130 ENVIRONMENTAL PARK
CALDWELL COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2383

TYPE I PERMIT APPLICATION

VOLUME 3 OF 5

Prepared for

130 ENVIRONMENTAL PARK, LLC

Technically Complete October 28, 2014

Biggs & Mathews, Inc.
Firm Registration No. F-834

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

And

BIGGS & MATHEWS, INC.
2500 Brook Avenue • Wichita Falls, Texas 76301 • 940-766-0156

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-834

130 ENVIRONMENTAL PARK
CALDWELL COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2383

TYPE I PERMIT APPLICATION

VOLUME 3 OF 5

CONTENTS

11/6/14

Biggs & Mathews, Inc.
Firm Registration No. F-834

130 ENVIRONMENTAL PARK
CALDWELL COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2383

TYPE I PERMIT APPLICATION

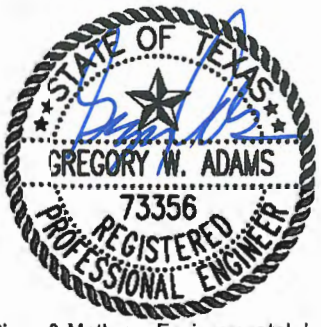
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D
WASTE MANAGEMENT UNIT DESIGN

Prepared for

130 ENVIRONMENTAL PARK, LLC

Technically Complete October 28, 2014



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

11/6/2014

Prepared by

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

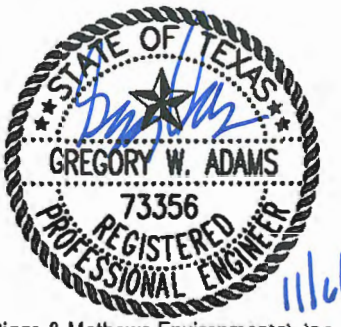
TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-256

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

And

BIGGS & MATHEWS, INC.
2500 Brook Avenue • Wichita Falls, Texas 76301 • 940-766-0156

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-834



11/6/2014

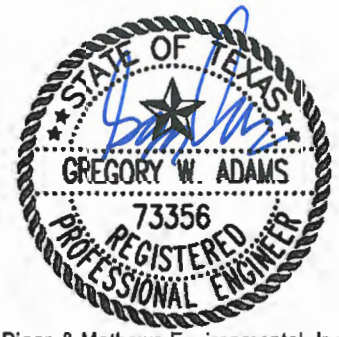
Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

CONTENTS

30 TAC §330.63(d)

TABLES AND FIGURES

Tables



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

11/6/2014

1 WASTE MANAGEMENT UNIT DESIGN

30 TAC §330.63(d)

The 130 Environmental Park facility boundary will encompass about 520 acres of the approximately 1,229-acre property. The landfill facility will be accessed from northbound US Highway 183 through an entrance road. A gatehouse and scales will be provided within the facility boundary along with a maintenance area, large item storage area, reusable materials staging area, citizen convenience center, used/scrap tire storage area, wood waste processing area, leachate storage facility, and truck wheel wash.

The landfill footprint will cover approximately 202 acres and have a disposal capacity of approximately 33.1 million cubic yards which will provide about 44 years of site life. The landfill method will be below-grade fill with 4H:1V liner sidewall slopes and aerial fill with 4H:1V final cover side slopes, with a maximum six percent final cover top slope. The drainage system will be designed to meet or exceed TCEQ and EPA requirements for runon and runoff. The landfill liner, leachate collection, final cover, gas monitoring, and groundwater monitoring systems will be designed to meet the Subtitle D and/or TCEQ requirements, whichever are more stringent.

The following table provides a summary of the proposed permit conditions:

Table D-1
130 Environmental Park
Permit Condition Summary

Description	Proposed Condition
Permitted Area (Site)	520 acres
Landfill Unit Area	202 acres
Buffer/Other Areas	318 acres
Total Permitted Capacity	33.1 million cubic yards
Total Projected Site Life	44 years
Maximum Elevation of Final Cover (msl)	736 feet

2 STORAGE AND TRANSFER UNITS

30 TAC §330.63(d)(1)(A) and (B)

The storage and transfer units will be designed for the rapid processing and minimum detention of solid waste at the facility and will be managed to prevent nuisances and fire hazards. The design of the storage and transfer units will be sufficient to control and contain a worst-case spill or release from the units and the unenclosed areas associated with the units, and will account for precipitation from the 25-year, 24-hour rainfall event. The storage and transfer units will include the large item storage area, reusable materials staging area, citizen's convenience center, used/scrap tire storage area, wood waste processing area, leachate storage facility, and truck wheel wash.

2.1 Large Item Storage Area

A storage area for large items and white goods may be provided near the working face, or may be provided near the citizen's convenience center. Large items and white goods include ovens, dishwashers, freezers, air conditioners, scrap metal and other large items. Typically, large items and white goods are received in source-separated loads. Should large items or white goods be received in mixed loads, they will be removed from the active face and staged on the ground near the working face, or citizen's convenience center. The large items and white goods are unloaded and then transferred into steel roll-off containers for storing until transport to an off-site recycler. The roll-off containers will be covered with tarps to prevent rainfall from accumulating inside the containers and to prevent generation of contaminated water. The elimination of contaminated water within the roll-off containers will limit the potential for generating odors within the area. These items may be recycled to prevent a nuisance and to preclude discharge, but will not be stored in excess of 180 days. Large items that are not recycled will be disposed of at the working face.

The large item storage area, when located within the landfill footprint will be placed only over areas that have received intermediate cover. Surface water runoff will be diverted around the storage area. Surface water from the large item storage area will be contained by containment and diversion berms consistent with Part III, Attachment D6 – Leachate and Contaminated Water Plan.

2.2 Reusable Materials Staging Area

Inert materials such as brick, concrete, etc., and non-inert materials (asphalt pavement and asphalt concrete) may be stockpiled for use on access roads and staging areas or for erosion control in drainage structures. Asphalt pavement will not be used for erosion control in drainage structures. The reusable materials staging area will be located within the landfill footprint and will be relocated periodically as the working face moves. The size of the stockpiles may vary depending on the amount of materials received at any given time. Since the brick and concrete materials are inert, runon and runoff from rainfall will not be controlled in a special manner and odor control measures are not required for these materials. Since asphalt pavement or asphaltic concrete is not an inert

material, it will be managed in a manner that will prevent runoff of contaminated water, discharge of waste, or the creation of nuisance conditions. Asphalt pavement and asphalt concrete stockpiles will be located in areas that provide positive drainage away from the stockpile and containment berms will be constructed to contain runoff from the 25-year, 24-hour rainfall event. Containment berm calculations are provided in Attachment D6, Appendix D6-C. Since these inert and non-inert materials will continuously be reused for site operations, there is no time limit on the storage of these materials.

2.3 Citizen's Convenience Center

A citizen's convenience center for waste drop-off will be located within the site entrance facilities, as shown on Drawing D1.2. Either thirty or forty cubic yard roll-off containers, as well as containers for recycled goods, may be provided. Roll-off containers will be emptied at the active working face at the end of each day. The containers will also be covered with tarps to prevent rainfall from accumulating inside the containers and to prevent generation of contaminated waters. The elimination of contaminated water within the roll-off containers will minimize the potential for generating odors within the area. Recycle containers will periodically be transported to an appropriate recycling facility. Large items and white goods may be stored at the citizen's convenience center in steel roll-off containers and will be periodically transported to an appropriate recycling facility.

2.4 Used/Scrap Tire Storage Area

130 Environmental Park will not intentionally or knowingly accept whole used or scrap tires for disposal unless processed prior to disposal in a manner acceptable to the executive director. Scrap tires will be accepted from the public or from community clean-up efforts and stored in containers or trailers prior to shipment. Scrap tires identified during landfill operations or generated through routine maintenance will be stored on-site in containers or trailers prior to shipment. The total quantity of tires stored on-site will not exceed 500 (or weight equivalent tire pieces) on the ground, or 2,000 in containers. Tire containers will be kept within the facility boundary, typically near the working face, or citizen's convenience center. Manifests will be used for shipment of scrap tires offsite.

2.5 Wood Waste Processing Area

The wood waste processing area will be located within the landfill footprint and will process incoming yard trimmings, clean wood materials and vegetative materials, including trees and brush, into wood chips and mulch. The wood chips and mulch will only be used on-site and will be stored in the processing area for a maximum time of 60 days. The wood chips and mulch will be stored in small piles and will be managed to prevent fire, safety, or health hazards in accordance with 30 TAC §330.209(a). The wood waste processing area will not be larger than approximately 125 feet by 100 feet.

2.6 Leachate Storage Facility

Primary leachate storage will be provided by the leachate sumps, which will be located within each landfill cell. Leachate and landfill gas condensate will be pumped from the sumps directly into transport trucks or through a dual contained leachate forcemain to

the leachate storage facility. The leachate storage facility will be located near the maintenance shop as shown on Drawing D1.2 to allow access for transport trucks. The storage facility will consist of up to two 250,000-gallon storage tanks within a secondary containment structure, which will be installed individually as needed based on leachate generation. The secondary containment structure will provide containment, with 12 inches of freeboard, for volume from one leachate storage tank and precipitation from the 25-year, 24-hour storm event or 110 percent of the volume from one leachate storage tank. Secondary containment volume calculations are provided in Attachment D6, Section 2.3 – Leachate Storage and Appendix D6-D.

2.7 Truck Wheel Wash

The truck wheel wash will be located near the scalehouse, as shown on Drawing D1.2. The wheel wash is a drive through structure with a series of metal grates and water nozzles. As vehicles drive across the grates, the nozzles spray the undercarriage and sides with water, and the mud drops through the grates into a settling basin. The accumulated mud will be periodically removed from a settling basin and placed in the active working face. The periodic removal of mud and contaminated water will provide odor controls for the truck wheel wash. The water removed from the system will be treated as contaminated water in accordance with Attachment D6 – Leachate and Contaminated Water Plan.

3 LANDFILL UNITS

30 TAC §330.63(d)(4)

The landfill unit design includes all weather operation, landfilling methods, landfill design parameters, site life projection, landfill cross sections, and the liner and final cover quality control plans.

3.1 All Weather Operation

30 TAC §330.63(d)(4)(A)

The landfill access roads will be constructed of crushed stone, gravel, concrete rubble, masonry rubble, wood chips, or other similar materials to provide access to the disposal area during all weather conditions. To enhance operating efficiency during wet weather, a disposal area close to the all weather roads may be reserved for wet weather operations. The wet weather area will move as operations progress.

Site personnel will maintain the access roads for all weather access. Stockpiles of crushed stone, gravel, concrete rubble, masonry rubble, wood chips or other similar material will be available for use in maintaining passable access roads. Grading equipment or other appropriate equipment will be used as necessary to control or remove mud from the access roads and the entrance road.

Tracking of mud onto public roads will be minimized by the all weather surfaces of the access roads and the entrance road. The almost two-mile long entrance and access road will be a 40-foot-wide concrete or asphalt paved road and will provide mud control for waste hauling vehicles prior to exiting the site and returning to public roads. Additional mud control will be provided by speed bumps and a truck wheel wash.

3.2 Landfilling Methods

30 TAC §330.63(d)(4)(B)

The development method for the landfill will be a combination of area-excavation fill followed by aerial fill to the proposed landfill completion height. Final cover placement will generally follow the sequence of development as shown in Part II, Appendix IIA – Maps and Drawings, and will be ongoing as the site is developed. Completed areas will be closed according to the closure plan provided in Part III, Attachment H – Closure Plan.

3.3 Landfill Design Parameters

30 TAC §330.63(d)(4)(C)

The 520 permitted acres will include 202 acres for waste disposal and 318 acres of buffer and other non-fill areas. The elevation of deepest excavation will be 501.9 feet msl and the maximum elevation of final cover will be 736 feet msl. The maximum elevation of disposed waste will be 731.5 feet msl.

Excavation sideslopes will not exceed 4H:IV and waste sideslopes will not exceed 4H:IV. Final cover topslopes will have a six percent slope. Excavation and final completion plans are presented on Attachment D1, Drawings D1.6 and D1.7.

3.4 Site Life Projection

30 TAC §330.63(d)(4)(D)

The total volume available for waste disposal will be approximately 33.1 million cubic yards (waste and daily cover), which will provide an estimated 44 years of site life. Calculations and assumptions for the waste volume and site life estimate are included in Attachment D4 – Site Life.

3.5 Landfill Cross Sections

30 TAC §330.63(d)(4)(E) and (F)

Cross sections of the landfill unit are provided in Attachment D2 – Cross Sections. The section locations were selected to represent the conditions across the entire site. These sections show the top of the proposed fill (top of the final cover), maximum elevation of the proposed fill, top of the wastes, existing ground, bottom of the excavations, side slopes of excavations, gas vents, groundwater monitoring wells, and the initial and static levels of any water encountered. Groundwater was not observed during drilling, but groundwater levels observed in the piezometers after the completion of drilling operations have been included on the sections. Soil borings, monitoring wells, and gas monitoring probes near the sections have been projected onto the sections. The typical construction detail of the perimeter berm is also included in Attachment D2.

3.6 Liner Quality Control Plan

30 TAC §330.63(d)(4)(G)

The quality control plan for the liner system is provided in Attachment D7 – Liner Quality Control Plan. The components of the liner system are listed from top to bottom in Table D-2. Details of the liner system are provided in Attachment D3 – Construction Design Details.

Table D-2
130 Environmental Park
Components of the Liner System

SUBTITLE D LINER (Top to Bottom)		
Liner System Component	**Description**	**Thickness**
Protective Cover	General earthfill	24 inches minimum
Leachate Collection Layer	Double-sided geocomposite	275 mil nominal
Geomembrane Liner	Textured HDPE geomembrane	60 mil nominal
Compacted Soil Liner	Compacted soil with a permeability less than or equal to $1x10^{-7}$ cm/sec	24 inches minimum

3.7 Final Cover Quality Control Plan

30 TAC §330.457

The quality control plan for the final cover system is provided in Attachment D8 – Final Cover Quality Control Plan. Details of the final cover system are provided in Attachment D3 – Construction Design Details. The components of the final cover system are listed from top to bottom in Table D-3.

Table D-3
130 Environmental Park
Components of the Final Cover System

SUBTITLE D FINAL COVER (Top to Bottom)		
Cover System Component	**Description**	**Thickness**
Erosion Layer	Soil that is capable of sustaining native plant growth	24 inches minimum
Drainage Layer (Sideslope only)	Double-sided geocomposite	200 mil nominal
Cushion Layer (Topslope only)	Nonwoven geotextile	6 oz/sy nominal
Flexible Membrane Cover	Textured LLDPE geomembrane	40 mil nominal
Infiltration Layer	Compacted soil with a permeability less than or equal to $1x10^{-5}$ cm/sec	18 inches minimum

130 ENVIRONMENTAL PARK
CALDWELL COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2383

TYPE I PERMIT APPLICATION

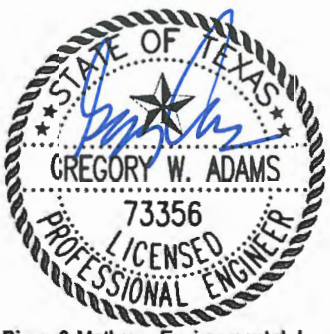
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D1
SITE LAYOUT PLANS

Prepared for

130 ENVIRONMENTAL PARK, LLC

Technically Complete October 28, 2014



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256
11/6/2014

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

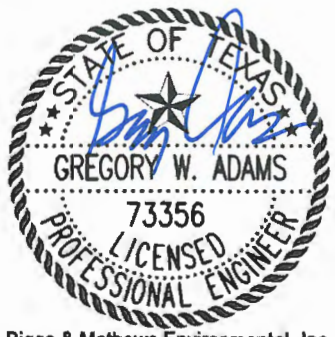
And

BIGGS & MATHEWS, INC.
2500 Brook Avenue • Wichita Falls, Texas 76301 • 940-766-0156

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-834

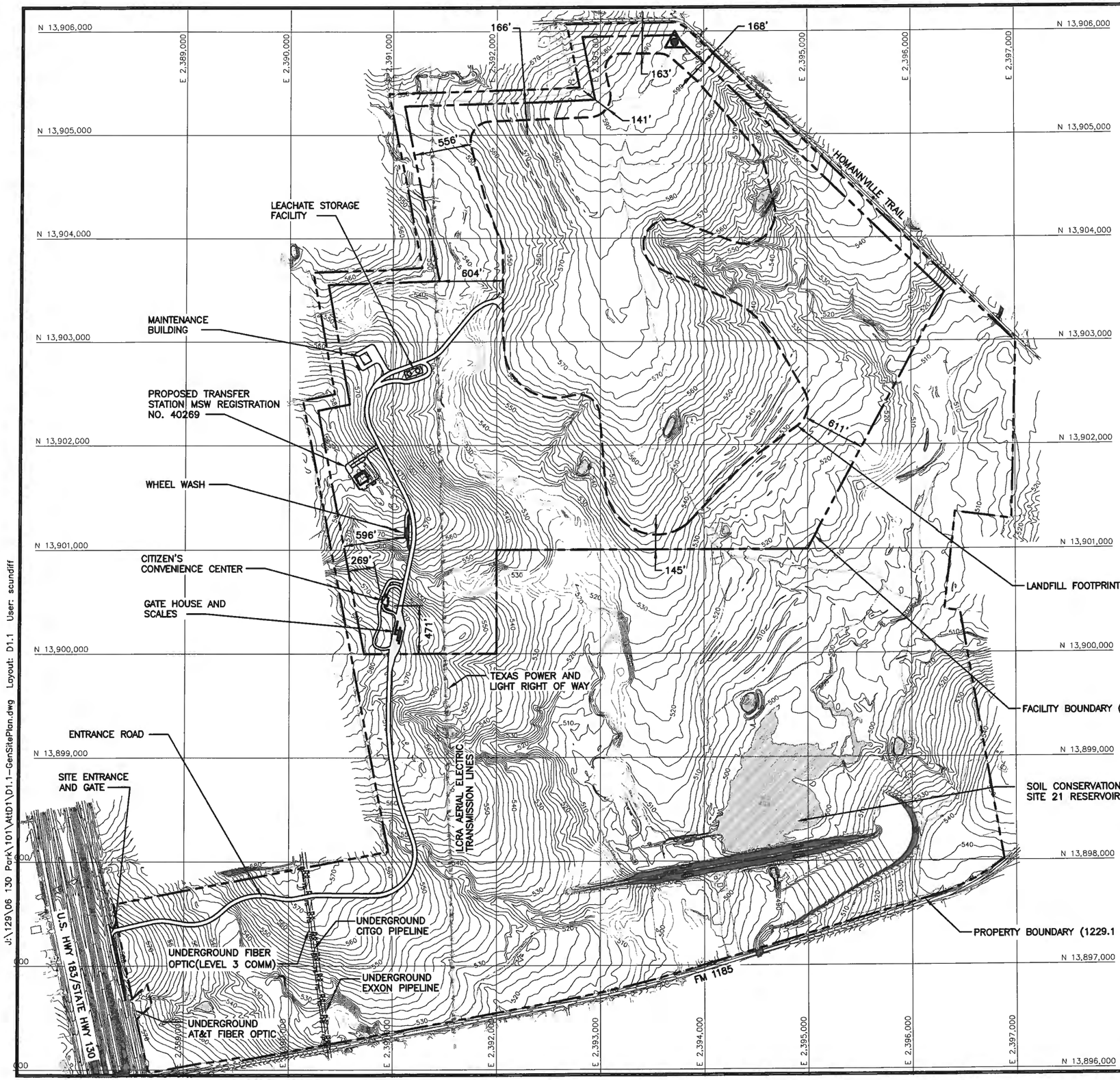
CONTENTS

30 TAC §330.63(d)



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

11/6/2014



J:\129_06 130 Park\101\AtD1\D1.1-GenSitePlan.dwg Layout: D1.1 User: scundiff

0 500 1000
SCALE IN FEET

LEGEND

- PROPERTY BOUNDARY
- FACILITY BOUNDARY
- LANDFILL FOOTPRINT
- SITE BENCHMARK
- 510 EXISTING 2' CONTOUR
- N 13,904,000 STATE PLANE GRID

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SERVICE FROM AERIAL PHOTOGRAPHY FLOWN MAY 13, 2013. HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83). ELEVATIONS ARE RELATIVE TO NAVD88 – GEOID 12A.
2. PROPERTY BOUNDARY, FACILITY BOUNDARY, EASEMENT LOCATIONS, AND PERMANENT BENCHMARK PROVIDED BY HODDE & HODDE LAND SURVEYING, INC.
3. PERMANENT BENCHMARK INFORMATION:
   COORDINATES (NAD 83): N 13905896.44, E 2393722.33
   LATITUDE: N 29°58'43.75"
   LONGITUDE: W 97°39'24.76"
   ELEVATION: 592.37 FT–MSL
4. ACCESS CONTROL WILL BE PROVIDED BY FENCE ALONG FACILITY BOUNDARY. SITE ENTRANCE WILL BE GATED.
5. REFER TO DRAWING D1.2 FOR ENTRANCE FACILITIES AND STORAGE AND TRANSFER UNITS.
6. REFER TO DRAWING D1.3 FOR LANDFILL UNITS.
7. REFER TO DRAWING D1.4 FOR ENTRANCE ROAD AND ACCESS ROADS.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11-6-2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

GENERAL SITE PLAN

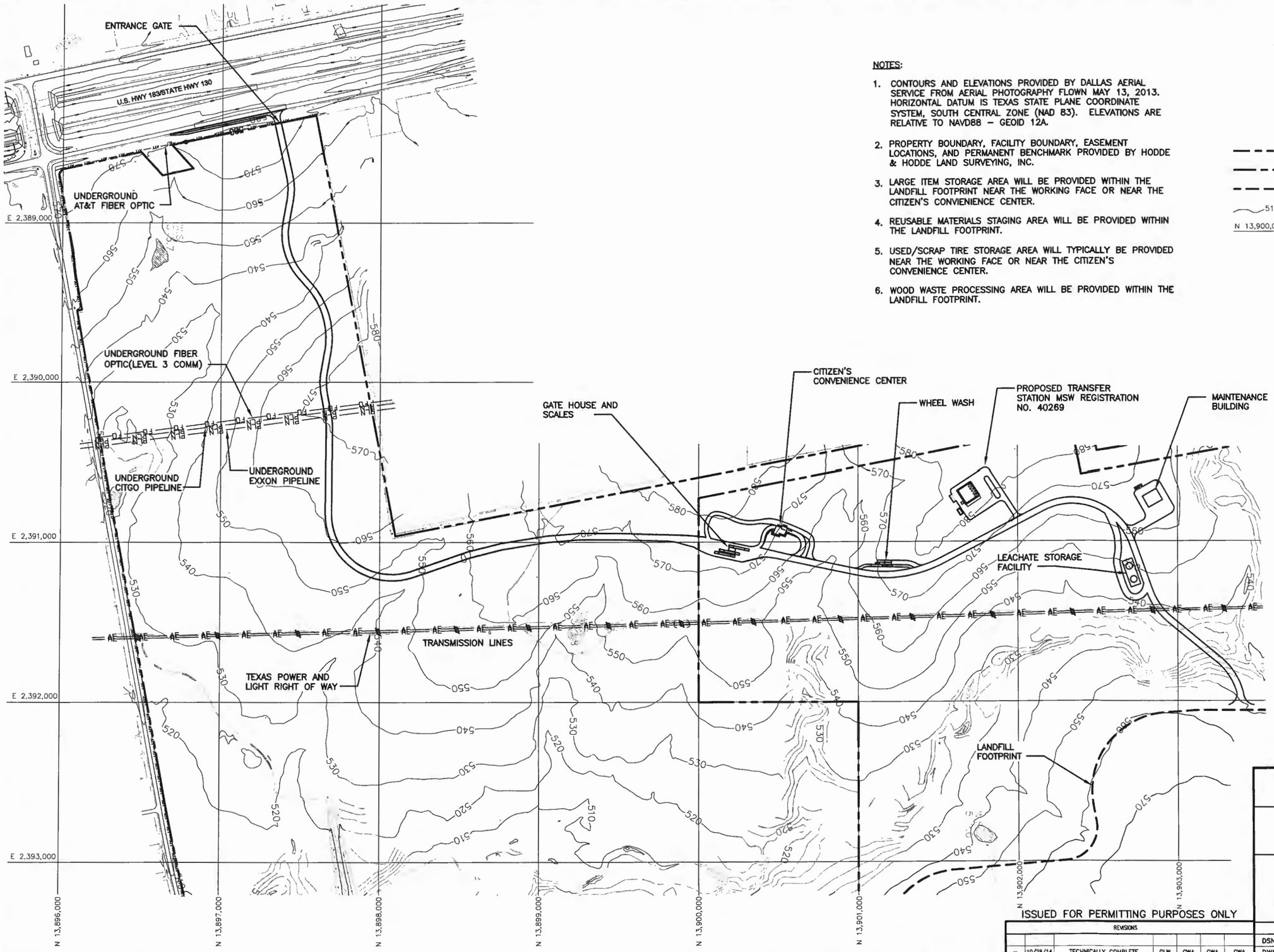
130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817–563–1144

TBPE FIRM NO. F–256 | TBPG FIRM NO. 50222

DSN. GWA | DATE : 10/13
DWN. GLW | SCALE : GRAPHIC
CHK. GWA | DWG : D1.1–GenSitePlan.dwg

DRAWING D1.1



NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SERVICE FROM AERIAL PHOTOGRAPHY FLOWN MAY 13, 2013. HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83). ELEVATIONS ARE RELATIVE TO NAVD88 – GEOID 12A.
2. PROPERTY BOUNDARY, FACILITY BOUNDARY, EASEMENT LOCATIONS, AND PERMANENT BENCHMARK PROVIDED BY HODDE & HODDE LAND SURVEYING, INC.
3. LARGE ITEM STORAGE AREA WILL BE PROVIDED WITHIN THE LANDFILL FOOTPRINT NEAR THE WORKING FACE OR NEAR THE CITIZEN'S CONVIENIENCE CENTER.
4. REUSABLE MATERIALS STAGING AREA WILL BE PROVIDED WITHIN THE LANDFILL FOOTPRINT.
5. USED/SCRAP TIRE STORAGE AREA WILL TYPICALLY BE PROVIDED NEAR THE WORKING FACE OR NEAR THE CITIZEN'S CONVENIENCE CENTER.
6. WOOD WASTE PROCESSING AREA WILL BE PROVIDED WITHIN THE LANDFILL FOOTPRINT.

