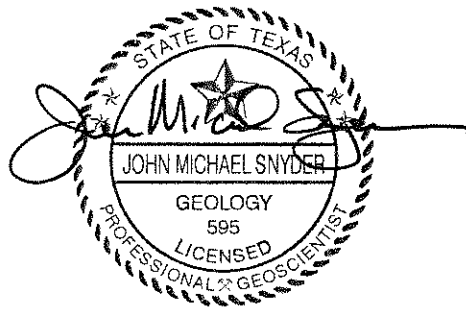


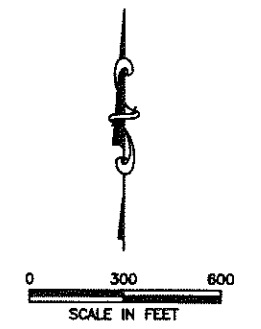
**SKYLINE LANDFILL**  
**APPENDIX E3**  
**SITE GEOLOGIC DATA**

Geologic Cross Section Location Map	E3-1
Geologic Cross Section A-A'	E3-2
Geologic Cross Section B-B'	E3-3
Geologic Cross Section C-C'	E3-4
Geologic Cross Section D-D'	E3-5
Structural Contour Map of the Unweathered Taylor	E3-6



4-12-2012

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- LEGEND**
- PERMIT BOUNDARY
  - LANDFILL FOOTPRINT
  - MW-5 EXISTING MONITORING WELL
  - CB-15 BORING
  - P-1 PIEZOMETER
  - ▨ PRE-SUBTITLE D AREA WITH FINAL COVER

- NOTES:**
1. MONITORING WELL LOCATION MAP MODIFIED FROM ORIGINAL HDR DRAWING.
  2. EXISTING CONTOURS COMPILED BY AEROMETRIC FROM AERIAL PHOTOGRAPHY. FLOWN MARCH 6, 2011. COORDINATE SYSTEM IS BASED ON TEXAS STATE PLANE NAD 27, TEXAS NORTH CENTRAL ZONE, US FEET.



**GEOLOGIC CROSS SECTION LOCATION MAP**  
**WASTE MANAGEMENT OF TEXAS, INC.**  
**SKYLINE LANDFILL**  
**MAJOR PERMIT AMENDMENT**

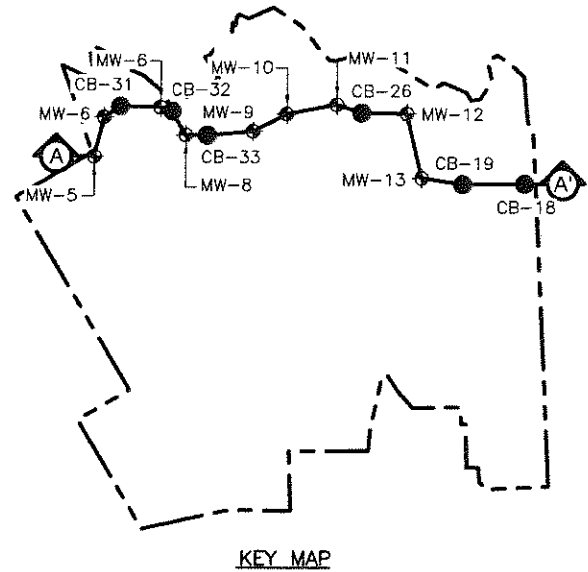
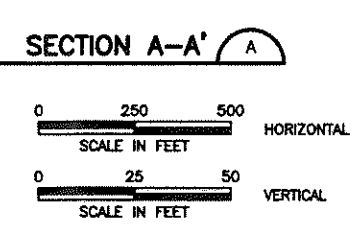
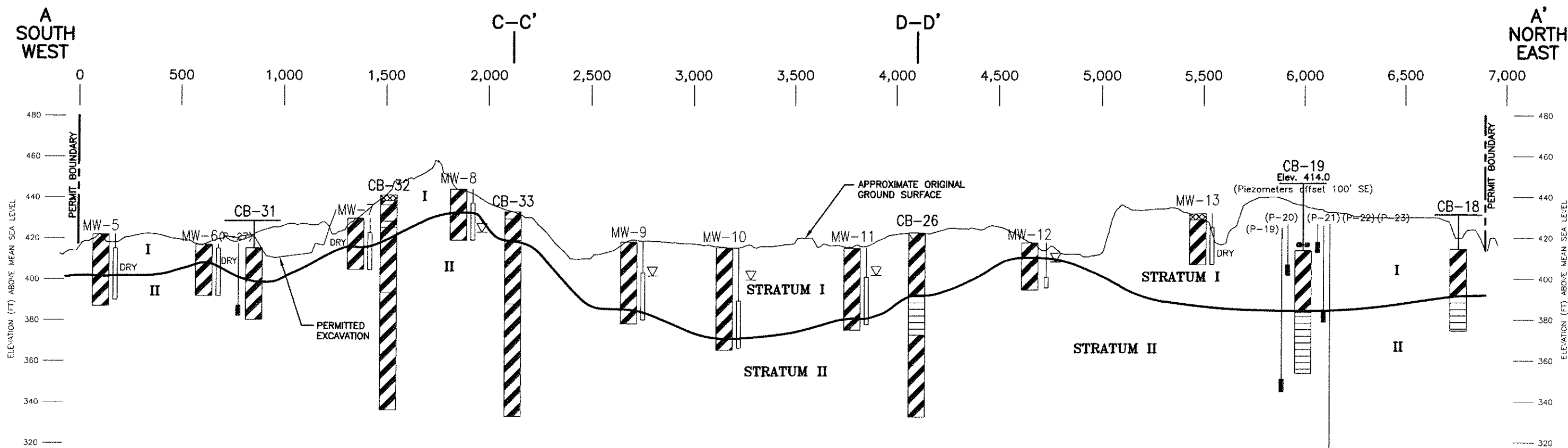


**BIGGS & MATHEWS**  
**ENVIRONMENTAL**  
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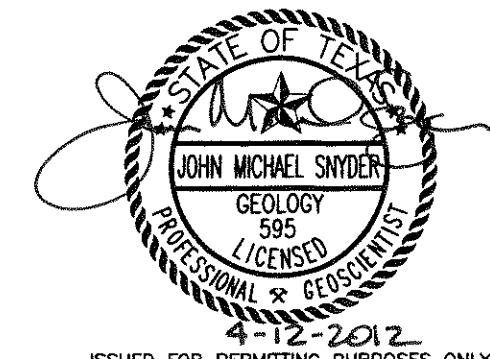
ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS				TBPE FIRM NO. F-256	TBPG FIRM NO. 50222	
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DWN.	SRC	SCALE :	GRAPHIC			
CHK.	JMS	DWG :	E3-1_XSecLocs.dwg			
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

J:\101\011\120\ATT E\E3-2-5\_XSections.dwg Layout: E3-2 User: scundiff



- LEGEND**
- Clay (CH)
  - Fill
  - Claystone (Unweathered Taylor Marl)
  - WATER LEVEL ELEVATION TAKEN DURING JUNE 2010 SAMPLING EVENT
  - DRY NO WATER WAS OBSERVED DURING THE JUNE 2010 SAMPLING EVENT



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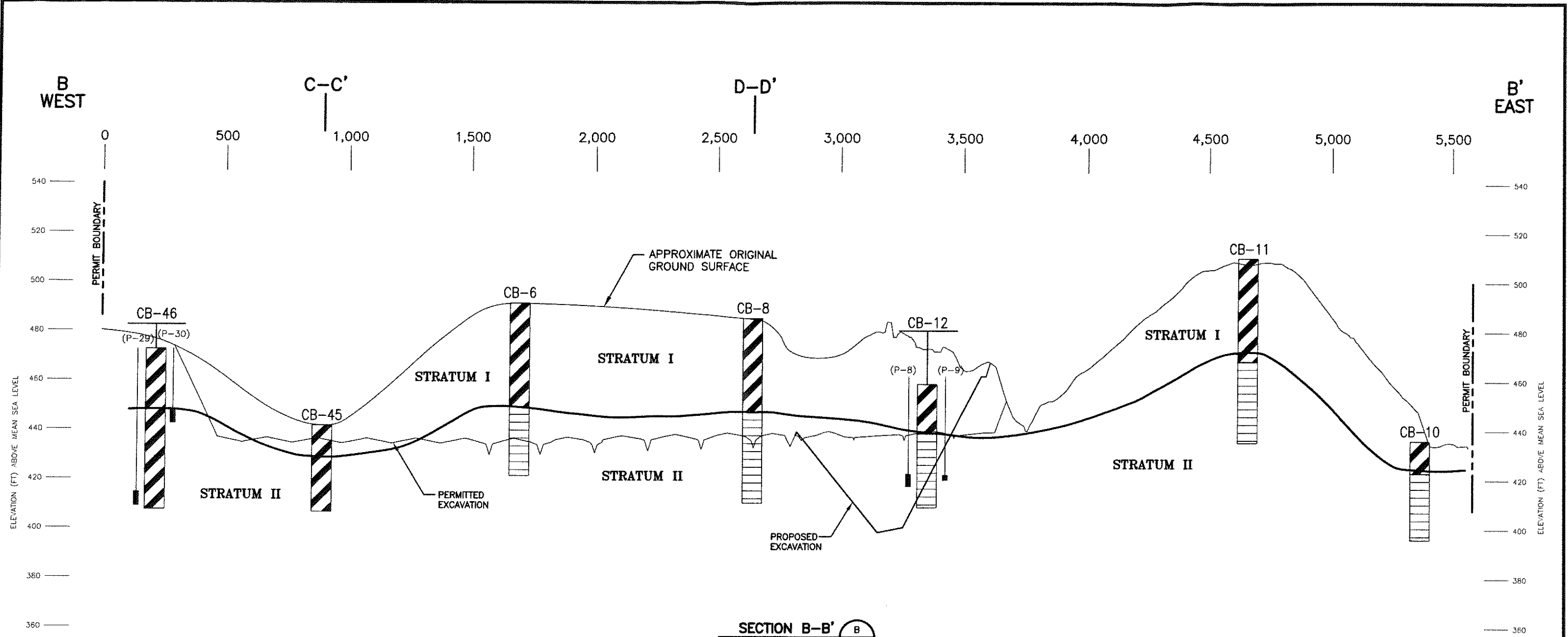
**GEOLOGIC CROSS SECTION A-A'**

