSIONAL ENGINEER

WP/vb

Copies Submitted: 3

TABLE OF CONTENTS

INTRODUCTION

The Stephenville Sanitary Landfill, Permit No. 664, is located approximately six miles west of the Court House and approximately one mile north of Highway 67 West. The general location and orientation of the landfill site shown relative to Stephenville is presented on the Site Location Map, Plate 1, in the Illustrations section. The permitted area consists of approximately 100 acres and is permitted as a Type I landfill.

PURPOSE AND SCOPE

This investigation of site hydrogeological conditions was performed for the purpose of evaluating the depth to and hydraulic gradient of the upper most aquifer within the site boundary. The following tasks were undertaken to achieve the intended purpose: (1) auger borings were drilled at selected locations to prescribed depths in order to obtain samples for stratigraphy identification; (2) piezometers were installed and water level readings were obtained over an extended time frame; and (3) groundwater observations were analyzed in order to define the piezometric surface map of the site. As an added scope, samples were obtained on September 23, and December 10, 1991 for quality assessment purposes. Results are presented and interpreted herein.

FIELD INVESTIGATION

Subsurface conditions at the site were evaluated between April 8 and 12, 1991, with five undisturbed sample borings located approximately as shown on the Plan of Borings, Plate 2. A water well drilling rig using air and water for bit cooling and cuttings removal was used to advance the borings. A Piezometer was installed in each bore hole upon boring completion. Sample depths, soil descriptions, and classifications (based on the Unified Soil Classification system and standard geologic nomenclature) are shown on the logs of boring, Plates 3 through 11. A key to descriptive terms and symbols used on the logs is presented on Plate 12.

Undisturbed samples of cohesive materials were obtained utilizing a thin-walled, seamless Shelby tube sampler. Upon recovery, Shelby tube samples were extruded in the field, visually classified, wrapped, and labeled according to boring number and depth.

Dense or granular materials were sampled utilizing a two-inch diameter, split-spoon sampler in conjunction with the Standard Penetration Test (ASTM D-1586). This test utilizes a 140-pound hammer that drops a free fall vertical distance of 30 inches. The number of blows required for 18 inches of penetration is recorded and the value for the last 12 inches, or the penetration obtained with in 100 blows, whichever is first, is reported as the "Standard Penetration Value".

Below the depth of Shelby tube refusal, cohesive materials were recovered using split-spoon samplers for identification purposes only. Standard drilling and sampling procedures are described in the Appendix.

Five piezometers were installed during the field exploration phase in order to observe the static water level over an extended period of time. Upon drilling completion, two-inch diameter flush joint, schedule 40 PVC machine slotted screen and riser was centered in the open bore hole. A screen length of five to ten feet was used. Number two sandblast sand was placed in the annulus around the slotted screen section, followed by a four to ten foot thick seal of bentonite pellets. Powered bentonite grout mixed with cuttings was used above the seal to the surface, to keep potential surface water from entering the hole. A description of each installation is presented on Piezometer Installation Details, Plates 13 through 17.

Groundwater was not observed during drilling in any of the five borings. However, observation of the air flow after turning off the water source tended to indicate water being present in all borings prior to termination. Water levels can be expected to vary seasonally and will likely be related to fluctuations in the local groundwater recharge/utilization rate.

LABORATORY TESTING

All recovered samples were transported to the laboratory for further visual classification in order to verify field classifications. No laboratory soil tests were proposed or performed as a part of this study.

GEOLOGY AND SITE CONDITIONS

Site Geology

The site is located in an outcrop of the Walnut Formation which is underlain by the Paluxy Formation of Cretaceous geologic age. In the Stephenville area, the Paluxy Formation consists of interbedded claystones and sandstones, mostly light gray to red with a total thickness in excess of 100 feet. The Walnut Formation consists of interbedded claystone and limestone with iron staining varying in color from light brown to gray and white.

Site Conditions

The materials and conditions encountered at this site are generally consistent with the expected geology. Based on the samples recovered, the borings revealed the presence of surficial silty clays underlain by silty sands and clays with occasional clay or sandstone seams.

Based on the borings drilled for this study, the upper 20 to 55 feet of surficial material consists of silty clays with an occasional limestone or sandstone seam or silty fine sand seam. This surficial material is underlain by silty sands extending to depths beyond the boring completion depths ranging from 35 to 80 feet. Refer to the individual boring logs for a more detailed description of the materials encountered.

Groundwater

Groundwater was encountered in all five piezometers. Water level readings were recorded approximately every month following completion of field activities from April through November, 1991. Results of the long term water level observations are presented on Plate 18. Water level data were recorded to the top of the risers which extend approximately four to five feet above the ground surface. The elevations of the top of riser and ground surface at these locations are presented on Plate 19.

DISCUSSION

Based upon the information from the borings drilled on site, the underlying stratigraphy generally consists of relatively permeable silty fine sand. Above the sands, slowly permeable clays and silty clays are predominant. The underlying purple clay layer (marker bed) may serve as an aquiclude, and has been used for in situ bottom liner in a significant portion of the filled areas.

Water levels observed over an extended period indicate small changes in the static water elevations across the site. The lowest water level elevation of 1412.34 was recorded on August 24, 1991 at observation well (piezometer) number P-4. The highest water level elevation of 1441.3 was recorded on June 18, 1991 at observation well number P-1. A plot showing the observed groundwater elevations in all five piezometers for the evaluation period is presented on Plate 20.

The potentiometric surface map of the groundwater in the landfill area was defined by observing the static water levels in each of the installed piezometers. The reference point (top of riser) used for each well was surveyed to allow determination of the elevation of the static water level relative to mean sea level (MSL). In general the potentiometric surface map tends to indicate that the groundwater gradient is from the southeast to the northwest direction across the site. Our interpretation of the potentiometric surface map is presented on Plate 21.

Groundwater samples were obtained from piezometers P-1, P-2, P-4 and P-5 (the four boundary piezometers) on September 23, 1991 and again on December 10, 1991, and delivered to National Environmental Testing, Inc (NET) laboratory in Carrollton, Texas for analysis. Parameters evaluated included all Texas Department of Health (TDH) parameters for Groups 3 and 4, as defined on TDH Form SE 65 10-1-85. These include chloride, pH, specific conductance, total dissolved solids, total organic carbon (four replicates), iron and manganese. Results are presented on the NET Analytical Reports for sample numbers 172078 through 172081 dated 10/07/91, Plates 22 and 23, and for sample numbers 176124 through 176127 dated 12/26/91, Plates 30 and 31.. The NET Standard Quality Control Data Reports are presented on Plates 24 and 32, respectively. Typical TDH Groundwater Monitoring Reports for these samples are presented on Plates 25 through 28 and 33 through 36, respectively. Copies of the "Chain of Custody control" forms are presented on Plates 29 and 37, respectively.

CONCLUSIONS

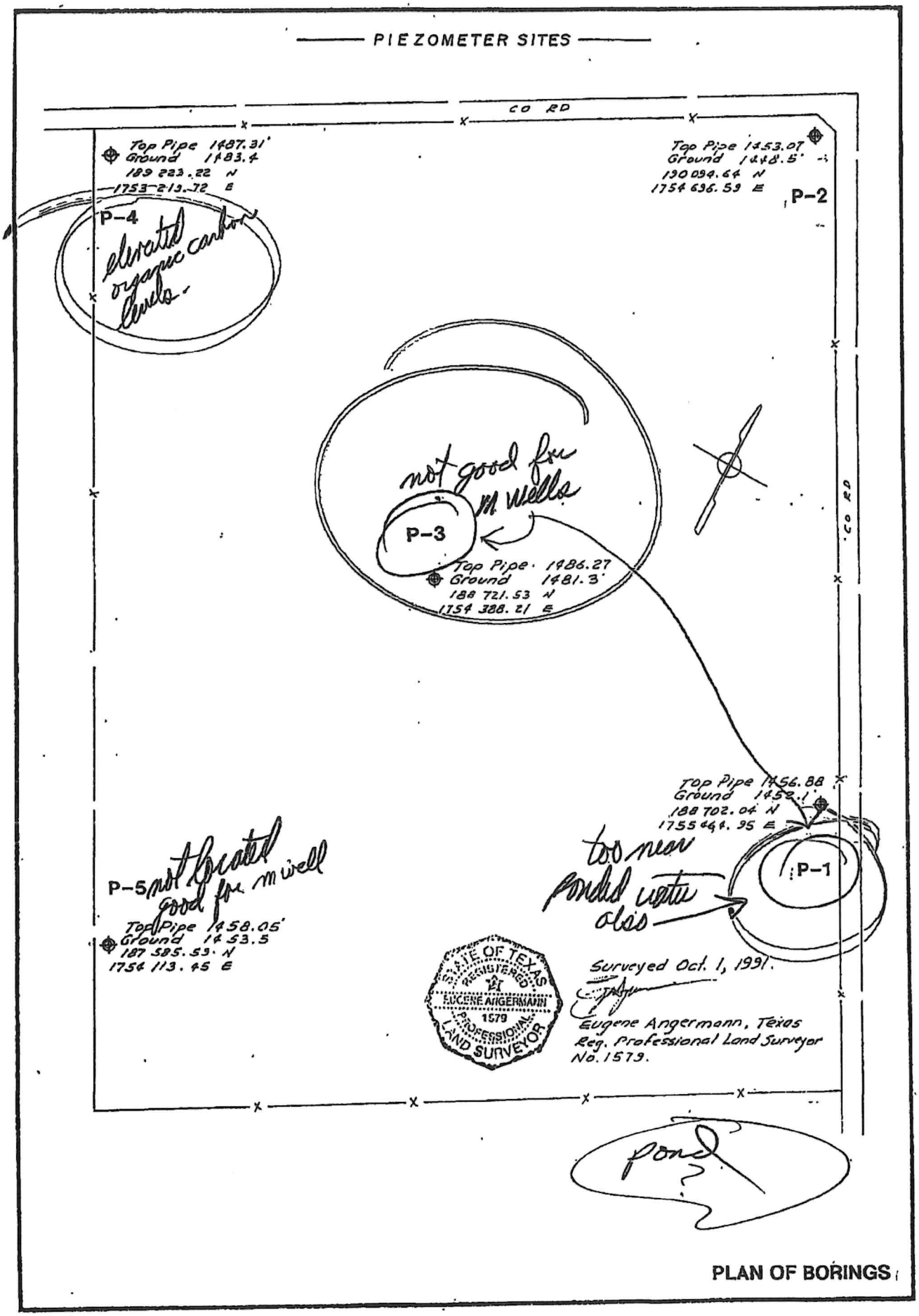
The results of the hydrogeological site assessment of the groundwater gradients at the site generally indicate a groundwater flow from southeast to northwest in a pattern as depicted on Plate 21. Based upon this conclusion, the up gradient location is along the southern side of the site, and the down gradient location is along the northern and western sides.

At present, five observation wells (piezometers) have been installed at the site. The location of each well is shown on the Plan of Borings, Plate 2. Based on the observed groundwater gradients, the locations of piezometers, except piezometers P-1 and P-3, are generally acceptable for the location of groundwater monitoring wells. However, it is our opinion that observation well P-5 is not optimally located and that observation well P-1 is too near the ponded water on site to be ideally suited for a non impacted upgradient monitoring location. The ponded water has significantly affected the interpretation of the results of this study and may have negated the usefulness of piezometer P-1 for the purposes of this study. However, as the pond is eliminated, the information obtainable from this location will help improve our understanding of groundwater gradients along the eastern half of the site.

Groundwater quality, as evaluated by samples obtained on September 23, and December 10, 1991, tends to indicate a consistently "good" quality water in observation wells P-1, P-2 (downgradient), and P-5 (downgradient). However, groundwater in observation well P-4 (downgradient) was observed to contain slightly elevated total organic carbon values (level of concern = 10.0 mg/L) in the first set of sample analyses but only a slight difference from other wells in the second set of sample analyses. It is possible that the first set of samples was not representative of the actual ground water quality in this location. However, in order to clarify this issue, additional samples should be obtained to develop a "statistically significant" data base on which adequate confidence can be based. Such a data base is not considered adequate with fewer than four samples obtained at the rate of one per calendar quarter for one full year. Also, the full list of parameters (see Plates 25 through 28 and 33 through 36) are required for defining the "base line" groundwater quality in any current groundwater assessment program. Under this current criteria, laboratory cost per sample per well is approximately $410.00. Under the subtitle "D" regulations, the Phase I list of parameters is estimated to cost approximately $500.00 per sample while the Phase II list (triggered by deterioration being observed under Phase I testing) is estimated to cost approximately $1,800.00 per sample. We recommend that, prior to making any final decisions, additional samples be obtained and analyzed for verification purposes. Should the data be consistent, it would enhance the City's ability to make an "educated" decision as to whether or not to remain committed to landfilling at this site under U.S. EPA subtitle "D" regulations. Should a commitment be made to this site, it is recommended that additional observation wells be installed in prime locations to better assess the impact of past landfilling operations on groundwater quality. Ultimately, a groundwater assessment program will be required and a groundwater monitoring system will have to be designed and installed in conformance with the then current Municipal Solid Waste Management Regulations. We anticipate a system with a minimum of six wells will be required at an estimated cost per well of $2,500.00 - $3,500.00.

ILLUSTRATIONS

SITE LOCATION MAP


PIEZOMETER SITES
CO RD
Top Pipe 1487.31'
Ground 1483.4
189 223.22 N
1753 213.72 E
P-4
elevated organic carbon levels
Top Pipe 1453.07
Ground 1448.5'
190 094.64 N
1754 636.59 E
P-2
not good for m wells
P-3
Top Pipe 1486.27
Ground 1481.3'
188 721.53 N
1754 388.21 E
CO RD
Top Pipe 1456.88
Ground 1452.1
188 702.04 N
1755 441.95 E
too near ponded water oasis
P-1
P-5 not located good for m well
Top Pipe 1458.05'
Ground 1453.5
187 585.53 N
1754 113.45 E
STATE OF TEXAS
REGISTERED
EUGENE ANGERMANN
1579
PROFESSIONAL
LAND SURVEYOR
Surveyed Oct. 1, 1991.
Eugene Angermann, Texas
Reg. Professional Land Surveyor
No. 1579.
pond
PLAN OF BORINGS

SOIL BOREHOLE LOG

SITE NAME AND LOCATION

Hydrogeological Site Assessment
Stephenville Landfill - Permit No. 664
Stephenville, Erath County, Texas

188702.04N
DATUM 1755464.95E ELEVATION 1452.1

DRILLING METHOD: Wash/Air Rotary

SAMPLING METHOD: Disturbed and Undistrubed

Stickup:4.78'

WATER LEVEL	31 .5'				
TIME	3:15				
DATE	4/8/91				
CASING DEPTH	39.78				

BORING NO. P-1

SHEET 1 OF 1

DRILLING START	DRILLING FINISH
TIME 10:30	TIME 3:00
DATE 4/8/91	DATE 4/8/91

DRILL RIG W.W.

SURFACE CONDITIONS DRY

ANGLE Vert. BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR Dowell Well Service, Inc.

Stephenville, Texas

LOGGED BY W.P.

DATE 4/8/91 CHK'D BY W.P.

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPCIFIC GRAVITY	OTHER TESTS
5		U	Light tan and gray silty clay								
10		U									
15		U	-Shelby Tube collapsed (Limited sample recovery) (CL)								
20		U	Purple and gray clay -light tan sandstone lense @ 24' (CH)								
30		U	Light tan clayey sand (SC)								
			? ? ? ?								
30		U	Light gray sandy clay -sandstone seam @ 34' (CL)								
35		U									

SOIL BOREHOLE LOG

SITE NAME AND LOCATION

Hyrdrogeological Site Assessment
Stephenville Landfill - Permit No. 664
Stephenville, Erath County, Texas

190094.64N
DATUM 1754696.59E ELEVATION 1448.5

DRILL RIG W.W.
ANGLE Vert. BEARING
SAMPLE HAMMER TORQUE FT.-LBS

DRILLING METHOD: Wash/Air Rotary
SAMPLING METHOD: Disturbed and Undisturbed
Stickup: 4.57'

WATER LEVEL	40.1'				
TIME	4:30				
DATE	4/9/91				
CASING DEPTH	44.57				

BORING NO. P-2
SHEET 1 OF 2
DRILLING START TIME 11:15 DATE 4/9/91
DRILLING FINISH TIME 4:30 DATE 4/9/91
SURFACE CONDITIONS DRY

DRILLING CONTR. Dowell Well Service, Inc.
Stephenville, Texas

LOGGED BY J.K. CHK'D BY W.P.
DATE 4/9/91

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPCIFIC GRAVITY	OTHER TESTS
			Reddish tan and gray silty clay								
5		U	-tan and gray with white silt seams								
10		U	-light gray with white silt nodules -caliche seam @ 13'								
			? ? ? (CL)								
15		U	Light gray silty sand with iron stains -6" shelby tube push -cuttings contain purple CL bits								
20		U	-6" shelby tube push -with dark green clay @ 23'								
25		U	-light tan and dark gray silty clay laminations -6" shelby tube push -with pieces of rock and clay @ 28.5'								
30		X	-light gray -shelby tube collapsed @ 30' -attempt to push split spoon yielded 2" -cuttings contain small amount of clay								
35		/	-refusal with shelby tube and split spoon @ 35' (no recovery)								

PLATE 4

SOIL BOREHOLE LOG

SITE NAME AND LOCATION
Hydrogeolocial Site Assessment
Stephenville Landfill - Permit No. 664
Stephenville, Brath County, Texas

DRILLING METHOD: Wash/Air Rotary

SAMPLING METHOD: Disturbed and Undisturbed

Stickup: 4.78'

BORING NO. P-2

SHEET 2 OF 2

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME 11:15	TIME 4:30
TIME						
DATE					DATE 4/9/91	DATE 4/9/91
CASING DEPTH						

DATUM 190094.64N 1754696.59E ELEVATION 1148.5

DRILL RIG W.W.

SURFACE CONDITIONS DRY

ANGLE Vert BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR Dowell Service, Inc. Stephenville, Texas

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPCIFIC GRAVITY	OTHER TESTS
40			Light gray silty sand with iron stains (continued) -shelby tube collapsed (no recovery) -pushed split spoon (SM-SC)								
45											
50											
55											
60											
65											
70											

LOGGED BY J.K.

DATE 4/9/91 CHK'D BY W.P.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION
Hyrdo geological Site Assessment
Stephenville Landfill - Permit No. 664
Stephenville, Erath County, Texas

DRILLING METHOD: Wash/Air Rotary

SAMPLING METHOD: Undisturbed and Disturbed

Stickup: 4.97'

BORING NO. P-3

SHEET 1 OF 2

					DRILLING START	DRILLING FINISH
WATER LEVEL	DRY				TIME	TIME
TIME	6:15				11:00	6:00
DATE	4/10/91				DATE 4/10/91	DATE 4/10/91
CASING DEPTH						

DATUM 188721.53N 1754388.21E ELEVATION 1481.3

DRILL RIG

SURFACE CONDITIONS DRY

ANGLE Vert BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR Dowell Well Service, Inc. Stephenville, Texas

LOGGED BY J.K. CHK'D BY W.P.

DATE 4/10/91

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPCIFIC GRAVITY	OTHER TESTS
			Tan silty clay -with trash inclusions.								
5		U	-light gray and tan with limestone cuttings								
10			-no recovery								
			-harder @14'								
15		U	-tan and gray with limestone fragments and iron stains								
			-cuttings contain purple and gray clay @ 18'								
20		U	-light gray with silty sand seams and iron stains								
25		U									
30		U	-bluish gray with calcareous nods and iron stains								
			-cuttings with purple clay @ 34'								
35		U									

SOIL BOREHOLE LOG

SITE NAME AND LOCATION
Hydrogeological Site Assessment
Stephenville Landfill - Permit No. 664
Stephenville, Erath County, Texas

DRILLING METHOD: Wash/Air Rotary
SAMPLING METHOD: Undisturbed and Disturbed
Stickup: 4.78'

BORING NO. P-3
SHEET 2 OF 2

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					11:00	6:00
DATE					DATE	DATE
CASING DEPTH					4/10/91	4/10/91

DATUM ELEVATION
DRILL RIG
ANGLE Vert BEARING
SAMPLE HAMMER TORQUE FT.-LBS
SURFACE CONDITIONS DRY

DRILLING CONTR. Dowell Well Service, Inc.
Stephenville, Texas

LOGGED BY J.K.
DATE 4/10/91 CHK'D BY W.P.