0 300 600
SCALE IN FEET

LEGEND

- PROPERTY BOUNDARY
- FACILITY BOUNDARY
- LANDFILL FOOTPRINT
- 510 EXISTING 10' CONTOUR
- N 13,900,000 STATE PLANE GRID

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11-6-2014

ISSUED FOR PERMITTING PURPOSES ONLY

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

STORAGE AND TRANSFER UNITS PLAN

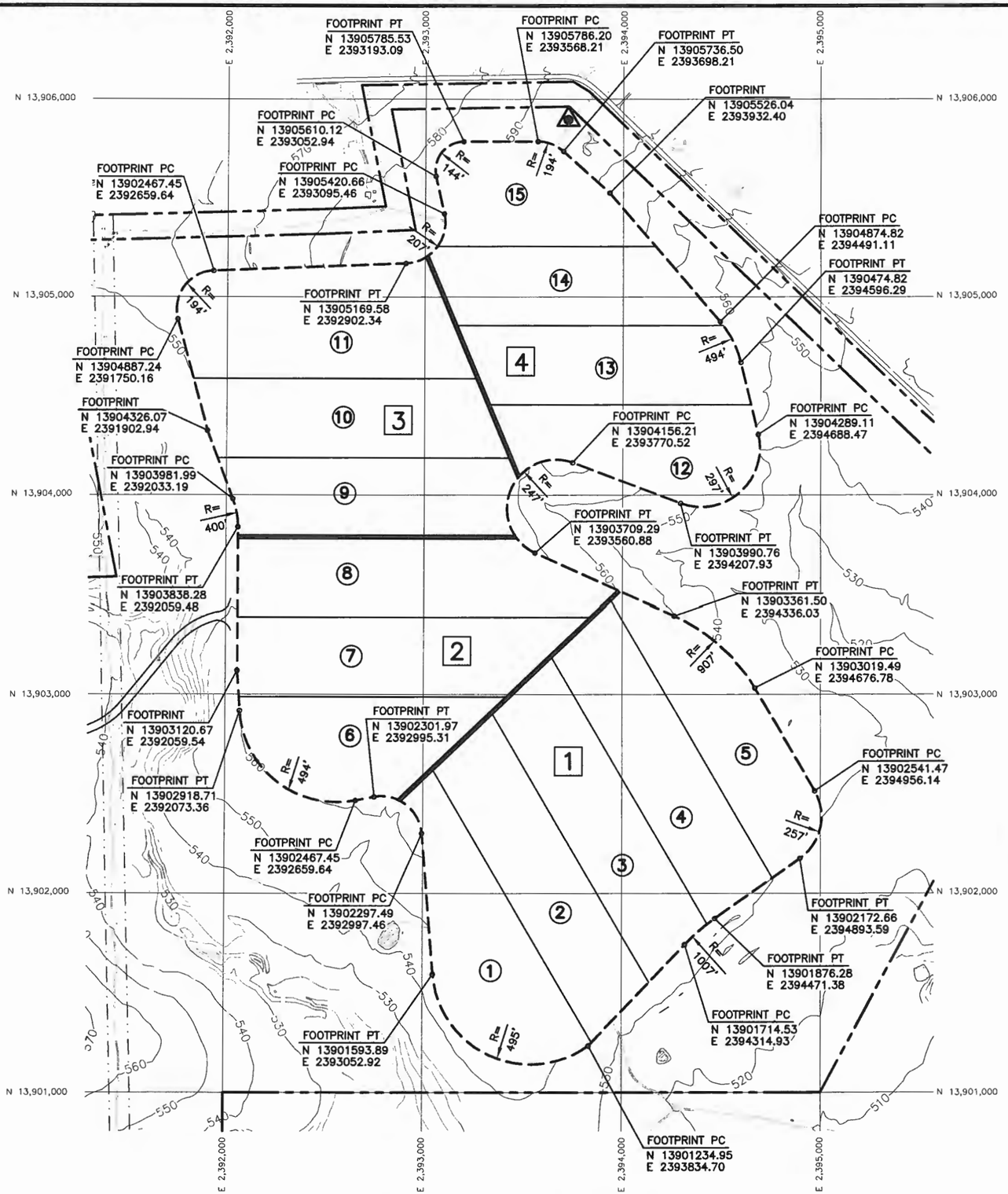
130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD ◆ WICHITA FALLS
817-563-1144

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

DSN. GWA	DATE : 10/13	DRAWING
DWN. GLW	SCALE : GRAPHIC	D1.2
CHK. GWA	DWG : D1.2-StorUnit.dwg	

J:\129\06 130 Park\101\Att01\D1.2-StorUnit.dwg Layout: D1.2 User: scundiff



0 300 600
SCALE IN FEET

LEGEND

- PROPERTY BOUNDARY
- FACILITY BOUNDARY
- LANDFILL FOOTPRINT
- SITE BENCHMARK
- 510 EXISTING 10' CONTOUR
- N 13,904,000 STATE PLANE GRID
- 1 PHASE DESIGNATION
- (1) CELL DESIGNATION

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SERVICE FROM AERIAL PHOTOGRAPHY FLOWN MAY 13, 2013. HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83). ELEVATIONS ARE RELATIVE TO NAVD88 – GEOID 12A.
2. REFER TO DRAWING D1.6 FOR THE EXCAVATION PLAN.
3. REFER TO DRAWING D1.7 FOR THE LANDFILL COMPLETION PLAN.
4. REFER TO ATTACHMENT D2 FOR CROSS SECTIONS.

PHASE	CELL	PLAN AREA AC.
1	1	13.6
	2	14.5
	3	14.2
	4	14.5
	5	13.1
2	6	11.7
	7	14.6
	8	15.0
3	9	13.1
	10	13.5
	11	17.2
4	12	12.1
	13	12.3
	14	12.2
	15	10.6
TOTAL		202.2

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11-6-2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

LANDFILL UNITS PLAN

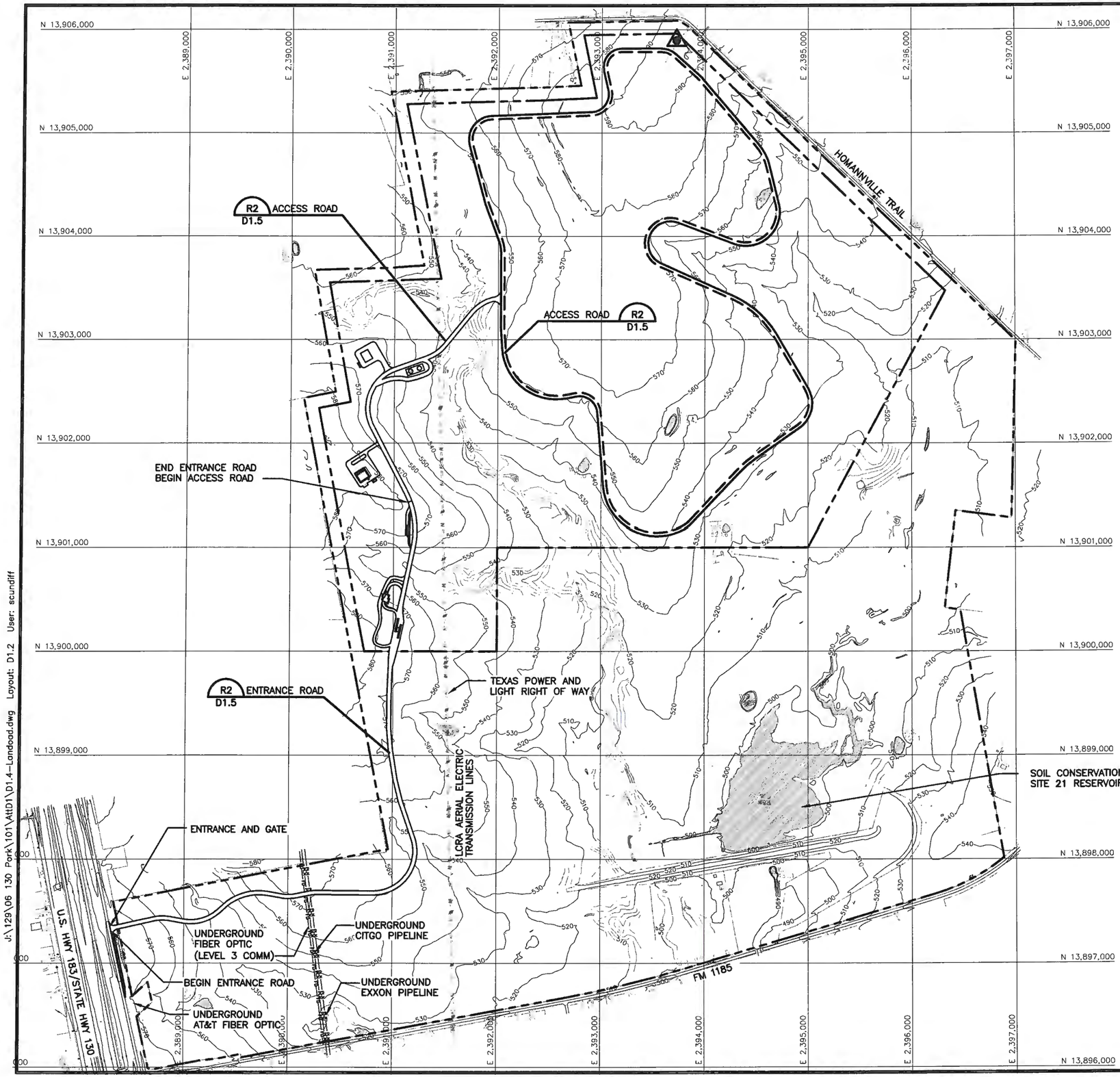
130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA DATE : 10/13
DWN. GLW SCALE : GRAPHIC
CHK. GWA DWG : D1.3–LandfillUnits.dwg

DRAWING D1.3

J:\129\06 130 Park\101\Att D1\D1.3–LandfillUnits.dwg Layout: D1.2 User: scundiff



J:\129\06 130 Park\101\Att01\D1.4-Landoad.dwg Layout: D1.2 User: scundiff

0 500 1000
SCALE IN FEET

LEGEND

- PROPERTY BOUNDARY
- FACILITY BOUNDARY
- LANDFILL FOOTPRINT
- SITE BENCHMARK
- 510 EXISTING 10' CONTOUR
- N 13,904,000 STATE PLANE GRID

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SERVICE FROM AERIAL PHOTOGRAPHY FLOWN MAY 13, 2013. HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83). ELEVATIONS ARE RELATIVE TO NAVD88 – GEOID 12A.
2. PROPERTY BOUNDARY, FACILITY BOUNDARY, EASEMENT LOCATIONS, AND PERMANENT BENCHMARK PROVIDED BY HODDE & HODDE LAND SURVEYING, INC.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11-6-2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

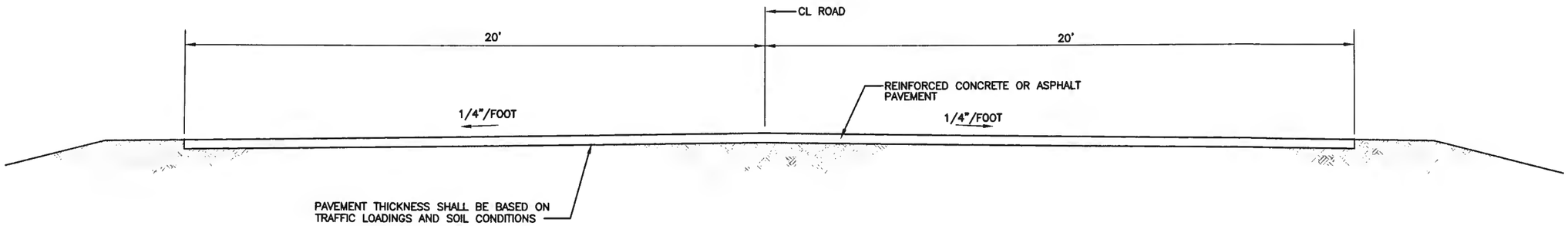
LANDFILL ENTRANCE AND ACCESS ROAD PLAN

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144

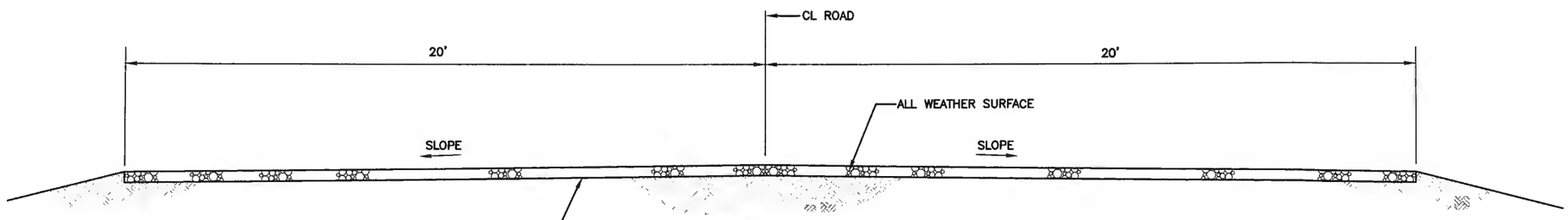
TBPE FIRM NO. F-256 | TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13	DRAWING
DWN. GLW	SCALE : GRAPHIC	D1.4
CHK. GWA	DWG : D1.4-Landoad.dwg	



ENTRANCE ROAD R1 D1.5

0 2 4
SCALE IN FEET



ACCESS ROADS SHALL BE CONSTRUCTED AND MAINTAINED WITH ALL WEATHER SURFACE (CRUSHED STONE, GRAVEL, CONCRETE RUBBLE, MASONRY RUBBLE, WOOD CHIPS, OR OTHER SIMILAR MATERIALS) WHERE USED AS ACCESS TO WORKING FACE BY WASTE HAUL VEHICLES.

ACCESS ROAD R2 D1.5

0 2 4
SCALE IN FEET

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER

11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

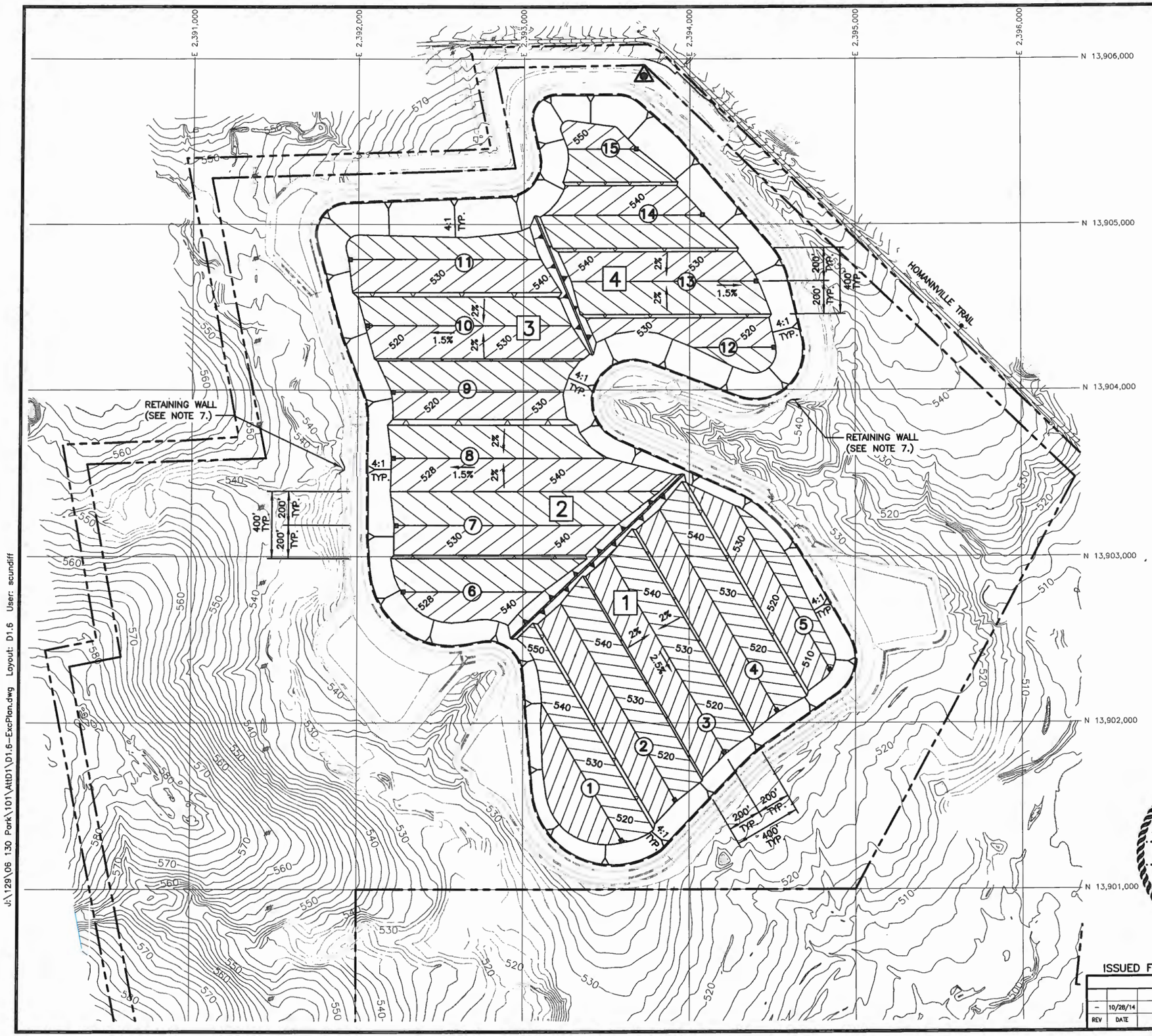
LANDFILL ENTRANCE AND ACCESS ROAD DETAILS

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D1.5	
CHK. GWA	DWG : D1.5–RoadDtls.dwg		

J:\129\06 130 Park\101\AHD1\D1.5–RoadDtls.dwg Layout: D1.6 User: scundiff



0 300 600
SCALE IN FEET

LEGEND

- PROPERTY BOUNDARY
- FACILITY BOUNDARY
- LANDFILL FOOTPRINT
- SITE BENCHMARK
- 510 EXISTING 2' CONTOUR
- N 13,904,000 STATE PLANE GRID
- 4 PHASE DESIGNATION
- 12 CELL DESIGNATION
- 520 LINER SUBGRADE 2' CONTOUR
- SUMP

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SERVICE FROM AERIAL PHOTOGRAPHY FLOWN MAY 13, 2013. HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83). ELEVATIONS ARE RELATIVE TO NAVD88 – GEOID 12A.
2. PROPERTY BOUNDARY, FACILITY BOUNDARY, EASEMENT LOCATIONS, AND PERMANENT BENCHMARK PROVIDED BY HODDE & HODDE LAND SURVEYING, INC
3. PERMANENT BENCHMARK INFORMATION:
   COORDINATES (NAD 83): N 13905896.44
   E 2393722.33
   LATITUDE: N 29°58'43.75"
4. LONGITUDE: W 97°39'24.76"
   ELEVATION: 592.37 FT-MSL
5. PROPOSED CONTOURS DEPICT LINER SUBGRADE.
6. ELEVATION OF DEEPEST EXCAVATION IS BOTTOM OF CELL 5 SUMP = 501.9 MSL.
7. REFER TO ATTACHMENT D2 FOR LOCATION AND DETAILS OF RETAINING WALLS.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER

11-6-2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

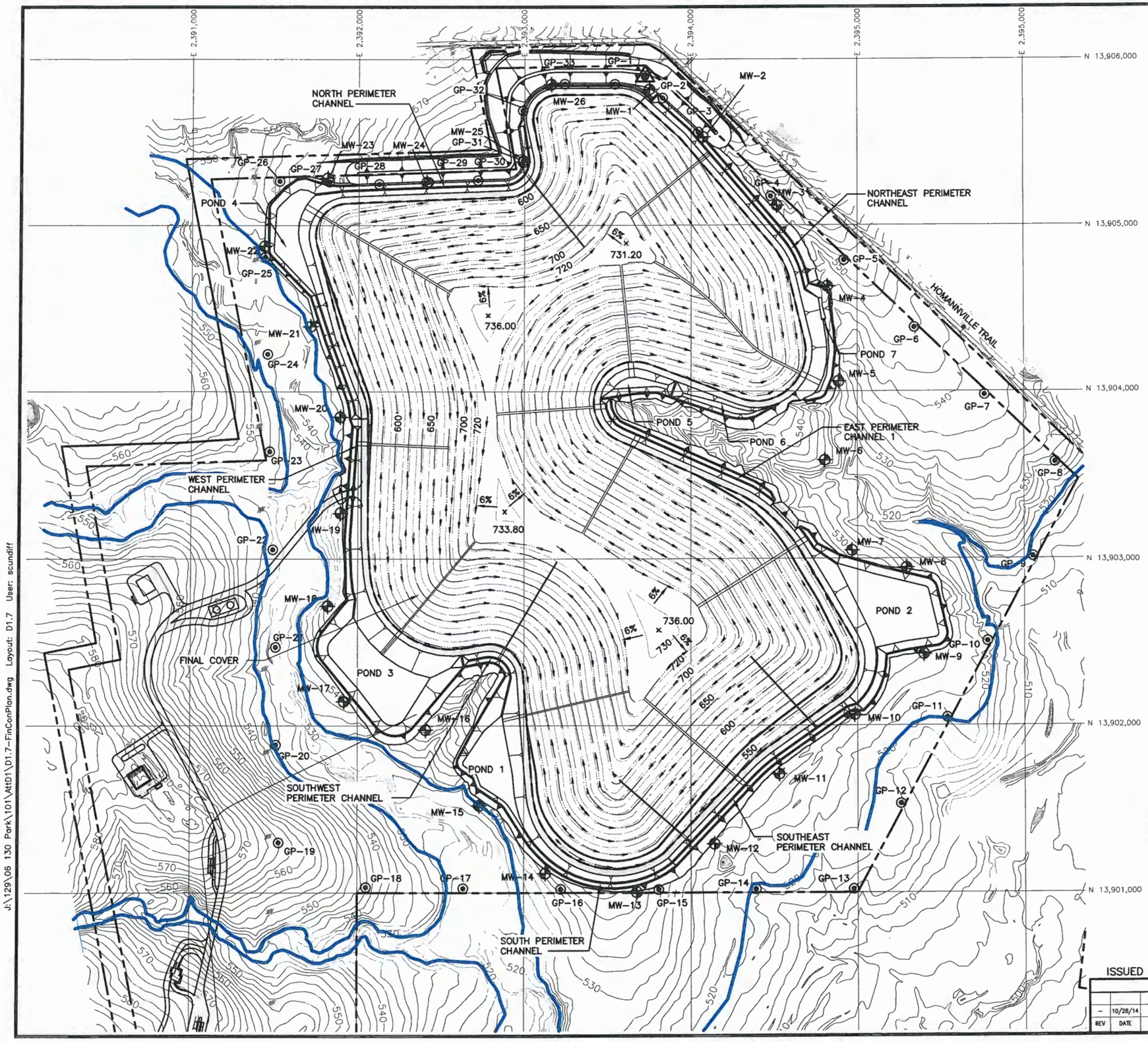
EXCAVATION PLAN

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D1.6	
CHK. GWA	DWG : D1.6-ExcPlan.dwg		