**WASTE MANAGEMENT OF TEXAS, INC.**  
**SKYLINE LANDFILL**  
**MAJOR PERMIT AMENDMENT**

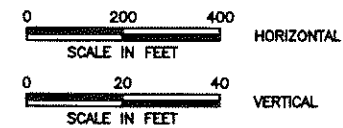
**BIGGS & MATHEWS**  
**ENVIRONMENTAL**  
**CONSULTING ENGINEERS**  
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 817-563-1144

REVISIONS						TBPE FIRM NO. F-256	TBPG FIRM NO. 50222
DSN.	ESF	DATE :	04/12		FIGURE		
DWN.	SRC	SCALE :	GRAPHIC		E3-2		
CHK.	JMS	DWG :	E3-2-5_XSections.dwg				
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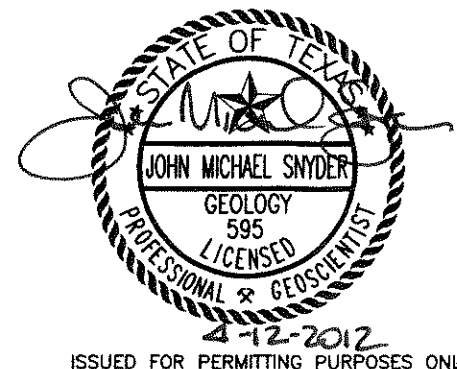
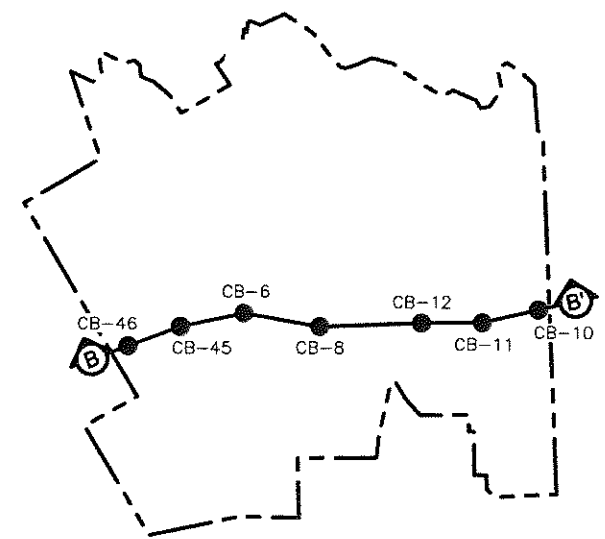


**SECTION B-B'**



**LEGEND**

- Clay (CH)
- Claystone (Unweathered Taylor Marl)
- WATER LEVEL ELEVATION TAKEN DURING JUNE 2010 SAMPLING EVENT
- DRY NO WATER WAS OBSERVED DURING THE JUNE 2010 SAMPLING EVENT



ISSUED FOR PERMITTING PURPOSES ONLY

**GEOLOGIC CROSS SECTION B-B'**

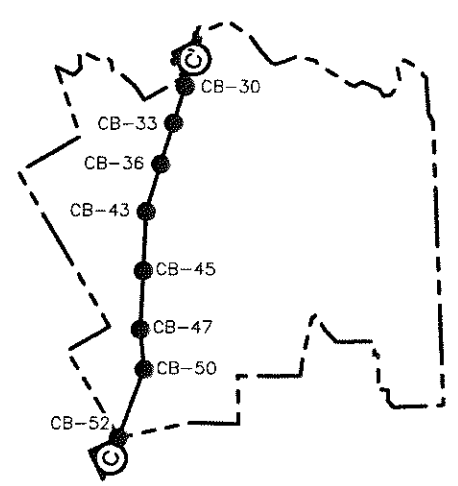
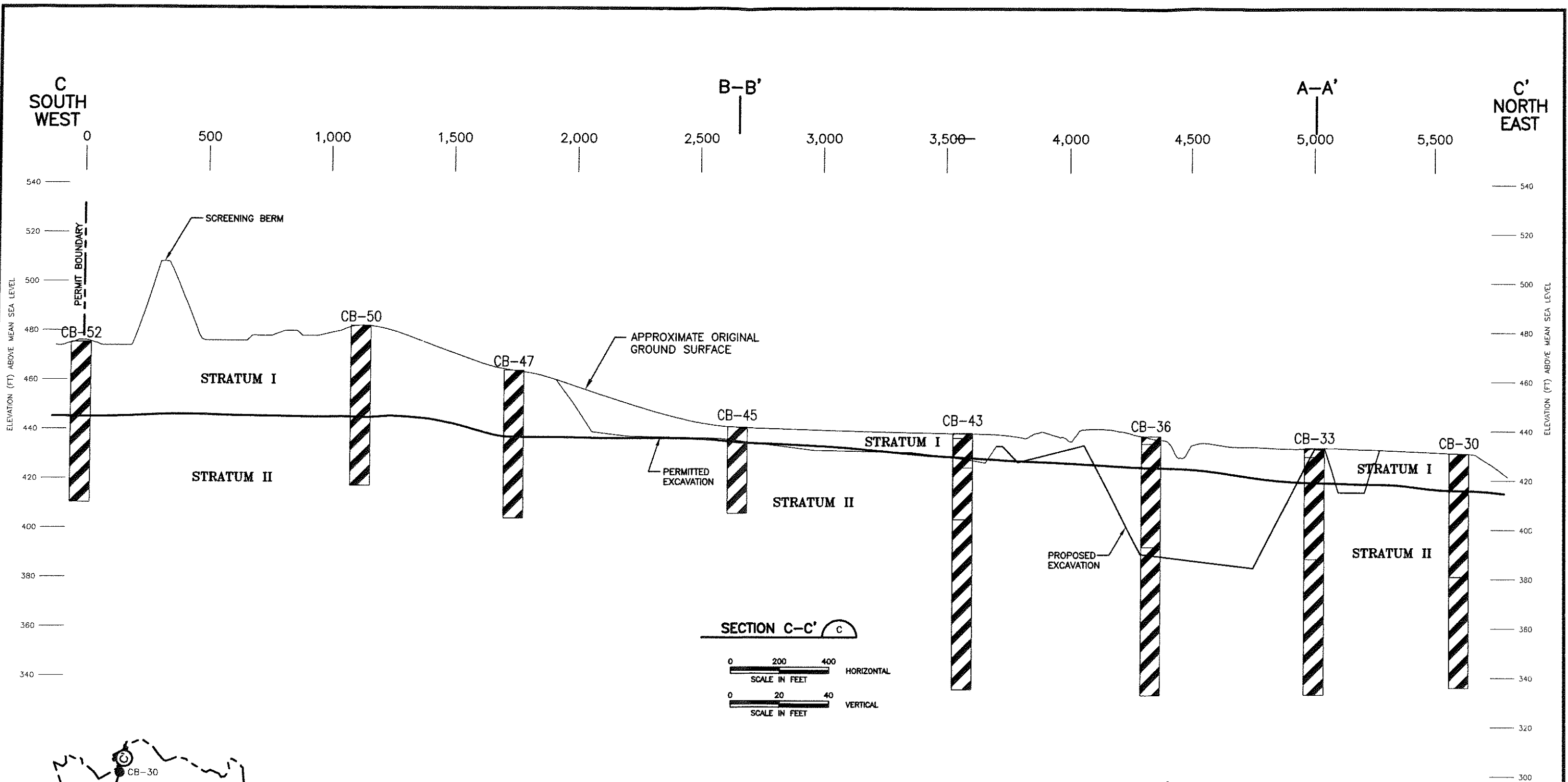
**WASTE MANAGEMENT OF TEXAS, INC.**  
SKYLINE LANDFILL  
MAJOR PERMIT AMENDMENT



