APPENDIX I – LABORATORY GEOTECHNICAL DATA

I.1 – Laboratory Data Summary Tables (Most Recent Investigation)
I.2 – Laboratory Data (Most Recent Investigation)
I.3 – Laboratory Data Summary Tables (Previous Investigation)

I.1 – Laboratory Data Summary Tables (Most Recent Investigation)

TABLE 1
ZION LANDFILL SITE 2 NORTH EXPANSION
SUMMARY OF GEOTECHNICAL LABORATORY TEST RESULTS FOR WADSWORTH TILL

Boring No.	Sample No.	Depth BGS (feet)	USCS Soil Class.	Soil	Grain Size Analysis: ASTM C136 & ASTM D1140				Atterberg Limits: ASTM D4318			Properties Below Taken from Hydraulic Conductivity Test Data (ASTM D5084) or Specific Gravity Test Data (ASTM D854)								Hydr. Cond. "k" (cm/sec)
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	PL	LL	PI	Specific Gravity "G_s"	Void Ratio "e"	Porosity "n"	Saturation "S" (%)	Moisture Content "w" (%)	Dry Unit Weight "γ_{dry}" (pcf)	Total Unit Weight "γ_{total}" (pcf)	Sat. Unit Weight "γ_{sat}" (pcf)	
B-01-18	ST-35	68.0 - 70.0'	CL	Grey CLAY	-	-	-	-	-	-	-	2.750	0.42	0.30	98.0	15.0	120.7	138.9	139.3	2.38E-08
B-03-18	ST-34	66.0 - 68.0'	CL	Dark Grey Silty CLAY	-	-	-	-	-	-	-	2.750	0.38	0.28	92.0	12.7	124.3	140.2	141.5	4.77E-08
B-05-18	ST-37	72.0 - 74.0'	CL	Brown-Grey CLAY	-	-	-	-	-	-	-	2.750	0.67	0.40	99.0	24.3	102.6	127.5	127.8	4.85E-08
B-10-18	ST-30	58.0 - 60.0'	CL-ML	Grey Silty CLAY with thin layers of dry SILT	-	-	-	-	-	-	-	2.750	0.45	0.31	87.0	14.3	118.1	135.0	137.6	9.84E-08
B-11-18	ST-29	56.0 - 58.0'	CL	Grey CLAY	-	-	-	-	-	-	-	2.750	0.46	0.31	100.0	16.6	117.9	137.5	137.4	3.63E-08
B-14-18	ST-33	64.0 - 66.0'	CL	Grey Silty CLAY	-	-	-	-	-	-	-	2.750	0.35	0.26	84.0	10.8	126.9	140.6	143.2	3.65E-08
B-01-18	SS-23	44.0 - 46.0'	CL	Grey Lean CLAY with Sand	2.2	19.1	51.8	26.9	11	26	15	-	-	-	-	-	-	-	-	-
B-01-18	SS-27	52.0 - 54.0'	CL	Light Grey Lean CLAY	0.8	5.5	52.9	40.8	12	34	22	-	-	-	-	-	-	-	-	-
B-02-18	SS-30	58.0 - 60.0'	CL	Light Brown Lean CLAY	0.2	7.7	55.9	36.2	12	30	18	-	-	-	-	-	-	-	-	-
B-02-18	SS-33	64.0 - 66.0'	CL	Grey Silty Lean CLAY with Sand	1.3	18.1	58.5	22.1	10	21	11	-	-	-	-	-	-	-	-	-
B-03-18	SS-29	56.0 - 58.0'	CL	Grey Lean CLAY	1.7	7.7	55.6	35.0	15	30	15	-	-	-	-	-	-	-	-	-
B-03-18	SS-32	62.0 - 64.0'	CL	Grey Silty Lean CLAY	0.9	6.4	52.2	40.5	15	32	17	-	-	-	-	-	-	-	-	-
B-04-18	SS-20	38.0 - 40.0'	CL	Greay Sandy Lean CLAY	9.4	27.4	51.2	12.0	11	19	8	-	-	-	-	-	-	-	-	-
B-04-18	SS-23	44.0 - 46.0'	CL	Light Grey Lean CLAY with Sand	2.9	19.8	48.0	29.3	11	29	18	-	-	-	-	-	-	-	-	-
B-05-18	SS-31	60.0 - 62.0'	CL	Light Grey Lean CLAY	0.0	12.3	52.9	34.8	13	28	15	-	-	-	-	-	-	-	-	-
B-06-18	SS-31	60.0 - 62.0'	CL	Grey Lean CLAY	1.1	11.2	52.3	35.4	12	33	21	-	-	-	-	-	-	-	-	-
B-07-18	SS-15	28.0 - 30.0'	CL	Light Brown Lean CLAY	0.9	12.5	64.7	21.9	14	23	9	-	-	-	-	-	-	-	-	-
B-07-18	SS-24	46.0 - 48.0'	CL	Grey Lean CLAY with Sand	1.4	18.0	56.8	23.8	13	27	14	-	-	-	-	-	-	-	-	-
B-08-18	SS-30	58.0 - 60.0'	CL	Brown, Grey Lean CLAY with Sand	0.6	19.1	53.2	27.1	13	28	15	-	-	-	-	-	-	-	-	-
B-09-18	SS-22	42.0 - 44.0'	CL-ML	Grey Silty CLAY with Sand	1.0	27.4	62.0	9.6	14	18	4	-	-	-	-	-	-	-	-	-
B-09-18	SS-28	54.0 - 56.0'	CL	Grey Lean CLAY with SAND	2.0	17.2	52.1	28.7	14	27	13	-	-	-	-	-	-	-	-	-
B-10-18	SS-23	44.0 - 46.0'	CL	Brown-Grey Lean CLAY with Sand	2.6	17.6	49.7	30.1	14	26	12	-	-	-	-	-	-	-	-	-
B-10-18	SS-28	54.0 - 56.0'	CL	Grey Lean CLAY with SAND	3.2	16.6	49.7	30.5	14	28	14	-	-	-	-	-	-	-	-	-
B-11-18	SS-22	42.0 - 44.0'	CL-ML	Grey Sandy Silty CLAY	3.1	36.2	49.4	11.3	12	17	5	-	-	-	-	-	-	-	-	-
B-11-18	SS-28	54.0 - 56.0'	CL	Grey Lean CLAY with Sand	0.9	19.2	50.4	29.5	14	27	13	-	-	-	-	-	-	-	-	-
B-12-18	SS-27	52.0 - 54.0'	CL	Grey Lean CLAY with Sand	4.4	18.1	49.2	28.3	13	25	12	-	-	-	-	-	-	-	-	-
B-12-18	SS-32	62.0 - 64.0'	CL	Grey Lean CLAY with Sand	3.6	17.4	55.7	23.3	12	25	13	-	-	-	-	-	-	-	-	-
B-13-18	SS-17	32.0 - 34.0'	CL-ML	Grey Silty CLAY	0.0	1.5	79.5	19.0	15	22	7	-	-	-	-	-	-	-	-	-
B-13-18	SS-26	50.0 - 52.0'	CL	Grey Lean CLAY with Sand	5.5	17.8	50.8	25.9	14	26	12	-	-	-	-	-	-	-	-	-
B-14-18	SS-26	50.0 - 52.0'	CL	Grey Lean CLAY	0.0	0.4	49.7	49.9	18	40	22	-	-	-	-	-	-	-	-	-
B-14-18	SS-31	60.0 - 62.0'	CL-ML	Brownish Grey Sandy Silty CLAY	0.6	41.6	43.8	14.0	12	18	6	-	-	-	-	-	-	-	-	-
B-15-18	SS-24	46.0 - 48.0'	CL	Greay Sandy Lean CLAY	6.0	25.2	42.9	25.9	14	28	14	-	-	-	-	-	-	-	-	-
B-15-18	SS-29	56.0 - 58.0'	CL	Grey Lean CLAY	0.0	1.5	54.9	43.6	15	32	17	-	-	-	-	-	-	-	-	-
				Minimum:	0.0	0.4	42.9	9.6	10.0	17.0	4.0	2.750	0.35	0.26	84.0	10.8	102.6	127.5	127.8	2.38E-08
				Maximum:	9.4	41.6	79.5	49.9	18.0	40.0	22.0	2.750	0.67	0.40	100.0	24.3	126.9	140.6	143.2	9.84E-08
				Average:	2.1	16.4	53.5	28.0	13.2	26.6	13.4	2.750	0.46	0.31	93.3	15.6	118.4	136.6	137.8	4.85E-08

Note:

1) Values in cells shaded in gray were calculated using the soil density relationships below.

Soil Density Relationships:

$\gamma_{dry} = [(G_s \times \gamma_w] / (1+e)$

$\gamma_{total} = [(G_s + Se) \times \gamma_w] / (1+e)$

$\gamma_{total} = \gamma_d \times (1 + (w\% / 100))$

$\gamma_{sat} = [(G_s + e) \times \gamma_w] / (1+e)$

$S\% = (w \times G_s) / e$

$n = e / (1+e)$

$e = n / (1-n)$

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TABLE 2
ZION LANDFILL SITE 2 NORTH EXPANSION
SUMMARY OF GEOTECHNICAL LABORATORY TEST RESULTS FOR SHALLOW DRIFT AQUIFER

Boring No.	Sample No.	Depth BGS (feet)	USCS Soil Class.	Soil	Grain Size Analysis: ASTM C136 & ASTM D1140				Properties Below Taken from Hydraulic Conductivity Test Data (ASTM D5084) or Specific Gravity Test Data (ASTM D854)							
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Specific Gravity "G_s"	Void Ratio "e"	Porosity "n"	Saturation "S" (%)	Moisture Content "w" (%)	Dry Unit Weight "γ_{dry}" (pcf)	Total Unit Weight "γ_{total}" (pcf)	Sat. Unit Weight "γ_{sat}" (pcf)
B-05-18	SS-59	116.0 - 118.0'	SM	Grey Silty SAND	0.0	77.6	20.6	1.8	2.789	0.76	0.43	63.0	17.1	99.0	116.0	125.9
B-06-18	SS-53	104.0 - 106.0'	SM	Grey Silty SAND	4.4	82.7	12.3	0.6	2.814	0.53	0.35	75.0	14.2	114.5	130.8	136.2
B-08-18	SS-61	120.0 - 122.0'	SM	Grey Silty SAND	0.0	81.7	16.3	2.0	2.790	0.73	0.42	84.0	22.0	100.8	123.0	127.2
				Minimum:	0.0	77.6	12.3	0.6	2.789	0.53	0.35	63.0	14.2	99.0	116.0	125.9
				Maximum:	4.4	82.7	20.6	2.0	2.814	0.76	0.43	84.0	22.0	114.5	130.8	136.2
				Average:	1.5	80.7	16.4	1.5	2.798	0.67	0.40	74.0	17.8	104.8	123.3	129.8

Soil Density Relationships:

$\gamma_{dry} = [(G_s \times \gamma_w] / (1+e)$

$\gamma_{total} = [(G_s + Se) \times \gamma_w] / (1+e)$

$\gamma_{total} = \gamma_d \times (1 + (w\% / 100))$

$\gamma_{sat} = [(G_s + e) \times \gamma_w] / (1+e)$

$S\% = (w \times G_s) / e$

$n = e / (1+e)$

$e = n / (1-n)$

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TABLE 3
ZION LANDFILL SITE 2 NORTH EXPANSION
SUMMARY OF SOIL PROPERTIES AND STANDARD PROCTOR TEST DATA - WADSWORTH FORMATION

Boring Location	Depth BGS (feet)	USCS Soil Class.	Standard Proctor Test Results (ASTM D698)		95% of Standard Proctor			90% of Standard Proctor		
			$\gamma_{dry\text{-}max}$ (pcf)	MC_{opt} (%)	γ_{dry} (pcf)	γ_{total} (pcf)	$\gamma_{saturated}$ (pcf)	γ_{dry} (pcf)	γ_{total} (pcf)	$\gamma_{saturated}$ (pcf)
B-01-18 Brown and Grey CLAY	6.0 - 79.0'	CL	118.1	14.5	112.2	128.5	133.8	106.3	121.7	130.0
B-05-18 Grey CLAY	16.0 - 115.5'	CL	119	13.2	113.1	128.0	134.3	107.1	121.2	130.6
		MINIMUM:	118.1	13.2	112.2	128.0	133.8	106.3	121.2	130.0
		MAXIMUM:	119	14.5	113.1	128.5	134.3	107.1	121.7	130.6
		AVERAGE:	118.6	13.9	112.6	128.2	134.1	106.7	121.5	130.3

Notes:

1) Values in cells shaded in gray were calculated using the soil density relationships below.

Soil Density Relationships:

$\gamma_{total} = \gamma_d \times (1 + (w\% / 100))$

$\gamma_{sat} = [(G_s + e) \times \gamma_w] / (1+e)$

TABLE 4
ZION LANDFILL SITE 2 NORTH EXPANSION
SUMMARY OF REMOLDED PERMEABILITY TEST RESULTS FOR REMOLDED WADSWORTH TILL SAMPLES

Boring No.	Depth BGS (feet)	Description	Hydraulic Conductivity Test Data (ASTM D5084)								
			Specific Gravity "G_s"	Void Ratio "e"	Porosity "n"	Saturation "S" (%)	Moisture Content "w" (%)	Dry Unit Weight "γ_{dry}" (pcf)	Total Unit Weight "γ_{total}" (pcf)	Sat. Unit Weight "γ_{sat}" (pcf)	Hydr. Cond. "k" (cm/sec)
B-01-18	6'- 79'	Opt+ 0%	2.750	0.49	0.33	78	14.0	114.9	131.0	135.5	2.13E-07
		Opt+ 2%	2.750	0.50	0.33	88	16.0	114.4	132.8	135.2	3.05E-08
		Opt+ 4%	2.750	0.51	0.34	99	18.2	113.9	134.7	134.9	1.95E-08
B-05-18	16'-115.5'	Opt+ 0%	2.750	0.50	0.33	71	12.9	114.6	129.3	135.3	1.73E-07
		Opt+ 2%	2.750	0.47	0.32	87	15.0	116.5	134.0	136.6	3.53E-08
		Opt+ 4%	2.750	0.49	0.33	97	17.4	115.0	135.0	135.6	1.54E-08
		MINIMUM:	**2.750**	**0.47**	**0.32**	**71**	**12.9**	**113.9**	**129.3**	**134.9**	**1.54E-08**
		MAXIMUM:	**2.750**	**0.51**	**0.34**	**99**	**18.2**	**116.5**	**135.0**	**136.6**	**2.13E-07**
		AVERAGE:	**2.750**	**0.49**	**0.33**	**87**	**15.6**	**114.9**	**132.8**	**135.5**	**4.78E-08**

Note:

1) Values in cells shaded in gray were calculated using the soil density relationships below.

Soil Density Relationships:

$\gamma_{dry} = [(G_s \times \gamma_w] / (1+e)$

$\gamma_{total} = [(G_s + Se) \times \gamma_w] / (1+e)$

$\gamma_{total} = \gamma_d \times (1 + (w\,\% / 100))$

$\gamma_{sat} = [(G_s + e) \times \gamma_w] / (1+e)$

$S\% = (w \times G_s) / e$

$n = e / (1+e)$

$e = n / (1-n)$

TABLE 5
ZION LANDFILL SITE 2 NORTH EXPANSION
SUMMARY OF TRIAXIAL SHEAR STRENGTH TEST DATA - WADSWORTH FORMATION

Boring Location	Sample No.	Depth (Feet MSL)	Soil	Mohr Circles				Total (Undrained) Shear Strength		Effective (Drained) Shear Strength	
				Failure Stress	1	2	3	Cohesion (c)	Friction Angle (ϕ)	Cohesion (c')	Friction Angle (ϕ')
Consolidated Undrained - Triaxial Shear Strength: ASTM D2850											
B-01-18	ST-31	60.0 - 62.0'	Brown-Grey CLAY	σ_1 : σ_3 :	4,752 psf 864 psf	8,496 psf 2,016 psf	14,976 psf 3,888 psf	752 psf	24.9 deg	508 psf	33.2 deg
B-12-18	ST-34	66.0 - 68.0'	Grey Silty CLAY	σ_1 : σ_3 :	9,173 psf 2,218 psf	11,750 psf 2,851 psf	12,845 psf 3,125 psf	2,740 psf	12.1 deg	48 psf	37.2 deg
B-13-18	ST-29	56.0-58.0'	Grey Silty CLAY	σ_1 : σ_3 :	6,106 psf 1,253 psf	9,202 psf 2,174 psf	9,821 psf 2,578 psf	1,974 psf	11.1 deg	726 psf	29.5 deg
							MINIMUM:	**752 psf**	**11.1 deg**	**48 psf**	**29.5 deg**
							MAXIMUM:	**2,740 psf**	**24.9 deg**	**726 psf**	**37.2 deg**
							AVERAGE:	**1,822 psf**	**16.0 deg**	**427 psf**	**33.3 deg**
Unconsolidated Undrained - Triaxial Shear Strength: ASTM D4767											
B-06-18	ST-38	74.0 - 76.0'	Brown-Grey CLAY	σ_1 : σ_3 :	8,640 psf 2,016 psf	12,816 psf 4,032 psf	21,168 psf 8,064 psf	1,519 psf	20.7 deg		
B-07-18	ST-29	56.0 - 58.0'	Brown-Grey Silty CLAY	σ_1 : σ_3 :	7,344 psf 2,016 psf	10,368 psf 3,312 psf	15,120 psf 8,064 psf	2,481 psf	6.0 deg		
B-15-18	ST-30	58.0 - 60.0'	Brown-Grey CLAY	σ_1 : σ_3 :	8,064 psf 2,016 psf	10,656 psf 4,032 psf	15,840 psf 8,064 psf	2,344 psf	7.8 deg		
							MINIMUM:	**1,519 psf**	**6.0 deg**		
							MAXIMUM:	**2,481 psf**	**20.7 deg**		
							AVERAGE:	**2,115 psf**	**11.5 deg**		

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TABLE 6
ZION LANDFILL SITE 2 NORTH EXPANSION
SUMMARY OF 2018 CONSOLIDATION PARAMETERS

Geoligc Unit	Specific Gravity G_s	Dry Unit Weight[1] γ_{dry} (pcf)	Moisture Content %	Saturation (%)	Total Unit Weight[1] γ_{total} (pcf)	Saturated Unit Weight[1] γ_{sat} (pcf)	Pre-Consolidation Stress σ'_{pc} (psf)	Existing Effective Overburden Stress σ'_{vo} (psf)	OCR	Void Ratio (e_o)	Compression Index (C_c)	Recompression Index (C_r)	Secondary Compression Index (C_α)
Clay: B-02-18, ST-29 (56.0 - 58.0' bgs)	2.750	124.0	13.3	94.8	140.5	141.2	5,600	6,870	0.82	0.385	0.09	0.009	0.0036
Clay: B-04-18, ST-27 (52.0 - 54.0' bgs)	2.750	115.5	16.8	95.1	134.9	135.9	8,400	5,528	1.52	0.486	0.09	0.015	0.0036
Clay B-09-18, ST-31 (60.0 - 62.0' bgs)	2.750	124.6	13.2	95.7	141.0	141.6	7,000	7,097	0.99	0.378	0.07	0.027	0.0028
Averages:	**2.750**	**120.1**	**15.0**	**95.4**	**138.0**	**138.8**	**7,700**	**6313**	**1.25**	**0.432**	**0.08**	**0.021**	**0.0032**

Notes:

1. B-02-18 was assumed to be disturbed and was not inlcuded in the averages values reported in the table.
2. Consolidation tests were performed on representative soil samples taken at the borings/sample locations noted above.
3. The pre-consolidation stresses reported above were derived from the consolidation test data plots provided the attached pages.
4. The existing overburden stresses were calculated using the unit weight and the sample depth intervals reported above.

I.2 – Laboratory Data (Most Recent Investigation)

Atterberg Limits

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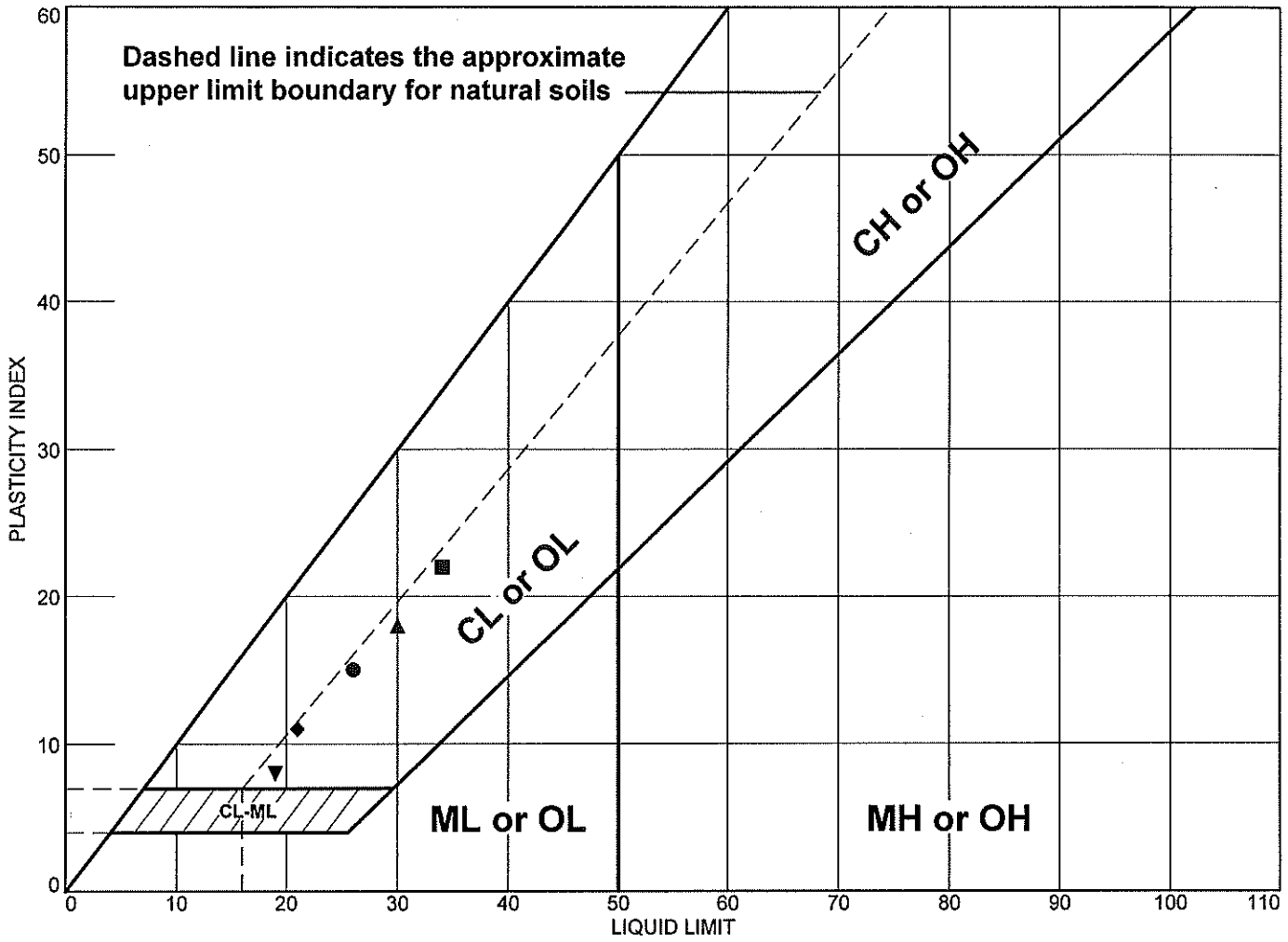
LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grey Lean CLAY with Sand	26	11	15	91.1	78.7	CL
■	Light Grey Lean CLAY	34	12	22	96.9	93.7	CL
▲	Light Brown Lean CLAY	30	12	18	96.6	92.1	CL
◆	Grey Lean CLAY with Sand	21	10	11	93.6	80.6	CL
▼	Grey Sandy Lean CLAY	19	11	8	80.5	63.2	CL

Project No. 28287 **Client:** APTIM

Project: Zion Landfill Site 2 Expansion, Aptim #3211

Remarks:

● **Location:** B-01-18 **Depth:** 44.0- 46.0' **Sample Number:** SS-23
■ **Location:** B-01-18 **Depth:** 52.0- 54.0' **Sample Number:** SS-27
▲ **Location:** B-02-18 **Depth:** 58.0- 60.0' **Sample Number:** SS-30
◆ **Location:** B-02-18 **Depth:** 64.0- 66.0' **Sample Number:** SS-33
▼ **Location:** B-04-18 **Depth:** 38.0- 40.0' **Sample Number:** SS-20

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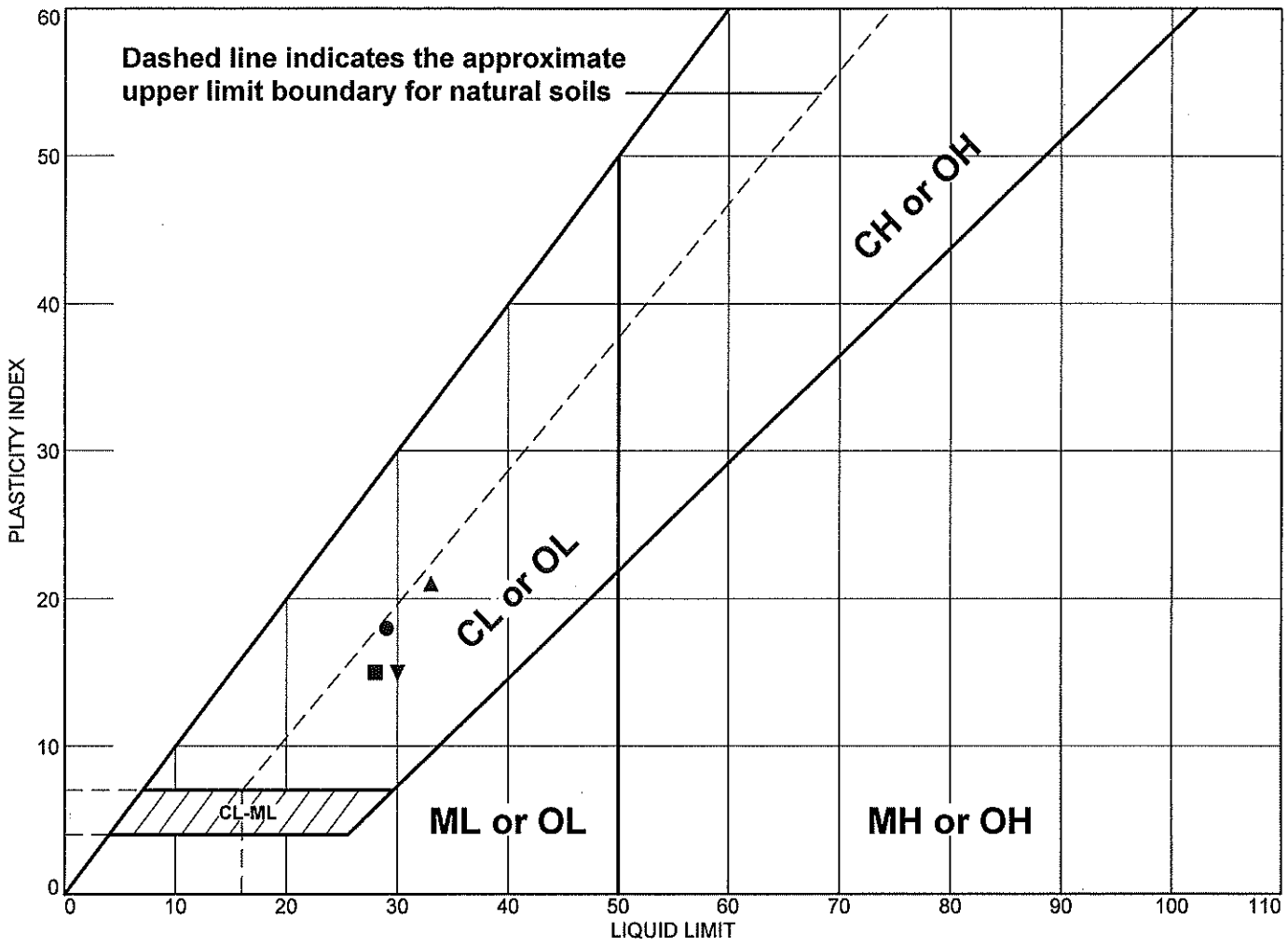
Figure

Tested By: JDS **Checked By:** WDP

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Light Grey Lean CLAY with Sand	29	11	18	90.4	77.3	CL
■	Light Grey Lean CLAY	28	13	15	97.3	87.7	CL
▲	Grey Lean CLAY	33	12	21	95.7	87.7	CL
◆	Grey Silty SAND	NV	NP	NP	99.0	22.4	SM
▼	Grey Lean CLAY	30	15	15	95.8	90.6	CL

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● **Location:** B-04-18 **Depth:** 44.0- 46.0' **Sample Number:** SS-23
■ **Location:** B-05-18 **Depth:** 60.0- 62.0' **Sample Number:** SS-31
▲ **Location:** B-06 **Depth:** 60.0- 62.0' **Sample Number:** SS-31
◆ **Location:** B-05 **Depth:** 116.0- 118.0' **Sample Number:** SS-59
▼ **Location:** B-03 **Depth:** 56.0- 58.0' **Sample Number:** SS-29

Remarks:

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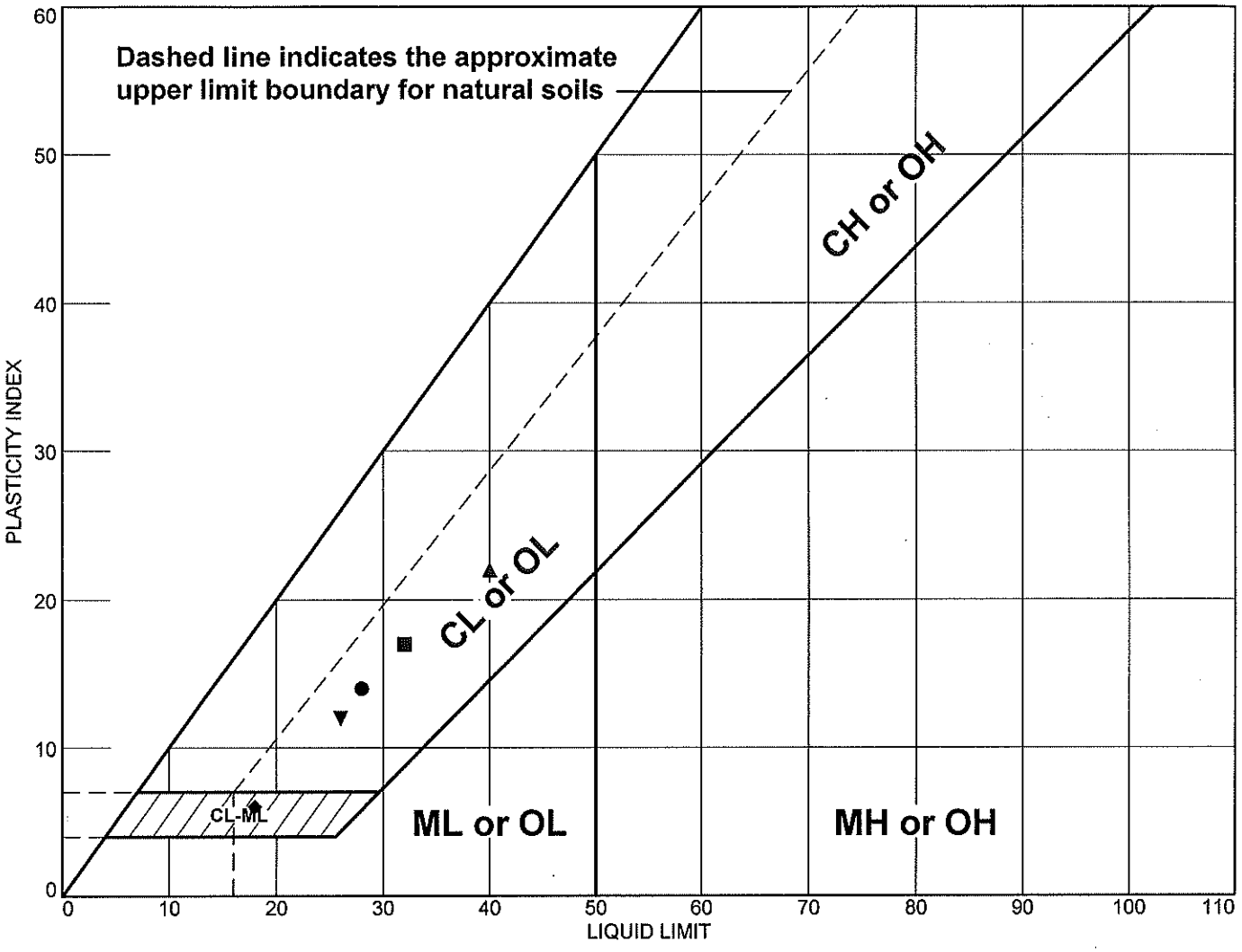
Figure

Tested By: JDS **Checked By:** WDP

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grey Sandy Lean CLAY	28	14	14	83.3	68.8	CL
■	Grey Lean CLAY	32	15	17	99.4	98.5	CL
▲	Grey Lean CLAY	40	18	22	99.7	99.6	CL
◆	Brownish Grey Sandy Silty CLAY	18	12	6	85.7	57.8	CL-ML
▼	Grey Lean CLAY with Sand	26	14	12	87.2	76.7	CL

Project No. 28287 **Client:** APTIM

Project: Zion Landfill Site 2 Expansion, Aptim #3211

● **Location:** B-15-18 **Depth:** 46.0- 48.0' **Sample Number:** SS-24
■ **Location:** B-15-18 **Depth:** 56.0- 58.0' **Sample Number:** SS-29
▲ **Location:** B-14-18 **Depth:** 50.0- 52.0' **Sample Number:** SS-26
◆ **Location:** B-14-18 **Depth:** 60.0- 62.0' **Sample Number:** SS-31
▼ **Location:** B-13-18 **Depth:** 50.0- 52.0' **Sample Number:** SS-26

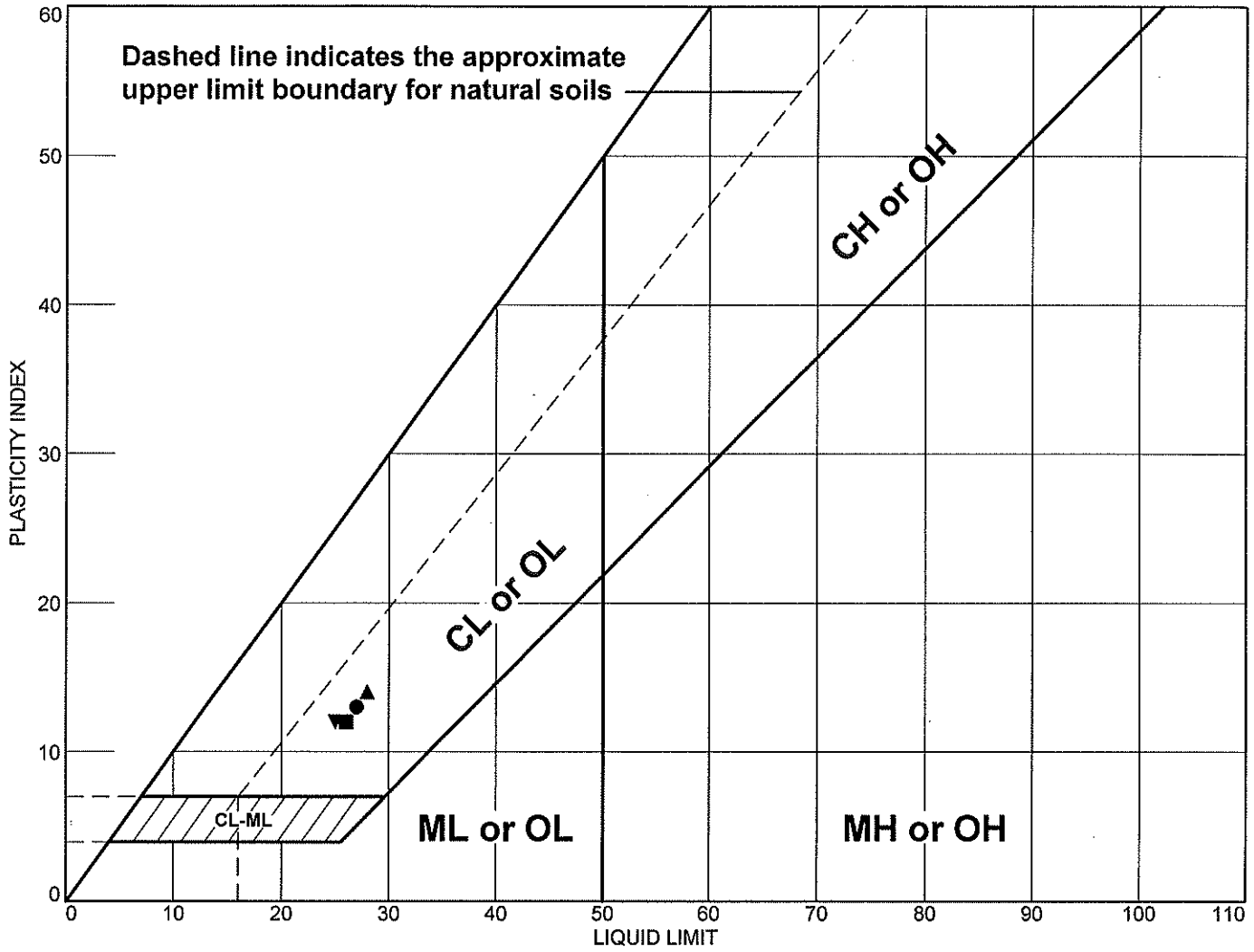
Remarks:

Midland Standard Engineering & Testing

South Elgin, IL

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grey Lean CLAY with SAND	27	14	13	90.9	80.8	CL
■	Brown-Grey Lean CLAY with Sand	26	14	12	89.9	79.8	CL
▲	Grey Lean CLAY with SAND	28	14	14	88.3	80.2	CL
◆	Grey Lean CLAY with Sand	27	14	13	90.4	79.9	CL
▼	Grey Lean CLAY with Sand	25	13	12	87.6	77.5	CL

Project No. 28287 **Client:** APTIM

Project: Zion Landfill Site 2 Expansion, Aptim #3211

● **Location:** B-09 **Depth:** 54.0- 56.0' **Sample Number:** SS-28
■ **Location:** B-10 **Depth:** 44.0- 46.0' **Sample Number:** SS-23
▲ **Location:** B-10 **Depth:** 54.0- 56.0' **Sample Number:** SS-28
◆ **Location:** B-11 **Depth:** 54.0- 56.0' **Sample Number:** SS-28
▼ **Location:** B-12 **Depth:** 52.0- 54.0' **Sample Number:** SS-27

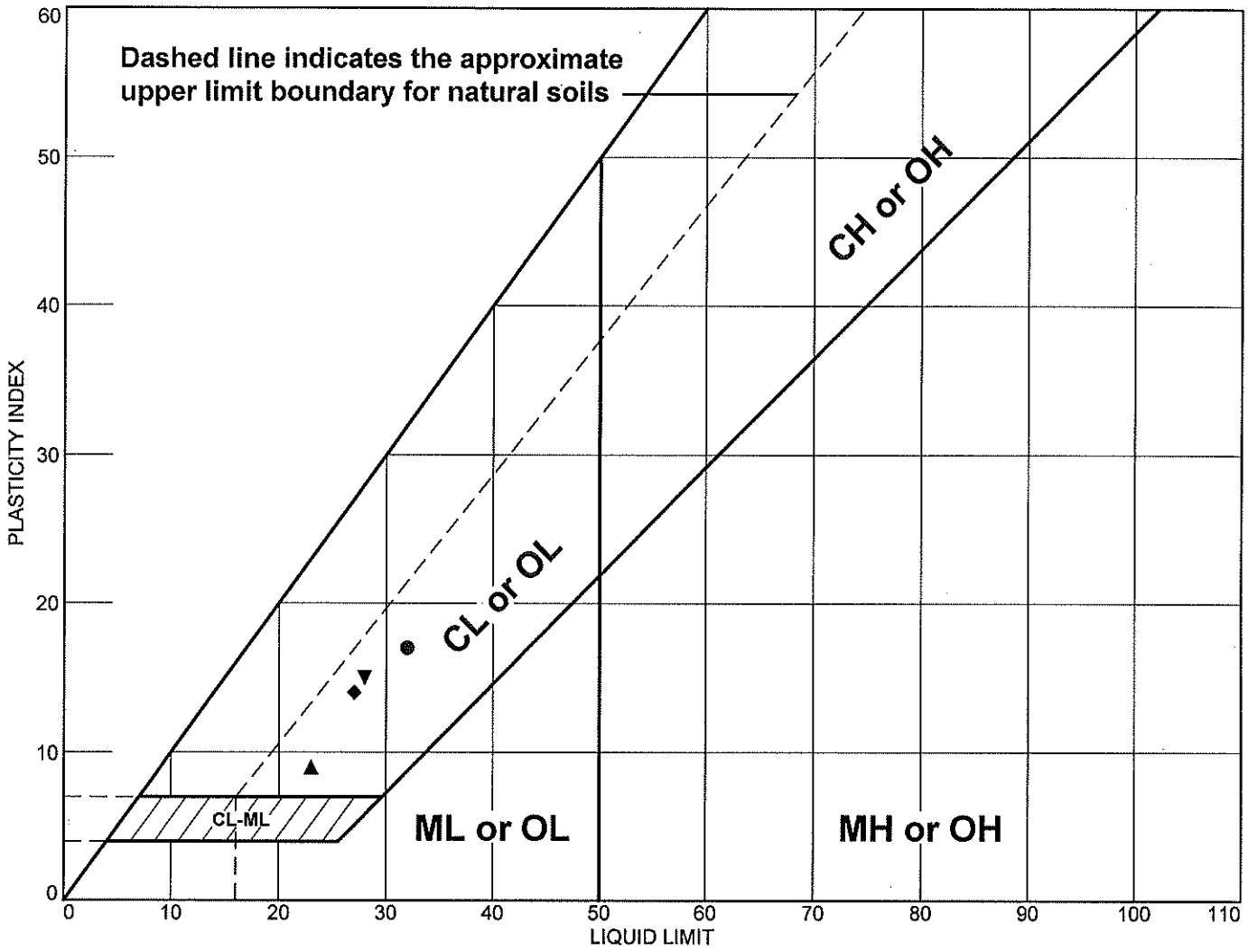
Remarks:

Midland Standard Engineering & Testing

South Elgin, IL

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grey Silty Lean CLAY	32	15	17	96.5	92.7	CL
■	Grey Silty SAND	NV	NP	NP	39.4	12.9	SM
▲	Light Brown Lean CLAY	23	14	9	96.3	86.6	CL
◆	Grey Lean CLAY with Sand	27	13	14	91.2	80.6	CL
▼	Brown, Grey Lean CLAY with Sand	28	13	15	90.5	80.3	CL

Project No. 28287 **Client:** APTIM

Project: Zion Landfill Site 2 Expansion, Aptim #3211

● **Location:** B-03 **Depth:** 62.0- 64.0' **Sample Number:** SS-32
■ **Location:** B-06 **Depth:** 104.0- 106.0' **Sample Number:** SS-53
▲ **Location:** B-07-18 **Depth:** 28.0- 30.0' **Sample Number:** SS-15
◆ **Location:** B-07-18 **Depth:** 46.0- 48.0' **Sample Number:** SS-24
▼ **Location:** B-08-18 **Depth:** 58.0- 60.0' **Sample Number:** SS-30

Remarks:

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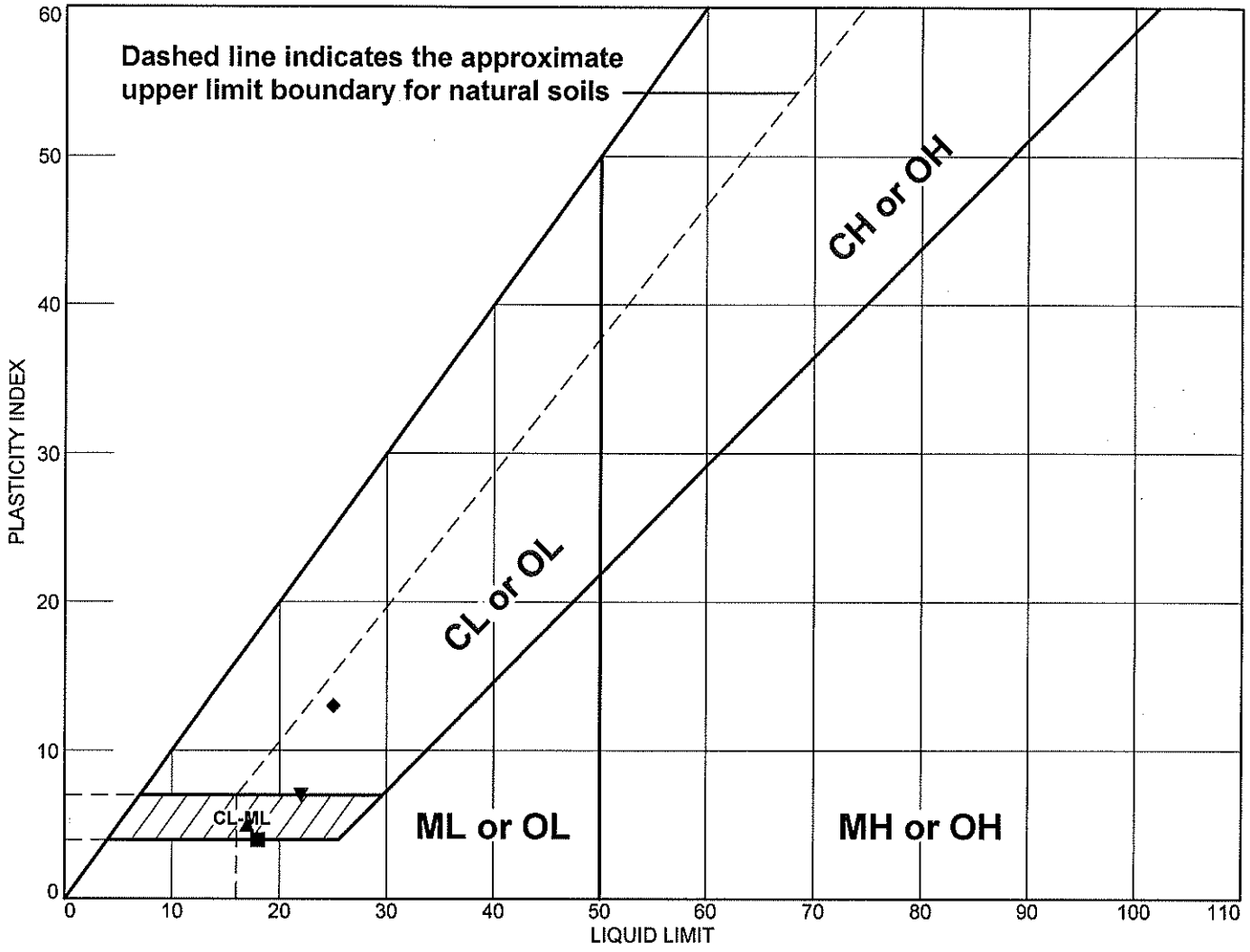
Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Grey Silty SAND	NV	NP	NP	99.1	18.3	SM
■	Grey Silty CLAY with Sand	18	14	4	93.5	71.6	CL-ML
▲	Grey Sandy Silty CLAY	17	12	5	77.0	60.7	CL-ML
◆	Grey Lean CLAY with Sand	25	12	13	89.6	79.0	CL
▼	Grey Silty CLAY	22	15	7	99.7	98.5	CL-ML

Project No. 28287 **Client:** APTIM

Project: Zion Landfill Site 2 Expansion, Aptim #3211

● **Location:** B-08-01 **Depth:** 120.0- 122.0' **Sample Number:** SS-61
■ **Location:** B-09-18 **Depth:** 42.0- 44.0' **Sample Number:** SS-22
▲ **Location:** B-11-18 **Depth:** 42.0- 44.0' **Sample Number:** SS-22
◆ **Location:** B-12-18 **Depth:** 62.0- 64.0' **Sample Number:** SS-32
▼ **Location:** B-13-18 **Depth:** 32.0- 34.0' **Sample Number:** SS-17

Remarks:

Midland Standard Engineering & Testing

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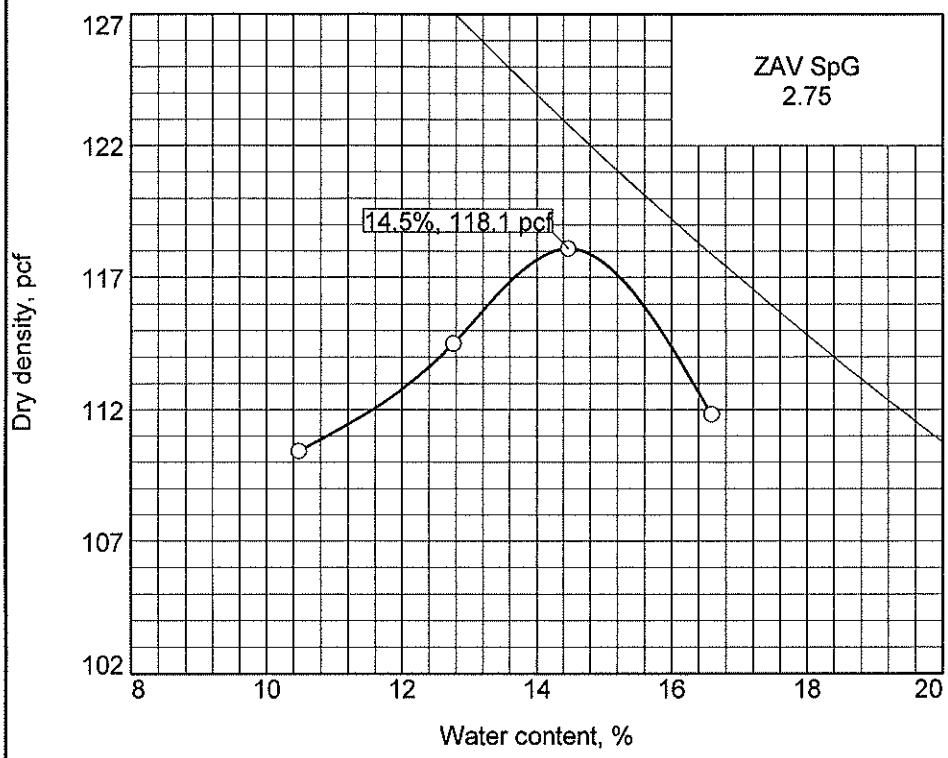
Figure

Compaction Tests

APTIM

COMPACTION TEST REPORT



Curve No.
B-01 6.0- 79.0'

Test Specification:
ASTM D 698-07 Method A Standard

Hammer Wt.: 5.5 lb.
Hammer Drop: 12 in.
Number of Layers: three
Blows per Layer: 25
Mold Size: 0.03333 cu. ft.