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
		U	Tan silty clay (continued) -purple and light gray @ 35.5'								
40		U	-purple and bluish gray								
			-bluish gray, slickensided -purple with iron stains @ 4 5.5' -cuttings contain reddish clay @47' -cuttings contain tan and yellow clay @ 48.5'								
45		U									
			? ? ? (CL)								
50		X	Yellowish tan silty sand with iron stains -pushed split spoon -with purple, blue, and tan clay @ 52'-54'								
55		U	-grayish tan with iron stains								
60		U	-tan with iron stains								
			-no recovery (SM)								
65		/									
70											

SOIL BOREHOLE LOG

SITE NAME AND LOCATION

Hydrogeological Site Assessment
Stephenville Landfill - Permit No. 664
Stephenville, Erath County, Texas

189223.22N
DATUM 1753219.72E ELEVATION 1483.4

DRILLING METHOD: Wash/Air Rotary

SAMPLING METHOD: Disturbed and Undisturbed

Stickup: 3.91'

BORING NO. P-4

SHEET 1 OF 2

	DRILLING START	DRILLING FINISH
WATER LEVEL		
TIME	9:00	5:30
DATE	4/11/91	4/11/91
CASING DEPTH		

DRILL RIG

ANGLE Vert BEARING

SAMPLE HAMMER TORQUE FT.-LBS

SURFACE CONDITIONS DRY

DRILLING CONTR Dowell Well Service, Inc. Stephenville, Texas

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPCIFIC GRAVITY	OTHER TESTS
			Tan silty clay -with limestone cuttings								
5	4"	U	-light gray and tan -with increasing limestone								
10	4"	U	-tan and yellow								
15	0		-tan and gray with iron stains and purple clay -no recovery								
20	12"	U	-light gray with silty sand seams and iron stains								
25		U									
30	2"	U	-bluish gray								
35	12"	U	-purple								

LOGGED BY W.P. CHK'D BY W.P.

DATE 4/11/91

SOIL BOREHOLE LOG

SITE NAME AND LOCATION

Hydrogeological Site Assessment
Stephenville Landfill - Permit No. 664
Stephenville, Erath County, Texas

DRILLING METHOD: Wash/Air Rotary

SAMPLING METHOD: Disturbed and Undistrurbed

BORING NO. P-4

SHEET 2 OF 2

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					9:00A.M	5:30P.M
DATE					DATE	DATE
CASING DEPTH					4/11/91	4/11/91

DATUM ELEVATION

DRILL RIG

SURFACE CONDITIONS DRY

ANGLE Vert BEARING

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR. Dowell Well Service, Inc.

Stephenville, Texas

LOGGED BY W.P. CHK'D BY

DATE 4/11/91

DEPTH IN FEET (ELEVATION)	BLOWS/ 6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPCIFIC GRAVITY	OTHER TESTS
		U	Tan silty clay (continued)								
			-purple								
40	12"	U	-purple and bluish gray								
45	12"	U	(CL)								
			? ? ?								
			Yellowish tan sandy clay with iron stains								
50	7"	U	(CL)								
			? ? ?								
			Light tan silty fine sand								
55	4"	U									
			-slightly clayey								
60											
65			-with occasional clay laminations								
			(SM)								
80											

SOIL BOREHOLE LOG

SITE NAME AND LOCATION
Hydrogeological Site Assessment
Stephenville Landfill - Permit No. 664
Stephenville, Erath County, Texas

187585.59N
DATUM 1754113.45E ELEVATION 1453.5

DRILLING METHOD: Wash/Air Rotary
SAMPLING METHOD: Disturbed and Undisturbed
Stickup: 4.55'

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

BORING NO. P-5
SHEET 1 OF 2
DRILLING

START	FINISH
TIME 11:00	TIME 4:00
DATE 4/12/91	DATE 4/12/91

DRILL RIG
ANGLE Vert BEARING
SAMPLE HAMMER TORQUE FT.-LBS
SURFACE CONDITIONS DRY

DRILLING CONTR. Dowell Well Service, Inc.
Stephenville, Texas

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS
5	10"	U	Tan and gray silty clay -with white silt pockets and iron stains -purple								
10	10"	U	-tan and purple -with limestone fragments and iron stains								
15	7"	U	-slightly sandy -with iron stains								
20	12"	U	-purple								
			? ? ? (CL)								
25	12"	U	Tan and bluish gray sandy clay with iron stains								
			? ? ? (CL)								
30	4"	U	Tan silty sand								
35	12"	U	-with clay seams								

LOGGED BY D.H.
DATE 4/12/91 CHK'D BY W.P.

SOIL BOREHOLE LOG

SITE NAME AND LOCATION
Hyrogeological Site Assessment
Stephenville Landfill - Permit No. 664
Stephenville, Erath County, Texas

DRILLING METHOD: Wash/Air Rotary

SAMPLING METHOD: Undisturbed and Disturbed

BORING NO. P-5

SHEET 2 OF 2

	DRILLING START	DRILLING FINISH
WATER LEVEL		
TIME	11:00	4:00
DATE	4/12/91	4/12/91
CASING DEPTH		

DATUM ELEVATION

DRILL RIG

SURFACE CONDITIONS DRY

ANGLE Vert BEARING

SAMPLE HAMMER TORQUE FT.-LBS

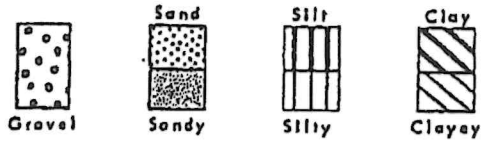
DRILLING CONTR. Dowell Well Service, Inc.
Stephenville, Texas

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (RECOVERY)	SYMBOL	SAMPLE NUMBER AND DESCRIPTION OF MATERIAL	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	TEST RESULTS: WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPCIFIC GRAVITY	OTHER TESTS
			Tan silty sand (continued)								
40	12"	U	-with red clay seams and iron stains								
45	12"	U	-with yellowish tan clay laminations and iron stained limestone inclusions (SM)								
50	12"	U									

LOGGED BY D.H.
DATE 4/12/91 CHK'D BY W.P.

KEY TO SOIL CLASSIFICATIONS AND SYMBOLS

SOIL TYPE



Predominant type shown heavy

SAMPLE TYPE

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS
(Major portion retained on No. 200 sieve)

Includes (1) clean gravels and sands described as fine, medium or coarse, depending on distribution of grain sizes and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as determined by laboratory tests or estimated from resistance to sampler penetration.

Penetration Resistance Blows/Foot**	Descriptive Term	Relative Density *
0 - 10	Loose	0 to 40%
10 - 30	Medium dense	40 to 70%
30 - 50	Dense	70 to 90%
Over 50	Very dense	90 to 100%

* From tests on undisturbed sand sample
** 140# hammer, 30-inch drop

Relative density is also used to describe condition of low plasticity (P I ≤ 10) fine grained soils such as sandy silts.

FINE GRAINED SOILS
(Major portion passing No. 200 sieve)

Includes (1) inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests for soils with plasticity indices ≥ 10.

Descriptive Term	Compressive Strength Tons/Sq. Ft.
Very soft	less than 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very stiff	2.00 to 4.00
Hard	4.00 and higher

Note: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes and weakness or shrinkage cracks in the soil. The consistency ratings of such soils are based on penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

Fissured - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical

Sensitive - pertaining to cohesive soils that are subject to appreciable loss of strength when remolded

Laminated - composed of thin layers of varying color and texture

Interbedded - composed of alternate layers of different soil types

Calcareous - containing appreciable quantities of calcium carbonate

Well graded - having wide range in grain sizes and substantial amounts of all intermediate particle sizes

Poorly graded - predominately of one grain size, or having a range of sizes with some intermediate size missing

Slickensided - having inclined planes of weakness that are slick and glossy in appearance.

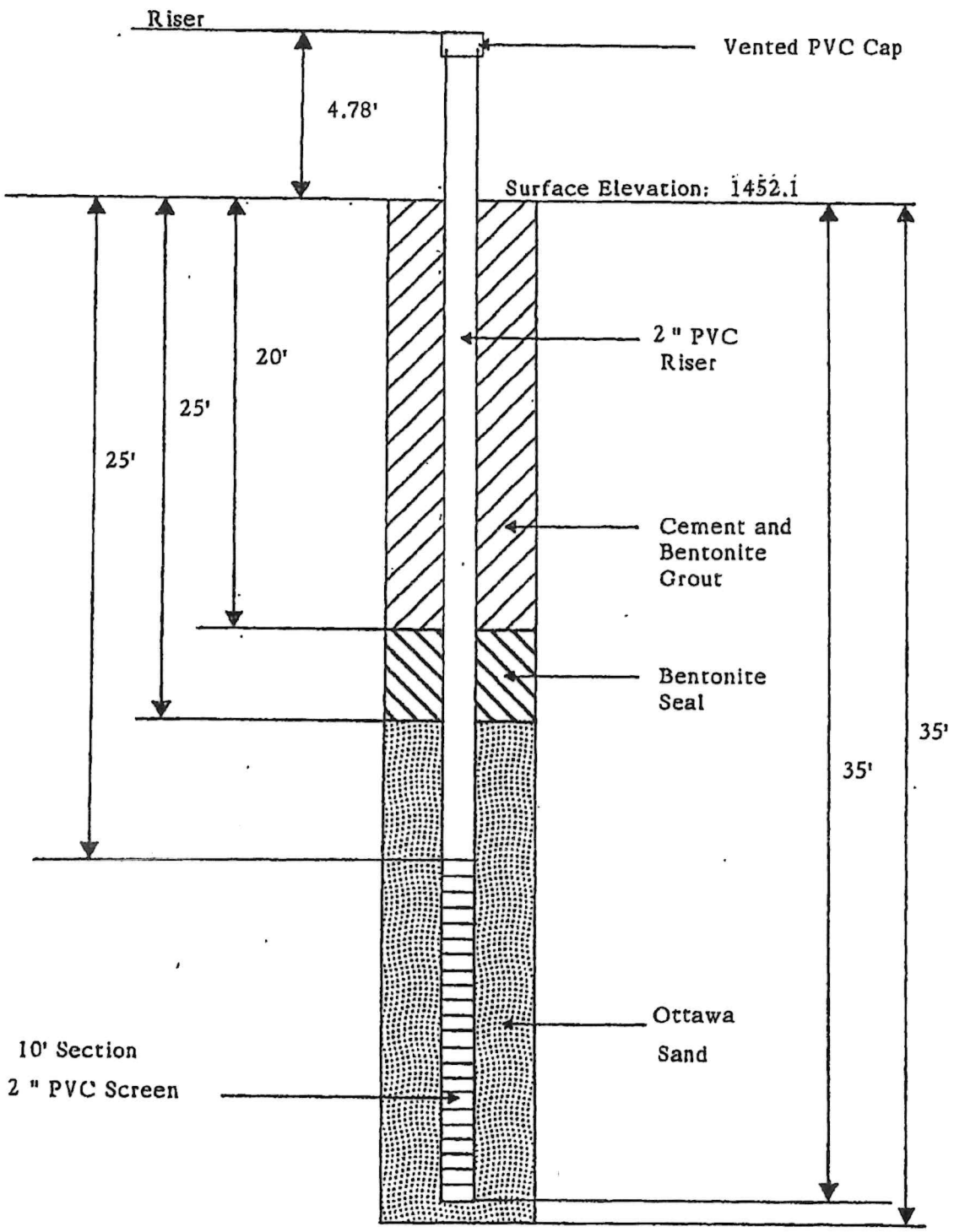
Degree of slickenside development:

Slightly slickensided - slickensides are present at intervals of 1-2 feet and soil does not easily break along these planes.

Moderately slickensided - slickensides are spaced at intervals of 1-2 feet and soil breaks easily along these planes.

Extremely slickensided - slickensides are spaced at intervals 4-12 inches, are continuous and interconnected. Soil breaks easily along the slickensides. Resulting size of broken pieces three to six inches.

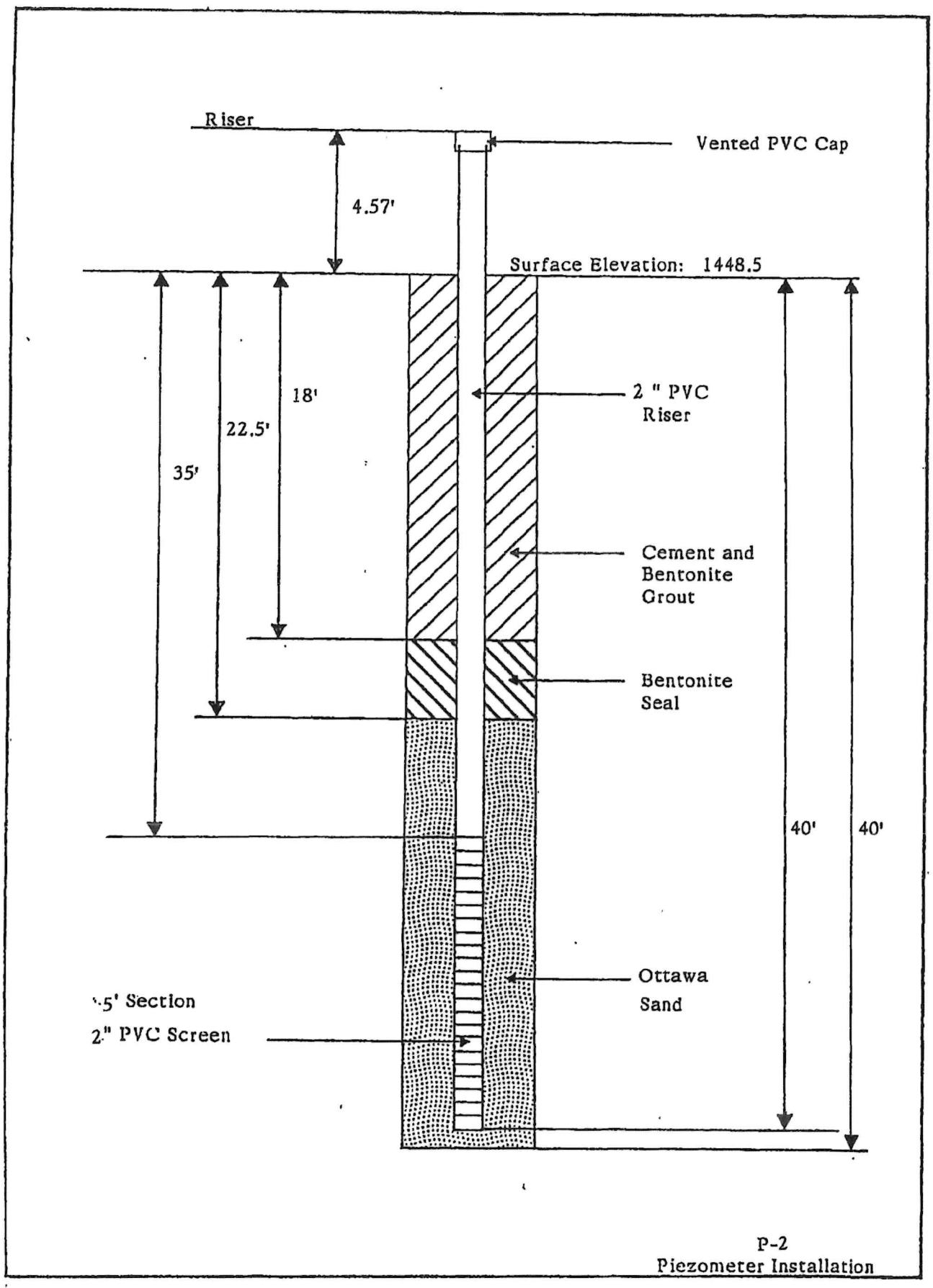
Intensely slickensided - slickensides are spaced at intervals of less than four inches and are continuous in all directions. Soil breaks down along planes into nodules 0.25 - 2 inch in size.



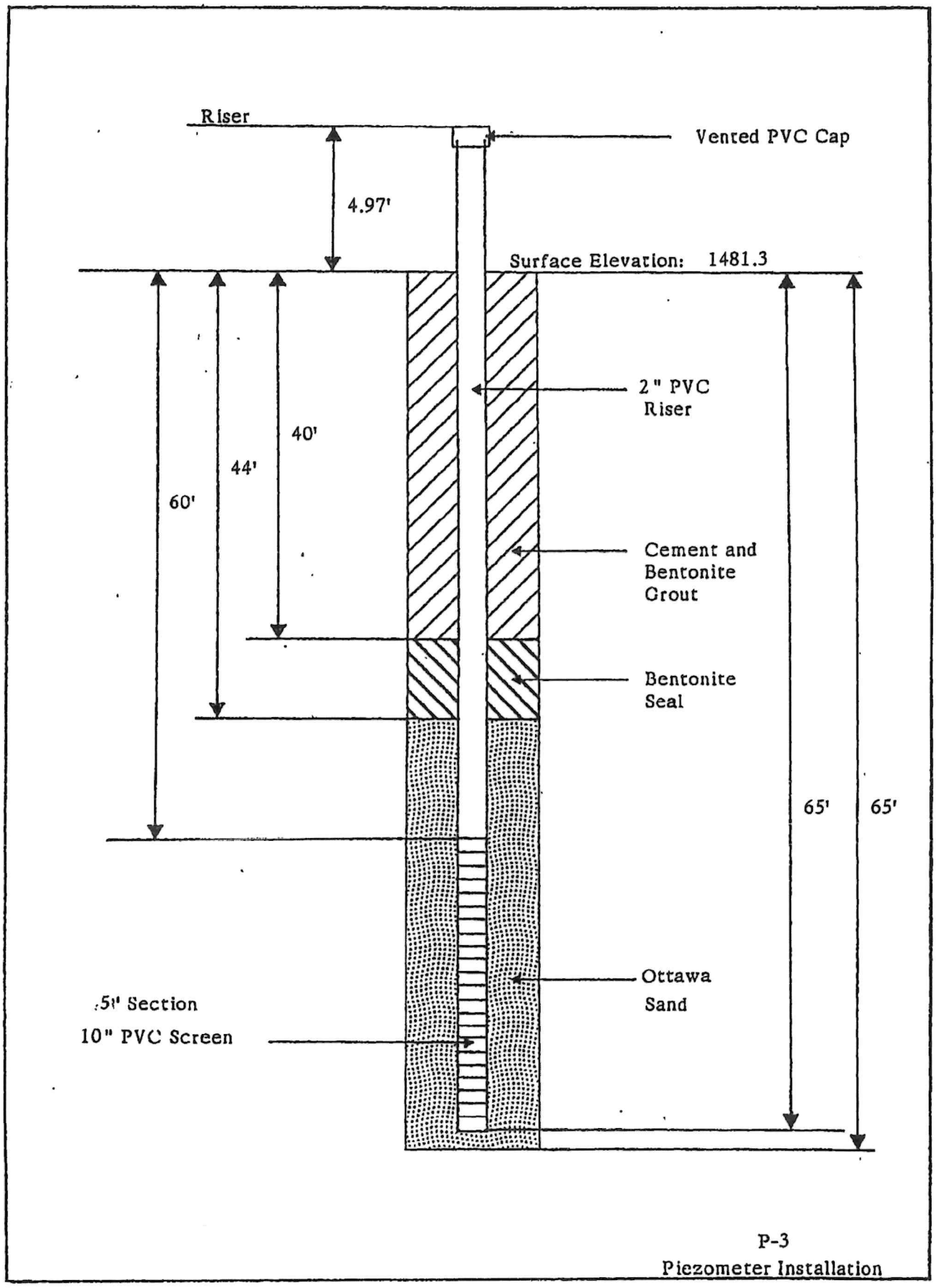
P-1
Piezometer Installation

TEAM Consultants, Inc.