J:\129\06 130 Park\101\Att01\D1.6-ExcPlan.dwg Layout: D1.6 User: scundiff



0 300 600
SCALE IN FEET

LEGEND

- PROPERTY BOUNDARY
- FACILITY BOUNDARY
- LANDFILL FOOTPRINT
- 250 EXISTING CONTOUR
- 100 YEAR FLOODPLAIN
- N 13,904.000 STATE PLANE GRID
- SITE BENCHMARK
- MW-4 MONITORING WELL
- GP-1 LFG MONITORING PROBE

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SERVICE FROM AERIAL PHOTOGRAPHY FLOWN MAY 13, 2013. HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83). ELEVATIONS ARE RELATIVE TO NAVD88 – GEOID 12A.
2. PROPERTY BOUNDARY, FACILITY BOUNDARY, EASEMENT LOCATIONS, AND PERMANENT BENCHMARK PROVIDED BY HODDE & HODDE LAND SURVEYING, INC.
3. PERMANENT BENCHMARK INFORMATION:
   COORDINATES (NAD 83): N 13905896.44, E 2393722.33
   LATITUDE: N 29°58'43.75"
   LONGITUDE: W 97°39'24.76"
   ELEVATION: 592.37 FT–MSL
4. PROPOSED CONTOURS DEPICT TOP OF FINAL COVER.
5. MAXIMUM TOP OF WASTE ELEVATION = 731.5 MSL.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11-6-2014

ISSUED FOR PERMITTING PURPOSES ONLY

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

LANDFILL COMPLETION PLAN

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 12/13
DWN. GLW	SCALE : GRAPHIC
CHK. GWA	DWG : D1.7–FinConPlan.dwg

DRAWING D1.7

J:\129\06 130 Park\101\Att01\D1.7–FinConPlan.dwg Layout: D1.7 User: scundiff

130 ENVIRONMENTAL PARK
CALDWELL COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2383

TYPE I PERMIT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D2
CROSS SECTIONS

Prepared for

130 ENVIRONMENTAL PARK, LLC

Technically Complete October 28, 2014

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

11/6/2014

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

And

BIGGS & MATHEWS, INC.
2500 Brook Avenue • Wichita Falls, Texas 76301 • 940-766-0156

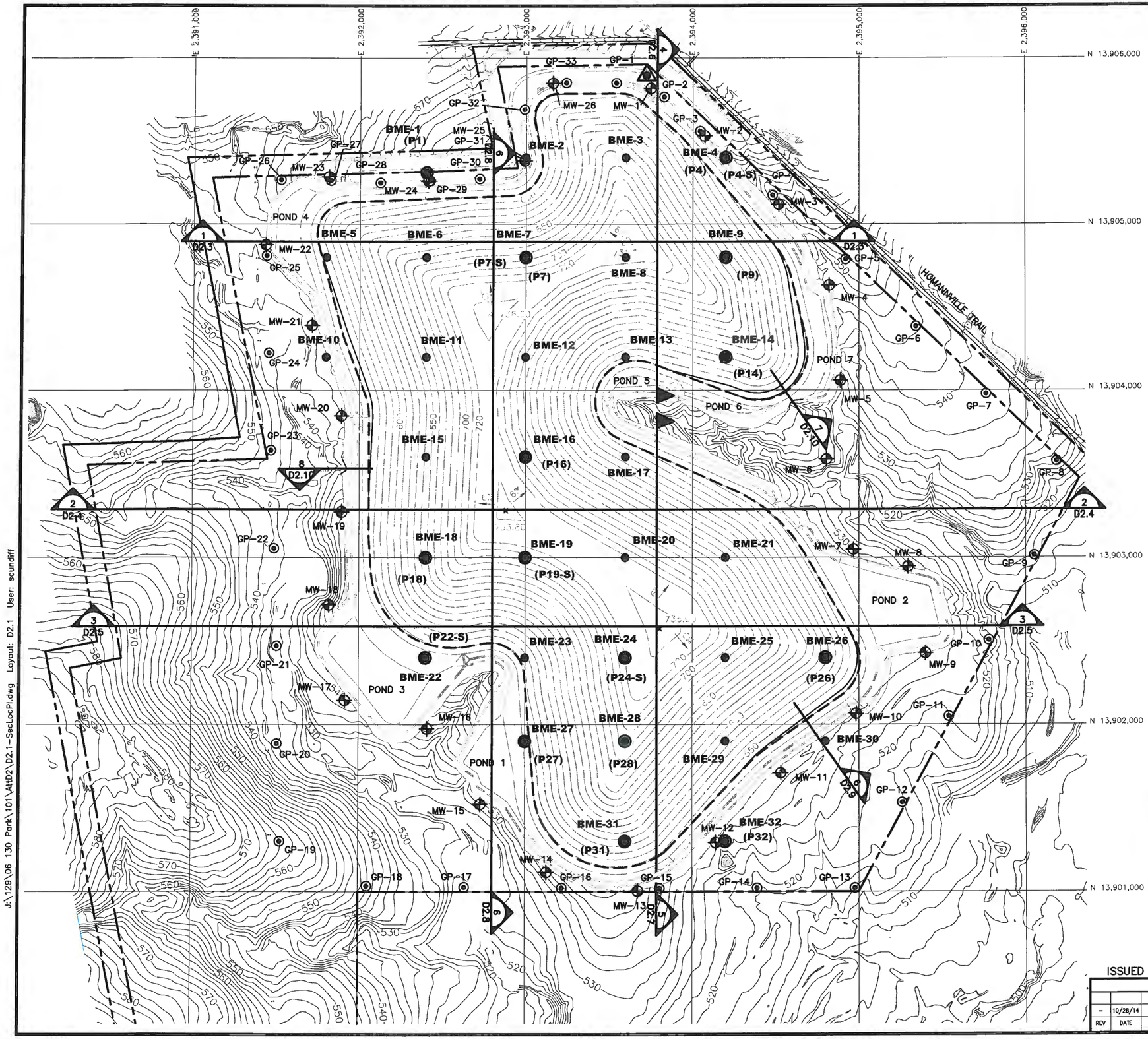
TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-834

CONTENTS

30 TAC §330.63(d)(4)(E) and (F)

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

11/6/2014



NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SERVICE FROM AERIAL PHOTOGRAPHY FLOWN MAY 13, 2013. HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83). ELEVATIONS ARE RELATIVE TO NAVD88 – GEOID 12A.
2. PROPERTY BOUNDARY, FACILITY BOUNDARY, EASEMENT LOCATIONS, AND PERMANENT BENCHMARK PROVIDED BY HODDE & HODDE LAND SURVEYING, INC.
3. GAS WELLS, SWALES AND LETDOWNS NOT SHOWN FOR CLARITY.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11-6-2014

ISSUED FOR PERMITTING PURPOSES ONLY

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
-	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

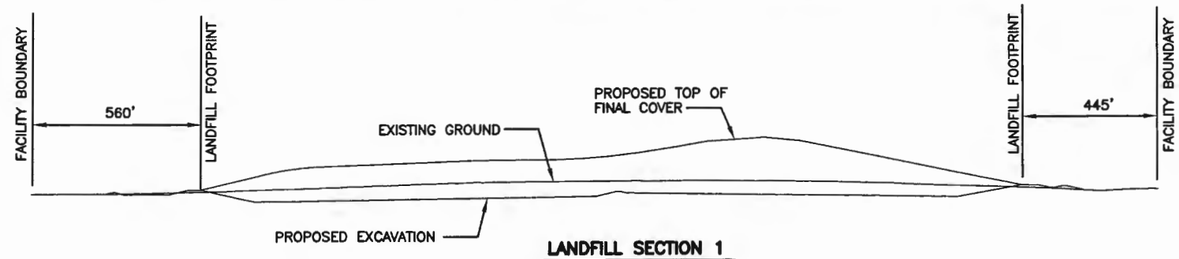
SECTION LAYOUT PLAN

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

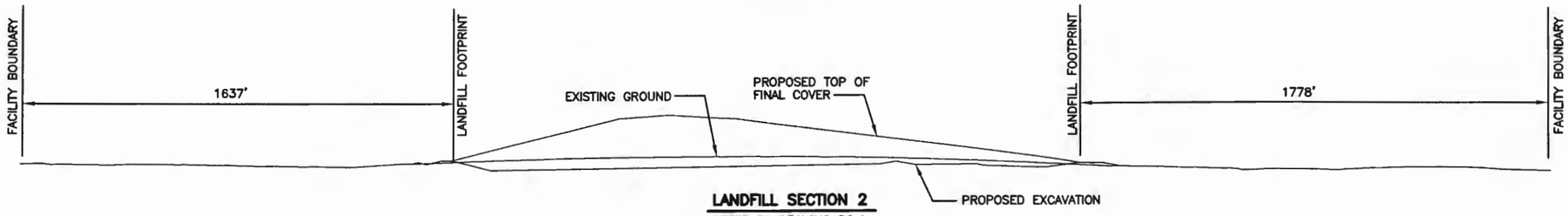
BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 11/13	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D2.1	
CHK. GWA	DWG : D2.1-SecLocPl.dwg		

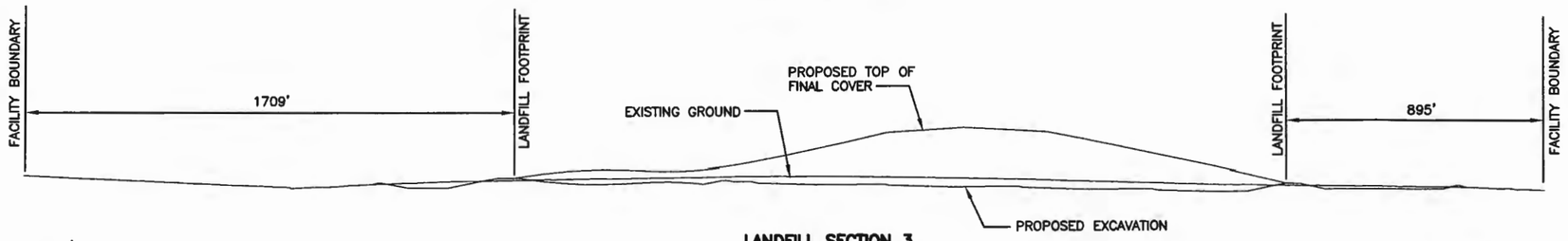
J:\129\06 130 Park\101\Att02\D2.1-SecLocPl.dwg Layout: D2.1 User: scundiff



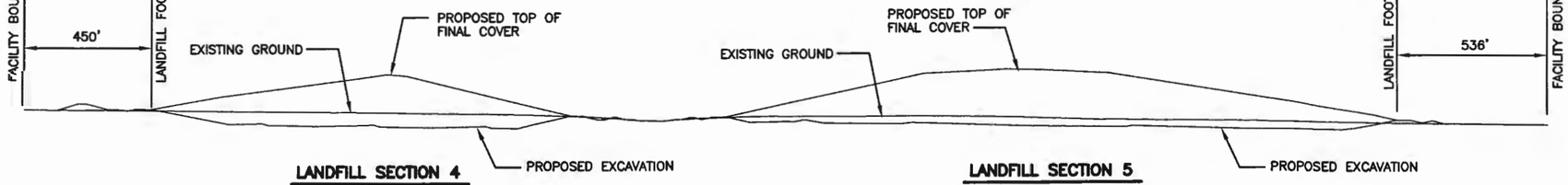
LANDFILL SECTION 1
REFER TO DRAWING D2.3



LANDFILL SECTION 2
REFER TO DRAWING D2.4

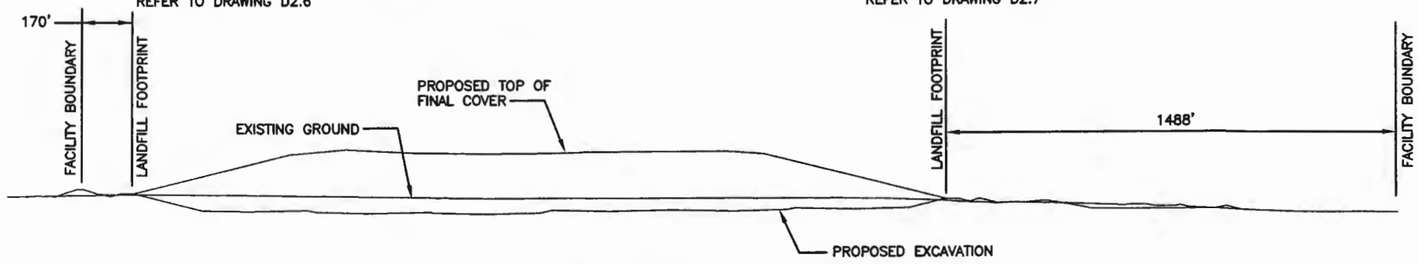


LANDFILL SECTION 3
REFER TO DRAWING D2.5



LANDFILL SECTION 4
REFER TO DRAWING D2.6

LANDFILL SECTION 5
REFER TO DRAWING D2.7



LANDFILL SECTION 6
REFER TO DRAWING D2.8

0 250 500
SCALE IN FEET

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11/4/2014

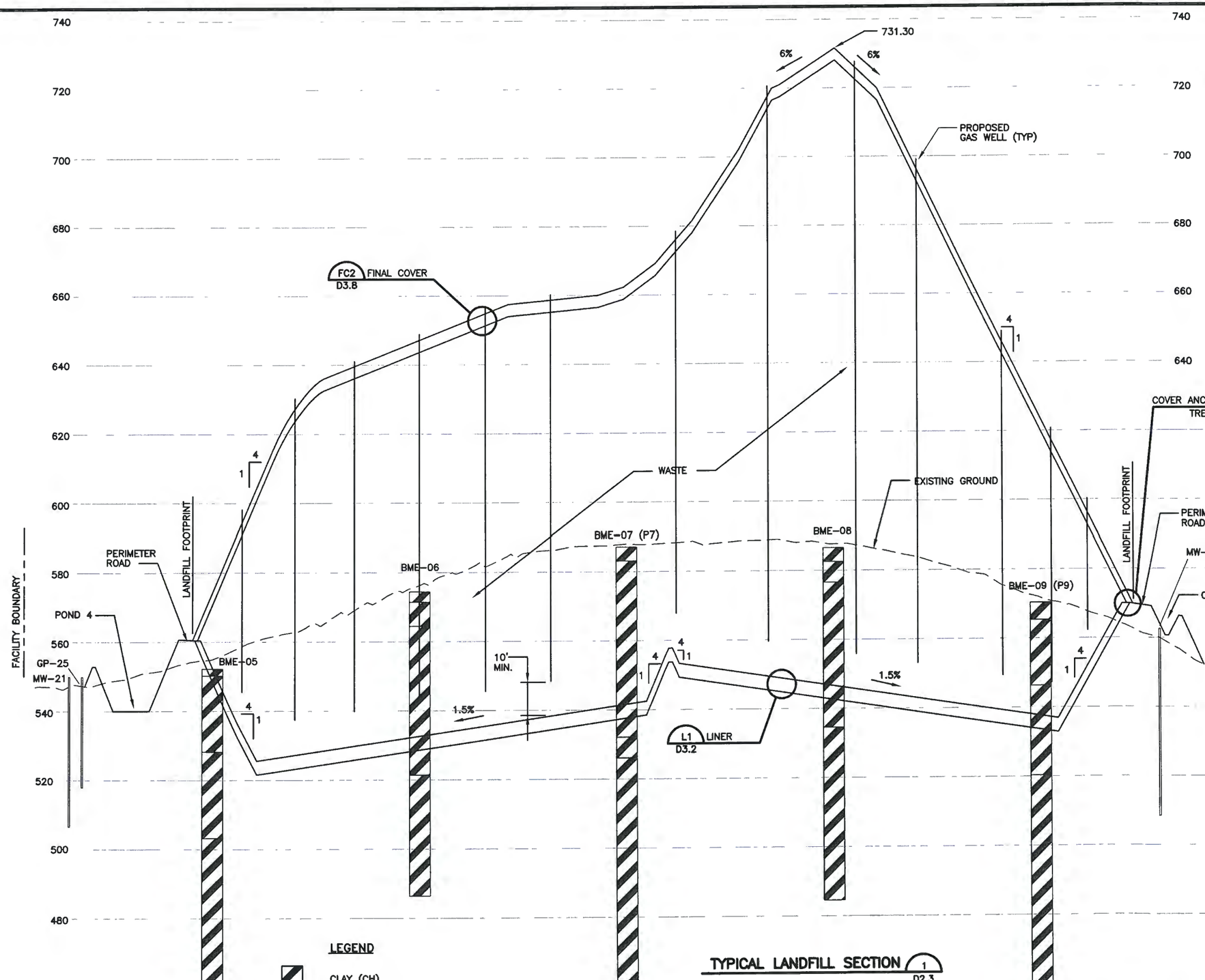
LANDFILL SECTIONS

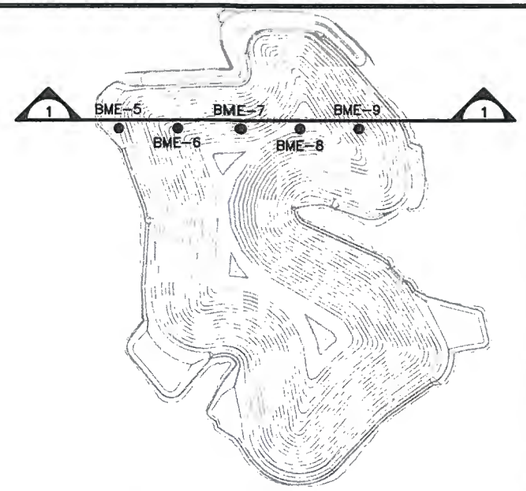
130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 6/14	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D2.2	
CHK. GWA	DWG : D2.2_TrueSec.dwg		

J:\129\06 130 Park\101\Att02\D2.2_TrueSec.dwg Layout: Layout1 User: scundiff





KEY MAP

NOTES:

1. REFER TO DRAWING D1.6 FOR EXCAVATION PLAN. REFER TO DRAWING D1.7 FOR LANDFILL COMPLETION PLAN.
2. REFER TO PART III, ATTACHMENT D3 FOR LINER, FINAL COVER, AND LEACHATE COLLECTION SYSTEM DETAILS.
3. REFER TO DRAWING D1.1 FOR BUFFER DISTANCES.
4. REFER TO PART III, ATTACHMENT E FOR SUBSURFACE CHARACTERIZATION.
5. MAXIMUM FINAL COVER ELEVATION: 736.00 FT-MSL. MAXIMUM ELEVATION OF WASTE: 731.50 FT-MSL. DEEPEST EXCAVATION AT LEACHATE SUMPS ELEVATION: 501.93 FT-MSL
6. SOME PROPOSED MONITORING WELLS, GAS PROBES AND BORINGS SHOWN ARE PROJECTED ONTO THE SECTION LINE. ACTUAL ELEVATIONS ARE SHOWN AND MAY NOT MATCH GROUND ELEVATION AT SECTION LOCATION.
7. GROUNDWATER WAS NOT OBSERVED IN THE BORINGS AND PIEZOMETERS UNLESS OTHERWISE NOTED.

LEGEND

- CLAY (CH)
- MW-1 PROPOSED MONITOR WELL
- GP-1 PROPOSED GAS PROBE

TYPICAL LANDFILL SECTION 1 D2.3

0 150 300 SCALE IN FEET HORIZONTAL

0 15 30 SCALE IN FEET VERTICAL

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

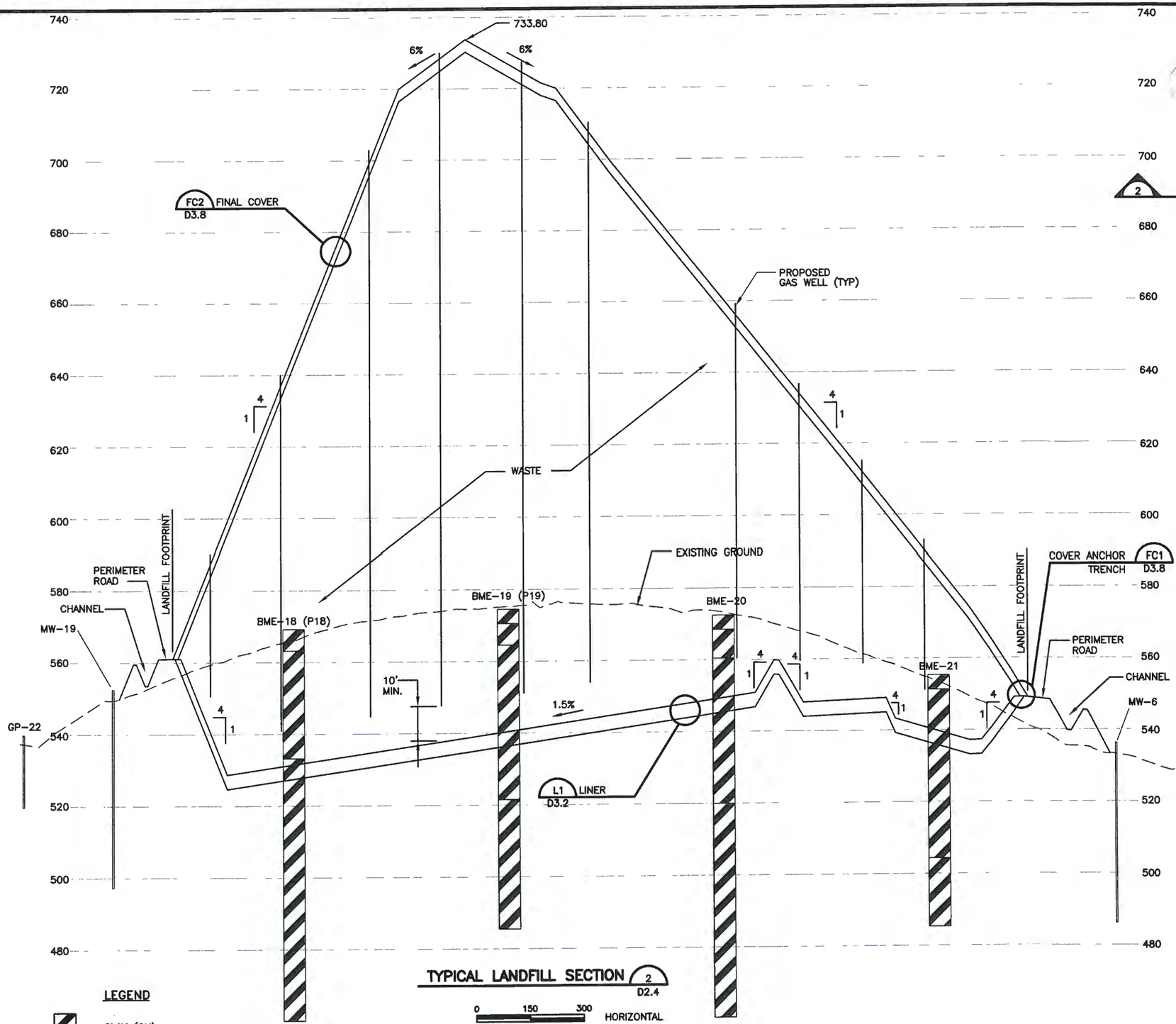
REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

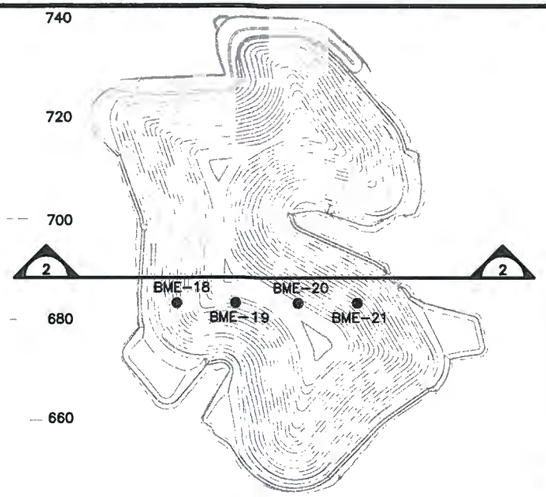
LANDFILL SECTION

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D2.3	
CHK. GWA	DWG : D2.2_6-AllSecs.dwg		





KEY MAP

NOTES:

1. REFER TO DRAWING D1.6 FOR EXCAVATION PLAN. REFER TO DRAWING D1.7 FOR LANDFILL COMPLETION PLAN.
2. REFER TO PART III, ATTACHMENT D3 FOR LINER, FINAL COVER, AND LEACHATE COLLECTION SYSTEM DETAILS.
3. REFER TO DRAWING D1.1 FOR BUFFER DISTANCES.
4. REFER TO PART III, ATTACHMENT E FOR SUBSURFACE CHARACTERIZATION.
5. MAXIMUM FINAL COVER ELEVATION: 736.00 FT-MSL. MAXIMUM ELEVATION OF WASTE: 731.50 FT-MSL. DEEPEST EXCAVATION AT LEACHATE SUMPS ELEVATION: 501.93 FT-MSL
6. SOME PROPOSED MONITORING WELLS, GAS PROBES AND BORINGS SHOWN ARE PROJECTED ONTO THE SECTION LINE. ACTUAL ELEVATIONS ARE SHOWN AND MAY NOT MATCH GROUND ELEVATION AT SECTION LOCATION.
7. GROUNDWATER WAS NOT OBSERVED IN THE BORINGS AND PIEZOMETERS UNLESS OTHERWISE NOTED.