Test Performed on Material Passing #4 **Sieve**

Soil Data

NM _____ **Sp.G.** 2.75
LL _____ **PI** _____
%>#4 _____ **%<#200** _____
USCS _____ **AASHTO** _____

TESTING DATA

	1	2	3	4	5	6
WM + WS	6405.0	6512.7	6604.4	6531.5		
WM	4560.5	4560.5	4560.5	4560.5		
WW + T #1	890.8	902.0	951.0	926.6		
WD + T #1	834.4	833.7	866.2	820.8		
TARE #1	296.2	298.5	280.3	183.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	10.5	12.8	14.5	16.6		
DRY DENSITY	110.4	114.5	118.1	111.8		

TEST RESULTS

Maximum dry density = 118.1 pcf

Optimum moisture = 14.5 %

Material Description

Brown and Grey CLAY

Project No. 28287 **Client:** APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211

○ **Location:** B-01 **Depth:** 6.0- 79.0'

Remarks:

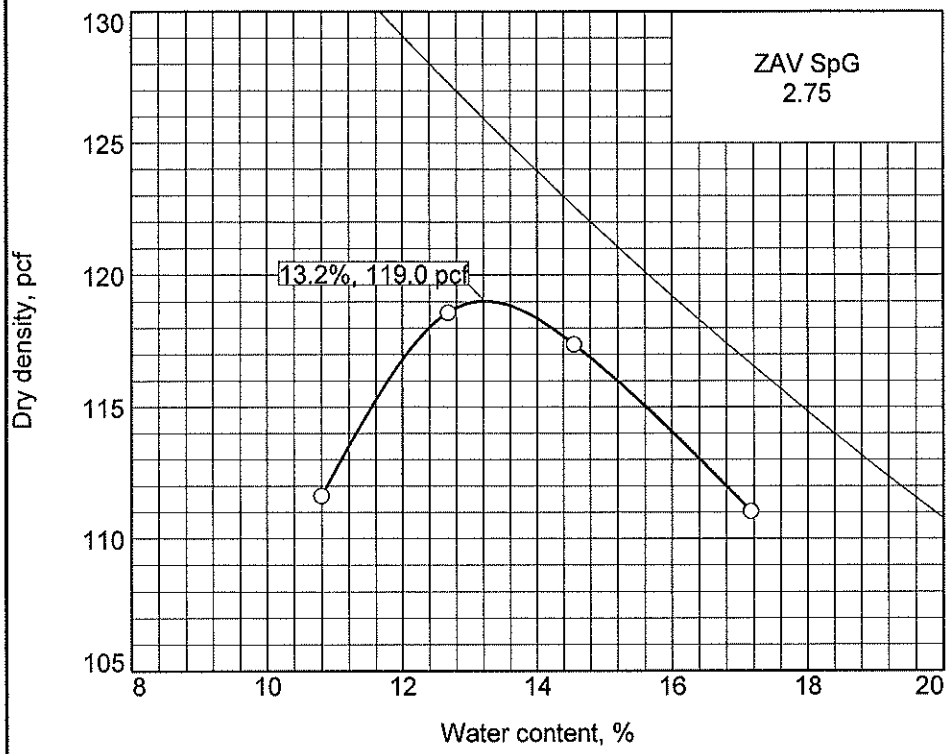
Midland Standard Engineering & Testing

South Elgin, IL

Figure

Tested By: JDS **Checked By:** WDP

COMPACTION TEST REPORT



Curve No.
B-05-18 16.0- 115.5'

Test Specification:
ASTM D 698-07 Method A Standard

Hammer Wt.: 5.5 lb.
Hammer Drop: 12 in.
Number of Layers: three
Blows per Layer: 25
Mold Size: 0.03333 cu. ft.

Test Performed on Material Passing #4 **Sieve**

Soil Data

NM _____ **Sp.G.** 2.75
LL _____ **PI** _____
%>#4 _____ **%<#200** _____
USCS _____ **AASHTO** _____

TESTING DATA

	1	2	3	4	5	6
WM + WS	6430.3	6580.6	6593.4	6527.2		
WM	4560.5	4560.5	4560.5	4560.5		
WW + T #1	1007.3	925.5	951.5	1242.5		
WD + T #1	934.7	853.5	863.7	1106.8		
TARE #1	262.5	285.5	260.4	315.9		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	10.8	12.7	14.6	17.2		
DRY DENSITY	111.6	118.6	117.4	111.0		

TEST RESULTS

Maximum dry density = 119.0 pcf

Optimum moisture = 13.2 %

Material Description

Grey CLAY

Project No. 28287 **Client:** APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211

○ **Location:** B-05-18 **Depth:** 16.0- 115.5'

Remarks:

Midland Standard Engineering & Testing

South Elgin, IL

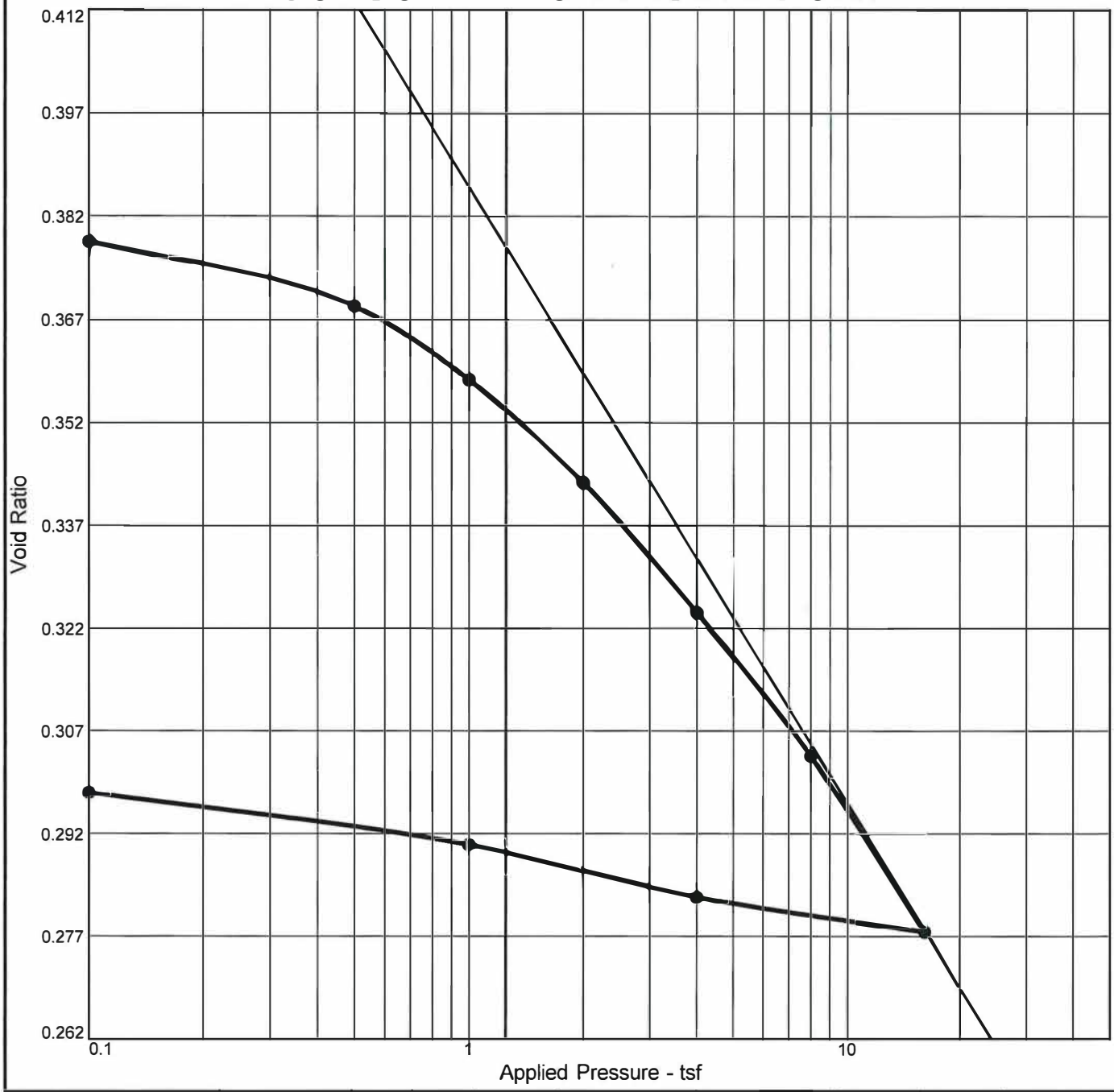
Figure

Tested By: JDS **Checked By:** WDP

Consolidation Tests

APTIM

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
94.8 %	13.3 %	124.0			2.75		2.8	0.09		0.385

MATERIAL DESCRIPTION	USCS	AASHTO
Brown-Grey Silty CLAY		

Project No. 28287 **Client:** APTIM

Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-2 **Depth:** 56.0- 58.0' **Sample Number:** ST-29

Remarks:

Midland Standard Engineering & Testing

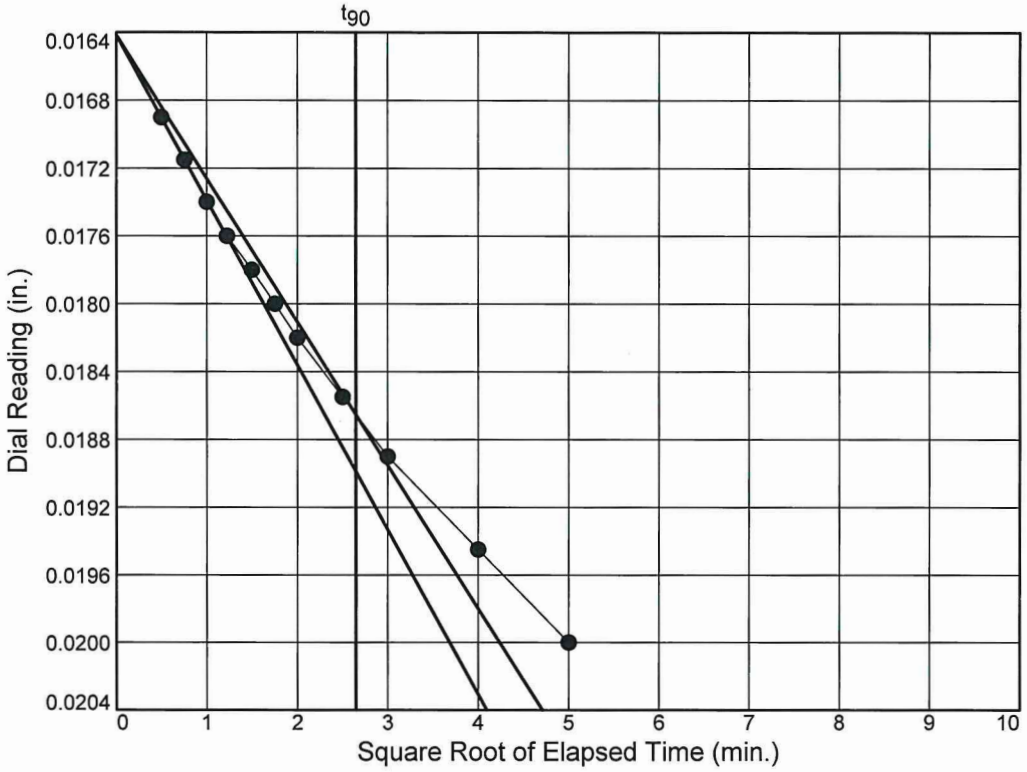
South Elgin, IL

Figure

Dial Reading vs. Time

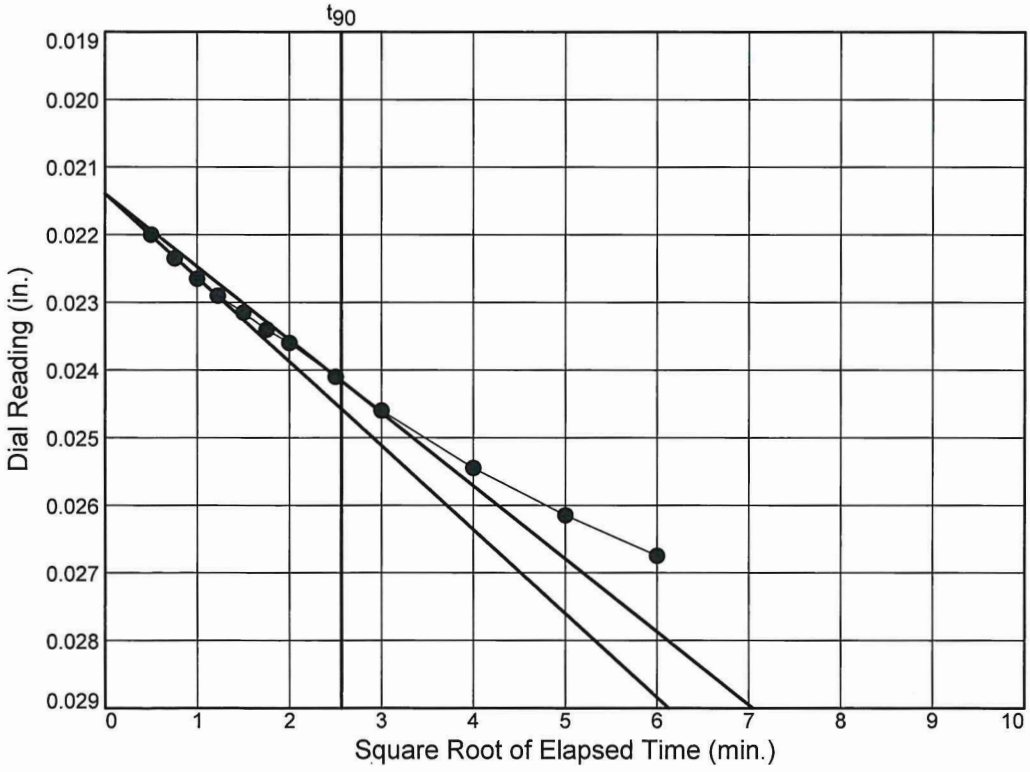
Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-2 Depth: 56.0- 58.0' Sample Number: ST-29



Load No.= 1
Load=0.10 tsf
D_0 = 0.0164
D_{90} = 0.0187
D_{100} = 0.0189
T_{90} = 6.99 min.

C_v @ T_{90}
0.302 ft.^{2}/day



Load No.= 2
Load=0.50 tsf
D_0 = 0.0214
D_{90} = 0.0242
D_{100} = 0.0245
T_{90} = 6.57 min.

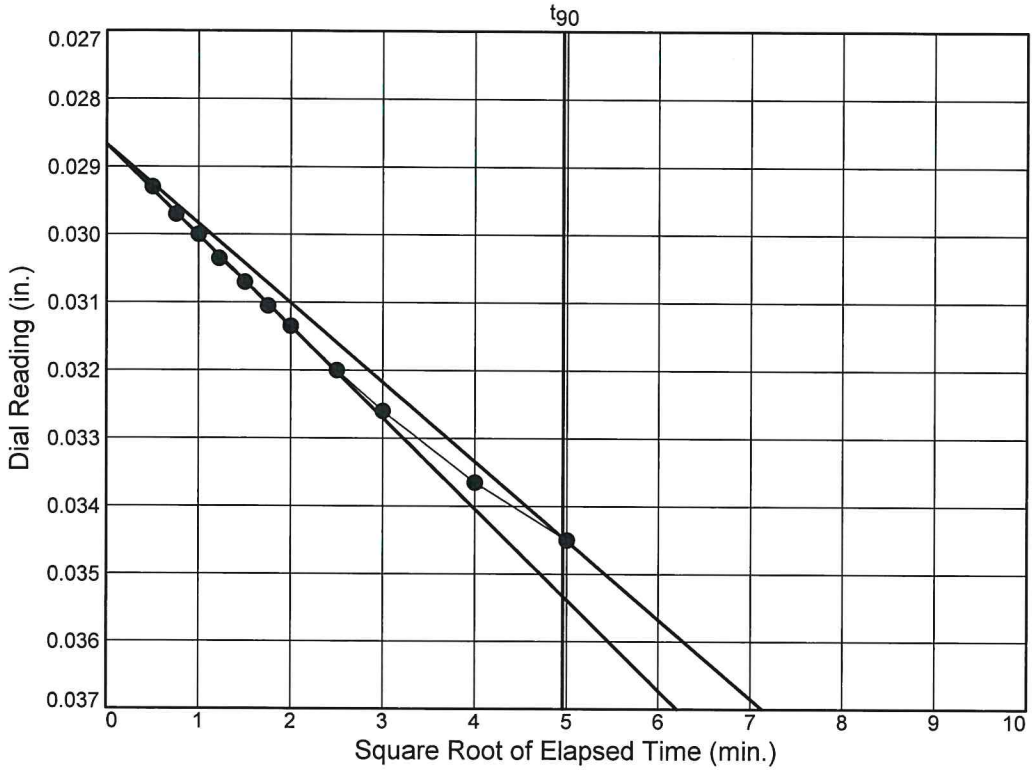
C_v @ T_{90}
0.318 ft.^{2}/day

Figure

Dial Reading vs. Time

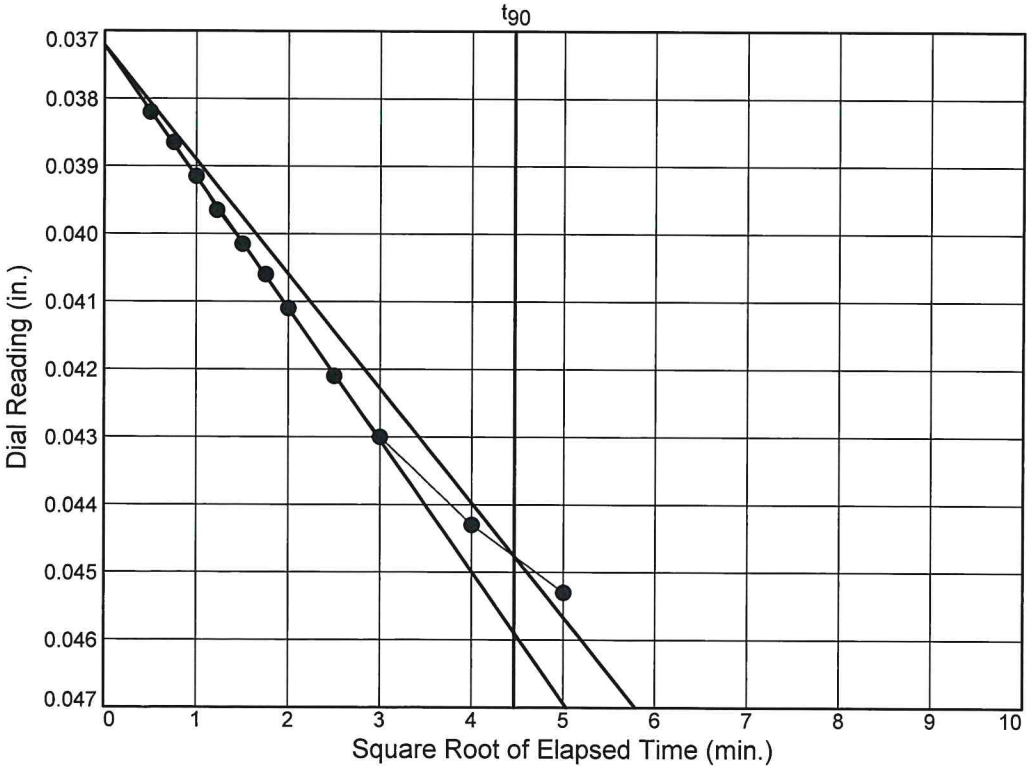
Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-2 Depth: 56.0- 58.0' Sample Number: ST-29



Load No.= 3
Load= 1.00 tsf
D_0 = 0.0287
D_{90} = 0.0345
D_{100} = 0.0351
T_{90} = 24.61 min.

C_v @ T_{90}
0.084 ft.2/day



Load No.= 4
Load= 2.00 tsf
D_0 = 0.0372
D_{90} = 0.0448
D_{100} = 0.0456
T_{90} = 19.95 min.

C_v @ T_{90}
0.101 ft.2/day

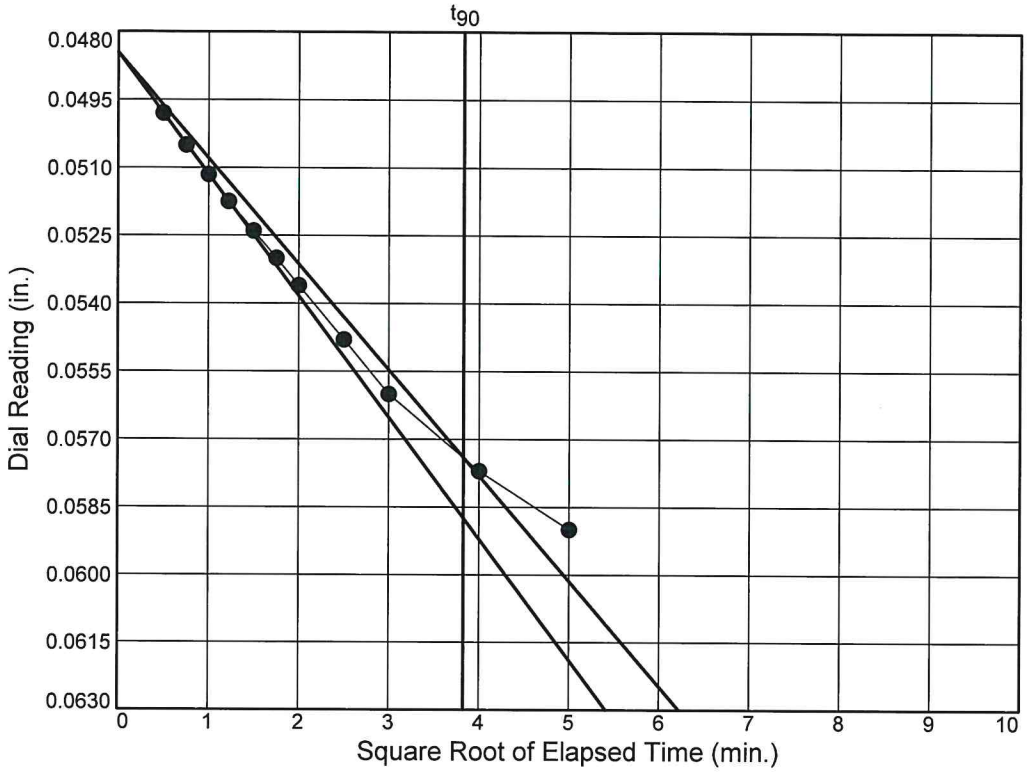
Figure

Midland Standard Engineering & Testing

Dial Reading vs. Time

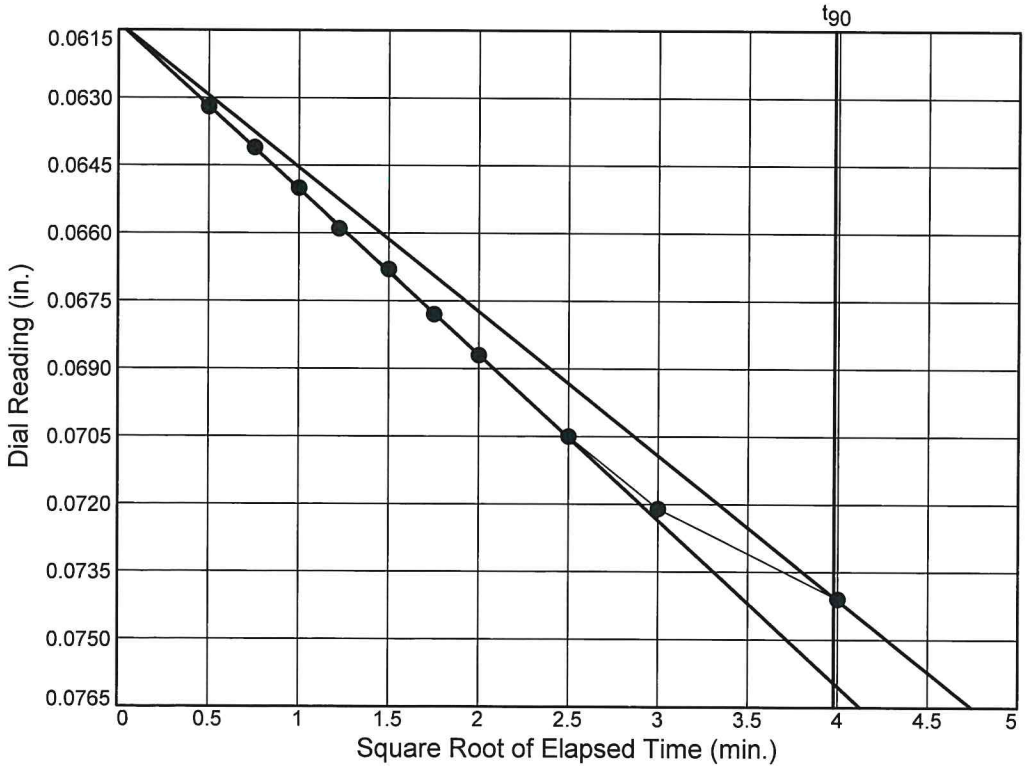
Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-2 Depth: 56.0- 58.0' Sample Number: ST-29



Load No.= 5
Load=4.00 tsf
D_0 = 0.0485
D_{90} = 0.0574
D_{100} = 0.0584
T_{90} = 14.66 min.

C_v @ T_{90}
0.134 ft.2/day



Load No.= 6
Load=8.00 tsf
D_0 = 0.0613
D_{90} = 0.0741
D_{100} = 0.0755
T_{90} = 15.84 min.

C_v @ T_{90}
0.120 ft.2/day

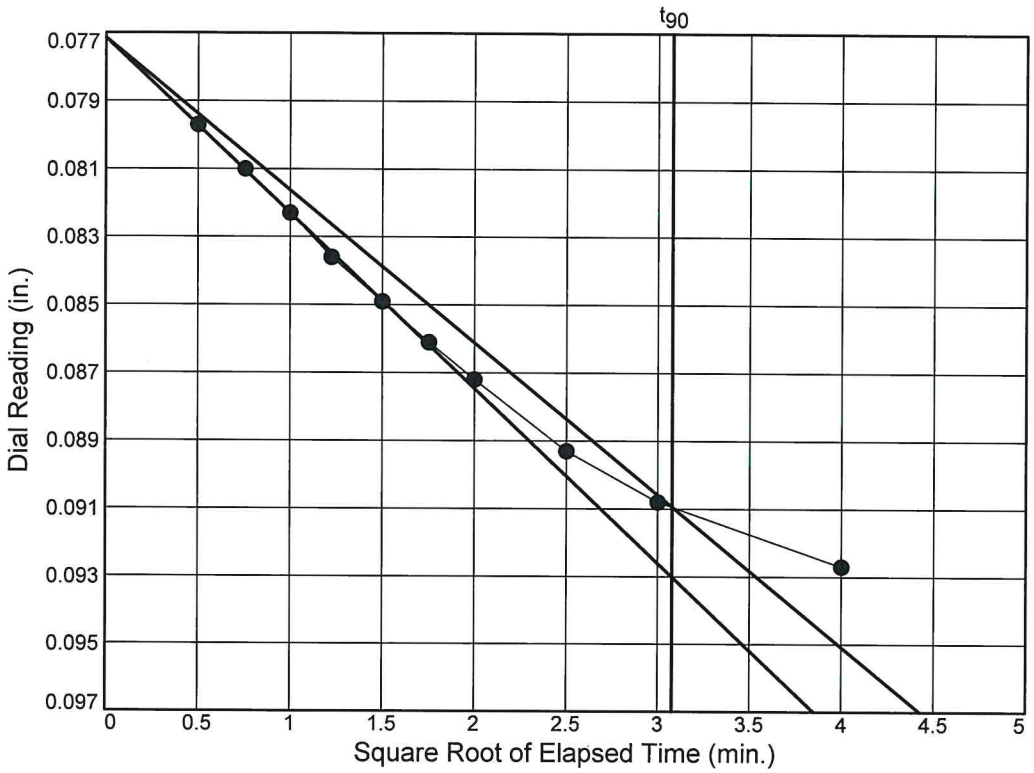
Figure

Midland Standard Engineering & Testing

Dial Reading vs. Time

Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

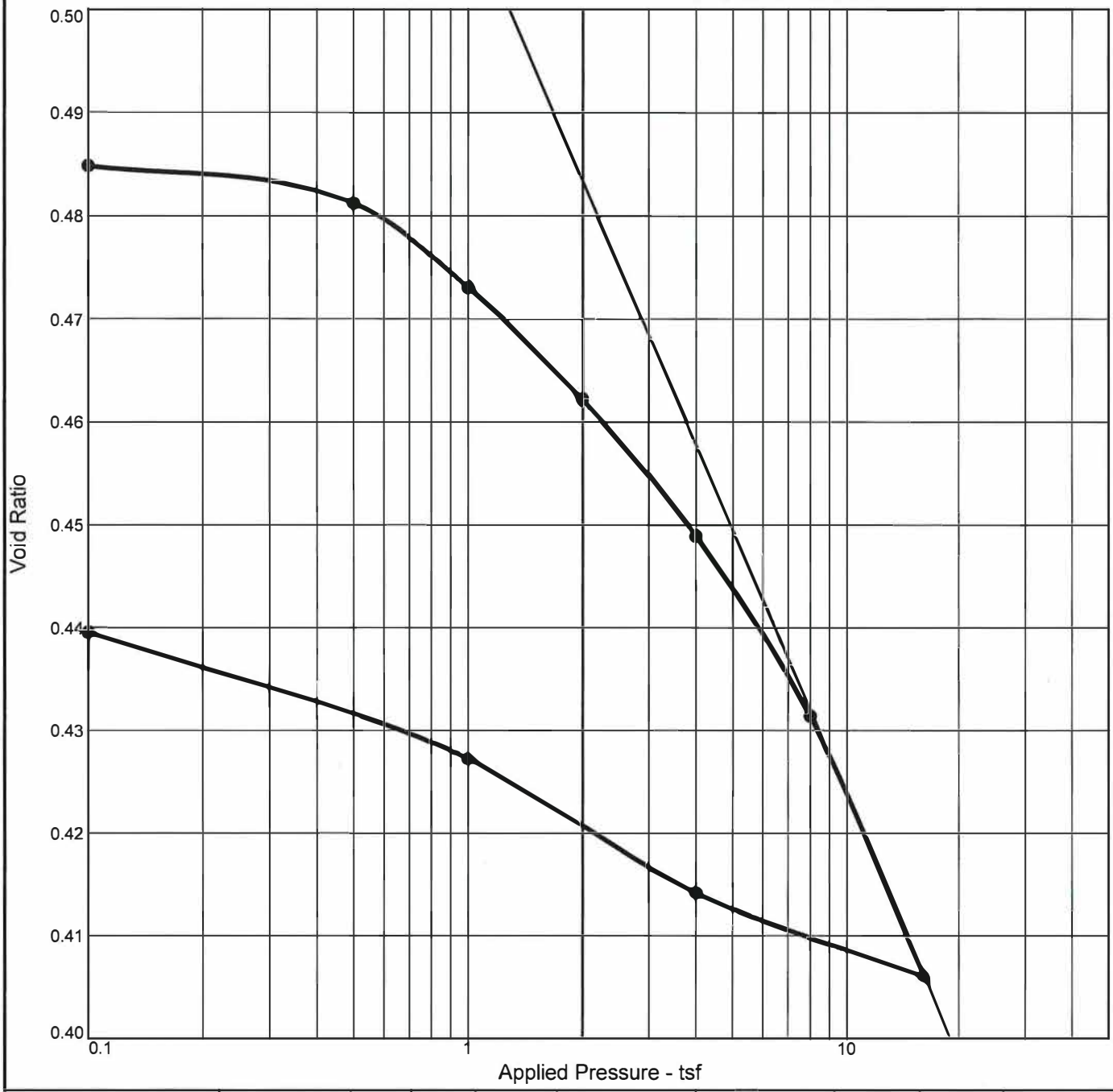
Location: B-2 Depth: 56.0- 58.0' Sample Number: ST-29



Load No.= 7
Load= 16.00 tsf
D_0 = 0.0771
D_{90} = 0.0909
D_{100} = 0.0925
T_{90} = 9.47 min.

C_v @ T_{90}
0.194 ft.^{2}/day

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
95.1 %	16.8 %	115.5			2.75		4.2	0.09		0.486

MATERIAL DESCRIPTION	USCS	AASHTO
Brown-grey CLAY		

Project No. 28287 **Client:** APTIM

Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-4 **Depth:** 52.0- 54.0' **Sample Number:** ST-27

Remarks:

Midland Standard Engineering & Testing

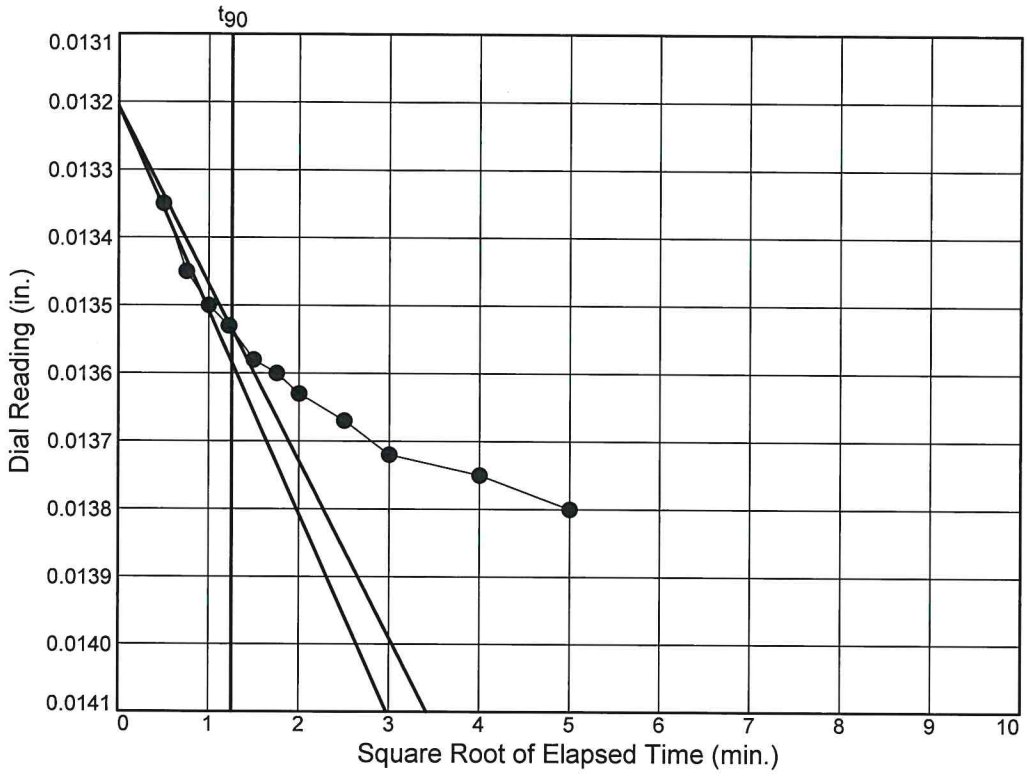
South Elgin, IL

Figure

Dial Reading vs. Time

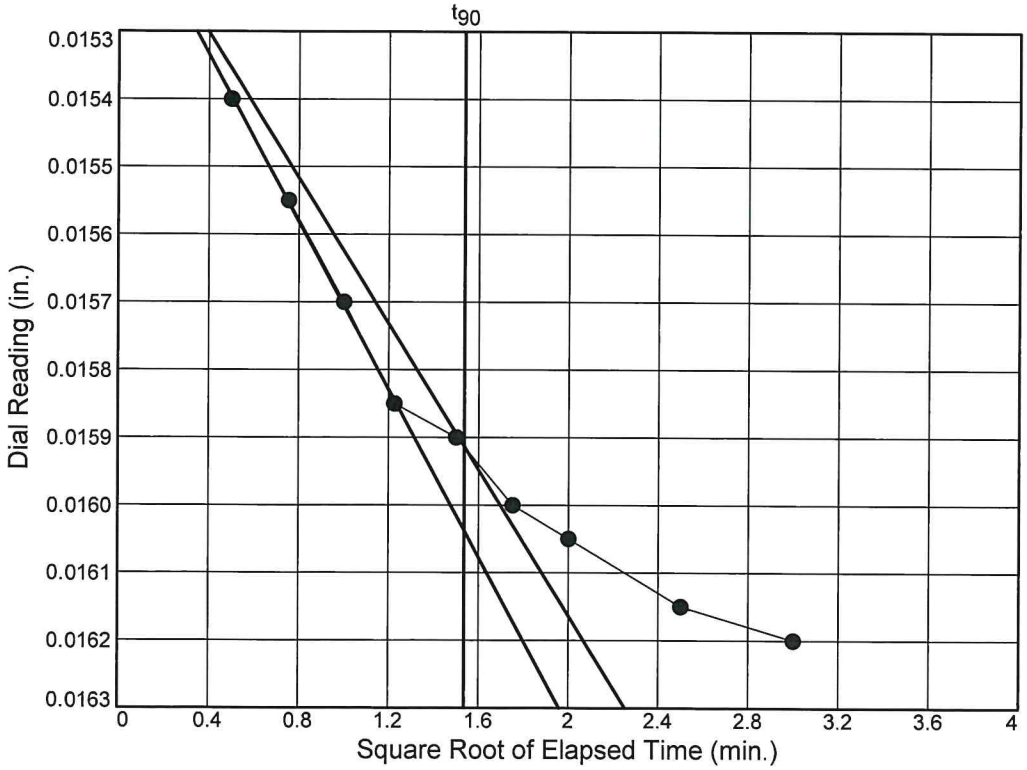
Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-4 Depth: 52.0- 54.0' Sample Number: ST-27



Load No.= 1
Load= 0.10 tsf
D_0 = 0.0132
D_{90} = 0.0135
D_{100} = 0.0136
T_{90} = 1.58 min.

C_v @ T_{90}
1.348 ft.^{2}/day



Load No.= 2
Load= 0.50 tsf
D_0 = 0.0151
D_{90} = 0.0159
D_{100} = 0.0160
T_{90} = 2.36 min.

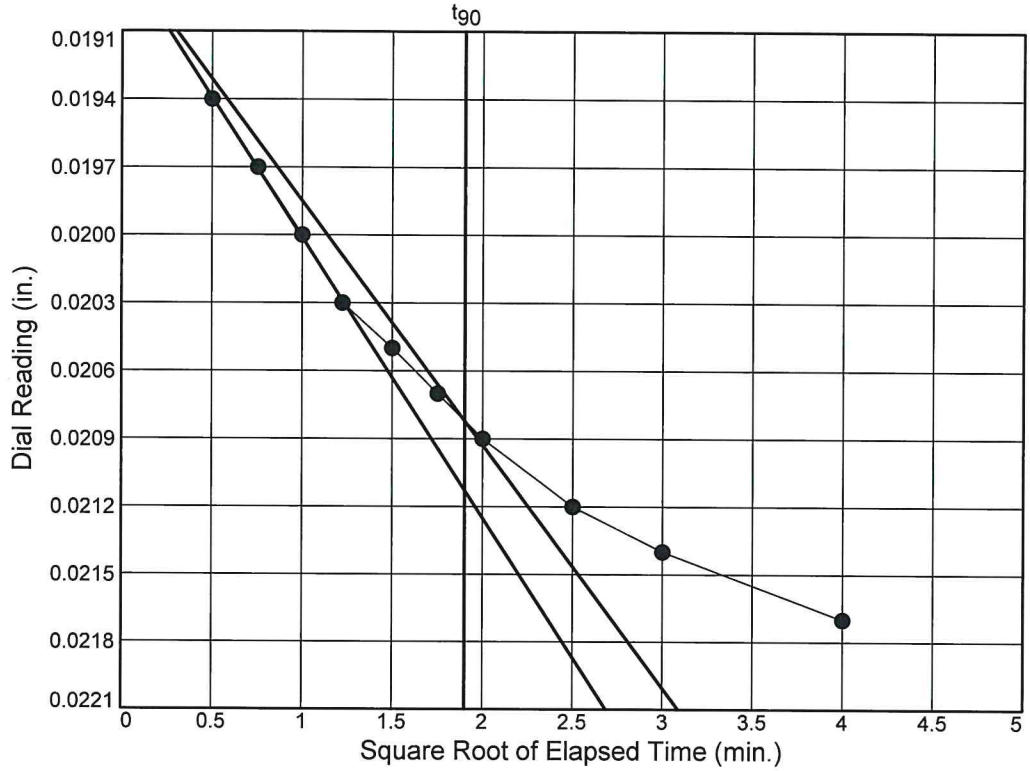
C_v @ T_{90}
0.899 ft.^{2}/day

Figure

Dial Reading vs. Time

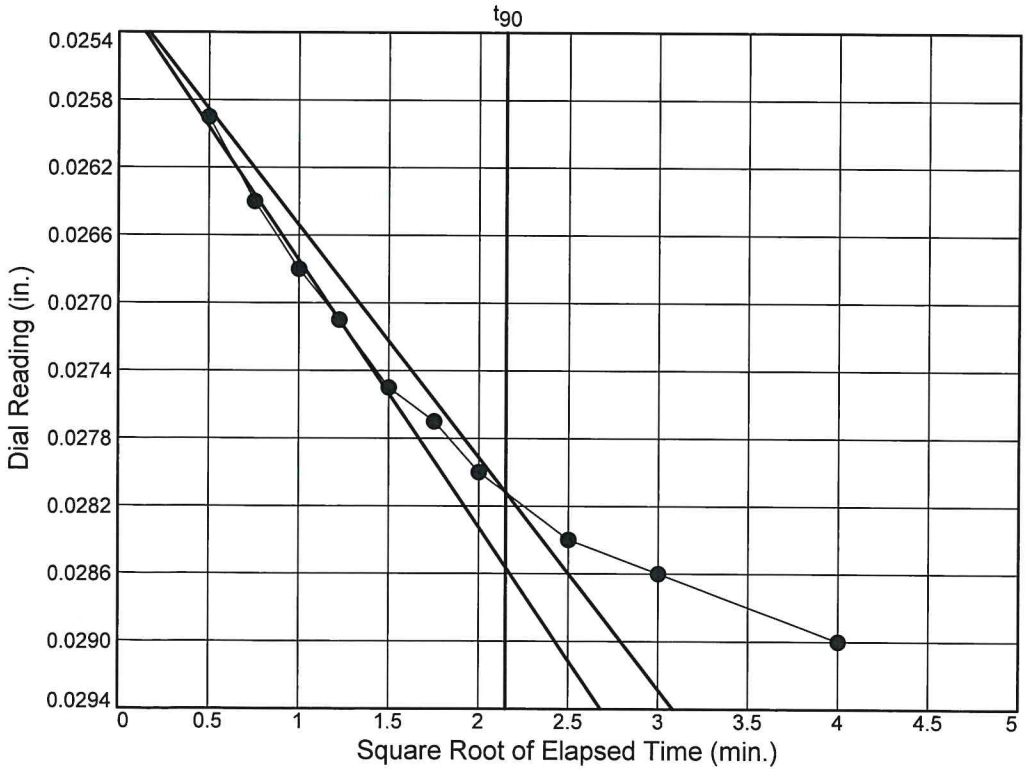
Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-4 Depth: 52.0- 54.0' Sample Number: ST-27



Load No.= 3
Load= 1.00 tsf
D_0 = 0.0188
D_{90} = 0.0208
D_{100} = 0.0210
T_{90} = 3.62 min.

C_v @ T_{90}
0.582 ft.2/day



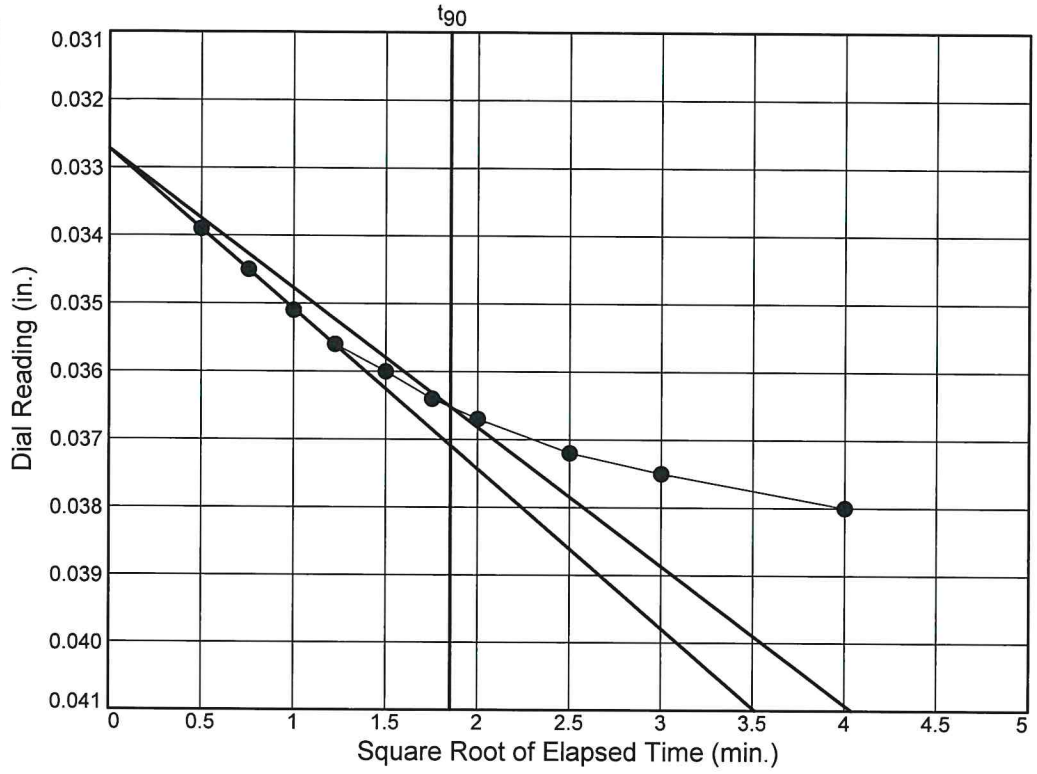
Load No.= 4
Load= 2.00 tsf
D_0 = 0.0252
D_{90} = 0.0281
D_{100} = 0.0284
T_{90} = 4.63 min.

C_v @ T_{90}
0.449 ft.2/day

Dial Reading vs. Time

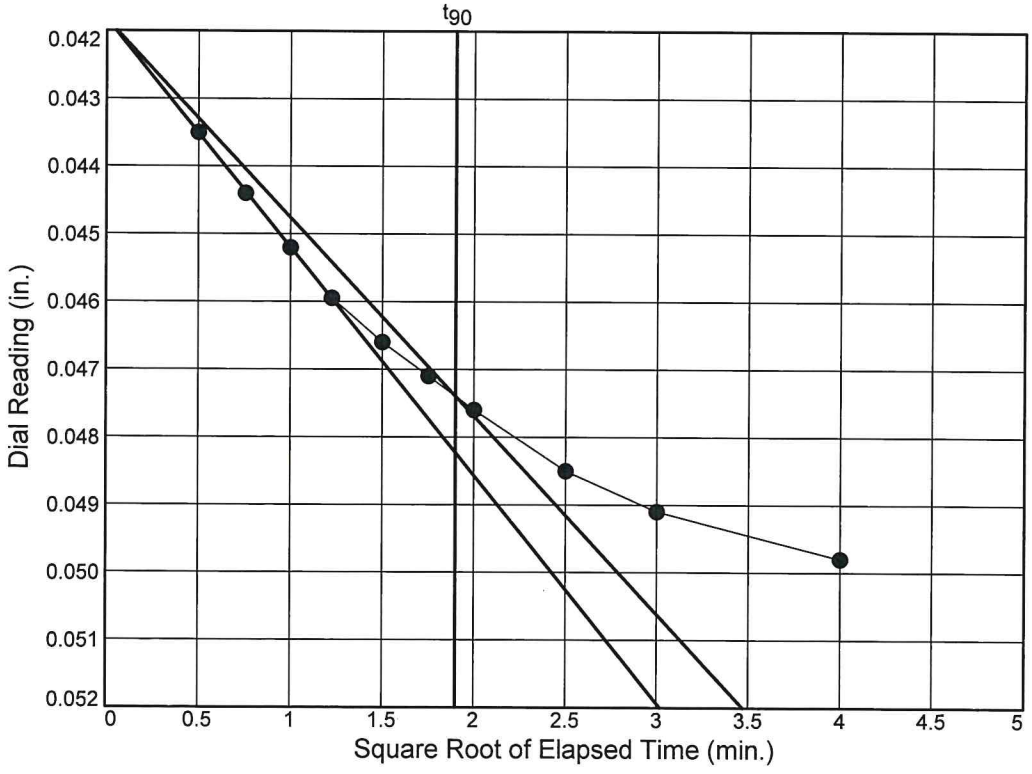
Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-4 Depth: 52.0- 54.0' Sample Number: ST-27



Load No.= 5
Load=4.00 tsf
D_0 = 0.0327
D_{90} = 0.0365
D_{100} = 0.0369
T_{90} = 3.44 min.

C_v @ T_{90}
0.594 ft.2/day



Load No.= 6
Load=8.00 tsf
D_0 = 0.0418
D_{90} = 0.0474
D_{100} = 0.0480
T_{90} = 3.61 min.