**BIGGS & MATHEWS**  
ENVIRONMENTAL  
CONSULTING ENGINEERS  
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REVISIONS						TBPE FIRM NO. F-256		TBPG FIRM NO. 50222	
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	DSN. ESF	DATE : 04/12	FIGURE
							DWN. SRC	SCALE : GRAPHIC	<b>E3-3</b>
							CHK. JMS	DWG : E3-2-5_XSections.dwg	

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**LEGEND**

Clay (CH)

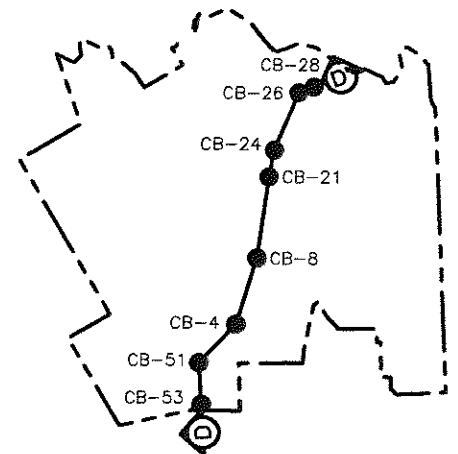
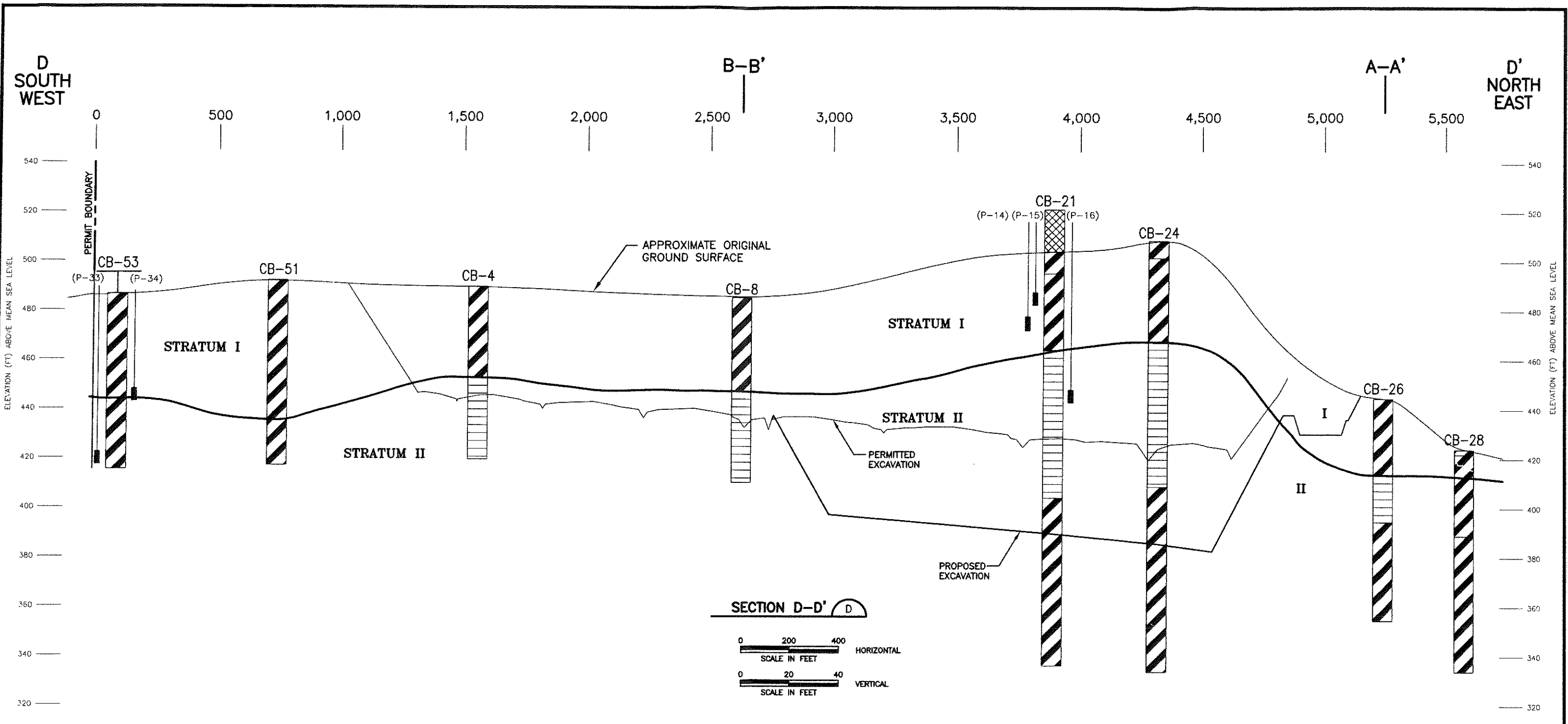


ISSUED FOR PERMITTING PURPOSES ONLY

<b>GEOLOGIC CROSS SECTION C-C'</b>	
<b>WASTE MANAGEMENT OF TEXAS, INC. SKYLINE LANDFILL MAJOR PERMIT AMENDMENT</b>	
	BIGGS & MATHEWS ENVIRONMENTAL CONSULTING ENGINEERS MANSFIELD • WICHITA FALLS 817-563-1144
TBPE FIRM NO. F-256	TBPG FIRM NO. 50222
DSN. ESF	DATE : 02/12
DWN. SRC	SCALE : GRAPHIC
CHK. JMS	DWG : E3-2-5_XSections.dwg
<b>FIGURE E3-4</b>	

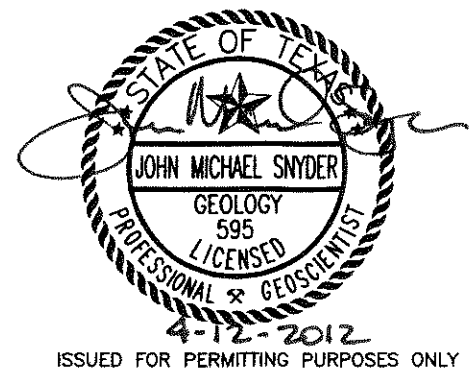
REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

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**LEGEND**

	Clay (CH)		Claystone (Unweathered Taylor Marl)
	Fill		



**GEOLOGIC CROSS SECTION D-D'**

**WASTE MANAGEMENT OF TEXAS, INC.**  
SKYLINE LANDFILL  
MAJOR PERMIT AMENDMENT

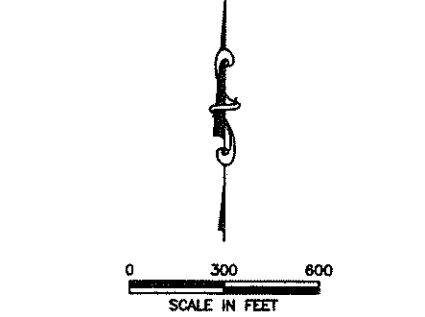
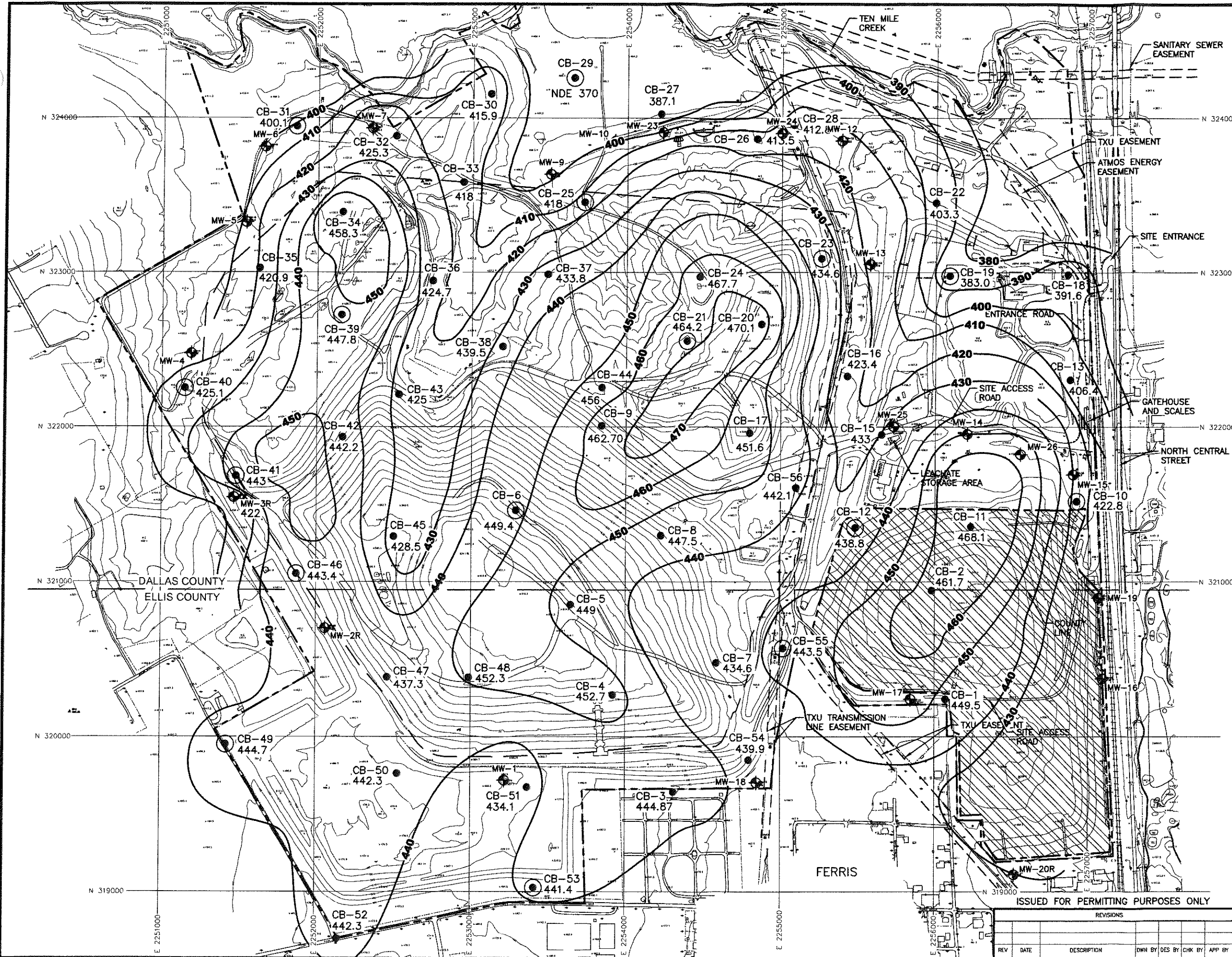
**BIGGS & MATHEWS**  
ENVIRONMENTAL CONSULTING ENGINEERS  
MANSFIELD • WICHITA FALLS  
817-563-1144