LEGEND

CLAY (CH)

MW-1 PROPOSED MONITOR WELL

GP-1 PROPOSED GAS PROBE

TYPICAL LANDFILL SECTION 2 D2.4

0 150 300 HORIZONTAL
SCALE IN FEET

0 15 30 VERTICAL
SCALE IN FEET

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

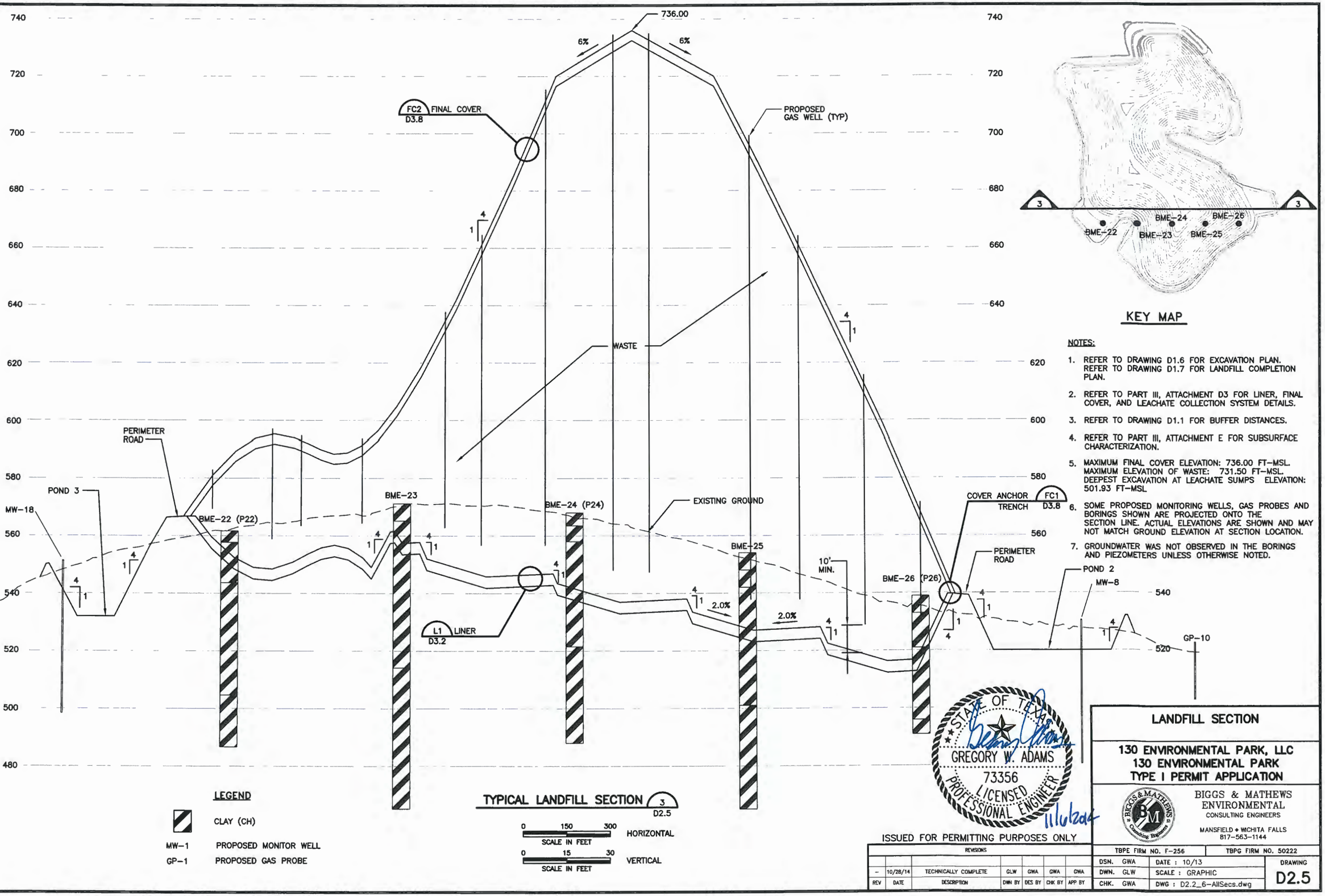
LANDFILL SECTION

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA DATE : 10/13
DWN. GLW SCALE : GRAPHIC
CHK. GWA DWG : D2.2_6-AllSecs.dwg

DRAWING D2.4



KEY MAP

NOTES:

1. REFER TO DRAWING D1.6 FOR EXCAVATION PLAN. REFER TO DRAWING D1.7 FOR LANDFILL COMPLETION PLAN.
2. REFER TO PART III, ATTACHMENT D3 FOR LINER, FINAL COVER, AND LEACHATE COLLECTION SYSTEM DETAILS.
3. REFER TO DRAWING D1.1 FOR BUFFER DISTANCES.
4. REFER TO PART III, ATTACHMENT E FOR SUBSURFACE CHARACTERIZATION.
5. MAXIMUM FINAL COVER ELEVATION: 736.00 FT-MSL. MAXIMUM ELEVATION OF WASTE: 731.50 FT-MSL. DEEPEST EXCAVATION AT LEACHATE SUMPS ELEVATION: 501.93 FT-MSL
6. SOME PROPOSED MONITORING WELLS, GAS PROBES AND BORINGS SHOWN ARE PROJECTED ONTO THE SECTION LINE. ACTUAL ELEVATIONS ARE SHOWN AND MAY NOT MATCH GROUND ELEVATION AT SECTION LOCATION.
7. GROUNDWATER WAS NOT OBSERVED IN THE BORINGS AND PIEZOMETERS UNLESS OTHERWISE NOTED.

LEGEND

CLAY (CH)

MW-1 PROPOSED MONITOR WELL

GP-1 PROPOSED GAS PROBE

TYPICAL LANDFILL SECTION 3 D2.5

0 150 300 HORIZONTAL
SCALE IN FEET

0 15 30 VERTICAL
SCALE IN FEET

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

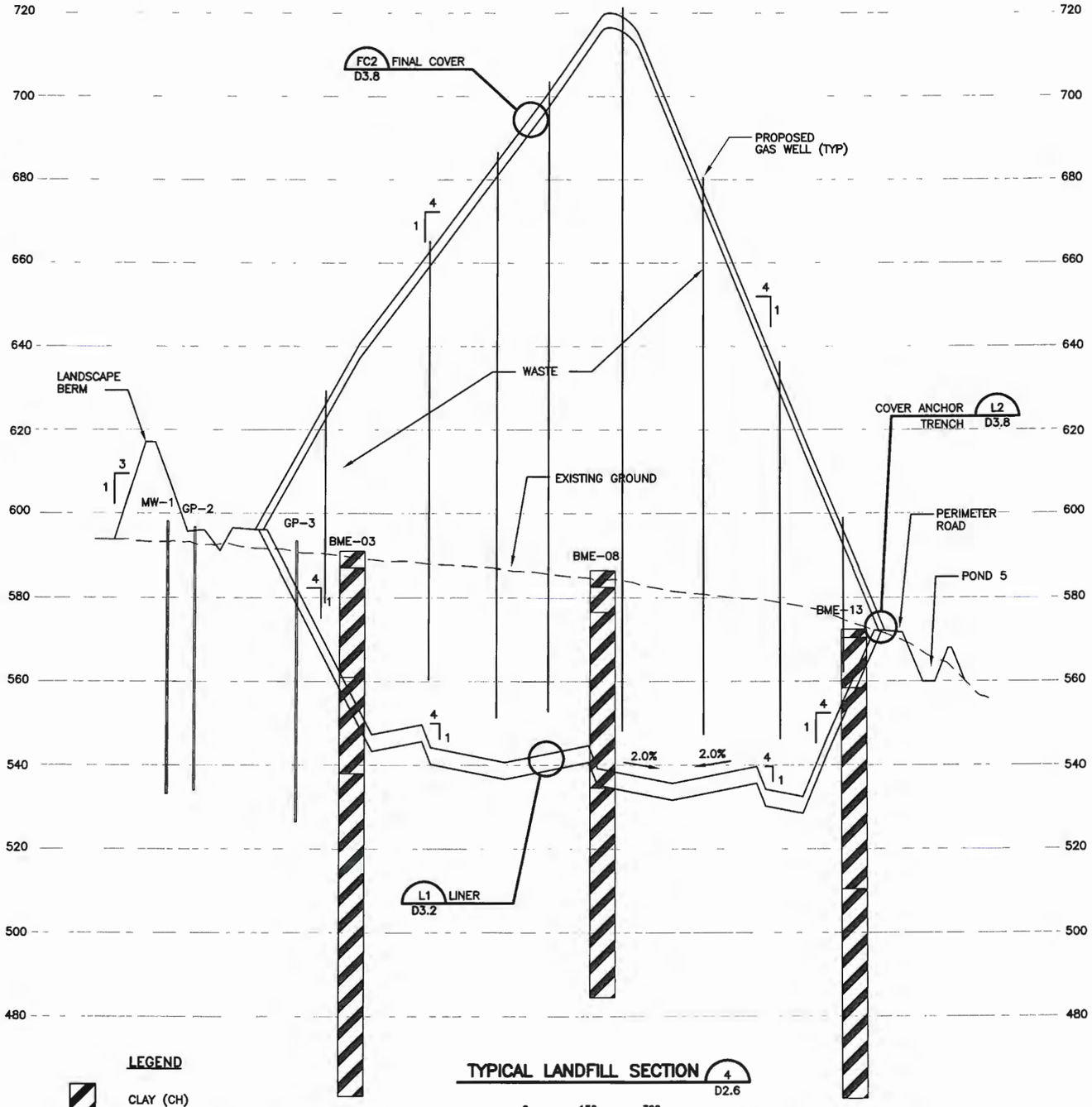
REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
-	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

LANDFILL SECTION

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD ◆ WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D2.5	
CHK. GWA	DWG : D2.2_6-AllSecs.dwg		



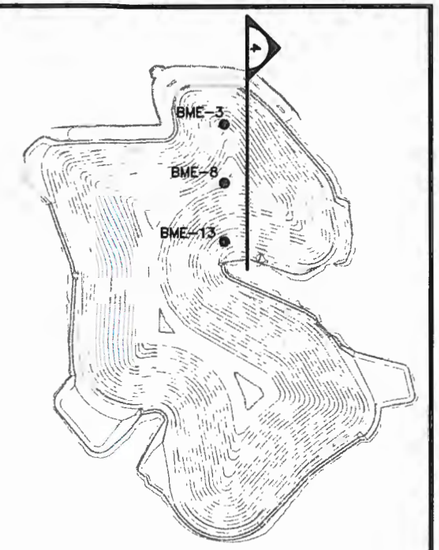
LEGEND

	CLAY (CH)
MW-1	PROPOSED MONITOR WELL
GP-1	PROPOSED GAS PROBE

TYPICAL LANDFILL SECTION 4 D2.6

0 150 300 HORIZONTAL
SCALE IN FEET

0 15 30 VERTICAL
SCALE IN FEET



KEY MAP

NOTES:

1. REFER TO DRAWING D1.6 FOR EXCAVATION PLAN. REFER TO DRAWING D1.7 FOR LANDFILL COMPLETION PLAN.
2. REFER TO PART III, ATTACHMENT D3 FOR LINER, FINAL COVER, AND LEACHATE COLLECTION SYSTEM DETAILS.
3. REFER TO DRAWING D1.1 FOR BUFFER DISTANCES.
4. REFER TO PART III, ATTACHMENT E FOR SUBSURFACE CHARACTERIZATION.
5. MAXIMUM FINAL COVER ELEVATION: 736.00 FT-MSL. MAXIMUM ELEVATION OF WASTE: 731.50 FT-MSL. DEEPEST EXCAVATION AT LEACHATE SUMPS ELEVATION: 501.93 FT-MSL
6. SOME PROPOSED MONITORING WELLS, GAS PROBES AND BORINGS SHOWN ARE PROJECTED ONTO THE SECTION LINE. ACTUAL ELEVATIONS ARE SHOWN AND MAY NOT MATCH GROUND ELEVATION AT SECTION LOCATION.
7. GROUNDWATER WAS NOT OBSERVED IN THE BORINGS AND PIEZOMETERS UNLESS OTHERWISE NOTED.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

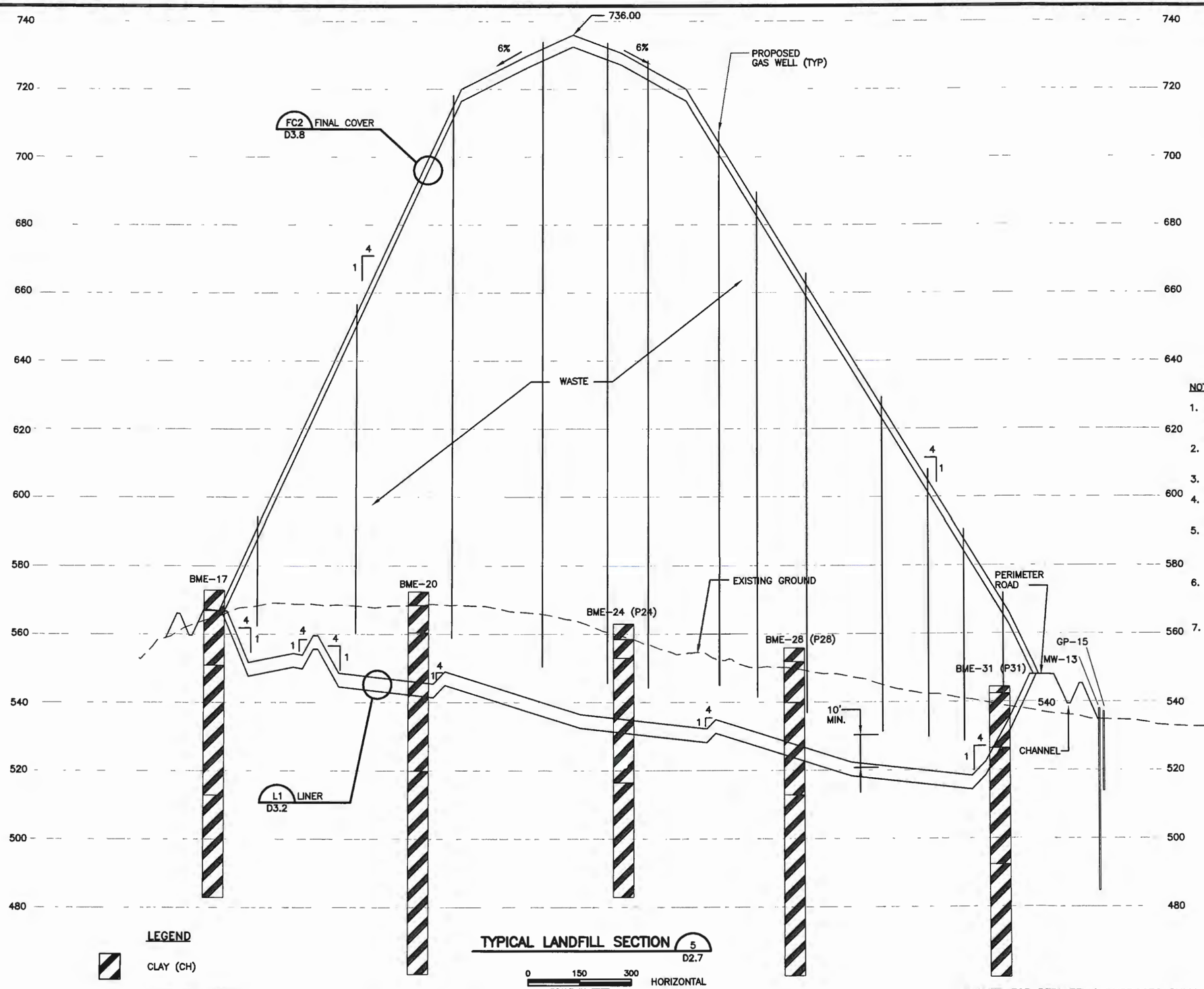
LANDFILL SECTION

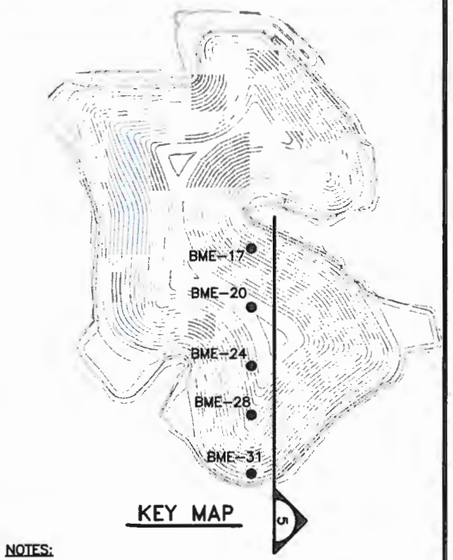
130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13	DRAWING
DWN. GLW	SCALE : GRAPHIC	D2.6
CHK. GWA	DWG : D2.2_6-AllSecs.dwg	

J:\129\06 130 Park\101\Att\D2\D2.2_6-AllSecs.dwg Layout: SEC4 User: scundiff





NOTES:

1. REFER TO DRAWING D1.6 FOR EXCAVATION PLAN. REFER TO DRAWING D1.7 FOR LANDFILL COMPLETION PLAN.
2. REFER TO PART III, ATTACHMENT D3 FOR LINER, FINAL COVER, AND LEACHATE COLLECTION SYSTEM DETAILS.
3. REFER TO DRAWING D1.1 FOR BUFFER DISTANCES.
4. REFER TO PART III, ATTACHMENT E FOR SUBSURFACE CHARACTERIZATION.
5. MAXIMUM FINAL COVER ELEVATION: 736.00 FT-MSL. MAXIMUM ELEVATION OF WASTE: 731.50 FT-MSL. DEEPEST EXCAVATION AT LEACHATE SUMPS ELEVATION: 501.93 FT-MSL
6. SOME PROPOSED MONITORING WELLS, GAS PROBES AND BORINGS SHOWN ARE PROJECTED ONTO THE SECTION LINE. ACTUAL ELEVATIONS ARE SHOWN AND MAY NOT MATCH GROUND ELEVATION AT SECTION LOCATION.
7. GROUNDWATER WAS NOT OBSERVED IN THE BORINGS AND PIEZOMETERS UNLESS OTHERWISE NOTED.

LEGEND

CLAY (CH)

MW-1 PROPOSED MONITOR WELL

GP-1 PROPOSED GAS PROBE

TYPICAL LANDFILL SECTION 5 D2.7

0 150 300 SCALE IN FEET HORIZONTAL

0 15 30 SCALE IN FEET VERTICAL

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

LANDFILL SECTION

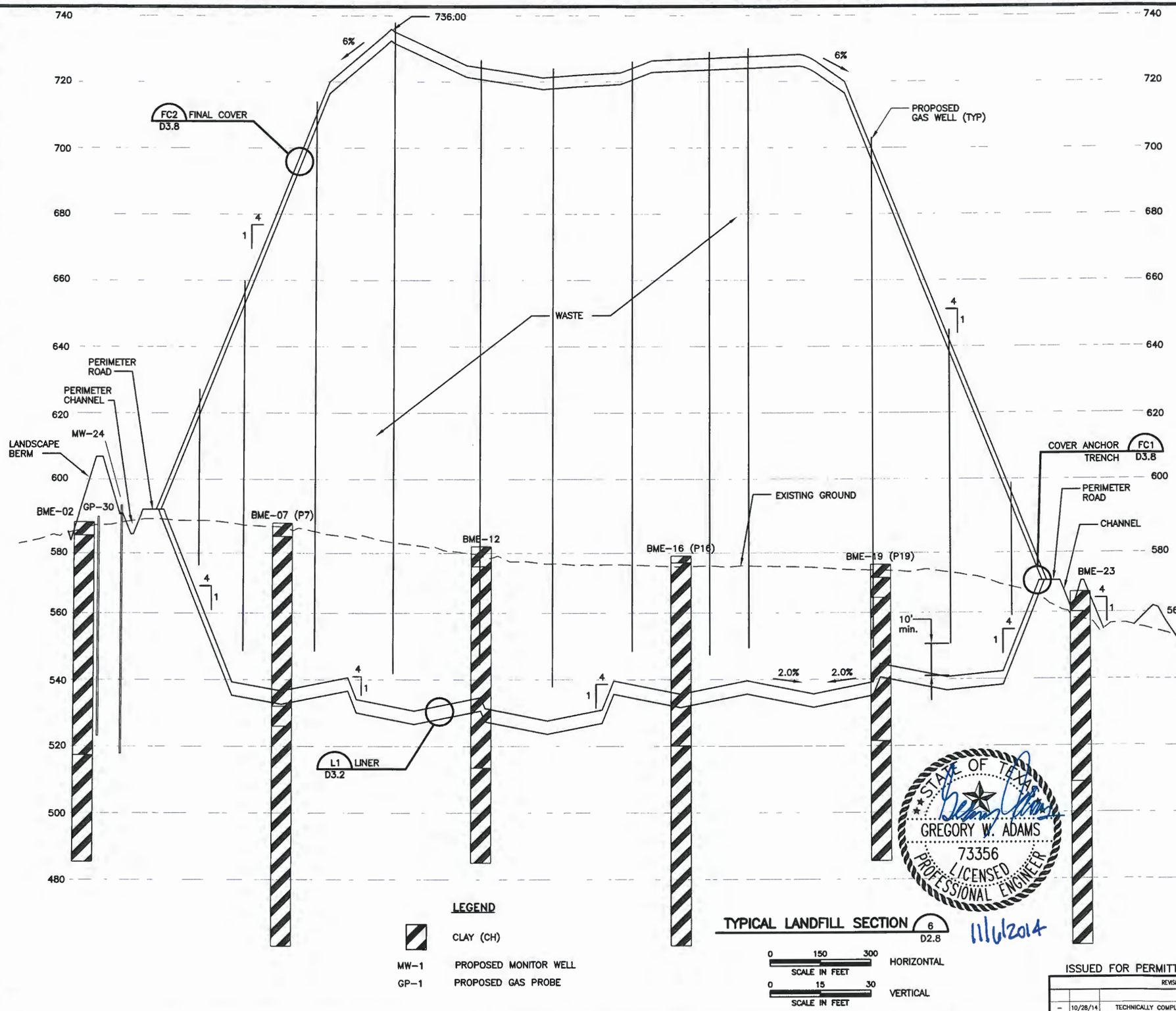
130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

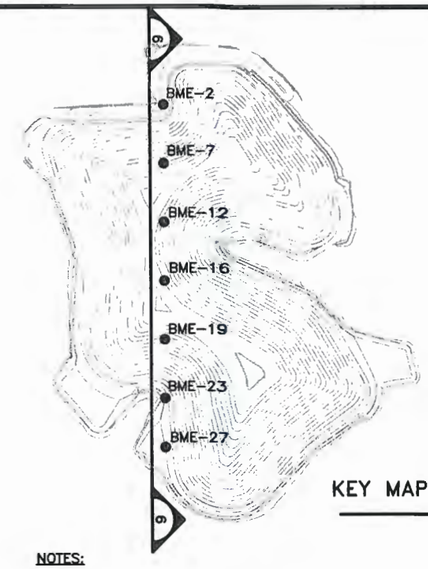
BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA DATE : 10/13
DWN. GLW SCALE : GRAPHIC
CHK. GWA DWG : D2.2_6-AllSecs.dwg

DRAWING D2.7

J:\129\06 130 Park\101\Att02\D2.2_6-AllSecs.dwg Layout: SEC5 User: scundiff





KEY MAP

NOTES:

1. REFER TO DRAWING D1.6 FOR EXCAVATION PLAN. REFER TO DRAWING D1.7 FOR LANDFILL COMPLETION PLAN.
2. REFER TO PART III, ATTACHMENT D3 FOR LINER, FINAL COVER, AND LEACHATE COLLECTION SYSTEM DETAILS.
3. REFER TO DRAWING D1.1 FOR BUFFER DISTANCES.
4. REFER TO PART III, ATTACHMENT E FOR SUBSURFACE CHARACTERIZATION.
5. MAXIMUM FINAL COVER ELEVATION: 736.00 FT-MSL. MAXIMUM ELEVATION OF WASTE: 731.50 FT-MSL. DEEPEST EXCAVATION AT LEACHATE SUMPS ELEVATION: 501.93 FT-MSL
6. SOME PROPOSED MONITORING WELLS, GAS PROBES AND BORINGS SHOWN ARE PROJECTED ONTO THE SECTION LINE. ACTUAL ELEVATIONS ARE SHOWN AND MAY NOT MATCH GROUND ELEVATION AT SECTION LOCATION.
7. GROUNDWATER WAS NOT OBSERVED IN THE BORINGS AND PIEZOMETERS UNLESS OTHERWISE NOTED.