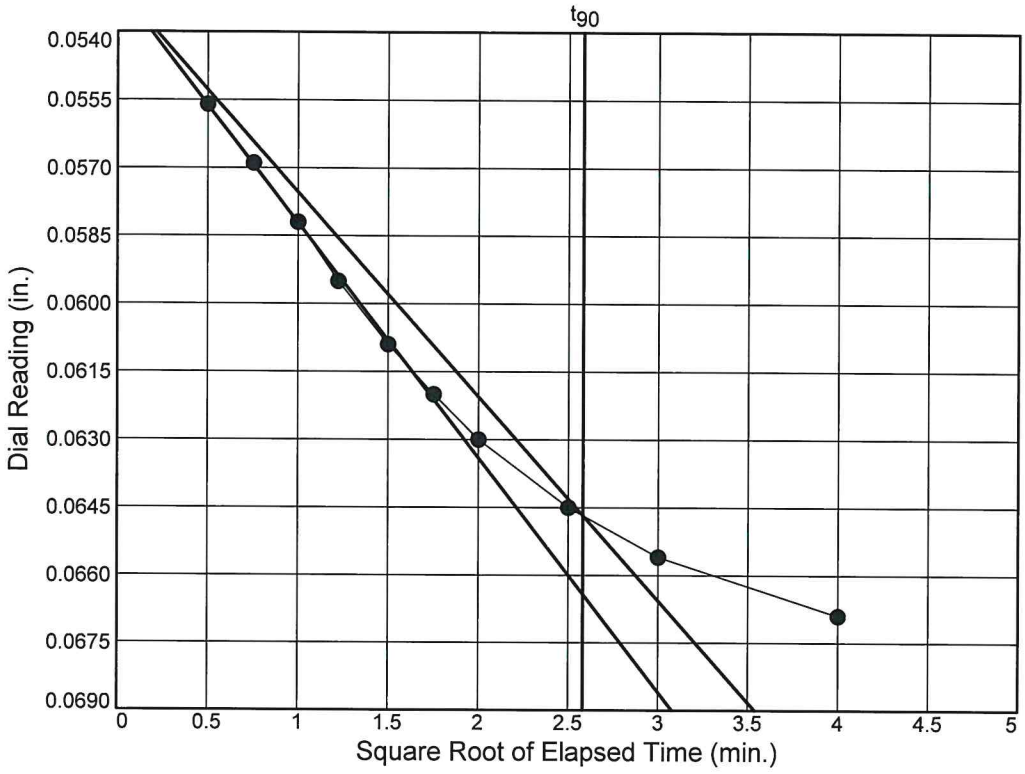
C_v @ T_{90}
0.554 ft.2/day

Figure

Dial Reading vs. Time

Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

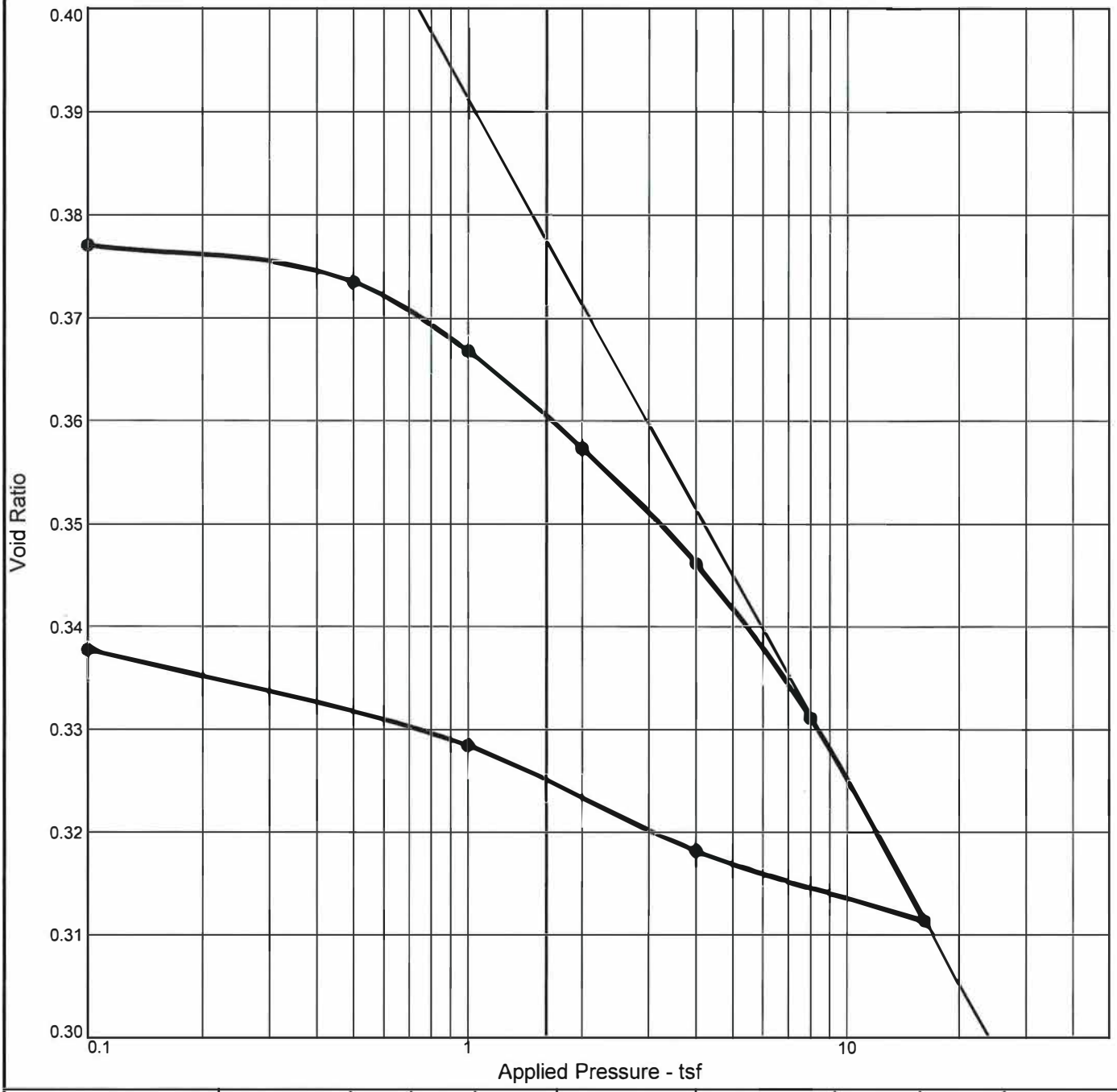
Location: B-4 Depth: 52.0- 54.0' Sample Number: ST-27



Load No.= 7
Load= 16.00 tsf
D_0 = 0.0530
D_{90} = 0.0647
D_{100} = 0.0660
T_{90} = 6.66 min.

C_v @ T_{90}
0.291 ft.^{2}/day

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
95.7 %	13.2 %	124.6			2.75		3.5	0.07		0.378

MATERIAL DESCRIPTION	USCS	AASHTO
Brown-grey Silty CLAY		

Project No. 28287 **Client:** APTIM

Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-9 **Depth:** 60.0- 62.0' **Sample Number:** ST-31

Remarks:

Midland Standard Engineering & Testing

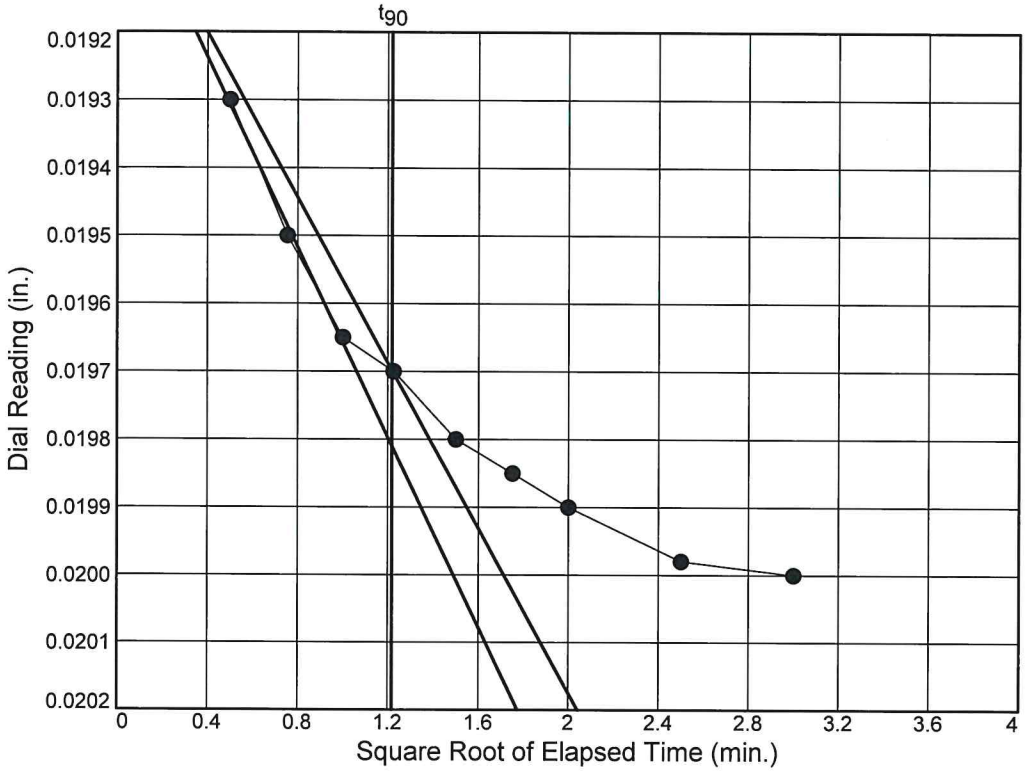
South Elgin, IL

Figure

Dial Reading vs. Time

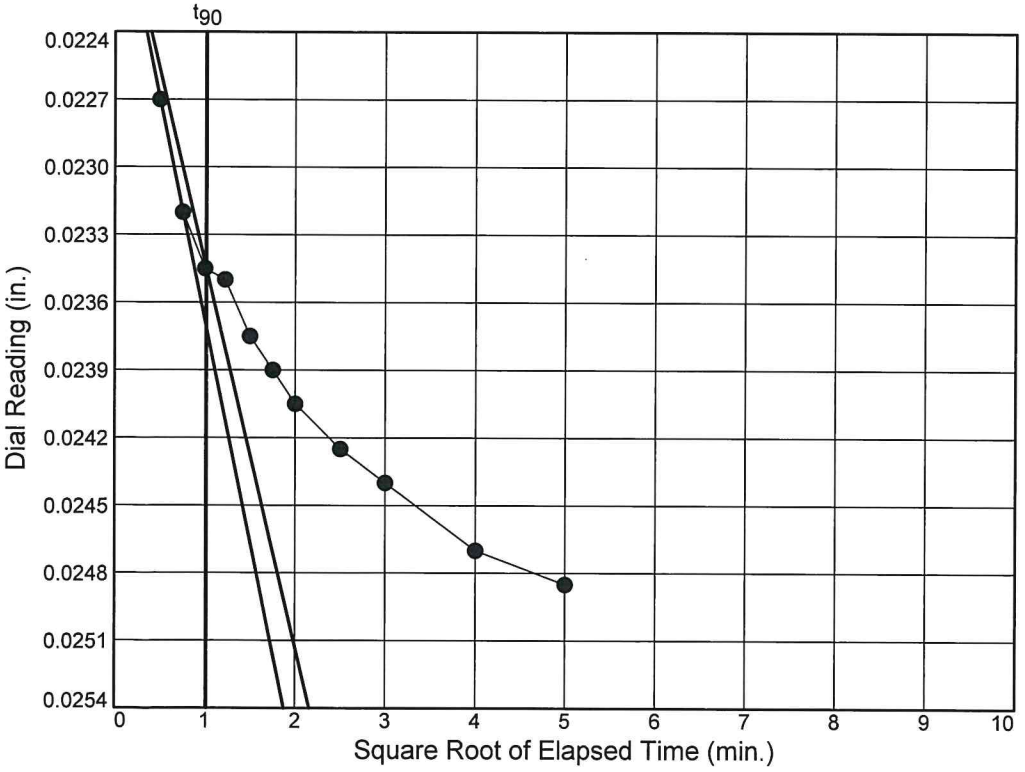
Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-9 Depth: 60.0- 62.0' Sample Number: ST-31



Load No.= 2
Load= 0.50 tsf
D_0 = 0.0190
D_{90} = 0.0197
D_{100} = 0.0198
T_{90} = 1.48 min.

C_v @ T_{90}
1.421 ft.^{2}/day



Load No.= 3
Load= 1.00 tsf
D_0 = 0.0217
D_{90} = 0.0235
D_{100} = 0.0236
T_{90} = 1.04 min.

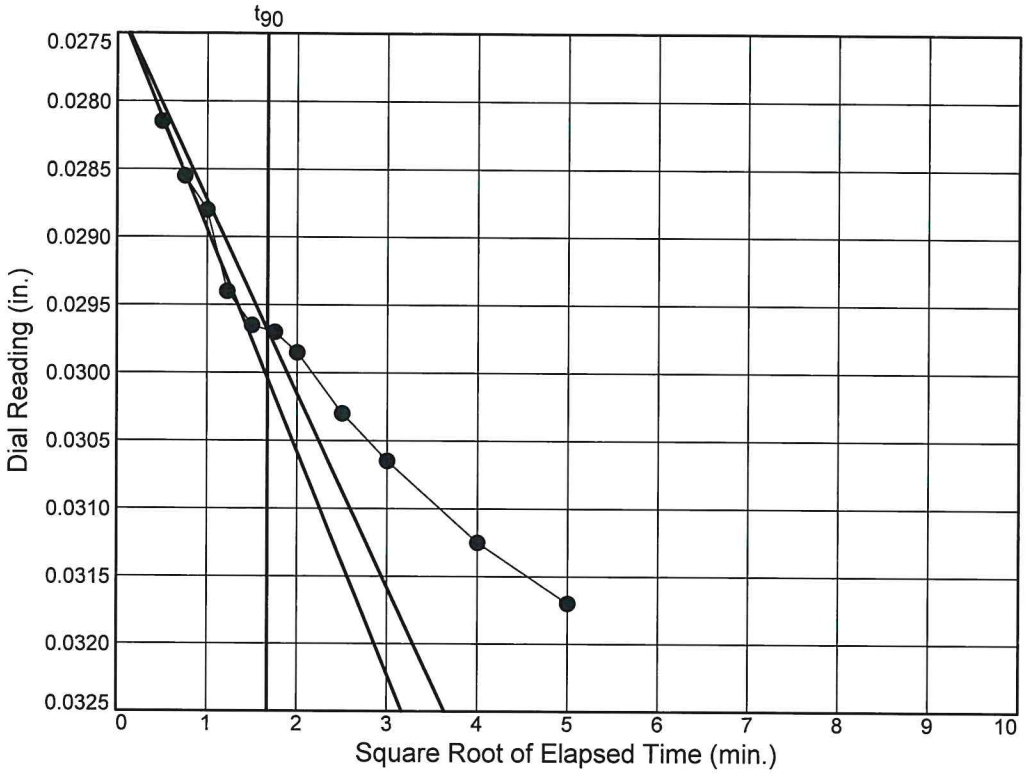
C_v @ T_{90}
2.016 ft.^{2}/day

Figure

Dial Reading vs. Time

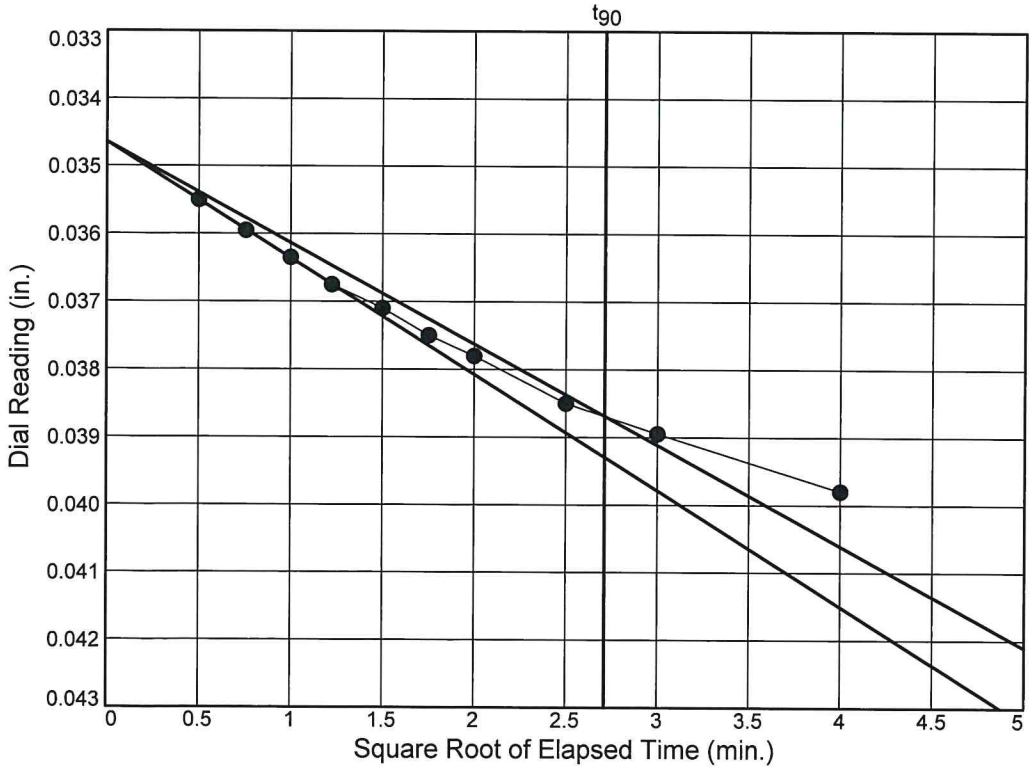
Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-9 Depth: 60.0- 62.0' Sample Number: ST-31



Load No.= 4
Load=2.00 tsf
D_0 = 0.0273
D_{90} = 0.0297
D_{100} = 0.0299
T_{90} = 2.79 min.

C_v @ T_{90}
0.740 ft.2/day



Load No.= 5
Load=4.00 tsf
D_0 = 0.0346
D_{90} = 0.0387
D_{100} = 0.0391
T_{90} = 7.35 min.

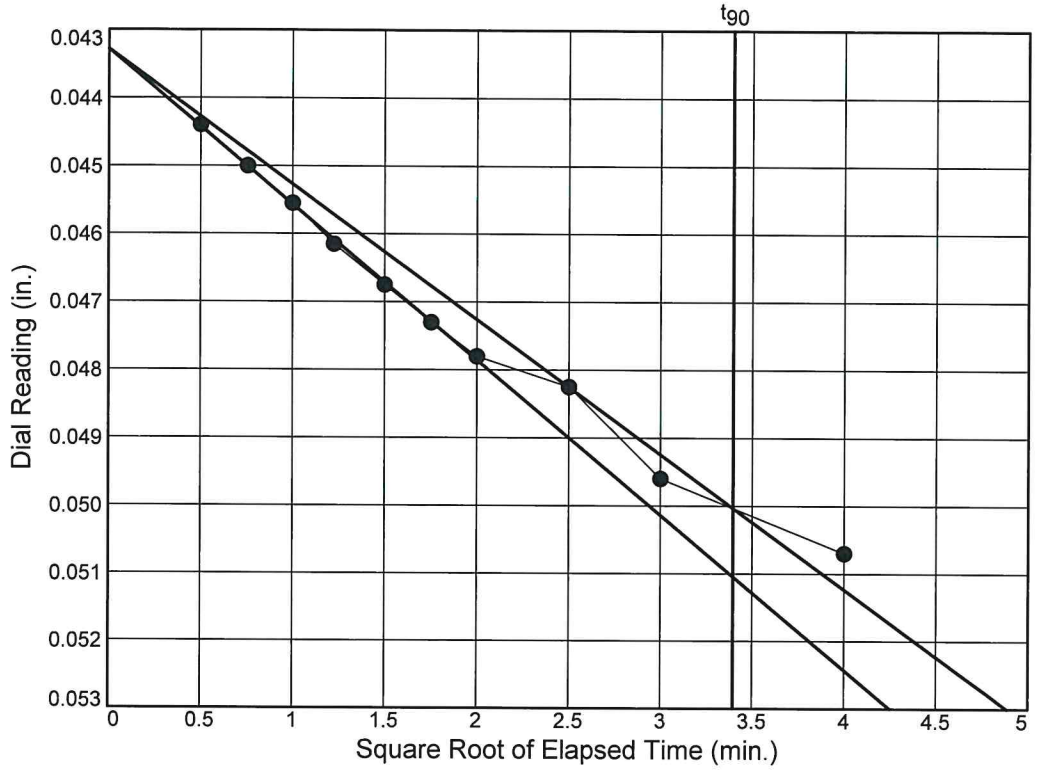
C_v @ T_{90}
0.277 ft.2/day

Figure

Dial Reading vs. Time

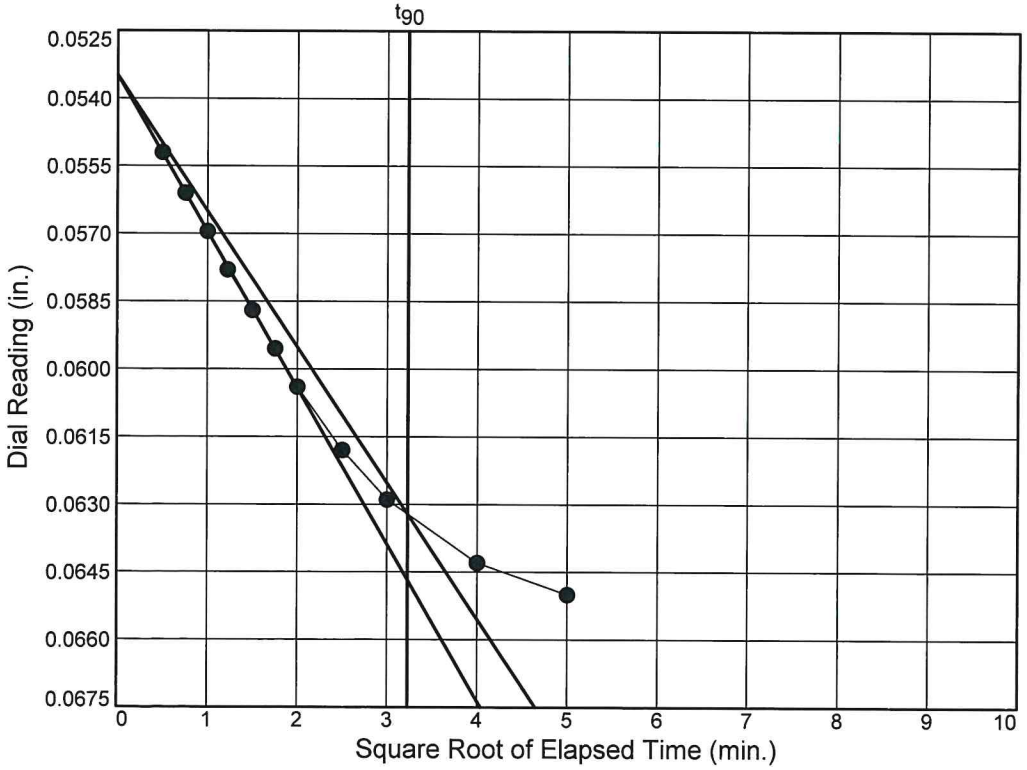
Project No.: 28287
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-9 Depth: 60.0- 62.0' Sample Number: ST-31



Load No.= 6
Load= 8.00 tsf
D_0 = 0.0433
D_{90} = 0.0500
D_{100} = 0.0508
T_{90} = 11.53 min.

C_v @ T_{90}
0.173 ft.^{2}/day

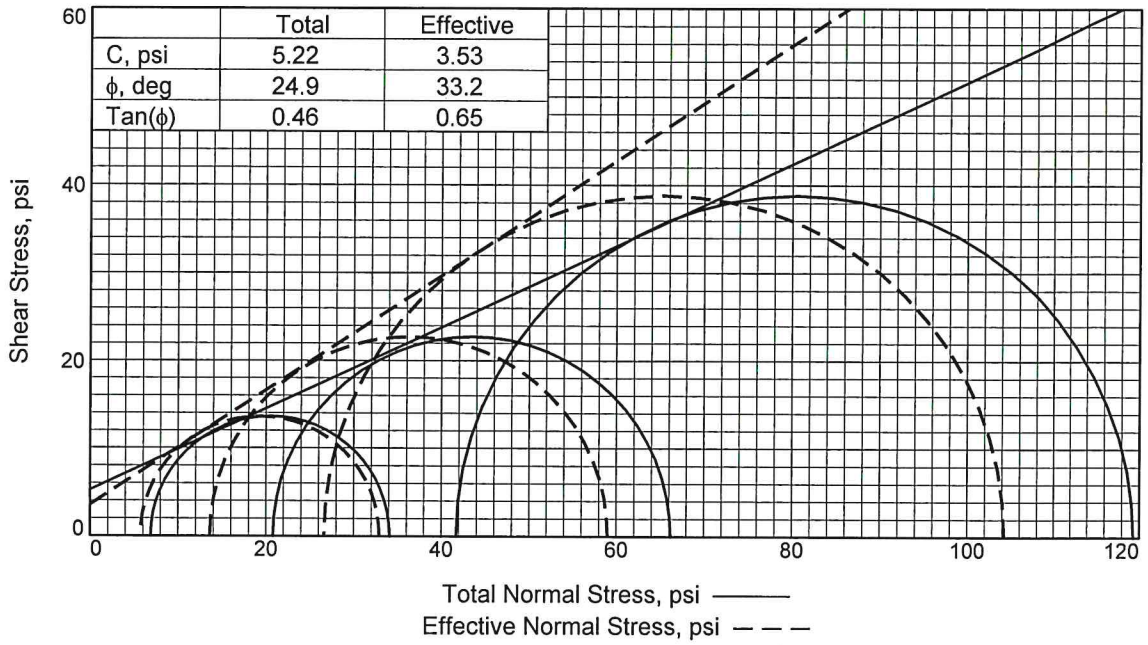


Load No.= 7
Load= 16.00 tsf
D_0 = 0.0535
D_{90} = 0.0632
D_{100} = 0.0643
T_{90} = 10.42 min.

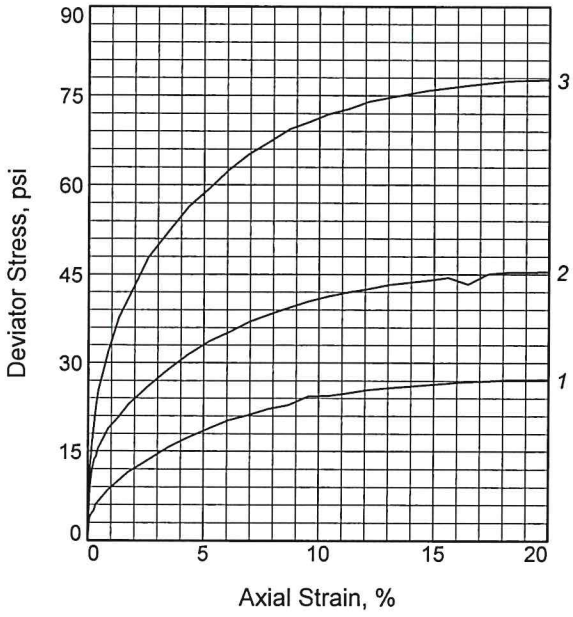
C_v @ T_{90}
0.187 ft.^{2}/day

CU Triaxial Shear Tests

APTIM



	Total	Effective
C, psi	5.22	3.53
ϕ, deg	24.9	33.2
Tan(ϕ)	0.46	0.65



Sample No.		1	2	3
Initial	Water Content, %	14.3	13.2	14.8
	Dry Density, pcf	121.6	124.2	120.3
	Saturation, %	95.3	94.8	95.2
	Void Ratio	0.4120	0.3818	0.4269
	Diameter, in.	2.84	2.85	2.82
	Height, in.	5.76	5.77	5.76
At Test	Water Content, %	15.0	13.9	15.5
	Dry Density, pcf	121.6	124.2	120.3
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.4120	0.3818	0.4269
	Diameter, in.	2.84	2.85	2.82
	Height, in.	5.76	5.77	5.76
Strain rate, in./min.		0.037	0.037	0.037
Back Pressure, psi		55	55	55
Cell Pressure, psi		62	76	97
Fail. Stress, psi		27	45	78
Total Pore Pr., psi		56	62	70
Ult. Stress, psi				
Total Pore Pr., psi				
$\bar{\sigma}_1$ Failure, psi		33	59	104
$\bar{\sigma}_3$ Failure, psi		6	14	27

Type of Test:
CU with Pore Pressures
Sample Type: Shelby Tube
Description: Brown-grey CLAY

Specific Gravity= 2.75
Remarks:

Figure _____

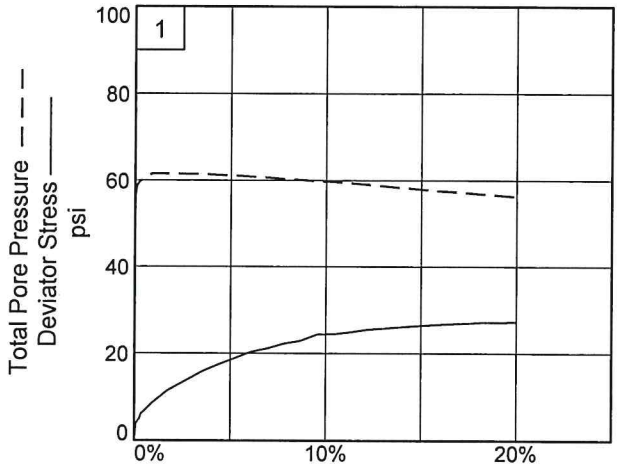
Client: APTIM

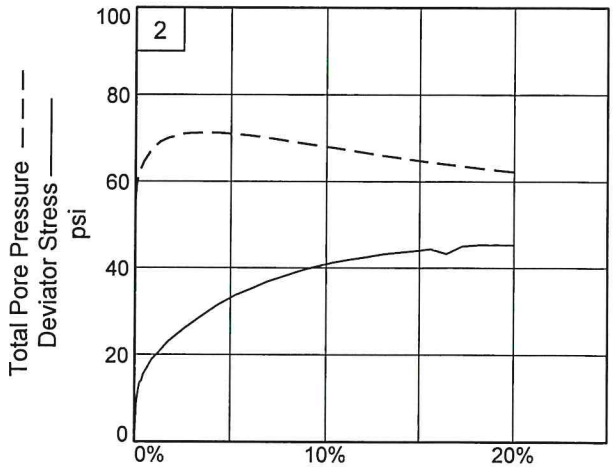
Project: Zion Landfill Site 2 Expansion, Aptim #3211

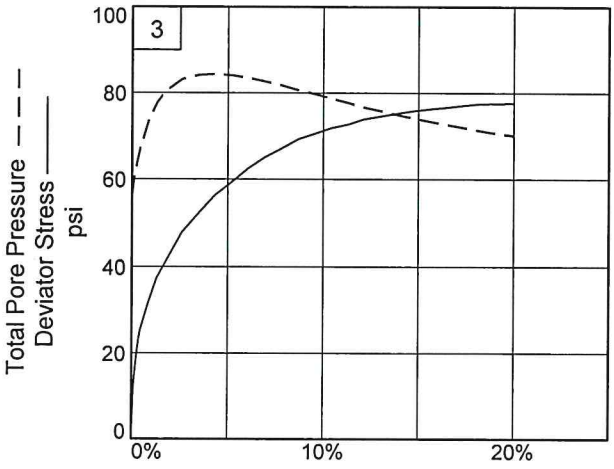
Location: B-01
Sample Number: ST-31 **Depth:** 60.0- 62.0'
Proj. No.: 28287 **Date Sampled:** 4/1/19

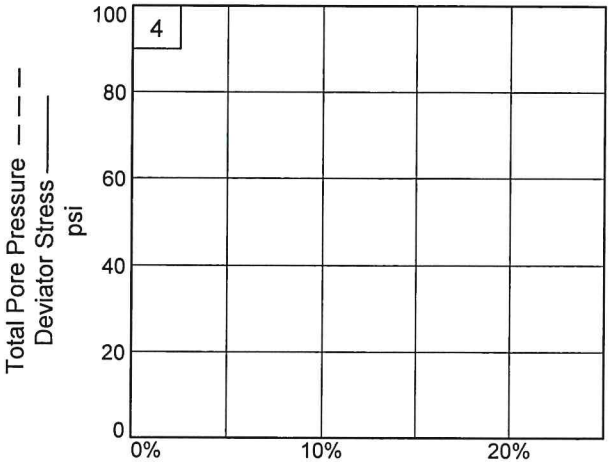
TRIAXIAL SHEAR TEST REPORT
Midland Standard Engineering & Testing
South Elgin, IL

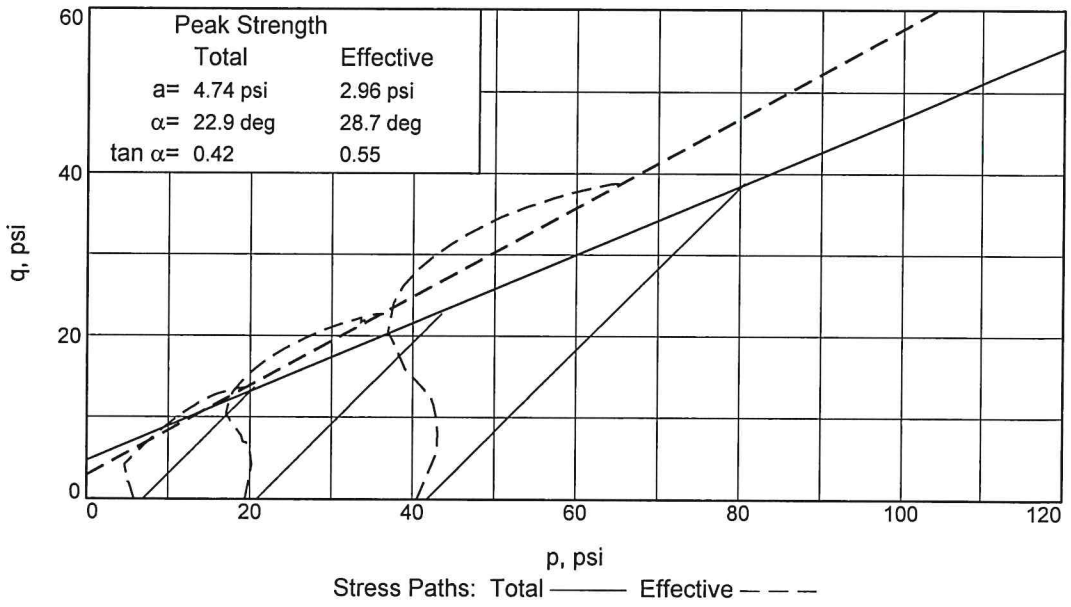
Tested By: JDS **Checked By:** WDP











Client: APTIM

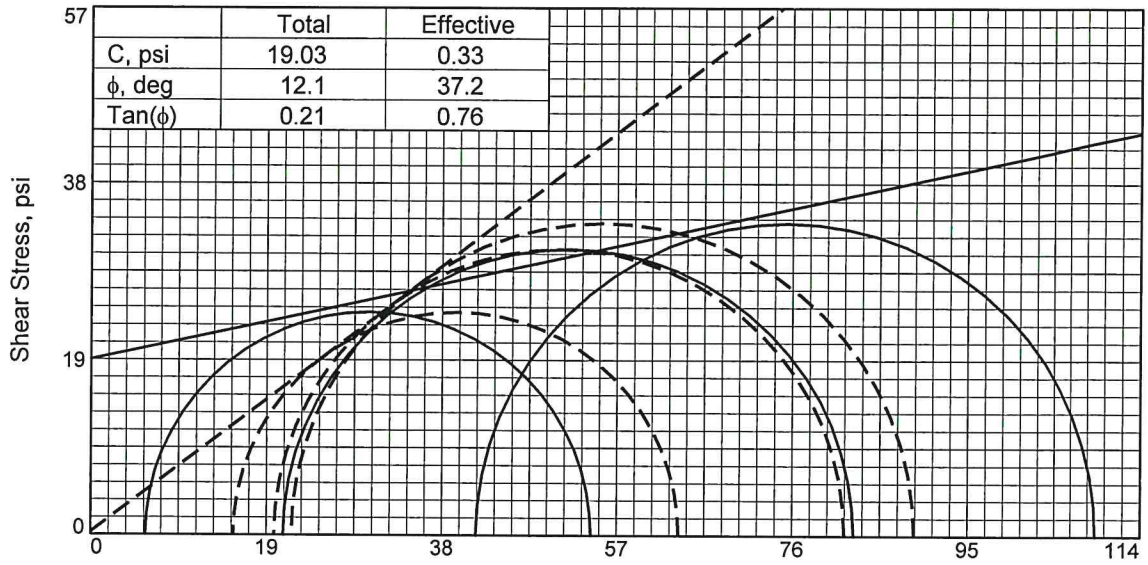
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Location: B-01 **Depth:** 60.0- 62.0' **Sample Number:** ST-31

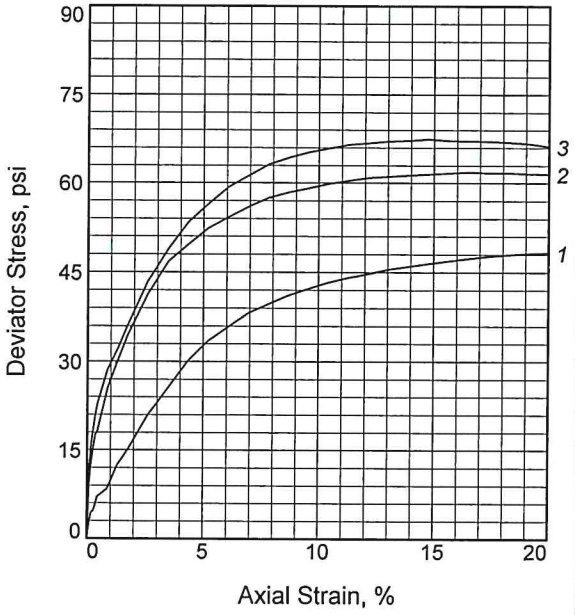
Project No.: 28287 **Figure** _____

Midland Standard Engineering & Testing

Tested By: JDS **Checked By:** WDP



	Total	Effective
C, psi	19.03	0.33
ϕ, deg	12.1	37.2
Tan(ϕ)	0.21	0.76



Sample No.		1	2	3
Initial	Water Content, %	15.9	15.3	16.2
	Dry Density, pcf	117.7	118.1	118.8
	Saturation, %	95.1	92.8	99.9
	Void Ratio	0.4589	0.4533	0.4448
	Diameter, in.	2.87	2.84	2.85
	Height, in.	5.76	5.75	5.76
At Test	Water Content, %	16.7	16.5	16.2
	Dry Density, pcf	117.7	118.1	118.8
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.4589	0.4533	0.4448
	Diameter, in.	2.87	2.84	2.85
	Height, in.	5.76	5.75	5.76
Strain rate, in./min.		0.037	0.037	0.037
Back Pressure, psi		60.5	60.5	60.5
Cell Pressure, psi		66.4	81.3	102.2
Fail. Stress, psi		48.3	61.8	67.5
Total Pore Pr., psi		51.0	61.5	80.5
Ult. Stress, psi				
Total Pore Pr., psi				
$\bar{\sigma}_1$ Failure, psi		63.7	81.6	89.2
$\bar{\sigma}_3$ Failure, psi		15.4	19.8	21.7

Type of Test:
CU with Pore Pressures
Sample Type: Shelby Tube
Description: Grey Silty CLAY

Specific Gravity= 2.750
Remarks:

Figure _____

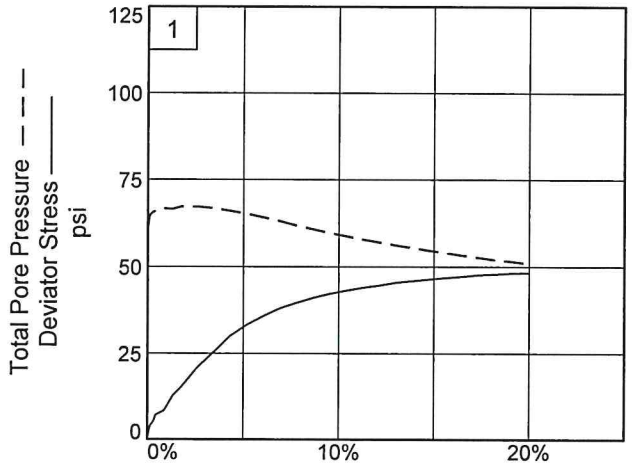
Client: APTIM

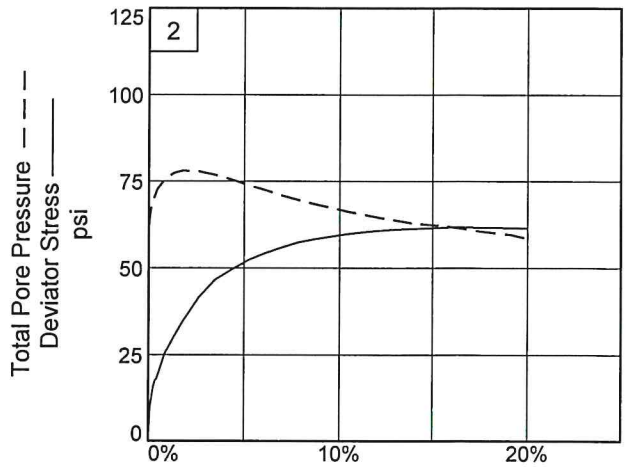
Project: Zion Landfill Site 2 Expansion, Aptim #3211

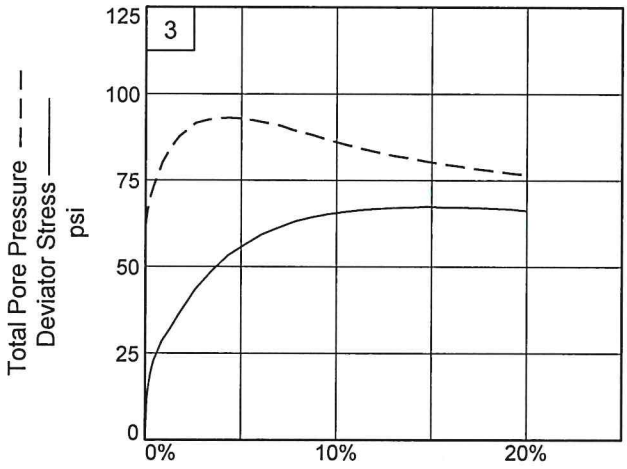
Location: B-12
Sample Number: ST-34 **Depth:** 66.0- 68.0'
Proj. No.: 28287 **Date Sampled:**

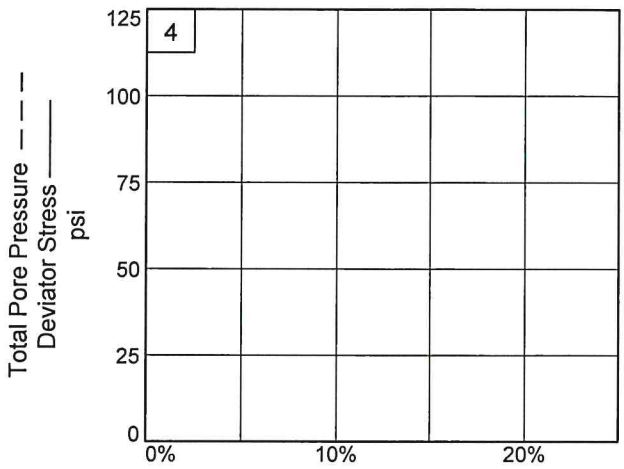
TRIAXIAL SHEAR TEST REPORT
Midland Standard Engineering & Testing
South Elgin, IL

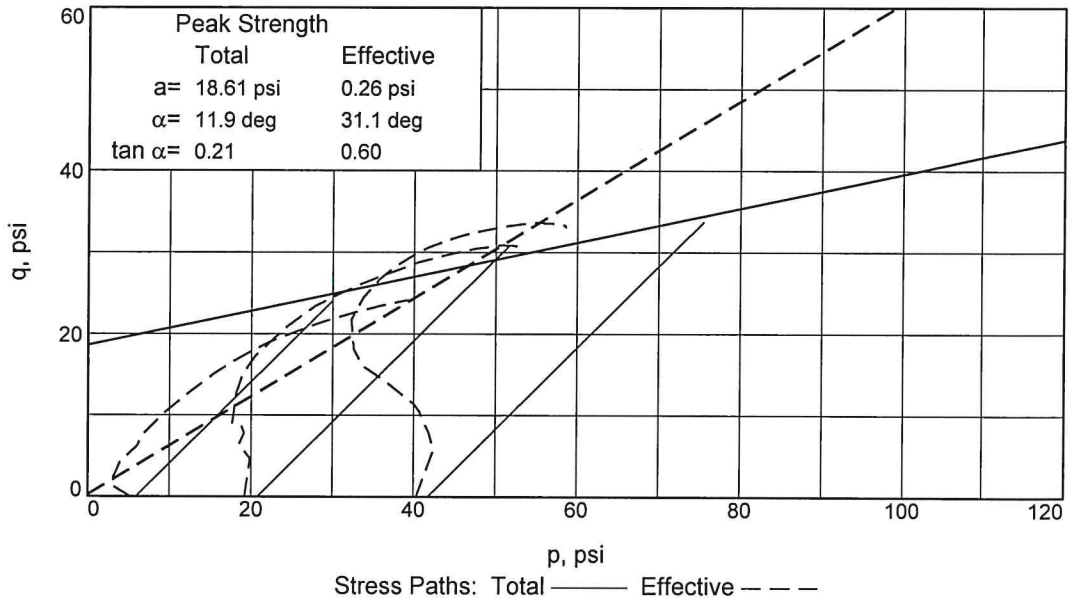
Tested By: JDS **Checked By:** WDP







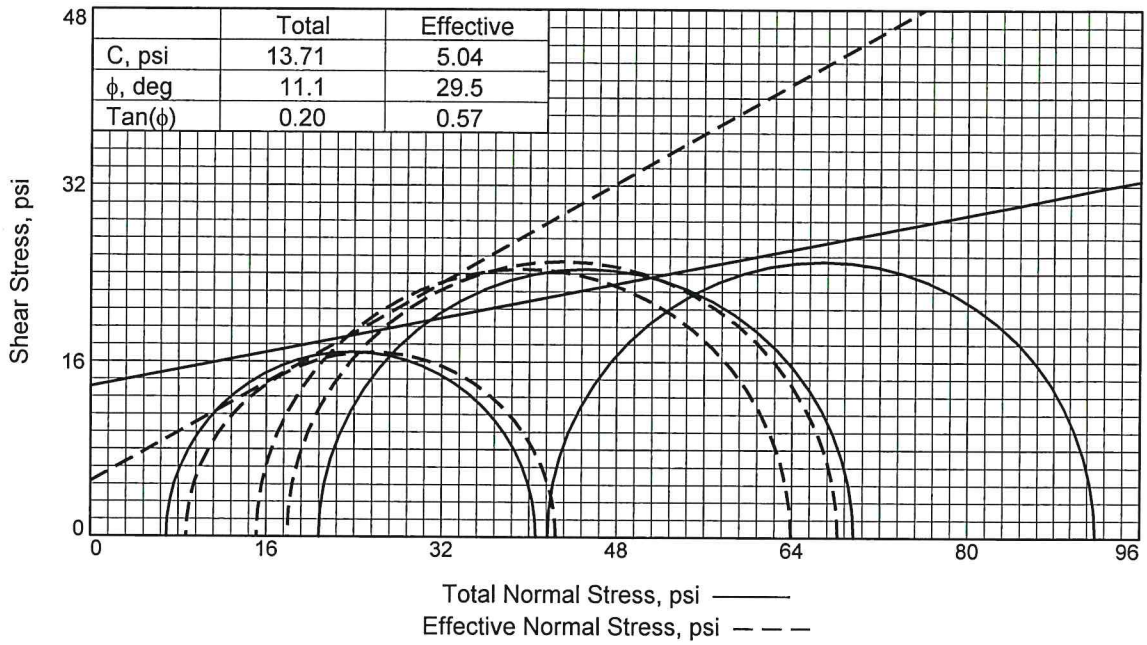


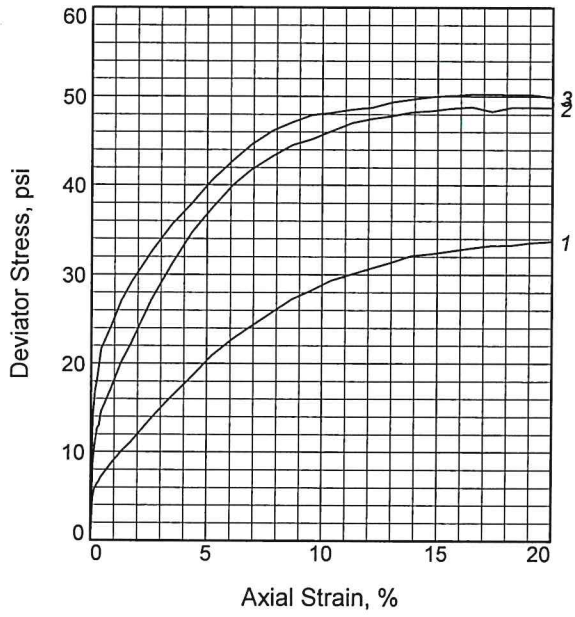


Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211
Location: B-12 **Depth:** 66.0- 68.0' **Sample Number:** ST-34
Project No.: 28287 **Figure** _____

Midland Standard Engineering & Testing

Tested By: JDS **Checked By:** WDP





Sample No.		1	2	3
Initial	Water Content, %	13.9	15.7	13.6
	Dry Density, pcf	123.5	120.6	122.3
	Saturation, %	97.8	102.1	92.4
	Void Ratio	0.3906	0.4239	0.4043
	Diameter, in.	2.86	2.90	2.85
	Height, in.	5.77	5.76	5.76
At Test	Water Content, %	14.2	15.4	14.7
	Dry Density, pcf	123.5	120.6	122.3
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.3906	0.4239	0.4043
	Diameter, in.	2.86	2.90	2.85
	Height, in.	5.77	5.76	5.76
Strain rate, in./min.		0.037	0.037	0.037
Back Pressure, psi		51.5	51.5	51.5
Cell Pressure, psi		58.4	72.3	93.2
Fail. Stress, psi		33.7	48.8	50.3
Total Pore Pr., psi		49.7	57.2	75.3
Ult. Stress, psi				
Total Pore Pr., psi				
$\bar{\sigma}_1$ Failure, psi		42.4	63.9	68.2
$\bar{\sigma}_3$ Failure, psi		8.7	15.1	17.9

Type of Test:
CU with Pore Pressures
Sample Type: Shelby Tube
Description: Grey Silty CLAY

Specific Gravity= 2.75
Remarks:

Figure _____

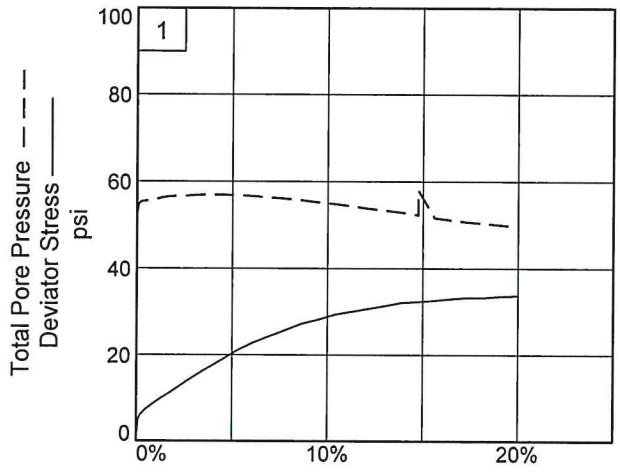
Client: APTIM

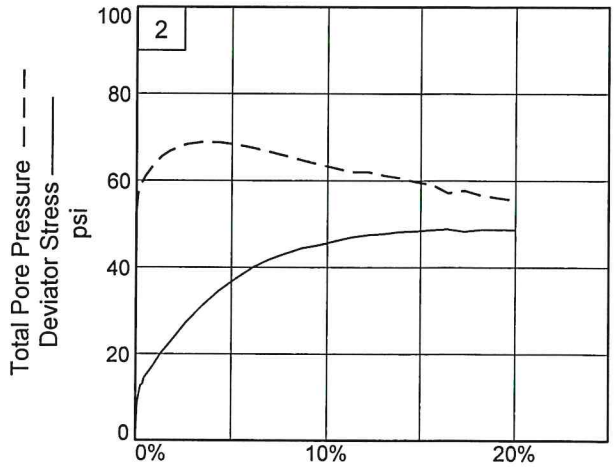
Project: Zion Landfill Site 2 Expansion, Aptim #3211