PLATE 13



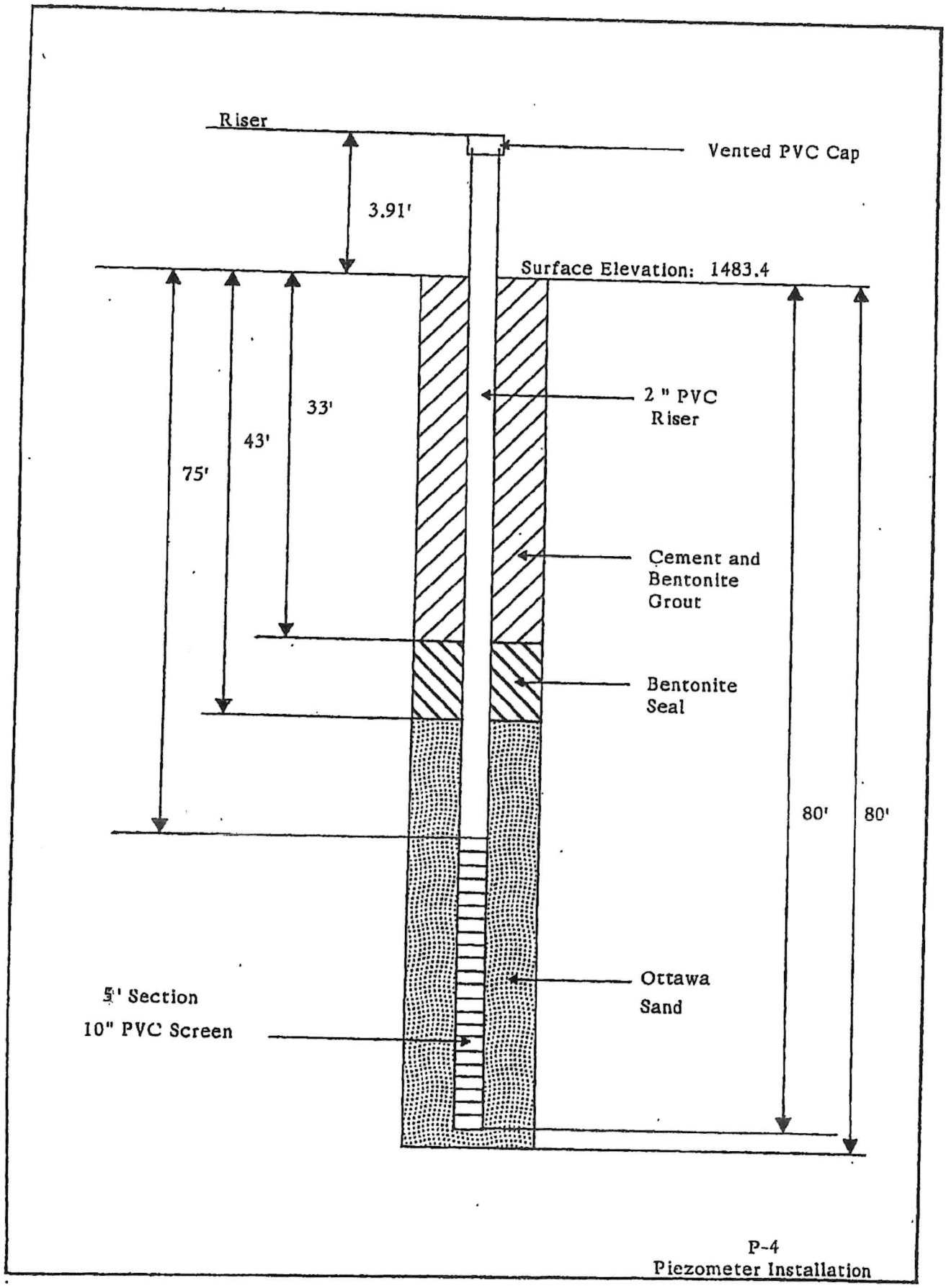
P-2
Piezometer Installation



P-3
Piezometer Installation

TEAM Consultants, Inc.

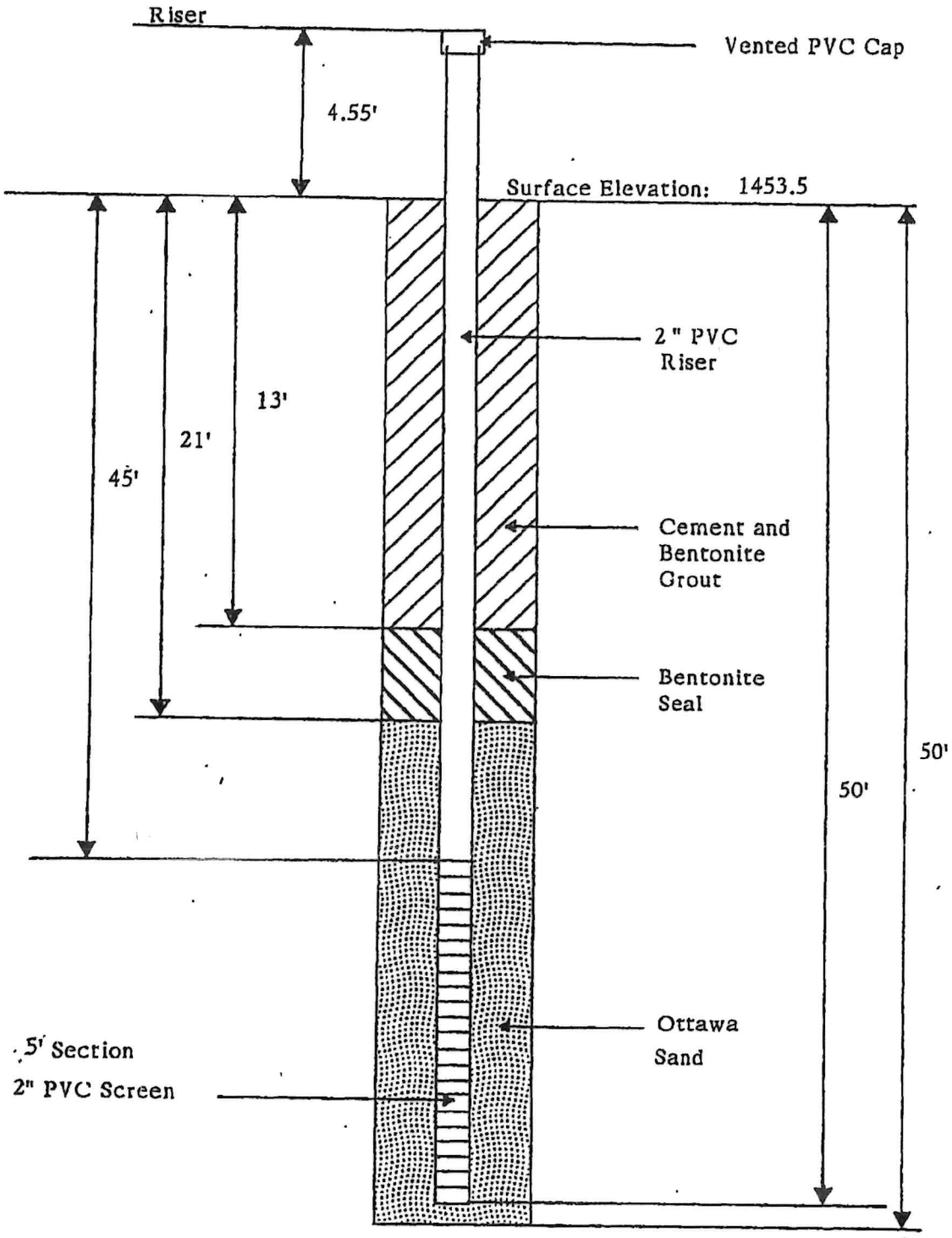
PLATE 15



P-4
Piezometer Installation

TEAM Consultants, Inc.

PLATE 16



P-5
Piezometer Installation

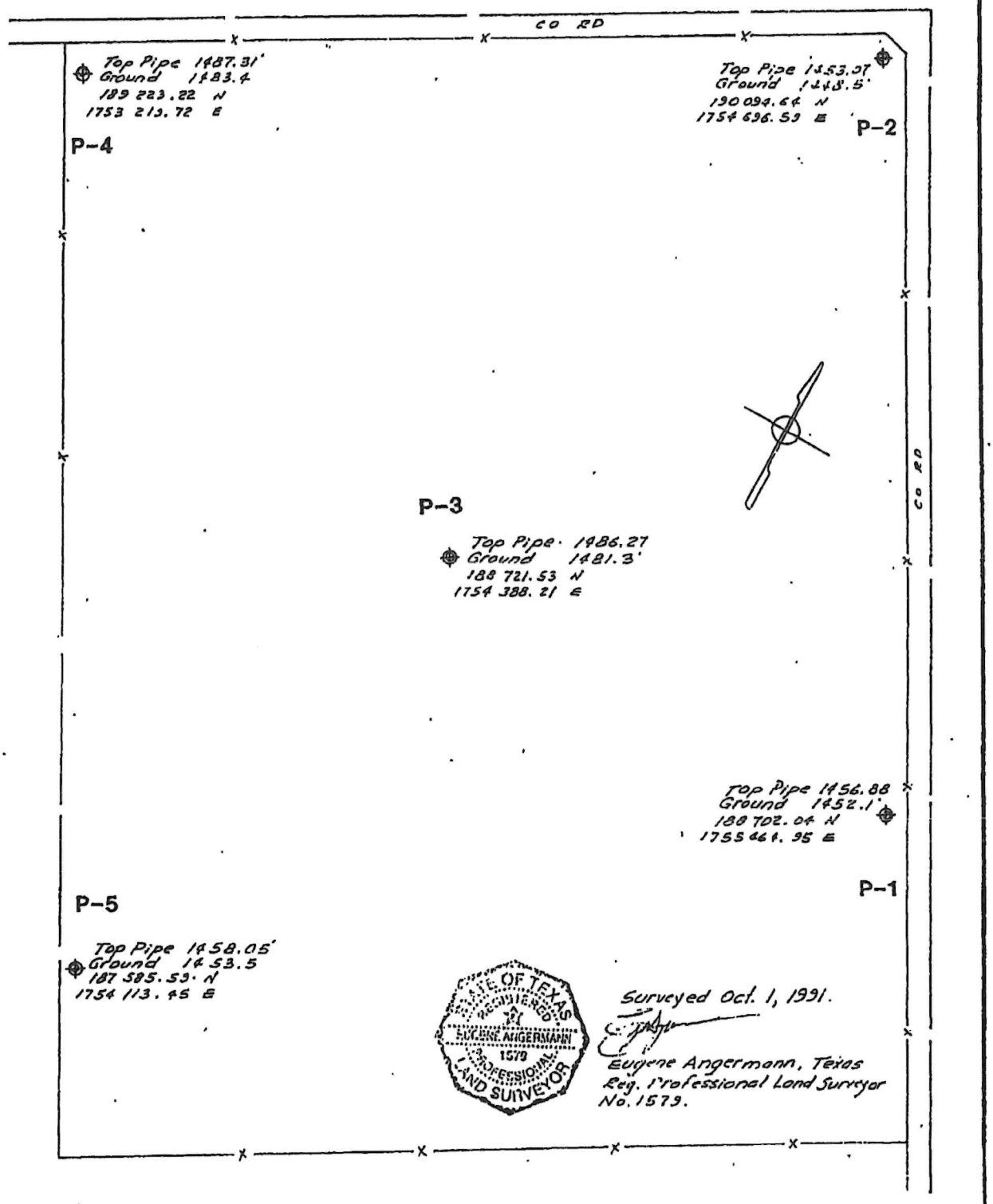
TEAM Consultants, Inc.

PLATE 17

HYDROGEOLOGICAL SITE ASSESSMENT
GROUNDWATER ELEVATION OBSERVATIONS
STEPHENVILLE SANITARY LANDFILL
TEAM PROJECT NO. 91201

Piez. No.	Date	Depth to Water	Elevation (MSL)
P-1	5/13/91	17.75	1439.13
	6/18/91	17.65	1439.23
	7/11/91	19.09	1437.79
	7/31/91	20.95	1435.93
	8/24/91	18.90	1437.98
	9/23/91	17.98	1438.90
	11/4/91	17.00	1439.88
P-2	5/13/91	40.10	1412.97
	6/18/91	40.05	1413.02
	7/11/91	40.12	1412.95
	7/31/91	40.25	1412.82
	8/24/91	40.25	1412.82
	9/23/91	40.10	1412.97
	11/4/91	39.85	1413.22
P-3	5/13/91	69.70	1416.57
	6/18/91	69.65	1416.62
	7/11/91	69.65	1416.62
	7/31/91	69.65	1416.62
	8/24/91	69.70	1416.57
	9/23/91	69.71	1416.56
	11/4/91	70.50	1415.77
P-4	5/13/91	73.49	1413.82
	6/18/91	73.55	1413.76
	7/11/91	73.46	1413.85
	7/31/91	73.48	1413.83
	8/24/91	73.65	1413.66
	9/23/91	73.50	1413.81
	11/4/91	73.70	1413.61
P-5	5/13/91	43.91	1414.14
	6/18/91	43.80	1414.25
	7/11/91	43.76	1414.29
	7/31/91	43.85	1414.20
	8/24/91	43.98	1414.07
	9/23/91	43.93	1414.12
	11/4/91	43.75	1414.30

PIEZOMETER SITES



Surveyed Oct. 1, 1991.

Eugene Angermann, Texas
Reg. Professional Land Surveyor
No. 1579.

HYDROGEOLOGICAL SITE ASSESSMENT

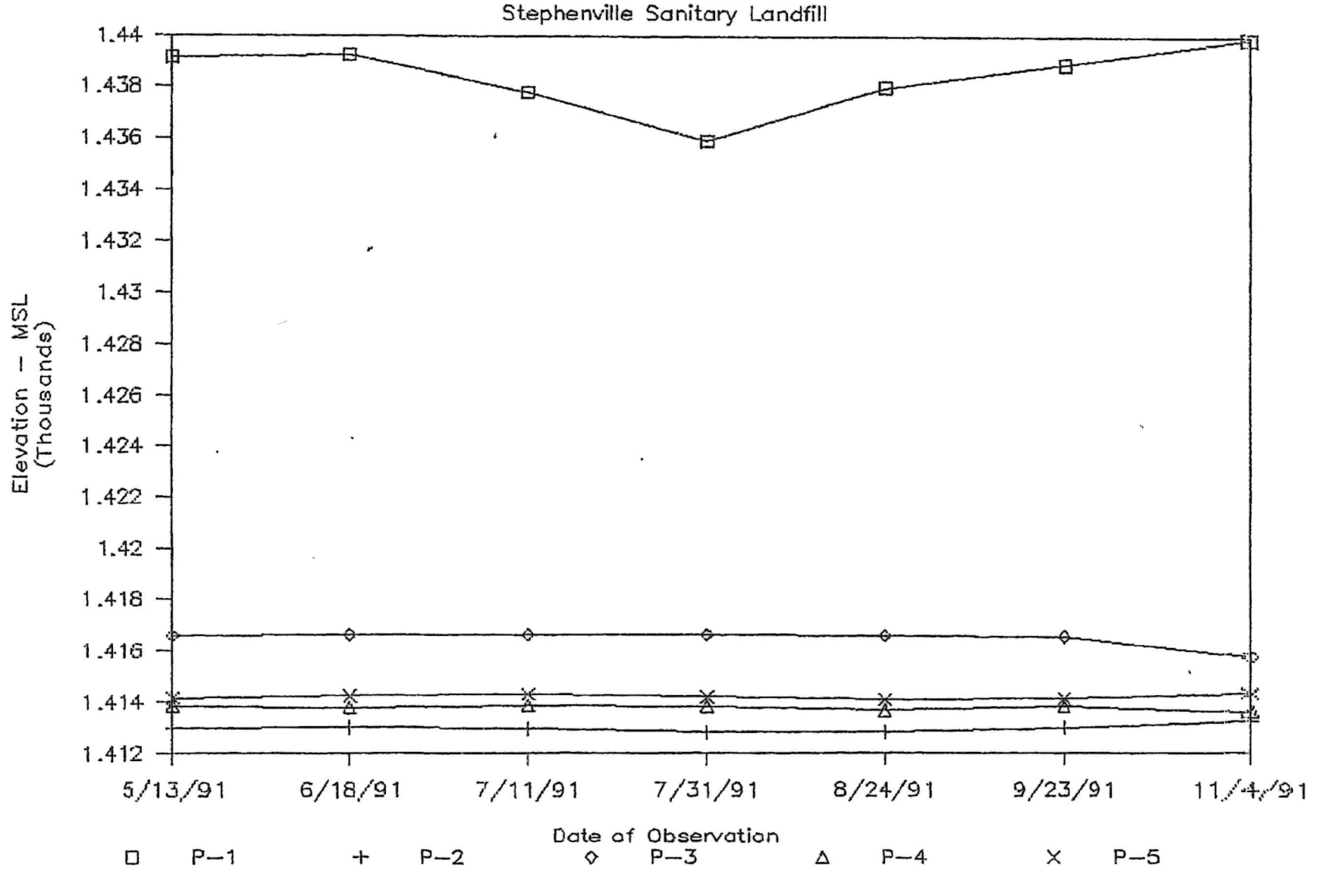
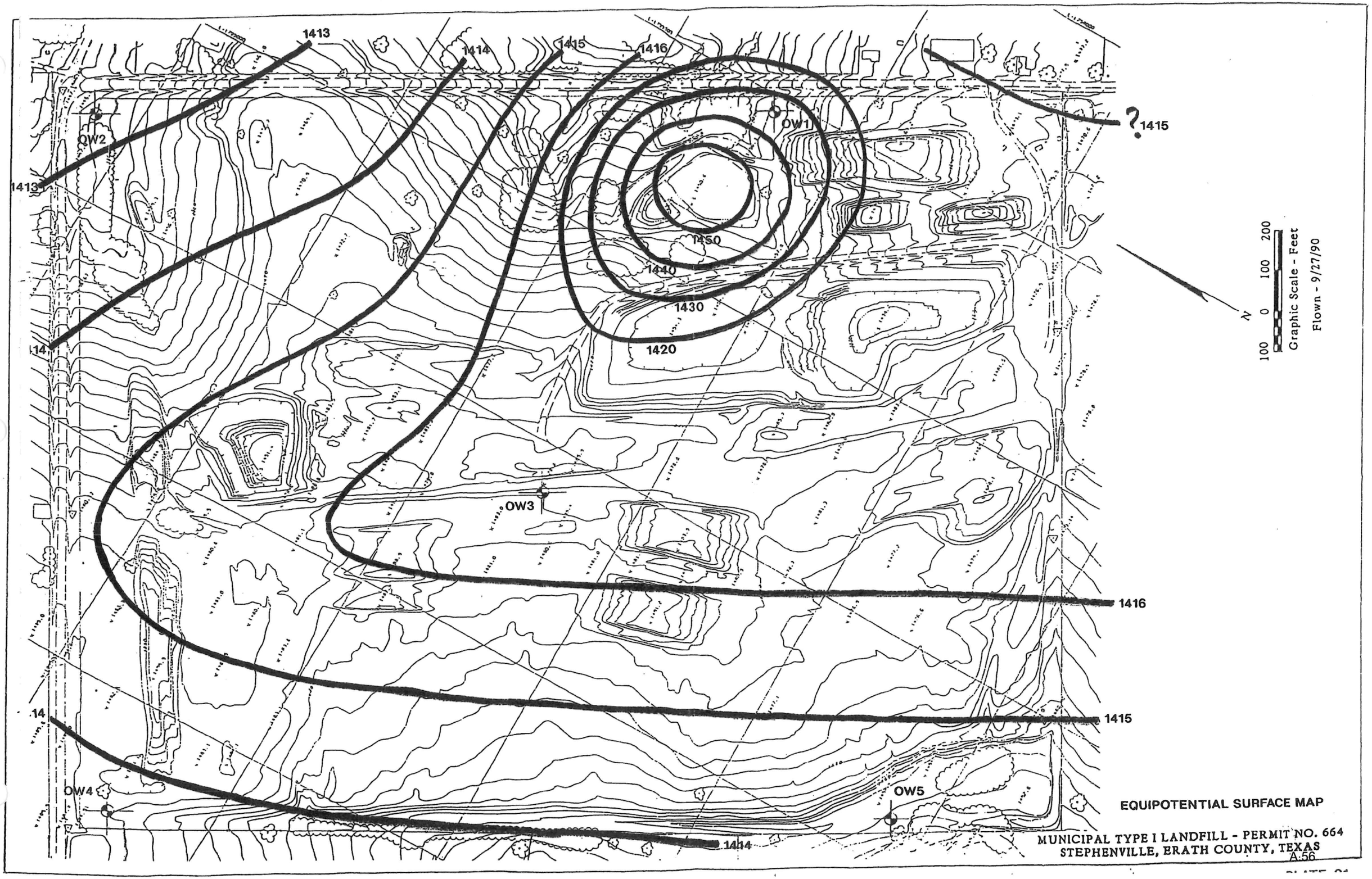