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REVISIONS						TBPE FIRM NO. F-256	TBPG FIRM NO. 50222
DSN.	ESF	DATE :	04/12		FIGURE		
DWN.	SRC	SCALE :	GRAPHIC		<b>E3-5</b>		
CHK.	JMS	DWG :	E3-2-5_XSections.dwg				
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	

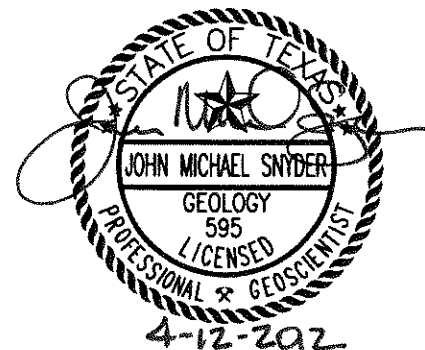


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- LEGEND**
- PERMIT BOUNDARY
  - LANDFILL FOOTPRINT
  - MW-5 EXISTING MONITORING WELL
  - CB-15 BORING
  - P-1 PIEZOMETER
  - CB-17 BORING TO BE DEEPEINED
  - ▨ PRE-SUBTITLE D AREA WITH FINAL COVER

- NOTES:**
1. MONITORING WELL LOCATION MAP MODIFIED FROM ORIGINAL HDR DRAWING.
  2. EXISTING CONTOURS COMPILED BY AEROMETRIC FROM AERIAL PHOTOGRAPHY, FLOWN MARCH 6, 2011. COORDINATE SYSTEM IS BASED ON TEXAS STATE PLANE NAD 27, TEXAS NORTH CENTRAL ZONE, US FEET.



**STRUCTURAL CONTOUR MAP  
TOP OF THE UNWEATHERED TAYLOR  
WASTE MANAGEMENT OF TEXAS, INC.  
SKYLINE LANDFILL  
MAJOR PERMIT AMENDMENT**



**BIGGS & MATHEWS**  
ENVIRONMENTAL  
CONSULTING ENGINEERS  
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REVISIONS				TPBE FIRM NO. F-256	TPPG FIRM NO. 50222	
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN.	ESF	DATE :	04/12	FIGURE
DWN.	SRC	SCALE :	GRAPHIC	
CHK.	JMS	DWG :	E3-6_TopTaylor.dwg	<b>E3-6</b>