LEGEND

CLAY (CH)

MW-1 PROPOSED MONITOR WELL

GP-1 PROPOSED GAS PROBE

TYPICAL LANDFILL SECTION 6 D2.8

0 150 300 SCALE IN FEET HORIZONTAL

0 15 30 SCALE IN FEET VERTICAL

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

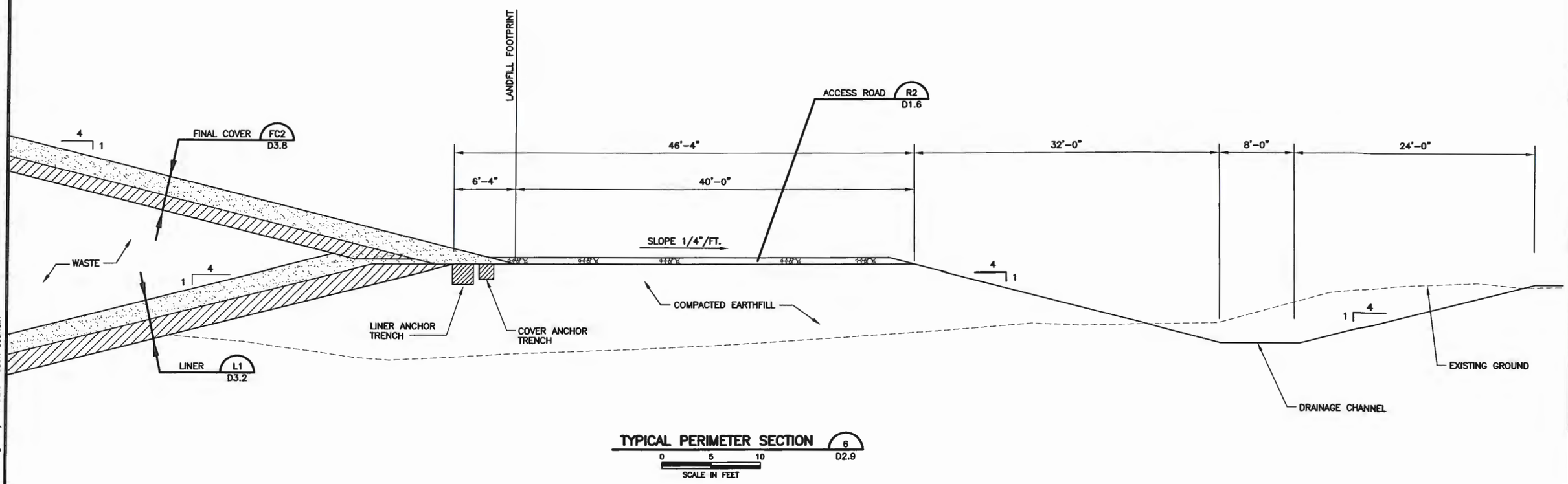
REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

LANDFILL SECTION

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD ◆ WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D2.8	
CHK. GWA	DWG : D2.2_6-AllSecs.dwg		



TYPICAL PERIMETER SECTION 6 D2.9

0 5 10

SCALE IN FEET

J:\129\06 130 Park\101\Att02\D2.9-Section.dwg Layout: D2.9 User: scundiff

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

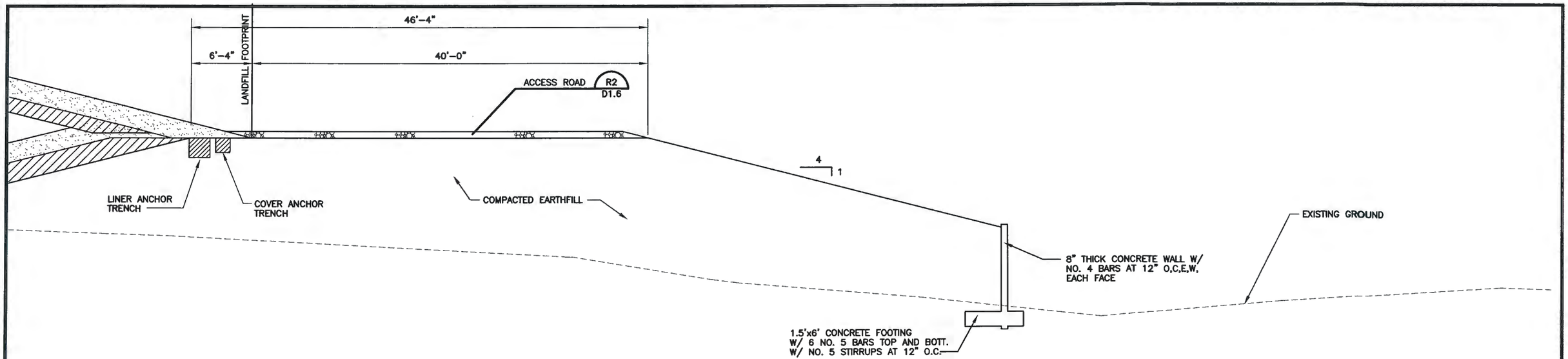
REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
-	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

PERIMETER SECTION

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

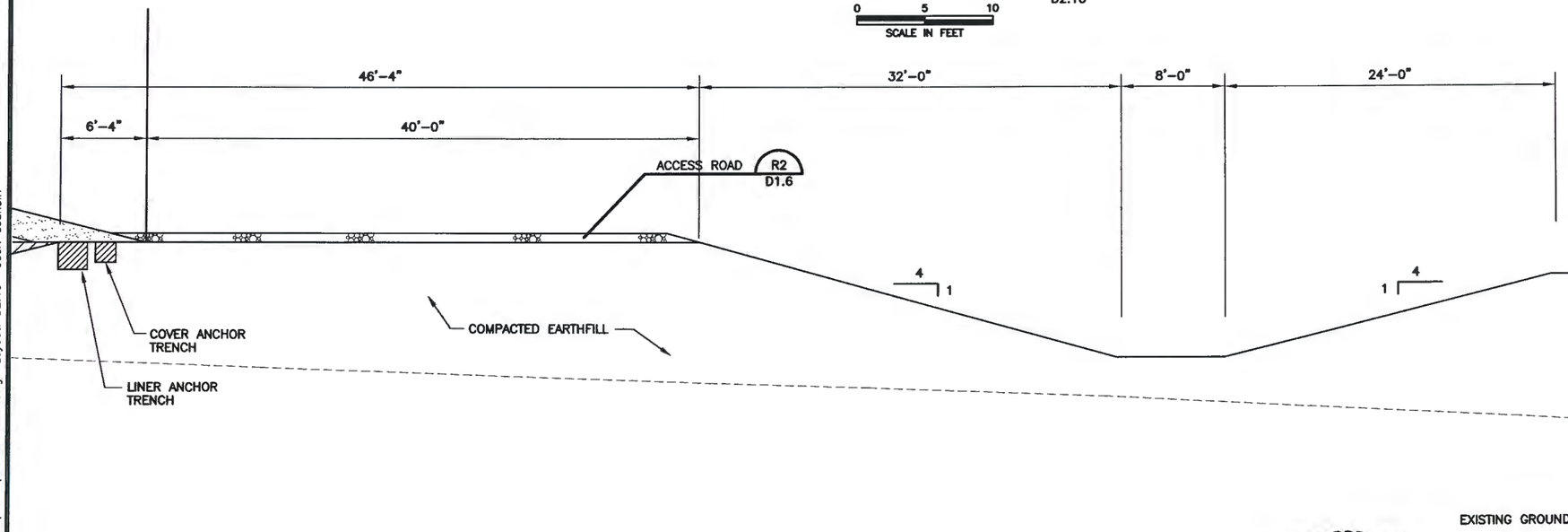
DSN. GWA	DATE : 10/13	DRAWING
DWN. GLW	SCALE : GRAPHIC	D2.9
CHK. GWA	DWG : D2.9-Section.dwg	



RETAINING WALL SECTION 7 D2.10

0 5 10

SCALE IN FEET



RETAINING WALL SECTION 8 D2.10

0 5 10

SCALE IN FEET

NOTES:

1. CANTILEVERED REINFORCED CONCRETE WALL IS SHOWN FOR ILLUSTRATION.
2. THE RETAINING WALL MAY BE CANTILEVERED REINFORCED CONCRETE WALL, CONCRETE GRAVITY RETAINING WALL, REINFORCED EARTH GRAVITY RETAINING WALL, OR A GABION BASKET RETAINING WALL.
3. FOR THE SELECTED WALL, THE FACTOR OF SAFETY AGAINST SLIDING ALONG THE BASE OF THE WALL SHALL BE EQUAL TO OR GREATER THAN 1.5. THE FACTOR OF SAFETY AGAINST OVERTURNING SHALL BE EQUAL TO OR GREATER THAN 2.0. THE BASE PRESSURE RESULTANT SHALL FALL WITHIN THE MIDDLE THIRD OF THE RETAINING WALL.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

RETAINING WALL SECTION

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA DATE : 10/13
DWN. GLW SCALE : GRAPHIC
CHK. GWA DWG : D2.9-Section.dwg

DRAWING D2.10

J:\129\06 130 Park\101\Att02\D2.9-Section.dwg Layout: D2.10 User: scundiff

130 ENVIRONMENTAL PARK
CALDWELL COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2383

TYPE I PERMIT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D3
CONSTRUCTION DESIGN DETAILS

Prepared for

130 ENVIRONMENTAL PARK, LLC

Technically Complete October 28, 2014

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

11/6/2014

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

And

BIGGS & MATHEWS, INC.
2500 Brook Avenue • Wichita Falls, Texas 76301 • 940-766-0156

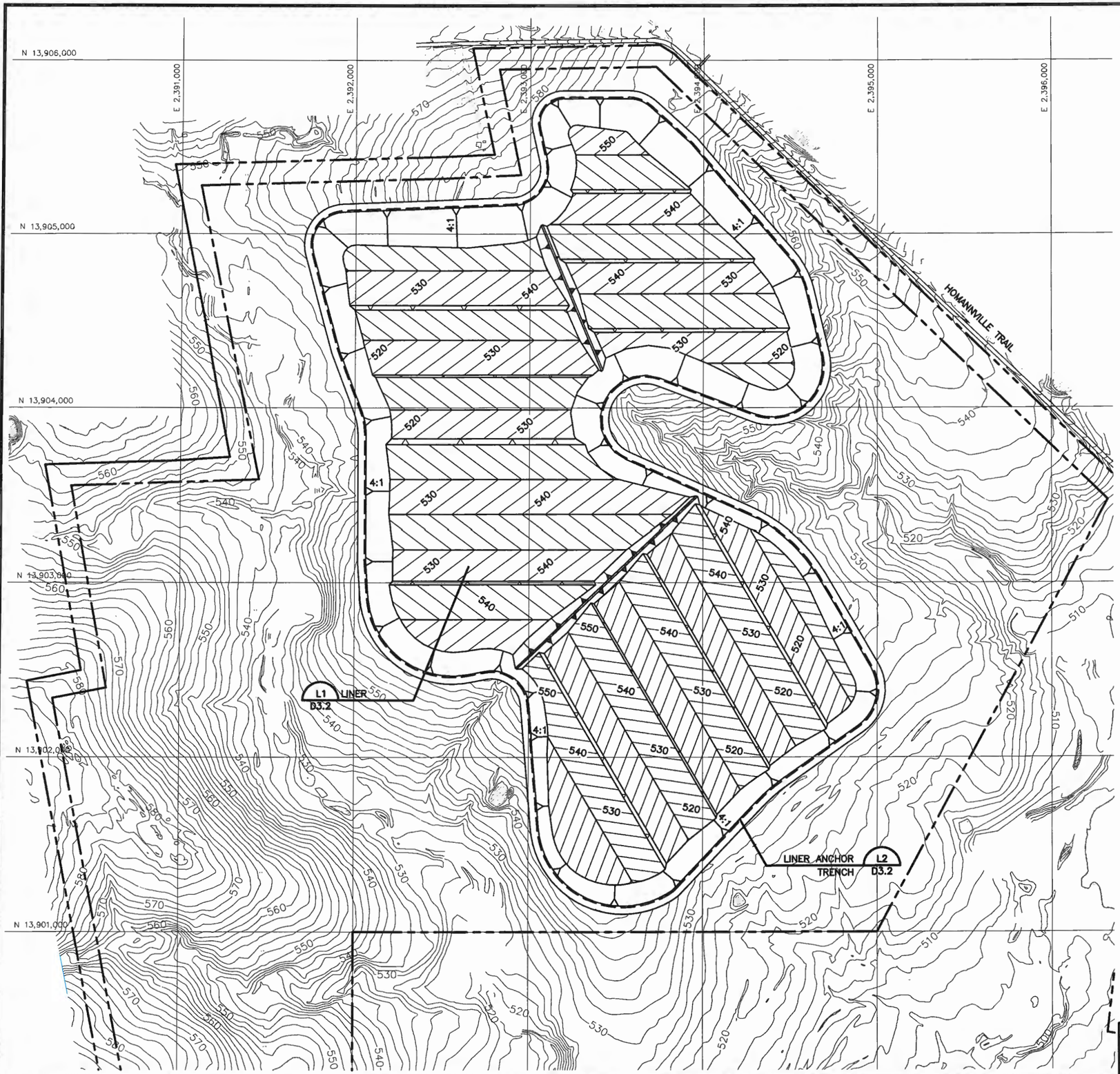
TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-834

CONTENTS

30 TAC §330.63(d)(4)

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

11/6/2014



0 300 600
SCALE IN FEET

LEGEND

- PROPERTY BOUNDARY
- FACILITY BOUNDARY
- LANDFILL FOOTPRINT
- 510 EXISTING 2' CONTOUR
- N 13,904,000 STATE PLANE GRID
- 520 TOP OF COMPACTED SOIL LINER

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SERVICE FROM AERIAL PHOTOGRAPHY FLOWN MAY 13, 2013. HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83). ELEVATIONS ARE RELATIVE TO NAVD88 – GEOID 12A.
2. PROPERTY BOUNDARY, FACILITY BOUNDARY, EASEMENT LOCATIONS, AND PERMANENT BENCHMARK PROVIDED BY HODDE & HODDE LAND SURVEYING, INC.
3. PROPOSED CONTOURS DEPICT TOP OF COMPACTED SOIL LINER.
4. INTERNAL SIDESLOPES ARE 4H:1V.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11-6-2014

ISSUED FOR PERMITTING PURPOSES ONLY

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

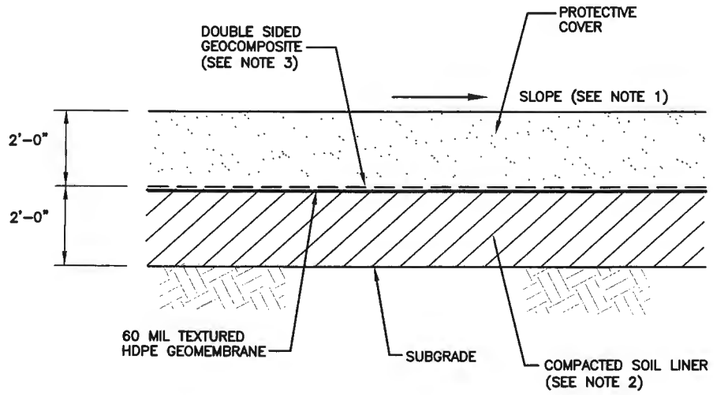
LINER PLAN

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D3.1	
CHK. GWA	DWG : D3.1–LinerPlan.dwg		

J:\129\06 130 Park\101\AttD3\D3.1–LinerPlan.dwg Layout: D3.1 User: scundiff



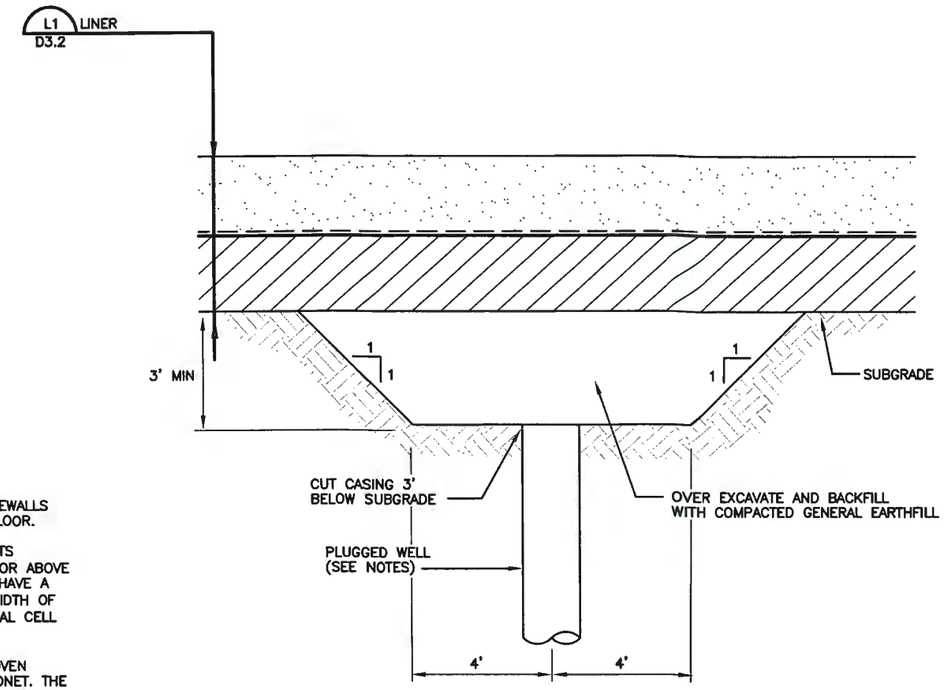
NOTES:

1. THE LINER SYSTEM WILL HAVE A 4H:1V SLOPE ON THE PERIMETER SIDEWALLS AND A 1.5% TO 2.5% DOWN SLOPE AND 2% CROSS SLOPE ON THE FLOOR.
2. THE COMPACTED SOIL LINER MUST BE INSTALLED IN 6 INCH THICK LIFTS COMPACTED TO A MINIMUM OF 95% PROCTOR TEST (ASTM D 698) AT OR ABOVE THE OPTIMUM MOISTURE CONTENT. THE COMPACTED SOIL LINER MUST HAVE A COEFFICIENT OF PERMEABILITY OF 1 x 10^{-7} cm/sec OR LESS. THE WIDTH OF COMPACTED SOIL LIFTS GENERALLY WILL NOT EXCEED 400 FEET (TYPICAL CELL WIDTH).
3. THE DOUBLE SIDED GEOCOMPOSITE CONSISTS OF AN 8 OZ./SY NONWOVEN GEOTEXTILE BONDED TO EACH SIDE OF A 0.275 INCH THICK HDPE GEONET. THE GEOCOMPOSITE MUST HAVE A MINIMUM TRANSMISSIVITY OF 7 x 10^{-4} m^2/sec.

LINER L1 D3.2

0 2 4

SCALE IN FEET



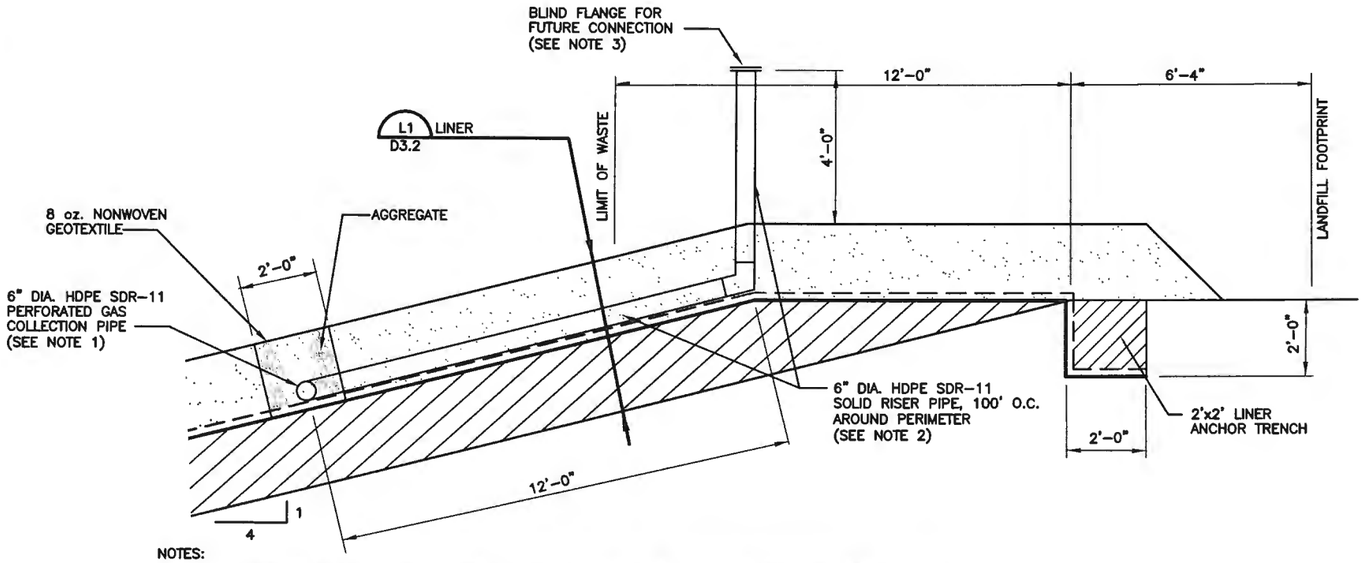
PLUGGED WELL COMPLETION L3 D3.2

0 2 4

SCALE IN FEET

NOTES:

1. ANY WATER WELL OR PIEZOMETER ENCOUNTERED WITHIN THE LANDFILL FOOTPRINT SHALL BE PLUGGED IN ACCORDANCE WITH THE RULES OF THE TCEQ AND OTHER APPLICABLE STATE AGENCIES.
2. ANY OIL OR GAS WELL ENCOUNTERED WITHIN THE LANDFILL FOOTPRINT SHALL BE PLUGGED IN ACCORDANCE WITH THE APPLICABLE TEXAS RAILROAD COMMISSION REGULATIONS.



NOTES:

1. THE PERFORATED GAS COLLECTION PIPE WILL BE INSTALLED ABOVE THE GEOCOMPOSITE AROUND THE ENTIRE PERIMETER OF THE LANDFILL FOR FUTURE GAS COLLECTION IF NECESSARY.
2. RISER PIPES WILL BE INSTALLED AT 100 FOOT INTERVALS AROUND THE PERIMETER OF THE LANDFILL FOR FUTURE CONNECTION TO THE GAS COLLECTION SYSTEM IF NECESSARY.
3. BLIND FLANGES WILL BE PROVIDED ON ENDS OF RISER PIPES FOR THE FUTURE CONNECTION TO THE GAS SYSTEM IF NECESSARY.
4. REFER TO ATTACHMENT G, SECTION 6A FOR A DESCRIPTION OF THE FUTURE GAS COLLECTION SYSTEM CONNECTIONS.