PLATE 20



EQUIPOTENTIAL SURFACE MAP

MUNICIPAL TYPE I LANDFILL - PERMIT NO. 664
STEPHENVILLE, ERATH COUNTY, TEXAS

EQUIPOTENTIAL SURFACE MAP
STEPHENVILLE LANDFILL
SEPTEMBER 23, 1991

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
Dallas Division
1548 Valwood Parkway
Suite 118
Carrollton, TX 75006
Tel: (214) 406-8100
Fax: (214) 484-2969

ANALYTICAL REPORT

Mailing Address:
P.O. Box 815006
Dallas, TX 75381

Bill Prikryl
TEAM CONSULTANTS
3101 Pleasant Valley
Suite 101
Arlington, TX 76015

10/07/1991
Job No.: 91.2600
Sample No: 172078
Page: 1

91201, STEPHENVILLE SLF

Date Received: 09/26/1991

172078 OW-1
Taken: 09/23/1991

Chloride	4.7	mg/L
pH, Field	6.88	units
Solids, Total Dissolved	325	mg/L
Specific Conductance, Field	569	umhos/cm
Total Organic Carbon (W) a	1.58	mg/L
Total Organic Carbon (W) b	1.64	mg/L
Total Organic Carbon (W) c	<1.00	mg/L
Total Organic Carbon (W) d	1.00	mg/L
Iron, ICP	0.09	mg/L
Manganese, ICP	<0.01	mg/L

172079 OW-2
Taken: 09/23/1991

Chloride	8.9	mg/L
pH, Field	6.91	units
Solids, Total Dissolved	535	mg/L
Specific Conductance, Field	755	umhos/cm
Total Organic Carbon (W) a	3.02	mg/L
Total Organic Carbon (W) b	4.36	mg/L
Total Organic Carbon (W) c	2.46	mg/L
Total Organic Carbon (W) d	3.12	mg/L
Iron, ICP	0.40	mg/L
Manganese, ICP	0.02	mg/L

PLATE 22

ANALYTICAL REPORT

Bill Prikryl
TEAM CONSULTANTS
3101 Pleasant Valley
Suite 101
Arlington, TX 76015

10/07/1991
Job No.: 91.2600
Sample No: 172079
Page: 2

91201, STEPHENVILLE SLF

Date Received: 09/26/1991

172080 OW-4
Taken: 09/23/1991

Chloride	30.0	mg/L
pH, Field	6.85	units
Solids, Total Dissolved	468	mg/L
Specific Conductance, Field	715	umhos/cm
Total Organic Carbon (W) a	11.3	mg/L
Total Organic Carbon (W) b	14.5	mg/L
Total Organic Carbon (W) c	7.97	mg/L
Total Organic Carbon (W) d	9.22	mg/L
Iron, ICP	0.58	mg/L
Manganese, ICP	0.09	mg/L

172081 OW-5
Taken: 09/23/1991

Chloride	16.8	mg/L
pH, Field	6.80	units
Solids, Total Dissolved	512	mg/L
Specific Conductance, Field	749	umhos/cm
Total Organic Carbon (W) a	2.50	mg/L
Total Organic Carbon (W) b	2.63	mg/L
Total Organic Carbon (W) c	<1.00	mg/L
Total Organic Carbon (W) d	1.22	mg/L
Iron, ICP	1.5	mg/L
Manganese, ICP	0.08	mg/L

Donna L. Bowlin

Donna L. Bowlin, Manager
Dallas Division

PLATE 23

STANDARD QUALITY CONTROL DATA REPORT

JOB NUMBER: 91.2600

PARAMETER	ANALYST	DATE	TIME	METHOD	STANDARD AMOUNT	EXTERNAL STANDARD	% REC	BLANK
Solids, Total Dissolved	mat	10/07/1991	14:30	A-209B	923	884	95.8	<10
Chloride	mat	09/30/1991	10:00	A-407B	74.4	73.4	98.6	<0.50
Iron	skw	10/02/1991	06:43	E-200.7	1.00	1.01	101.0	<0.05
Manganese	skw	10/02/1991	06:43	E-200.7	1.00	1.00	100.0	<0.01

Method - Codes, i.e.

A - refers to APHA, Standard Methods for the Examination of Water and Wastewater, 16th edition

E - refers to EPA's 1979 Methods for Chemical Analysis of Water and Wastes - for Inorganic Analyses
E - refers to EPA's 1979 Methods for Organic Chemical Analysis of Municipal and Industrial Wastes - for Organic Analyses

S - refers to SW846, 3rd edition

D - refers to ASTM

M - Method has been modified

* - refers to Other Reference

External Standard - the Actual/Theoretical value for that batch of analysis. Acceptance Criteria - for organic analyses, results must be within 10% of the true value, except where EPA methods state otherwise; for inorganic analyses, control limits are determined by internal control charts and are speficic to each analyte.

Blank - samples are not blank corrected by the laboratory

GROUNDWATER MONITORING REPORT

TDH Permit No. 664 Monitor Well I.D. No. MW-1

Submittal for |__| Background Data |X| Semiannual/Annual Data |__| Fourth Year Data
Purpose of: Groups 1 2 3 & 4 Groups 3 & 4 Groups 2 3 & 4
Date Sampled: 09/23/91 No. Quarts Collected: 2 Sampled By: D. Harris/TEAM CONSULTANTS

Representing: Site Operator |__| Consultant |X| Laboratory Personnel |__|

Well Purged/Bailed Before Sampling: Yes |X| No |__| How long Before: Immediately

No. Well Volumes Purged: 0.3 Depth to Water Before Bailing: __ ft Elev 17.98 MSL

How were Samples Collected: 1.7" TEFLON BAILER

Were sample preservation procedures in accordance with TDH Guidelines:

Yes |X| No |__|

GROUP	PARAMETER	LEVEL	UNITS	ANALYSIS METHOD
1	Arsenic		mg/l	E200.7
	Barium		mg/l	E200.7
	Cadmium		mg/l	E200.7
	Chromium		mg/l	E200.7
	Copper		mg/l	E200.7
	Lead		mg/l	E200.7
	Mercury		mg/l	E245.1
	Selenium		mg/l	E200.7
	Silver		mg/l	E200.7
	Zinc		mg/l	E200.7
2	Calcium, Dissolved		mg/l	E200.7
	Magnesium, Dissolved		mg/l	E200.7
	Sodium, Dissolved		mg/l	E200.7
	Potassium, Dissolved		mg/l	E200.7
	Carbonate		mg/l	
	Bicarbonate (CaCO3)		mg/l	
	Sulphate		mg/l	E375.4
	Fluoride		mg/l	E340.2
	Nitrate (N)		mg/l	E352.1
	Phenolphthalein			
	Alkalinity (CaCO3)		mg/l	
	Alkalinity (CaCo3)		mg/l	E310.1
	Hardness (CaCO3)		mg/l	E130.2
	Anion/Cation Balance		meq/meq	
	Anion/Cation Difference		%	
3	Chloride	4.7	mg/l	E325.3
	pH, Field	6.88	units	E150.1
	Specific Conductance, Field	569	umhos/cm	E120.1
	Total Dissolved Solids	325	mg/l	E160.1
	Total Organic Carbon	1.58	mg/l	E415.2
	Total Organic Carbon	1.64	mg/l	E415.2
	Total Organic Carbon	<1.00	mg/l	E415.2
	Total Organic Carbon	1.00	mg/l	E415.2
4	Iron, Dissolved	0.09	mg/l	E200.7
	Manganese, Dissolved	<0.01	mg/l	E200.7

Laboratory Representative Signature: D L Bowlin Phone: (214) 406-8100

Laboratory Name: NET (Gulf Coast), Inc. Address: 1548 Valwood Parkway, Suite 118

Site Operator Signature: _____ Date: _____

PLATE 25
A.61

GROUNDWATER MONITORING REPORT

TDH Permit No. 664 Monitor Well I.D. No. MW-2

Submittal for |__| Background Data |X| Semiannual/Annual Data |__| Fourth Year Data
Purpose of: Groups 1 2 3 & 4 Groups 3 & 4 Groups 2 3 & 4
Date Sampled: 09/23/91 No. Quarts Collected: 2 Sampled By: D. Harris/TEAM CONSULTANTS

Representing: Site Operator |__| Consultant |X| Laboratory Personnel |__|

Well Purged/Bailed Before Sampling: Yes |X| No |__| How long Before: Immediately

No. Well Volumes Purged: 0.2 Depth to Water Before Bailing: __ ft Elev 40.1 MSL

How were Samples Collected: 1.7" TEFLON BAILER

Were sample preservation procedures in accordance with TDH Guidelines:

Yes |X| No |__|

GROUP	PARAMETER	LEVEL	UNITS	ANALYSIS METHOD
1	Arsenic		mg/l	E200.7
	Barium		mg/l	E200.7
	Cadmium		mg/l	E200.7
	Chromium		mg/l	E200.7
	Copper		mg/l	E200.7
	Lead		mg/l	E200.7
	Mercury		mg/l	E245.1
	Selenium		mg/l	E200.7
	Silver		mg/l	E200.7
	Zinc		mg/l	E200.7
2	Calcium, Dissolved		mg/l	E200.7
	Magnesium, Dissolved		mg/l	E200.7
	Sodium, Dissolved		mg/l	E200.7
	Potassium, Dissolved		mg/l	E200.7
	Carbonate		mg/l	
	Bicarbonate (CaCO3)		mg/l	
	Sulphate		mg/l	E375.4
	Fluoride		mg/l	E340.2
	Nitrate (N)		mg/l	E352.1
	Phenolphthalein			
	Alkalinity (CaCO3)		mg/l	
	Alkalinity (CaCo3)		mg/l	E310.1
	Hardness (CaCO3)		mg/l	E130.2
	Anion/Cation Balance		meq/meq	
	Anion/Cation Difference		%	
3	Chloride	8.9	mg/l	E325.3
	pH, Field	6.91	units	E150.1
	Specific Conductance,Field	755	umhos/cm	E120.1
	Total Dissolved Solids	535	mg/l	E160.1
	Total Organic Carbon	3.02	mg/l	E415.2
	Total Organic Carbon	4.36	mg/l	E415.2
	Total Organic Carbon	2.46	mg/l	E415.2
	Total Organic Carbon	3.12	mg/l	E415.2
4	Iron, Dissolved	0.40	mg/l	E200.7
	Manganese, Dissolved	0.02	mg/l	E200.7

Laboratory Representative Signature: D K Bowlin Phone: (214) 406-8100

Laboratory Name: NET (Gulf Coast), Inc. Address: 1548 Valwood Parkway, Suite 118

Site Operator Signature: _____ Date: _____

GROUNDWATER MONITORING REPORT

TDH Permit No. 664 Monitor Well I.D. No. MW-4

Submittal for |__| Background Data |X| Semiannual/Annual Data |__| Fourth Year Data
Purpose of: Groups 1 2 3 & 4 Groups 3 & 4 Groups 2 3 & 4
Date Sampled: 09/23/91 No. Quarts Collected: 2 Sampled By: D. Harris/TEAM CONSULTANTS

Representing: Site Operator |__| Consultant |X| Laboratory Personnel |__|

Well Purged/Bailed Before Sampling: Yes |X| No |__| How long Before: Immediately

No. Well Volumes Purged: 0.2 Depth to Water Before Bailing: __ ft Elev 73.50 MSL

How were Samples Collected: 1.7" TEFLON BAILER

Were sample preservation procedures in accordance with TDH Guidelines:

Yes |X| No |__|

GROUP	PARAMETER	LEVEL	UNITS	ANALYSIS METHOD
1	Arsenic		mg/l	E200.7
	Barium		mg/l	E200.7
	Cadmium		mg/l	E200.7
	Chromium		mg/l	E200.7
	Copper		mg/l	E200.7
	Lead		mg/l	E200.7
	Mercury		mg/l	E245.1
	Selenium		mg/l	E200.7
	Silver		mg/l	E200.7
	Zinc		mg/l	E200.7
2	Calcium, Dissolved		mg/l	E200.7
	Magnesium, Dissolved		mg/l	E200.7
	Sodium, Dissolved		mg/l	E200.7
	Potassium, Dissolved		mg/l	E200.7
	Carbonate		mg/l	
	Bicarbonate (CaCO3)		mg/l	
	Sulphate		mg/l	E375.4
	Fluoride		mg/l	E340.2
	Nitrate (N)		mg/l	E352.1
	Phenolphthalein Alkalinity (CaCO3)		mg/l	
	Alkalinity (CaCo3)		mg/l	E310.1
	Hardness (CaCO3)		mg/l	E130.2
	Anion/Cation Balance		meq/meq	
	Anion/Cation Difference		%	
3	Chloride	30.0	mg/l	E325.3
	pH, Field	6.85	units	E150.1
	Specific Conductance,Field	715	umhos/cm	E120.1
	Total Dissolved Solids	468	mg/l	E160.1
	Total Organic Carbon	11.3	mg/l	E415.2
	Total Organic Carbon	14.5	mg/l	E415.2
	Total Organic Carbon	7.97	mg/l	E415.2
	Total Organic Carbon	9.22	mg/l	E415.2
4	Iron, Dissolved	0.58	mg/l	E200.7
	Manganese, Dissolved	0.09	mg/l	E200.7

Laboratory Representative Signature: D L Bowlin Phone: (214) 406-8100

Laboratory Name: NET (Gulf Coast), Inc. Address: 1548 Valwood Parkway, Suite 118

Site Operator Signature: _____ Date: _____

PLATE 27
A.63

GROUNDWATER MONITORING REPORT

TDH Permit No. 664 Monitor Well I.D. No. MW-5

Submittal for |__| Background Data |X| Semiannual/Annual Data |__| Fourth Year Data
Purpose of: Groups 1 2 3 & 4 Groups 3 & 4 Groups 2 3 & 4
Date Sampled: 09/23/91 No. Quarts Collected: 2 Sampled By: D. Harris/TEAM CONSULTANTS

Representing: Site Operator |__| Consultant |X| Laboratory Personnel |__|

Well Purged/Bailed Before Sampling: Yes |X| No |__| How long Before: Immediately

No. Well Volumes Purged: 0.5 Depth to Water Before Bailing: 43.93 ft Elev ___ MSL

How were Samples Collected: 1.7" TEFLON BAILER

Were sample preservation procedures in accordance with TDH Guidelines:

Yes |X| No |__|

GROUP	PARAMETER	LEVEL	UNITS	ANALYSIS METHOD
1	Arsenic		mg/l	E200.7
	Barium		mg/l	E200.7
	Cadmium		mg/l	E200.7
	Chromium		mg/l	E200.7
	Copper		mg/l	E200.7
	Lead		mg/l	E200.7
	Mercury		mg/l	E245.1
	Selenium		mg/l	E200.7
	Silver		mg/l	E200.7
	Zinc		mg/l	E200.7
2	Calcium, Dissolved		mg/l	E200.7
	Magnesium, Dissolved		mg/l	E200.7
	Sodium, Dissolved		mg/l	E200.7
	Potassium, Dissolved		mg/l	E200.7
	Carbonate		mg/l	
	Bicarbonate (CaCO3)		mg/l	
	Sulphate		mg/l	E375.4
	Fluoride		mg/l	E340.2
	Nitrate (N)		mg/l	E352.1
	Phenolphthalein Alkalinity (CaCO3)		mg/l	
	Alkalinity (CaCO3)		mg/l	E310.1
	Hardness (CaCO3)		mg/l	E130.2
	Anion/Cation Balance		meq/meq	
	Anion/Cation Difference		%	
3	Chloride	16.8	mg/l	E325.3
	pH, Field	6.80	units	E150.1
	Specific Conductance, Field	749	umhos/cm	E120.1
	Total Dissolved Solids	512	mg/l	E160.1
	Total Organic Carbon	2.50	mg/l	E415.2
	Total Organic Carbon	2.63	mg/l	E415.2
	Total Organic Carbon	<1.00	mg/l	E415.2
	Total Organic Carbon	1.22	mg/l	E415.2
4	Iron, Dissolved	1.5	mg/l	E200.7
	Manganese, Dissolved	0.08	mg/l	E200.7

Laboratory Representative Signature: [signature] Phone: (214) 406-8100

Laboratory Name: NET (Gulf Coast), Inc. Address: 1548 Valwood Parkway, Suite 118

Site Operator Signature: _____ Date: _____

NET (Gulf Coast), Inc.

Questions? Contact Customer Service at
Austin (512) 928-8905 | Gulfport (601) 863-3036
Dallas (214) 406-8100 | Houston (713) 681-5490

NET

1

YOUR COMPANY NAME: TEAM CONSULTANTS
YOUR COMPANY ADDRESS: 3101 PLEASANT VALLEY WEST #101
ARLINGTON, TX 76015
NAME OF PERSON TO CONTACT: BILL PRIKRYL
CONTACT PERSON'S PHONE: 817-467-5500

2

YOUR PROJECT NO.:	YOUR P.O.#	YOUR PROJECT NAME:
91201		STEPHENVILLE SLF

3 / 4

YOUR SAMPLE DESCRIPTION:	DATE	TIME	MATRIX	TPH Groups 3 & 4	NUMBER OF CONTAINERS	PRESERVATIONS
OW-1	9/23/91	1:00P		X	4	
OW-2	9/23/91	1:35P		X	4	
OW-4	9/23/91	3:35P		X	4	
OW-5	9/23/91	2:45P		X	4	

PARAMETERS FOR ANALYSIS

5 REMARKS

Turnaround Time: NORMAL

Detection Limits Special Limits Required Yes No
Please circle one, If Yes, please describe below or include separate sheet detailing requirements.

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
DAVID HARRIS	9/25/91	6:00P	Juan A. Yanez

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
Juan A. Yanez	9/26/91 7:40	7:40A	

6

METHOD OF SHIPMENT	SHIPPED BY: (Signature)	COURIER (Signature)	RECEIVED FOR NET BY: (Signature)	DATE/TIME
			L.D. Shirley	9-26-91 7:40

7

SAMPLE REMAINDER DISPOSAL
☐ RETURN SAMPLE REMAINDER TO CLIENT VIA _____
(SOME SHIPPING CHARGES MAY BE INCURRED)

☒ I REQUEST NET TO DISPOSE OF ALL SAMPLE REMAINDERS
Juan A. Yanez (Signature) 9/25/91 (Date)
IF SAMPLE REMAINDER IS DETERMINED TO BE HAZARDOUS, A MINIMUM ADDITIONAL CHARGE OF $25.00 PER SAMPLE WILL BE ASSESSED FOR DISPOSAL.