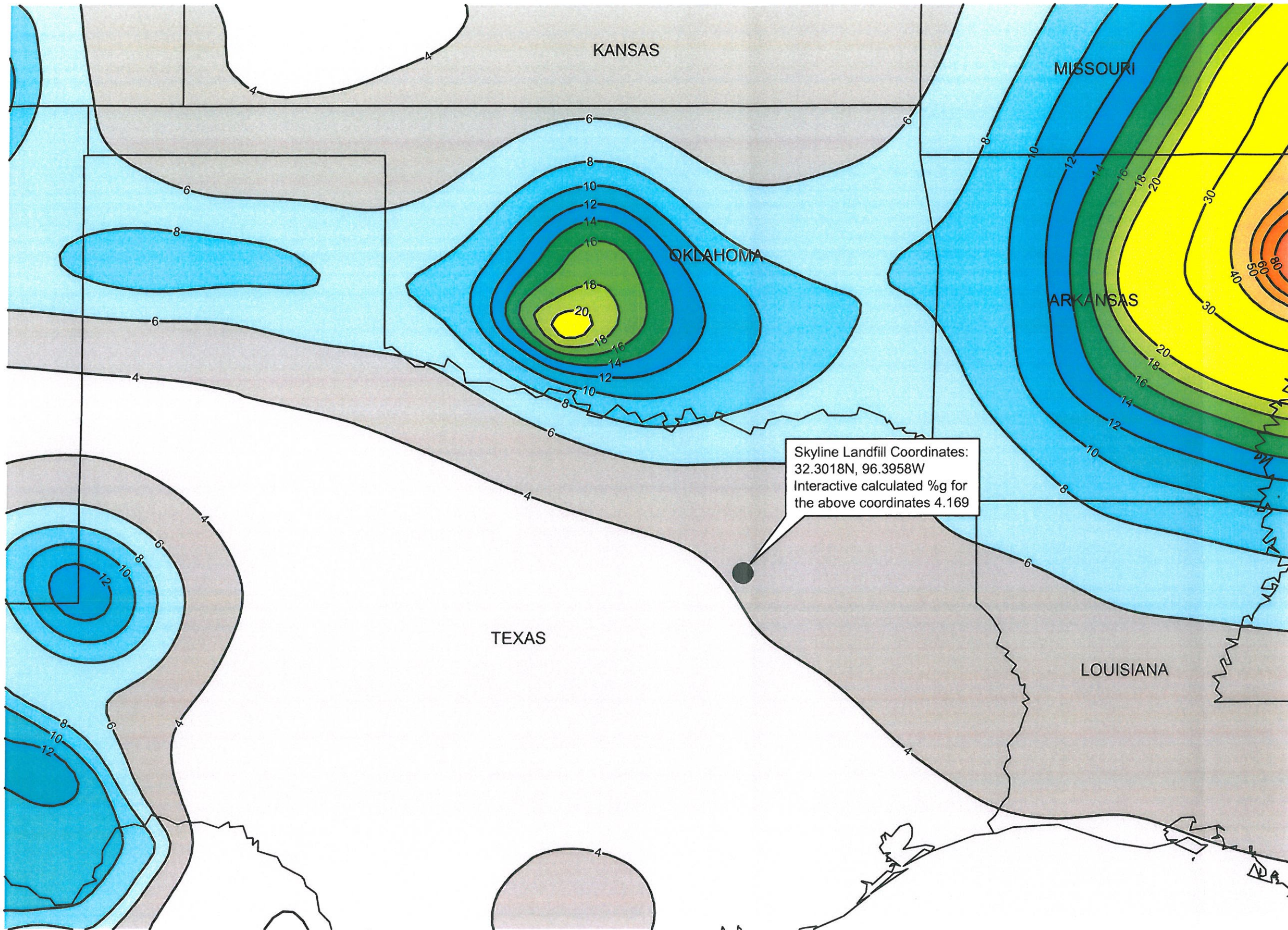
**SKYLINE LANDFILL**  
**APPENDIX E4**  
**FAULT AND SEISMIC DATA**

Seismic Impact Zone Map  
Locations Of Oil/Gas Producing Wells

E4-1  
E4-2







NOT TO SCALE

LEGEND

— 4 — CONTOUR OF PEAK HORIZONTAL ACCELERATION



**SEISMIC IMPACT MAP**  
**WASTE MANAGEMENT OF TEXAS, INC.**  
**SKYLINE LANDFILL**  
**MAJOR PERMIT AMENDMENT**



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**ENVIRONMENTAL**  
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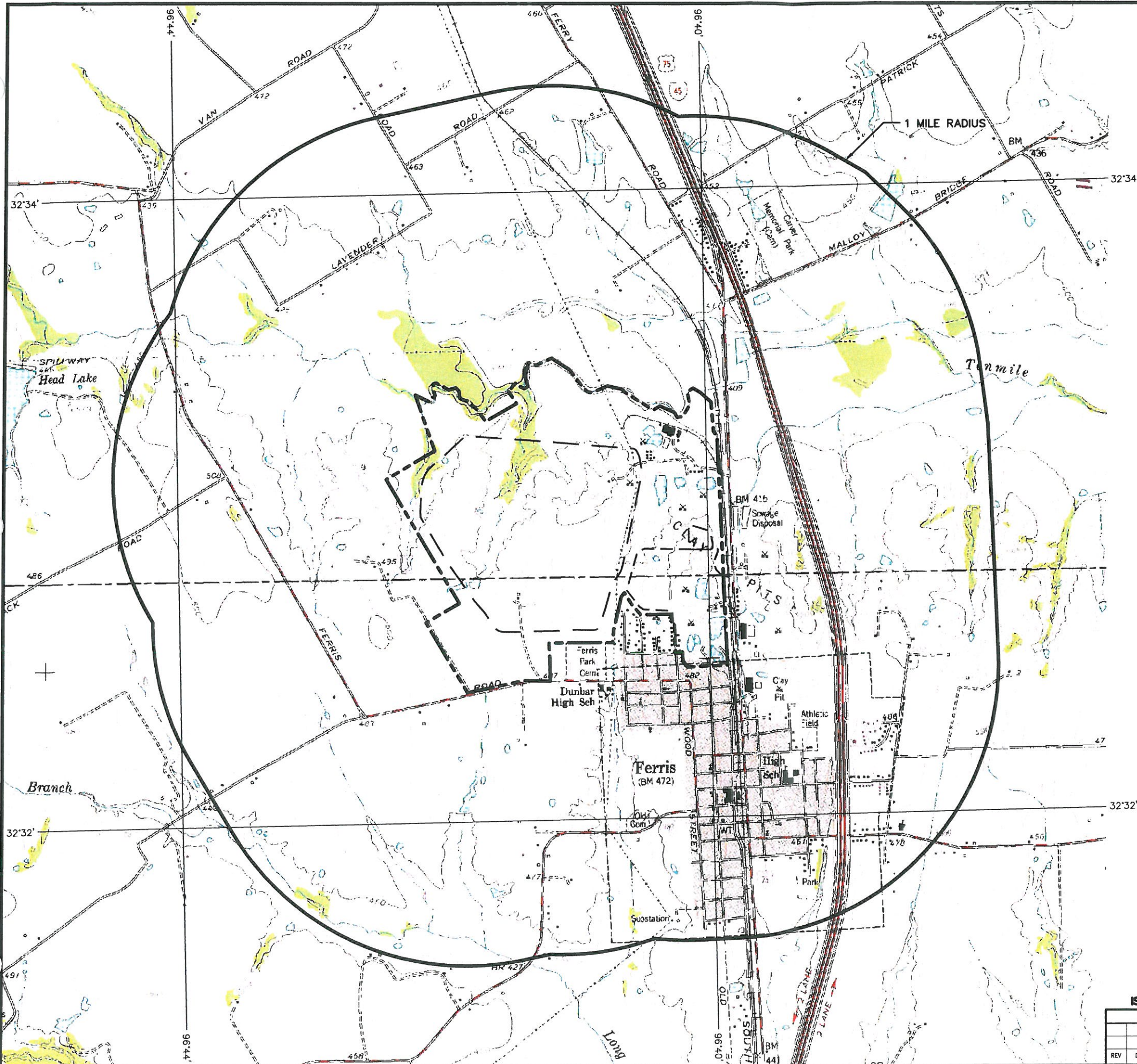
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REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	CHK. JMS
							DWG : E4-1_Seismic.dwg

SOURCE: USGS INTERACTIVE NATIONAL SEISMIC HAZARD MAPS - 2008  
 PEAK HORIZONTAL ACCELERATION (%g) WITH 2% PROBABILITY OF EXCEEDANCE IN 50 YEARS  
 URL: <http://gldims.cr.usgs.gov/website/nshp2008/viewer.htm>

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J:\101\01\120\ATT E\EA-2\_OilGasWells.dwg Layout: Layout1 User: scundiff



**LEGEND**

- PERMIT BOUNDARY
- - - LANDFILL FOOTPRINT

FERRIS, TEX.  
 SW/4 SFAO/VILLE 15' QUADRANGLE  
 N 12° 30' - W 96° 37' 5/7 5  
 1959  
 AMS 6649 1 SW SERIES V6R2

- ROAD CLASSIFICATION**
- Heavy-duty
  - Medium-duty
  - Light-duty
  - Unimproved dirt
  - Interstate Route
  - U.S. Route

**NOTES:**

1. OIL AND GAS WELL INFORMATION DOWNLOADED FROM RAILROAD COMMISSION OF TEXAS ON NOVEMBER 23, 2010.
2. NO PRODUCING OIL AND GAS WELLS WERE IDENTIFIED IN THE 1 MILE RADIUS OF THE FACILITY.



**LOCATION OF OIL/GAS PRODUCING WELLS**  
**WASTE MANAGEMENT OF TEXAS, INC.**  
**SKYLINE LANDFILL**  
**MAJOR PERMIT AMENDMENT**



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**ENVIRONMENTAL**  
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**ISSUED FOR PERMITTING PURPOSES ONLY**

REVISIONS						TBPE FIRM NO. F-256		TBPE FIRM NO. 50222	
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY	DSN. ESF	DATE : 04/12	FIGURE
							DWN. SRC	SCALE : GRAPHIC	E4-2
							CHK. JMS	DWG : E4-2_OilGasWells.dwg	



**SKYLINE LANDFILL**  
**APPENDIX E5**  
**LABORATORY TESTS**

Geotechnical Laboratory Test Summary	E5-1 through E5-6
Geotechnical Laboratory Testing Data	
Vertical Permeability Test Results	E5-7
Horizontal Permeability Test Results	E5-10
Triaxial Shear Test Results	E5-11

**Skyline Landfill  
Geotechnical Laboratory Test Summary**

Subsurface Exploration	Boring #	Sample Elevation, ft	Atterberg Limits				Moisture, %	Unit Dry Weight, pcf	Permeability, cm/sec
			Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Passing 200 Sieve, %			
	CB-1	476.5	78	24	54	26			
	CB-1	456.5	81	24	57	25			
	CB-1	446.5	81	27	54	20			
	CB-1	436.5	76	25	51	19			
	CB-2	488.7	90	24	66	27			
	CB-2	473.7	86	26	60	25			
	CB-2	453.7	73	24	49	21			
	CB-2	433.7	73	24	49	17			
	CB-3	476.2	79	26	53	28			
	CB-3	451.2	97	31	66	30			
	CB-3	441.2	92	30	62	25			
	CB-3	436.2	92	29	63	24			
	CB-4	481.7	74	27	47	29			
	CB-4	471.7	69	26	43	29			
	CB-4	456.7	80	27	53	28			
	CB-4	451.7	90	26	64	25			
	CB-5	473	86	30	56	27			
	CB-5	448	92	28	64	25			
	CB-5	443	90	31	59	23			
	CB-5	433	78	27	51	18			
	CB-6	483.4	94	66	28	28			
	CB-6	473.4	89	61	28	28			
	CB-6	458.4	85	56	29	29			
	CB-6	438.4	77	58	19	19			
	CB-7	456.6	80	53	27	27			
	CB-7	446.6	87	61	26	26			
	CB-7	436.6	88	62	26	26			
	CB-7	421.6	93	70	23	23			
	CB-8	482.5	82	46	36	36			
	CB-8	462.5	83	56	27	27			
	CB-8	442.5	89	60	29	29			
	CB-8	422.5	90	68	22	22			
	CB-9	489.7	82	55	27	27			
	CB-9	469.7	91	65	26	26			
	CB-9	454.7	92	68	24	24			
	CB-9	434.7	65	45	20	20			

**McBride-Ratcliff -  
1987-1990**

**Skyline Landfill  
Geotechnical Laboratory Test Summary**

Subsurface Exploration	Boring #	Sample Elevation, ft	Atterberg Limits			Passing 200 Sieve, %	Moisture, %	Unit Dry Weight, pcf	Permeability, cm/sec
			Liquid Limit, %	Plastic Limit, %	Plasticity Index, %				
<b>McBride-Ratcliff - 1987-1990</b>	CB-10	427.8	68	40	28		28		
	CB-10	417.8	72	53	19		19		
	CB-10	407.8	75	57	18		18		
	CB-11	507.1	56	38	18		18		
	CB-11	492.1	50	33	17		17		
	CB-11	477.1	80	55	25		25		
	CB-11	462.1	74	55	19		19		
	CB-12	445.8	72	48	24		24		
	CB-12	430.8	73	52	21		21		
	CB-12	420.8	64	44	20		20		
	CB-13	430.4	86	25	61		24		
	CB-13	415.4	73	24	49		28		
	CB-13	410.4	74	27	47		27		
	CB-13	390.4	78	24	54		18		
	CB-15	435	69	29	40		31		
	CB-15	425	70	28	42		21		
	CB-15	410	65	27	38		19		
	CB-16	437.4	69	21	48		24		
	CB-16	427.4	71	28	43		27		
	CB-16	417.4	66	26	39		22		
CB-16	412.4	63	28	35		22			
CB-17	475.6	73	28	45		23			
CB-17	460.6	79	29	50		23			
CB-17	445.6	85	27	58		20			
CB-17	430.6	87	27	60		18			
CB-18	411.6	81	26	55		28			
CB-18	401.6	73	26	47		25			
CB-18	391.6	71	28	43		18			
CB-18	381.6	67	27	40		18			
CB-19	406	76	24	52		26			
CB-19	396	71	23	48		27			
CB-19	381	65	28	37		31			
CB-19	371					20			
CB-20	493.1	83	28	55		19			
CB-20	478.1	74	27	47		25			
CB-20	463.1	78	25	53		22			