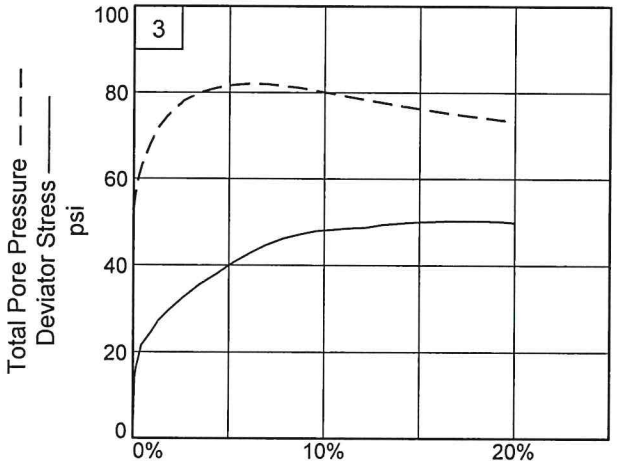
Location: B-13
Sample Number: ST-29 **Depth:** 56.0- 58.0'
Proj. No.: 28287 **Date Sampled:** 4/17/19

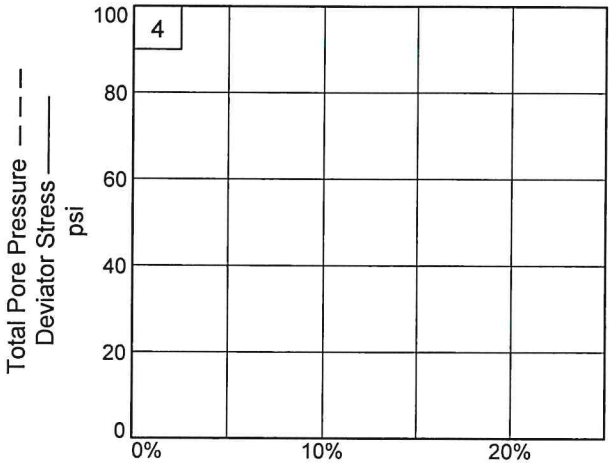
TRIAXIAL SHEAR TEST REPORT
Midland Standard Engineering & Testing
South Elgin, IL

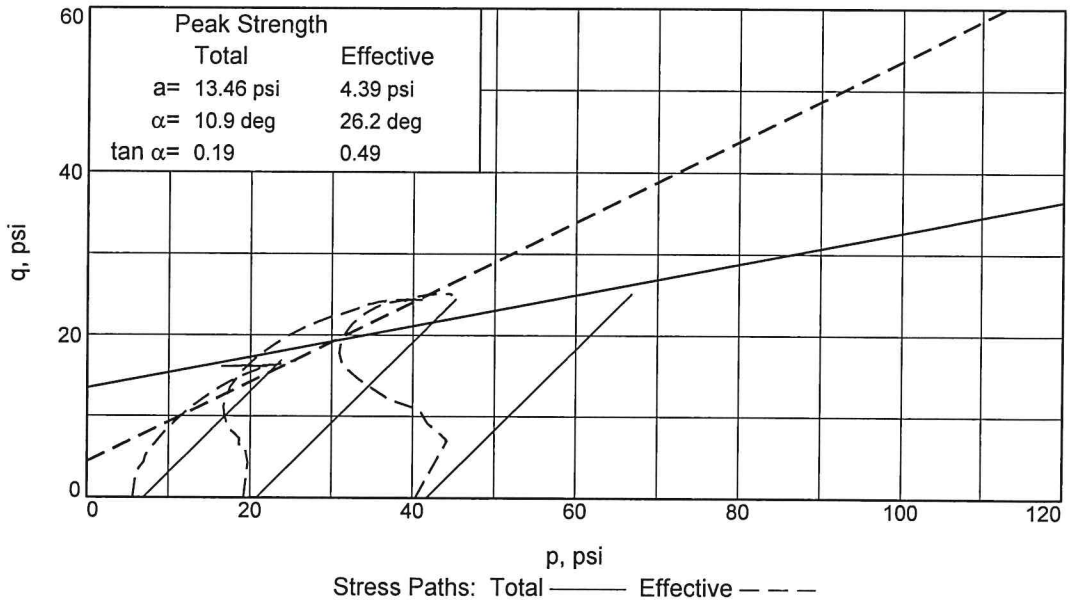
Tested By: JDS **Checked By:** WDP











Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211
Location: B-13 **Depth:** 56.0- 58.0' **Sample Number:** ST-29
Project No.: 28287 **Figure** _____

Midland Standard Engineering & Testing

Tested By: JDS **Checked By:** WDP

Moisture Contents

APTIM

Laboratory Moisture Content, Qu Calc Sheet

PROJECT: Zion LF

Date Received:

PROJECT NO.: 28287.0

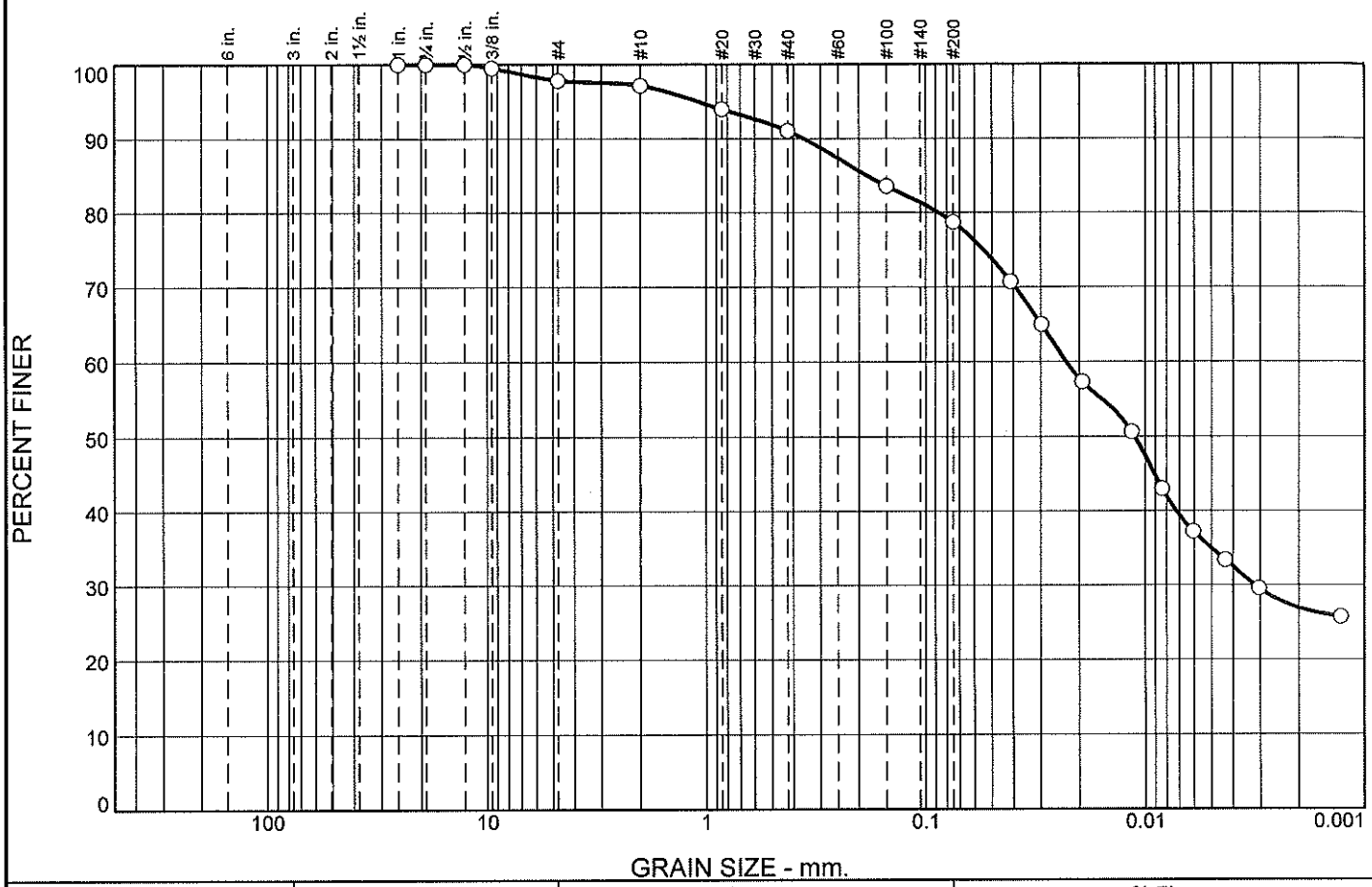
Date Tested:

boring no.	depth (ft)	tare #	wet wt.	dry wt.	moisture gms.	moisture %	Qp (tsf)	Failure Type	Qu (tsf)	Wet Weight	dry density description, etc.
1	23	1	37.40	32.51	4.89	15.0			0.00		
	27	2	28.62	24.18	4.44	18.4			0.00		
2	30	3	36.90	31.34	5.56	17.7			0.00		
	33	4	35.87	31.26	4.61	14.7			0.00		
3	29	5	27.66	23.86	3.80	15.9			0.00		
	32	6	32.09	26.75	5.34	20.0			0.00		
4	20	7	42.68	36.84	5.84	15.9			0.00		
	23	8	32.92	28.61	4.31	15.1			0.00		
5	31	9	40.47	34.61	5.86	16.9			0.00		
	59	10	39.21	33.47	5.74	17.1			0.00		
6	31	11	29.69	25.52	4.17	16.3			0.00		
	53	12	54.42	47.67	6.75	14.2			0.00		
7	15	13	30.90	25.61	5.29	20.7			0.00		
	24	14	34.24	29.82	4.42	14.8			0.00		
8	30	15	25.76	22.35	3.41	15.3			0.00		
	61	16	40.02	32.81	7.21	22.0			0.00		
9	22	17	49.82	41.26	8.56	20.7			0.00		
	28	18	58.10	51.02	7.08	13.9			0.00		
10	23	19	51.26	44.68	6.58	14.7			0.00		
	28	20	40.06	35.06	5.00	14.3			0.00		
11	22	21	40.64	34.66	5.98	17.3			0.00		
	28	22	59.57	47.39	12.18	25.7			0.00		
12	27	23	48.68	42.19	6.49	15.4			0.00		
	32	24	43.18	37.82	5.36	14.2			0.00		
13	17	25	39.03	33.23	5.80	17.5			0.00		
	26	26	50.61	44.26	6.35	14.3			0.00		
14	26	27	39.71	32.01	7.70	24.1			0.00		
	31	28	46.66	41.20	5.46	13.3			0.00		
15	24	29	47.47	40.74	6.73	16.5			0.00		
	29	30	43.87	36.06	7.81	21.7			0.00		
		31			0.00	#DIV/0!			0.00		
		32			0.00	#DIV/0!			0.00		
		33			0.00	#DIV/0!			0.00		
		34			0.00	#DIV/0!			0.00		

Partical Size Distribution Tests

APTIM

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.2	0.6	6.1	12.4	51.8	26.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	99.5		
#4	97.8		
#10	97.2		
#20	94.0		
#40	91.1		
#100	83.6		
#200	78.7		
0.0412 mm.	70.7		
0.0298 mm.	65.0		
0.0195 mm.	57.3		
0.0115 mm.	50.6		
0.0084 mm.	43.0		
0.0061 mm.	37.2		
0.0043 mm.	33.4		
0.0030 mm.	29.6		
0.0013 mm.	25.8		

* (no specification provided)

Soil Description

Grey Lean CLAY with Sand

Atterberg Limits

PL= 11 LL= 26 PI= 15

Coefficients

D_{90}= 0.3555 D_{85}= 0.1831 D_{60}= 0.0230
D_{50}= 0.0112 D_{30}= 0.0032 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(9)

Remarks

Location: B-01-18
Sample Number: SS-23 **Depth:** 44.0- 46.0' **Date:** 2/27/19

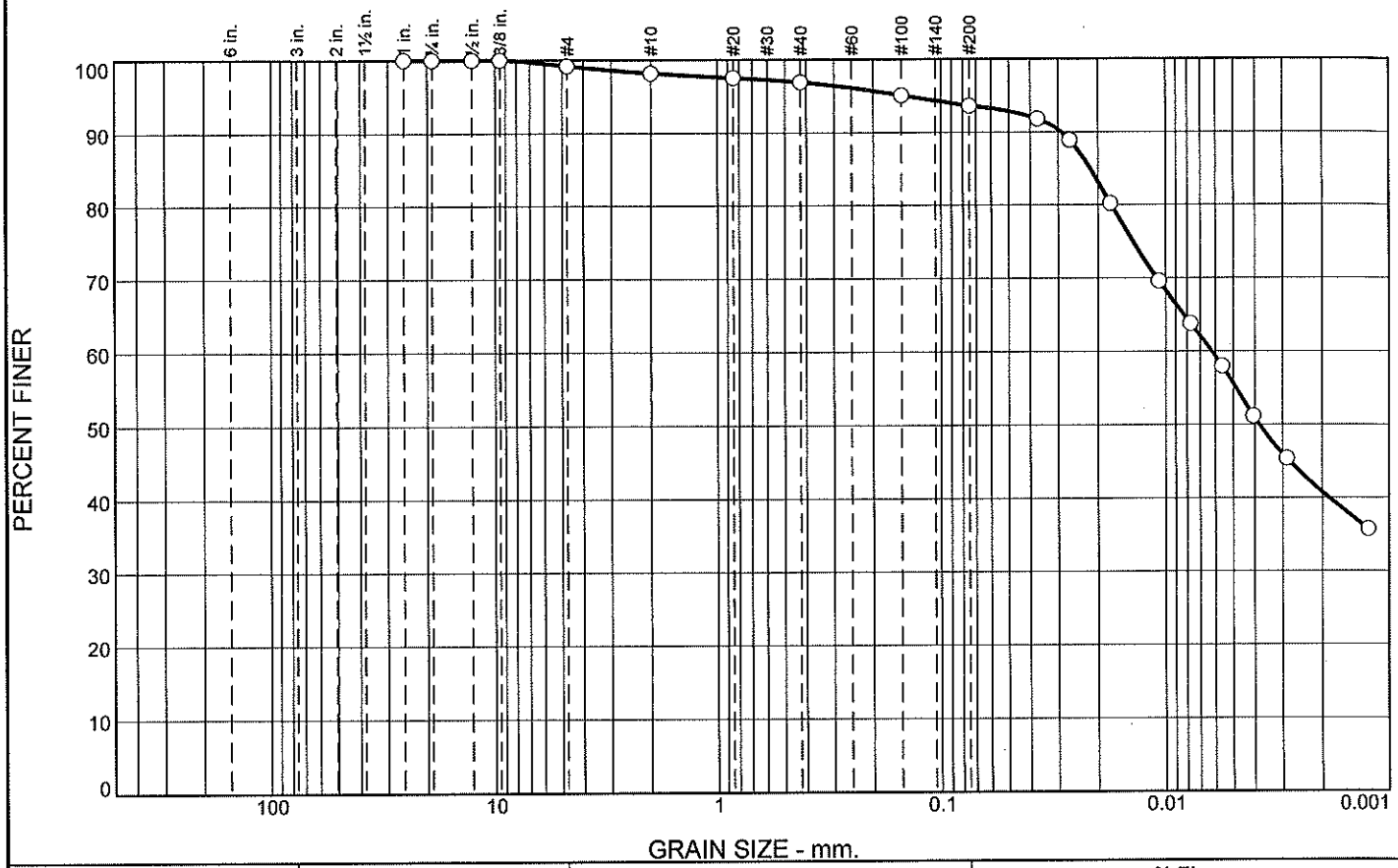
Midland Standard Engineering & Testing

South Elgin, IL

Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim # 3211

Project No: 28287 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	1.0	1.3	3.2	52.9	40.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.2		
#10	98.2		
#20	97.6		
#40	96.9		
#100	95.1		
#200	93.7		
0.0372 mm.	91.8		
0.0267 mm.	88.9		
0.0176 mm.	80.2		
0.0107 mm.	69.6		
0.0077 mm.	63.8		
0.0056 mm.	58.0		
0.0041 mm.	51.2		
0.0029 mm.	45.4		
0.0012 mm.	35.8		

* (no specification provided)

Soil Description

Light Grey Lean CLAY

Atterberg Limits

PL= 12 LL= 34 PI= 22

Coefficients

D_{90}= 0.0290 D_{85}= 0.0217 D_{60}= 0.0062
D_{50}= 0.0038 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(20)

Remarks

Location: B-01-18
Sample Number: SS-27 **Depth:** 52.0- 54.0' **Date:** 3/4/19

Midland Standard Engineering & Testing

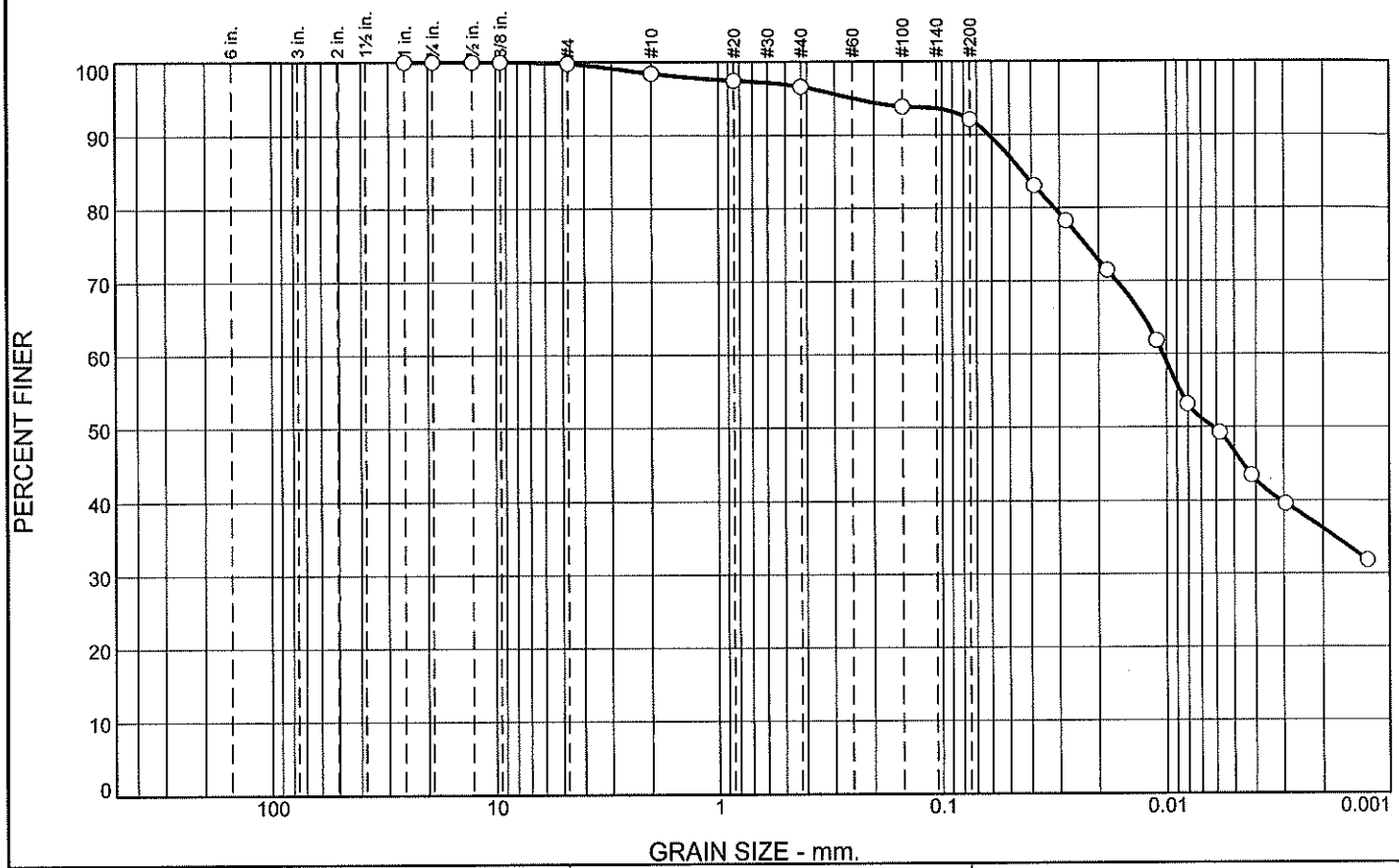
South Elgin, IL

Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim # 3211

Project No: 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.4	1.8	4.5	55.9	36.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.8		
#10	98.4		
#20	97.5		
#40	96.6		
#100	93.9		
#200	92.1		
0.0389 mm.	83.1		
0.0282 mm.	78.3		
0.0184 mm.	71.5		
0.0110 mm.	61.8		
0.0081 mm.	53.1		
0.0058 mm.	49.3		
0.0042 mm.	43.5		
0.0029 mm.	39.6		
0.0013 mm.	31.9		

* (no specification provided)

Soil Description

Light Brown Lean CLAY

Atterberg Limits

PL= 12 LL= 30 PI= 18

Coefficients

D_{90}= 0.0617 D_{85}= 0.0440 D_{60}= 0.0104
D_{50}= 0.0062 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(15)

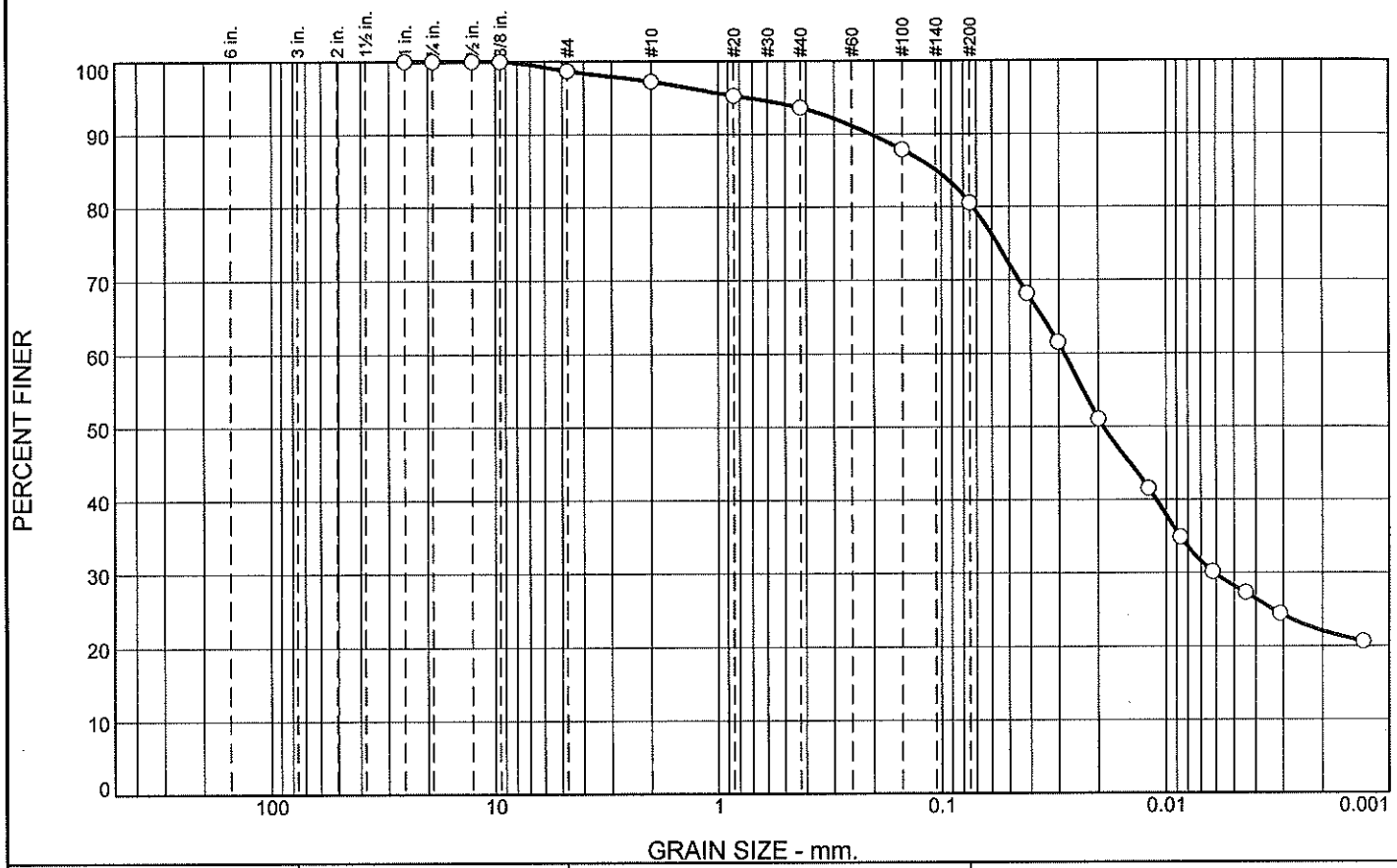
Remarks

Location: B-02-18
Sample Number: SS-30 **Depth:** 58.0- 60.0' **Date:** 3/5/19

Midland Standard Engineering & Testing **South Elgin, IL**	**Client:** APTIM **Project:** Zion Landfill Site 2 Expansion, Aptim # 3211 **Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.3	1.4	3.7	13.0	58.5	22.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	98.7		
#10	97.3		
#20	95.3		
#40	93.6		
#100	87.9		
#200	80.6		
0.0417 mm.	68.2		
0.0304 mm.	61.6		
0.0200 mm.	51.1		
0.0120 mm.	41.6		
0.0087 mm.	34.9		
0.0062 mm.	30.2		
0.0044 mm.	27.3		
0.0031 mm.	24.5		
0.0013 mm.	20.7		

* (no specification provided)

Soil Description

Grey Silty Lean CLAY with Sand

Atterberg Limits

PL= 10 LL= 21 PI= 11

Coefficients

D_{90}= 0.2053 D_{85}= 0.1049 D_{60}= 0.0285
D_{50}= 0.0190 D_{30}= 0.0061 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(5)

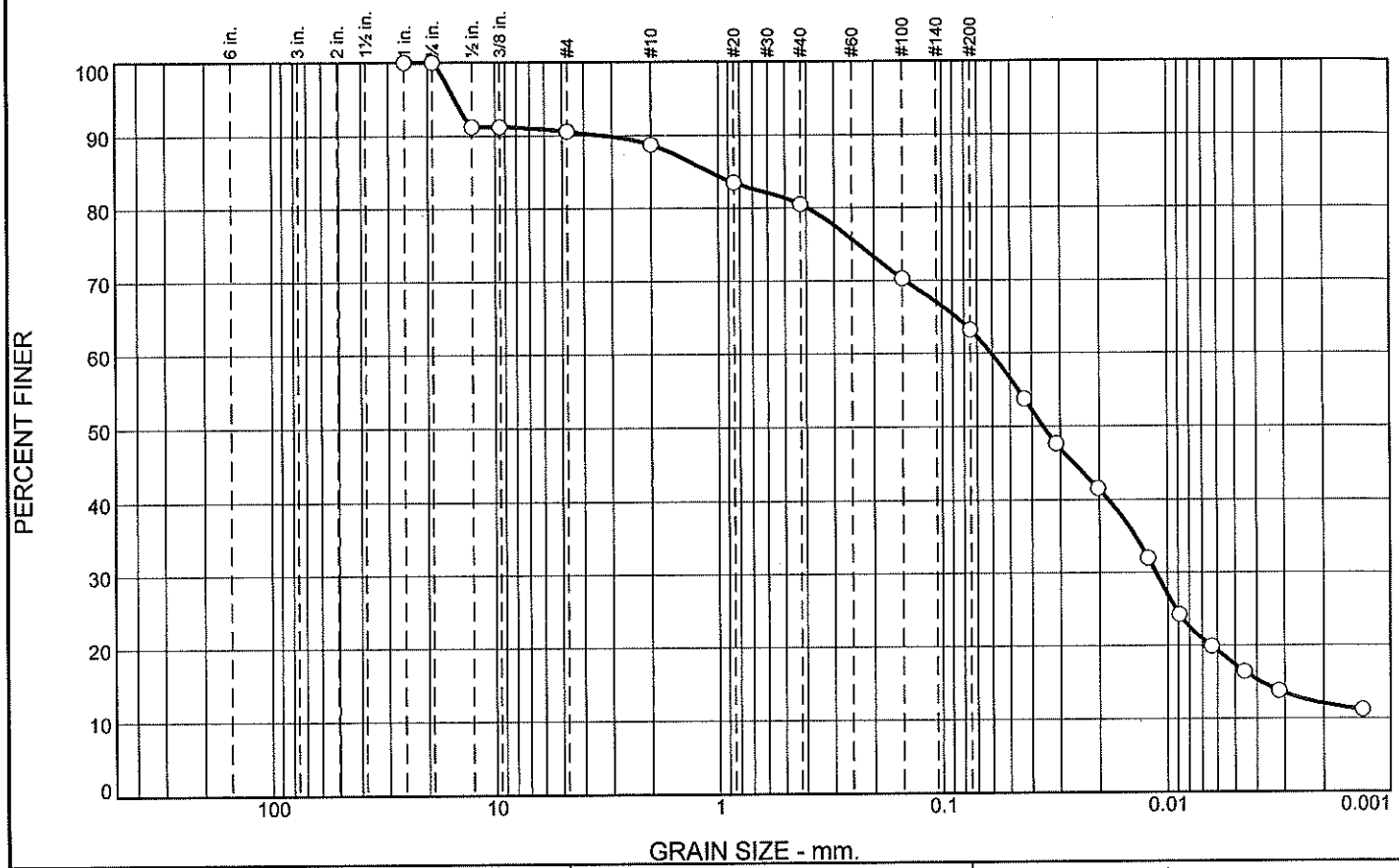
Remarks

Location: B-02-18
Sample Number: SS-33 **Depth:** 64.0- 66.0' **Date:** 3/1/19

Midland Standard Engineering & Testing **South Elgin, IL**	**Client:** APTIM **Project:** Zion Landfill Site 2 Expansion, Aptim # 3211 **Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.4	1.8	8.3	17.3	51.2	12.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	91.3		
3/8"	91.3		
#4	90.6		
#10	88.8		
#20	83.5		
#40	80.5		
#100	70.3		
#200	63.2		
0.0432 mm.	53.8		
0.0314 mm.	47.7		
0.0203 mm.	41.6		
0.0122 mm.	32.1		
0.0089 mm.	24.2		
0.0064 mm.	19.9		
0.0046 mm.	16.4		
0.0032 mm.	13.8		
0.0013 mm.	11.2		

* (no specification provided)

Soil Description

Grey Sandy Lean CLAY

Atterberg Limits

PL= 11 LL= 19 PI= 8

Coefficients

D_{90}= 3.3099 D_{85}= 1.0893 D_{60}= 0.0607
D_{50}= 0.0357 D_{30}= 0.0112 D_{15}= 0.0038
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(2)

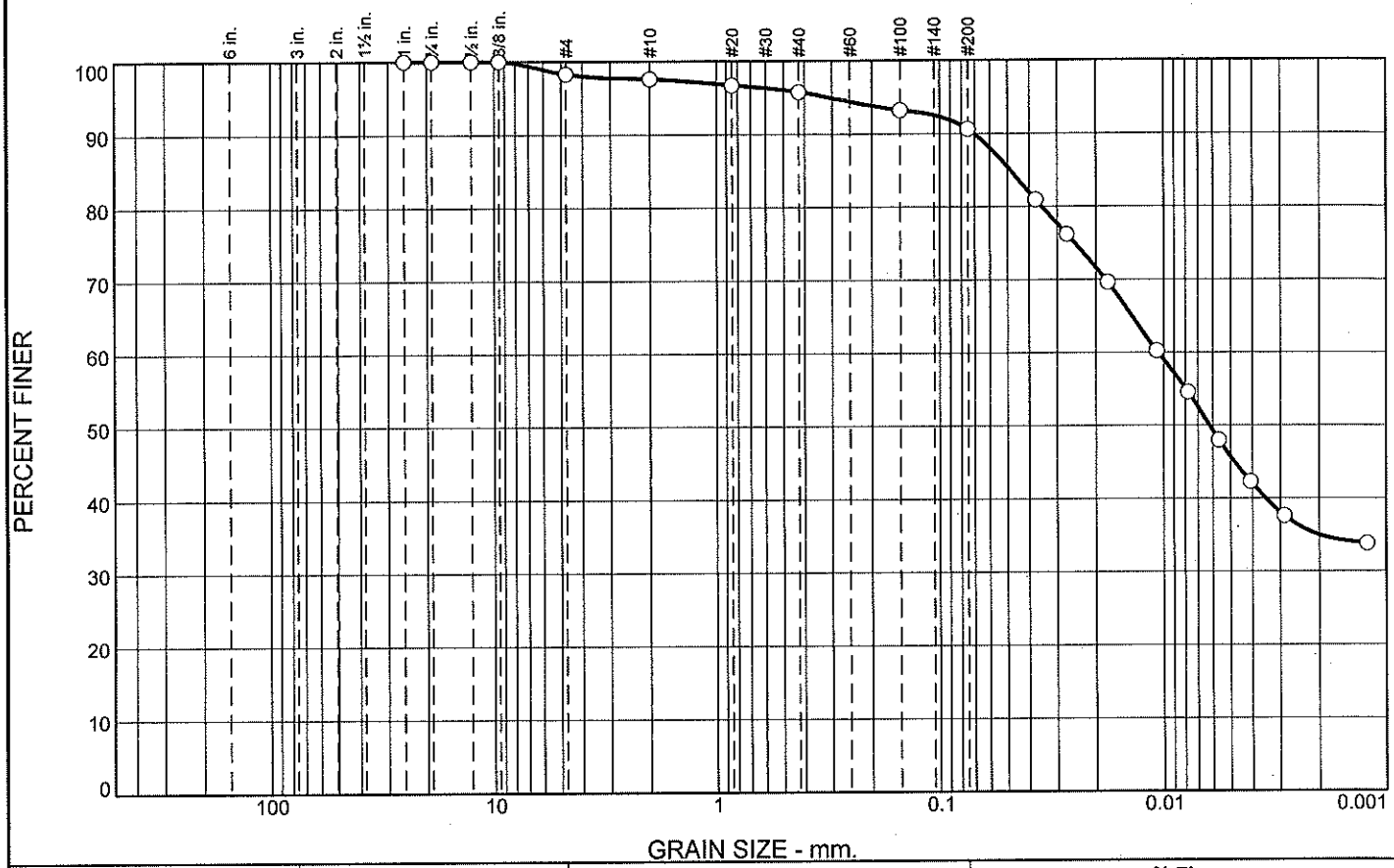
Remarks

Location: B-04-18
Sample Number: SS-20 **Depth:** 38.0- 40.0' **Date:** 2/27/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.7	0.7	1.8	5.2	55.6	35.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	98.3		
#10	97.6		
#20	96.7		
#40	95.8		
#100	93.2		
#200	90.6		
0.0375 mm.	81.0		
0.0272 mm.	76.2		
0.0178 mm.	69.7		
0.0107 mm.	60.2		
0.0078 mm.	54.6		
0.0056 mm.	48.0		
0.0041 mm.	42.3		
0.0029 mm.	37.6		
0.0012 mm.	33.8		

* (no specification provided)

Soil Description

Grey Lean CLAY

Atterberg Limits

PL= 15 LL= 30 PI= 15

Coefficients

D_{90}= 0.0704 D_{85}= 0.0486 D_{60}= 0.0106
D_{50}= 0.0062 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(12)

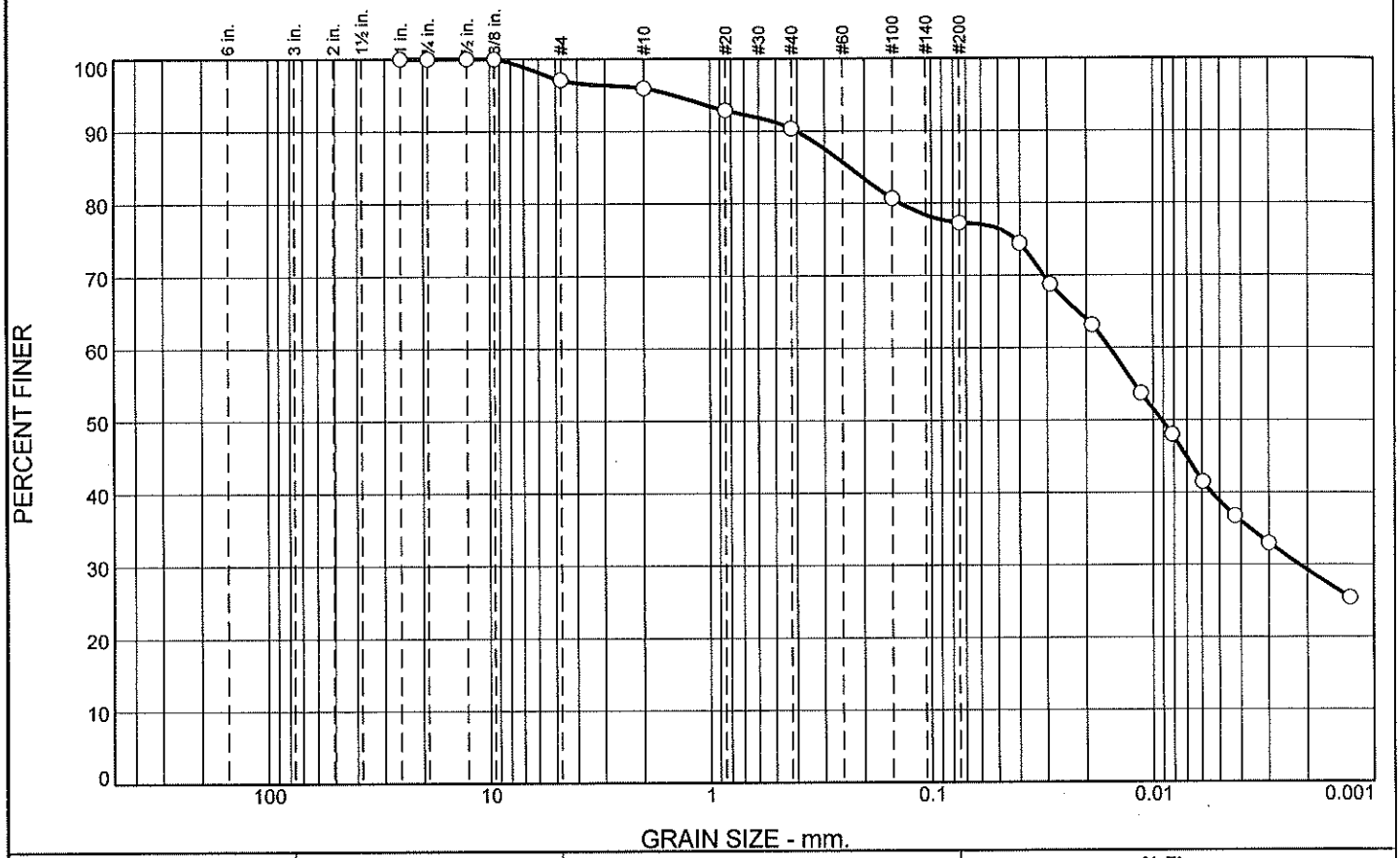
Remarks

Location: B-03
Sample Number: SS-29 **Depth:** 56.0- 58.0' **Date:**

Midland Standard Engineering & Testing **South Elgin, IL**	**Client:** APTIM **Project:** Zion Landfill Site 2 Expansion, Aptim #3211 **Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.9	1.1	5.6	13.1	48.0	29.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	97.1		
#10	96.0		
#20	92.9		
#40	90.4		
#100	80.7		
#200	77.3		
0.0402 mm.	74.5		
0.0292 mm.	68.8		
0.0189 mm.	63.2		
0.0113 mm.	53.7		
0.0082 mm.	48.1		
0.0059 mm.	41.5		
0.0043 mm.	36.8		
0.0030 mm.	33.0		
0.0013 mm.	25.5		

* (no specification provided)

Soil Description

Light Grey Lean CLAY with Sand

Atterberg Limits

PL= 11 LL= 29 PI= 18

Coefficients

D_{90}= 0.4010 D_{85}= 0.2332 D_{60}= 0.0157
D_{50}= 0.0091 D_{30}= 0.0022 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(11)

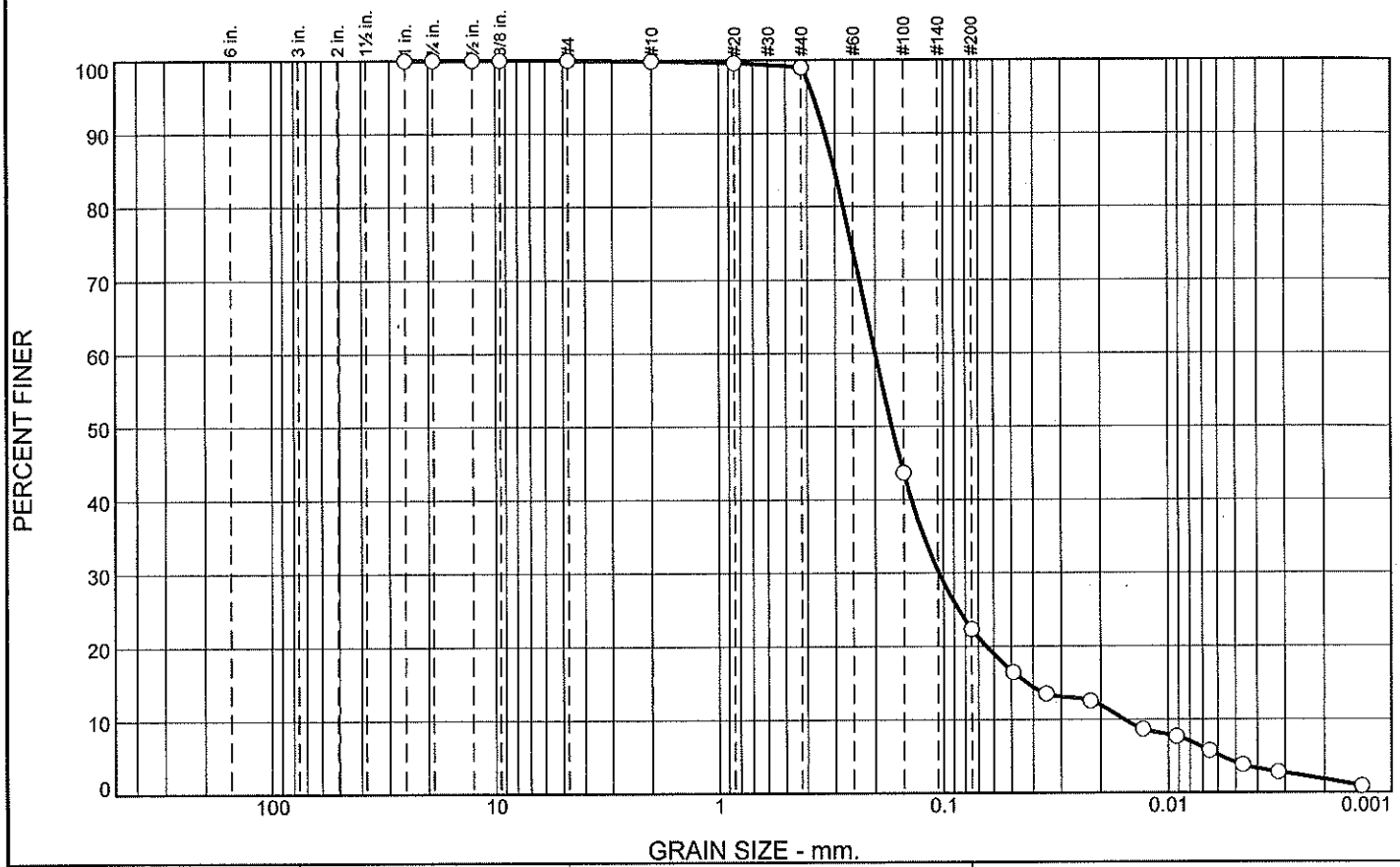
Remarks

Location: B-04-18
Sample Number: SS-23 **Depth:** 44.0- 46.0' **Date:** 3/4/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.9	76.6	20.6	1.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	100.0		
#10	99.9		
#20	99.6		
#40	99.0		
#100	43.7		
#200	22.4		
0.0490 mm.	16.5		
0.0350 mm.	13.6		
0.0222 mm.	12.6		
0.0129 mm.	8.7		
0.0092 mm.	7.7		
0.0065 mm.	5.8		
0.0046 mm.	3.8		
0.0032 mm.	2.8		
0.0014 mm.	0.9		

* (no specification provided)

Soil Description

Grey Silty SAND

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3332 D_{85}= 0.3021 D_{60}= 0.1999
D_{50}= 0.1690 D_{30}= 0.1051 D_{15}= 0.0426
D_{10}= 0.0157 C_u= 12.77 C_c= 3.53

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Location: B-05
Sample Number: SS-59 **Depth:** 116.0- 118.0' **Date:**

Midland Standard Engineering & Testing

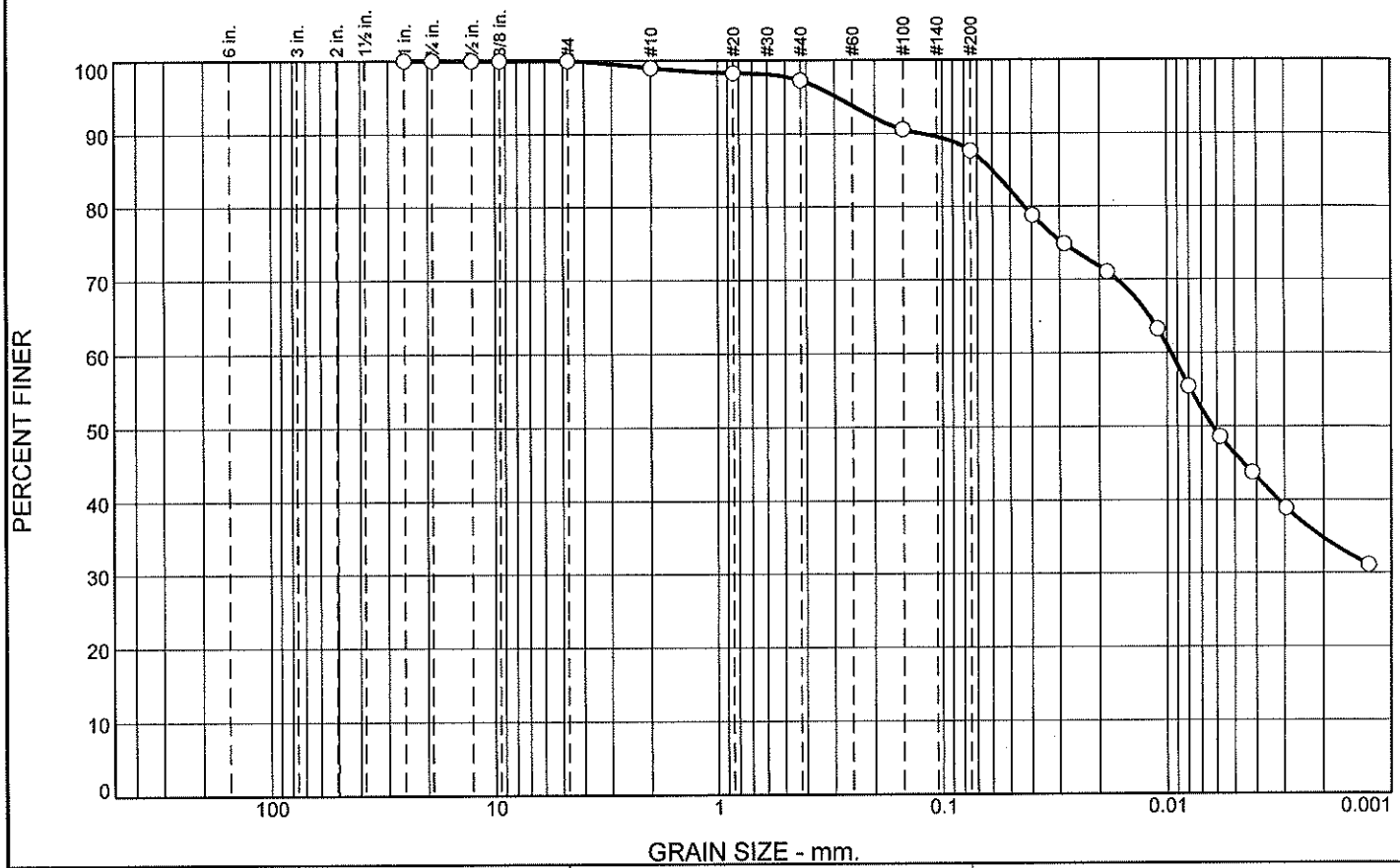
South Elgin, IL

Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Project No: 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.0	1.7	9.6	52.9	34.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	100.0		
#10	99.0		
#20	98.3		
#40	97.3		
#100	90.6		
#200	87.7		
0.0398 mm.	78.8		
0.0287 mm.	74.9		
0.0184 mm.	71.0		
0.0110 mm.	63.2		
0.0080 mm.	55.5		
0.0058 mm.	48.6		
0.0042 mm.	43.8		
0.0029 mm.	38.9		
0.0013 mm.	31.1		

* (no specification provided)

Soil Description

Light Grey Lean CLAY

Atterberg Limits

PL= 13 LL= 28 PI= 15

Coefficients

D_{90}= 0.1239 D_{85}= 0.0601 D_{60}= 0.0096
D_{50}= 0.0063 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(11)