REVISION DATE 6/90

A.65

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Gulf Coast, Inc.
Dallas Division
1548 Valwood Parkway
Suite 118
Carrollton, TX 75006
Tel: (214) 406-8100
Fax: (214) 484-2969

Mailing Address:
P.O. Box 815006
Dallas, TX 75381

ANALYTICAL REPORT

Bill Prikryl
TEAM CONSULTANTS
3101 Pleasant Valley
Suite 101
Arlington, TX 76015

12/26/1991
Job No.: 91.3677

Page: 1

91201 STEPHENVILLE SLF

Date Received: 12/11/1991

176124 OW-1
Taken: 12/10/1991 01:25

Chloride	8.3	mg/L
pH	7.3	units
Total Organic Carbon (W) a	2.0	mg/L
Total Organic Carbon (W) b	2.0	mg/L
Total Organic Carbon (W) c	2.0	mg/L
Total Organic Carbon (W) d	2.0	mg/L
Iron, ICP	0.14	mg/L
Manganese, ICP	<0.01	mg/L
Specific Conductance	562	umhos/cm
Solids, Total Dissolved	335	mg/L

176125 OW-2
Taken: 12/10/1991 01:50

Chloride	25.3	mg/L
pH	7.2	units
Total Organic Carbon (W) a	2.0	mg/L
Total Organic Carbon (W) b	2.0	mg/L
Total Organic Carbon (W) c	2.0	mg/L
Total Organic Carbon (W) d	2.0	mg/L
Iron, ICP	93.9	mg/L
Manganese, ICP	5.0	mg/L
Specific Conductance	550	umhos/cm
Solids, Total Dissolved	452	mg/L

PLATE 30

ANALYTICAL REPORT

Bill Prikryl
TEAM CONSULTANTS
3101 Pleasant Valley
Suite 101
Arlington, TX 76015

12/26/1991
Job No.: 91.3677

91201 STEPHENVILLE SLF

Date Received: 12/11/1991

176126 OW-5
Taken: 12/10/1991 03:15

Chloride	24.0	mg/L
pH	7.1	units
Total Organic Carbon (W) a	2.0	mg/L
Total Organic Carbon (W) b	2.0	mg/L
Total Organic Carbon (W) c	2.0	mg/L
Total Organic Carbon (W) d	2.0	mg/L
Iron, ICP	21.2	mg/L
Manganese, ICP	1.2	mg/L
Specific Conductance	715	umhos/cm
Solids, Total Dissolved	487	mg/L

176127 OW-4
Taken: 12/10/1991 02:35

Chloride	38.7	mg/L
pH	7.2	units
Total Organic Carbon (W) a	5.0	mg/L
Total Organic Carbon (W) b	4.0	mg/L
Total Organic Carbon (W) c	3.0	mg/L
Total Organic Carbon (W) d	3.0	mg/L
Iron, ICP	4.2	mg/L
Manganese, ICP	0.30	mg/L
Specific Conductance	696	umhos/cm
Solids, Total Dissolved	437	mg/L

Donna L. Bowlin

Donna L. Bowlin, Manager
Dallas Division

PLATE 31

STANDARD QUALITY CONTROL DATA REPORT

JOB NUMBER: 91.3677

PARAMETER	ANALYST	DATE	TIME	METHOD	STANDARD AMOUNT	EXTERNAL STANDARD	% REC	BLANK
Chloride	clwt	12/17/1991	15:00	A407B	55.4	51.6	93	<0.50
Total Organic Carbon	ndk	12/13/1991		E415.1			102	<1.0
Total Organic Carbon	ndk	12/23/1991		E415.1			95	<1.0
Iron, ICP	skw	12/20/1991	12:28	E200.7	1.00	1.03	103	<0.05
Manganese, ICP	skw	12/20/1991	12:28	E200.7	1.00	1.02	102	<0.01
Specific Conductance	dee	12/16/1991	08:00	A205	1410	1410	100	<0.80
Solids, Total Dissolved								

Method - Codes, i.e.
- A - refers to APHA, Standard Methods for the Examination of Water and Wastewater, 16th edition
- E - refers to EPA's 1979 Methods for Chemical Analysis of Water and Wastes - for Inorganic Analyses
- E - refers to EPA's 1979 Methods for Organic Chemical Analysis of Municipal and Industrial Wastes - for Organic Analyses
- S - refers to SW846, 3rd edition
- D - refers to ASTM
- M - Method has been modified
- * - refers to Other Reference

External Standard - the Actual/Theoretical value for that batch of analysis. Acceptance Criteria - for organic analyses, results must be within 10% of the true value, except where EPA methods state otherwise.

Blank - samples are not blank corrected by the laboratory

GROUNDWATER MONITORING REPORT

TDH Permit No. 664 Monitor Well I.D. No. OW-1

Submittal for [ ] Background Data [X] Semiannual/Annual Data [ ] Fourth Year Data
Purpose of: Groups 1 2 3 & 4 Groups 3 & 4 Groups 2 3 & 4
Date Sampled: 12/10/91 No. Quarts Collected: 2 Sampled By: D.Harris/TEAM CONSULTANTS

Representing: Site Operator [ ] Consultant [X] Laboratory Personnel [ ]

Well Purged/Bailed Before Sampling: Yes [X] No [ ] How long Before: Immediately

No. Well Volumes Purged: 0.5 Depth to Water Before Bailing: 17.1 ft Elev 1439.78 MSL

How were Samples Collected: 1.5" Teflon Bailer

Were sample preservation procedures in accordance with TDH Guidelines:

Yes [X] No [ ]

GROUP	PARAMETER	LEVEL	UNITS	ANALYSIS METHOD
1	Arsenic		mg/l	E200.7
	Barium		mg/l	E200.7
	Cadmium		mg/l	E200.7
	Chromium		mg/l	E200.7
	Copper		mg/l	E200.7
	Lead		mg/l	E200.7
	Mercury		mg/l	E245.1
	Selenium		mg/l	E200.7
	Silver		mg/l	E200.7
	Zinc		mg/l	E200.7
2	Calcium		mg/l	E200.7
	Magnesium		mg/l	E200.7
	Sodium		mg/l	E200.7
	Potassium		mg/l	E200.7
	Carbonate		mg/l	
	Bicarbonate (CaCO3)		mg/l	
	Sulphate		mg/l	E375.4
	Fluoride		mg/l	E340.2
	Nitrate (N)		mg/l	E352.1
	Phenolphthalein Alkalinity (CaCO3)		mg/l	
	Alkalinity (CaCo3)		mg/l	E310.1
	Hardness (CaCO3)		mg/l	E130.2
	Anion/Cation Balance		meq/meq	
	Anion/Cation Difference		%	
3	Chloride	8.3	mg/l	E325.3
	pH, Field	6.84	units	E150.1
	Specific Conductance,Field	580	umhos/cm	E120.1
	Total Dissolved Solids	335	mg/l	E160.4
	Total Organic Carbon	2.0	mg/l	E415.2
	Total Organic Carbon	2.0	mg/l	E415.2
	Total Organic Carbon	2.0	mg/l	E415.2
	Total Organic Carbon	2.0	mg/l	E415.2
4	Iron	0.14	mg/l	E200.7
	Manganese	<0.01	mg/l	E200.7

Laboratory Representative Signature: D.R. Bowlin Phone: (214) 406-8100

Laboratory Name: NET (Gulf Coast), Inc. Address: 1548 Valwood Parkway, Suite 118

Site Operator Signature: _____ Date: _____

PLATE 33

GROUNDWATER MONITORING REPORT

TDH Permit No. 664 Monitor Well I.D. No. OW-2

Submittal for [ ] Background Data [X] Semiannual/Annual Data [ ] Fourth Year Data
Purpose of: Groups 1 2 3 & 4 Groups 3 & 4 Groups 2 3 & 4
Date Sampled: 12/10/91 No. Quarts Collected: 2 Sampled By: D.Harris/TEAM CONSULTANTS

Representing: Site Operator [ ] Consultant [X] Laboratory Personnel [ ]

Well Purged/Bailed Before Sampling: Yes [X] No [ ] How long Before: Immediately

No. Well Volumes Purged: 0.7 Depth to Water Before Bailing: 39.9 ft Elev 1413.17 MSL

How were Samples Collected: 1.5" Teflon Bailer

Were sample preservation procedures in accordance with TDH Guidelines:

Yes [X] No [ ]

GROUP	PARAMETER	LEVEL	UNITS	ANALYSIS METHOD
1	Arsenic		mg/l	E200.7
	Barium		mg/l	E200.7
	Cadmium		mg/l	E200.7
	Chromium		mg/l	E200.7
	Copper		mg/l	E200.7
	Lead		mg/l	E200.7
	Mercury		mg/l	E245.1
	Selenium		mg/l	E200.7
	Silver		mg/l	E200.7
	Zinc		mg/l	E200.7
2	Calcium		mg/l	E200.7
	Magnesium		mg/l	E200.7
	Sodium		mg/l	E200.7
	Potassium		mg/l	E200.7
	Carbonate		mg/l	
	Bicarbonate (CaCO3)		mg/l	
	Sulphate		mg/l	E375.4
	Fluoride		mg/l	E340.2
	Nitrate (N)		mg/l	E352.1
	Phenolphthalein Alkalinity (CaCO3)		mg/l	
	Alkalinity (CaCo3)		mg/l	E310.1
	Hardness (CaCO3)		mg/l	E130.2
	Anion/Cation Balance		meq/meq	
	Anion/Cation Difference		%	
3	Chloride	25.3	mg/l	E325.3
	pH, Field	6.93	units	E150.1
	Specific Conductance,Field	571	umhos/cm	E120.1
	Total Dissolved Solids	452	mg/l	E160.4
	Total Organic Carbon	2.0	mg/l	E415.2
	Total Organic Carbon	2.0	mg/l	E415.2
	Total Organic Carbon	2.0	mg/l	E415.2
	Total Organic Carbon	2.0	mg/l	E415.2
4	Iron	93.9	mg/l	E200.7
	Manganese	5.0	mg/l	E200.7

Laboratory Representative Signature: D K Boerlin Phone: (214) 406-8100

Laboratory Name: NET (Gulf Coast), Inc. Address: 1548 Valwood Parkway, Suite 118

Site Operator Signature: _____ Date: _____

PLATE 34

GROUNDWATER MONITORING REPORT

TDH Permit No. 664 Monitor Well I.D. No. OW-5

Submittal for [ ] Background Data [X] Semiannual/Annual Data [ ] Fourth Year Data
Purpose of: Groups 1 2 3 & 4 Groups 3 & 4 Groups 2 3 & 4
Date Sampled: 12/10/91 No. Quarts Collected: 2 Sampled By: D. Harris/TEAM CONSULTANTS

Representing: Site Operator [ ] Consultant [X] Laboratory Personnel [ ]

Well Purged/Bailed Before Sampling: Yes [X] No [ ] How long Before: Immediately

No. Well Volumes Purged: 0.5 Depth to Water Before Bailing: 43.4 ft Elev 1414.65 MSL

How were Samples Collected: 1.5" Teflon Bailer

Were sample preservation procedures in accordance with TDH Guidelines:

Yes [X] No [ ]

GROUP	PARAMETER	LEVEL	UNITS	ANALYSIS METHOD
1	Arsenic		mg/l	E200.7
	Barium		mg/l	E200.7
	Cadmium		mg/l	E200.7
	Chromium		mg/l	E200.7
	Copper		mg/l	E200.7
	Lead		mg/l	E200.7
	Mercury		mg/l	E245.1
	Selenium		mg/l	E200.7
	Silver		mg/l	E200.7
	Zinc		mg/l	E200.7
2	Calcium		mg/l	E200.7
	Magnesium		mg/l	E200.7
	Sodium		mg/l	E200.7
	Potassium		mg/l	E200.7
	Carbonate		mg/l	
	Bicarbonate (CaCO3)		mg/l	
	Sulphate		mg/l	E375.4
	Fluoride		mg/l	E340.2
	Nitrate (N)		mg/l	E352.1
	Phenolphthalein Alkalinity (CaCO3)		mg/l	
	Alkalinity (CaCo3)		mg/l	E310.1
	Hardness (CaCO3)		mg/l	E130.2
	Anion/Cation Balance		meq/meq	
	Anion/Cation Difference		%	
3	Chloride	24.0	mg/l	E325.3
	pH, Field	6.83	units	E150.1
	Specific Conductance,Field	755	umhos/cm	E120.1
	Total Dissolved Solids	487	mg/l	E160.4
	Total Organic Carbon	2.0	mg/l	E415.2
	Total Organic Carbon	2.0	mg/l	E415.2
	Total Organic Carbon	2.0	mg/l	E415.2
	Total Organic Carbon	2.0	mg/l	E415.2
4	Iron	21.2	mg/l	E200.7
	Manganese	1.2	mg/l	E200.7

Laboratory Representative Signature: D L Bowlin Phone: (214) 406-8100

Laboratory Name: NET (Gulf Coast), Inc. Address: 1548 Valwood Parkway, Suite 118

Site Operator Signature: _____ Date: _____

PLATE 35

GROUNDWATER MONITORING REPORT

TDH Permit No. 664 Monitor Well I.D. No. OW-4

Submittal for [ ] Background Data [X] Semiannual/Annual Data [ ] Fourth Year Data
Purpose of: Groups 1 2 3 & 4 Groups 3 & 4 Groups 2 3 & 4
Date Sampled: 12/10/91 No. Quarts Collected: 2 Sampled By: D.Harris/TEAM CONSULTANTS

Representing: Site Operator [ ] Consultant [X] Laboratory Personnel [ ]

Well Purged/Bailed Before Sampling: Yes [X] No [ ] How long Before: Immediately

No. Well Volumes Purged: 0.4 Depth to Water Before Bailing: 73.2 ft Elev 1414.11 MSL

How were Samples Collected: 1.5" Teflon Bailer

Were sample preservation procedures in accordance with TDH Guidelines:

Yes [X] No [ ]

GROUP	PARAMETER	LEVEL	UNITS	ANALYSIS METHOD
1	Arsenic		mg/l	E200.7
	Barium		mg/l	E200.7
	Cadmium		mg/l	E200.7
	Chromium		mg/l	E200.7
	Copper		mg/l	E200.7
	Lead		mg/l	E200.7
	Mercury		mg/l	E245.1
	Selenium		mg/l	E200.7
	Silver		mg/l	E200.7
	Zinc		mg/l	E200.7
2	Calcium		mg/l	E200.7
	Magnesium		mg/l	E200.7
	Sodium		mg/l	E200.7
	Potassium		mg/l	E200.7
	Carbonate		mg/l	
	Bicarbonate (CaCO3)		mg/l	
	Sulphate		mg/l	E375.4
	Fluoride		mg/l	E340.2
	Nitrate (N)		mg/l	E352.1
	Phenolphthalein			
	Alkalinity (CaCO3)		mg/l	
	Alkalinity (CaCo3)		mg/l	E310.1
	Hardness (CaCO3)		mg/l	E130.2
	Anion/Cation Balance		meq/meq	
	Anion/Cation Difference		%	
3	Chloride	38.7	mg/l	E325.3
	pH, Field	6.97	units	E150.1
	Specific Conductance,Field	696	umhos/cm	E120.1
	Total Dissolved Solids	437	mg/l	E160.4
	Total Organic Carbon	5.0	mg/l	E415.2
	Total Organic Carbon	4.0	mg/l	E415.2
	Total Organic Carbon	3.0	mg/l	E415.2
	Total Organic Carbon	3.0	mg/l	E415.2
4	Iron	4.2	mg/l	E200.7
	Manganese	0.30	mg/l	E200.7

Laboratory Representative Signature: D. R. Bowlin Phone: (214) 406-8100

Laboratory Name: NET (Gulf Coast), Inc. Address: 1548 Valwood Parkway, Suite 118

Site Operator Signature: _____ Date: _____

PLATE 36

NET (Gulf Coast), Inc.

Questions? Contact Customer Service at
Austin (512) 928-8905 Gulfport (601) 863-3036
Dallas (214) 406-8100 Houston (713) 681-5496
Baton Rouge (504) 293-1085

NET

1 YOUR COMPANY NAME: TEXAS CONSULTANTS

YOUR COMPANY ADDRESS: 3101 PLEASANT VALLEY ST #201
ARLINGTON TX 76015-2916

NAME OF PERSON TO CONTACT: BILL PRIKRYL

CONTACT PERSON'S PHONE: 817-4675500

2

YOUR PROJECT NO.:	YOUR P.O.#	YOUR PROJECT NAME:
91201		STEPHENVILLE SLF

3

YOUR SAMPLE DESCRIPTION:	DATE	TIME	MATRIX
OW-1	12/10/91	1:25P	
OW-2	12/10/91	1:50P	
OW-5 per James Knight	12/10/91	3:15P	
OW-4	12/10/91	2:35P	

4 PARAMETERS FOR ANALYSIS

T.O.H GROUPS 3 & 4	NUMBER OF CONTAINERS	PRESERVATIONS
X	2	
X	2	
X	2	
X	2	

5 REMARKS

Turnaround Time: NORMAL

Detection Limits Special Limits Required Yes (No)

Please circle one, if Yes, please describe below or include separate sheet detailing requirements.

6

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
Dawn Nunn	12/11/91	8:48A	James Knight	James Knight	12/11/91	1020A	

METHOD OF SHIPMENT	SHIPPED BY: (Signature)	COURIER (Signature)	RECEIVED FOR NET BY: (Signature)	DATE/TIME
			B Shirodaw	10:20 12-11

7 SAMPLE REMAINDER DISPOSAL

☐ RETURN SAMPLE REMAINDER TO CLIENT VIA _____
(SOME SHIPPING CHARGES MAY BE INCURRED)

☐ I REQUEST NET TO DISPOSE OF ALL SAMPLE REMAINDERS
_____ (Signature) _____ (Date)
IF SAMPLE REMAINDER IS DETERMINED TO BE HAZARDOUS, A MINIMUM ADDITIONAL CHARGE OF $25.00 PER SAMPLE WILL BE ASSESSED FOR DISPOSAL.

REVISION DATE 2/91

PLATE 37
A.73

APPENDIX

STANDARD FIELD DRILLING AND SAMPLING PROCEDURES

Standard field drilling and sampling procedures and laboratory testing procedures are described in the following paragraphs.

Field Drilling and Sampling

Borings were advanced in soil formations by either auger or air rotary wash drilling methods. Soil samples were obtained at the designated sampling intervals using the following sampling techniques:

1. Undisturbed Samples

   Shelby Tube Samples

   The Shelby tube sampler is a three-inch diameter (O.D.), thin-walled steel tube which is primarily used to obtain undisturbed samples of cohesive soils into which the tube can be pushed by the hydraulic pulldown and weight of the drill rig. Shelby tube sampling procedures are in general accordance with ASTM Method D-1587. Recovered Shelby tube samples are extruded in the field, logged, separated horizontally into 0.4 foot long segments and, finally, sealed in plastic bags.

   The consistency of undisturbed cohesive soil samples is evaluated in the field using a calibrated hand penetrometer. This device measures the pressure necessary to push a 0.25-inch diameter piston into the undisturbed specimen. The pressure at 0.25-inch penetration has been correlated with the laboratory unconfined compressive strength; thus, a representative estimate of soil consistency is obtained. The results, expressed in terms of shear strength (one-half the compressive strength), are plotted as open circles in the strength graph on the boring logs. A plus sign (+) accompanying the open circle indicates that the shear strength exceeds 1.5 tsf, which is the capacity of the penetrometer.

2. Disturbed Samples

   Split Spoon Samples

   Below the depth of Shelby tube refusal, dense or granular materials were sampled utilizing a two-inch diameter, split-spoon sampler in conjunction with the Standard Penetration Test (ASTM D-1586). This test utilized a 140 pound hammer that drops a free fall vertical distance of 30 inches. The number of blows required for 18 inches of penetration is recorded for each six inch increment and either the value for the last 12

inch increment and either the value for the last 12 inches of penetration, the penetration obtained within 100 blows, or the penetration achieved when a total of 50 blows have been applied during any six-inch increment, whichever occurs first, is reported as the standard penetration value.