**Skyline Landfill  
Geotechnical Laboratory Test Summary**

Subsurface Exploration	Boring #	Sample Elevation, ft	Atterberg Limits			Passing 200 Sieve, %	Moisture, %	Unit Dry Weight, pcf	Permeability, cm/sec
			Liquid Limit, %	Plastic Limit, %	Plasticity Index, %				
	CB-20	438.1	79	27	52		18		
	CB-21	501.2	65	25	40		28		
	CB-21	481.2	75	27	48		25		
	CB-21	451.2	69	28	41		20		
	CB-21	411.2	67	27	40		19		
	CB-22	406.3	77	29	48		26		
	CB-22	401.3	70	27	43		17		
	CB-22	386.3	91	28	63		15		
	CB-23	444.6	72	22	50		20		
	CB-23	439.6	74	27	47		24		
	CB-23	434.6	66	27	39		20		
	CB-23	429.6	62	28	34		23		
	CB-24	485.7	73	25	48		22		
	CB-24	460.7	67	26	41		20		
	CB-24	435.7	75	26	49		19		
	CB-25	433	74	28	46		23		
	CB-25	423	70	26	44		21		
	CB-25	413	67	24	43		16		
	CB-25	403	62	26	36		20		
	CB-26	441.5	70	26	44		26		
	CB-26	431.5	73	26	47		28		
	CB-26	421.5	77	22	55		25		
	CB-26	411.5	71	27	44		21		
	CB-27	400.1	75	21	54		27		
	CB-27	390.1	78	23	55		26		
	CB-27	380.1	59	23	36		20		
	CB-27	370.1	60	24	36		16		
	P-12	436	72	33	39		27	91	
	P-12	431	72	35	37		28		
	P-13	437	75	38	37		26		
	P-13	432	74	34	40		27	93	
	P-13	427	73	35	38		26	93	
	P-13	422	47	27	20		21	103	
	P-13	417	72	26	46		18		
	P-13	412	67	29	38		18	110	
	P-13	407	62	25	37		18		

**McBride-Ratcliff -  
1987-1990**



**Skyline Landfill  
Geotechnical Laboratory Test Summary**

Subsurface Exploration	Boring #	Sample Elevation, ft	Atterberg Limits			Passing 200 Sieve, %	Moisture, %	Unit Dry Weight, pcf	Permeability, cm/sec
			Liquid Limit, %	Plastic Limit, %	Plasticity Index, %				
<b>McBride-Ratcliff - 1987-1990</b>	P-14	501	76	30	46		20	83	
	P-14	496	63	27	36		21		
	P-14	486					28		
	P-14	476	72	33	39		24		
	P-15	486	73	30	43		27	96	
	P-16	501	69	21	48		18	102	
	P-16	496	89	30	59		28	97	
	P-16	491	80	29	51		29		
	P-16	486	77	30	47		27	96	
	P-16	481	67	29	38		26	96	
	P-16	476					26	100	
	P-16	471	79	32	47		23	97	
	P-16	466					20		
	P-16	461	59	27	32		22	96	
	P-16	453	86	31	55		21		
	P-16	450	80	31	49		22	103	
	P-16	445	90	32	58		21	103	
	P-17	477	77	42	35		28	93.2	
	P-17	467	77	42	35		29		
	P-18	482	79	26	53				
P-18	477					30	92		
P-18	472	80	28	52		29	92		
P-18	467					27			
P-18	462	78	32	46		23	93		
P-18	457	81	33	48		28	91		
P-18	452	84	30	54		29	92		
P-19	414	85	28	57		31			
P-19	404					24	96		
P-19	394	72	30	42		20	78		
P-19	384				99	19	104		
P-19	374					18			
P-19	364	80	33	47		18	98		
P-19	354					18			
P-19	348					17	101		
P-20	416					29	94		
P-20	406	74	31	43		29	95		

**Skyline Landfill  
Geotechnical Laboratory Test Summary**

Subsurface Exploration	Boring #	Sample Elevation, ft	Atterberg Limits			Passing 200 Sieve, %	Moisture, %	Unit Dry Weight, pcf	Permeability, cm/sec
			Liquid Limit, %	Plastic Limit, %	Plasticity Index, %				
McBride-Ratcliff - 1987-1990	P-21	416					32	93	
	P-22	416					30		
	P-22	406	77	24	53		29	96	
	P-22	396	77	30	47		20	96	
	P-22	386	75	28	47		19	107	
	P-23	421	78	28	50		19	97	
	P-23	416					29		
	P-23	411	71	23	48		30	90	
	P-23	406					29	90	
	P-23	401	62	29	33		31	84	
	P-23	396	65	26	39	99	8	112	
	P-23	391	85	30	55		20	109	
	P-23	381	63	28	35		19	99	
	P-23	371	70	21	49		19	86	
	P-23	366					19		
	P-23	361	77	30	47		19	101	
	P-23	356				99	19		
	P-23	351	66	33	33		17	98	
	P-23	346	83	25	58		19	73	
	P-23	341					19	100	
P-23	331	84	30	54		19	93		
P-23	326					16			
P-23	321	75	27	48		17	101		
P-23	316	78	30	48					
P-23	311	71	28	43		16	98		
P-23	306					16			
P-23	298	77	26	51		16			
HDR Engineering - 1991	CB-28	418.8	85	26	59	99.6			
	CB-28	408.8	81	37	44				
	CB-29	395.5	70	23	47				
	CB-32	433.3	76	24	52		30		
	CB-33	417	65	24	41				
	CB-34	463.3	74	27	47				
	CB-34	413.3	72	26	46	99.6	14		
	CB-35	429.9	72	28	44		20		
CB-35	424.9	74	28	46		21			

**Skyline Landfill  
Geotechnical Laboratory Test Summary**

Subsurface Exploration	Boring #	Sample Elevation, ft	Atterberg Limits				Moisture, %	Unit Dry Weight, pcf	Permeability, cm/sec
			Liquid Limit, %	Plastic Limit, %	Plasticity Index, %	Passing 200 Sieve, %			
	CB-36	432.7	71	24	47				
	CB-36	422.7	63	22	41				
	CB-37	432.8	64	26	38				
	CB-38	433.5	61	24	37				
	CB-39	478.8	66	27	39	99.6		4.00E-09	
	CB-39	463.8	72	25	47				
	CB-39	418.8	63	24	39				
	CB-40	427.1	74	26	48				
	CB-40	422.1	71	22	49				
	CB-41	470.4	79	25	54		102		
	CB-42	452.2	72	27	45				
	CB-42	437.2	70	24	46				
	CB-42	392.2	56	26	30				
	CB-44	437.2	74	24	50		98		
	CB-44	382.2	61	23	38				
	CB-45	426.5	74	25	49				
	CB-46	457.4	73	25	48				
	CB-46	437.4	70	22	48				
	CB-48	482.3	67	24	43	98.4			
	CB-48	447.3	65	19	46	99.7		6.80E-09	
	CB-49	488.7	44	20	24				
	CB-49	473.7	82	24	58		105		
	CB-50	462.3	69	22	47	98.4			
	CB-50	437.3	62	24	38				
	CB-51	452.1	75	25	50				
	CB-51	418.1	62	24	38	99.2			
	CB-52	460.3	81	22	59		97		
	CB-52	425.3	73	22	51		102		
	CB-53	476.4	73	19	54				
	CB-53	446.4	73	19	54				
	CB-53	436.4	67	23	44				
	CB-54	453.9	79	25	54		97		
	CB-55	459.5	87	32	55				
	CB-56	446.1	79	26	53				
	CB-56	436.1	69	30	39				
	CB-21	396.6	69	30	39			8.20E-09	
	CB-33	378.9	69	30	39			9.0E-09	
	CB-36	384.0	69	30	39			6.0E-09	

HDR Engineering -  
1991

Biggs & Mathews  
Environmental, Inc.