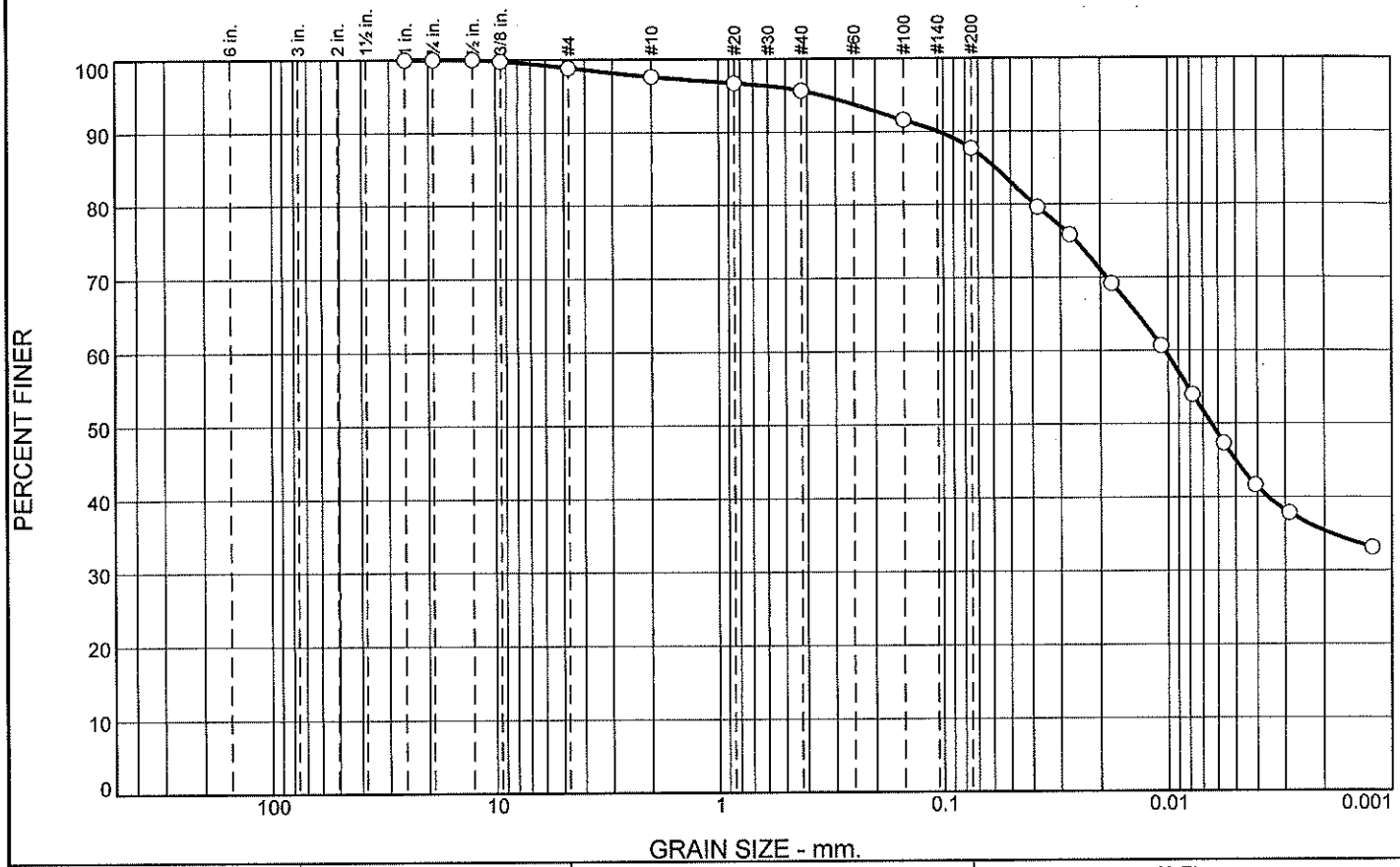
Remarks

Location: B-05-18
Sample Number: SS-31 **Depth:** 60.0- 62.0' **Date:** 3/4/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	1.3	1.9	8.0	52.3	35.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	99.8		
#4	98.9		
#10	97.6		
#20	96.7		
#40	95.7		
#100	91.6		
#200	87.7		
0.0379 mm.	79.6		
0.0273 mm.	75.8		
0.0179 mm.	69.2		
0.0107 mm.	60.7		
0.0078 mm.	54.0		
0.0057 mm.	47.4		
0.0041 mm.	41.7		
0.0029 mm.	37.9		
0.0012 mm.	33.1		

* (no specification provided)

Soil Description

Grey Lean CLAY

Atterberg Limits

PL= 12 LL= 33 PI= 21

Coefficients

D_{90}= 0.1040 D_{85}= 0.0584 D_{60}= 0.0104
D_{50}= 0.0064 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(17)

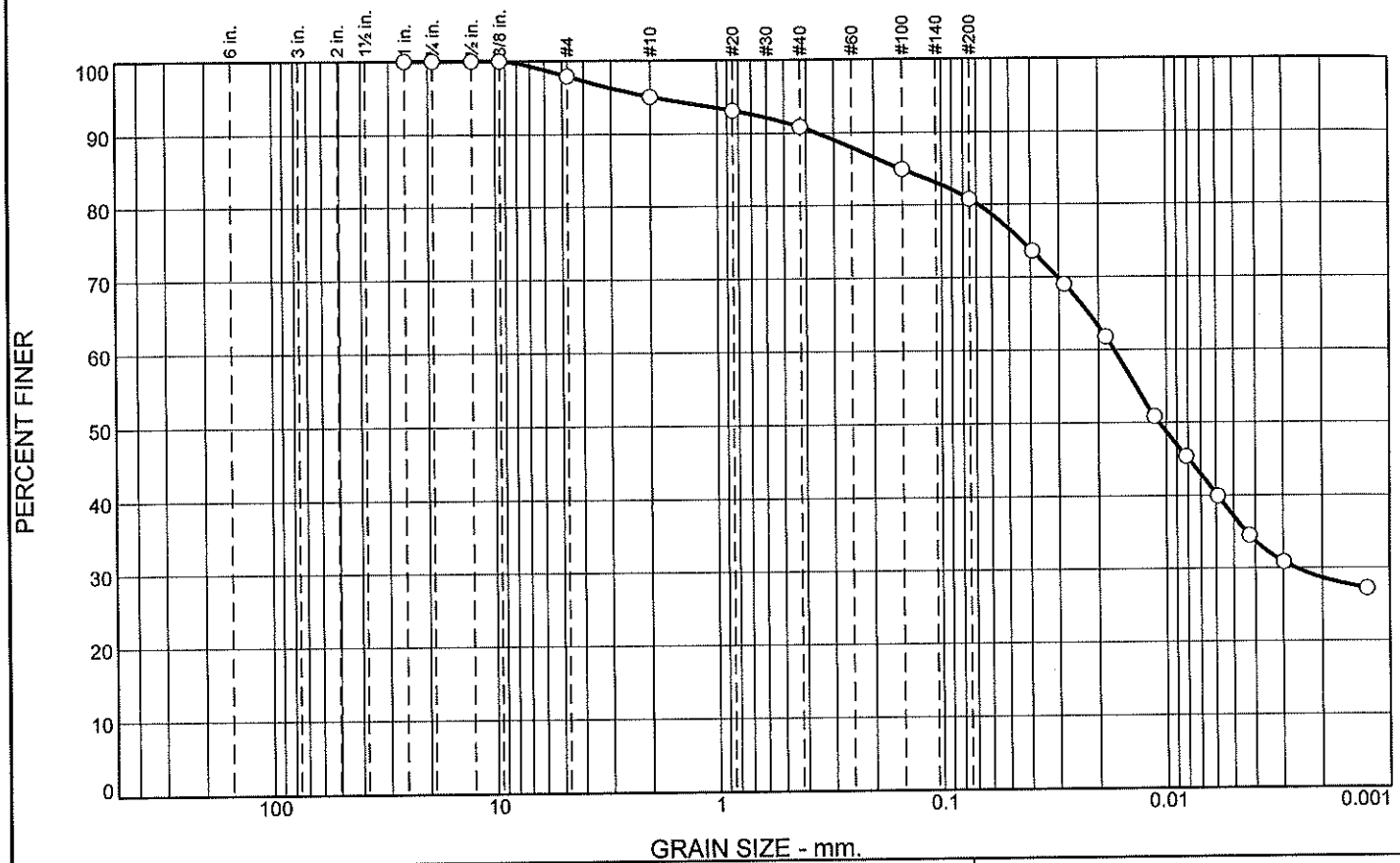
Remarks

Location: B-06
Sample Number: SS-31 **Depth:** 60.0- 62.0' **Date:**

Midland Standard Engineering & Testing **South Elgin, IL**	**Client:** APTIM **Project:** Zion Landfill Site 2 Expansion, Aptim #3211 **Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.0	2.9	4.2	10.1	52.1	28.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	98.0		
#10	95.1		
#20	93.1		
#40	90.9		
#100	85.0		
#200	80.8		
0.0393 mm.	73.6		
0.0284 mm.	69.1		
0.0186 mm.	61.8		
0.0113 mm.	50.9		
0.0081 mm.	45.4		
0.0059 mm.	40.0		
0.0042 mm.	34.5		
0.0030 mm.	30.9		
0.0013 mm.	27.2		

* (no specification provided)

Soil Description

Grey Lean CLAY with SAND

Atterberg Limits

PL= 14 LL= 27 PI= 13

Coefficients

D_{90}= 0.3549 D_{85}= 0.1508 D_{60}= 0.0171
D_{50}= 0.0108 D_{30}= 0.0026 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

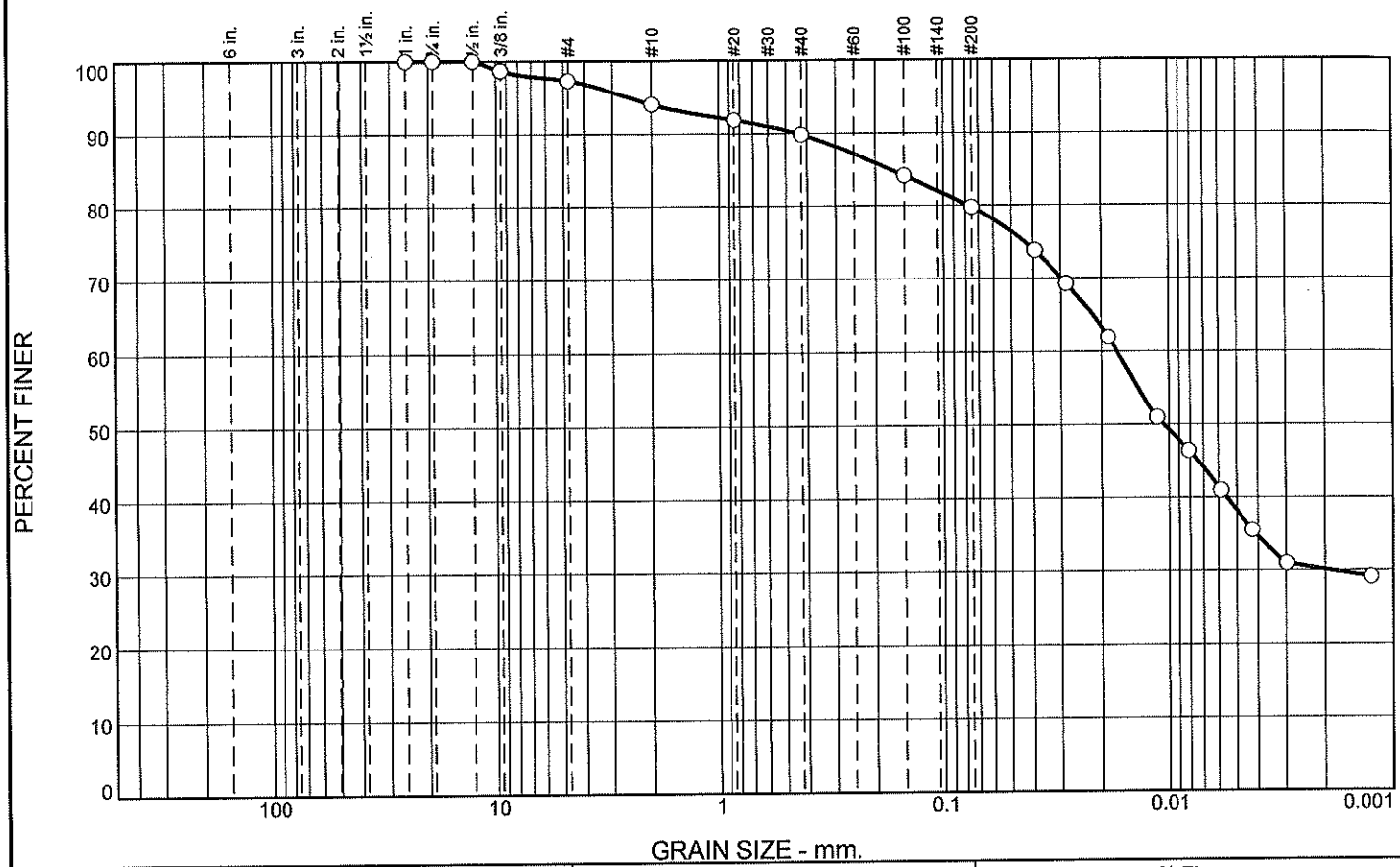
Remarks

Location: B-09
Sample Number: SS-28 **Depth:** 54.0- 56.0' **Date:** 3/27/19

Midland Standard Engineering & Testing	Client: APTIM
South Elgin, IL	Project: Zion Landfill Site 2 Expansion, Aptim #3211
	Project No: 28287 Figure

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.6	3.3	4.2	10.1	49.7	30.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	98.7		
#4	97.4		
#10	94.1		
#20	91.9		
#40	89.9		
#100	84.1		
#200	79.8		
0.0393 mm.	73.8		
0.0284 mm.	69.3		
0.0186 mm.	62.0		
0.0113 mm.	51.0		
0.0081 mm.	46.5		
0.0059 mm.	41.0		
0.0042 mm.	35.5		
0.0030 mm.	31.0		
0.0013 mm.	29.1		

* (no specification provided)

Soil Description

Brown-Grey Lean CLAY with Sand

Atterberg Limits

PL= 14 LL= 26 PI= 12

Coefficients

D_{90}= 0.4400 D_{85}= 0.1727 D_{60}= 0.0170
D_{50}= 0.0106 D_{30}= 0.0019 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(7)

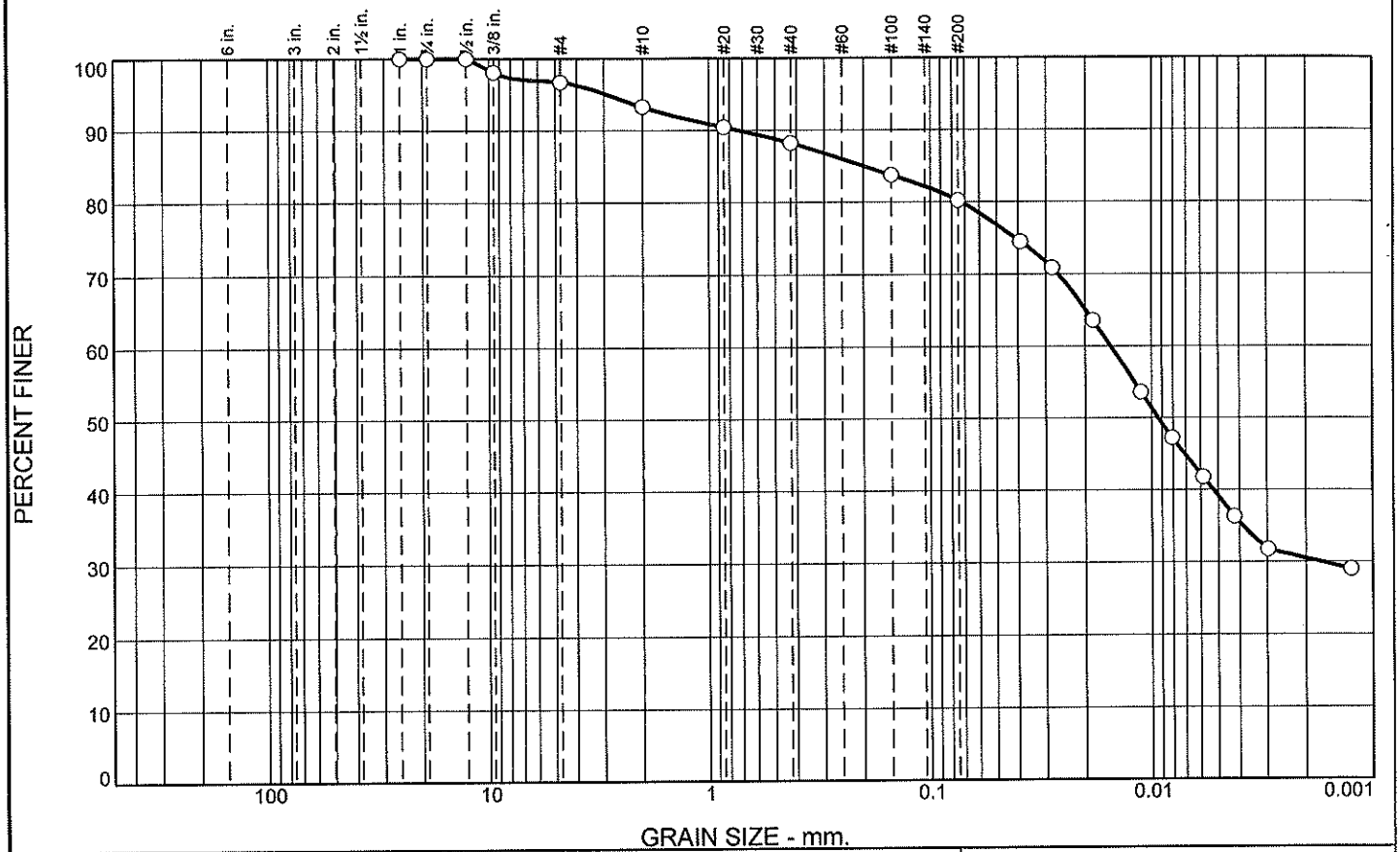
Remarks

Location: B-10
Sample Number: SS-23 **Depth:** 44.0- 46.0' **Date:** 3/27/19

Midland Standard Engineering & Testing **South Elgin, IL**	**Client:** APTIM **Project:** Zion Landfill Site 2 Expansion, Aptim #3211 **Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.2	3.5	5.0	8.1	49.7	30.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	98.1		
#4	96.8		
#10	93.3		
#20	90.5		
#40	88.3		
#100	83.8		
#200	80.2		
0.0391 mm.	74.5		
0.0282 mm.	70.9		
0.0185 mm.	63.6		
0.0111 mm.	53.6		
0.0081 mm.	47.2		
0.0058 mm.	41.8		
0.0042 mm.	36.3		
0.0030 mm.	31.8		
0.0013 mm.	29.1		

* (no specification provided)

Soil Description

Grey Lean CLAY with SAND

Atterberg Limits

PL= 14 LL= 28 PI= 14

Coefficients

D_{90}= 0.7219 D_{85}= 0.1982 D_{60}= 0.0153
D_{50}= 0.0093 D_{30}= 0.0017 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(9)

Remarks

Location: B-10
Sample Number: SS-28 **Depth:** 54.0- 56.0' **Date:** 3/27/19

Midland Standard Engineering & Testing

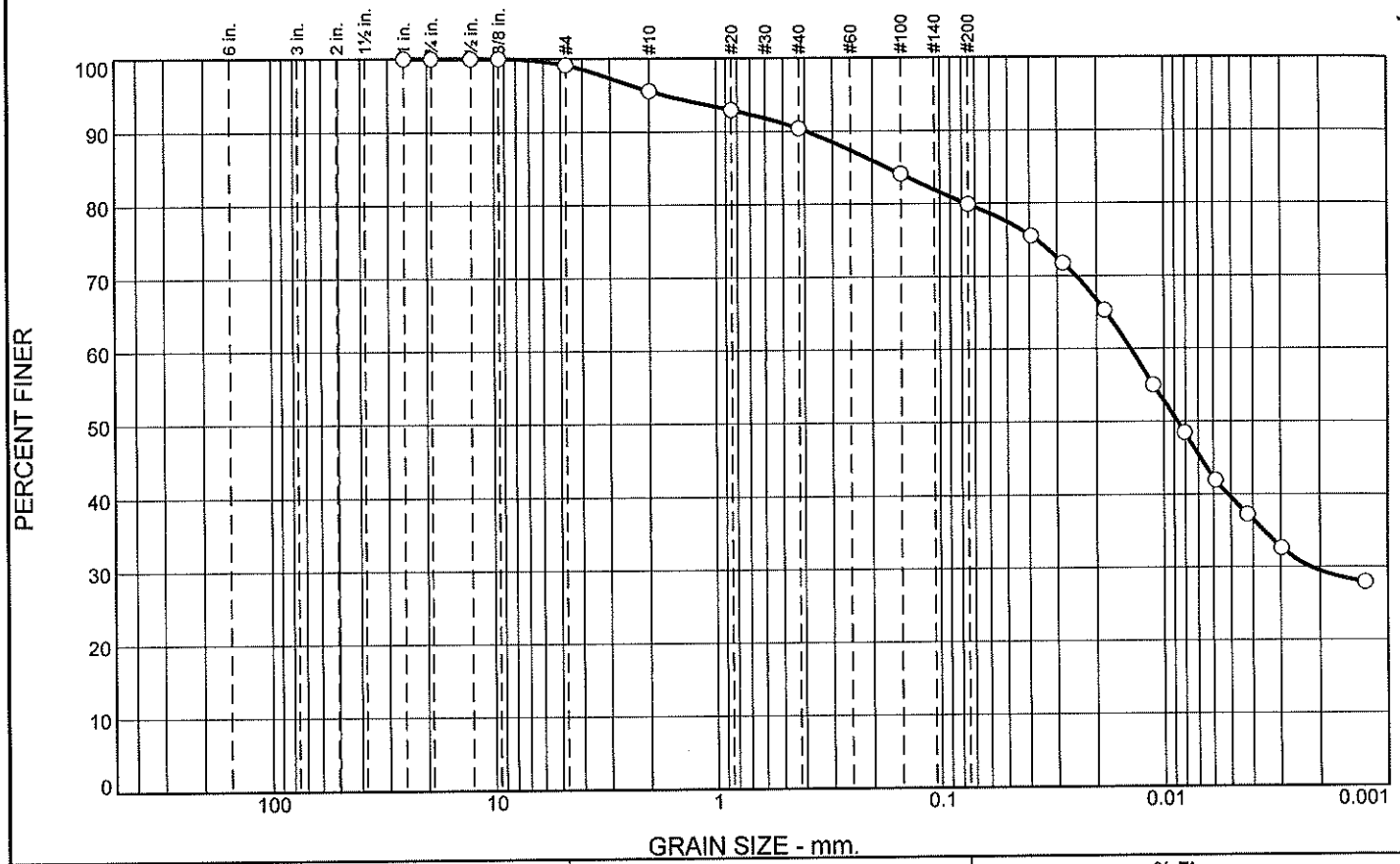
South Elgin, IL

Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Project No: 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	3.5	5.2	10.5	50.4	29.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.1		
#10	95.6		
#20	93.0		
#40	90.4		
#100	84.1		
#200	79.9		
0.0393 mm.	75.6		
0.0283 mm.	71.8		
0.0185 mm.	65.3		
0.0111 mm.	55.0		
0.0081 mm.	48.5		
0.0059 mm.	42.0		
0.0042 mm.	37.3		
0.0030 mm.	32.6		
0.0013 mm.	28.0		

* (no specification provided)

Soil Description

Grey Lean CLAY with Sand

Atterberg Limits

PL= 14 LL= 27 PI= 13

Coefficients

D_{90}= 0.3909 D_{85}= 0.1716 D_{60}= 0.0141
D_{50}= 0.0087 D_{30}= 0.0022 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

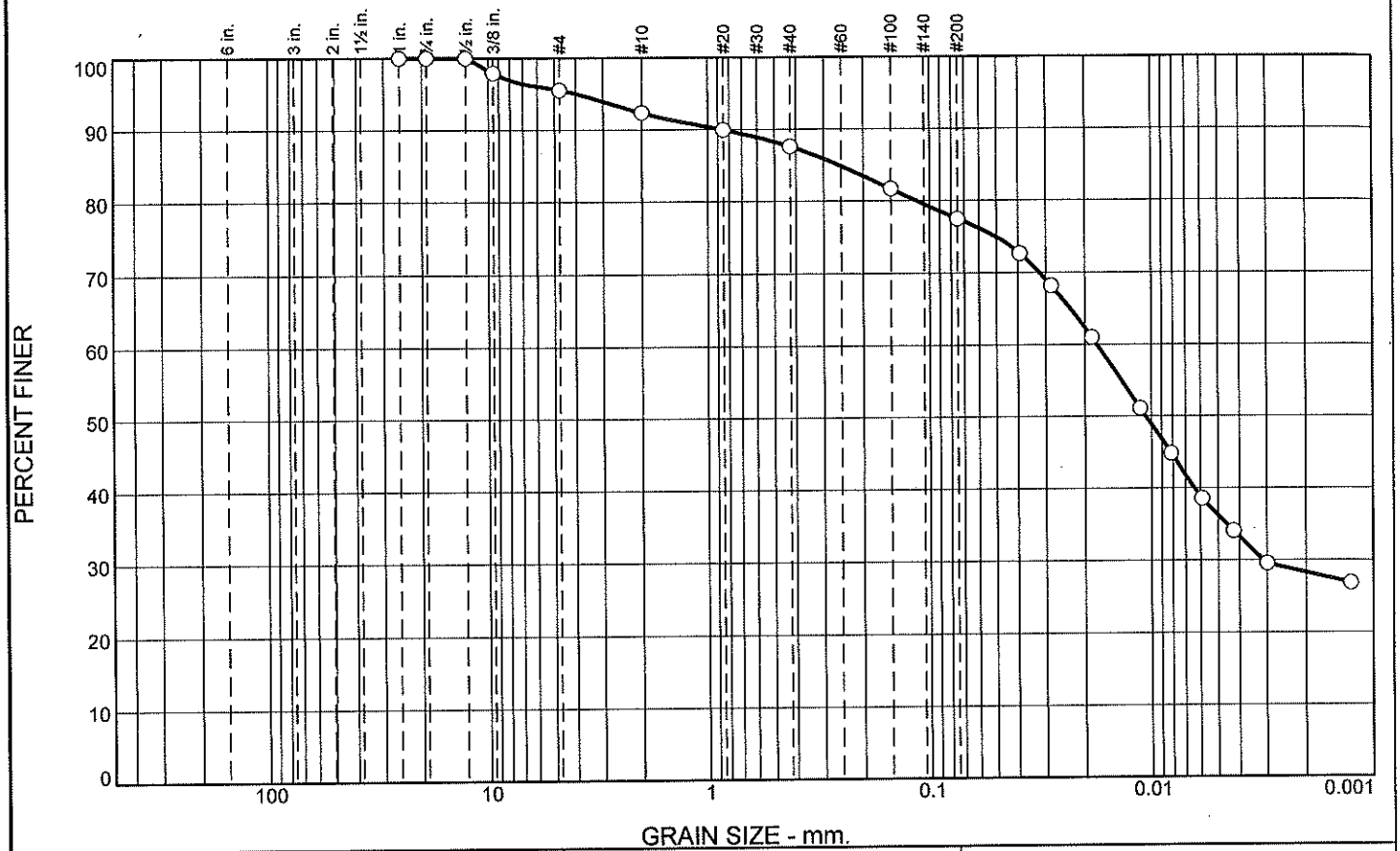
Remarks

Location: B-11
Sample Number: SS-28 **Depth:** 54.0- 56.0' **Date:** 3/27/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	3.2	4.8	10.1	49.2	28.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	97.9		
#4	95.6		
#10	92.4		
#20	90.0		
#40	87.6		
#100	81.7		
#200	77.5		
0.0393 mm.	72.7		
0.0284 mm.	68.2		
0.0186 mm.	61.0		
0.0112 mm.	51.1		
0.0081 mm.	44.9		
0.0059 mm.	38.6		
0.0042 mm.	34.1		
0.0030 mm.	29.6		
0.0013 mm.	26.9		

* (no specification provided)

Soil Description

Grey Lean CLAY with Sand

Atterberg Limits

PL= 13 LL= 25 PI= 12

Coefficients

D_{90}= 0.8609 D_{85}= 0.2565 D_{60}= 0.0176
D_{50}= 0.0106 D_{30}= 0.0031 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(7)

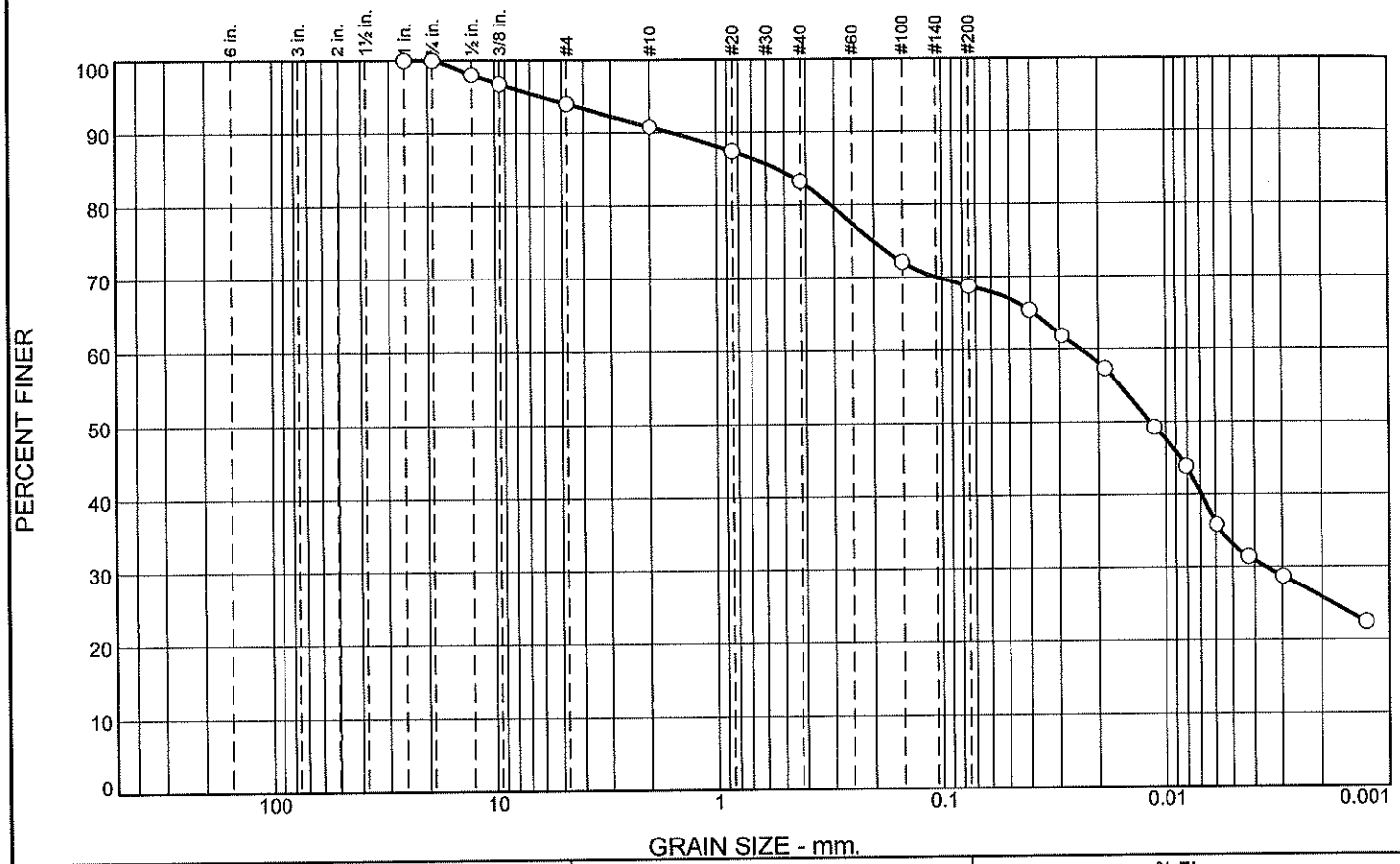
Remarks

Location: B-12
Sample Number: SS-27 **Depth:** 52.0- 54.0' **Date:** 3/27/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.0	3.1	7.6	14.5	42.9	25.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	98.1		
3/8"	96.7		
#4	94.0		
#10	90.9		
#20	87.4		
#40	83.3		
#100	72.1		
#200	68.8		
0.0404 mm.	65.4		
0.0291 mm.	61.8		
0.0188 mm.	57.3		
0.0112 mm.	49.3		
0.0081 mm.	43.9		
0.0059 mm.	35.9		
0.0043 mm.	31.4		
0.0030 mm.	28.7		
0.0013 mm.	22.5		

* (no specification provided)

Soil Description

Grey Sandy Lean CLAY

Atterberg Limits

PL= 14 LL= 28 PI= 14

Coefficients

D_{90}= 1.5949 D_{85}= 0.5326 D_{60}= 0.0241
D_{50}= 0.0117 D_{30}= 0.0036 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(7)

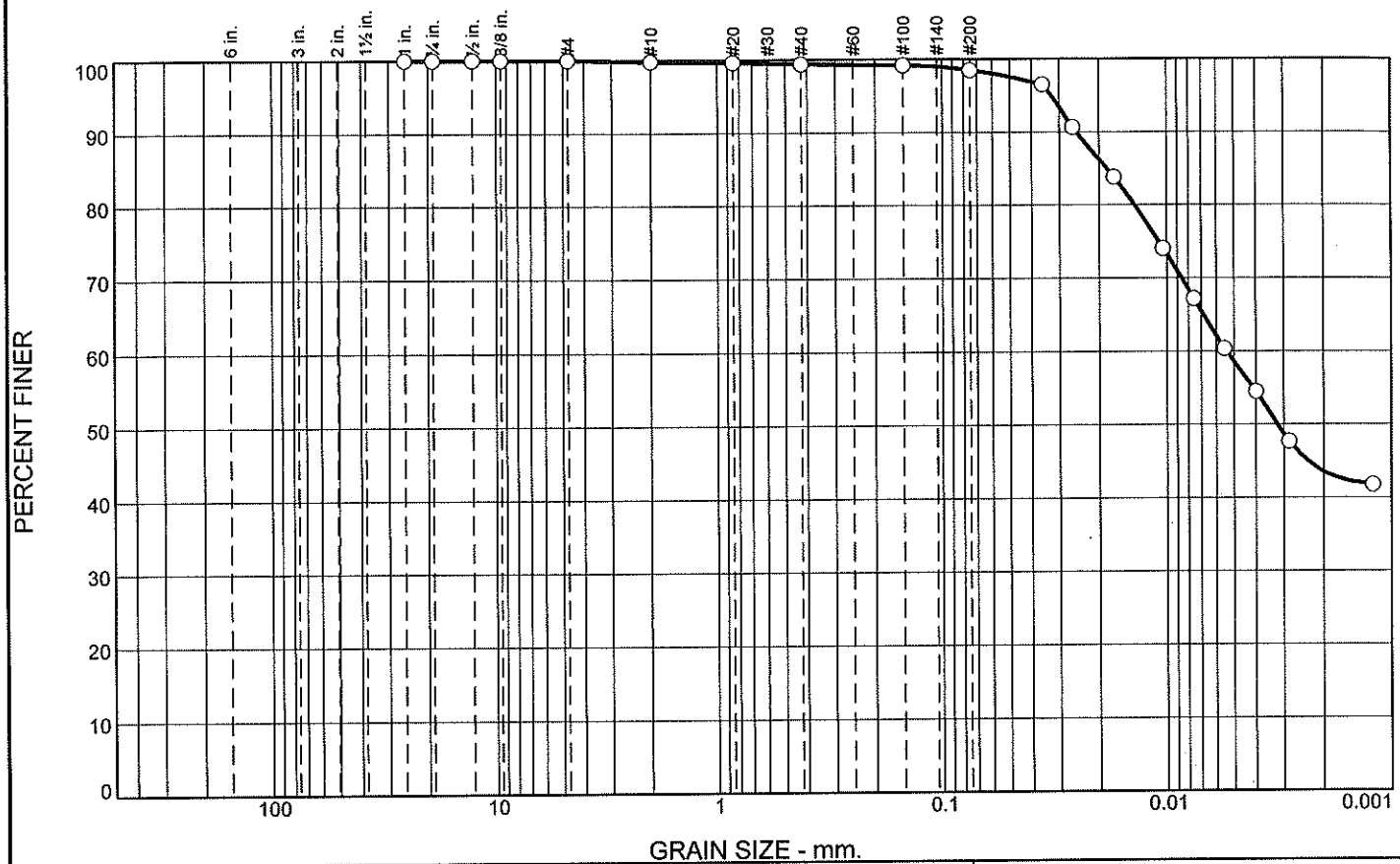
Remarks

Location: B-15-18
Sample Number: SS-24 **Depth:** 46.0- 48.0' **Date:** 3/27/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	0.4	0.9	54.9	43.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	100.0		
#10	99.8		
#20	99.6		
#40	99.4		
#100	99.2		
#200	98.5		
0.0359 mm.	96.5		
0.0262 mm.	90.7		
0.0172 mm.	83.8		
0.0104 mm.	74.1		
0.0076 mm.	67.2		
0.0055 mm.	60.4		
0.0040 mm.	54.5		
0.0028 mm.	47.7		
0.0012 mm.	41.8		

* (no specification provided)

Soil Description

Grey Lean CLAY

Atterberg Limits

PL= 15 LL= 32 PI= 17

Coefficients

D_{90}= 0.0253 D_{85}= 0.0185 D_{60}= 0.0054
D_{50}= 0.0032 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(16)

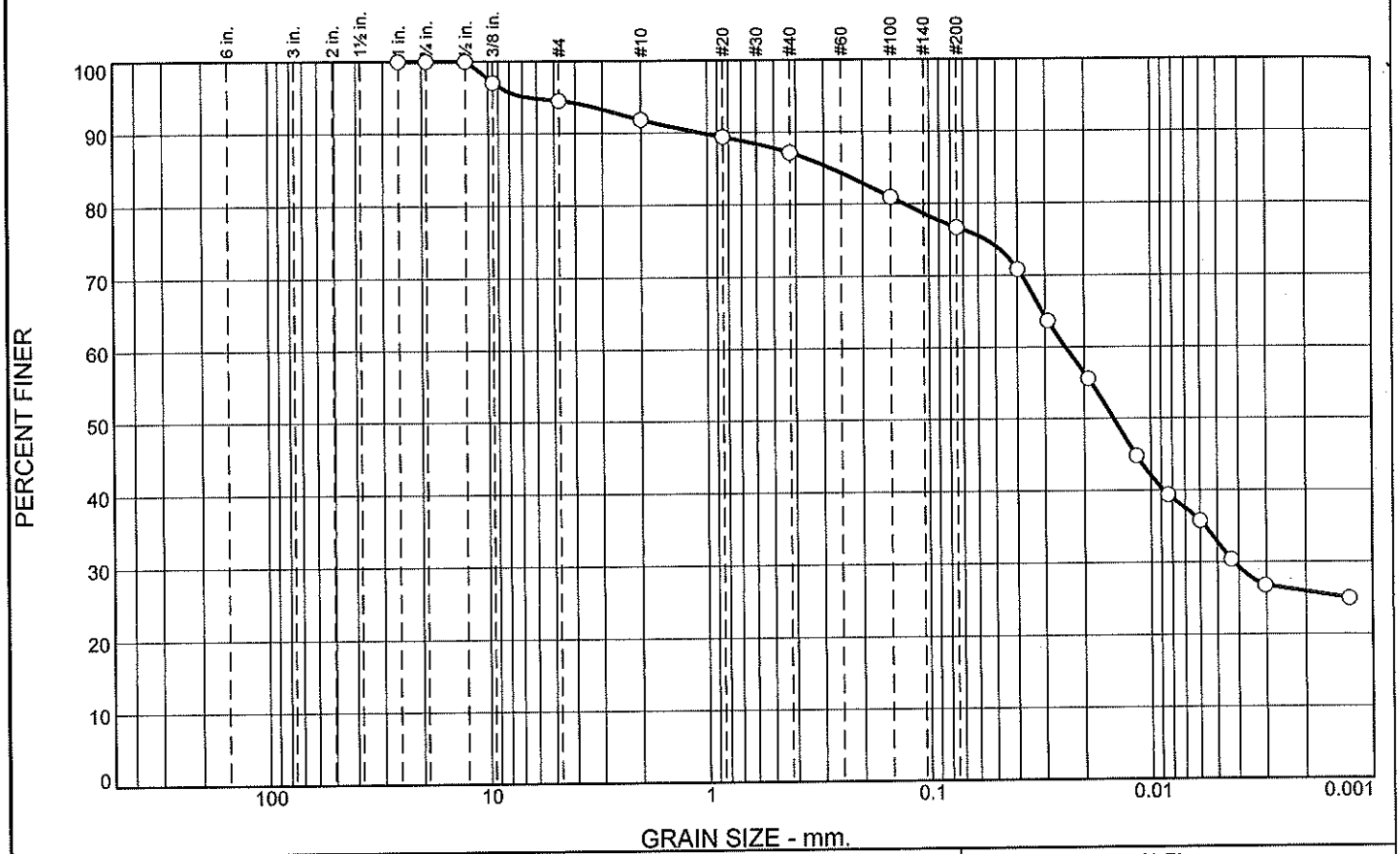
Remarks

Location: B-15-18
Sample Number: SS-29 **Depth:** 56.0- 58.0' **Date:** 3/27/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.5	2.6	4.7	10.5	50.8	25.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	97.1		
#4	94.5		
#10	91.9		
#20	89.4		
#40	87.2		
#100	81.0		
#200	76.7		
0.0399 mm.	70.9		
0.0292 mm.	63.7		
0.0192 mm.	55.6		
0.0116 mm.	44.8		
0.0084 mm.	39.4		
0.0060 mm.	35.8		
0.0043 mm.	30.4		
0.0030 mm.	26.8		
0.0013 mm.	25.0		

* (no specification provided)

Soil Description

Grey Lean CLAY with Sand

Atterberg Limits

PL= 14 LL= 26 PI= 12

Coefficients

D_{90}= 1.0717 D_{85}= 0.2793 D_{60}= 0.0243
D_{50}= 0.0148 D_{30}= 0.0042 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(7)

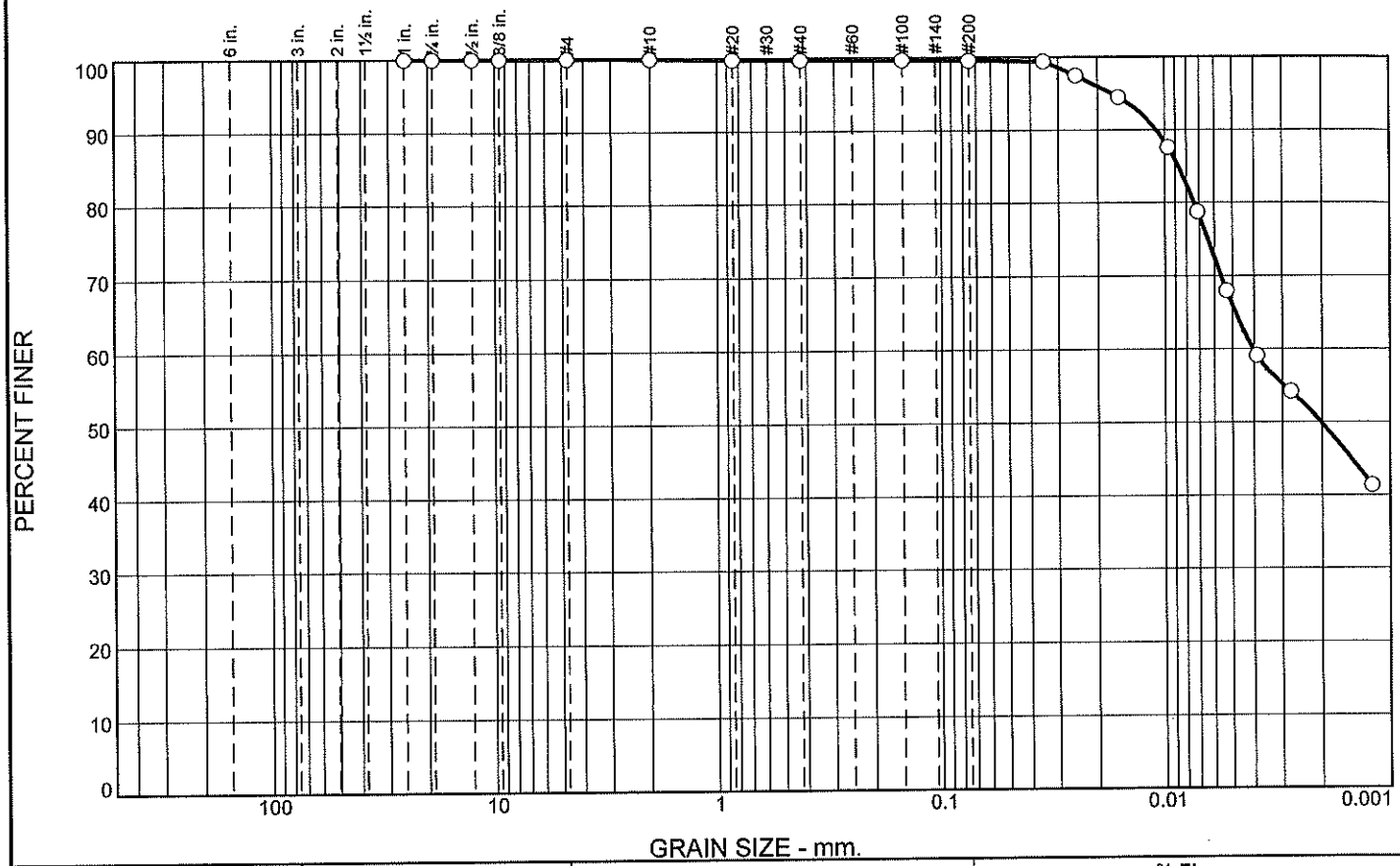
Remarks

Location: B-13-18
Sample Number: SS-26 **Depth:** 50.0- 52.0' **Date:** 3/28/19

Midland Standard Engineering & Testing **South Elgin, IL**	**Client:** APTIM **Project:** Zion Landfill Site 2 Expansion, Aptim #3211 **Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.3	0.1	49.7	49.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	100.0		
#10	100.0		
#20	99.8		
#40	99.7		
#100	99.6		
#200	99.6		
0.0351 mm.	99.4		
0.0251 mm.	97.5		
0.0162 mm.	94.5		
0.0097 mm.	87.6		
0.0071 mm.	78.8		
0.0053 mm.	68.0		
0.0039 mm.	59.1		
0.0027 mm.	54.2		
0.0012 mm.	41.4		

* (no specification provided)

Soil Description

Grey Lean CLAY

Atterberg Limits

PL= 18 LL= 40 PI= 22

Coefficients

D_{90}= 0.0109 D_{85}= 0.0087 D_{60}= 0.0040
D_{50}= 0.0020 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(23)

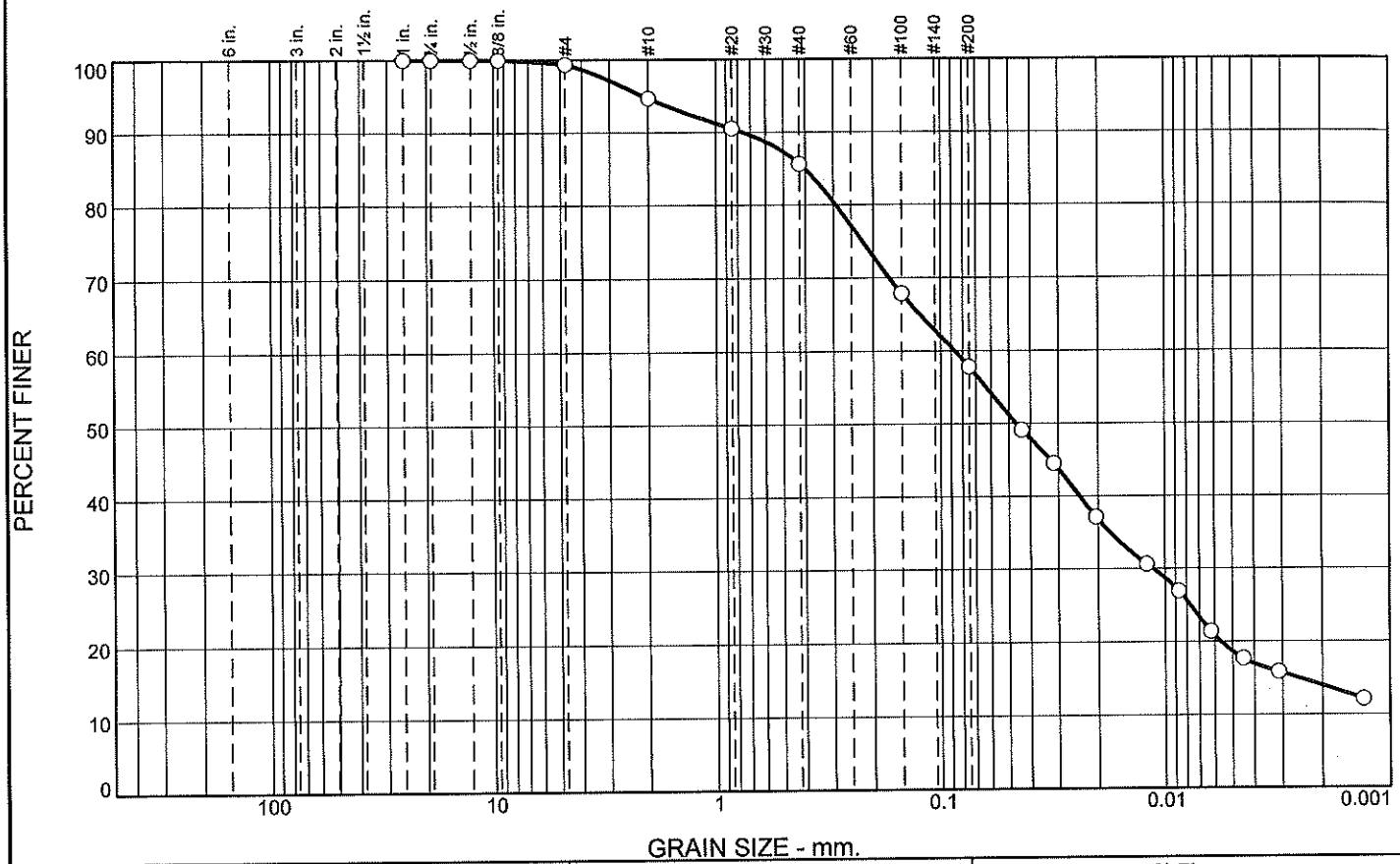
Remarks

Location: B-14-18
Sample Number: SS-26 **Depth:** 50.0- 52.0' **Date:** 3/27/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	4.7	9.0	27.9	43.8	14.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.4		
#10	94.7		
#20	90.5		
#40	85.7		
#100	67.9		
#200	57.8		
0.0438 mm.	49.2		
0.0315 mm.	44.5		
0.0205 mm.	37.1		
0.0121 mm.	30.7		
0.0087 mm.	27.0		
0.0062 mm.	21.4		
0.0045 mm.	17.7		
0.0031 mm.	15.9		
0.0013 mm.	12.2		

* (no specification provided)

Soil Description

Brownish Grey Sandy Silty CLAY

Atterberg Limits

PL= 12 LL= 18 PI= 6

Coefficients

D_{90}= 0.7546 D_{85}= 0.4027 D_{60}= 0.0868
D_{50}= 0.0463 D_{30}= 0.0113 D_{15}= 0.0025
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(0)