Auger Samples

Disturbed soil samples are obtained from soil cuttings brought to the ground surface while advancing a boring with six-inch diameter, continuous-flight augers. The recovered soil samples are sealed in plastic bags. In addition, bulk samples, usually weighing 50 to 75 pounds, are obtained at selected auger boring locations to provide a sufficient quantity of soil for performing laboratory tests on remolded specimens.

In instances where coring is necessary to advance borings through rock formations, rock coring is performed using a "NX" double-tube core barrel equipped with a tungsten carbide or diamond drill bit. The diameter of the recovered rock cores generally ranges from 1.875 inches ("NX" wire line size) to 2.125 inches (standard "NX" size) depending upon the particular type of "NX" core barrel employed. Rock cores are sealed in plastic and placed in cardboard core boxes. The amount of core recovered, expressed as a percentage of the coring interval (REC - Recovery), is tabulated at the respective depths on the boring logs.

TEAM CONSULTANTS, INC.

Geotechnical, Environmental, Construction Materials Testing

August 18, 1994
TEAM Project No. 942069E
Report No. 1

City of Stephenville
354 North Belknap
Stephenville, Texas 76401

Attention: Mr. Danny R. Johnson
Director of Utilities

Re: Decommissioning of Five Piezometers
Stephenville Sanitary Landfill - Permit No. 664-A
Stephenville, Erath County, Texas

Dear Mr. Johnson:

Presented herein is our report which documents the decommissioning of five piezometers identified as P-1 through P-5 at the above referenced facility. This work was completed in general accordance with our Proposal No. 942069E dated August 5, 1994. Authorization to proceed was verbally provided by you on August 8, 1994.

BACKGROUND INFORMATION

Piezometers No. P-1 through P-5 were installed by TEAM Consultants, Inc. on April 8 through April 12, 1991, to total depths of 35, 40, 65, 80 and 50 feet, respectively. Each installation was installed using air rotary drilling methods and consisted of 2.0" I.D. Schedule 40 PVC flush thread casing and machine slotted (0.010") screen installed within a 4-3/4-inch diameter borehole.

PIEZOMETER DECOMMISSIONING

On August 15, 1994, TEAM Consultants, Inc. traveled to the subject site to overdrill and grout Piezometers No. P-1 through P-5. Each installation was pressure filled with cement grout from the bottom up to the land surface. A tremi pipe was utilized to install the grout mixture. Each installation was then overdrilled using hollow stem auger drilling methods to a depth of approximately 15 feet. Upon completion of overdrilling, as much of the casing as possible was removed. Each borehole was then cement grouted from the bottom to form a continuous plug.

The plugging of Piezometers No. P-1 through P-5 in accordance with the above procedures has been documented in "Plugging Reports" for submittal to the Texas Natural Resource Conservation Commission. An original and three copies of each plugging report, including a site map showing the location of the

site relative to the City of Stephenville and the locations of the piezometer installations on the site, are attached for your review. Your signature is required at the bottom of each plugging report prior to forwarding the original and two copies to:

Texas Natural Resource Conservation Commission
P. O. Box 13087
Capitol Station
Austin, Texas 78711-3087

Attention: Ms. Ada Lichaa, Team Leader
Ground-Water Monitoring Team
Compliance and Enforcement Section
Municipal Solid Waste Division

We appreciate the opportunity to be of service. Should you have any questions or need additional assistance, please call.

Very truly yours,

TEAM Consultants, Inc.

Edward Gomez

James Knight, P.E.

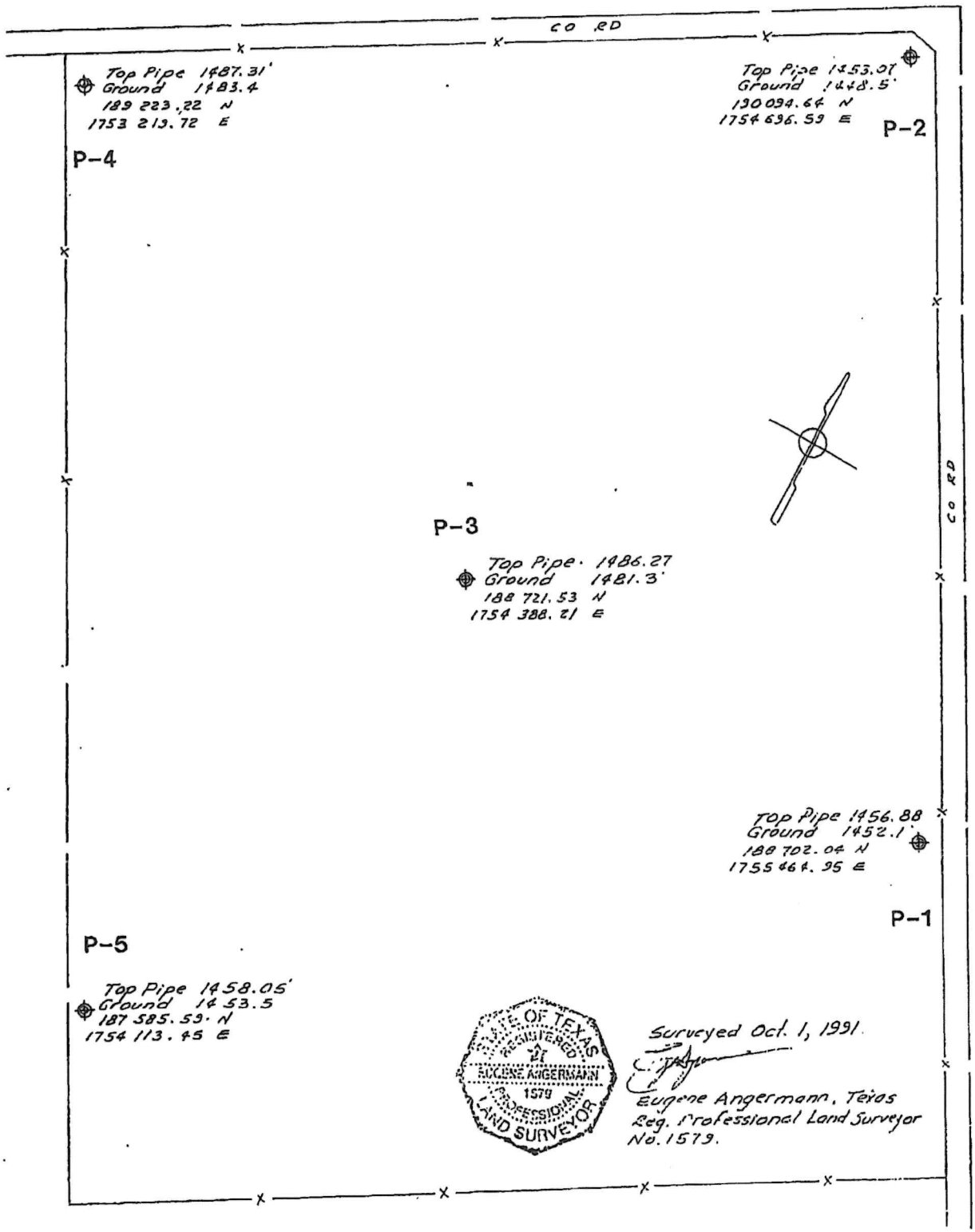
STATE OF TEXAS
JAMES KNIGHT
30546
REGISTERED
PROFESSIONAL ENGINEER

EG/JK/vo
Enclosure

ATTACHMENTS

SITE LOCATION MAP

PIEZOMETER SITES



Surveyed Oct. 1, 1991

Eugene Angermann, Texas
Reg. Professional Land Surveyor
No. 1579.

PLAN OF BORINGS

Please use black ink.

File WHITE COPY with:
Texas Water Commission
P.O. Box 13087
Austin, Texas 78711
Phone (512) 371-6299

State of Texas

PLUGGING REPORT

(This form must be completed and filed with the TWC within 30 days following the date the well is plugged as required by current statutory law.)

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711
Phone (512) 371-6299

A. Well Identification and Location Data

1) Owner City of Stephenville (Name) Address 354 North Belknap (Street or RFD) Stephenville (City) TX (State) 76401 (Zip)

2) Owner's Well Number Piezometer P-1

3) Location of Well: County Erath 6 miles in S.W. (N.E., S.W., etc.) direction from Stephenville (Town)

☐ Legal description:

Driller or other person performing the plugging operations 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.

Section No. _____ Block No. _____ Township _____

Abstract No. _____ Survey Name _____

Distance and direction from two intersecting section lines or survey lines: _____

☒ See Attached map.

B. Historical Data on Well To Be Plugged (if available)

4) Driller Dowell Well Services, Inc. License Number 1891 City Stephenville

5) Drilled 4-8 19 91; 6) Diameter of hole 4.75 inches; 7) Total depth of well 35.0 feet.

C. Current Plugging Data

8) Date well plugged 8-15, 19 94.

9) Sketch of well: Using space at right, show method of plugging the well including all casing and cemented intervals.

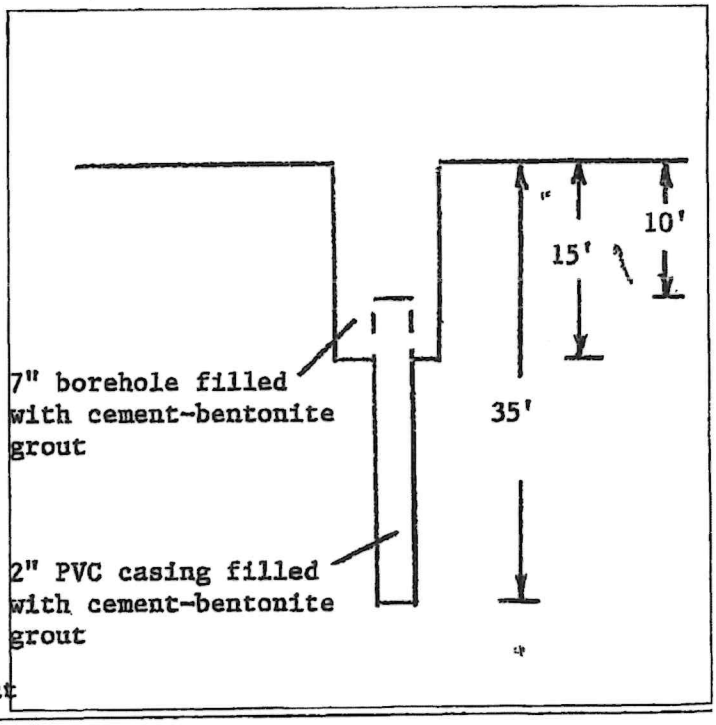
10) Name of Driller or other person actually performing the plugging operations Bill McGuire

if a water well driller plugged the well, give the driller's license no. 02763M.

11) Casing and cementing data relative to the plugging operations:

Diameter (inches)	Casing Left in Well	
	From (feet)	To (feet)
2.0	35.0	10.0

Cement Plug(s) Placed in Well		Sack(s) of cement used
From (feet)	To (feet)	
35.0	0.0	2-94# Sacks-Cement
		1-50# Sack-Bentonite Grout



D. Validation of Information Included in Form

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

Company or Individual's Name McGuire Drilling Company, Inc. (Type or Print)

Address P.O. Box 154244 (Street or RFD) Irving (City) TX (State) 75015 (Zip)

(Signed) _____ (Person performing plugging operations) (Signed) _____ (Owner of Well)

For TWC use only
Well No. A.82
Location on map

TWC-0055 (Rev. 07-27-88) White - TWC Yellow - Well Owner Pink - Contractor

Please use black ink.

File WHITE COPY with:
Texas Water Commission
P.O. Box 13087
Austin, Texas 78711
Phone (512) 371-6299

State of Texas

PLUGGING REPORT

(This form must be completed and filed with the TWC within 30 days following the date the well is plugged as required by current statutory law.)

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711
Phone (512) 371-6299

A. Well Identification and Location Data

1) Owner City of Stephenville (Name) Address 354 North Belknap (Street or RFD) Stephenville (City) TX (State) 76401 (Zip)

2) Owner's Well Number Piezometer P-2

3) Location of Well: County Erath 6 miles in S.W. (N.E., S.W., etc.) direction from Stephenville (Town)

Driller or other person performing the plugging operations 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 lines or survey lines: _____

☒ See Attached map.

B. Historical Data on Well To Be Plugged (if available)

4) Driller Dowell Well Services, Inc License Number 1891 City Stephenville

5) Drilled 4-9 19 94; 6) Diameter of hole 4.75 inches; 7) Total depth of well 40.0 feet.

C. Current Plugging Data

8) Date well plugged 8-15, 19 94.

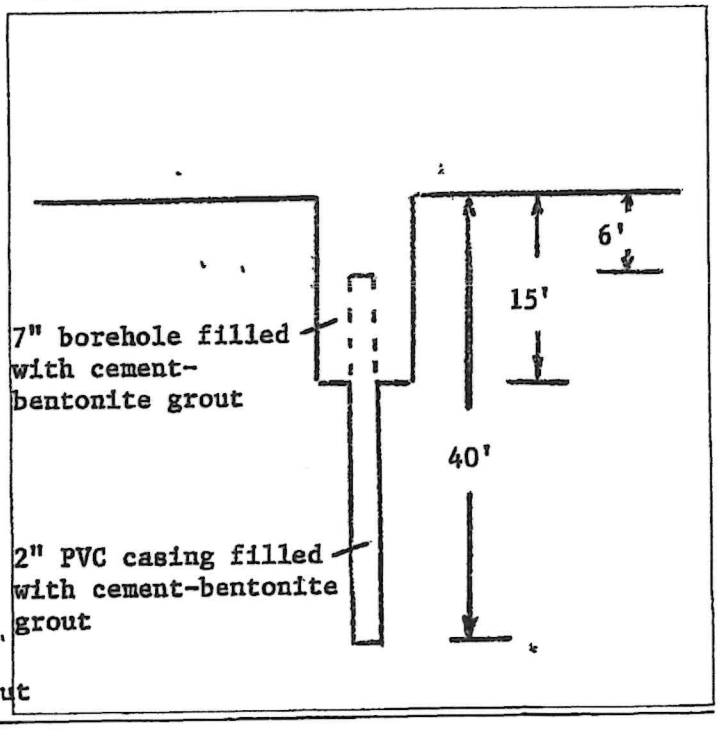
9) Sketch of well: Using space at right, show method of plugging the well including all casing and cemented intervals.

10) Name of Driller or other person actually performing the plugging operations Bill McGuire;
if a water well driller plugged the well, give the driller's license no. 02763M.

11) Casing and cementing data relative to the plugging operations:

Diameter (inches)	Casing Left in Well	
	From (feet)	To (feet)
2.0	40.0	6.0

Cement Plug(s) Placed in Well		Sack(s) of cement used
From (feet)	To (feet)	
40.0	0.0	2-94# Sacks-Cement
		1-50# Sack-Bentonite Grout



D. Validation of Information Included in Form

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

Company or Individual's Name McGuire Drilling Company, Inc. (Type or Print)

Address P.O. Box 154244 (Street or RFD) Irving (City) Texas (State) 75015 (Zip)

(Signed) William P. McGuire (Person performing plugging operations) (Signed) Danny R. Johnson (Owner of Well)

For TWC use only
Well No. A.83
Location on map

TWC-0055 (Rev. 07-27-88) White - TWC Yellow - Well Owner Pink - Contractor

Please use black ink.	State of Texas	
File WHITE COPY with: Texas Water Commission P.O. Box 13087 Austin, Texas 78711 Phone (512) 371-6299	**PLUGGING REPORT** (This form must be completed and filed with the TWC within 30 days following the date the well is plugged as required by current statutory law.)	Texas Water Well Drillers Board P.O. Box 13087 Austin, Texas 78711 Phone (512) 371-6299

A. Well Identification and Location Data

1) Owner City of Stephenville (Name) Address 354 North Belknap (Street or RFD) Stephenville (City) TX (State) 76401 (Zip)

2) Owner's Well Number Piezometer P-3

3) Location of Well: County Erath 6 miles in S.W. (N.E., S.W., etc.) direction from Stephenville (Town)

Driller or other person performing the plugging operations 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 lines or survey lines: _____

☒ See Attached map.

B. Historical Data on Well To Be Plugged (if available)

4) Driller Dowell Well Services, Inc. License Number 1891 City Stephenville

5) Drilled 4-10 19 91; 6) Diameter of hole 4.75 inches; 7) Total depth of well 65.0 feet.

C. Current Plugging Data

8) Date well plugged 8-15, 19 94.

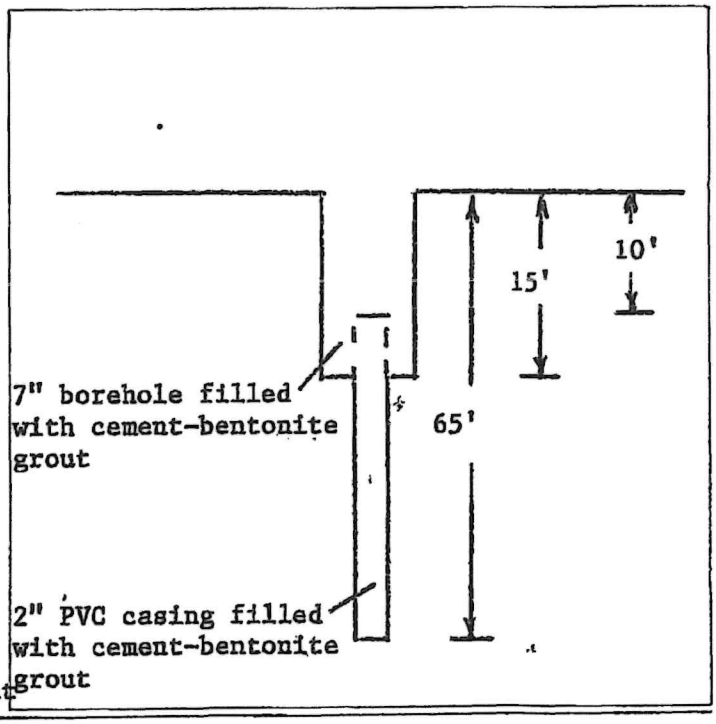
9) Sketch of well: Using space at right, show method of plugging the well including all casing and cemented intervals.

10) Name of Driller or other person actually performing the plugging operations Bill McGuire;
if a water well driller plugged the well, give the driller's license no. 02763M.

11) Casing and cementing data relative to the plugging operations:

Diameter (inches)	Casing Left in Well	
	From (feet)	To (feet)
2.0	65.0	10.0

Cement Plug(s) Placed in Well		Sack(s) of cement used
From (feet)	To (feet)	
65.0	0.0	2-94# Sacks-Cement
		1-50# Sack-Bentonite Grout



D. Validation of Information Included in Form

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

Company or Individual's Name McGuire Drilling Company, Inc. (Type or Print)

Address P.O. Box 154244 (Street or RFD) Irving (City) TX (State) 75015 (Zip)

(Signed) William P. McGuire (Person performing plugging operations) (Signed) Danny L. Johnson (Owner of Well)

For TWC use only
Well No. A.84
Location on map

TWC-0055 (Rev. 07-27-88) White - TWC Yellow - Well Owner Pink - Contractor

Please use black ink.	State of Texas	
File WHITE COPY with: Texas Water Commission P.O. Box 13087 Austin, Texas 78711 Phone (512) 371-6299	**PLUGGING REPORT** (This form must be completed and filed with the TWC within 30 days following the date the well is plugged as required by current statutory law.)	Texas Water Well Drillers Board P.O. Box 13087 Austin, Texas 78711 Phone (512) 371-6299

A. Well Identification and Location Data

1) Owner City of Stephenville (Name) Address 354 North Belknap (Street or RFD) Stephenville (City) TX (State) 76401 (Zip)

2) Owner's Well Number Piezometer P-4

3) Location of Well: County Erath 6 miles in S.W. (N.E., S.W., etc.) direction from Stephenville (Town)

Driller or other person performing the plugging operations 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 lines or survey lines: _____

☒ See Attached map.