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CLIENT: Biggs & Mathews Environmental, Inc.  
 1700 Robert Road, Ste. 100  
 Mansfield, TX 76063

REPORT DATE: 2/8/2012  
 PROJECT NO.: 0611-1655

PROJECT: Skyline Landfill Expansion

**HYDRAULIC CONDUCTIVITY WORKSHEET**  
 FALLING HEAD, RISING TAILWATER, CONSTANT VOLUME - FLEXIBLE WALL PERMEAMETER

LOCATION:		LAB START DATE:	2/4/2012
MATERIAL:	Shale, gray	LAB RPT. DATE:	2/8/2012
BORING/SAMPLE:	CB-21	TECHNICIAN:	MLT
PROCTOR #:		DEPTH/LIFT:	124.7-125.4'
SAMPLE ORIENTATION:	Vertical	PERM FLUID USED:	De-aired Tap Water
	Remold _____		
a. Length of Specimen, L:	2.01 in	b. Avg. Diameter of Specimen:	1.86 in
c. Sample Volume		d. Wet Unit Weight:	
( $\pi b^2 / 4 * a$ ):	5.46 cu in	$[(e * 3.8095) / c]$ :	134.6 pcf

**INITIAL CONDITIONS**

**FINAL CONDITIONS**

e. Wet Weight Soil:	192.9 gms	k. Wet Weight Soil + Tare:	292.9 gms
f. Wet Weight Soil + Tare:	291.5 gms	l. Dry Weight Soil + Tare:	264.1 gms
g. Dry Weight Soil + Tare:	264.1 gms	m. Tare Weight:	98.6 gms
h. Tare Weight:	98.6 gms	n. Moisture Content	
i. Moisture Content		$[(k-l)/(l-m)]*100$ :	17.4 %
$[(f-g)/(g-h)]*100$ :	16.6 %		
j. Unit Dry Weight			
$[d/(1+(i/100))]$ :	115.4 pcf		

Specific Gravity of Mercury, $d_{Hg}$ :	13.55	Equilibrium Head, $R_{eq}$ :	2.0 cm
Specific Gravity of Water, $d_w$ :	1.00	Maximum Pipet Head, $R_p$ :	13.72 cm
		Maximum Gradient, $i$ :	30.0 cm/cm

B COEFFICIENT DETERMINATION						PRESSURE, psi			
	Ps	Delta Pressure	Back Pressure, bp	Pore Pressure	B Coeff.	Trial	Ps op	Inflow $h_i$ , in	Outflow $h_o$ , out
		10							
		10							
		10							
7-Feb	45	10	40	49.5	0.95		45	40	40

	Time	Cumul. Time, s	Head Reading H, cm	Total Head Loss $Dz_p$ , cm	Temp C	Rt	k @ 20C cm/sec
2/7/2012	07:00		13.70				
2/7/2012	07:12	720	13.50	0.20	22	0.953	1.6E-08
2/7/2012	07:20	1200	13.40	0.30	22	0.953	1.4E-08
2/7/2012	07:30	1800	13.30	0.40	22	0.953	1.3E-08
2/7/2012	07:39	2340	13.30	0.40	22	0.953	9.9E-09
2/7/2012	07:47	2820	13.30	0.40	22	0.953	8.2E-09

Test Method ASTM D 5084-90  
 Pipet Area = 0.031416 sq cm  
 Annulus Area = 0.767120 sq cm



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CLIENT: Biggs & Mathews Environmental, Inc.  
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 Mansfield, TX 76063

REPORT DATE: 2/8/2012  
 PROJECT NO.: 0611-1655

PROJECT: Skyline Landfill Expansion

**HYDRAULIC CONDUCTIVITY WORKSHEET**  
 FALLING HEAD, RISING TAILWATER, CONSTANT VOLUME - FLEXIBLE WALL PERMEAMETER

LOCATION:		LAB START DATE:	2/4/2012
MATERIAL:	Shale, gray	LAB RPT. DATE:	2/8/2012
BORING/SAMPLE:	CB-33	TECHNICIAN:	MLT
PROCTOR #:		DEPTH/LIFT:	54.0'-55.0'
SAMPLE ORIENTATION:	Vertical	PERM FLUID USED:	De-aired Tap Water
	Remold _____		
a. Length of Specimen, L:	2.6 in	b. Avg. Diameter of Specimen:	1.94 in
c. Sample Volume		d. Wet Unit Weight:	
( $\pi b^2 / 4 * a$ ):	7.69 cu in	[(e * 3.8095) / c]:	135.6 pcf

**INITIAL CONDITIONS**

**FINAL CONDITIONS**

e. Wet Weight Soil:	273.6 gms	k. Wet Weight Soil + Tare:	372.5 gms
f. Wet Weight Soil + Tare:	370.8 gms	l. Dry Weight Soil + Tare:	333.1 gms
g. Dry Weight Soil + Tare:	333.1 gms	m. Tare Weight:	97.2 gms
h. Tare Weight:	97.2 gms	n. Moisture Content	
i. Moisture Content		[(k-l)/(l-m)]*100:	16.7 %
	[(f-g)/(g-h)]*100:		16.0 %
j. Unit Dry Weight			
	[d/(1+(i/100))]:		116.9 pcf

Specific Gravity of Mercury,  $d_{Hg}$ : 13.55  
 Specific Gravity of Water,  $d_w$ : 1.00

Equilibrium Head,  $R_{eq}$ : 2.0 cm  
 Maximum Pipet Head,  $R_p$ : 17.17 cm  
 Maximum Gradient,  $i$ : 30.0 cm/cm

B COEFFICIENT DETERMINATION						PRESSURE, psi			
	Ps	Delta Pressure	Back Pressure, bp	Pore Pressure	B Coeff.	Trial	Ps cp	Inflow $h_i$ , in	Outflow $h_o$ , out
		10							
		10							
		10							
7-Feb	45	10	40	49.5	0.95		45	40	40
	Time	Cumul. Time, s	Head Reading H, cm	Total Head Loss $D_{zp}$ , cm	Temp C	Rt	k @ 20C cm/sec		
2/7/2012	07:51		17.10						
2/7/2012	08:02	660	16.80	0.30	22	0.953	2.4E-08		
2/7/2012	08:15	1440	16.70	0.40	22	0.953	1.5E-08		
2/7/2012	08:27	2160	16.60	0.50	22	0.953	1.2E-08		
2/7/2012	08:42	3060	16.50	0.60	22	0.953	1.0E-08		
2/7/2012	08:50	3540	16.50	0.80	22	0.953	9.0E-09		

Test Method ASTM D 5084-90

Pipet Area = 0.031416 sq cm  
 Annulus Area = 0.767120 sq cm



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CLIENT: Biggs & Mathews Environmental, Inc.  
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Mansfield, TX 76063

REPORT DATE: 2/8/2012  
PROJECT NO.: 0611-1655

PROJECT: Skyline Landfill Expansion

**HYDRAULIC CONDUCTIVITY WORKSHEET**  
**FALLING HEAD, RISING TAILWATER, CONSTANT VOLUME - FLEXIBLE WALL PERMEAMETER**

LOCATION:		LAB START DATE:	2/4/2012
MATERIAL:	Shale, gray	LAB RPT. DATE:	2/8/2012
BORING/SAMPLE:	CB-36	TECHNICIAN:	MLT
PROCTOR #:		DEPTH/LIFT:	53.7'-54.6'
SAMPLE ORIENTATION:	Vertical Remold _____	PERM FLUID USED:	De-aired Tap Water
a. Length of Specimen, L:	2.74 in	b. Avg. Diameter of Specimen:	1.98 in
c. Sample Volume ( $\pi b^2 / 4 * a$ ):	8.44 cu in	d. Wet Unit Weight: [( $e * 3.8095$ ) / c]:	133.5 pcf

**INITIAL CONDITIONS**

**FINAL CONDITIONS**

e. Wet Weight Soil:	295.7 gms	k. Wet Weight Soil + Tare:	399.2 gms
f. Wet Weight Soil + Tare:	396.5 gms	l. Dry Weight Soil + Tare:	353.5 gms
g. Dry Weight Soil + Tare:	353.5 gms	m. Tare Weight:	100.8 gms
h. Tare Weight:	100.8 gms	n. Moisture Content [(k-l)/(l-m)]*100:	18.1 %
i. Moisture Content [(f-g)/(g-h)]*100:	17.0 %		
j. Unit Dry Weight [d/(1+(l/100))]:	114.1 pcf		

Specific Gravity of Mercury,  $d_{Hg}$ : 13.55  
Specific Gravity of Water,  $d_w$ : 1.00

Equilibrium Head,  $R_{eq}$ : 2.0 cm  
Maximum Pipet Head,  $R_p$ : 17.98 cm  
Maximum Gradient,  $i$ : 30.0 cm/cm

B COEFFICIENT DETERMINATION						PRESSURE, psi			
	P <sub>3</sub>	Delta Pressure	Back Pressure, hp	Pore Pressure	B Coeff.	Time	P <sub>3</sub> cp	Inflow h <sub>e</sub> , in	Outflow h <sub>e</sub> , out
		10							
		10							
		10							
7-Feb	45	10	40	49.5	0.95		45	40	40
	Time	Cumul. Time, s	Head Reading H, cm	Total Head Loss D <sub>z<sub>p</sub></sub> , cm	Temp C	R <sub>t</sub>	k @ 20C cm/sec		
2/7/2012	08:53		17.90						
2/7/2012	09:10	1020	17.70	0.20	22	0.953	9.9E-09		
2/7/2012	09:22	1740	17.60	0.30	22	0.953	8.7E-09		
2/7/2012	09:30	2220	17.50	0.40	22	0.953	9.2E-09		
2/7/2012	09:39	2760	17.50	0.40	22	0.953	7.4E-09		
2/7/2012	09:50	3420	17.50	0.40	22	0.953	6.0E-09		