LINER ANCHOR TRENCH L2 D3.2

0 2 4

SCALE IN FEET

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

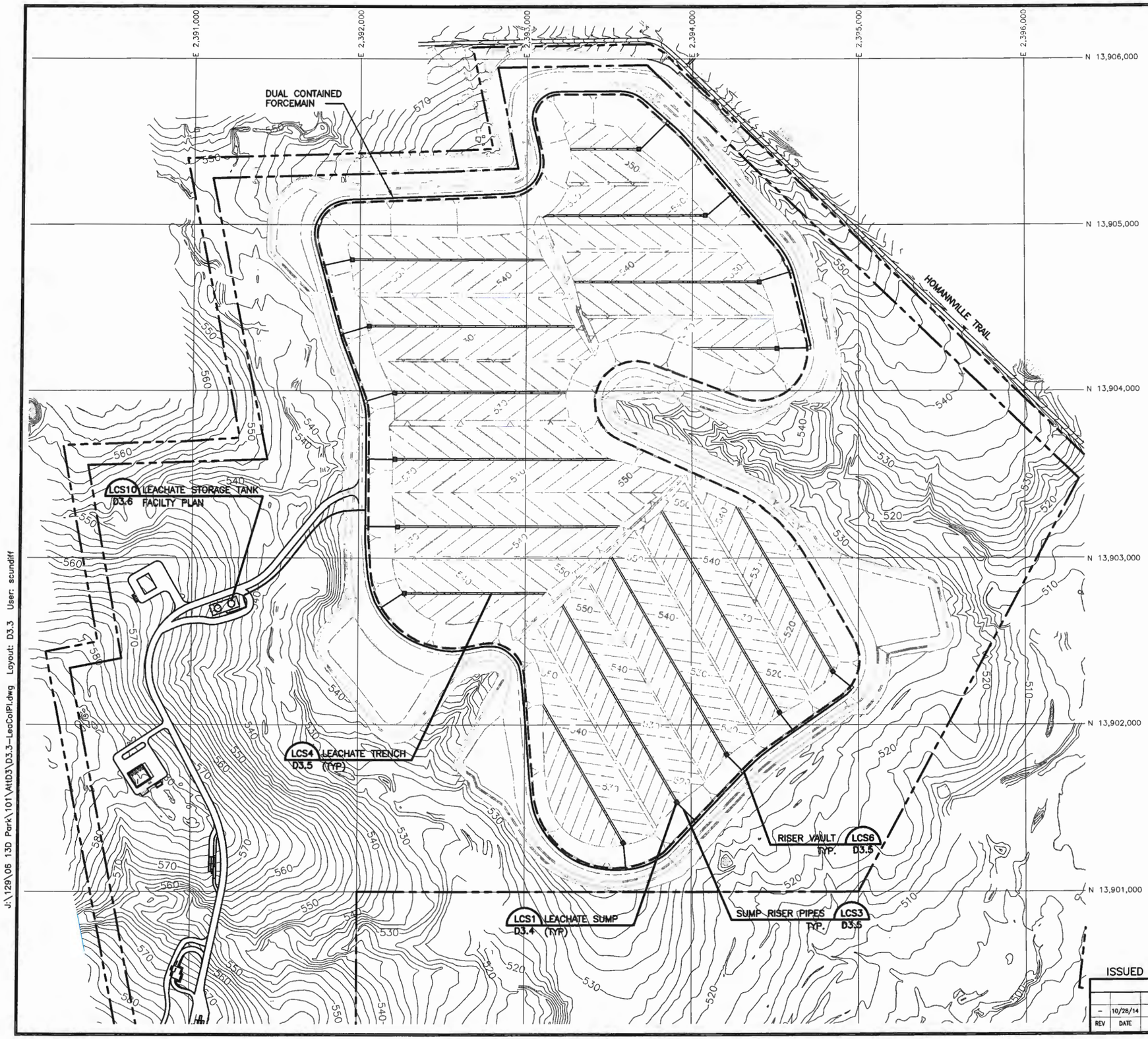
REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

LINER DETAILS

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D3.2	
CHK. GWA	DWG : D3.2-LinerDets.dwg		



0 300 600
SCALE IN FEET

LEGEND

- PROPERTY BOUNDARY
- FACILITY BOUNDARY
- LANDFILL FOOTPRINT
- 510 EXISTING 2' CONTOUR
- N 13,904,000 STATE PLANE GRID
- 530 TOP OF PROTECTIVE COVER
- LEACHATE SUMP

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SERVICE FROM AERIAL PHOTOGRAPHY FLOWN MAY 13, 2013. HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83). ELEVATIONS ARE RELATIVE TO NAVD88 – GEOID 12A.
2. PROPERTY BOUNDARY, FACILITY BOUNDARY, EASEMENT LOCATIONS, AND PERMANENT BENCHMARK PROVIDED BY HODDE & HODDE LAND SURVEYING, INC.
3. PROPOSED CONTOURS DEPICT TOP OF PROTECTIVE COVER.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED PROFESSIONAL ENGINEER
11-6-2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS							
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA	

LEACHATE COLLECTION SYSTEM PLAN

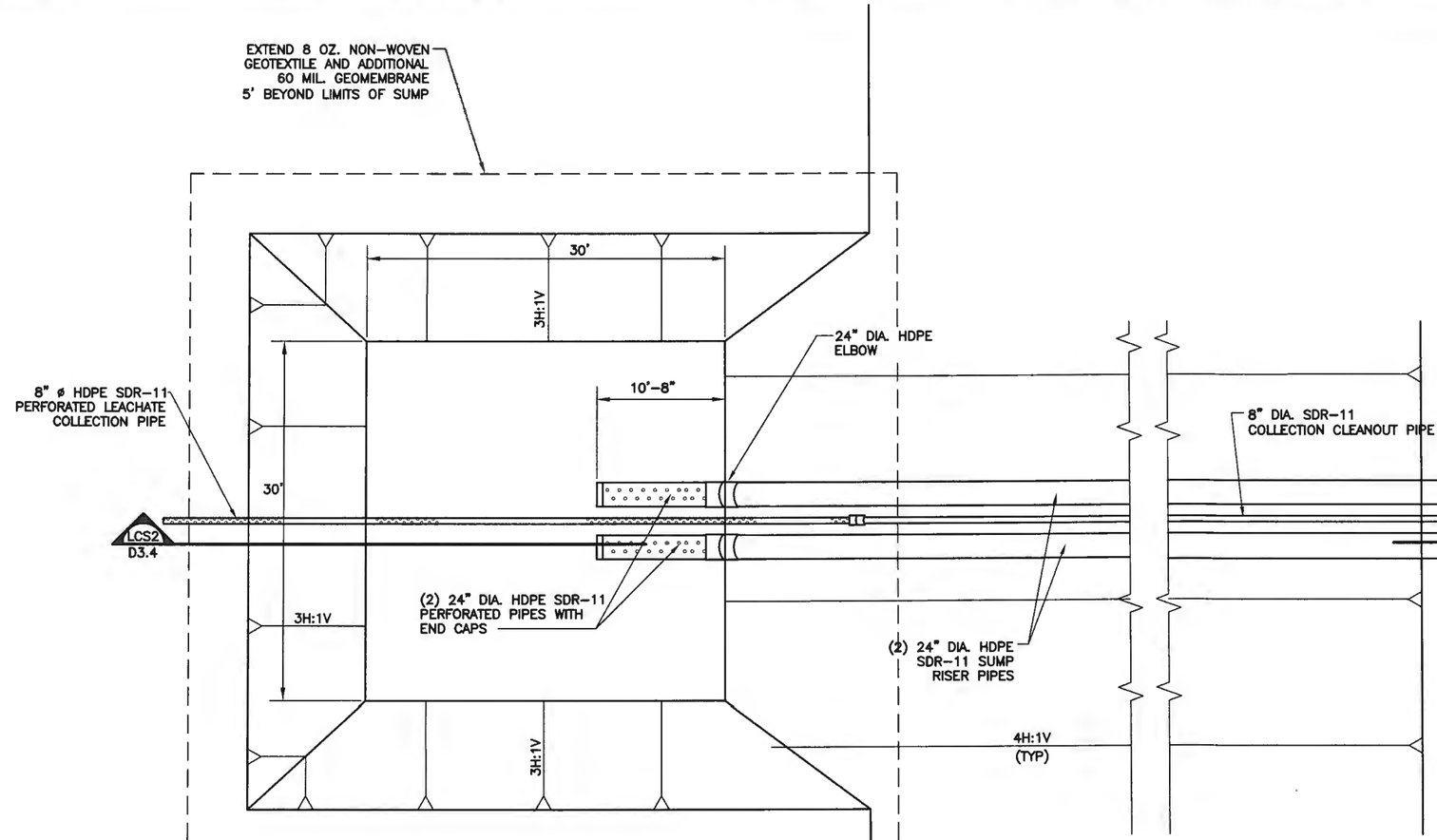
130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13
DWN. GLW	SCALE : GRAPHIC
CHK. GWA	DWG : D3.3–LeaCollPl.dwg

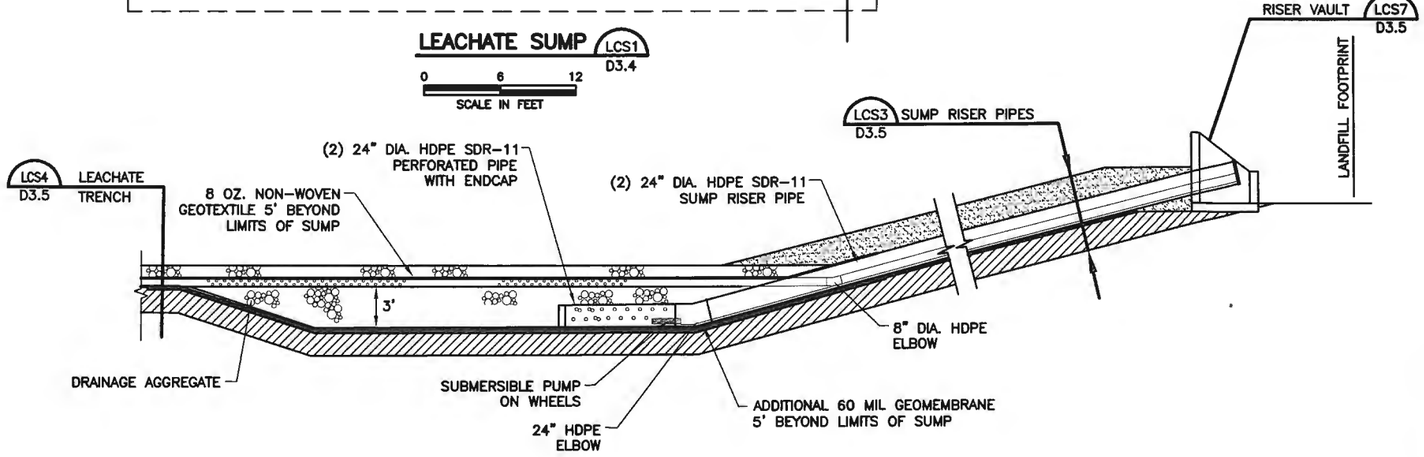
DRAWING D3.3

J:\129\06 13D Park\101\Att\D3\D3.3–LeaCollPl.dwg Layout: D3.3 User: scundiff



LEACHATE SUMP LCS1 D3.4

0 6 12
SCALE IN FEET



LEACHATE SUMP AND RISER LCS2 D3.4

0 6 12
SCALE IN FEET

NOTES:

1. DRAINAGE AGGREGATE NOT SHOWN FOR CLARITY.
2. REFER TO ATTACHMENTS D6 AND D7 FOR INSTALLATION AND MATERIAL REQUIREMENTS.
3. REFER TO ATTACHMENT D6, APPENDIX D6-A FOR LEACHATE SUMP DESIGN CALCULATIONS.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

LEACHATE COLLECTION SYSTEM DETAILS

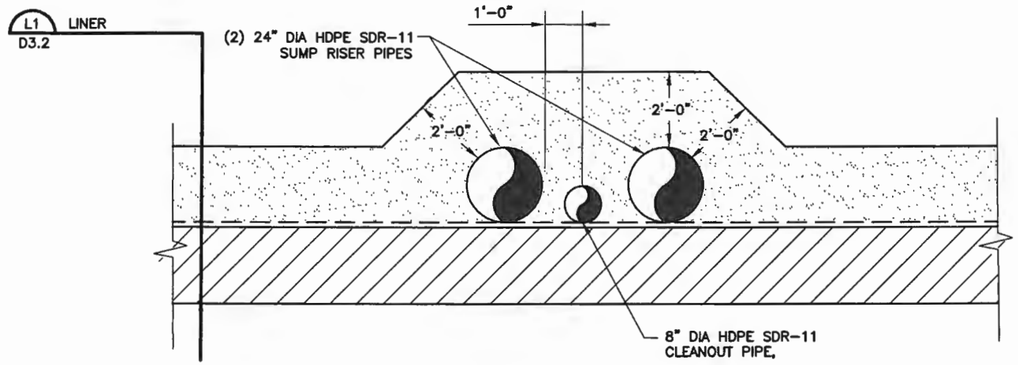
130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144

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

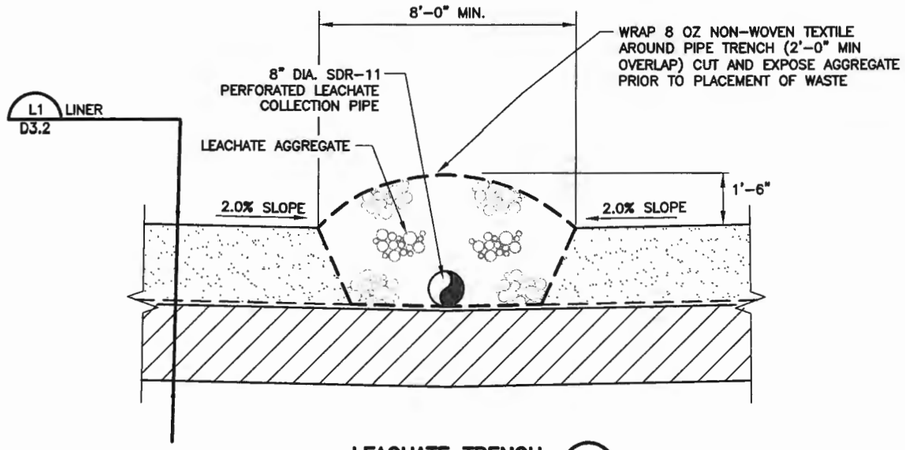
DSN. GWA	DATE : 10/13	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D3.4	
CHK. GWA	DWG : D3.4_5-LeaDet.dwg		

J:\129\06 130 Park\101\Att03\D3.4_5-LeaDet.dwg Layout: D3.4 User: scundiff



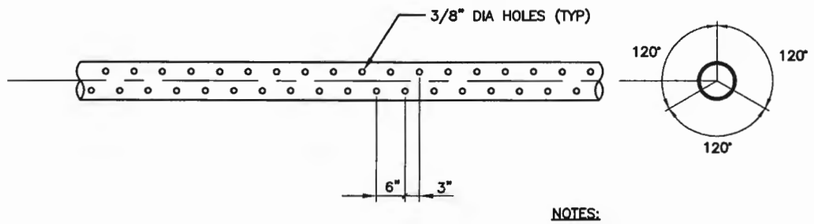
SUMP RISER PIPES (LCS3 D3.5)

0 2 4
SCALE IN FEET



LEACHATE TRENCH (LCS4 D3.5)

0 2 4
SCALE IN FEET

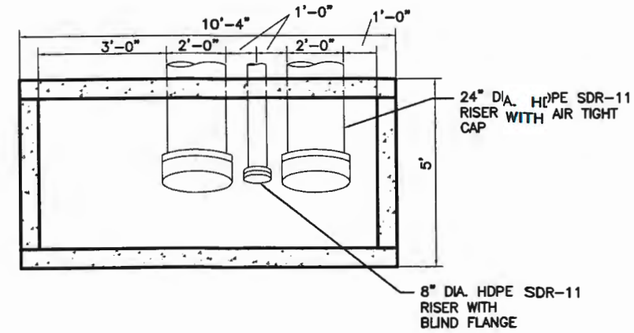


PERFORATED PIPE (LCS5 D3.5)

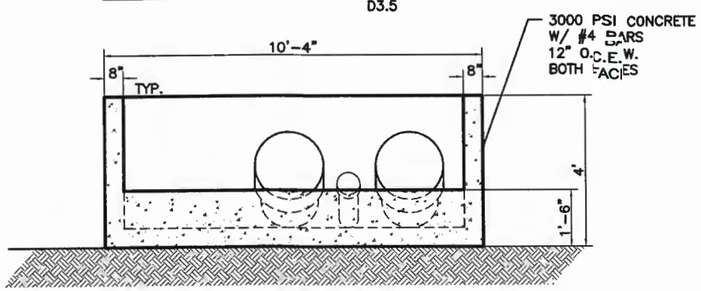
NTS

NOTES:

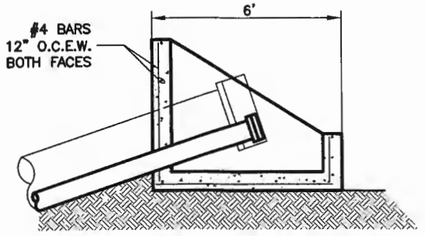
1. REFER TO ATTACHMENTS D6 AND D7 FOR INSTALLATION AND MATERIAL REQUIREMENTS.



RISER VAULT PLAN (LCS6 D3.5)



RISER VAULT SECTION (LCS7 D3.5)



RISER VAULT SECTION (LCS8 D3.5)

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER

11/6/2014

LEACHATE COLLECTION SYSTEM DETAILS

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144

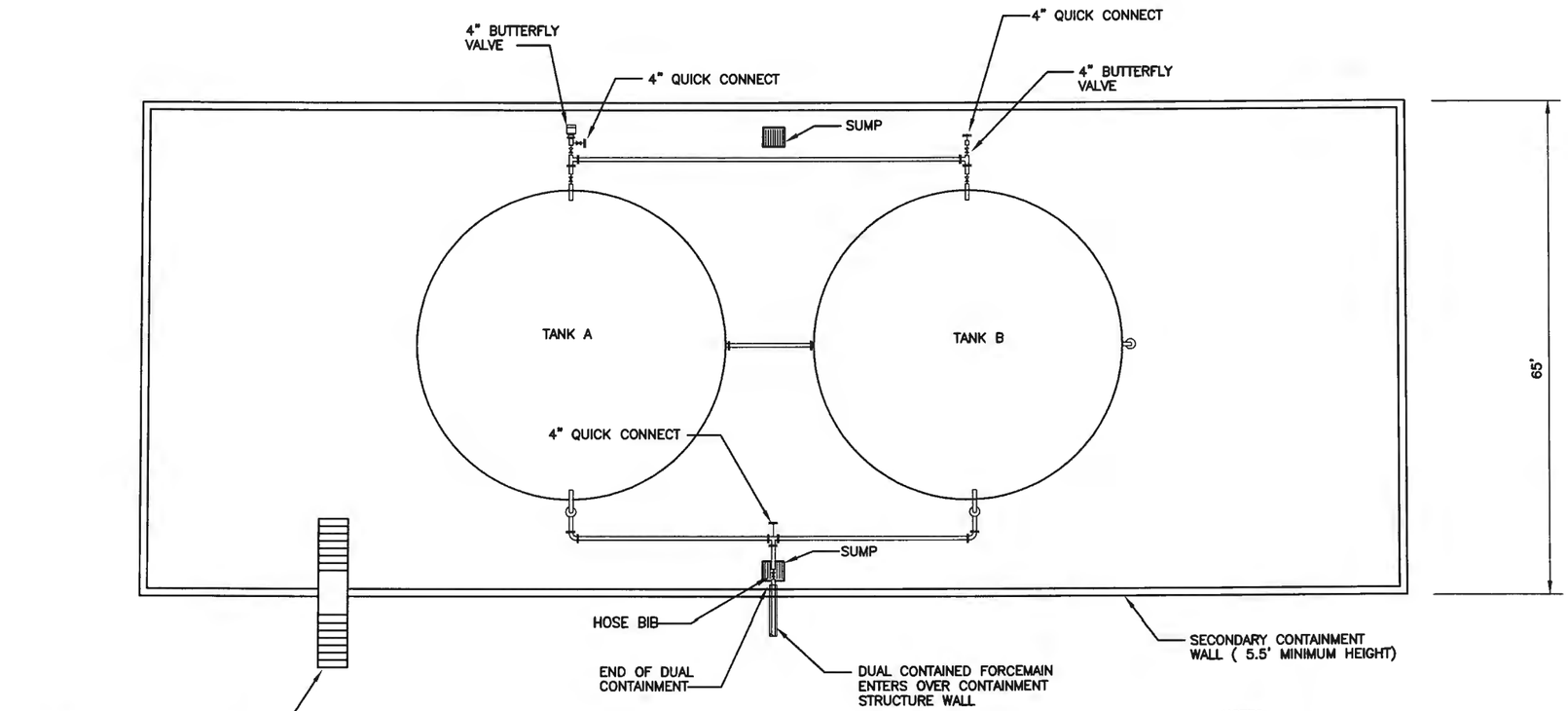
ISSUED FOR PERMITTING PURPOSES ONLY

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

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

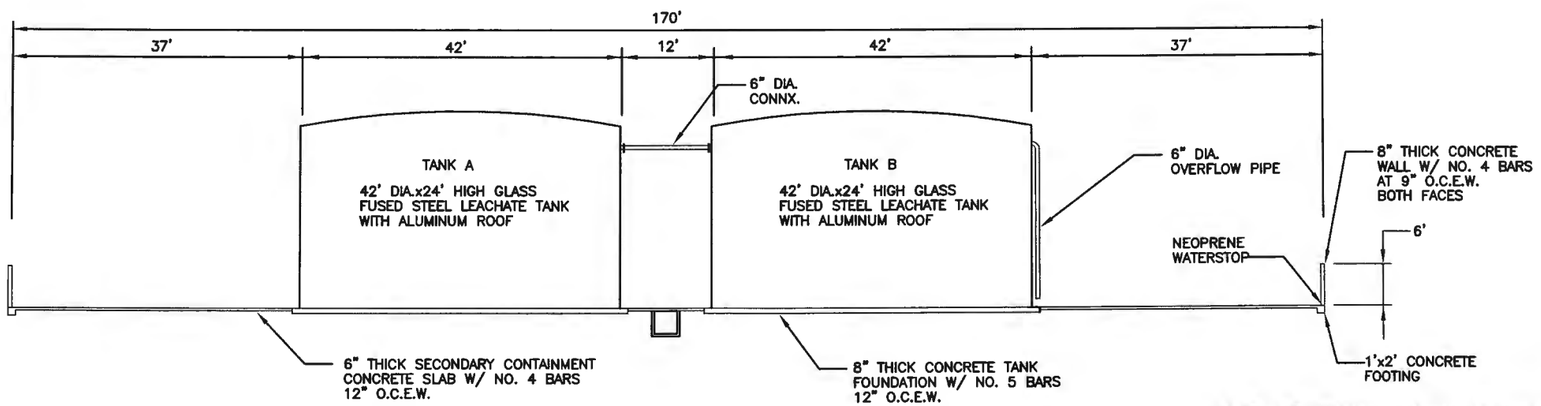
DSN. GWA | DATE : 10/13 | DRAWING D3.5
DWN. GLW | SCALE : GRAPHIC
CHK. GWA | DWG : D3.4_5-LeaDet.dwg

J:\129\06 130 Park\101\Att\D3\D3.4_5-LeaDet.dwg Layout: D3.5 User: scundiff



LEACHATE STORAGE TANK FACILITY PLAN (LCS10) D3.6

0 10 20
SCALE IN FEET



LEACHATE STORAGE TANK FACILITY SECTION (LCS9) D3.6

0 10 20
SCALE IN FEET

NOTES:

1. SECONDARY CONTAINMENT STRUCTURE WILL BE INSTALLED WITH TANK A. TANK B MAY BE INSTALLED AT A LATER DATE WHEN NEEDED.
2. STEEL SECONDARY CONTAINMENT STRUCTURE MAY BE USED INSTEAD OF CONCRETE.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

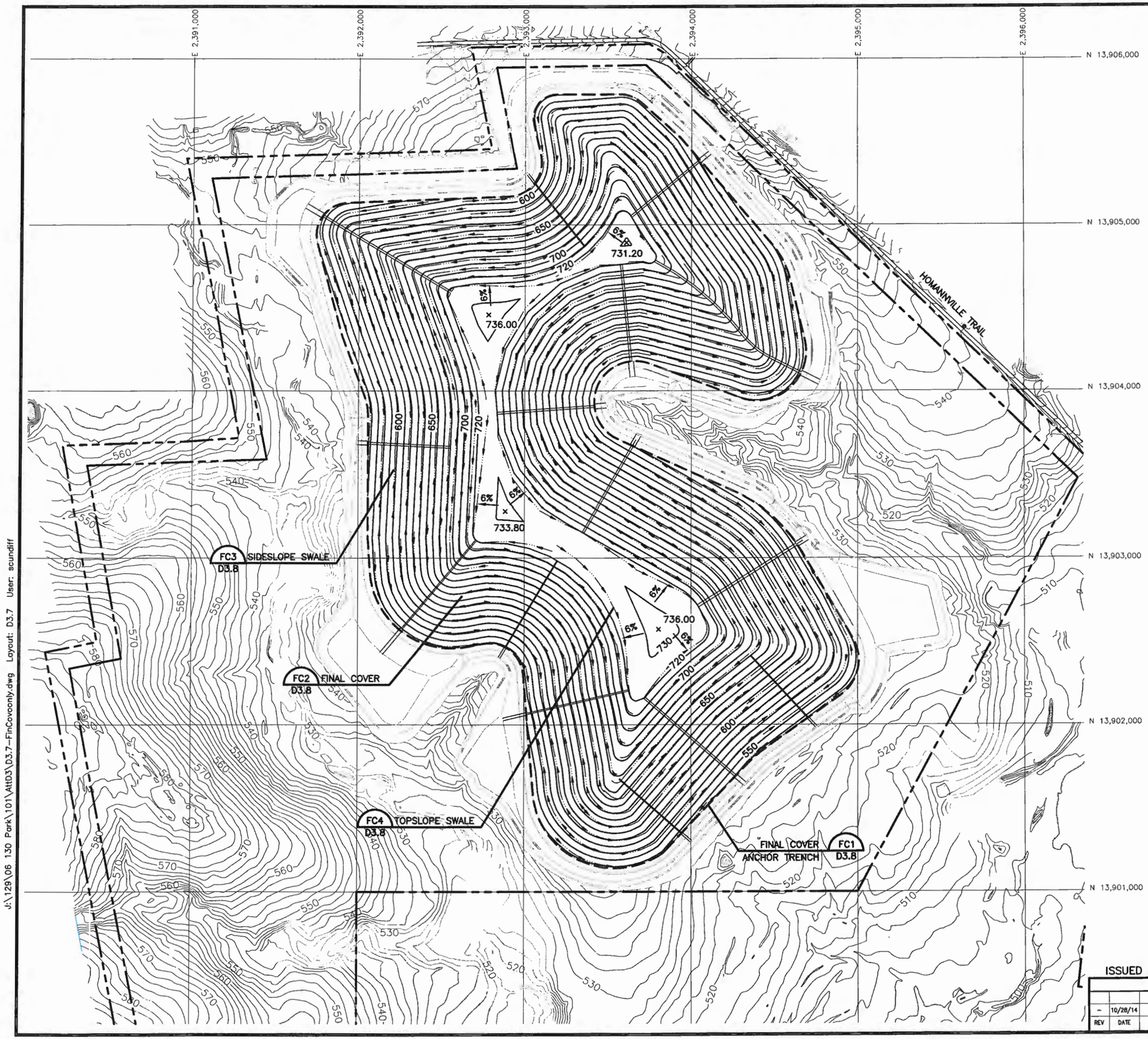
LEACHATE STORAGE TANK FACILITY

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD ◆ WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN.	GWA	DATE : 10/13	DRAWING
DWN.	GLW	SCALE : GRAPHIC	D3.6
CHK.	GWA	DWG : D3.4_5-LeaDet.dwg	

J:\129\06 130 Park\101\Att03\D3.4_5-LeaDet.dwg Layout: D3.6 User: scundiff



0 300 600
SCALE IN FEET

LEGEND

- PROPERTY BOUNDARY
- FACILITY BOUNDARY
- LANDFILL FOOTPRINT
- 510 EXISTING 2' CONTOUR
- N 13,904,000 STATE PLANE GRID
- 600 TOP OF FINAL COVER 10' CONTOUR

NOTES:

1. CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SERVICE FROM AERIAL PHOTOGRAPHY FLOWN MAY 13, 2013. HORIZONTAL DATUM IS TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH CENTRAL ZONE (NAD 83). ELEVATIONS ARE RELATIVE TO NAVD88 – GEOID 12A.
2. PROPERTY BOUNDARY, FACILITY BOUNDARY, EASEMENT LOCATIONS, AND PERMANENT BENCHMARK PROVIDED BY HODDE & HODDE LAND SURVEYING, INC.
3. PROPOSED CONTOURS DEPICT TOP OF FINAL COVER.
4. SEE DRAWING D1.7 FOR LANDFILL COMPLETION PLAN.