B. Historical Data on Well To Be Plugged (if available)

4) Driller Dowell Well Services, Inc. License Number 1891 City Stephenville

5) Drilled 4-11 19 91; 6) Diameter of hole 4.75 inches; 7) Total depth of well 80.0 feet.

C. Current Plugging Data

8) Date well plugged 8-15, 19 94.

9) Sketch of well: Using space at right, show method of plugging the well including all casing and cemented intervals.

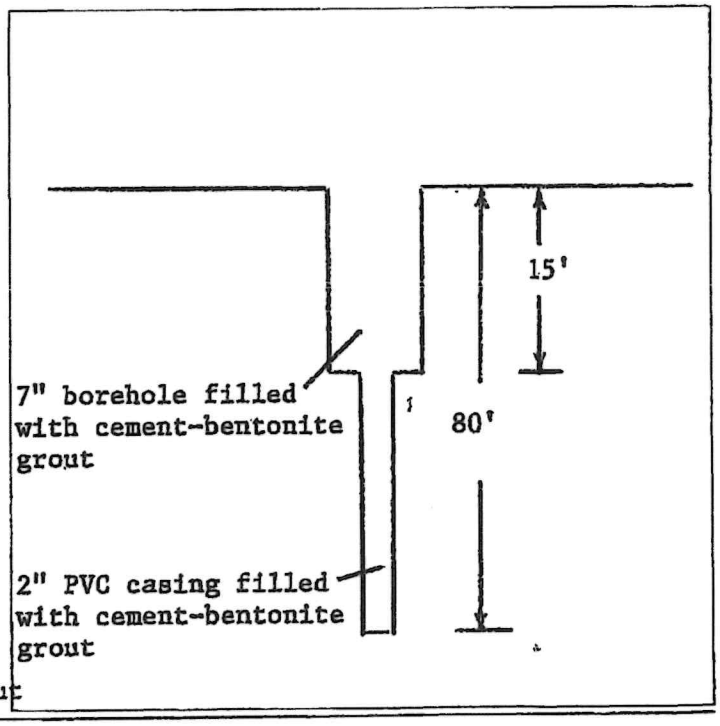
10) Name of Driller or other person actually performing the plugging operations Bill McGuire

if a water well driller plugged the well, give the driller's license no. 02763M.

11) Casing and cementing data relative to the plugging operations:

Diameter (inches)	Casing Left in Well	
	From (feet)	To (feet)
2.0	80.0	15.0

Cement Plug(s) Placed in Well		Sack(s) of cement used
From (feet)	To (feet)	
80.0	0.0	2-94# Sacks-
		Cement
		1-50# Sack-
		Bentonite Grout



D. Validation of Information Included in Form

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

Company or Individual's Name McGuire Drilling Company, Inc. (Type or Print)

Address P.O. Box 154244 (Street or RFD) Irving (City) TX (State) 75015 (Zip)

(Signed) William P. McGuire (Person performing plugging operations) (Signed) Danny R. Johnson (Owner of Well)

For TWC use only
Well No. A.85
Location on map

Please use black ink.

File WHITE COPY with:
Texas Water Commission
P.O. Box 13087
Austin, Texas 78711
Phone (512) 371-6299

State of Texas

PLUGGING REPORT

(This form must be completed and filed with the TWC within 30 days following the date the well is plugged as required by current statutory law.)

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711
Phone (512) 371-6299

A. Well Identification and Location Data

1) Owner City of Stephenville (Name) Address 354 North Belknap (Street or RFD) Stephenville (City) TX (State) 76401 (Zip)

2) Owner's Well Number Piezometer P-5

3) Location of Well: County Erath 6 miles in S.W. (N.E., S.W., etc.) direction from Stephenville (Town)

Driller or other person performing the plugging operations 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 lines or survey lines: ____

☒ See Attached map.

B. Historical Data on Well To Be Plugged (if available)

4) Driller Dowell Well Services, Inc. License Number 1891 City Stephenville

5) Drilled 4-12 1991; 6) Diameter of hole 4.75 inches; 7) Total depth of well 50.0 feet.

C. Current Plugging Data

8) Date well plugged 8-15, 1994.

9) Sketch of well: Using space at right, show method of plugging the well including all casing and cemented intervals.

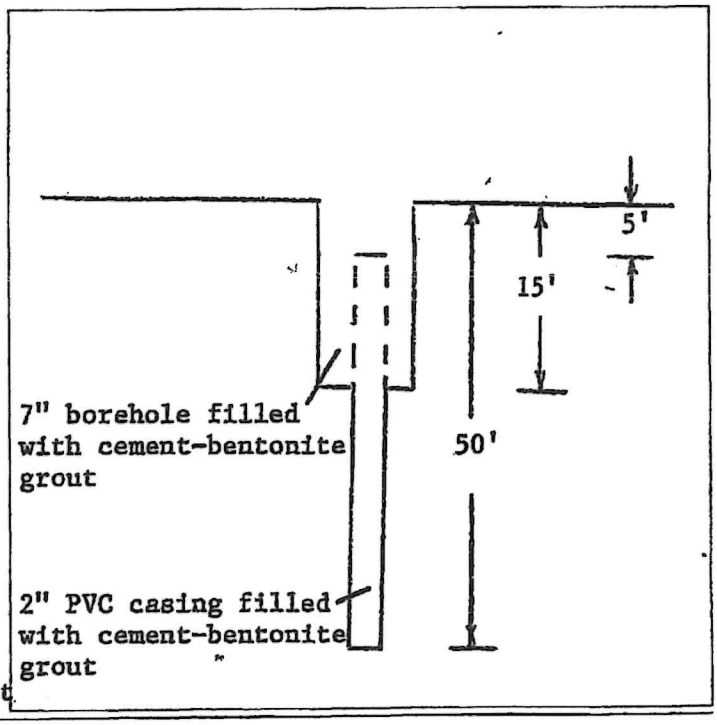
10) Name of Driller or other person actually performing the plugging operations Bill McGuire;

if a water well driller plugged the well, give the driller's license no. 02763M.

11) Casing and cementing data relative to the plugging operations:

Diameter (inches)	Casing Left in Well	
	From (feet)	To (feet)
2.0	50.0	5.0

Cement Plug(s) Placed in Well		Sack(s) of cement used
From (feet)	To (feet)	
50.0	0.0	2-94# Sacks-Cement
		1-50# Sack-Bentonite Grout



D. Validation of Information Included in Form

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

Company or Individual's Name McGuire Drilling Company, Inc. (Type or Print)

Address P.O. Box 154244 (Street or RFD) Irving (City) TX (State) 75015 (Zip)

(Signed) William P. Mahon (Person performing plugging operations) (Signed) Danny L. Johnson (Owner of Well)

For TWC use only
Well No. A.86
Location on map

TWC 6056 (Rev. 07-07-89) White - TWC Yellow - Well Owner Pink - Contractor

THOMPSON-HAYWARD CHEMICAL COMPANY

2627 Weir Street
P.O. Box 6226
Dallas, Tx 75222
(214) 638-8034

Collum Pipe

16 - 21' joints 1¼" Pipe
1 11" nipple
1 13'2" nipple
5'1" pump & motor

16 = 21' joints of Pipe = 336' Pipe
1 = 13' 2" " " " " = 13' 2"
1 = 0' 11" " " " " = 11"
1 = 5' 1" Pump & motor = 5' 1"
Pump setting = 355' 2"

LANDFILL WELL
10-1-75

THOMPSON-HAYWARD CHEMICAL COMPANY

2627 Weir Street
P.O. Box 6226
Dallas, Tex 75222
(214) 638-8034

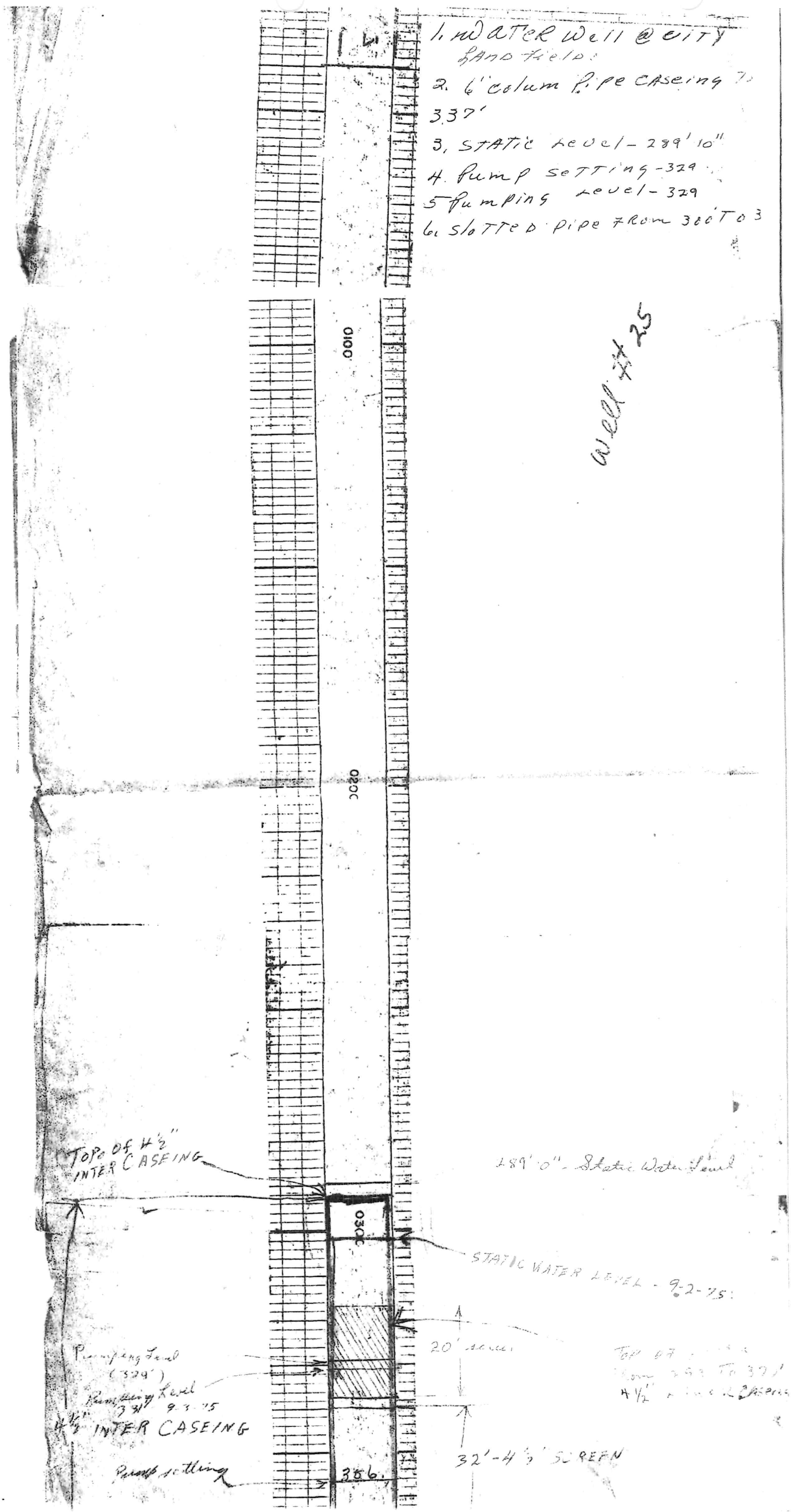
	333' 6"	original Hole
11:40 A.M.	338'	filled original hole, clay
12:08 PM	343'	NEW Hole sand + gravel 2' clay
12:25 PM	348'	(fine) sand + gravel formation
12:50 PM	353'	(fine) sand formation
2:30 PM / 3:00 PM	358'	sand + small gravel
3:45 PM	363	sand + pea gravel
4:25 PM	368'	sand + fine gravel
	372'	sand + gravel mostly gravel

363'

24,938,026

1. WATER Well @ CITY
LAND Fields
2. 6" colum Pipe CASeing To
337'
3. STATIC Level - 289' 10"
4. Pump SeTTing - 329
5 Pumping Level - 329
6. SloTTED Pipe FROM 300' TO 3

Well #25



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*

For TDWR use only
Well No.
Located on map
Received:

1) OWNER City of Stephenville (Name) Address 354 N. Belknap (Street or RFD) (City) (State) (Zip)

2) LOCATION OF WELL: County Erath 3 miles in W (N.E., S.W., etc.) direction from Dale (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. 173

☐ 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 12-7-79

DIAMETER OF HOLE Dia. (in.)	From (ft.)	To (ft.)
6 3/4	Surface 0	395

7) BOREHOLE COMPLETION: ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☑ Gravel Packed ☐ Other _____
If Gravel Packed give interval . . . from 350 ft. to 395 ft.

From (ft.)	To (ft.)	Description and color of formation material
0	15	Caliche
15	80	Clay
80	95	Sand
95	280	Grey Shale
280	360	Shale w/clay streaks
360	370	gravel
370	375	Limestone
375	393	Sand & gravel
393	395	red bed

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	Steel, slotted			150

CEMENTING DATA
Cemented from 0 ft. to 100 ft.
Method used _____
Cemented by _____ (Company or Individual)

9) WATER LEVEL:
Static level _____ ft. below land surface Date _____
Artesian flow _____ gpm. Date _____

10) PACKERS: Type Depth
gravel packed

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

(Use reverse side if necessary)

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

12) WELL TESTS:
☐ Type Test: ☐ Pump ☑ Bailer ☐ Jetted ☐ Estimated
Yield: 30 gpm with 15 ft. drawdown after 1 hrs.

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 _____ (Type or Print) Water Well Drillers Registration No. _____

ADDRESS _____ (Street or RFD) (City) (State) (Zip)

(Signed) _____ (Water Well Driller) (Company)

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

TDWR-0392 (Rev. 1-12-79) WELL OWNER'S C

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING PRIVILEGE OF CONFIDENTIALITY

The Water Well Drillers Board and the Department of Water Resources are concerned that some persons having water wells drilled may not be aware of the confidentiality privilege provision of Section 5 of the Water Well Drillers Act. Section 5, the Reporting of Well Logs, reads as follows:

> "Every registered water well driller drilling, deepening, or otherwise altering a water well within this State shall make and keep, or cause to be made and kept, a legible and accurate well log, and within sixty (60) days from the completion or cessation of drilling, deepening or otherwise altering such a water well, shall deliver or transmit by certified mail a copy of such well log to the Commission, and the owner thereof or the person having had such well drilled. The well log required herein shall at the request in writing to the Commission, by certified mail, by the owner or the person having such well drilled be held as confidential matter and not made of public record."

The last sentence specifies the means whereby you can, if you wish, assure that logs of your wells will be kept confidential. Please note that the term "Commission" in the above-quoted section and elsewhere in the Water Well Drillers Act now properly means the Texas Department of Water Resources (P. O. Box 13087; Austin, Texas 78711).

Please use black ink. File WHITE COPY with: Texas Water Commission P.O. Box 13087 Austin, Texas 78711 Phone (512) 463-7997	State of Texas **PLUGGING REPORT** (This form must be completed and filed with the TWC within 30 days following the date the well is plugged as required by current statutory law.)	Texas Water Well Drillers Board P.O. Box 13087 Austin, Texas 78711 Phone (512) 463-7997

A. Well Identification and Location Data

1) Owner City of Stephenville (Name) Address 3541 N. Belknap (Street or RFD) Stephenville (City) Texas (State) 76401 (Zip)

2) Owner's Well Number Land Fill #1

3) Location of Well: County Erath, 3 miles in West (N.E., S.W., etc.) direction from Stephenville (Town)

Driller or other person performing the plugging operations 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 lines or survey lines: _____

☑ See Attached map.

B. Historical Data on Well To Be Plugged (if available)

4) Driller N.A. License Number _____ City _____

5) Drilled N.A. 19___; 6) Diameter of hole _____ inches; 7) Total depth of well _____ feet.

C. Current Plugging Data

8) Date well plugged 9-17, 1990.

9) Sketch of well: Using space at right, show method of plugging the well including all casing and cemented intervals.

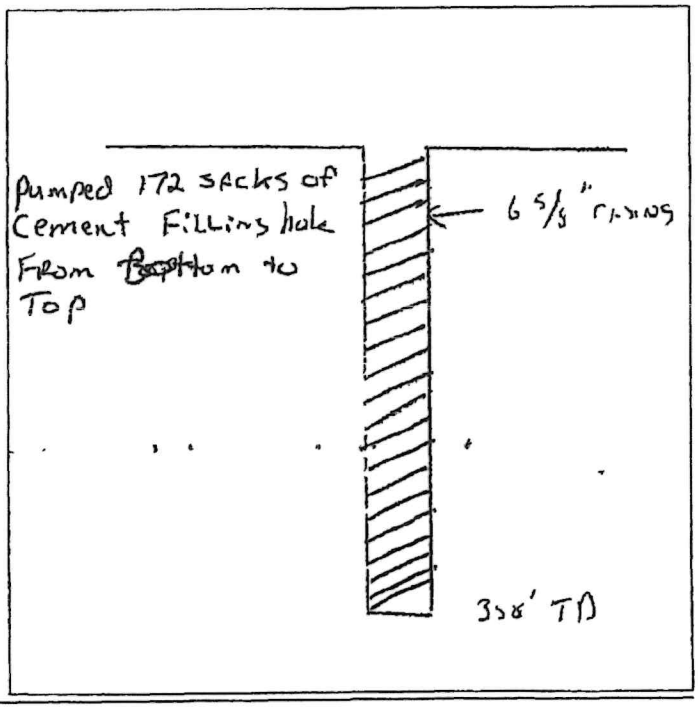
10) Name of Driller or other person actually performing the plugging operations H D Hicks;

if a water well driller plugged the well, give the driller's license no. C.2126-W.

11) Casing and cementing data relative to the plugging operations:

Diameter (inches)	Casing Left in Well	
	From (feet)	To (feet)
6 5/8"	0	358'

Cement Plug(s) Placed in Well		Sack(s) of cement used
From (feet)	To (feet)	
0	358'	172



D. Validation of Information Included in Form

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

Company or Individual's Name T L Myers Co. (Type or Print)

Address 2403 F Hwy 31 (Street or RFD) Kilgore (City) Texas (State) 75663 (Zip)

(Signed) _____ (Person performing plugging operations) (Signed) _____ (Owner of Well) Director of Public Works

For TWC use only
Well No. _____
Location on map A.92

WWD-009 (Rev. 07/27/88) WELL OWNER'S COPY

Please use black ink. File WHITE COPY with: Texas Water Commission P.O. Box 13087 Austin, Texas 78711 Phone (512) 463-7997	State of Texas **PLUGGING REPORT** (This form must be completed and filed with the TWC within 30 days following the date the well is plugged as required by current statutory law.)	Texas Water Well Drillers Board P.O. Box 13087 Austin, Texas 78711 Phone (512) 463-7997

A. Well Identification and Location Data

1) Owner City of Stephenville (Name) Address 354 N Bel Knap (Street or RFD) Stephenville (City) Texas (State) 76401 (Zip)

2) Owner's Well Number Land Fill #2

3) Location of Well: County Erath, 3 miles in West (N.E., S.W., etc.) direction from Stephenville (Town)

Driller or other person performing the plugging operations 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 lines or survey lines: _____

☑ See Attached map.

B. Historical Data on Well To Be Plugged (if available)

4) Driller W. D. Dowell License Number 1268 City Stephenville

5) Drilled 12, 7- 1979; 6) Diameter of hole 6 3/4" inches; 7) Total depth of well 395' feet.

C. Current Plugging Data

8) Date well plugged 9-17, 1990.