Test Method ASTM D 5084-90

Pipet Area = 0.031416 sq cm  
Annulus Area = 0.767120 sq cm





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CLIENT: Biggs & Matthews Engineering

REPORT DATE: 10/16/2011

PROJECT NO.: 1655

PROJECT: Skyline Landfill

**HYDRAULIC CONDUCTIVITY WORKSHEET  
FALLING HEAD - FIXED WALL PERMEAMETER**

LOCATION:  
MATERIAL: Shaley clay, gray & tan  
BORING/SAMPLE: North of Cell #8  
PROCTOR #: \_\_\_\_\_  
SAMPLE ORIENTATION: H   X   V \_\_\_\_\_  
Remold \_\_\_\_\_

LAB START DATE: 10/14/2011  
LAB RPT. DATE: 10/16/2011  
TECHNICIAN: MLT  
DEPTH/LIFT:  
PERM FLUID USED: De-aired Tap Water

a. Length of Specimen, L: 1.0 in  
c. Sample Volume  
( $\pi b^2 / 4 * a$ ): 4.909 cu in

b. Avg. Diameter of Specimen: 2.5 in  
d. Wet Unit Weight  
[ $((f-h)*3.8095)/c$ ]: 108.8 pcf

**INITIAL CONDITIONS**

**FINAL CONDITIONS**

e. Ring + Wet Weight Soil: 687.1 gms  
f. Wet Weight Soil + Tare: 237.5 gms  
g. Dry Weight Soil + Tare: 206.2 gms  
h. Tare Weight: 97.3 gms  
i. Moisture Content  
[ $((f-g)/(g-h))*100$ ]: 28.7 %  
j. Unit Dry Weight  
[ $d/(1+(i/100))$ ]: 84.5 pcf

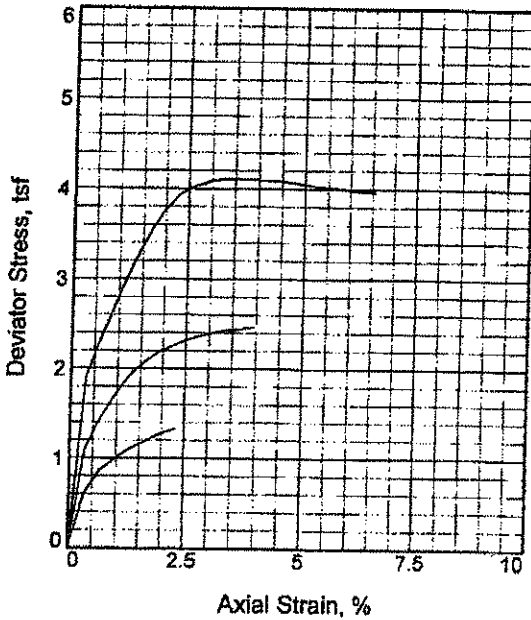
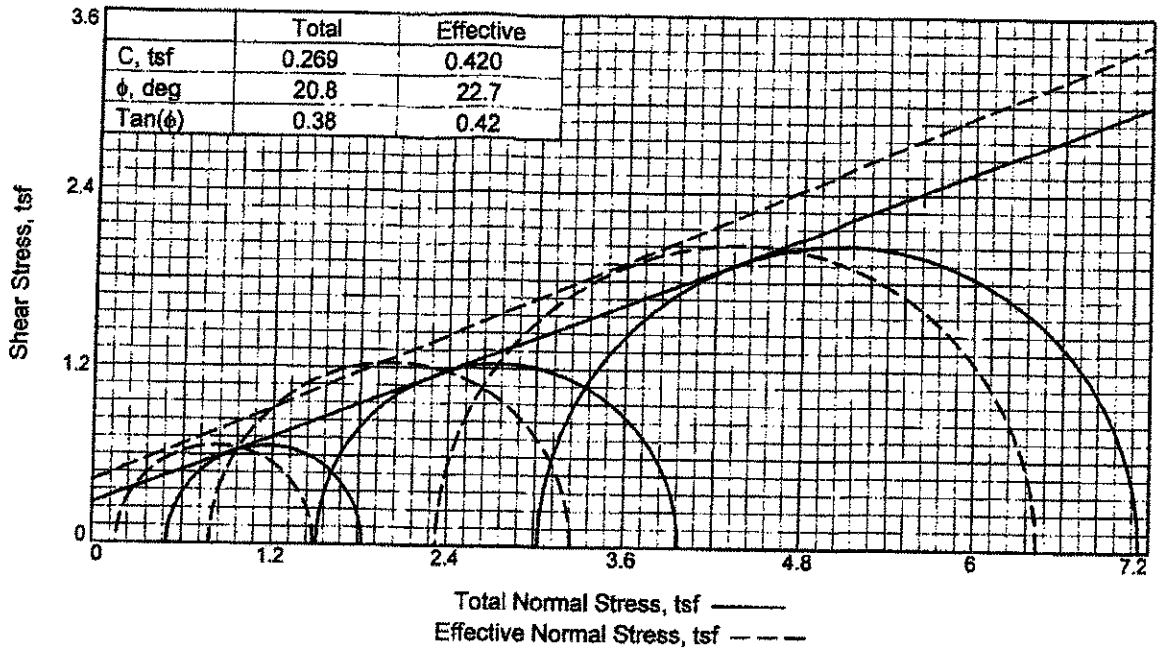
k. Wet Weight Soil + Tare: 245.5 gms  
l. Dry Weight Soil + Tare: 206.2 gms  
m. Tare Weight: 97.3 gms  
n. Moisture Content  
[ $((k-l)/(l-m))*100$ ]: 36.1 %  
o. Unit Dry Weight  
[ $d/(1+(n/100))$ ]: 80.0 pcf  
p. Ring Weight: 526.9 gms

Date	Time	t sec	Initial Height, h <sub>o</sub>	Corrected h <sub>o</sub> - C	Final Height, h <sub>f</sub>	Corrected h <sub>f</sub> - C	Temp C	R <sub>t</sub>	k @ 20C cm/sec
14-Oct	09:19		44.1	36.6					
14-Oct	18:20	32460			31.7	24.2	22	0.953	8.4E-07
14-Oct	18:20		31.7	24.2					
15-Oct	06:51	45060			30.2	22.7	22	0.953	9.4E-08
15-Oct	06:51		30.2	22.7					
15-Oct	12:06	18900			29.6	22.1	22	0.953	9.4E-08
15-Oct	12:06		29.6	22.1					
15-Oct	16:00	14040			29.2	21.7	22	0.953	8.6E-08
15-Oct	16:00		29.2	21.7					
15-Oct	21:32	19920			28.7	21.2	22	0.953	7.7E-08
14-Oct	18:20		31.7	24.2					
15-Oct	21:32	97920			28.7	21.2	22	0.953	8.9E-08
Height of Top of Specimen			Standpipe Diameter			Standpipe Area			
From Top of Table:			7.50 cm			1.05 cm 0.868 sq cm			

skyline Permeameter Method: Corps of Engineers EM 1110-2-1906, Appendix 10/16/2011

H<sub>x</sub>-C = H<sub>x</sub>-H<sub>t</sub>

LANDTEC



Sample No.	1	2	3
<b>Initial</b>			
Water Content, %	30.0	30.0	30.0
Dry Density, pcf	89.6	89.6	89.6
Saturation, %	93.8	93.8	93.8
Void Ratio	0.8472	0.8472	0.8472
Diameter, in.	1.45	1.45	1.45
Height, in.	3.05	3.05	3.05
<b>At Test</b>			
Water Content, %	32.0	32.0	32.0
Dry Density, pcf	89.6	89.6	89.6
Saturation, %	100.0	100.0	100.0
Void Ratio	0.8472	0.8472	0.8472
Diameter, in.	1.45	1.45	1.45
Height, in.	3.05	3.05	3.05
Strain rate, in./min.			
Back Pressure, psi	10.00	10.00	10.00
Cell Pressure, psi	17.00	31.00	52.00
Fail. Stress, tsf	1.32	2.46	4.11
Total Pore Pr., tsf	1.06	1.45	1.42
Ult. Stress, tsf			
Total Pore Pr., tsf			
$\bar{\sigma}_1$ Failure, tsf	1.49	3.25	6.43
$\bar{\sigma}_3$ Failure, tsf	0.17	0.78	2.33

**Type of Test:**  
CU with Pore Pressures

**Sample Type:** Undisturbed

**Description:** Clay, shaley w/sand seams brown & gray

LL= 65      PL= 32      PI= 33

**Assumed Specific Gravity=** 2.65

**Remarks:** Sample Taken North Of Cell #8

**Client:**

**Project:** Skyline Landfill

**Sample Number:** Cell #8

**Proj. No.:** 1655      **Date Sampled:** 10/14/2011

**TRIAXIAL SHEAR TEST REPORT**  
**M L Testing, LLC**  
**Bluff Dale, TX**

**Figure** \_\_\_\_\_