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED
PROFESSIONAL ENGINEER
11-6-2014

ISSUED FOR PERMITTING PURPOSES ONLY

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

FINAL COVER PLAN

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

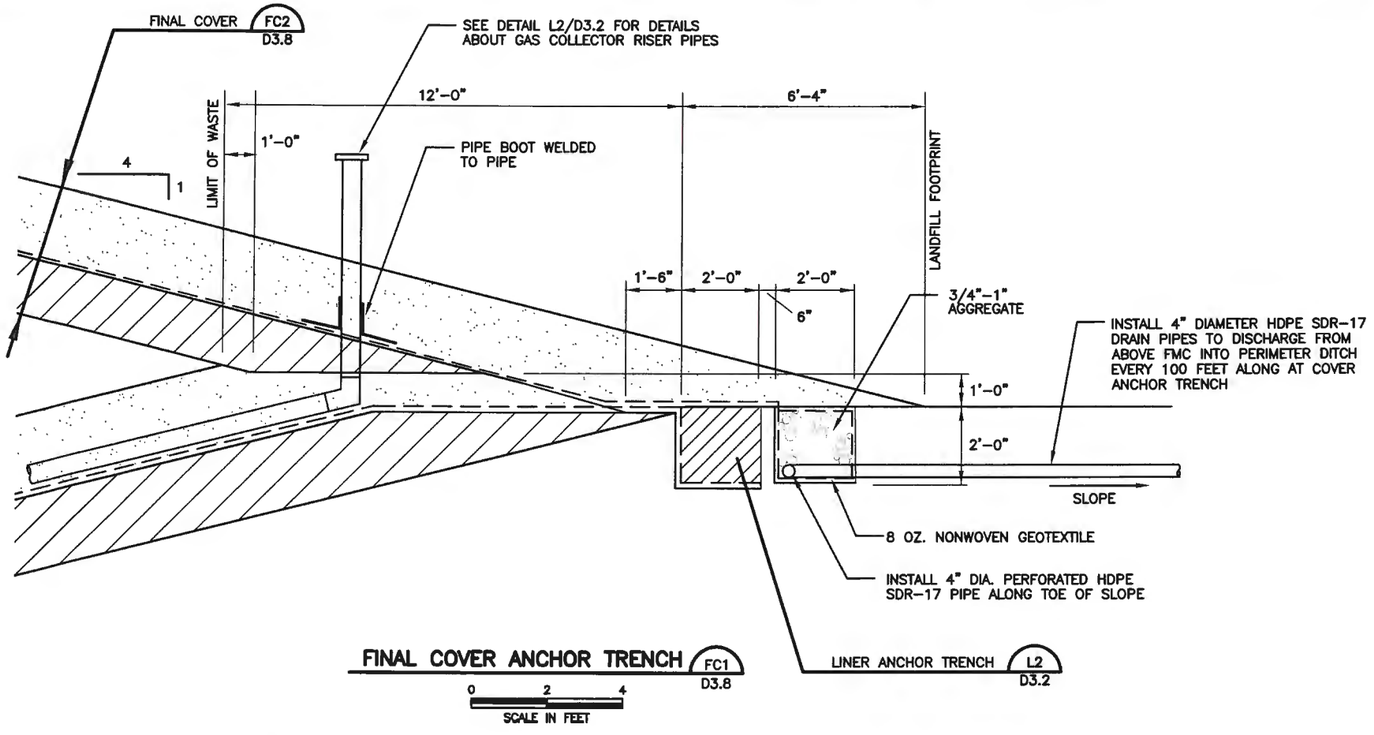
BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144

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

DSN. GWA | DATE : 10/13
DWN. GLW | SCALE : GRAPHIC
CHK. GWA | DWG : D3.7–FinCovoonly.dwg

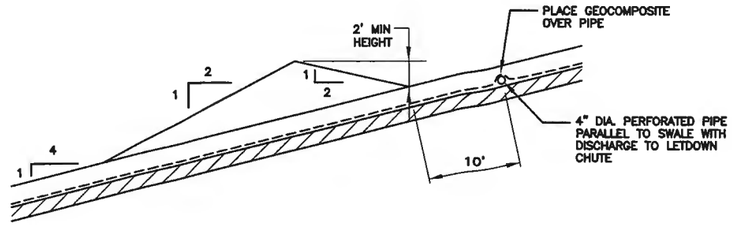
DRAWING D3.7

J:\129\06 130 Park\101\AttD3\D3.7–FinCovoonly.dwg Layout: D3.7 User: scundiff



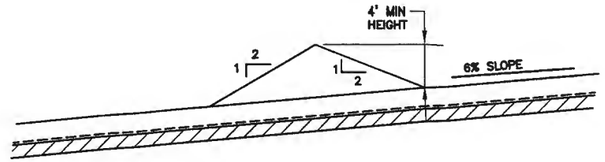
FINAL COVER ANCHOR TRENCH FC1 D3.8

0 2 4
SCALE IN FEET



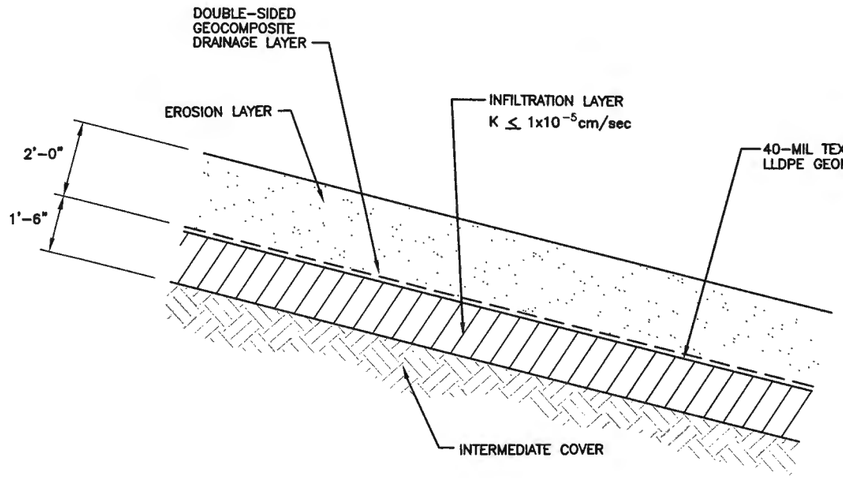
SIDESLOPE SWALE FC3 D3.8

0 4 8
SCALE IN FEET

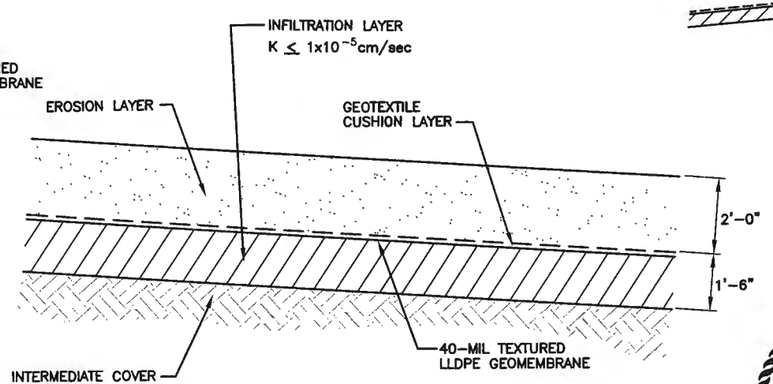


TOPSLOPE SWALE FC4 D3.8

0 4 8
SCALE IN FEET



SIDESLOPE



TOPSLOPE

FINAL COVER FC2 D3.8

0 2 4
SCALE IN FEET

STATE OF TEXAS
GREGORY W. ADAMS
73356
LICENSED PROFESSIONAL ENGINEER
11/6/2014

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
–	10/28/14	TECHNICALLY COMPLETE	GLW	GWA	GWA	GWA

FINAL COVER DETAILS

130 ENVIRONMENTAL PARK, LLC
130 ENVIRONMENTAL PARK
TYPE I PERMIT APPLICATION

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256 TBPG FIRM NO. 50222

DSN. GWA	DATE : 10/13	DRAWING	
DWN. GLW	SCALE : GRAPHIC	D3.8	
CHK. GWA	DWG : D3.8-FCDet.dwg		

J:\129\06 130 Park\101\AthD3\D3.8-FCDet.dwg Layout: D3.8 User: scundiff

130 ENVIRONMENTAL PARK
CALDWELL COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2383

TYPE I PERMIT APPLICATION

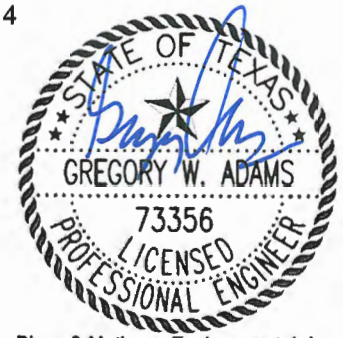
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D4
SITE LIFE

Prepared for

130 ENVIRONMENTAL PARK, LLC

Technically Complete October 28, 2014



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256
11/6/2014

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

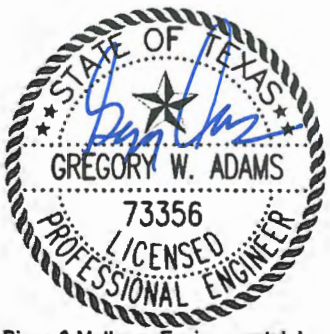
And

BIGGS & MATHEWS, INC.
2500 Brook Avenue • Wichita Falls, Texas 76301 • 940-766-0156

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-834

CONTENTS

30 TAC §330.63(d)(4)(D)



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

11/6/2014

1 SITE LIFE

30 TAC §330.63(d)(4)(D)

1.1 Solid Waste Generation

130 Environmental Park will accept waste generated in Caldwell County, Texas, and surrounding areas. 130 Environmental Park has been designed to provide disposal capacity for waste generated from the areas identified as well as other neighboring counties. The facility will accept waste the equivalent of 5.5 days per week (approximately 286 days per year). The waste acceptance rate is projected to increase at an annual rate of 1.58 percent for the life of the facility.

1.2 Airspace Utilization

An airspace utilization factor (ratio of tons disposed to in-place cubic yard volume) of 0.80 was used to calculate the projected site life based on the approximate volume available for deposition of solid waste.

1.3 Landfill Capacity

The total landfill capacity is defined as the volume between the protective cover and the top of waste, and was estimated using Trimble TerraModel computer software. The total landfill disposal capacity is approximately 33,114,000 cubic yards (cy) of waste and daily cover.

1.4 Site Life Calculations

The capacity for solid waste in tons was calculated by multiplying the airspace utilization factor by the solid waste capacity (cubic yards). The solid waste capacity for the site is approximately 26,500,000 tons. The proposed site will reach the design waste capacity in approximately 44 years at the projected waste acceptance rates.

130 ENVIRONMENTAL PARK
SITE LIFE

Required:

Estimate the total capacity and site life for the proposed configuration.

Assumptions:

1. The waste acceptance rate increases at an annual rate of 1.58% consistent with 80% of CAPCOG Region Population Projections.
2. Beginning Waste Accepted = 1,500 tons/day
3. Airspace Utilization Factor = 0.80
4. The facility accepts waste 286 days per year (5.5 days a week).

Solution:

AUF:	0.80		
Year 1 Waste (tons):	429,000	Total waste volume =	33,114,000 cy
Days Operating	286	Total waste volume =	26,491,200 tons

Year	Annual Waste (tons)	Daily Waste (tons/day)	Accumulated Waste (tons)	Remaining Capacity (tons)	Annual Waste (cy)	Accumulated Waste (cy)	Remaining Capacity (cy)
1	429,000	1,500	429,000	26,062,200	536,250	536,250	32,577,750
2	435,778	1,524	864,778	25,626,422	544,723	1,080,973	32,033,027
3	442,663	1,548	1,307,442	25,183,758	553,329	1,634,302	31,479,698
4	449,658	1,572	1,757,099	24,734,101	562,072	2,196,374	30,917,626
5	456,762	1,597	2,213,861	24,277,339	570,953	2,767,327	30,346,673
6	463,979	1,622	2,677,840	23,813,360	579,974	3,347,301	29,766,699
7	471,310	1,648	3,149,150	23,342,050	589,137	3,936,438	29,177,562
8	478,757	1,674	3,627,907	22,863,293	598,446	4,534,884	28,579,116
9	486,321	1,700	4,114,228	22,376,972	607,901	5,142,785	27,971,215
10	494,005	1,727	4,608,233	21,882,967	617,506	5,760,291	27,353,709
11	501,810	1,755	5,110,043	21,381,157	627,263	6,387,553	26,726,447
12	509,739	1,782	5,619,781	20,871,419	637,173	7,024,727	26,089,273
13	517,793	1,810	6,137,574	20,353,626	647,241	7,671,967	25,442,033
14	525,974	1,839	6,663,548	19,827,652	657,467	8,329,435	24,784,565
15	534,284	1,868	7,197,832	19,293,368	667,855	8,997,290	24,116,710
16	542,726	1,898	7,740,557	18,750,643	678,407	9,675,697	23,438,303
17	551,301	1,928	8,291,858	18,199,342	689,126	10,364,823	22,749,177
18	560,011	1,958	8,851,870	17,639,330	700,014	11,064,837	22,049,163
19	568,860	1,989	9,420,729	17,070,471	711,074	11,775,911	21,338,089
20	577,848	2,020	9,998,577	16,492,623	722,309	12,498,221	20,615,779
21	586,978	2,052	10,585,554	15,905,646	733,722	13,231,943	19,882,057
22	596,252	2,085	11,181,806	15,309,394	745,315	13,977,257	19,136,743
23	605,673	2,118	11,787,478	14,703,722	757,091	14,734,348	18,379,652
24	615,242	2,151	12,402,721	14,088,479	769,053	15,503,401	17,610,599
25	624,963	2,185	13,027,684	13,463,516	781,204	16,284,604	16,829,396
26	634,837	2,220	13,662,521	12,828,679	793,547	17,078,151	16,035,849
27	644,868	2,255	14,307,389	12,183,811	806,085	17,884,236	15,229,764
28	655,057	2,290	14,962,446	11,528,754	818,821	18,703,057	14,410,943
29	665,407	2,327	15,627,852	10,863,348	831,758	19,534,815	13,579,185
30	675,920	2,363	16,303,772	10,187,428	844,900	20,379,715	12,734,285
31	686,600	2,401	16,990,372	9,500,828	858,250	21,237,965	11,876,035
32	697,448	2,439	17,687,820	8,803,380	871,810	22,109,775	11,004,225
33	708,468	2,477	18,396,287	8,094,913	885,584	22,995,359	10,118,641
34	719,661	2,516	19,115,949	7,375,251	899,577	23,894,936	9,219,064
35	731,032	2,556	19,846,981	6,644,219	913,790	24,808,726	8,305,274
36	742,582	2,596	20,589,563	5,901,637	928,228	25,736,954	7,377,046
37	754,315	2,637	21,343,878	5,147,322	942,894	26,679,847	6,434,153
38	766,233	2,679	22,110,111	4,381,089	957,792	27,637,639	5,476,361
39	778,340	2,721	22,888,451	3,602,749	972,925	28,610,564	4,503,436
40	790,638	2,764	23,679,089	2,812,111	988,297	29,598,861	3,515,139
41	803,130	2,808	24,482,218	2,008,982	1,003,912	30,602,773	2,511,227
42	815,819	2,853	25,298,037	1,193,163	1,019,774	31,622,546	1,491,454
43	828,709	2,898	26,126,746	364,454	1,035,886	32,658,433	455,567
44	841,803	2,943	26,968,549	-477,349	1,052,253	33,710,686	-596,686

130 ENVIRONMENTAL PARK
CALDWELL COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2383

TYPE I PERMIT APPLICATION

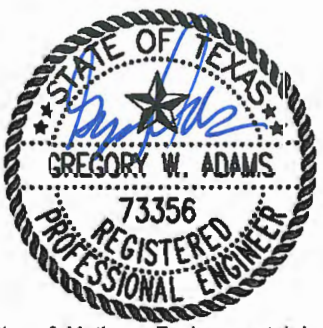
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D5
GEOTECHNICAL DESIGN

Prepared for

130 ENVIRONMENTAL PARK, LLC

Technically Complete October 28, 2014



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

11/6/2014

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

And

BIGGS & MATHEWS, INC.
2500 Brook Avenue • Wichita Falls, Texas 76301 • 940-766-0156

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-834

CONTENTS

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256
11/6/2014

TABLES

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

11/6/2014

1 GEOTECHNICAL TESTING

30 TAC §330.63(e)(5)

The geotechnical report is based on the field explorations described in Attachment E – Geology Report. Geotechnical tests were performed on samples recovered from the borings to evaluate the physical and engineering properties of the subsurface materials. The results of the laboratory tests are provided in Attachment E, Appendix E5 – Laboratory Tests, and on the boring logs in Attachment E, Appendix E2 – Site Exploration Data.

Numerous Atterberg limits, gradation, and percent passing the number 200 sieve tests have been performed during the site investigation. These test results were used to classify the soils according to the Unified Soil Classification System (USCS) and to evaluate the engineering properties of the soils.

Unit dry weight and moisture content tests were performed to determine the physical properties of the soils. These test results were used in the evaluation of slope stability and in the settlement and heave analysis.

A total of five vertical and two horizontal hydraulic conductivity tests have been performed on undisturbed samples from the units that may form the bottom and sides of the proposed excavations. The laboratory and test results were used to evaluate the hydrogeologic parameters of the site and the hydraulic conductivity of engineered fill constructed from on-site materials.

2 SUBSURFACE MATERIALS

30 TAC §330.63(e)(5)

The stratigraphy beneath the proposed 130 Environmental Park was characterized using information from the site exploration for the site and is presented in Attachment E – Geology Report.

The site is founded on the outcrop of the Midway Group. The Midway in the area consists primarily of hard, silty, highly plastic clay and based on published literature is between 400 and 600 feet thick beneath the site. The borings encountered the following general strata, all of which are part of the Midway clays.

Stratum I – Silty Clay

Stratum I ranges from two to six feet thick and consists primarily of brown to tan, organic silty fat clay with occasional occurrence of cobbles, pebbles and some gravel. This stratum represents the weathered clay and terrace deposits that have settled into the underlying Midway clay.

Stratum II – Weathered Silty Clay

Stratum II ranges from 30 to 60 feet thick and consists of weathered hard, silty, highly plastic clay. The degree of weathering decreases with depth and the color varies from tan near the surface to tan and gray and eventually to gray at the interface with the unweathered silty clay.

Stratum III – Unweathered Silty Clay

Stratum III consists of unweathered, hard, silty, highly plastic clay. The unweathered clay is dark gray and was encountered in all of the borings. Published literature suggests that the Midway is 400 to 600 feet thick beneath the site.

Table D5-1
130 Environmental Park
Generalized Site Stratigraphy

Geologic Unit	Lithology	Average Depth to Top of Unit (ft)	Average Thickness of Unit (ft)
Stratum I	Silty Clay	Surface outcrop	4
Stratum II	Weathered Silty Clay	4	48
Stratum III	Unweathered Silty Clay	50	400 – 600

2.1 Material Properties

The laboratory test results are included in Attachment E, Appendix E5 – Laboratory Tests and are summarized on Table D5-2. These test results were reviewed along with

the boring logs to develop generalized soil properties for use in the analyses. As shown on the cross sections in Attachment E, Appendix E3 – Site Geologic Data, the landfill excavation will encounter silty clay.

Table D5-2
130 Environmental Park
Average Properties of On-Site Materials

Stratum	USCS Classification	Liquid Limit %	Plastic Limit %	Plasticity Index %	Passing 200 Sieve %	Moisture Content %	Unit Dry Weight (pcf)
I	CH	69	26	43	88	NA	NA
II	CH	72	28	44	95	23.9	99.7
III	CH	70	28	42	96	24.8	97.8

2.2 Material Requirements

On-site soils will be required for construction of the compacted soil liner and protective cover components of the liner system, and for the infiltration layer and erosion layer components of the final cover system. On-site soils will also be required for operational cover (daily and intermediate) and general earthfill. Typical material requirements for the various landfill components are summarized in Table D5-3.

The soil liner and final cover infiltration layer must be constructed from soils that can be compacted to form a low hydraulic conductivity barrier. The classification and hydraulic conductivity test results indicate that the silty clay excavated from the site will be satisfactory for use as compacted soil liner and infiltration layer material.

Protective cover and erosion layer soils will not contain large rocks. Operational cover soils will not have been previously mixed with waste materials and erosion layer material will be capable of sustaining vegetation. The test results and boring logs indicate that any of the soil material excavated from the site will be suitable for use as operational and protective cover and that the surficial soils will be suitable for use as the upper layer of the final cover system erosion layer.

Table D5-3
130 Environmental Park
Typical Soil Requirements for Landfill Construction

Landfill Component	Classification	LL	PI	% - 200	Hydraulic Conductivity cm/sec	Material Source
Soil Liner	SC, CL, CH	30 min	15 min	30 min	$\leq 1 \times 10^{-7}$	On-site
Infiltration Layer	SC, CL, CH	30 min	15 min	30 min	$\leq 1 \times 10^{-5}$	
Protective Cover	SP, SM, SC, CL, CH, ML	No large rocks				
Erosion Layer	SC, CL, SM, CH, ML	Suitable to support plant growth				
Operational Cover (Daily Cover, Intermediate Cover)	SP, SC, CL, CH, ML, SM	Not mixed with waste				
General Fill	SC, CL, CH, ML	NA	5 min	15 min	NA	

3 EARTHWORK

30 TAC §330.337(e)

3.1 Excavation

Excavations up to about 50 feet below the existing ground surface will be required to achieve the design subgrade elevations. The excavations in the northern half of the site will average about 40 feet deep, while the excavations in the southern half of the site will average about 25 feet deep. Prior to use the soils will be tested for suitability in accordance with Attachment D7 – Liner Quality Control Plan and Attachment D8 – Final Cover Quality Control Plan. Excavation and construction below the groundwater table is discussed in Section 4 and the stability of excavation slopes is discussed in Section 6.

3.2 Earthfill

General fill will be required to construct roads and perimeter berms. General fill should consist of on-site soils, which are free of organic or other objectionable materials. General fill should be spread in maximum 9-inch-thick loose lifts. General fill should be compacted to a minimum of 95 percent of maximum dry density as defined by the standard Proctor test (ASTM D698), within a range of two percentage points below to three percentage points above optimum moisture content. A minimum of one standard Proctor test should be performed on each representative soil used as general fill material.