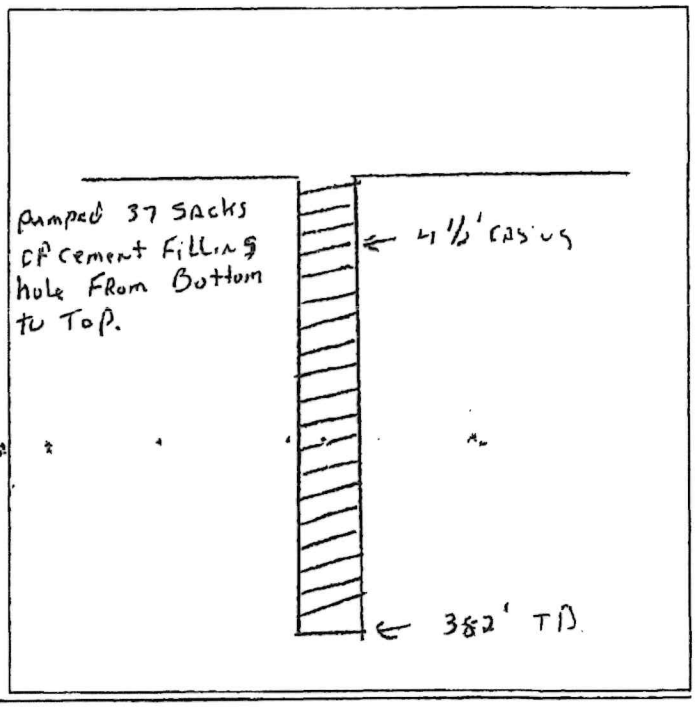
9) Sketch of well: Using space at right, show method of plugging the well including all casing and cemented intervals.

10) Name of Driller or other person actually performing the plugging operations H. D. Hinds 02126-W; if a water well driller plugged the well, give the driller's license no. 02126-W.

11) Casing and cementing data relative to the plugging operations:

Diameter (inches)	Casing Left in Well	
	From (feet)	To (feet)
4 1/2" C.D.	0	382'

Cement Plug(s) Placed in Well		Sack(s) of cement used
From (feet)	To (feet)	
C	382'	37



D. Validation of Information Included in Form

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

Company or Individual's Name J. L. Myers CO. (Type or Print)

Address 2803 E. Hwy 31 (Street or RFD) Kilgore (City) Texas (State) 75663 (Zip)

(Signed) H D Hinds (Person performing plugging operations) (Signed) Thomas L Thomson (Owner of Well) Director of Public Works

For TWC use only
Well No. _____
Location on map A.93

WWD-009 (Rev. 07/27/88) WELL OWNER'S COPY

LOG OF BORING
SOIL AND LINER EVALUATION
STEPHENVILLE SANITARY LANDFILL - PERMIT NO. 664
STEPHENVILLE, ERATH COUNTY, TEXAS

BORING TYPE: Undisturbed & Auger LOCATION: See Plan of Borings BORING NO. B-4

DEPTH (FT.)	SYMBOL	SAMPLES	SOIL DESCRIPTION	BLOWS PER FT.	% PASSING NO. 200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	SHEAR STRENGTH (TONS/SQ. FT.) 0.5 1.0 1.5	UNIT DRY WT. LBS./CU. FT.
			Hard tan & gray silty clay		98	61	27	34	29		
5			-purple -tan & gray -bright tan -soft		95	54	24	30	23		
			(CL-CH)								
		X	Dense tan & light gray silty fine sand, Shelby tube refusal (SM)	50 for 3"							
10			Hard tan & gray silty clay (CL-CH)								
			Dense gray silty fine sand								
15		X	(SM)	50 for 5"							
			Note: Dry at completion. Boring was grouted upon completion.								
20											
25											
30											
35											

COMPLETION DEPTH: 15.5' DEPTH TO WATER:
DATE: 2/14/90 DATE:

LOG OF BORING
SOIL AND LINER EVALUATION
STEPHENVILLE SANITARY LANDFILL - PERMIT NO. 664
STEPHENVILLE, ERATH COUNTY, TEXAS

BORING TYPE: LOCATION: See Plan of Borings BORING NO. B-9

DEPTH (FT.)	SYMBOL	SAMPLES	SOIL DESCRIPTION	BLOWS PER FT.	% PASSING NO. 200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	SHEAR STRENGTH (TONS/SQ. FT.) 0.5 1.0 1.5	UNIT DRY WT. LBS./CU. FT.
5			Very stiff to hard tan silty clay w/occ. gray inclusions -w/occ. sandy laminations (CL-CH)								
10			Very stiff to hard gray silty clay w/occ. calcareous nodules -sandstone laminations 2" or 3" -sandstone lamination (CL-CH)	34							
			Very stiff to hard red & purple silty clay (CL-CH)								
15			Dense to very dense tan to gray silty fine sand, cemented -water at 14.0' (SM)	50 for 2"							
20			Note: Water at 13' 10" upon completion. Boring was grouted upon completion.								
25											
30											
35											

COMPLETION DEPTH: 14.5' DEPTH TO WATER:
DATE: 2/14/90 DATE:

SOIL BOREHOLE LOG

Copy

SITE NAME AND LOCATION	DRILLING METHOD: 4.0" O.D. Flight Augers	BORING NO. B-1
GEOTECHNICAL EVALUATION STEPHENVILLE SANITARY LANDFILL PERMIT NO. 664 STEPHENVILLE, ERATH COUNTY, TEXAS	SAMPLING METHOD: Undisturbed/Disturbed	SHEET 1 OF 2

WATER LEVEL	Dry			
TIME	12:20			
DATE	12-1-94			
CASED DEPTH				

DRILLING	
START	FINISH
TIME 10:55	TIME 12:15
DATE 12-1-94	DATE 12-1-94

DATUM MSL ELEVATION 1467.2

LAT/LONG OR COORDINATES See Plan of Borings

SURFACE CONDITIONS Dry

DRILL RIG CME 45

ANGLE Vertical BEARING

DRILLING CONTR. TEAM Consultants, Inc.

DRILLER Bill Maguire #02789M

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN. ON SAMPLER (% RECOVERY)	SYMBOL	SAMPLE	DESCRIPTION OF MATERIALS	% RECOVERY	RQD	% PASSING #200 SIEVE	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	UNIT DRY WEIGHT (pcf)	POCKET PENETROMETER
0.0				Very light gray clay with occasional iron stains								4.5+
5.0												4.5+
				- with occasional calcareous nodules								4.5+
10.0												
				- light gray and tan with occasional calcite crystals								4.5+
15.0				- bluish gray								
				- light gray and purple with occasional calcareous nodules								

LOGGED BY R.H.

CHECKED BY W.S.

A.96

SOIL BOREHOLE LOG

Copy

SITE NAME AND LOCATION	GEOTECHNICAL EVALUATION STEPHENVILLE SANITARY LANDFILL PERMIT NO. 864 STEPHENVILLE, ERATH COUNTY, TEXAS
DRILLING METHOD:	4.0" O.D. Flight Augers
SAMPLING METHOD:	Undisturbed/Disturbed
BORING NO.	B-3
SHEET	1 OF 2
DATUM	MSL
ELEVATION	1463.2
LANDFILL GRID COORDINATES	See Plan of Borings
SURFACE CONDITIONS	Dry
DRILL RIG	CME 45
ANGLE	Vertical

WATER LEVEL	Dry			
TIME	15:05			
DATE	12-1-94			
CAVED DEPTH				

DRILLING	START	FINISH
TIME	13:40	15:00
DATE	12-1-94	12-1-94

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER (% RECOVERY)	SYMBOL	SAMPLES	DESCRIPTION OF MATERIALS	% RECOVERY	RQD	% PASSING #200 SIEVE	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	UNIT DRY WEIGHT (pcf)	POCKET PENETROMETER
0.0				Very stiff brown silty clay with occasional calcareous nodules and roots								2.25
				- light tan								
5.0				- very stiff to hard, light tan with occasional calcareous nodules			87.5		51	14		2.75 / 4.5+
8.0				Hard light gray clay with occasional iron stains								
10.0												4.5+
				- purple and light gray								
15.0												4.5+

LOGGED BY R.B.

CHECKED BY W.P.

CITY OF STEPHENVILLE LANDFILL
ERATH COUNTY, TEXAS
TCEQ PERMIT NO. MSW 664

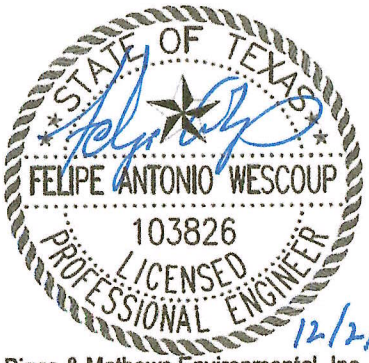
LIMITED SCOPE PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
ATTACHMENT 8
COST ESTIMATE FOR CLOSURE AND POST CLOSURE CARE

Prepared for

CITY OF STEPHENVILLE

March 2023
Revised August 2023
Revised December 2024



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-256

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

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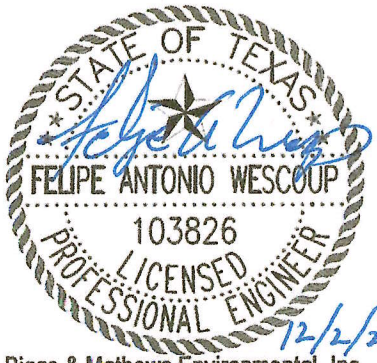


Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Table 8-1
Closure Cost Estimate

No.	ITEM		COST
1.0	**Engineering Costs**		
1.1	Topographic Survey	$	4,858.00
1.2	Boundary Survey	$	3,470.00
1.3	Site Evaluation	$	3,470.00
1.4	Development of Plans	$	14,574.00
1.5	Administration	$	13,880.00
1.6	Closure Inspection and Testing	$	29,148.00
1.7	Permit Compliance Package	$	6,940.00
	Engineering Total	$	76,340.00
2.0	**Construction Costs**		
2.1	Final Cover System		
2.1.1	Infiltration Layer	$	206,465.00
2.1.2	Erosion Layer	$	60,725.00
2.2	Vegetation	$	38,864.00
2.3	Site Grading and Drainage	$	24,290.00
2.4	Site Fencing and Security	-	
2.5	Landfill Gas Probe Installation	$	65,000.00
	Construction Total	$	395,344.00
	Engineering and Construction Total	$	471,684.00
	10 % Contingency	$	47,168.40
3.0	**Administrative Costs**		
3.1	Contract Performance Bond	$	9,433.68
3.2	TCEQ Contract Administration/Legal Fees	$	4,716.84
	Total	$	533,002.92

Table 8-2
Postclosure Care Cost Estimate

No.	ITEM	ANNUAL COST	
1.0	Engineering Costs	$	6,754.85
2.0	Construction / Maintenance Costs	$	11,364.25
	Subtotal	$	18,119.10
	10% Contingency	$	2,351.91
3.0	Administration	$	2,351.91
	Annual Postclosure Costs	**$**	**22,822.92**
	Total Postclosure Costs	**$**	**141,114.60**

CITY OF STEPHENVILLE LANDFILL

APPENDIX 8-1
CLOSURE COST ESTIMATE CALCULATIONS

Includes pages 8-1-1 through 8-1-4

City of Stephenville Landfill
CLOSURE COST ESTIMATE

Required: Estimate the cost to hire a third party to conduct final closure activities.

References:
1 Texas Natural Resources Conservation Commission, *Cost Estimate Handbook for Closure and Postclosure Care*, Version 1, August 1993.
2 *2012 RS Means Heavy Construction Cost Data, 26th Annual Edition.*
3 Construction costs from recent similar construction projects and cost estimates from heavy construction contractors.

Solution:

Final closure will require construction of final cover over	17.50 acres
Final closure will require closure of	100.00 acres
Final closure will require installation of LFG probes	13.00 ea

No.	ITEM	QTY	UNIT	UNIT COST	TOTAL COST
1.0	**Engineering Costs**				
1.1	Topographic Survey	100.00	ac	$ 48.58	$ 4,858.00
1.2	Boundary Survey	100.00	ac	$ 34.70	$ 3,470.00
1.3	Site Evaluation	100.00	ac	$ 34.70	$ 3,470.00
1.4	Development of Plans	17.50	ac	$ 832.80	$ 14,574.00
1.5	Administration	1	LS	$ 13,880.00	$ 13,880.00
1.6	Closure Inspection and Testing	17.50	ac	$ 1,665.60	$ 29,148.00
1.7	Permit Compliance Package	1	LS	$ 6,940.00	$ 6,940.00
	Engineering Total				$ 76,340.00
2.0	**Construction Costs**				
2.1	Final Cover System				
2.1.1	Infiltration Layer	17.50	ac	$ 11,798.00	$ 206,465.00
2.1.2	Erosion Layer	17.50	ac	$ 3,470.00	$ 60,725.00
2.2	Vegetation	17.50	ac	$ 2,220.80	$ 38,864.00
2.3	Site Grading and Drainage	17.50	ac	$ 1,388.00	$ 24,290.00
2.4	Site Fencing and Security	-	ac	-	-
2.5	Landfill Gas Probe Installation	13	ea	$ 5,000.00	$ 65,000.00
	Construction Total				$ 395,344.00
	Engineering and Construction Total				$ 471,684.00
	Contingency	10	%		$ 47,168.40
3.0	**Administrative Costs**				
3.1	Contract Performance Bond	2.0	%		$ 9,433.68
3.2	TCEQ Contract Administration/Legal Fees	1.0	%		$ 4,716.84
	Total				$ 533,002.92

***This closure cost estimate was developed in 2023 dollars.**

CITY OF STEPHENVILLE LANDFILL

APPENDIX 8-2
POSTCLOSURE CARE COST ESTIMATE CALCULATIONS

Includes pages 8-2-1 through 8-2-2

City of Stephenville Landfill
POSTCLOSURE COST ESTIMATE

Required: Estimate the cost to hire a third party to conduct postclosure care activities.

References: 1. Texas Natural Resources Conservation Commission, *Cost Estimate Handbook for Closure and Postclosure Care*, Version 1, August 1993.

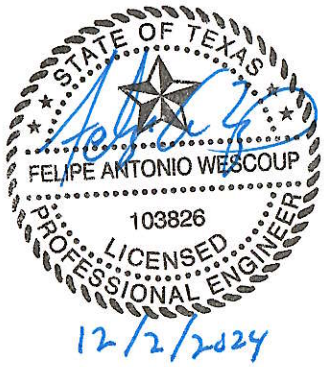
Solution:

Postclosure care period =	5 years
Permit area =	100 acres
Waste footprint[1] =	65.5 acres
Number of gas probes	13 probes

No.	ITEM	ANNUAL QTY	UNIT	UNIT COST	TOTAL COST
1.0	**Engineering Costs**				
1.1	Postclosure Plan	1	LS	$ 694.00	$ 694.00
1.2	Site Inspections	100	ac	$ 13.88	$ 1,388.00
1.3	Correctional Plans and Specifications	65.5	ac	$ 34.70	$ 2,272.85
1.4	Site Monitoring	52	event	$ 150.00	$ 7,800.00
2.0	**Construction / Maintenance Costs**	65.5	ac	$ 173.50	$ 11,364.25
	Subtotal				$ 23,519.10
	Contingency	10	%		$ 2,351.91
3.0	**Administration**	10	%		$ 2,351.91
	Annual Postclosure Cost				$ 28,222.92
	Total Postclosure Cost				**$ 141,114.60**

***This postclosure cost estimate was developed in 2023 dollars.**

[1]The waste footprint includes the largest area requiring final cover of 17.5 acres and in-place final cover of 48 acres totalling 65.5 acres.



CITY OF STEPHENVILLE LANDFILL
ERATH COUNTY, TEXAS
TCEQ PERMIT NO. MSW 664

LIMITED SCOPE PERMIT AMENDMENT APPLICATION

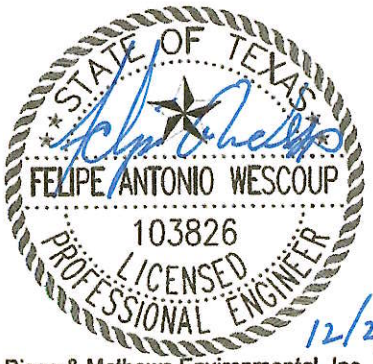
PART III – SITE DEVELOPMENT PLAN
ATTACHMENT 12 – FINAL CLOSURE PLAN

APPENDIX 12-4
FINAL COVER QUALITY CONTROL PLAN

Prepared for

CITY OF STEPHENVILLE

March 2023
Revised August 2023
Revised December 2024



12/2/2024

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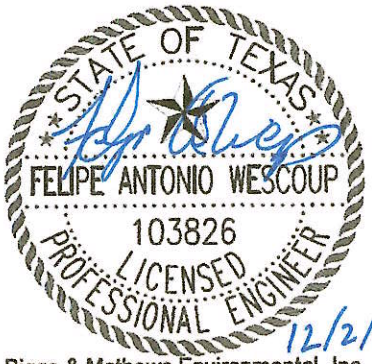

12/2/2024

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256
30 TAC §330.453

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Table 12-4-4
City of Stephenville Landfill
Infiltration Layer Material Construction Tests

Test	Standard	Frequency[1]
Field Density	ASTM D 2922	1/8,000 sf per 6-inch lift
Atterberg Limits	ASTM D 4318	1/100,000 sf per 6-inch lift
Percent Passing No. 200 Mesh Sieve	ASTM D 1140	1/100,000 sf per 6-inch lift
Standard Proctor Test	ASTM D 698	1 per material type
Coefficient of Permeability	ASTM D 5084 or COE EM 1110-2-1906 Appendix VII	1 per acre (evenly distributed through all lifts)

[1] A minimum of one test must be performed for each lift regardless of surface area.

The Atterberg limits of the in-place infiltration layer must be compared to the Atterberg limits of the Proctor curve sample to assure that the Proctor curve represents the in-place material. Any variance of more than 10 points between the liquid limit or plasticity index of the in-place soil and those of the Proctor curve sample will require that a new Proctor curve be developed. Permeability testing will be performed on undisturbed samples from the infiltration layer as described in Section 3.8.1 and all test data will be reported.

3.8.3 Thickness Verification

The as-built thickness of the infiltration layer shall be determined by standard survey methods. Prior to the placement of infiltration layer material, the subgrade elevations will be determined at a minimum rate of one survey point per 5,000 square feet of lined area. After the infiltration layer is completed, the top of infiltration layer elevations will be determined at the same locations as the subgrade elevations. Settlement plates may be utilized to verify infiltration layer thickness.

4 EROSION LAYER

30 TAC §330.453

4.1 General

The erosion layer consists of a 6-inch-thick layer of soil capable of sustaining native plant growth. The CQA monitor shall provide continuous on-site observation during erosion layer placement to assure that erosion layer placement does not damage the underlying infiltration layer. The GP shall make sufficient site visits during erosion layer placement to document the construction activities and thickness verification in the Final Cover Evaluation Report.

4.2 Materials

Erosion layer material shall consist of soil that is free from debris, rubbish, frozen materials, foreign objects, and organic material, or any material that could damage the underlying infiltration layer. The required erosion layer material properties are summarized in the table below.

Table 4-5
Sprint Fort Bend County Landfill
Erosion Layer Material Properties

Test	Standard	Required Property
Plasticity Index	ASTM D 4318	15 or greater
Liquid Limit	ASTM D 4318	30 or greater
Percent Passing No. 200 Mesh Sieve	ASTM D 1140	30 or greater

4.3 Preparation

Prior to placing the erosion layer material, the top of infiltration layer elevations shall be verified in accordance with the requirements of Section 3.8.3 and all testing on the underlying infiltration layer shall be completed.

4.4 Placement

The erosion layer shall be placed in a manner that minimizes the potential to damage the underlying infiltration layer. The erosion layer shall be dumped from the haul road and spread by low ground pressure equipment in a manner that prevents ruts in the infiltration layer.