Remarks

Location: B-14-18
Sample Number: SS-31 **Depth:** 60.0- 62.0' **Date:** 3/26/19

Midland Standard Engineering & Testing

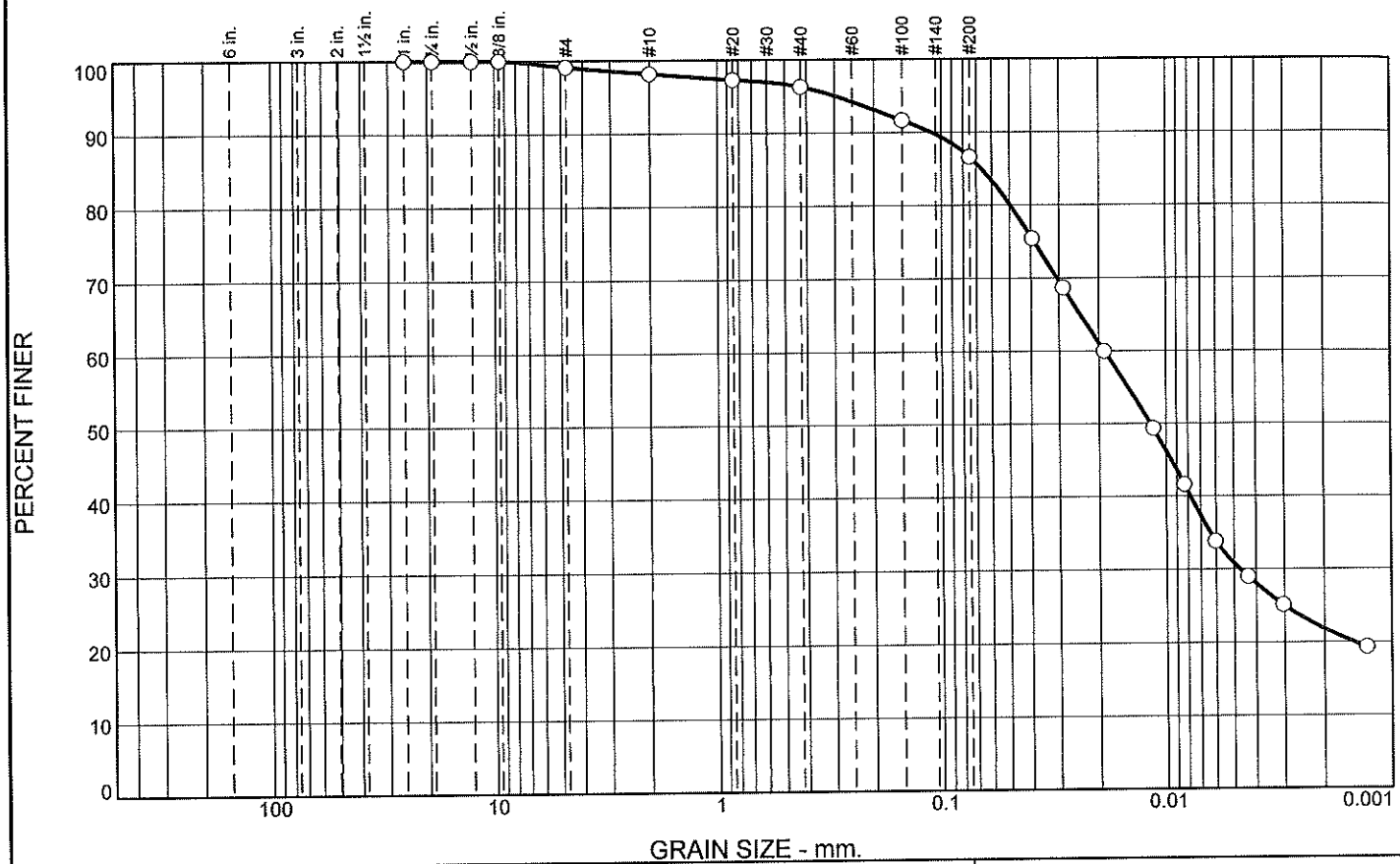
South Elgin, IL

Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Project No: 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	0.9	1.9	9.7	64.7	21.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.1		
#10	98.2		
#20	97.3		
#40	96.3		
#100	91.7		
#200	86.6		
0.0396 mm.	75.5		
0.0289 mm.	68.7		
0.0190 mm.	60.0		
0.0114 mm.	49.3		
0.0083 mm.	41.6		
0.0060 mm.	33.9		
0.0043 mm.	29.0		
0.0030 mm.	25.2		
0.0013 mm.	19.4		

* (no specification provided)

Soil Description

Light Brown Lean CLAY

Atterberg Limits

PL= 14 LL= 23 PI= 9

Coefficients

D_{90}= 0.1100 D_{85}= 0.0665 D_{60}= 0.0190
D_{50}= 0.0118 D_{30}= 0.0047 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(5)

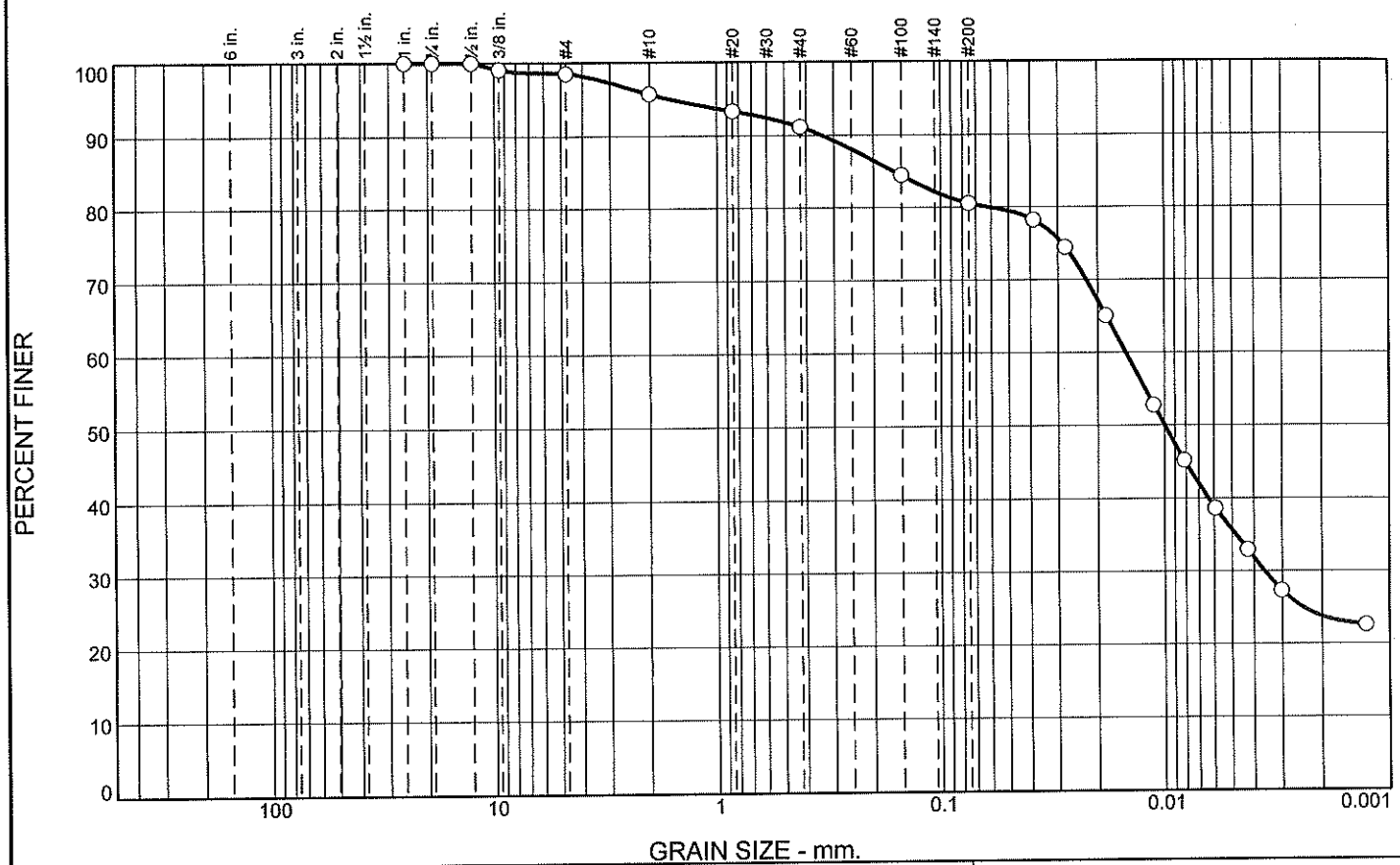
Remarks

Location: B-07-18
Sample Number: SS-15 **Depth:** 28.0- 30.0' **Date:** 3/21/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.4	2.9	4.5	10.6	56.8	23.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	99.1		
#4	98.6		
#10	95.7		
#20	93.4		
#40	91.2		
#100	84.5		
#200	80.6		
0.0387 mm.	78.2		
0.0279 mm.	74.5		
0.0184 mm.	65.1		
0.0112 mm.	52.8		
0.0082 mm.	45.3		
0.0059 mm.	38.7		
0.0043 mm.	33.0		
0.0030 mm.	27.3		
0.0013 mm.	22.6		

* (no specification provided)

Soil Description

Grey Lean CLAY with Sand

Atterberg Limits

PL= 13 LL= 27 PI= 14

Coefficients

D_{90}= 0.3369 D_{85}= 0.1613 D_{60}= 0.0151
D_{50}= 0.0100 D_{30}= 0.0036 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(9)

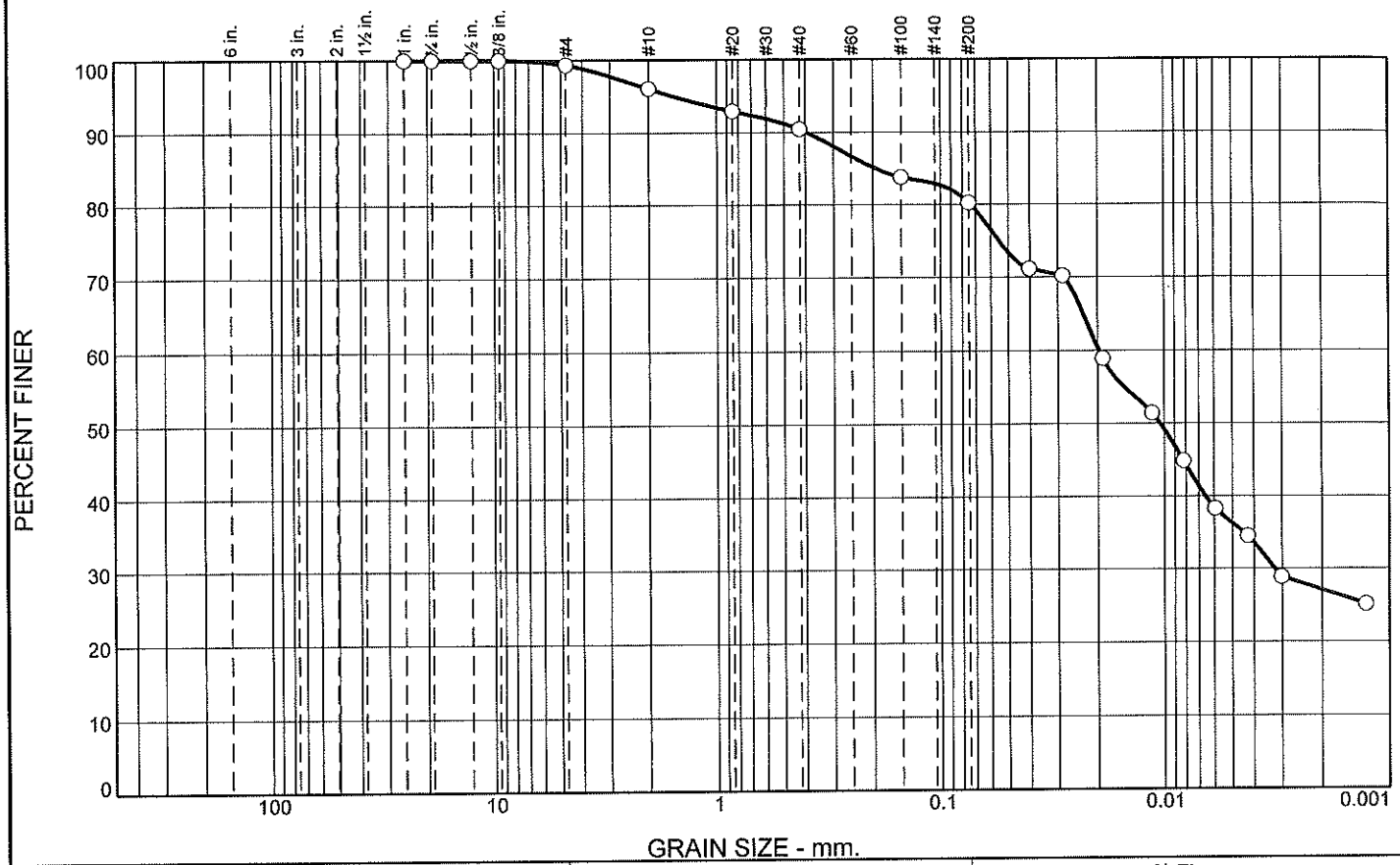
Remarks

Location: B-07-18
Sample Number: SS-24 **Depth:** 46.0- 48.0' **Date:** 3/21/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	3.3	5.6	10.2	53.2	27.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.4		
#10	96.1		
#20	93.0		
#40	90.5		
#100	83.8		
#200	80.3		
0.0403 mm.	71.2		
0.0286 mm.	70.2		
0.0190 mm.	59.0		
0.0113 mm.	51.5		
0.0082 mm.	44.9		
0.0060 mm.	38.3		
0.0043 mm.	34.6		
0.0030 mm.	28.9		
0.0013 mm.	25.2		

* (no specification provided)

Soil Description

Brown, Grey Lean CLAY with Sand

Atterberg Limits

PL= 13 LL= 28 PI= 15

Coefficients

D_{90}= 0.3937 D_{85}= 0.1935 D_{60}= 0.0198
D_{50}= 0.0104 D_{30}= 0.0032 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(10)

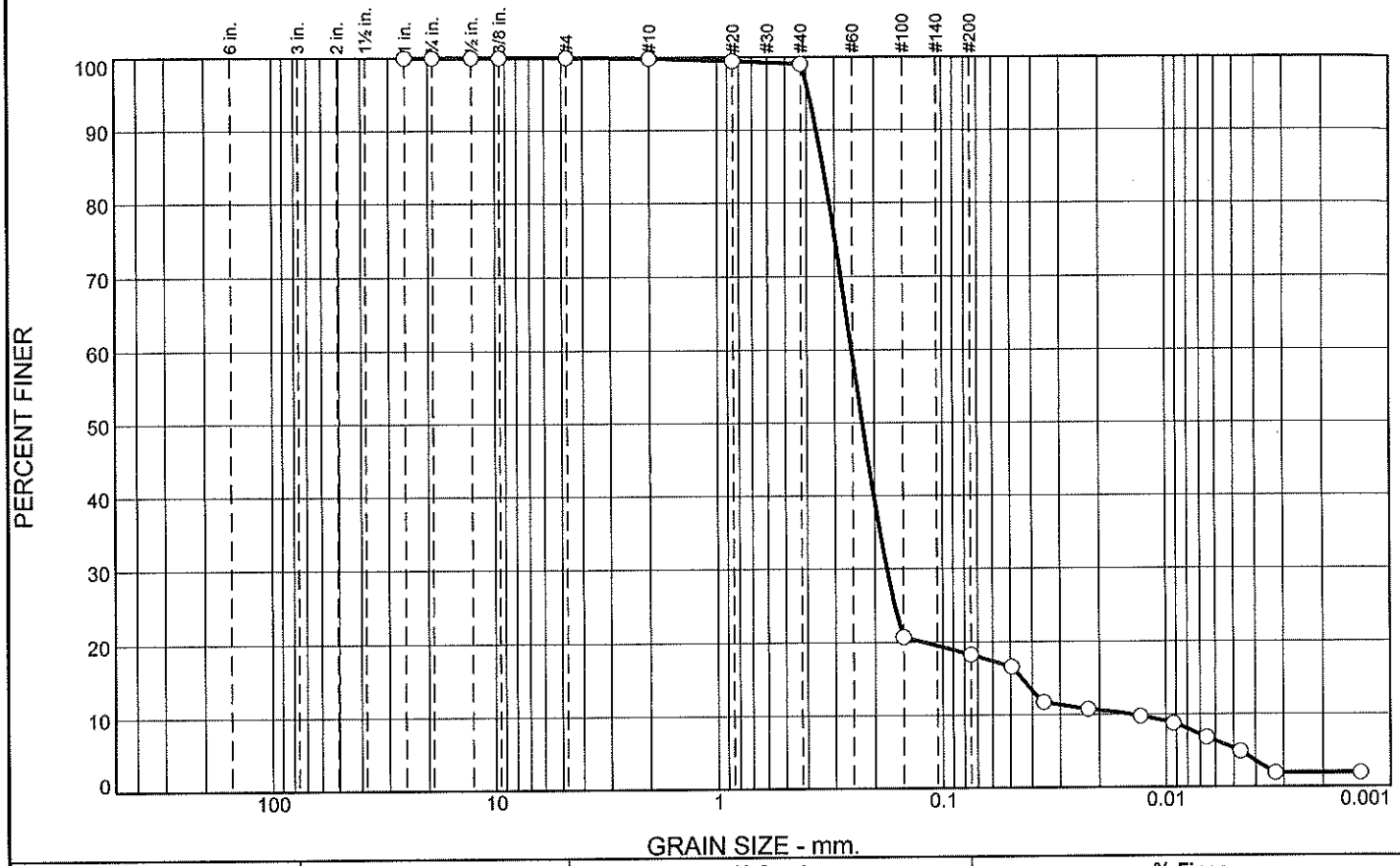
Remarks

Location: B-08-18
Sample Number: SS-30 **Depth:** 58.0- 60.0' **Date:** 3/27/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.8	80.8	16.3	2.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	100.0		
#10	99.9		
#20	99.5		
#40	99.1		
#100	20.7		
#200	18.3		
0.0495 mm.	16.6		
0.0355 mm.	11.7		
0.0225 mm.	10.7		
0.0130 mm.	9.8		
0.0092 mm.	8.8		
0.0066 mm.	6.8		
0.0047 mm.	4.9		
0.0033 mm.	2.0		
0.0014 mm.	2.0		

* (no specification provided)

Soil Description

Grey Silty SAND

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.3604 D_{85}= 0.3363 D_{60}= 0.2522
D_{50}= 0.2261 D_{30}= 0.1769 D_{15}= 0.0445
D_{10}= 0.0144 C_u= 17.55 C_c= 8.63

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Location: B-08-01
Sample Number: SS-61 **Depth:** 120.0- 122.0' **Date:** 3/25/19

Midland Standard Engineering & Testing

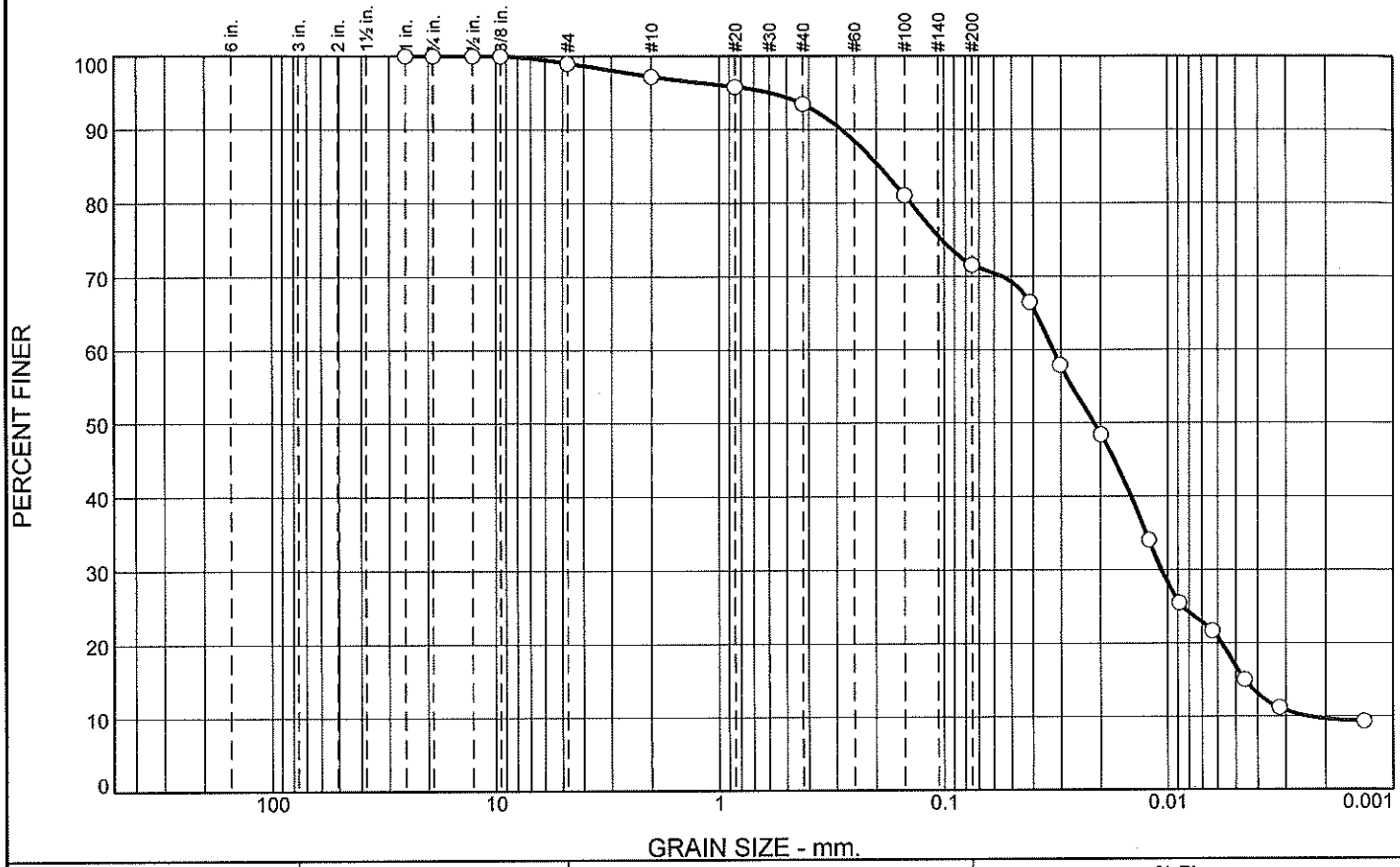
South Elgin, IL

Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Project No: 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.0	1.8	3.7	21.9	62.0	9.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.0		
#10	97.2		
#20	95.8		
#40	93.5		
#100	81.1		
#200	71.6		
0.0415 mm.	66.5		
0.0304 mm.	57.9		
0.0200 mm.	48.4		
0.0122 mm.	34.1		
0.0088 mm.	25.5		
0.0063 mm.	21.7		
0.0046 mm.	15.1		
0.0032 mm.	11.2		
0.0013 mm.	9.3		

* (no specification provided)

Soil Description

Grey Silty CLAY with Sand

Atterberg Limits

PL= 14 LL= 18 PI= 4

Coefficients

D_{90}= 0.2857 D_{85}= 0.1933 D_{60}= 0.0327
D_{50}= 0.0214 D_{30}= 0.0106 D_{15}= 0.0046
D_{10}= 0.0024 C_u= 13.78 C_c= 1.46

Classification

USCS= CL-ML AASHTO= A-4(0)

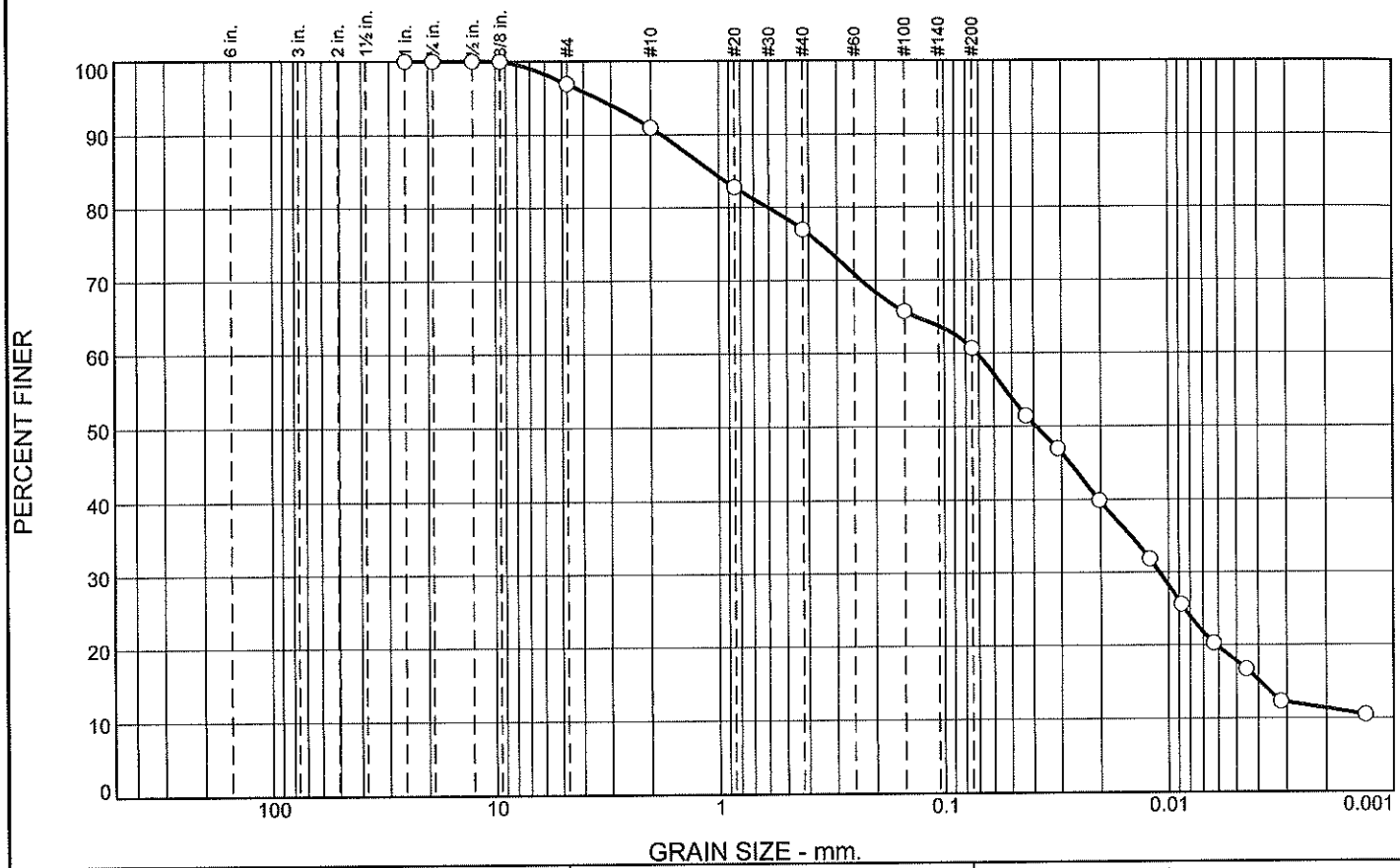
Remarks

Location: B-09-18
Sample Number: SS-22 **Depth:** 42.0- 44.0' **Date:** 3/27/19

Midland Standard Engineering & Testing	Client: APTIM
South Elgin, IL	Project: Zion Landfill Site 2 Expansion, Aptim #3211
	Project No: 28287 Figure

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	5.9	14.0	16.3	49.4	11.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	96.9		
#10	91.0		
#20	82.8		
#40	77.0		
#100	65.7		
#200	60.7		
0.0434 mm.	51.5		
0.0313 mm.	47.0		
0.0203 mm.	39.9		
0.0121 mm.	31.9		
0.0088 mm.	25.6		
0.0063 mm.	20.3		
0.0045 mm.	16.7		
0.0032 mm.	12.3		
0.0013 mm.	10.5		

* (no specification provided)

Soil Description

Grey Sandy Silty CLAY

Atterberg Limits

PL= 12 LL= 17 PI= 5

Coefficients

D_{90}= 1.7890 D_{85}= 1.0751 D_{60}= 0.0714
D_{50}= 0.0391 D_{30}= 0.0109 D_{15}= 0.0039
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(0)

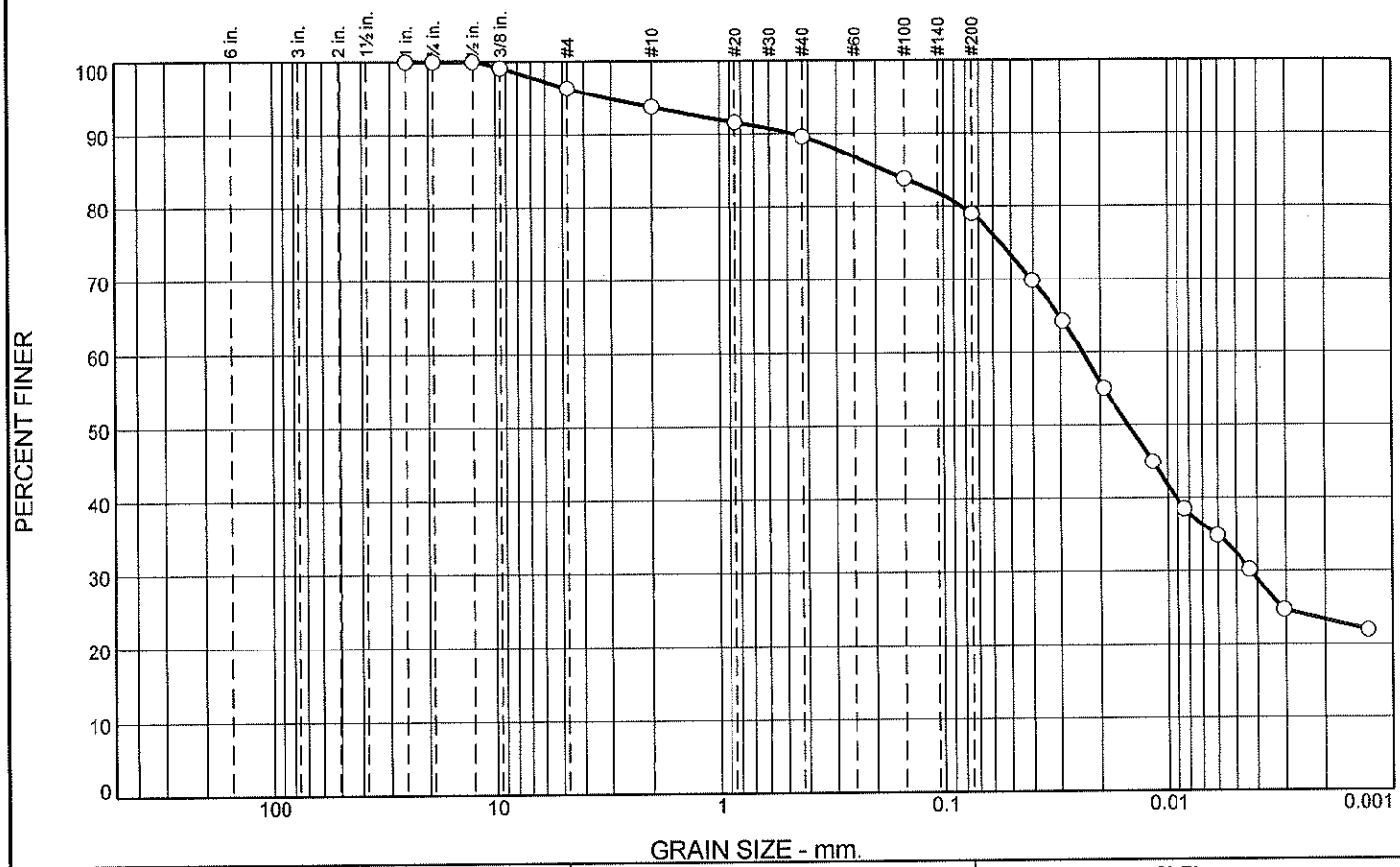
Remarks

Location: B-11-18
Sample Number: SS-22 **Depth:** 42.0- 44.0' **Date:** 3/27/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.6	2.6	4.2	10.6	55.7	23.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	99.2		
#4	96.4		
#10	93.8		
#20	91.6		
#40	89.6		
#100	83.8		
#200	79.0		
0.0404 mm.	69.9		
0.0293 mm.	64.3		
0.0193 mm.	55.1		
0.0116 mm.	45.0		
0.0084 mm.	38.5		
0.0060 mm.	34.8		
0.0043 mm.	30.2		
0.0031 mm.	24.7		
0.0013 mm.	21.9		

* (no specification provided)

Soil Description

Grey Lean CLAY with Sand

Atterberg Limits

PL= 12 LL= 25 PI= 13

Coefficients

D_{90}= 0.4693 D_{85}= 0.1849 D_{60}= 0.0240
D_{50}= 0.0150 D_{30}= 0.0043 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(7)

Remarks

Location: B-12-18
Sample Number: SS-32 **Depth:** 62.0- 64.0' **Date:** 3/28/19

Midland Standard Engineering & Testing

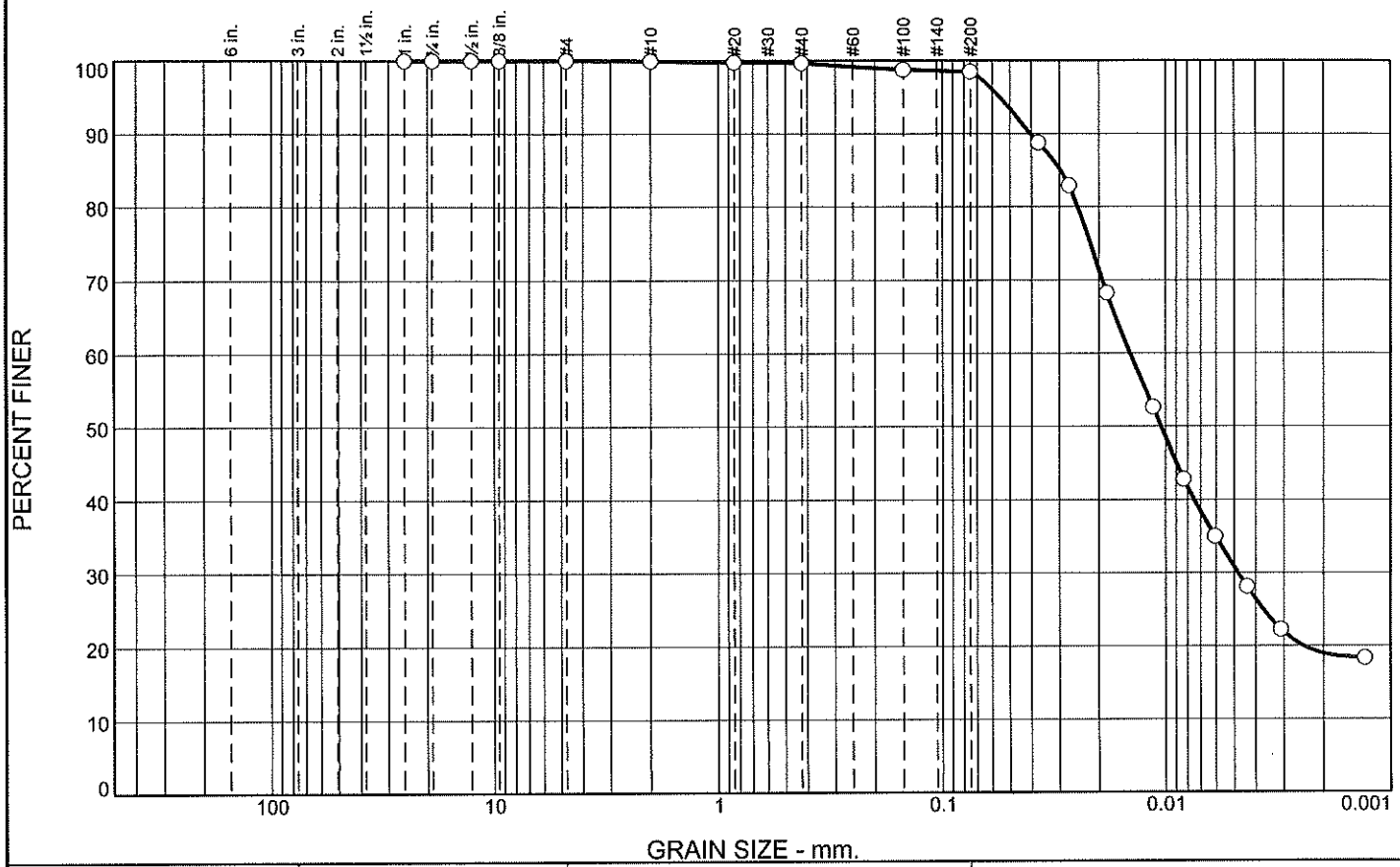
South Elgin, IL

Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211

Project No: 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.2	1.2	79.5	19.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	100.0		
#10	99.9		
#20	99.8		
#40	99.7		
#100	98.8		
#200	98.5		
0.0375 mm.	88.8		
0.0273 mm.	82.9		
0.0185 mm.	68.3		
0.0114 mm.	52.6		
0.0083 mm.	42.8		
0.0061 mm.	35.0		
0.0044 mm.	28.2		
0.0031 mm.	22.3		
0.0013 mm.	18.4		

* (no specification provided)

Soil Description

Grey Silty CLAY

Atterberg Limits

PL= 15 LL= 22 PI= 7

Coefficients

D_{90}= 0.0405 D_{85}= 0.0297 D_{60}= 0.0145
D_{50}= 0.0105 D_{30}= 0.0048 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(4)

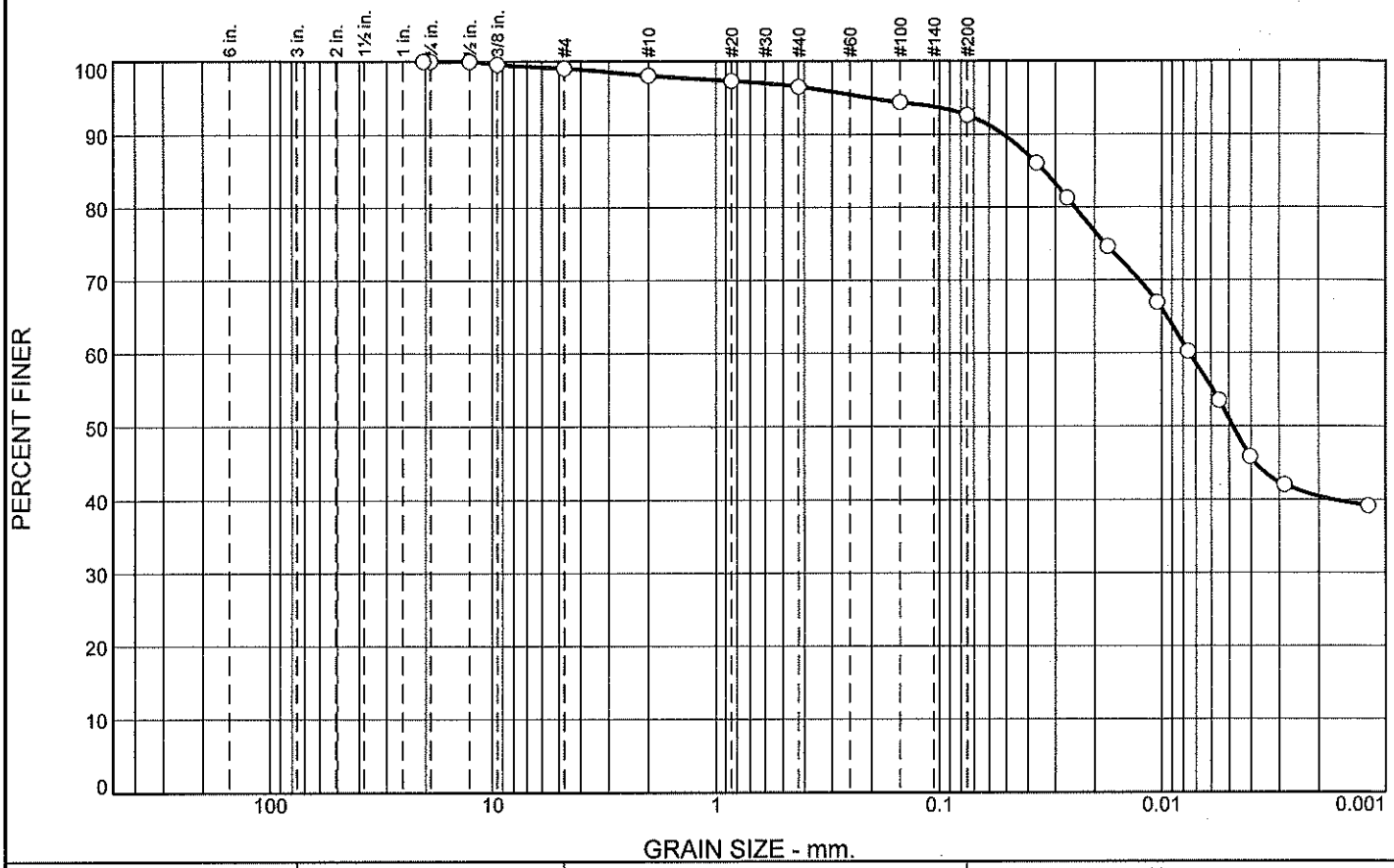
Remarks

Location: B-13-18
Sample Number: SS-17 **Depth:** 32.0- 34.0' **Date:** 3/27/19

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	1.0	1.6	3.8	52.2	40.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.81	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	99.6		
#4	99.1		
#10	98.1		
#20	97.3		
#40	96.5		
#100	94.4		
#200	92.7		
0.0367 mm.	86.1		
0.0267 mm.	81.3		
0.0174 mm.	74.6		
0.0104 mm.	67.0		
0.0076 mm.	60.3		
0.0055 mm.	53.6		
0.0040 mm.	45.9		
0.0028 mm.	42.1		
0.0012 mm.	39.2		

* (no specification provided)

Soil Description

Grey Silty Lean CLAY

Atterberg Limits

PL= 15 LL= 32 PI= 17

Coefficients

D_{90}= 0.0516 D_{85}= 0.0339 D_{60}= 0.0075
D_{50}= 0.0048 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(15)

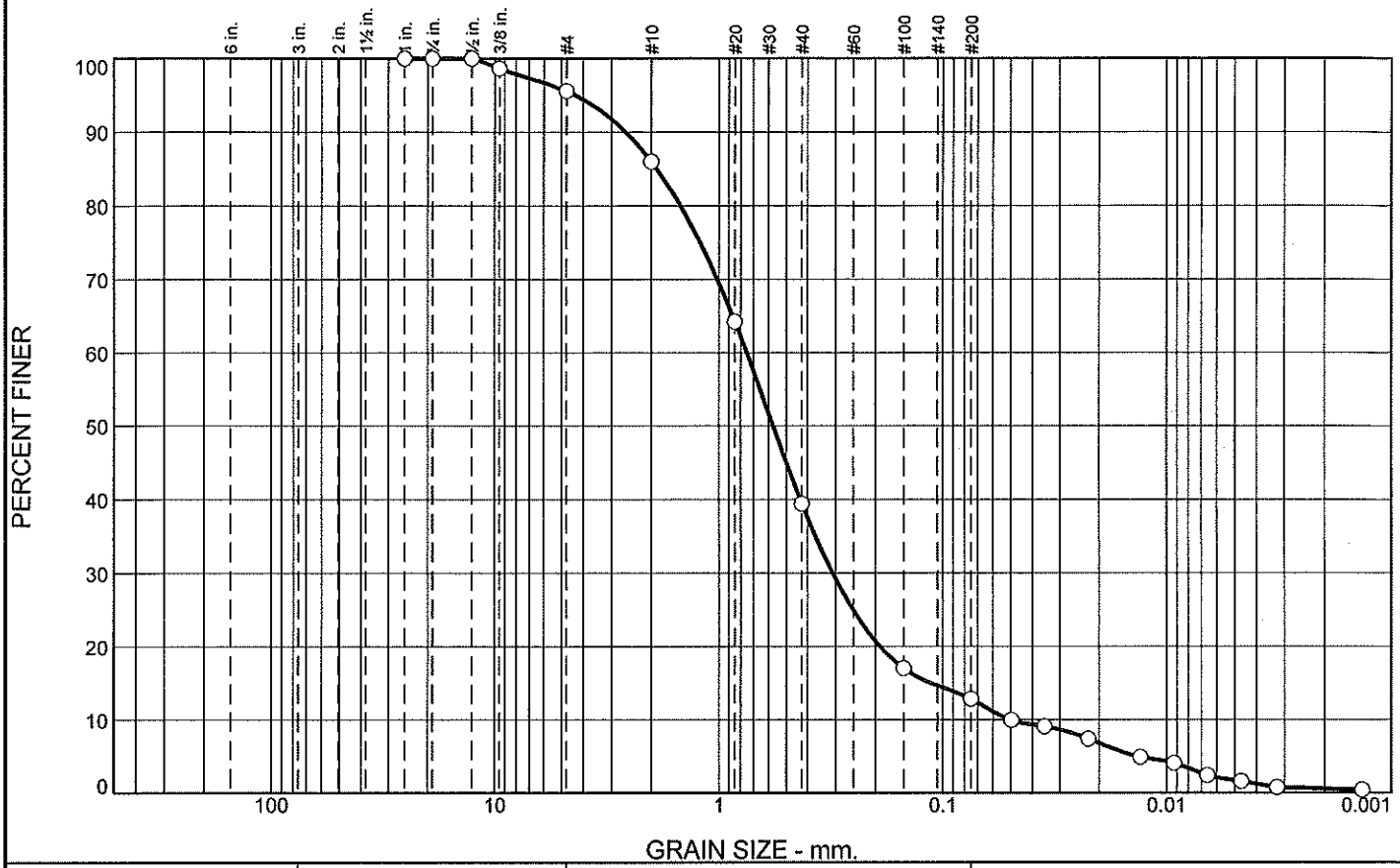
Remarks

Location: B-03
Sample Number: SS-32 **Depth:** 62.0- 64.0' **Date:**

Midland Standard Engineering & Testing	**Client:** APTIM
	Project: Zion Landfill Site 2 Expansion, Aptim #3211
South Elgin, IL	**Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.4	9.6	46.6	26.5	12.3	0.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100.0		
3/4"	100.0		
1/2"	100.0		
3/8"	98.7		
#4	95.6		
#10	86.0		
#20	64.3		
#40	39.4		
#100	17.0		
#200	12.9		
0.0497 mm.	9.9		
0.0353 mm.	9.1		
0.0224 mm.	7.4		
0.0131 mm.	4.9		
0.0093 mm.	4.1		
0.0066 mm.	2.4		
0.0047 mm.	1.6		
0.0032 mm.	0.8		
0.0014 mm.	0.4		

* (no specification provided)

Soil Description

Grey Silty SAND

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 2.5992 D_{85}= 1.8930 D_{60}= 0.7522
D_{50}= 0.5727 D_{30}= 0.3092 D_{15}= 0.1126
D_{10}= 0.0505 C_u= 14.89 C_c= 2.52

Classification

USCS= SM AASHTO= A-1-b

Remarks

Location: B-06
Sample Number: SS-53 **Depth:** 104.0- 106.0' **Date:**

Midland Standard Engineering & Testing **South Elgin, IL**	**Client:** APTIM **Project:** Zion Landfill Site 2 Expansion, Aptim #3211 **Project No:** 28287 **Figure**

Tested By: JDS **Checked By:** WDP

Permeability Tests

APTIM

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-3 ST-34 66.0- 68.0'	**REPORT NO:**	1 perm
CLASSIFICATION	Dark Grey Silty CLAY	**DATE:**	3/20/19
SAMPLE TYPE	Shelby Tube	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90

Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, ℃	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.5

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	5.10E-08
TEST INTERVAL 2	4.73E-08
TEST INTERVAL 3	4.70E-08
TEST INTERVAL 4	4.54E-08
AVERAGE k	4.77E-08
k 20	**4.77E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.84	2.82
LENGTH, in	5.77	5.73
VOLUME, cu in	36.55	35.80
WEIGHT, gm	1344.9	1346.1
UNIT WEIGHT, pcf	140.0	143.1
MOIST. CONTENT, %	12.7	12.8
DRY DENSITY, pcf	124.3	126.9
DEGREE OF SATUR, %	92	100

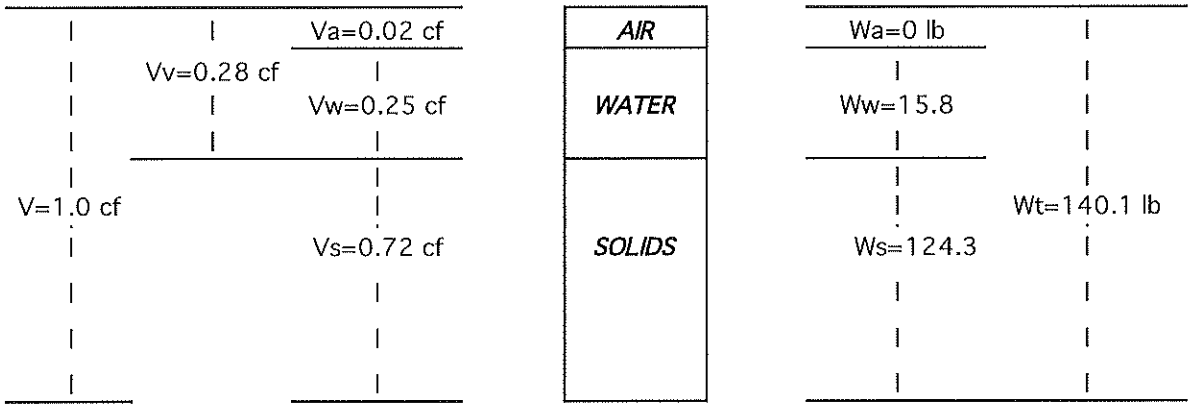
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-3 ST-34 66.0- 68.0'

SOIL CLASS: Dark Grey Silty CLAY **PROJ NO.** 28287



	START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- - Mc=	12.7	12.8
ENTER SAMPLE WEIGHT, grams- - - - - - - - W=	1345	1346
ENTER SAMPLE DIAMETER, inches- - - - - - - Ds=	2.84	2.82
ENTER SAMPLE LENGTH, inches- - - - - - - - Ls=	5.77	5.73
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - - - V=	36.55	35.80
WET DENSITY, #/cu ft- - - - - - - - - - - - Wt=	140.1	143.1
WEIGHT OF SOLIDS, pounds- - - - - - - - - - - Ws=	124.3	126.9
WEIGHT OF WATER, pounds- - - - - - - - - - - Ww=	15.8	16.2
VOLUME OF SOLIDS, cubic feet- - - - - - - - - Vs=	0.72	0.74
VOLUME OF WATER, cubic feet- - - - - - - - - Vw=	0.25	0.26
VOLUME OF AIR, cubic feet- - - - - - - - - - - Va=	0.02	0.00
VOLUME OF VOIDS, cubic feet- - - - - - - - - Vv=	0.28	0.26
POROSITY, n- - - - - - - - - - - - - - n=	**0.28**	**0.26**
VOID RATIO, e- - - - - - - - - - - - - e=	0.38	0.35
DEGREE OF SATURATION, Sr- - - - - - - Sr=	92%	100%

Respectfully Submitted:
William D. Prigge, P.E.