4 CONSTRUCTION BELOW THE GROUNDWATER TABLE

30 TAC §330.337

As shown in Attachment D7 – Liner Quality Control Plan, Drawing D7-A.1 – Highest Measured Groundwater Elevations, the excavation will not extend below the highest recorded groundwater elevations within the landfill footprint. Consequently, the liners will be constructed above the highest measured groundwater elevations.

5 SETTLEMENT AND HEAVE ANALYSIS

30 TAC §330.337(e)

5.1 Subgrade Heave

Heave or rebound can occur in cohesive soils after the removal of overburden. Heave occurs relatively soon after excavating the overburden and is directly related to the depth of the excavation. The potential heave in the subgrade beneath the floor of the landfill was calculated from the recompression index and the unit weights of the overburden soils. The predicted heave is less than five inches and should be uniform over the landfill floor. Since the heave should occur during and soon after excavation it will not adversely affect the performance of the liner system. Subgrade heave calculations are presented in Appendix D5-A – Settlement/Heave Analysis.

5.2 Subgrade Settlement

Settlement may occur due to consolidation of cohesive soils from the weight of the landfill components (i.e., liner, solid waste and daily cover, and final cover systems). The predicted maximum differential settlement is about 11 inches. The settlement of the liner should be generally uniform and is within the strain tolerance of the liner system. Furthermore, subgrade settlement will occur slowly as the waste is deposited allowing redistribution of stresses within the layers. Any differential settlement should be distributed over the distance from near the center of the fill where the waste thickness is greater to the edges where the fill thickness is less. Subgrade settlement calculations are presented in Appendix D5-A.

5.3 Solid Waste Settlement

Consolidation and decomposition can produce settlement within the solid waste. Primary consolidation results from stress increase and occurs soon after load application and secondary consolidation results from the decomposition of solid waste. Due to the length of time that it will take to construct and fill the landfill, most of the consolidation in the waste will have occurred prior to construction of the final cover system. Minor settlement that occurs after the construction of the final cover system will be corrected by the addition of erosion layer material in accordance with Part III, Attachment I – Postclosure Plan.

6 SLOPE STABILITY ANALYSES

30 TAC §330.337(e)

Slope stability analyses were performed on representative sections of the landfill to predict the stability of the excavation slope, liner slope, interim waste slope, final waste slope and final cover slope. Excavation and liner slope sections were developed to represent the critical subsurface conditions that may be encountered. The geometry of the sections was developed from the proposed excavation and landfill completion plans and from data on logs of borings drilled in the vicinity of each section.

Table D5-4 summarizes the unit weights and strength parameters that were used for the stability analyses. The unit weights and strength parameters for the in situ soils were selected based on a review of the boring logs and laboratory and field test results. The unit weights and strength parameters for the liner/cover material and solid waste were selected based on engineering judgment and test values. Site specific strength parameters for the liner and cover geosynthetic materials will be verified prior to construction in accordance with Attachment D7 – Liner Quality Control Plan and Attachment D8 – Final Cover Quality Control Plan.

Table D5-4
130 Environmental Park
Summary of Material Weight and Strength Properties

Material	Description	Wet Weight (pcf)	Total Stress		Effective Stress	
			Cohesion (psf)	Friction (deg)	Cohesion (psf)	Friction (deg)
Stratum II	Silty Clay	123.5	1935	11.1	2381	9.6
Stratum III	Silty Clay	122.1	1935	11.1	2381	9.6
Compacted Soil	Silty Clay	109.4	1935	11.1	2381	9.6
Geosynthetics	Geomembrane/Soil	109.4	1361	5.2	1361	5.2
Solid Waste	Waste	60.0	250	23.0	250	23.0

The excavation and retaining wall sections were analyzed for short-term conditions using total stress parameters and long-term conditions using effective stress parameters. The interim waste slope was analyzed for short-term conditions using total stress parameters. The final waste slope was analyzed for long-term conditions using effective stress parameters. PCSTABL6, a computer program developed to model the slope stability, was used to analyze the stability of the excavation and retaining wall sections, interim waste slopes, and final waste slopes. The results of the stability analyses indicate that the proposed slopes are stable under the conditions analyzed. Table D5-5 summarizes the results of the stability analyses and compares the calculated factor of safety to the recommended minimum factor of safety. The recommended minimum factors of safety were selected from the Corps of Engineers "Design and Construction of Levees" manual (EM 1110-2-1913). The slope stability analyses are provided in Appendix D5-B.

The interim and final waste slope stability was analyzed for two failure modes. The circular arc failure analysis was performed using properties of the solid waste, clay liner and supporting soils. The sliding block analysis was performed using properties of the solid waste and the geomembrane to geocomposite interface at the floor of the cell.

Table D5-5
130 Environmental Park
Summary of Slope Stability Analyses

Condition	Minimum Calculated Factor of Safety	Recommended Factor of Safety	Acceptable Factor of Safety
Excavation			
Short Term	2.8	1.3	Yes
Long Term	3.0	1.5	Yes
Retaining Wall			
Short Term	7.1	1.3	Yes
Long Term	8.4	1.5	Yes
Interim Waste Slope			
Circular Arc Failure	1.6	1.3	Yes
Sliding Block Failure	2.1	1.3	Yes
Final Waste Slope			
Circular Arc Failure	2.1	1.5	Yes
Sliding Block Failure	1.8	1.5	Yes
Liner Veneer			
Protective Cover/Geocomposite	3.2	1.3	Yes
Geocomposite/Geomembrane	3.1	1.3	Yes
Geomembrane/Soil Liner	2.8	1.3	Yes
Final Cover Veneer (side slope)			
Erosion Layer/Geocomposite	3.2	1.5	Yes
Geocomposite/FMC	3.1	1.5	Yes
FMC/Infiltration Layer	2.8	1.5	Yes
Final Cover Veneer (top slope)			
Erosion Layer/Geotextile	7.5	1.5	Yes
Geotextile/FMC	8.7	1.5	Yes
FMC/Infiltration Layer	12.1	1.5	Yes

The slope stability analyses were performed for 4H:1V excavation and liner slopes, 3H:1V interim waste and 4H:1V final waste slopes. Any changes to the excavation plan, liner system, final cover system, or landfill completion plan will necessitate that the slope stability analyses be revised to reflect the changed conditions. Waste must be placed and properly compacted in horizontal lifts generally less than 20 feet thick. Temporary construction slopes should not be steeper than the interim slopes and concentrated loadings such as heavy equipment and soil stockpiles should not be placed near the crest of slopes unless additional slope stability analyses are performed.

7 LINER CONSTRUCTION

30 TAC §330.331

The composite liner system will consist of a standard Subtitle D liner with a 2-foot-thick compacted soil liner overlain by a 60-mil HDPE geomembrane, a geocomposite drainage layer, and a 2-foot-thick layer of protective soil cover. The liner details are provided in Attachment D3 – Construction Design Details.

7.1 Subgrade Preparation

The liner subgrade must be firm and stable. Prior to beginning liner construction, the subgrade should be proof-rolled with heavy, rubber-tired construction equipment to detect soft areas. Isolated soft areas should be undercut then backfilled with compacted earthfill in accordance with the requirements for general fill. Low areas should be brought to the design grades with general fill that is placed and compacted in accordance with the requirements in Section 4.

7.2 Compacted Soil Liner

The soil liner material must consist of relatively homogeneous cohesive materials, which are free of debris, rocks greater than 1 inch in diameter, plant materials, frozen materials, foreign objects, and organic material. Clay and sandy clay will be available from proposed landfill excavations or on-site borrow sources to provide material for the compacted soil liners. Laboratory tests indicate that the remolded cohesive soils will meet the compacted soil liner requirements listed in 30 TAC §330.339(c)(5). The soil liner properties summarized in Table D5-6 are specified in Attachment D7 – Liner Quality Control Plan.

Table D5-6
130 Environmental Park
Soil Liner Properties

Test	Specifications
In-Place Density	95% of Standard Proctor (ASTM D 698)
In-Place Moisture Content	Standard Proctor Optimum Moisture Content (OMC) to 4 percentage points above OMC
Hydraulic Conductivity	1.0×10^{-7} cm/sec or less
Plasticity Index	15 minimum
Liquid Limit	30 minimum
Percent Passing No. 200 Mesh Sieve	30 minimum
Percent Passing 1-inch Sieve	100

Preconstruction sampling should be performed on soils to be used as liner material. At a minimum, one liquid limit, plastic limit, percent passing the No. 200 sieve, standard Proctor (ASTM D 698), and hydraulic conductivity test should be performed for each borrow material type prior to use as liner material.

The soil liner material should be placed in maximum nine-inch loose lifts to produce compacted lift thickness of approximately six inches. The material should be compacted to a minimum of 95 percent of the maximum dry density determined by standard Proctor (ASTM D 698) at a moisture content at or above the optimum moisture. Rocks within the liner must be less than one inch in diameter and should not total more than 10 percent by weight. The material should be processed to a maximum particle size of one inch or less before water is added to adjust the moisture content. Soil processing may be achieved using a disc or soil pulverizer. Water should be applied as necessary to the material and worked into the material with the compaction or processing equipment. Water used for the soil liner compaction must not be contaminated by waste or any objectionable material.

The soil liner must be compacted with a pad/tamping-foot or prong-foot roller. A footed roller is necessary to achieve bonding between lifts, to reduce the clod size, and to achieve a blending of the soil matrix through kneading action. The compactor should weigh at least 40,000 pounds and make at least four passes across the area being compacted. A pass is defined as one pass of the compactor, front and rear drums. The Caterpillar 815 and 825 are examples of equipment typically used to achieve satisfactory results. The lift thickness shall be controlled to achieve total penetration into the top of the previously compacted lift; therefore, the lift thickness must not be greater than the pad or prong length. Cleaning devices on the compaction roller must be in-place and maintained to prevent the prongs or pad feet from becoming clogged to the point that they cannot achieve full penetration. Soil liner shall not be compacted with a bulldozer, rubber-tired (pneumatic) roller, flat-wheel roller, scraper, truck, or any tracked equipment unless it is used to pull a footed roller.

Tie-ins with previously constructed soil liners shall be constructed using a sloped or stair-step transition as described in Attachment D7 – Liner Quality Control Plan.

7.3 Protective Cover

The protective cover should be constructed of soils that are free of debris, large rock, plant materials, frozen materials, foreign objects, and organic material. Soil will be available from proposed landfill excavations or on-site borrow sources to provide material for the protective cover.

7.4 Liner Testing and Documentation

CQA testing of the soil liner must be performed as the liner is being constructed. Liner system testing is addressed in Attachment D7 – Liner Quality Control Plan. The construction methods and test procedures documented in the SLER must be consistent with the requirements of Attachment D7.

8 COVER CONSTRUCTION

30 TAC §§330.165, 330.457

8.1 Daily/Intermediate Cover

The daily and intermediate cover should be constructed of soils that are free of waste and debris. Suitable cover soils should be available from on-site sources such as the proposed landfill excavations or on-site borrows. Requirements for the placement of daily and intermediate cover are provided in Part IV – Site Operating Plan.

8.2 Final Cover

The final cover system will consist of an 18-inch-thick compacted soil infiltration layer overlain by a geomembrane, geocomposite on the sideslopes and a geotextile on the topslope, and a 24-inch-thick erosion layer. The final cover system requirements are provided in Attachment D8 – Final Cover Quality Control Plan and the final cover system details are provided in Attachment D3 – Construction Design Details.

The infiltration layer material must consist of relatively homogeneous cohesive materials that are free of debris, rocks greater than 1 inch in diameter, plant materials, frozen materials, foreign objects, and organic material. The infiltration layer should be constructed directly over the intermediate cover once the waste has reached final grades. The infiltration layer construction procedures are the same as those outlined in Section 7 for liner construction.

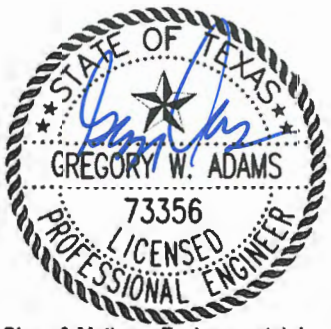
The erosion layer should consist of: (1) topsoil stockpiled during the excavation process, (2) on-site soil that has been modified to be capable of sustaining vegetation, or (3) an imported material suitable to sustain vegetation growth. This layer may be spread and placed in one lift over the drainage layer. After spreading, the layer may be rolled lightly to reduce future erosion, although not to the extent that compaction would inhibit plant growth.

8.3 Final Cover Testing and Documentation

CQA testing of the final cover system must be performed during construction. Final cover system requirements are outlined in Attachment D8 – Final Cover Quality Control Plan.

130 ENVIRONMENTAL PARK

APPENDIX D5-A
SETTLEMENT/HEAVE ANALYSIS



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

11/6/2014

Includes pages D5-A-1 through D5-A-4

Technically Complete October 28, 2014

130 Environmental Park
Settlement/Heave Analysis

Required: Estimate the following:

1) Subgrade heave
2) Subgrade settlement
3) Strain on liner from differential settlement

References:

1) *Essentials of Soil Mechanics and Foundations*, 2nd Edition, McCarthy, Reston Publishing.
2) *TM 5-818-1 Soils and Geology Procedures for Foundation Design of Buildings and Other Structures,* US Army COE, October 1983.
3) Daniel, David E. *Geotechnical Practice for Waste Disposal*, Chapman and Hall, Boundary Row, London, 1993.

Assumptions 1) Typical material properties are shown below:

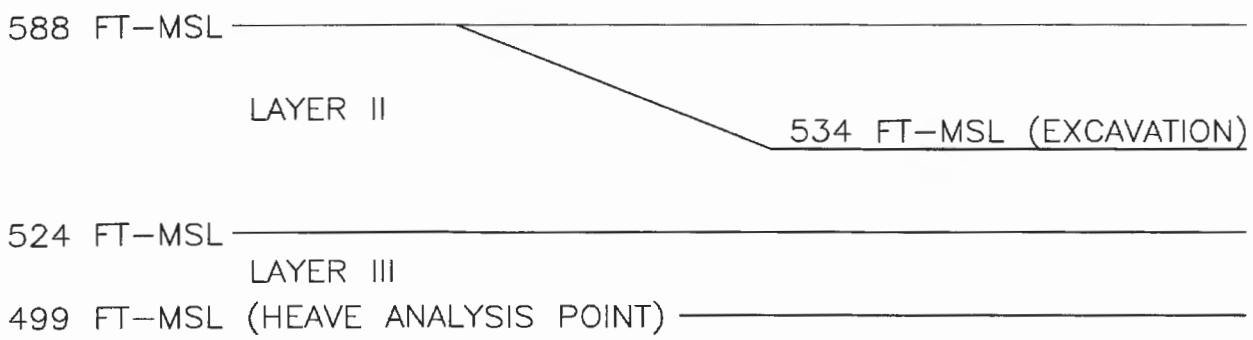
Material	Description	Moisture[a] %	Dry Wt[a] pcf	Wet Wt[b] pcf	C_c[a]	C_r[a]	P_c[a] tsf
Layer II	Silty Clay	23.9	99.7	123.5	0.174	0.020	3.5
Layer III	Silty Clay	24.8	97.8	122.1	0.215	0.025	6.5
Erosion Layer	Clay	26.3	86.6	109.4	na	na	na
Liner/Infiltration	Clay	26.3	86.6	109.4	na	na	na
Protective Cover	Clay	26.3	86.6	109.4	na	na	na
Solid Waste	Waste/Cover	na	na	60.0	na	na	na

[a] Average laboratory test values

[b] Wet Wt = Dry Wt x (1 + Moisture)

Solution: **1) Subgrade Heave**

Heave Analysis Section from Cell 10



NTS

The heave in the subgrade is estimated from the equation:

$$R = [H / (1 + e_o)][C_r \log(P_f / P_o)]$$

where:
- R = heave in feet
- C_r = recompression index
- H = layer thickness in feet
- P_o = initial overburden pressure in tsf
- P_f = final overburden pressure in tsf
- e_o = initial void ratio

130 Environmental Park
Settlement/Heave Analysis

Determine the initial and final overburden pressures.

Layer	Overburden	H_o	H_f	Unit Wt	P_o	P_f
II	II	59.0	5.0	123.5	3.64	0.31
I Total					**3.64**	**0.31**
III	II	64.0	10.0	123.5	3.95	0.62
	III	25.0	25.0	122.1	1.53	1.53
III Total					**5.48**	**2.14**

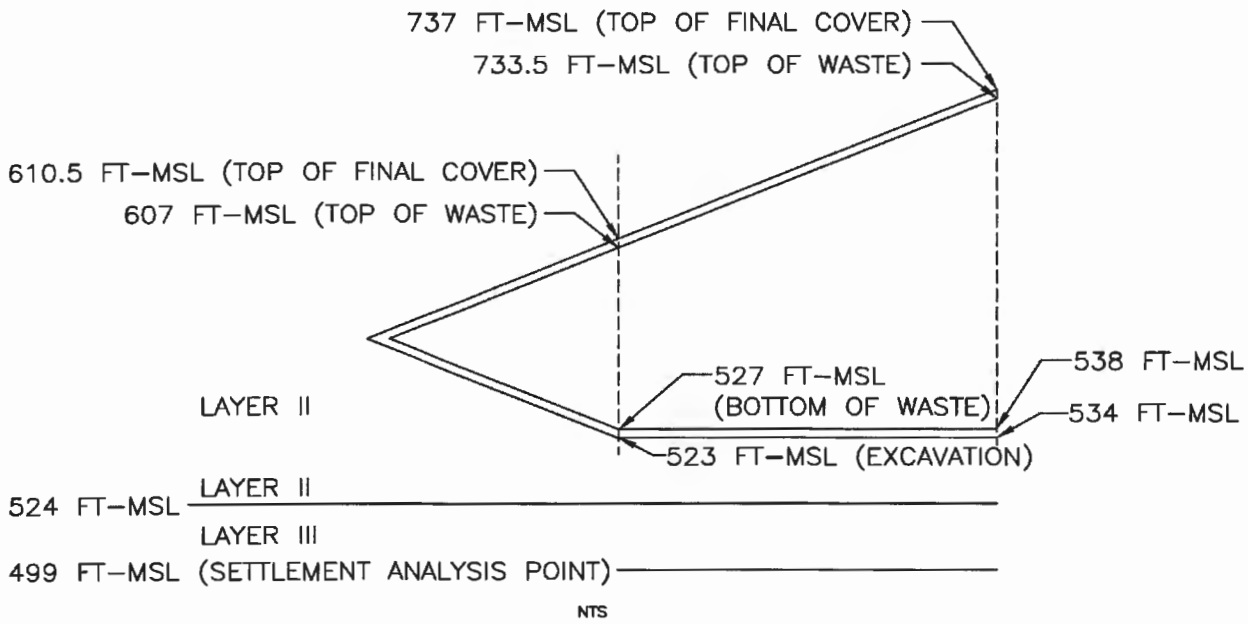
Determine the heave in the subgrade.

Layer	H ft	P_o tsf	P_f tsf	C_r	e_o	R ft
I	10.0	3.64	0.31	0.020	0.90	-0.11
III	50.0	5.48	2.14	0.025	0.90	-0.27
						-0.38

Maximum subgrade heave = **0.38** **ft**
4.6 **in**

2) Subgrade Settlement

Settlement Analysis Section from Cell 10



NTS

Settlement is estimated from the equation:

$$S = [H / (1 + e_o)][C_r \log(P_c / P_o) + C_c \log(P_f / P_c)]$$

where:
- S = settlement in feet
- C_c = compression index
- C_r = recompression index
- H = layer thickness in feet
- P_o = initial overburden pressure in tsf
- P_c = preconsolidation pressure in tsf
- P_f = final overburden pressure in tsf
- e_o = initial void ratio

130 Environmental Park
Settlement/Heave Analysis

2a) Center of Landfill

Determine the initial and final overburden pressures.

Layer	Overburden Layer	H_o ft	H_f ft	Unit Wt pcf	P_o tsf	P_f tsf
II	Erosion Layer	0.0	2.0	109.4	0.00	0.11
	Infiltration Layer	0.0	1.5	109.4	0.00	0.08
	Waste/Cover	0.0	195.5	60.0	0.00	5.87
	Protective Cover	0.0	2.0	109.4	0.00	0.11
	Compacted Liner	0.0	2.0	109.4	0.00	0.11
	II	5.0	5.0	123.5	0.31	0.31
Total					**0.31**	**6.58**
III	Erosion Layer	0.0	2.0	109.4	0.00	0.11
	Infiltration Layer	0.0	1.5	109.4	0.00	0.08
	Solid Waste	0.0	195.5	60.0	0.00	5.87
	Protective Cover	0.0	2.0	109.4	0.00	0.11
	Compacted Liner	0.0	2.0	109.4	0.00	0.11
	II	10.0	10.0	123.5	0.62	0.62
	III	25.0	25.0	122.1	1.53	1.53
Total					**2.14**	**8.42**

Determine settlement in the subgrade.

Layer	H ft	P_o tsf	P_c tsf	P_f tsf	C_r	C_c	e_o	S ft
II	10.0	0.31	3.50	6.58	0.02	0.17	0.90	0.36
III	50.0	2.14	6.50	8.42	0.03	0.22	0.90	0.95
								1.31

2b) Toe of Slope

Determine the initial and final overburden pressures.

Layer	Overburden Layer	H_o ft	H_f ft	Unit Wt pcf	P_o tsf	P_f tsf
I	Erosion Layer	0.0	2.0	109.4	0.00	0.11
	Infiltration Layer	0.0	1.5	109.4	0.00	0.08
	Waste/Cover	0.0	80.0	60.0	0.00	2.40
	Protective Cover	0.0	2.0	109.4	0.00	0.11
	Compacted Liner	0.0	2.0	109.4	0.00	0.11
	II	2.0	2.0	123.5	0.12	0.12
Total					**0.12**	**2.93**
III	Erosion Layer	0.0	2.0	109.4	0.00	0.11
	Infiltration Layer	0.0	1.5	109.4	0.00	0.08
	Waste/Cover	0.0	80.0	60.0	0.00	2.40
	Protective Cover	0.0	2.0	109.4	0.00	0.11
	Compacted Liner	0.0	2.0	109.4	0.00	0.11
	II	4.0	4.0	123.5	0.25	0.25
	III	25.0	25.0	122.1	1.53	1.53
Total					**1.77**	**4.58**

Determine settlement in the subgrade.

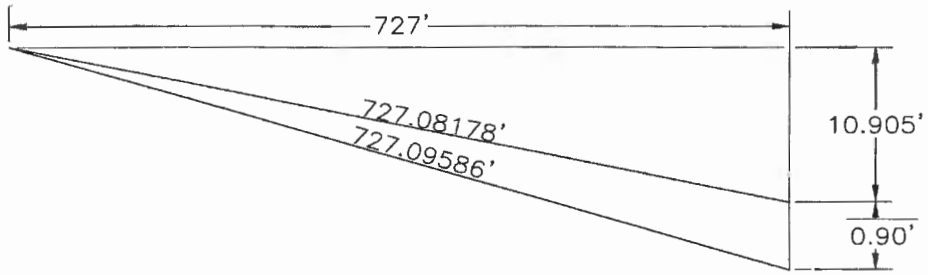
Layer	H ft	P_o tsf	P_c tsf	P_f tsf	C_r	e_o	S ft
I	4.0	0.12	3.50	2.93	0.02	0.90	0.06
III	50.0	1.77	6.50	4.58	0.03	0.90	0.37
							0.43

Subgrade heave =	**0.38**	**ft**	**4.6 in**
Settlement at center =	**1.31**	**ft**	**15.8 in**
Settlement at toe =	**0.43**	**ft**	**5.2 in**
Differential settlement =	**0.88**	**ft**	**10.6 in**

130 Environmental Park
Settlement/Heave Analysis

3) Compacted Soil Liner Strain

From Reference 3, the allowable tensile strain in the compacted soil liner is 0.1%. From 2) above, the maximum predicted differential settlement between the toe and center of Cell 10 is approximately 7 inches. A typical section through Cell 10 is shown below.



NTS

Initial Surface

Horizontal distance =	727	ft
Slope =	1.5%	
ΔElevation=	10.905	ft
tanθ =	ΔElevation/Horizontal distance	
tanθ =	0.0150	
θ =	0.014998875	rad
cosθ =	Horizontal distance/Initial surface	
Initial Surface =	727.08178	ft

Final Surface

ΔS=	0.88	ft
ΔElevation=	11.79	ft
tanθ =	ΔElevation/Horizontal distance	
tanθ =	0.0162	
θ =	0.016212342	rad
cosθ =	Horizontal distance/Final surface	
Final Surface =	727.09555	ft

Strain

Strain =	ΔL/L	
=	(Final Surface - Initial Surface)/Initial Surface	
=	1.89E-05	ft/ft
=	0.001894	%

Therefore, differential settlement will not be detrimental to the clay liner since the predicted strain is significantly less than allowable strain (0.1%).