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-5 ST-37 72.0- 74.0'	**REPORT NO:**	2 perm
CLASSIFICATION	Brown-Grey CLAY	**DATE:**	3/20/19
SAMPLE TYPE	Shelby Tube	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.4

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	8.08E-08
TEST INTERVAL 2	4.30E-08
TEST INTERVAL 3	2.19E-08
TEST INTERVAL 4	4.84E-08
AVERAGE k	4.85E-08
k 20	**4.85E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.88	2.87
LENGTH, in	5.74	5.75
VOLUME, cu in	37.39	37.26
WEIGHT, gm	1252.6	1251.6
UNIT WEIGHT, pcf	127.5	127.9
MOIST. CONTENT, %	24.3	24.2
DRY DENSITY, pcf	102.6	102.9
DEGREE OF SATUR, %	99	100

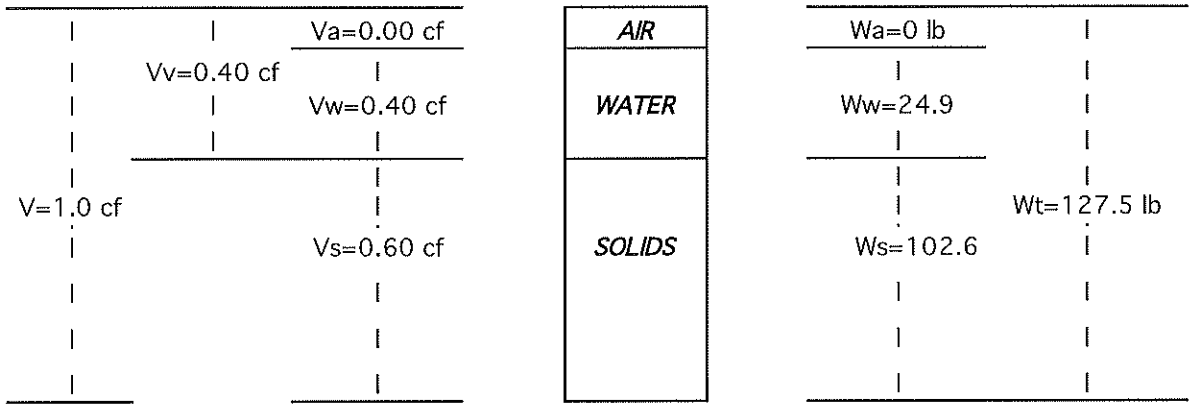
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-5 ST-37 72.0- 74.0'

SOIL CLASS: Brown-Grey CLAY **PROJ NO.** 28287



		START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- -	Mc=	24.3	24.2
ENTER SAMPLE WEIGHT, grams- - - - - - - -	W=	1253	1252
ENTER SAMPLE DIAMETER, inches- - - - - - -	Ds=	2.88	2.87
ENTER SAMPLE LENGTH, inches- - - - - - - -	Ls=	5.74	5.75
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs	Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - - -	V=	37.39	37.26
WET DENSITY, #/cu ft- - - - - - - - - - - -	Wt=	127.5	127.9
WEIGHT OF SOLIDS, pounds- - - - - - - - - -	Ws=	102.6	102.9
WEIGHT OF WATER, pounds- - - - - - - - - -	Ww=	24.9	24.9
VOLUME OF SOLIDS, cubic feet- - - - - - - -	Vs=	0.60	0.60
VOLUME OF WATER, cubic feet- - - - - - - -	Vw=	0.40	0.40
VOLUME OF AIR, cubic feet- - - - - - - - - -	Va=	0.00	0.00
VOLUME OF VOIDS, cubic feet- - - - - - - -	Vv=	0.40	0.40
POROSITY, n- - - - - - - - - - - - - -	**n=**	**0.40**	**0.40**
VOID RATIO, e- - - - - - - - - - - - -	**e=**	0.67	0.67
DEGREE OF SATURATION, Sr- - - - - - -	**Sr=**	99%	100%

Respectfully Submitted:
William D. Prigge, P.E.

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-1 ST-35 68.0- 70.0'	**REPORT NO:**	3 perm
CLASSIFICATION	Grey CLAY	**DATE:**	3/20/19
SAMPLE TYPE	Shelby Tube	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90

Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.5

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	2.50E-08
TEST INTERVAL 2	2.52E-08
TEST INTERVAL 3	2.10E-08
TEST INTERVAL 4	2.38E-08
AVERAGE k	2.38E-08
k 20	**2.38E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.87	2.85
LENGTH, in	5.79	5.71
VOLUME, cu in	37.46	36.43
WEIGHT, gm	1366.4	1352.1
UNIT WEIGHT, pcf	138.8	141.3
MOIST. CONTENT, %	15.0	13.8
DRY DENSITY, pcf	120.7	124.1
DEGREE OF SATUR, %	98	99

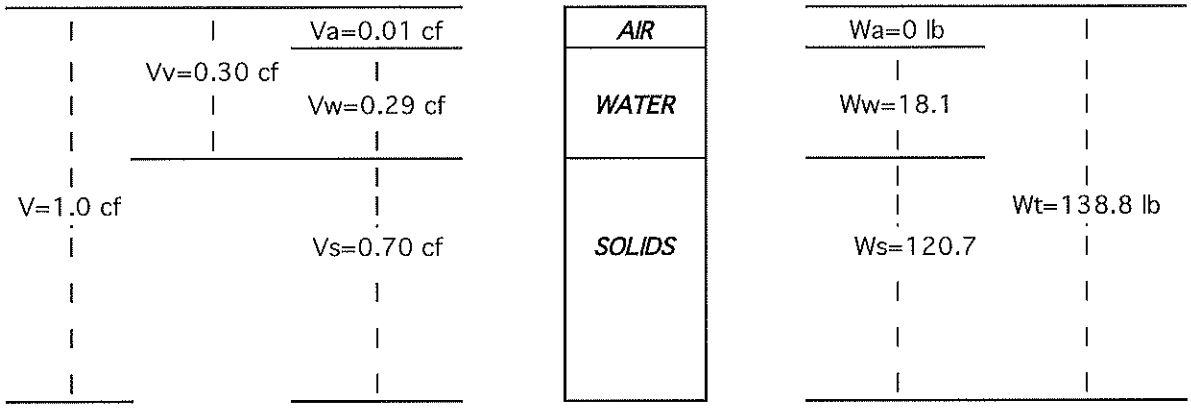
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-1 ST-35 68.0- 70.0'

SOIL CLASS: Grey CLAY **PROJ NO.** 28287



	START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- - Mc=	15.0	13.8
ENTER SAMPLE WEIGHT, grams- - - - - - - - W=	1366	1352
ENTER SAMPLE DIAMETER, inches- - - - - - Ds=	2.87	2.85
ENTER SAMPLE LENGTH, inches- - - - - - - - Ls=	5.79	5.71
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - - - V=	37.46	36.43
WET DENSITY, #/cu ft- - - - - - - - - - - - Wt=	138.8	141.3
WEIGHT OF SOLIDS, pounds- - - - - - - - - - - Ws=	120.7	124.1
WEIGHT OF WATER, pounds- - - - - - - - - - - Ww=	18.1	17.1
VOLUME OF SOLIDS, cubic feet- - - - - - - - - Vs=	0.70	0.72
VOLUME OF WATER, cubic feet- - - - - - - - - Vw=	0.29	0.27
VOLUME OF AIR, cubic feet- - - - - - - - - - Va=	0.01	0.00
VOLUME OF VOIDS, cubic feet- - - - - - - - - Vv=	0.30	0.28
POROSITY, n- - - - - - - - - - - - - - n=	**0.30**	**0.28**
VOID RATIO, e- - - - - - - - - - - - - e=	0.42	0.38
DEGREE OF SATURATION, Sr- - - - - - - Sr=	98%	99%

Respectfully Submitted:
William D. Prigge, P.E.

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-11 ST-29 56.0- 58.0'	**REPORT NO:**	4 perm
CLASSIFICATION	Grey CLAY	**DATE:**	3/20/19
SAMPLE TYPE	Shelby Tube	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.7

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	5.80E-08
TEST INTERVAL 2	3.63E-08
TEST INTERVAL 3	3.63E-08
TEST INTERVAL 4	1.45E-08
AVERAGE k	3.63E-08
k 20	**3.63E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.88	2.86
LENGTH, in	5.78	5.66
VOLUME, cu in	37.65	36.32
WEIGHT, gm	1359.6	1332.8
UNIT WEIGHT, pcf	137.4	139.7
MOIST. CONTENT, %	16.6	14.3
DRY DENSITY, pcf	117.9	122.2
DEGREE OF SATUR, %	100	97

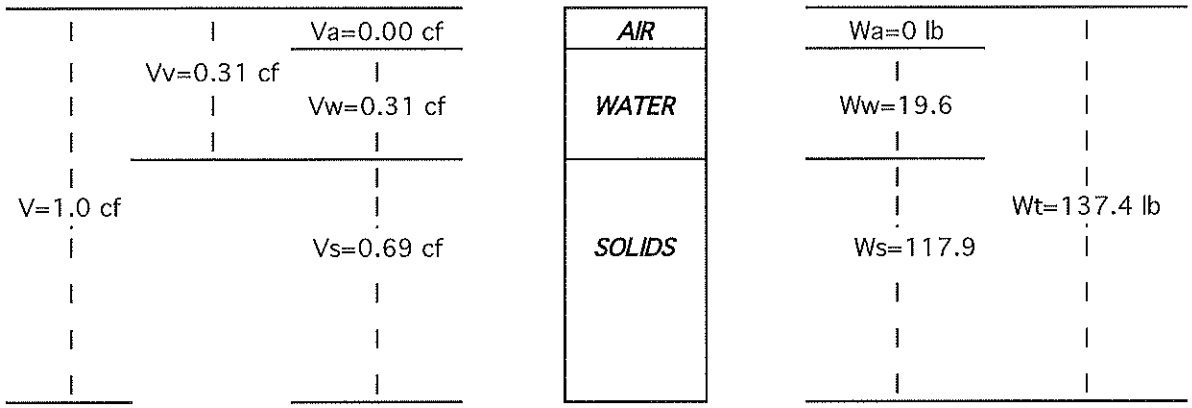
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-11 ST-29 56.0- 58.0'

SOIL CLASS: Grey CLAY **PROJ NO.** 28287



	START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- - Mc=	16.6	14.3
ENTER SAMPLE WEIGHT, grams- - - - - - - - W=	1360	1333
ENTER SAMPLE DIAMETER, inches- - - - - - - Ds=	2.88	2.86
ENTER SAMPLE LENGTH, inches- - - - - - - - Ls=	5.78	5.66
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - - - V=	37.65	36.32
WET DENSITY, #/cu ft- - - - - - - - - - - - Wt=	137.4	139.7
WEIGHT OF SOLIDS, pounds- - - - - - - - - - - Ws=	117.9	122.2
WEIGHT OF WATER, pounds- - - - - - - - - - - Ww=	19.6	17.5
VOLUME OF SOLIDS, cubic feet- - - - - - - - - Vs=	0.69	0.71
VOLUME OF WATER, cubic feet- - - - - - - - - Vw=	0.31	0.28
VOLUME OF AIR, cubic feet- - - - - - - - - - - Va=	0.00	0.01
VOLUME OF VOIDS, cubic feet- - - - - - - - - Vv=	0.31	0.29
POROSITY, n- - - - - - - - - - - - - - n=	**0.31**	**0.29**
VOID RATIO, e- - - - - - - - - - - - - e=	0.46	0.40
DEGREE OF SATURATION, Sr- - - - - - - Sr=	100%	97%

Respectfully Submitted:
William D. Prigge, P.E.

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-14 ST-33 64.0- 66.0'	**REPORT NO:**	5 perm
CLASSIFICATION	Grey Silty CLAY	**DATE:**	3/20/19
SAMPLE TYPE	Shelby Tube	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.4

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	4.87E-08
TEST INTERVAL 2	3.78E-08
TEST INTERVAL 3	3.27E-08
TEST INTERVAL 4	2.69E-08
AVERAGE k	3.65E-08
k 20	**3.65E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.86	2.88
LENGTH, in	5.77	5.77
VOLUME, cu in	37.15	37.59
WEIGHT, gm	1372.8	1403.8
UNIT WEIGHT, pcf	140.7	142.1
MOIST. CONTENT, %	10.8	13.3
DRY DENSITY, pcf	126.9	125.5
DEGREE OF SATUR, %	84	99

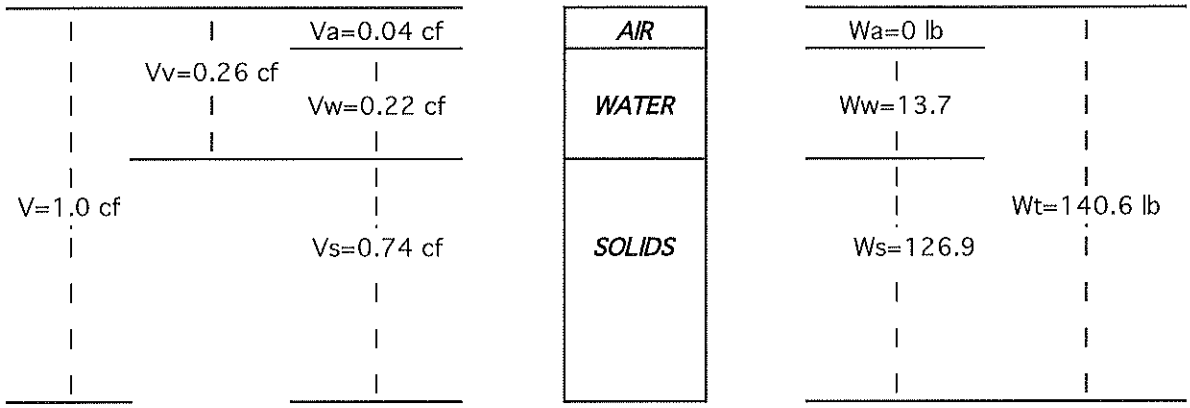
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-14 ST-33 64.0- 66.0'

SOIL CLASS: Grey Silty CLAY **PROJ NO.** 28287



	START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- - Mc=	10.8	13.3
ENTER SAMPLE WEIGHT, grams- - - - - - - - W=	1373	1404
ENTER SAMPLE DIAMETER, inches- - - - - - - Ds=	2.86	2.88
ENTER SAMPLE LENGTH, inches- - - - - - - - Ls=	5.77	5.77
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - - - V=	37.15	37.59
WET DENSITY, #/cu ft- - - - - - - - - - - - Wt=	140.6	142.1
WEIGHT OF SOLIDS, pounds- - - - - - - - - - - Ws=	126.9	125.5
WEIGHT OF WATER, pounds- - - - - - - - - - - Ww=	13.7	16.7
VOLUME OF SOLIDS, cubic feet- - - - - - - - Vs=	0.74	0.73
VOLUME OF WATER, cubic feet- - - - - - - - - Vw=	0.22	0.27
VOLUME OF AIR, cubic feet- - - - - - - - - - Va=	0.04	0.00
VOLUME OF VOIDS, cubic feet- - - - - - - - - Vv=	0.26	0.27
POROSITY, n- - - - - - - - - - - - - - n=	**0.26**	**0.27**
VOID RATIO, e- - - - - - - - - - - - - e=	0.35	0.37
DEGREE OF SATURATION, Sr- - - - - - - Sr=	84%	99%

Respectfully Submitted:
William D. Prigge, P.E.

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-10 ST-30 58.0-60.0'	**REPORT NO:**	6 perm
CLASSIFICATION	Grey Silty CLAY with thin layers of dry SILT	**DATE:**	3/20/19
SAMPLE TYPE	Shelby Tube	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	16.2

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	1.31E-07
TEST INTERVAL 2	1.14E-07
TEST INTERVAL 3	7.82E-08
TEST INTERVAL 4	7.02E-08
AVERAGE k	9.84E-08
k 20	**9.84E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.85	2.85
LENGTH, in	5.11	5.11
VOLUME, cu in	32.72	32.66
WEIGHT, gm	1160.4	1181.7
UNIT WEIGHT, pcf	135.0	137.7
MOIST. CONTENT, %	14.3	16.4
DRY DENSITY, pcf	118.1	118.3
DEGREE OF SATUR, %	87	100

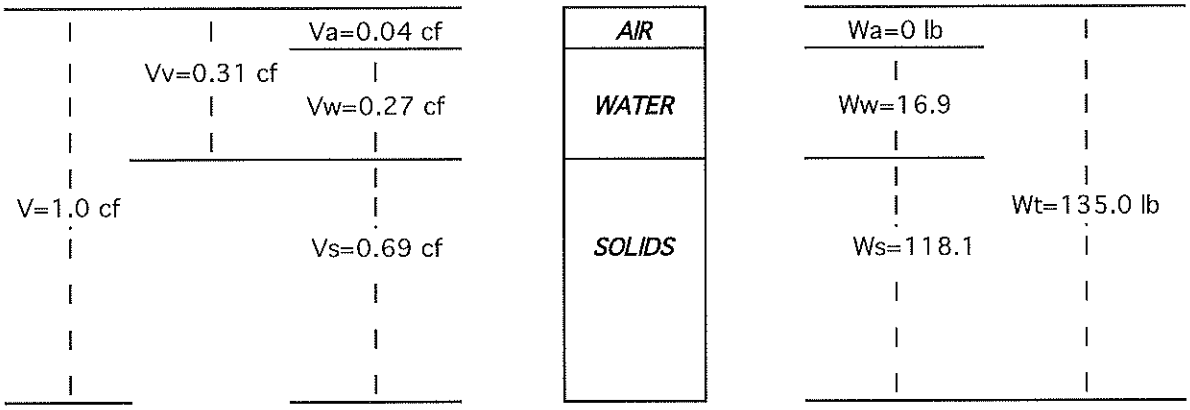
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-10 ST-30 58.0-60.0'

SOIL CLASS: Grey Silty CLAY with thin layers of dry SILT **PROJ NO.** 28287



		START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- -	Mc=	14.3	16.4
ENTER SAMPLE WEIGHT, grams- - - - - - - -	W=	1160	1182
ENTER SAMPLE DIAMETER, inches- - - - - -	Ds=	2.85	2.85
ENTER SAMPLE LENGTH, inches- - - - - - - -	Ls=	5.11	5.11
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs	Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - -	V=	32.72	32.66
WET DENSITY, #/cu ft- - - - - - - - - - -	Wt=	135.0	137.7
WEIGHT OF SOLIDS, pounds- - - - - - - - - -	Ws=	118.1	118.3
WEIGHT OF WATER, pounds- - - - - - - - - -	Ww=	16.9	19.4
VOLUME OF SOLIDS, cubic feet- - - - - - - -	Vs=	0.69	0.69
VOLUME OF WATER, cubic feet- - - - - - - -	Vw=	0.27	0.31
VOLUME OF AIR, cubic feet- - - - - - - - - -	Va=	0.04	0.00
VOLUME OF VOIDS, cubic feet- - - - - - - -	Vv=	0.31	0.31
POROSITY, n- - - - - - - - - - - - - -	**n=**	**0.31**	**0.31**
VOID RATIO, e- - - - - - - - - - - - -	**e=**	0.45	0.45
DEGREE OF SATURATION, Sr- - - - - - -	**Sr=**	87%	100%

Respectfully Submitted:
William D. Prigge, P.E.

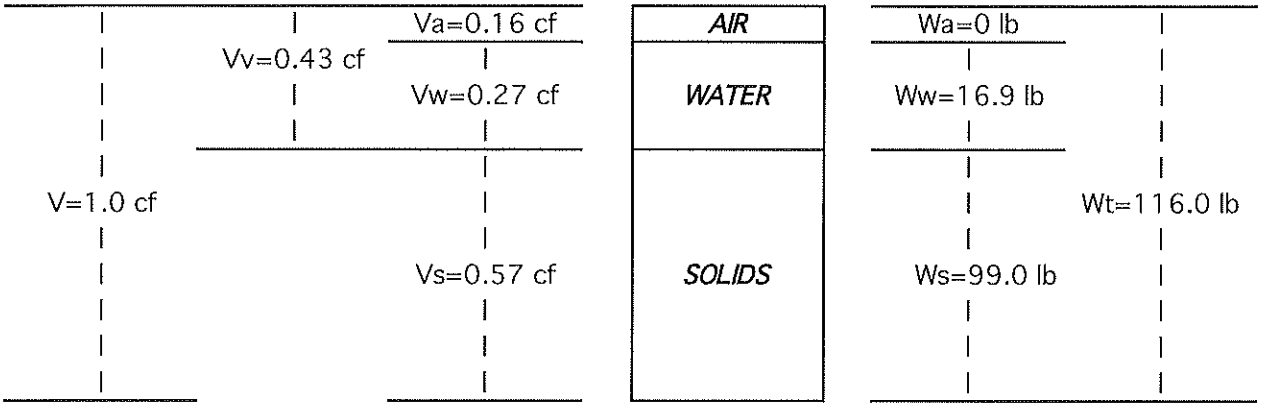
Porosity Tests

APTIM

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME:	Zion Landfill Site 2 Expansion	**PROJECT NO:**	28287
SAMPLE LOCATION:	Zion, Illinois	**DATE:**	3/18/19
SOIL CLASSIFICATION:	Brown SAND	**CLIENT:**	APTIM #3211

B-5 SS-59

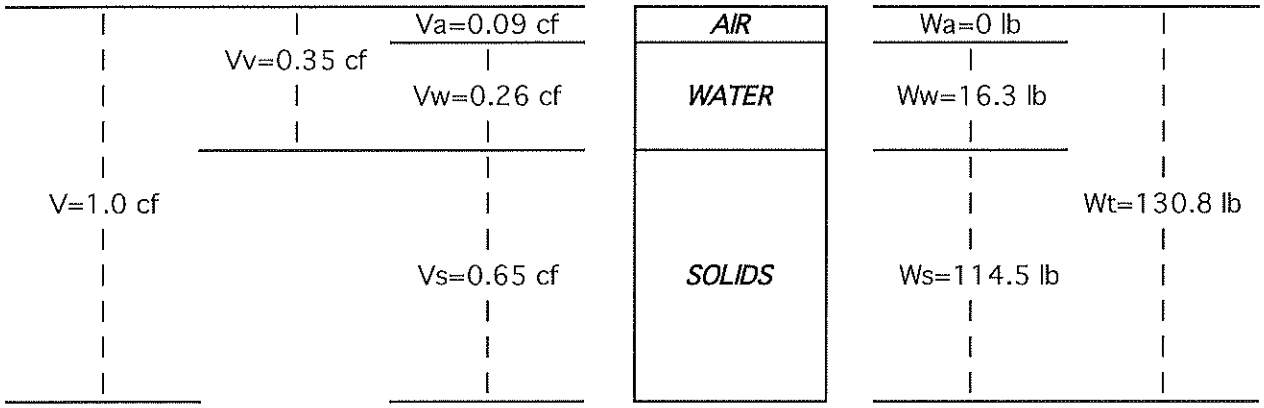


ENTER LABORATORY MOISTURE CONTENT, %- -	Mc=	17.1	LAB ENTRY
ENTER SAMPLE WEIGHT, grams- - - - - - - -	W=	185.55	LAB ENTRY
ENTER SAMPLE DIAMETER, inches- - - - - - -	Ds=	1.527	LAB ENTRY
ENTER SAMPLE LENGTH, inches- - - - - - - -	Ls=	3.327	LAB ENTRY
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs	Gs=	2.789	LAB ENTRY
SAMPLE VOLUME, cubic inches- - - - - - - - -	V=	6.09	((Ds/2)*(Ds/2)*3.14)*Ls
WET DENSITY, #/cu ft- - - - - - - - - - - -	Wt=	116.0	(W/454)/(V/1728)
WEIGHT OF SOLIDS, pounds- - - - - - - - - -	Ws=	99.0	Wt/(1+(Mc/100))
WEIGHT OF WATER, pounds- - - - - - - - - -	Ww=	16.9	(Mc/100)*Ws
VOLUME OF SOLIDS, cubic feet- - - - - - - -	Vs=	0.57	Ws/(Gs*62.4)
VOLUME OF WATER, cubic feet- - - - - - - - -	Vw=	0.27	Ww/62.4
VOLUME OF AIR, cubic feet- - - - - - - - - -	Va=	0.16	1.0-Vs-Vw
VOLUME OF VOIDS, cubic feet- - - - - - - - -	Vv=	0.43	Va+Vw
POROSITY, n- - - - - - - - - - - - - -	**n=**	**0.43**	Vv/v
VOID RATIO, e- - - - - - - - - - - - -	**e=**	**0.76**	Vv/Vs
DEGREE OF SATURATION, Sr- - - - - - -	**Sr=**	**63%**	Vw/Vv*100

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME:	Zion Landfill Site 2 Expansion	**PROJECT NO:**	28287
SAMPLE LOCATION:	Zion, Illinois	**DATE:**	3/18/19
SOIL CLASSIFICATION:	Brown SAND	**CLIENT:**	APTIM #3211

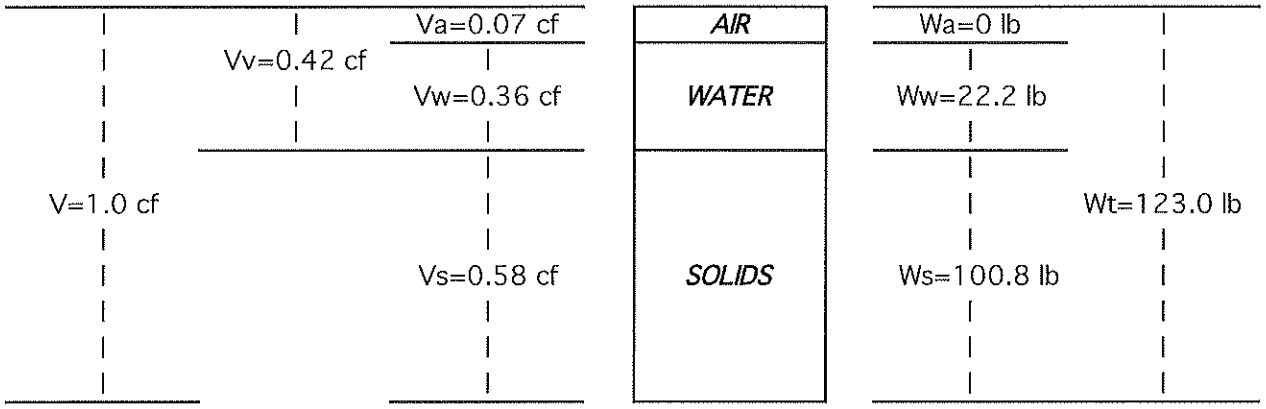
B-6 SS-53



ENTER LABORATORY MOISTURE CONTENT, %- -	Mc=	14.2	LAB ENTRY
ENTER SAMPLE WEIGHT, grams- - - - - - - -	W=	209.27	LAB ENTRY
ENTER SAMPLE DIAMETER, inches- - - - - - -	Ds=	1.527	LAB ENTRY
ENTER SAMPLE LENGTH, inches- - - - - - - -	Ls=	3.327	LAB ENTRY
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs	Gs=	2.814	LAB ENTRY
SAMPLE VOLUME, cubic inches- - - - - - - - -	V=	6.09	((Ds/2)*(Ds/2)*3.14)*Ls
WET DENSITY, #/cu ft- - - - - - - - - - - -	Wt=	130.8	(W/454)/(V/1728)
WEIGHT OF SOLIDS, pounds- - - - - - - - - - -	Ws=	114.5	Wt/(1+(Mc/100))
WEIGHT OF WATER, pounds- - - - - - - - - - -	Ww=	16.3	(Mc/100)*Ws
VOLUME OF SOLIDS, cubic feet- - - - - - - - -	Vs=	0.65	Ws/(Gs*62.4)
VOLUME OF WATER, cubic feet- - - - - - - - -	Vw=	0.26	Ww/62.4
VOLUME OF AIR, cubic feet- - - - - - - - - - -	Va=	0.09	1.0-Vs-Vw
VOLUME OF VOIDS, cubic feet- - - - - - - - -	Vv=	0.35	Va+Vw
POROSITY, n- - - - - - - - - - - - - -	**n=**	**0.35**	Vv/v
VOID RATIO, e- - - - - - - - - - - - -	**e=**	**0.53**	Vv/Vs
DEGREE OF SATURATION, Sr- - - - - - -	**Sr=**	**75%**	Vw/Vv*100

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME:	Zion Landfill Site 2 Expansion	**PROJECT NO:**	28287
SAMPLE LOCATION:	Zion, Illinois	**DATE:**	3/18/19
SOIL CLASSIFICATION:	Brown SAND **B-8 SS-61**	**CLIENT:**	APTIM #3211



ENTER LABORATORY MOISTURE CONTENT, %- -	Mc=	22.0	LAB ENTRY
ENTER SAMPLE WEIGHT, grams- - - - - - -	W=	196.84	LAB ENTRY
ENTER SAMPLE DIAMETER, inches- - - - - -	Ds=	1.527	LAB ENTRY
ENTER SAMPLE LENGTH, inches- - - - - - -	Ls=	3.327	LAB ENTRY
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs	Gs=	2.790	LAB ENTRY
SAMPLE VOLUME, cubic inches- - - - - - - -	V=	6.09	((Ds/2)*(Ds/2)*3.14)*Ls
WET DENSITY, #/cu ft- - - - - - - - - - -	Wt=	123.0	(W/454)/(V/1728)
WEIGHT OF SOLIDS, pounds- - - - - - - - - -	Ws=	100.8	Wt/(1+(Mc/100))
WEIGHT OF WATER, pounds- - - - - - - - - -	Ww=	22.2	(Mc/100)*Ws
VOLUME OF SOLIDS, cubic feet- - - - - - - -	Vs=	0.58	Ws/(Gs*62.4)
VOLUME OF WATER, cubic feet- - - - - - - -	Vw=	0.36	Ww/62.4
VOLUME OF AIR, cubic feet- - - - - - - - -	Va=	0.07	1.0-Vs-Vw
VOLUME OF VOIDS, cubic feet- - - - - - - -	Vv=	0.42	Va+Vw
POROSITY, n- - - - - - - - - - - - - -	**n=**	**0.42**	Vv/v
VOID RATIO, e- - - - - - - - - - - - -	**e=**	**0.73**	Vv/Vs
DEGREE OF SATURATION, Sr- - - - - - -	**Sr=**	**84%**	Vw/Vv*100

Remolded Permeability Tests

APTIM

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-01 6'-79' 95% @ Opt +0	**REPORT NO:**	7 perm
CLASSIFICATION	Brown-grey Silty CLAY	**DATE:**	3/20/19
SAMPLE TYPE	D698	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.5

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	2.26E-07
TEST INTERVAL 2	2.49E-07
TEST INTERVAL 3	1.64E-07
TEST INTERVAL 4	2.13E-07
AVERAGE k	2.13E-07
k 20	**2.13E-07**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.87	2.84
LENGTH, in	5.76	5.73
VOLUME, cu in	37.23	36.32
WEIGHT, gm	1280.9	1301.1
UNIT WEIGHT, pcf	130.9	136.3
MOIST. CONTENT, %	14.0	15.8
DRY DENSITY, pcf	114.9	117.7
DEGREE OF SATUR, %	78	95

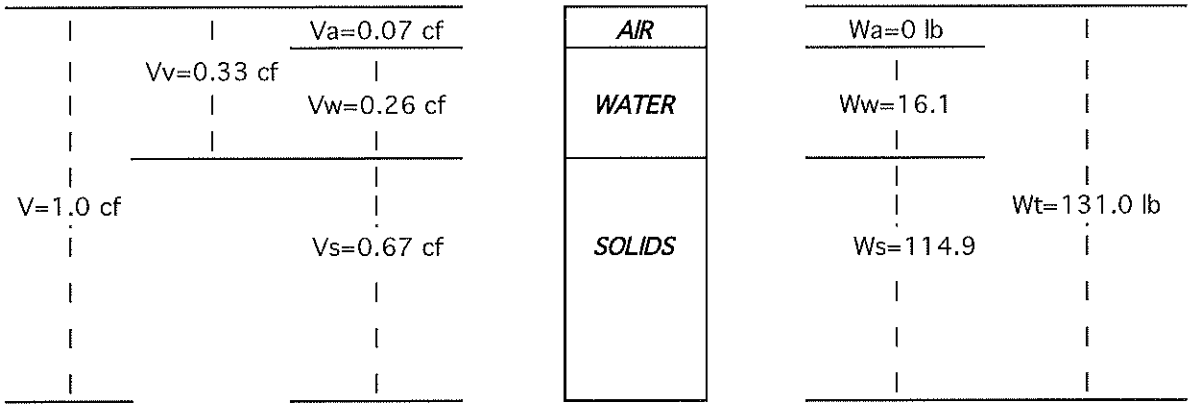
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-01 6'-79' 95% @ Opt +0

SOIL CLASS: Brown-grey Silty CLAY **PROJ NO.** 28287



		START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- -	Mc=	14.0	15.8
ENTER SAMPLE WEIGHT, grams- - - - - - - -	W=	1281	1301
ENTER SAMPLE DIAMETER, inches- - - - - -	Ds=	2.87	2.84
ENTER SAMPLE LENGTH, inches- - - - - - -	Ls=	5.76	5.73
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs	Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - -	V=	37.23	36.32
WET DENSITY, #/cu ft- - - - - - - - - - -	Wt=	131.0	136.4
WEIGHT OF SOLIDS, pounds- - - - - - - - - -	Ws=	114.9	117.7
WEIGHT OF WATER, pounds- - - - - - - - - -	Ww=	16.1	18.6
VOLUME OF SOLIDS, cubic feet- - - - - - - -	Vs=	0.67	0.69
VOLUME OF WATER, cubic feet- - - - - - - -	Vw=	0.26	0.30
VOLUME OF AIR, cubic feet- - - - - - - - -	Va=	0.07	0.02
VOLUME OF VOIDS, cubic feet- - - - - - - -	Vv=	0.33	0.31
POROSITY, n- - - - - - - - - - - - - -	**n=**	**0.33**	**0.31**
VOID RATIO, e- - - - - - - - - - - - -	**e=**	0.49	0.46
DEGREE OF SATURATION, Sr- - - - - - -	**Sr=**	78%	95%

Respectfully Submitted:
William D. Prigge, P.E.

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-01 6'-79' 95% @ Opt +2	**REPORT NO:**	8 perm
CLASSIFICATION	Brown-grey Silty CLAY	**DATE:**	3/20/19
SAMPLE TYPE	D698	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.5

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	3.49E-08
TEST INTERVAL 2	3.06E-08
TEST INTERVAL 3	3.02E-08
TEST INTERVAL 4	2.64E-08
AVERAGE k	3.05E-08
k 20	**3.05E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.86	2.84
LENGTH, in	5.77	5.72
VOLUME, cu in	37.15	36.24
WEIGHT, gm	1295.8	1299.2
UNIT WEIGHT, pcf	132.8	136.5
MOIST. CONTENT, %	16.0	16.3
DRY DENSITY, pcf	114.5	117.3
DEGREE OF SATUR, %	88	97

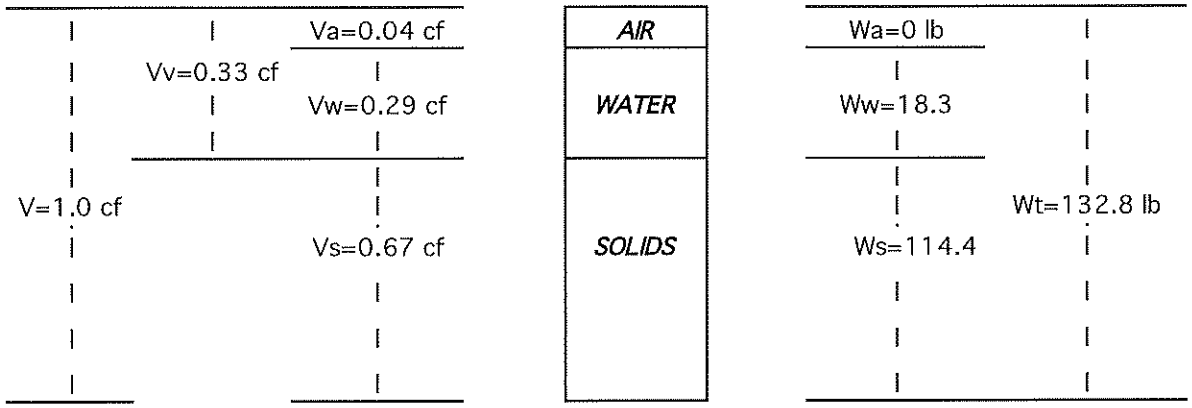
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-01 6'-79' 95% @ Opt +2

SOIL CLASS: Brown-grey Silty CLAY **PROJ NO.** 28287



		START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- -	Mc=	16.0	16.3
ENTER SAMPLE WEIGHT, grams- - - - - - - -	W=	1296	1299
ENTER SAMPLE DIAMETER, inches- - - - - -	Ds=	2.86	2.84
ENTER SAMPLE LENGTH, inches- - - - - - - -	Ls=	5.77	5.72
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs	Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - - -	V=	37.15	36.24
WET DENSITY, #/cu ft- - - - - - - - - - - -	Wt=	132.8	136.4
WEIGHT OF SOLIDS, pounds- - - - - - - - - -	Ws=	114.4	117.3
WEIGHT OF WATER, pounds- - - - - - - - - -	Ww=	18.3	19.1
VOLUME OF SOLIDS, cubic feet- - - - - - - -	Vs=	0.67	0.68
VOLUME OF WATER, cubic feet- - - - - - - -	Vw=	0.29	0.31
VOLUME OF AIR, cubic feet- - - - - - - - - -	Va=	0.04	0.01
VOLUME OF VOIDS, cubic feet- - - - - - - -	Vv=	0.33	0.32
POROSITY, n- - - - - - - - - - - - - -	**n=**	**0.33**	**0.32**
VOID RATIO, e- - - - - - - - - - - - -	**e=**	0.50	0.46
DEGREE OF SATURATION, Sr- - - - - - -	**Sr=**	88%	97%

Respectfully Submitted:
William D. Prigge, P.E.

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-01 6'-79' 95% @ Opt +4	**REPORT NO:**	9 perm
CLASSIFICATION	Brown-grey Silty CLAY	**DATE:**	3/20/19
SAMPLE TYPE	D698	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.6

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	2.07E-08
TEST INTERVAL 2	1.87E-08
TEST INTERVAL 3	2.02E-08
TEST INTERVAL 4	1.82E-08
AVERAGE k	1.95E-08
k 20	**1.95E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.86	2.84
LENGTH, in	5.78	5.67
VOLUME, cu in	37.17	36.03
WEIGHT, gm	1315.1	1298.4
UNIT WEIGHT, pcf	134.7	137.2
MOIST. CONTENT, %	18.2	16.7
DRY DENSITY, pcf	113.9	117.5
DEGREE OF SATUR, %	99	100

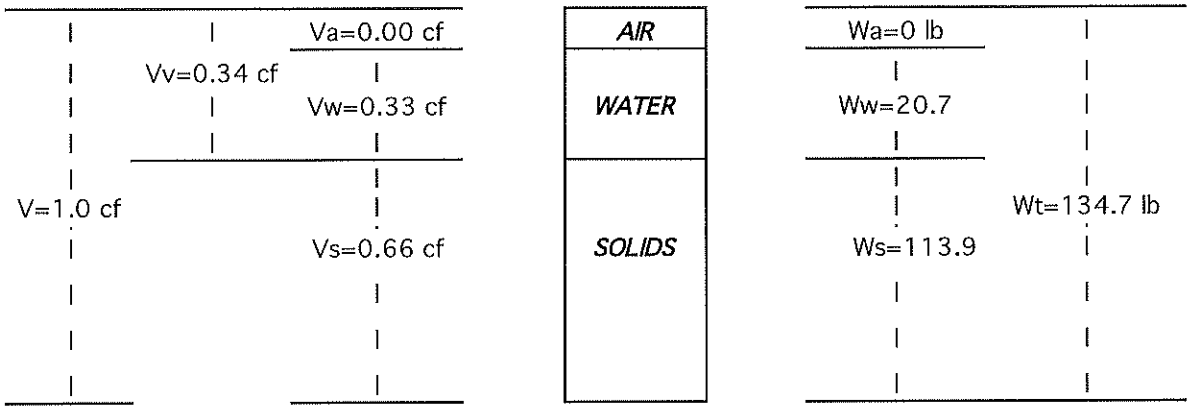
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-01 6'-79' 95% @ Opt +4

SOIL CLASS: Brown-grey Silty CLAY **PROJ NO.** 28287



		START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- -	Mc=	18.2	16.7
ENTER SAMPLE WEIGHT, grams- - - - - - - -	W=	1315	1298
ENTER SAMPLE DIAMETER, inches- - - - - - -	Ds=	2.86	2.84
ENTER SAMPLE LENGTH, inches- - - - - - - -	Ls=	5.78	5.67
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs	Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - - -	V=	37.17	36.03
WET DENSITY, #/cu ft- - - - - - - - - - -	Wt=	134.7	137.2
WEIGHT OF SOLIDS, pounds- - - - - - - - - -	Ws=	113.9	117.5
WEIGHT OF WATER, pounds- - - - - - - - - -	Ww=	20.7	19.6
VOLUME OF SOLIDS, cubic feet- - - - - - - -	Vs=	0.66	0.68
VOLUME OF WATER, cubic feet- - - - - - - - -	Vw=	0.33	0.31
VOLUME OF AIR, cubic feet- - - - - - - - - -	Va=	0.00	0.00
VOLUME OF VOIDS, cubic feet- - - - - - - -	Vv=	0.34	0.32
POROSITY, n- - - - - - - - - - - - - -	**n=**	**0.34**	**0.32**
VOID RATIO, e- - - - - - - - - - - - -	**e=**	0.51	0.46
DEGREE OF SATURATION, Sr- - - - - - -	**Sr=**	99%	100%

Respectfully Submitted:
William D. Prigge, P.E.

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-05 16'- 115.5' 95% at Opt + 0	**REPORT NO:**	10 perm
CLASSIFICATION	Grey Silty CLAY	**DATE:**	3/20/19
SAMPLE TYPE	D698	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90

Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, ℃	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.4

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	2.12E-07
TEST INTERVAL 2	1.75E-07
TEST INTERVAL 3	1.57E-07
TEST INTERVAL 4	1.49E-07
AVERAGE k	1.73E-07
k 20	**1.73E-07**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.86	2.82
LENGTH, in	5.77	5.75
VOLUME, cu in	36.95	36.02
WEIGHT, gm	1255.7	1291.3
UNIT WEIGHT, pcf	129.4	136.5
MOIST. CONTENT, %	12.9	16.1
DRY DENSITY, pcf	114.6	117.5
DEGREE OF SATUR, %	71	96

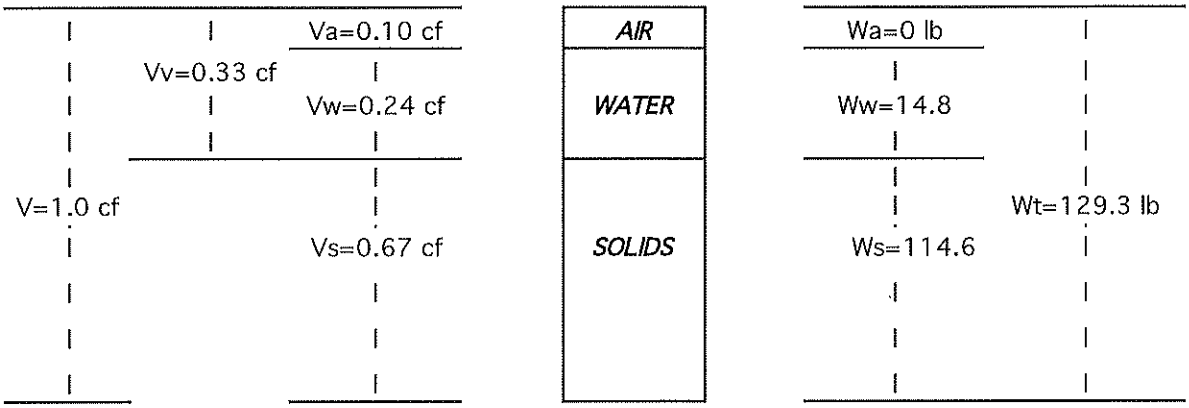
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-05 16'- 115.5' 95% at Opt + 0

SOIL CLASS: Grey Silty CLAY **PROJ NO.** 28287



	START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- - Mc=	12.9	16.1
ENTER SAMPLE WEIGHT, grams- - - - - - - - W=	1256	1291
ENTER SAMPLE DIAMETER, inches- - - - - - - Ds=	2.86	2.82
ENTER SAMPLE LENGTH, inches- - - - - - - - Ls=	5.77	5.75
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - - - V=	36.95	36.02
WET DENSITY, #/cu ft- - - - - - - - - - - - Wt=	129.3	136.4
WEIGHT OF SOLIDS, pounds- - - - - - - - - - - Ws=	114.6	117.5
WEIGHT OF WATER, pounds- - - - - - - - - - - Ww=	14.8	18.9
VOLUME OF SOLIDS, cubic feet- - - - - - - - - Vs=	0.67	0.68
VOLUME OF WATER, cubic feet- - - - - - - - - Vw=	0.24	0.30
VOLUME OF AIR, cubic feet- - - - - - - - - - - Va=	0.10	0.01
VOLUME OF VOIDS, cubic feet- - - - - - - - - Vv=	0.33	0.32
POROSITY, n- - - - - - - - - - - - - - n=	**0.33**	**0.32**
VOID RATIO, e- - - - - - - - - - - - - e=	0.50	0.46
DEGREE OF SATURATION, Sr- - - - - - - Sr=	71%	96%

Respectfully Submitted:
William D. Prigge, P.E.

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-05 16- 115.5' 95% at Opt + 2	**REPORT NO:**	11 perm
CLASSIFICATION	Brown-grey Silty CLAY	**DATE:**	3/20/19
SAMPLE TYPE	D698	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.5

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	3.92E-08
TEST INTERVAL 2	3.34E-08
TEST INTERVAL 3	3.70E-08
TEST INTERVAL 4	3.14E-08
AVERAGE k	3.53E-08
k 20	**3.53E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.85	2.83
LENGTH, in	5.75	5.71
VOLUME, cu in	36.61	35.87
WEIGHT, gm	1288.5	1293.0
UNIT WEIGHT, pcf	134.0	137.2
MOIST. CONTENT, %	15.0	15.4
DRY DENSITY, pcf	116.5	118.9
DEGREE OF SATUR, %	87	96

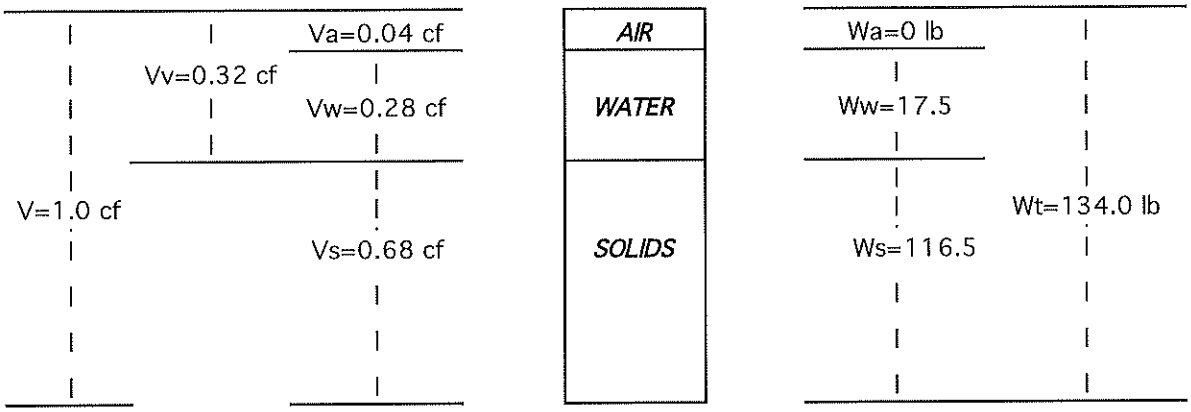
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-05 16- 115.5' 95% at Opt + 2

SOIL CLASS: Brown-grey Silty CLAY **PROJ NO.** 28287



		START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- -	Mc=	15.0	15.4
ENTER SAMPLE WEIGHT, grams- - - - - - - -	W=	1289	1293
ENTER SAMPLE DIAMETER, inches- - - - - -	Ds=	2.85	2.83
ENTER SAMPLE LENGTH, inches- - - - - - - -	Ls=	5.75	5.71
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs	Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - - -	V=	36.61	35.87
WET DENSITY, #/cu ft- - - - - - - - - - - -	Wt=	134.0	137.2
WEIGHT OF SOLIDS, pounds- - - - - - - - - -	Ws=	116.5	118.9
WEIGHT OF WATER, pounds- - - - - - - - - -	Ww=	17.5	18.3
VOLUME OF SOLIDS, cubic feet- - - - - - - -	Vs=	0.68	0.69
VOLUME OF WATER, cubic feet- - - - - - - -	Vw=	0.28	0.29
VOLUME OF AIR, cubic feet- - - - - - - - - -	Va=	0.04	0.01
VOLUME OF VOIDS, cubic feet- - - - - - - -	Vv=	0.32	0.31
POROSITY, n- - - - - - - - - - - - - -	**n=**	**0.32**	**0.31**
VOID RATIO, e- - - - - - - - - - - - -	**e=**	0.47	0.44
DEGREE OF SATURATION, Sr- - - - - - -	**Sr=**	87%	96%

Respectfully Submitted:
William D. Prigge, P.E.

MIDLAND STANDARD ENGINEERING & TESTING, INC.

410 NOLEN DRIVE, SOUTH ELGIN, ILLINOIS 60177 (847) 844-1895 F (847) 844-3875

REPORT OF PERMEABILITY TESTING

PROJECT NAME	Zion Landfill Site 2 Expansion, Aptim #3211		
SAMPLE NO.	B-05 16- 115.5' 95% at Opt + 4	**REPORT NO:**	12 perm
CLASSIFICATION	Brown-grey Silty CLAY	**DATE:**	3/20/19
SAMPLE TYPE	D698	**PROJECT NO:**	28287

METHOD OF TEST ASTM D-5084-90
Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

PERMEANT LIQUID	Tap Water	TOTAL BACK PRESSURE	30 psi
TEMPERATURE, °C	20	EFF. CONSOLIDATION STRESS, max	0.72 tsf
		EFF. CONSOLIDATION STRESS, min	0.5 tsf
CELL PRESSURE, psi	40	HYDRAULIC GRADIENT, i	14.8

	PERMEABILITY, k (cm/sec)
TEST INTERVAL 1	1.45E-08
TEST INTERVAL 2	1.67E-08
TEST INTERVAL 3	1.50E-08
TEST INTERVAL 4	1.54E-08
AVERAGE k	1.54E-08
k 20	**1.54E-08**

SAMPLE DATA:	INITIAL	FINAL
DIAMETER, in	2.86	2.85
LENGTH, in	5.77	5.60
VOLUME, cu in	37.14	35.68
WEIGHT, gm	1317.3	1300.5
UNIT WEIGHT, pcf	135.0	138.7
MOIST. CONTENT, %	17.4	15.9
DRY DENSITY, pcf	115.0	119.7
DEGREE OF SATUR, %	97	101

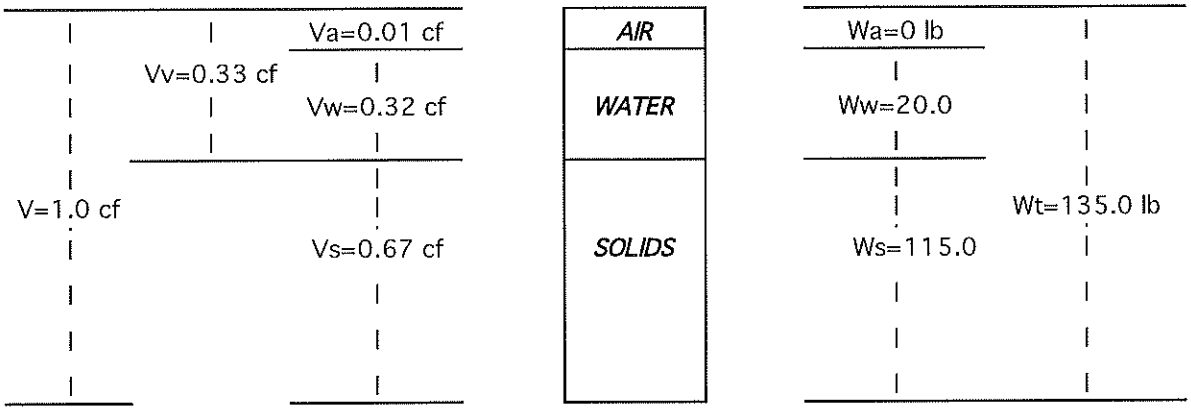
Respectfully Submitted:
William D. Prigge, P.E.

WEIGHT VOLUME RELATIONSHIPS OF SOIL

PROJECT NAME Zion Landfill Site 2 Expansion, Aptim #3211 **DATE:** 3/20/19

SAMPLE ID: B-05 16- 115.5' 95% at Opt + 4

SOIL CLASS: Brown-grey Silty CLAY **PROJ NO.** 28287



		START	FINISH
ENTER LABORATORY MOISTURE CONTENT, %- -	Mc=	17.4	15.9
ENTER SAMPLE WEIGHT, grams- - - - - - - -	W=	1317	1300
ENTER SAMPLE DIAMETER, inches- - - - - -	Ds=	2.86	2.85
ENTER SAMPLE LENGTH, inches- - - - - - - -	Ls=	5.77	5.60
ENTER ESTIMATED/KNOWN SPECIFIC GRAVITY,Gs	Gs=	2.750	2.750
SAMPLE VOLUME, cubic inches- - - - - - - - -	V=	37.14	35.68
WET DENSITY, #/cu ft- - - - - - - - - - - -	Wt=	135.0	138.7
WEIGHT OF SOLIDS, pounds- - - - - - - - - -	Ws=	115.0	119.7
WEIGHT OF WATER, pounds- - - - - - - - - -	Ww=	20.0	19.0
VOLUME OF SOLIDS, cubic feet- - - - - - - -	Vs=	0.67	0.70
VOLUME OF WATER, cubic feet- - - - - - - -	Vw=	0.32	0.30
VOLUME OF AIR, cubic feet- - - - - - - - - -	Va=	0.01	0.00
VOLUME OF VOIDS, cubic feet- - - - - - - -	Vv=	0.33	0.30
POROSITY, n- - - - - - - - - - - - - -	**n=**	**0.33**	**0.30**
VOID RATIO, e- - - - - - - - - - - - -	**e=**	0.49	0.43
DEGREE OF SATURATION, Sr- - - - - - -	**Sr=**	97%	101%

Respectfully Submitted:
William D. Prigge, P.E.

Specific Gravity Tests

APTIM

SPECIFIC GRAVITY of SOILS WORKSHEET
AASHTO T 100, METHOD B

Job Name: Zion Landfill Site 2 Expansion, Aptim# 3211

MSET File No. 28287
Date Received:
Date Tested: 3/18/19

BORING NO. B-05 SAMPLE NO. SS-59 DEPTH 116- 118'
SOIL DESCRIPTION: Grey SAND % PASSING NO. 4 SIEVE: _____
EXCLUDED SOIL (IF ANY) DESCRIPTION: +10

AASHTO Procedure

FLASK NO.	1	2	3	
VOLUME OF FLASK, ml				*lab entry*
WT. FLASK + WATER + SOIL = W_{bws}	173.49	172.13	172.94	*lab entry*
TEMPERATURE(W_{bws}), °C	20.9	20.9	20.9	*lab entry*
WT. FLASK + WATER = Wbw	156.36	155.77	156.26	*lab entry*
TARE NO.	SpG6	SpG1	A1	*lab entry*
TARE WEIGHT OF CONTAINER	265.09	204.93	369.61	*lab entry*
WT. CONTAINER + DRY SOIL	291.72	230.47	395.61	*lab entry*
WT. DRY SOIL = W_s	26.63	25.54	26	
$W_w = W_s + W_{bw} - W_{bws}$	9.50	9.18	9.32	
ENTER K, TEMP COEFF., SEE TABLE ON RIGHT	0.99981	0.99981	0.99981	
$G_s = K * W_s / W_w$	2.800	2.779	2.787	

Average, G_{AVE} 2.789

TEST TEMPERATURE

Temp, °C	Temp Coeff., K
16.0	1.00074
16.5	1.00066
17.0	1.00057
17.5	1.00048
18.0	1.00039
18.5	1.00030
19.0	1.00020
19.5	1.00010
20.0	1.00000
20.5	0.99990
21.0	0.99979
21.5	0.99968
22.0	0.99957
22.5	0.99945
23.0	0.99933
23.5	0.99921
24.0	0.99909
24.5	0.99897
25.0	0.99884

Form SPF007 1/03

Tested By: _____

SPECIFIC GRAVITY of SOILS WORKSHEET
AASHTO T 100, METHOD B

Job Name: Zion Landfill Site 2 Expansion, Aptim# 3211

MSET File No. 28287
Date Received:
Date Tested: 3/18/19

BORING NO. B-06 SAMPLE NO. SS-53 DEPTH 104- 106'
SOIL DESCRIPTION: Brown SAND % PASSING NO. 4 SIEVE: _____
EXCLUDED SOIL (IF ANY) DESCRIPTION: +10

AASHTO Procedure

FLASK NO.	1	2	3	
VOLUME OF FLASK, ml				*lab entry*
WT. FLASK + WATER + SOIL = W_{bws}	173.40	172.99	172.23	*lab entry*
TEMPERATURE(W_{bws}), °C	20.9	20.9	20.9	*lab entry*
WT. FLASK + WATER = Wbw	157.00	156.03	155.90	*lab entry*
TARE NO.	SpG4	A2	A6	*lab entry*
TARE WEIGHT OF CONTAINER	303.11	375.38	372.99	*lab entry*
WT. CONTAINER + DRY SOIL	328.54	401.62	398.39	*lab entry*
WT. DRY SOIL = W_s	25.43	26.24	25.4	
$W_w = W_s + W_{bw} - W_{bws}$	9.03	9.28	9.07	
ENTER K, TEMP COEFF., SEE TABLE ON RIGHT	0.99981	0.99981	0.99981	
$G_s = K * W_s / W_w$	2.816	2.827	2.800	

Average, G_{AVE} 2.814

TEST TEMPERATURE

Temp, °C	Temp Coeff., K
16.0	1.00074
16.5	1.00066
17.0	1.00057
17.5	1.00048
18.0	1.00039
18.5	1.00030
19.0	1.00020
19.5	1.00010
20.0	1.00000
20.5	0.99990
21.0	0.99979
21.5	0.99968
22.0	0.99957
22.5	0.99945
23.0	0.99933
23.5	0.99921
24.0	0.99909
24.5	0.99897
25.0	0.99884

Form SPF007 1/03

Tested By: _____

SPECIFIC GRAVITY of SOILS WORKSHEET
AASHTO T 100, METHOD B

Job Name: Zion Landfill Site 2 Expansion, Aptim# 3211

MSET File No. 28287
Date Received:
Date Tested: 3/18/19

BORING NO. B-08 SAMPLE NO. SS-61 DEPTH 120- 122'
SOIL DESCRIPTION: Grey SAND % PASSING NO. 4 SIEVE: _____
EXCLUDED SOIL (IF ANY) DESCRIPTION: +10

AASHTO Procedure

FLASK NO.	1	2	3	
VOLUME OF FLASK, ml				*lab entry*
WT. FLASK + WATER + SOIL = W_{bws}	173.10	172.94	172.75	*lab entry*
TEMPERATURE(W_{bws}), °C	20.9	20.9	20.9	*lab entry*
WT. FLASK + WATER = Wbw	156.36	155.77	156.26	*lab entry*
TARE NO.	SpG2	SpG3	SpG5	*lab entry*
TARE WEIGHT OF CONTAINER	209.48	208.02	302.02	*lab entry*
WT. CONTAINER + DRY SOIL	235.57	234.76	327.74	*lab entry*
WT. DRY SOIL = W_s	26.09	26.74	25.72	
$W_w = W_s + W_{bw} - W_{bws}$	9.35	9.57	9.23	
ENTER K, TEMP COEFF., SEE TABLE ON RIGHT	0.99981	0.99981	0.99981	
$G_s = K * W_s / W_w$	2.790	2.794	2.786	

Average, G_{AVE} 2.790

TEST TEMPERATURE

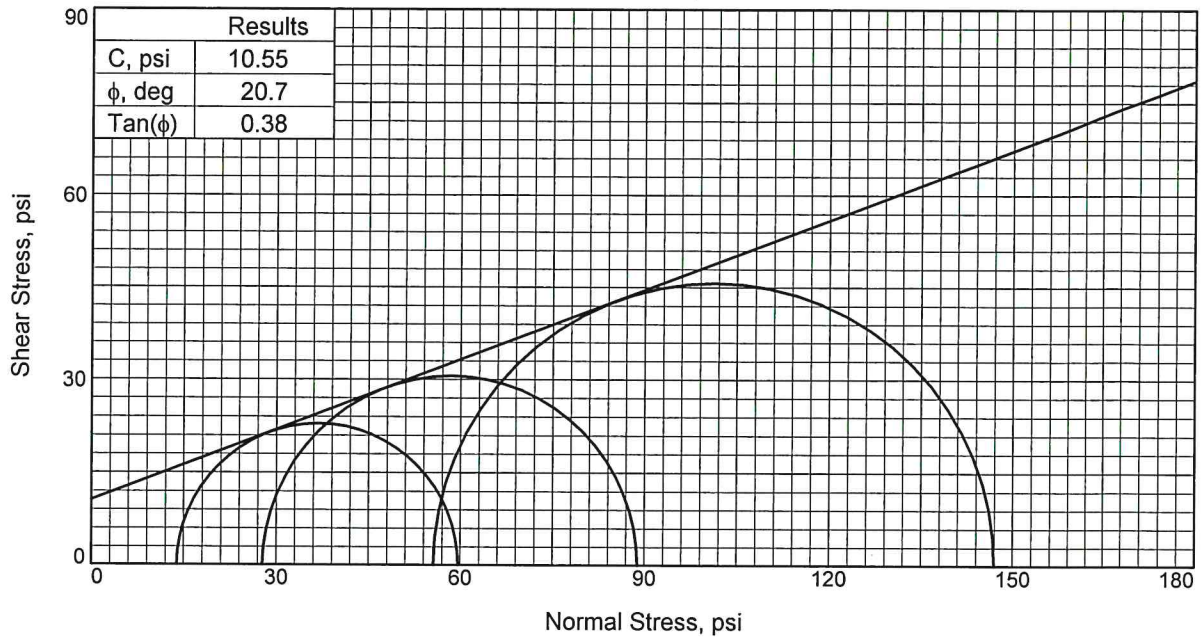
Temp, °C	Temp Coeff., K
16.0	1.00074
16.5	1.00066
17.0	1.00057
17.5	1.00048
18.0	1.00039
18.5	1.00030
19.0	1.00020
19.5	1.00010
20.0	1.00000
20.5	0.99990
21.0	0.99979
21.5	0.99968
22.0	0.99957
22.5	0.99945
23.0	0.99933
23.5	0.99921
24.0	0.99909
24.5	0.99897
25.0	0.99884

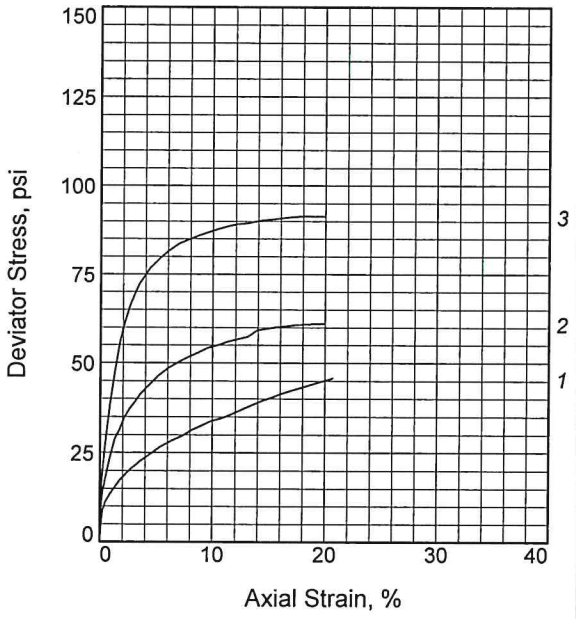
Form SPF007 1/03

Tested By: _____

UU Triaxial Shear Tests

APTIM





Sample No.		1	2	3
Initial	Water Content, %	21.1	22.9	19.8
	Dry Density, pcf	108.6	106.1	110.2
	Saturation, %	99.6	101.8	97.6
	Void Ratio	0.5814	0.6181	0.5581
	Diameter, in.	2.87	2.86	2.86
	Height, in.	5.56	5.75	5.76
At Test	Water Content, %	21.1	22.5	20.3
	Dry Density, pcf	108.6	106.1	110.2
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.5814	0.6181	0.5581
	Diameter, in.	2.87	2.86	2.86
	Height, in.	5.56	5.75	5.76
Strain rate, in./min.		0.037	0.037	0.037
Back Pressure, psi		68	68	68
Cell Pressure, psi		82	96	123
Fail. Stress, psi		46	61	91
Ult. Stress, psi				
σ_1 Failure, psi		60	89	147
σ_3 Failure, psi		14	28	56

Type of Test:
Unconsolidated Undrained
Sample Type: Shelby Tube
Description: Brown-Grey CLAY

Specific Gravity= 2.75
Remarks:

Figure _____

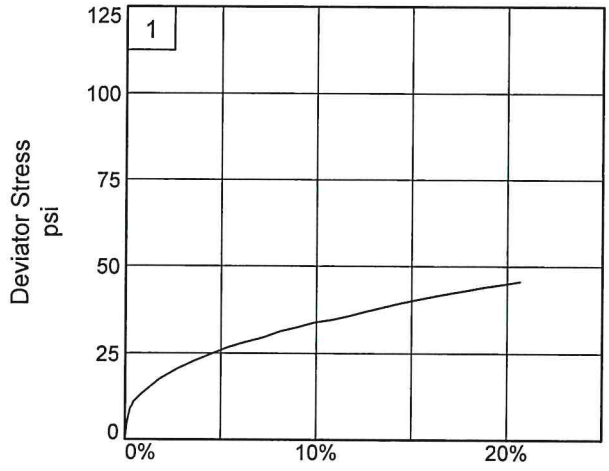
Client: APTIM

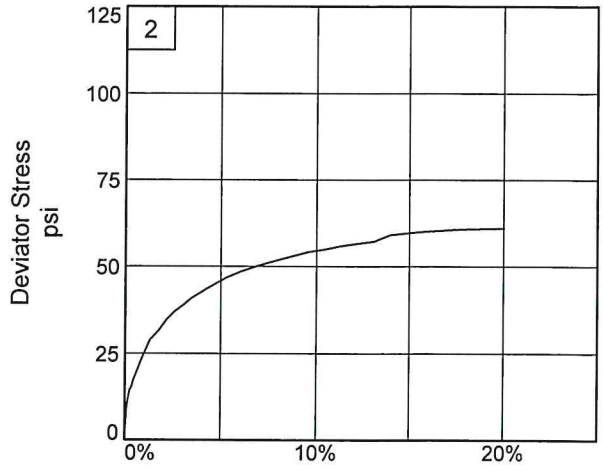
Project: Zion Landfill Site 2 Expansion, Aptim #3211

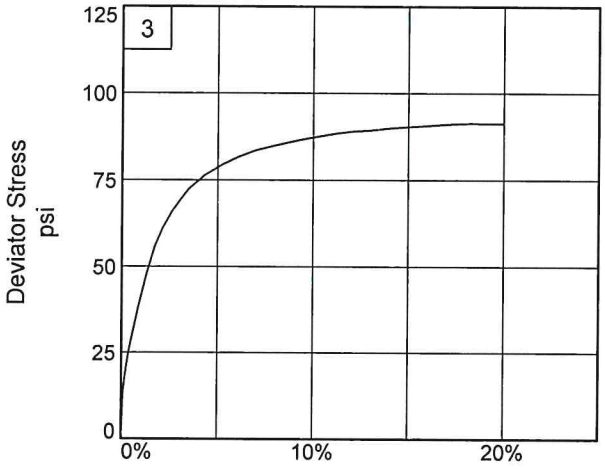
Location: B-6
Sample Number: ST-38 **Depth:** 74.0- 76.0'
Proj. No.: 28287 **Date Sampled:**

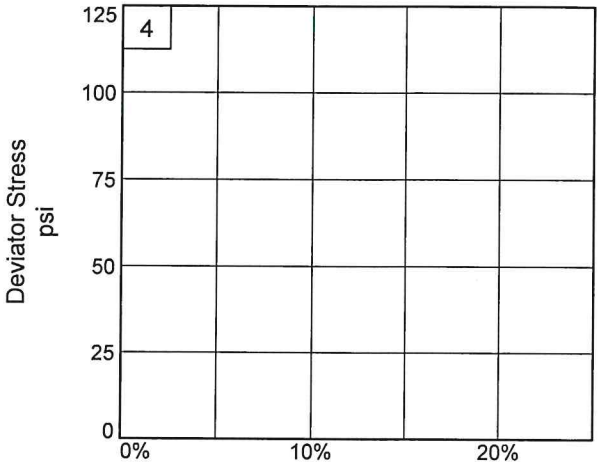
TRIAXIAL SHEAR TEST REPORT
Midland Standard Engineering & Testing
South Elgin, IL

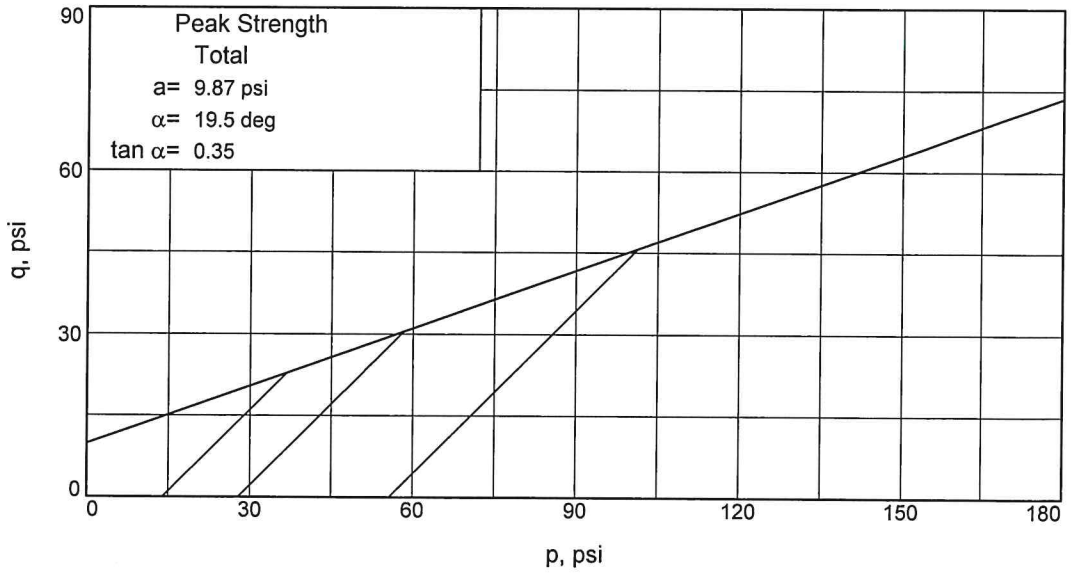
Tested By: JDS **Checked By:** WDP







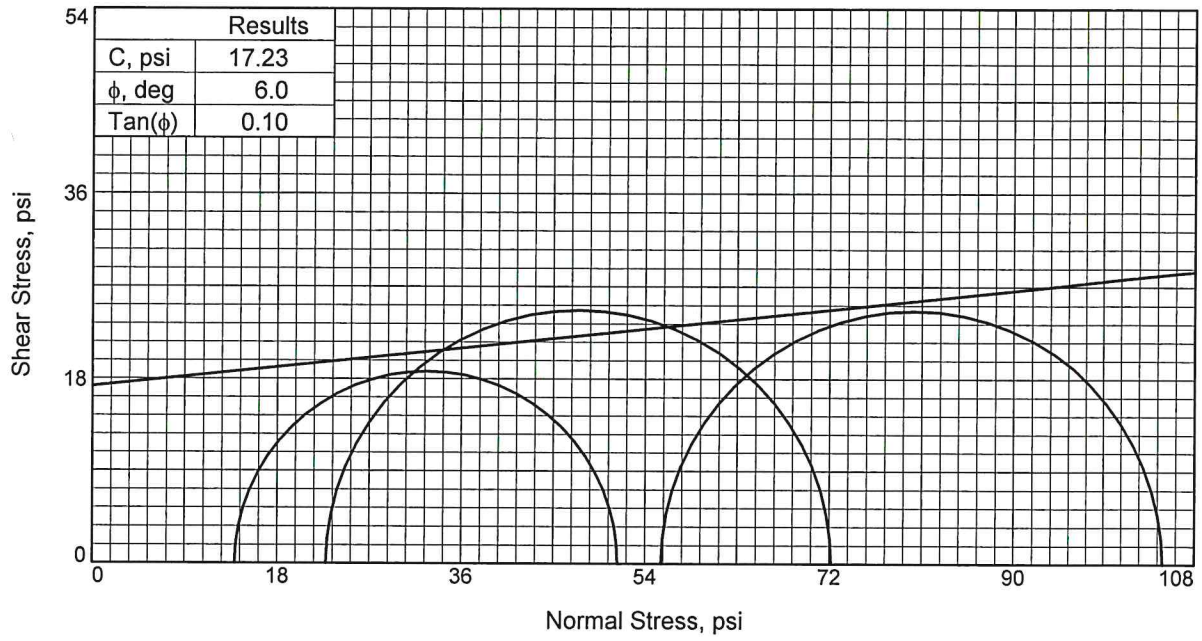


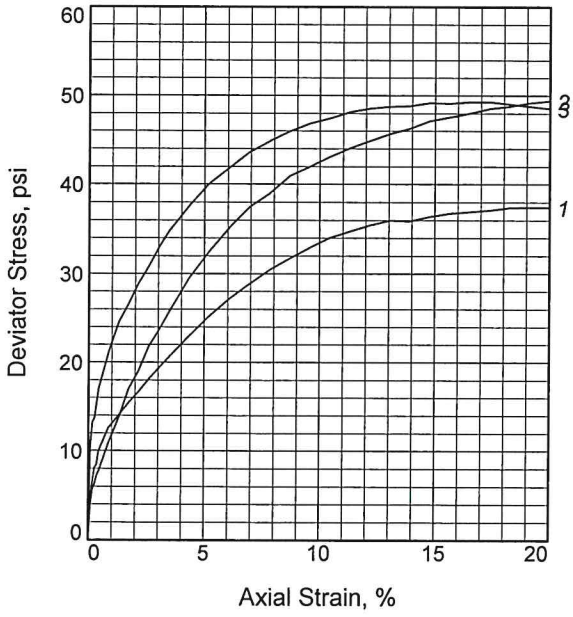


Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211
Location: B-6 **Depth:** 74.0- 76.0' **Sample Number:** ST-38
Project No.: 28287 **Figure** _____

Midland Standard Engineering & Testing

Tested By: JDS **Checked By:** WDP





Sample No.		1	2	3
Initial	Water Content, %	15.7	17.3	16.7
	Dry Density, pcf	121.0	117.5	118.3
	Saturation, %	103.1	103.3	101.9
	Void Ratio	0.4188	0.4614	0.4510
	Diameter, in.	2.74	2.85	2.79
	Height, in.	5.75	5.76	5.75
At Test	Water Content, %	0.0	16.8	17.5
	Dry Density, pcf	0.0	117.5	118.3
	Saturation, %	0.0	100.1	106.9
	Void Ratio	N/A	0.4614	0.4510
	Diameter, in.	2.74	2.85	2.79
	Height, in.	5.75	5.76	5.75
Strain rate, in./min.		0.037	0.037	0.037
Back Pressure, psi		52	57	52
Cell Pressure, psi		65	79	107
Fail. Stress, psi		37	49	49
Ult. Stress, psi				
σ_1 Failure, psi		51	72	105
σ_3 Failure, psi		14	23	56

Type of Test:
Unconsolidated Undrained
Sample Type: Shelby Tube
Description: Brown-grey Silty CLAY

Specific Gravity= 2.75
Remarks:

Figure _____

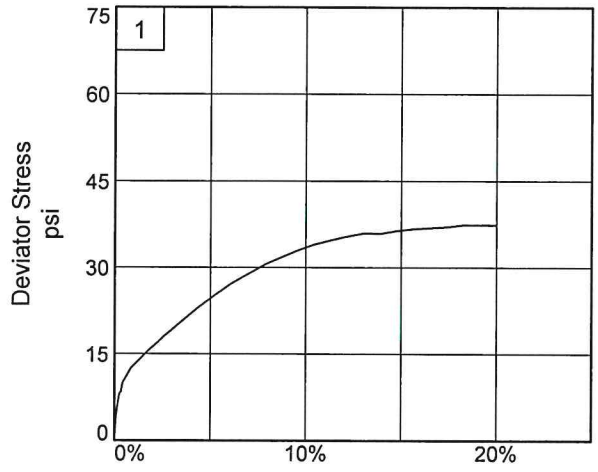
Client: APTIM

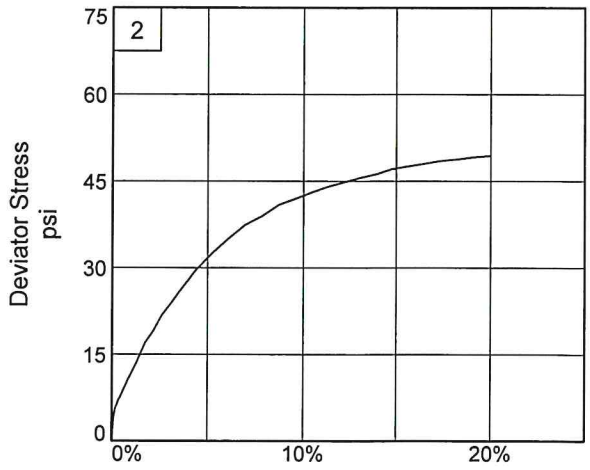
Project: Zion Landfill Site 2 Expansion, Aptim #3211

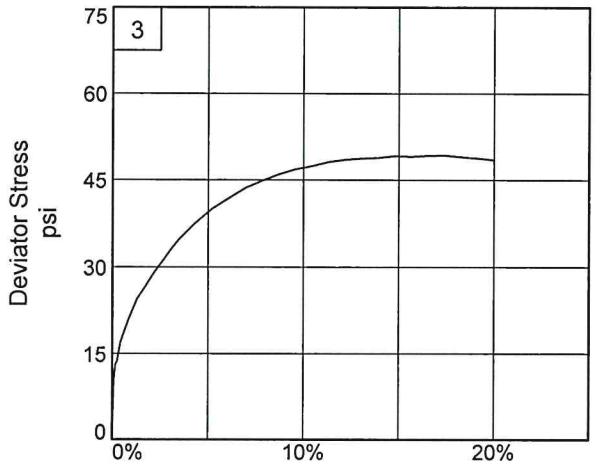
Location: B-7
Sample Number: ST-29 **Depth:** 56.0- 58.0'
Proj. No.: 28287 **Date Sampled:**

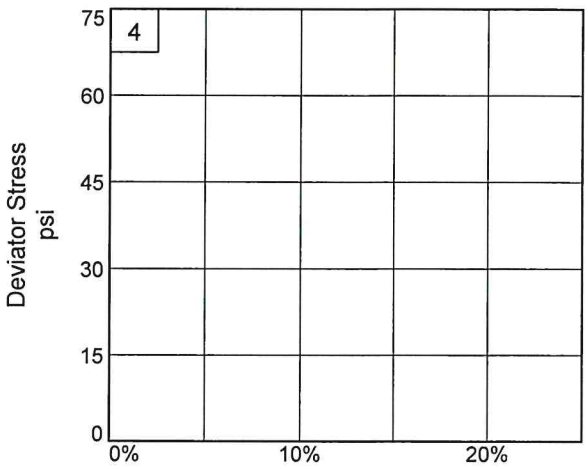
TRIAXIAL SHEAR TEST REPORT
Midland Standard Engineering & Testing
South Elgin, IL

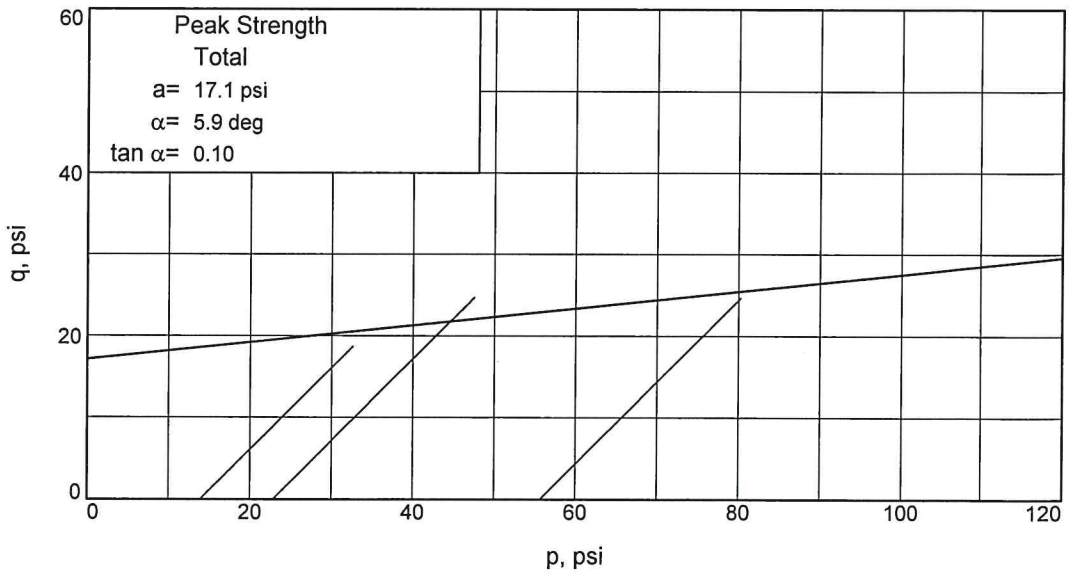
Tested By: JDS **Checked By:** WDP







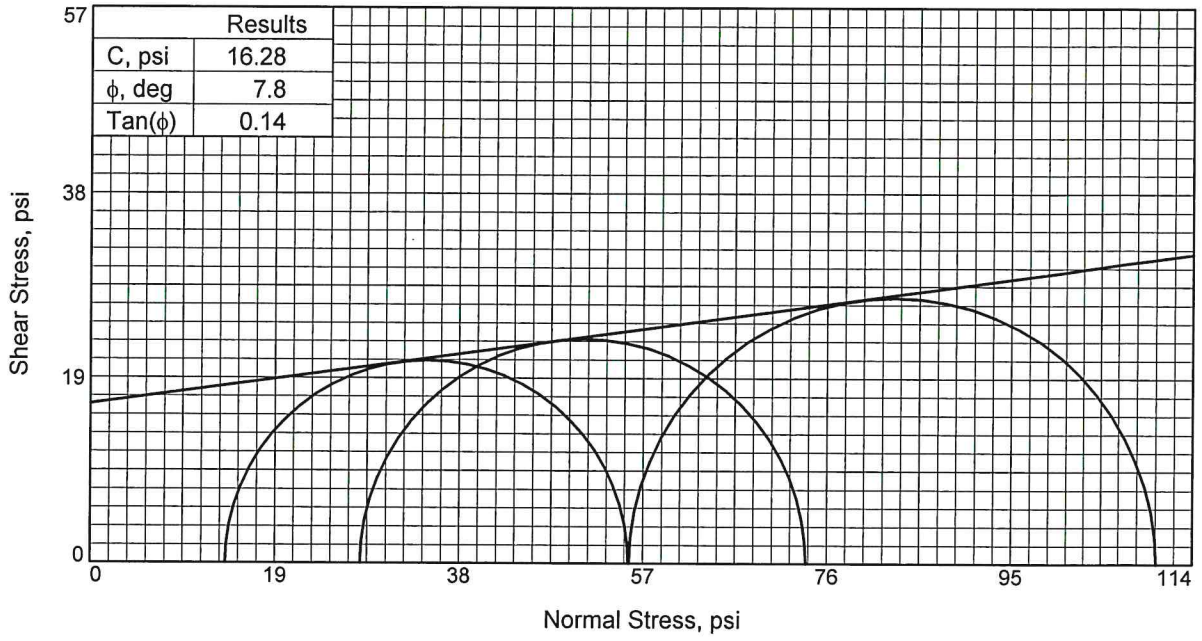


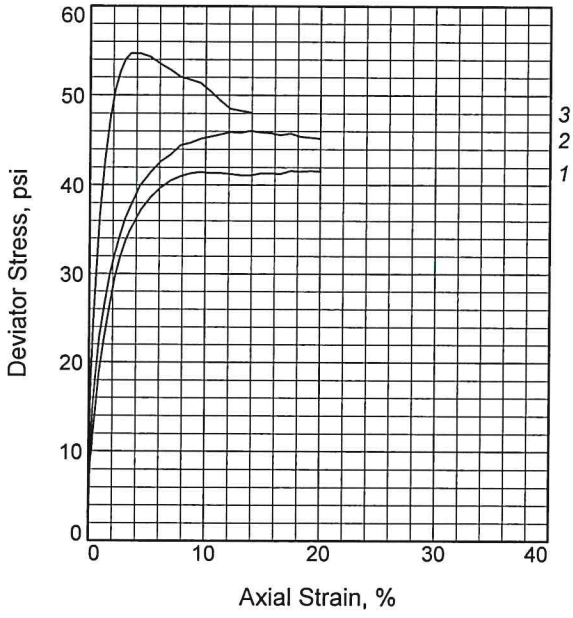


Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211
Location: B-7 **Depth:** 56.0- 58.0' **Sample Number:** ST-29
Project No.: 28287 **Figure** _____

Midland Standard Engineering & Testing

Tested By: JDS **Checked By:** WDP





Sample No.		1	2	3
Initial	Water Content, %	20.6	27.5	24.5
	Dry Density, pcf	106.6	97.5	103.3
	Saturation, %	93.0	99.3	101.8
	Void Ratio	0.6101	0.7607	0.6612
	Diameter, in.	2.86	2.86	2.84
	Height, in.	5.75	5.75	5.76
At Test	Water Content, %	23.2	27.0	24.2
	Dry Density, pcf	106.6	97.5	103.3
	Saturation, %	104.4	97.5	100.5
	Void Ratio	0.6101	0.7607	0.6612
	Diameter, in.	2.86	2.86	2.84
	Height, in.	5.75	5.75	5.76
Strain rate, in./min.		0.037	0.037	0.037
Back Pressure, psi		53	53	53
Cell Pressure, psi		67	81	109
Fail. Stress, psi		42	46	55
Ult. Stress, psi				
σ_1 Failure, psi		56	74	110
σ_3 Failure, psi		14	28	56

Type of Test:
Unconsolidated Undrained
Sample Type: Shelby Tube
Description: Brown-grey CLAY

Specific Gravity= 2.750
Remarks:

Figure _____

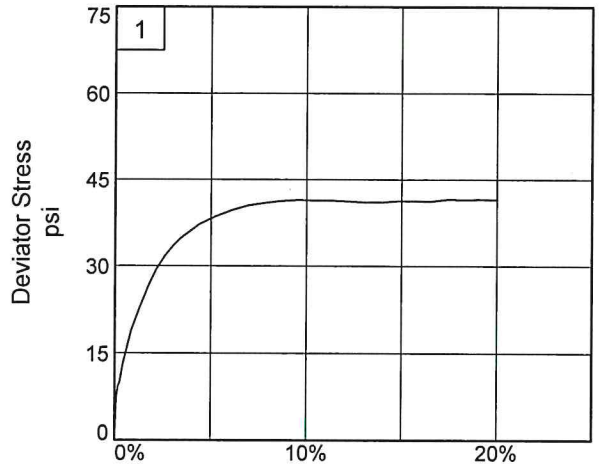
Client: APTIM

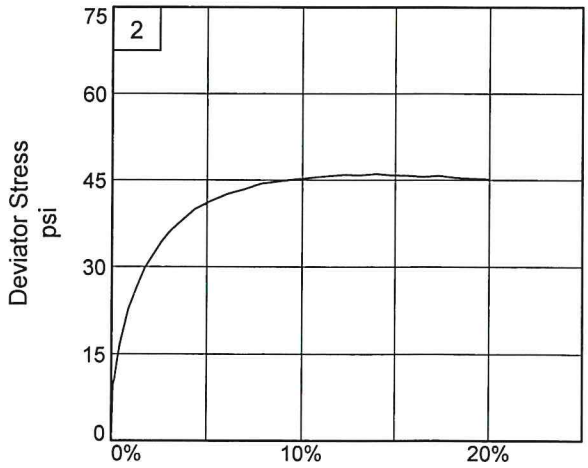
Project: Zion Landfill Site 2 Expansion, Aptim #3211

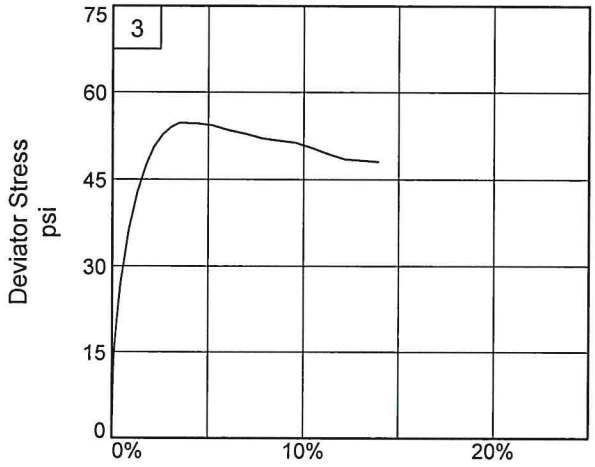
Location: B-15
Sample Number: ST-30 **Depth:** 58.0- 60.0'
Proj. No.: 28287 **Date Sampled:**

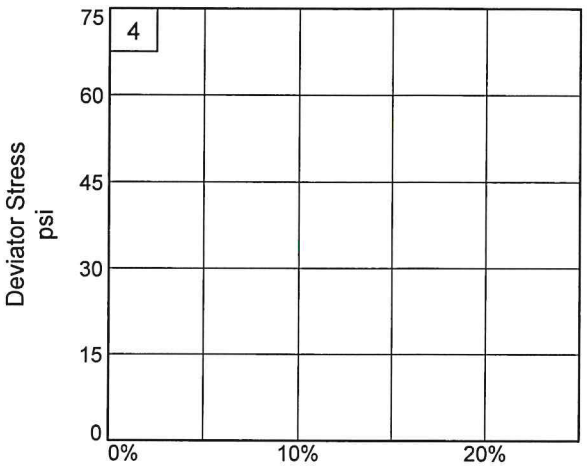
TRIAXIAL SHEAR TEST REPORT
Midland Standard Engineering & Testing
South Elgin, IL

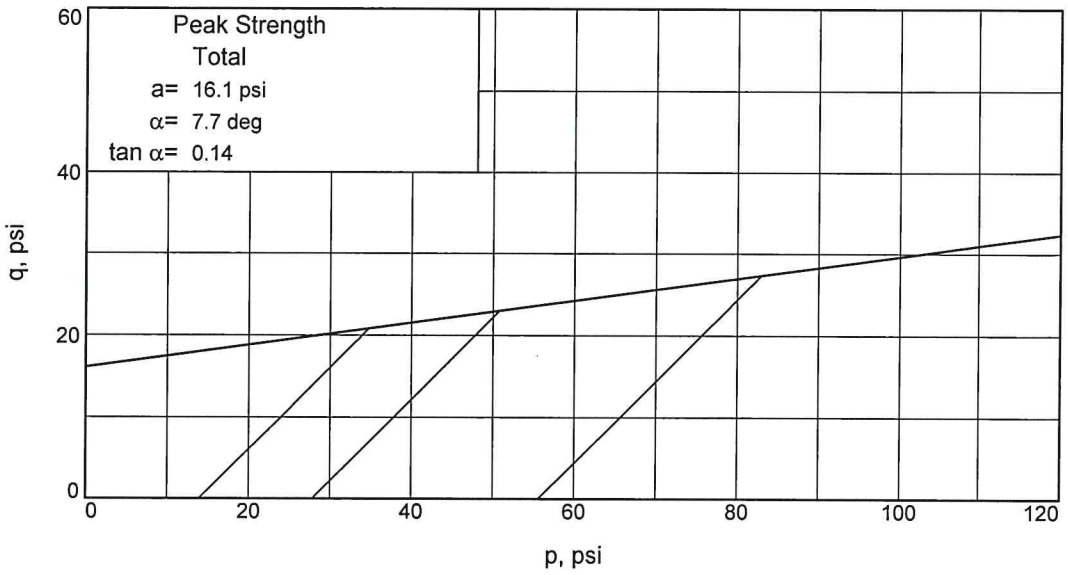
Tested By: JDS **Checked By:** WP











Client: APTIM
Project: Zion Landfill Site 2 Expansion, Aptim #3211
Location: B-15 **Depth:** 58.0- 60.0' **Sample Number:** ST-30
Project No.: 28287 **Figure** _____

Midland Standard Engineering & Testing

Tested By: JDS **Checked By:** WP

I.3 – Laboratory Data Summary Tables (Previous Investigation)

SUMMARY OF 2007 LABORATORY TEST RESULTS FOR THE WADSWORTH FORMATION

Boring No.	Sample No.	Depth (feet)	USCS Soil Class.	Grain Size Analysis				Atterberg Limits			Dry Density (pcf)	Specific Gravity	CEC (meq/100g)	Dry Density (pcf)	Porosity	Kv (cm/sec)	Moisture Content (%)	Organic Content (%)
				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL	PL	PI								
B-1-07	SS-28A	55.3-56.0	CL	0.7	14.0	46.5	38.8	23.0	14.0	9.0			4.96					
B-1-07	ST-32	62.0-64.0	CL								124.0	2.698		124.00	0.27	4.66E-08	15.20	
B-1-07	ST-35	68.0-70.0	CL								128.5	2.766		128.50	0.25	1.72E-07	12.50	
B-1-07	SS-42	82.0-84.0	CL	10.3	14.4	36.0	39.3	29.0	15.0	14.0								
B-2-07	ST-3	70.0-72.0	CL								123.2	2.695		123.20	0.27	4.10E-07	13.30	
B-2-07	SS-7	78.0-80.0	CL	0.2	3.9	27.7	68.2	39.0	18.0	21.0								
B-2-07	SS-8	80.0-82.0											34.18					0.96
B-3-07	ST-28	54.0-56.0	CL								134.4	2.729		134.40	0.21	5.61E-08	11.70	
B-3-07	SS-36	70.0-72.0	CL-ML	3.2	15.5	52.6	28.7	21.0	14.0	7.0								
B-3-07	SS-37	72.0-74.0																0.66
B-4-07	ST-14	57.5-60.0	CL								126.0	2.739		126.00	0.26	1.05E-07	13.50	
B-4-07	SS-18	72.0-74.0	CL	13.7	11.9	30.3	44.1	32.0	16.0	16.0								
B-4-07	SS-21	78.0-80.0											8.60					0.72
B-5-07	ST-1	60.0-62.0	CL								119.9	2.693		119.90	0.29	3.63E-08	12.90	
B-5-07	SS-7	74.0-76.0	CL	0.0	2.6	22.9	74.5	45.0	20.0	25.0			12.46					0.62
B-7-07	ST-11	60.0-62.0	CL								121.3	2.745		121.30	0.29	1.61E-07	13.70	
B-7-07	CS-14	60.0-62.5	CL	0.5	14.7	52.6	32.2	23.0	14.0	9.0								
B-7-07	CS-16	70.0-72.5											10.70					0.92
B-8-07	ST-24	46.0-48.0	CL-ML								130.9	2.713		130.90	0.23	1.24E-07	12.50	
B-8-07	SS-27	52.0-54.0											9.36					0.75
B-8-07	SS-28	54.0-56.0	CL	0.1	8.9	48.4	42.6	25.0	15.0	10.0								
B-8-07	SS-35	68.0-70.0	CL	2.7	16.6	46.7	34.0	24.0	14.0	10.0								
B-9-07	SS-24A	46.3-47.0	CL-ML	0.2	18.9	64.0	16.9	23.0	18.0	5.0								
B-9-07	ST-28	54.0-56.0	CL-ML								133.7	2.703		133.70	0.21	1.01E-07	17.00	
B-9-07	SS-35	68.0-70.0											6.00					0.52
B-9-07	SS-39	76.0-78.0	CL	0.1	5.1	25.5	69.3	41.0	19.0	22.0								
B-175	SS-15	28.0-28.5	CL	22.7	16.9	28.8	31.6	25.0	15.0	10.0			9.80					0.24
B-175	SS-25	48.0-50.0	CL	2.8	16.3	50.1	30.8	24.0	14.0	10.0								
Maximium				22.7	18.9	64.0	74.5	45.0	20.0	25.0	134.4	2.766	34.18	134.4	0.29	3.63E-08	11.70	0.24
Minimium				0.0	2.6	22.9	16.9	21.0	14.0	5.0	119.9	2.693	4.96	119.9	0.21	4.10E-07	17.00	0.96
Average				4.4	12.3	40.9	42.4	28.8	15.8	12.9	126.9	2.720	12.01	126.9	0.25	1.04E-07	13.59	0.67

Note:
1. The average vertical hydraulic conductivity was calculated using a geometric mean.
2. Moisture contents are only shown on this table for those sample intervals for which a hydraulic conductivity analysis was conducted. Additional moisture content data is provided in Appendix I.2 and on the boring logs from the most recent investigation.

SUMMARY OF 2007 LABORATORY TEST RESULTS FOR THE SHALLOW DRIFT											
Boring No.	Sample No.	Depth (feet)	USCS Soil Class.	Grain Size Analysis				Atterberg Limits			CEC (meq/100g)
				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL	PL	PI	
B-2-07	SS-14	92.0-94.0	SM	6.9	75.5	13.4	4.2				
B-3-07	SS-46	90.0-92.0	SP-SM	1.6	87.2	5.7	5.5				6.60
B-4-07	SS-26	88.0-88.5	SM	0.0	75.8	16.3	7.9				
B-5-07	SS-19	98.0-100.0	ML	0.0	8.7	81.7	9.6	18.0	17.0	1.0	
B-6-07	SS-4	104.0-106.0	SM	2.3	72.9	15.3	9.5				
B-9-07	SS-49	96.0-97.0	SM	9.9	42.0	34.0	14.1				
B-9-07	SS-49A	97.0-98.0	SM	18.3	57.3	24.4					
B-175	SS-49	94.0-96.0	ML	0.0	4.9	88.3	6.8	19.0	16.0	3.0	
Maximium				18.3	87.2	88.3	14.1	19.0	17.0	3.0	6.60
Minimium				0.0	4.9	5.7	4.2	18.0	16.0	1.0	6.60
Average				4.9	53.0	34.9	8.2	18.5	16.5	2.0	6.60

Note:

1. Moisture contents are only shown on this table for those sample intervals for which a hydraulic conductivity analysis was conducted. Additional moisture content data is provided in Appendix I.2 and on the boring logs from the most recent investigation.

SUMMARY OF 2007 LABORATORY TEST RESULTS FOR THE LOWER TILL															
Boring No.	Sample No.	Depth (feet)	USCS Soil Class.	Grain Size Analysis				Atterberg Limits			Dry Density (pcf)	Moisture Content (%)	Porosity	Specific Gravity	Kv (cm/sec)
				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL	PL	PI					
B-2-07	SS-16	96.0-98.0	CL-ML	4.9	33.1	43.8	18.2	17.0	12.0	5.0					
B-6-07	SS-10	116.0-118.0	CL	0.2	10.3	43.9	45.6	28.0	15.0	13.0					
B-6-07	ST-37	168.0-170.0	CL								126.7	13.90	0.26	2.739	2.69E-08
B-8-07	SS-47	92.0-94.0	CL-ML	10.5	23.2	43.3	23.0	18.0	13.0	5.0					
B-9-07	SS-50	98.0-100.0	CL	2.9	46.5	38.9	11.7								
Maximium				10.5	46.5	43.9	45.6	28.0	15.0	13.0	126.7	13.90	0.26	2.739	2.69E-08
Minimium				0.2	10.3	38.9	11.7	17.0	12.0	5.0	126.7	13.90	0.26	2.739	2.69E-08
Average				4.6	28.3	42.5	24.6	21.0	13.3	7.7	126.7	13.90	0.26	2.739	2.69E-08

Note:

1. Moisture content is only shown on this table for the sample interval for which a hydraulic conductivity analysis was conducted. Additional moisture content data is provided in Appendix I.2 and on the boring logs from the most recent investigation.

SUMMARY OF 2007 LABORATORY TEST RESULTS FOR THE INTRATILL SEDIMENTS													
Boring No.	Sample No.	Depth (feet)	USCS Soil Class.	Grain Size Analysis				Atterberg Limits			CEC (meq/100g)	Moisture Content (%)	Organic Content (%)
				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	LL	PL	PI			
B-1-07	SS-25	48.0-50.0	SM	28.9	53.6	12.4	5.1					11.52	0.19
B-6-07	SS-14	124.0-126.0									5.52	12.30	0.58
B-7-07	CS-8B	39.0-39.3	SM	19.6	50.3	21.4	8.7	16.0	14.0	2.0			
Maximium				28.9	53.6	21.4	8.7	16.0	14.0	2.0	5.5	12.3	0.6
Minimium				19.6	50.3	12.4	5.1	16.0	14.0	2.0	5.5	11.5	0.2
Average				24.3	52.0	16.9	6.9	16.0	14.0	2.0	5.5	11.9	0.4

Note:

1. The samples from B-1-07 and B-7-07 are from intratill sediments within the Wadsworth Formation. The sample from B-6-07 is from the intratill deposits within the Lower Till.