

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**
 Project Number: **022-15055**
 Date Sampled: 5/31/2016
 Sampled By: DA
 Sample Number:
 Sample Location: TP26 @ 6-6.5'
 Sample Description: SC

Date Tested: 10/31/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

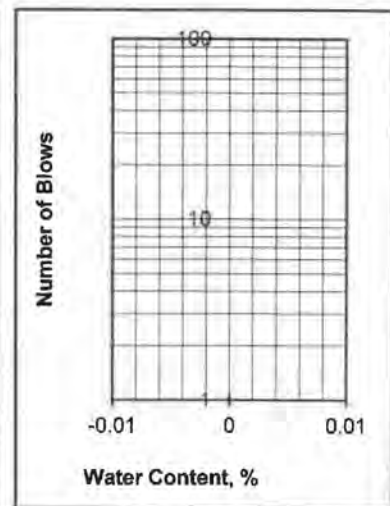
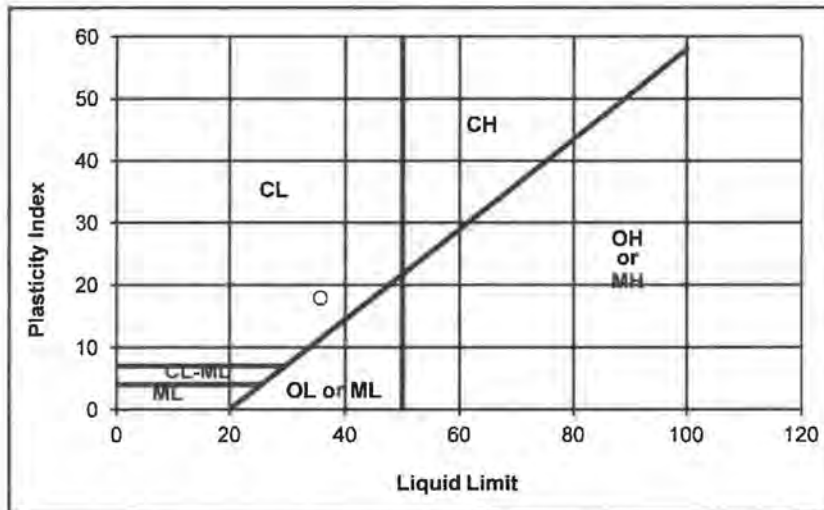
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	19.33	18.69		26.68	24.37	
Weight of Dry Soil & Tare (g)	18.64	17.98		23.44	21.75	
Weight of Tare (g)	14.91	14.07		14.20	14.41	
Weight of water (g)	0.70	0.71		3.23	2.63	
Weight of Dry Soil (g)	3.73	3.90		9.25	7.33	
Water Content (% of dry wt.)	18.6%	18.2%		35.0%	35.9%	
Number of Blows				30	25	

Plastic Limit : 18

Liquid Limit : 36

Plasticity Index : 18
 Unified Soil Classification : CL

Requirement:
 Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Sieve Analysis

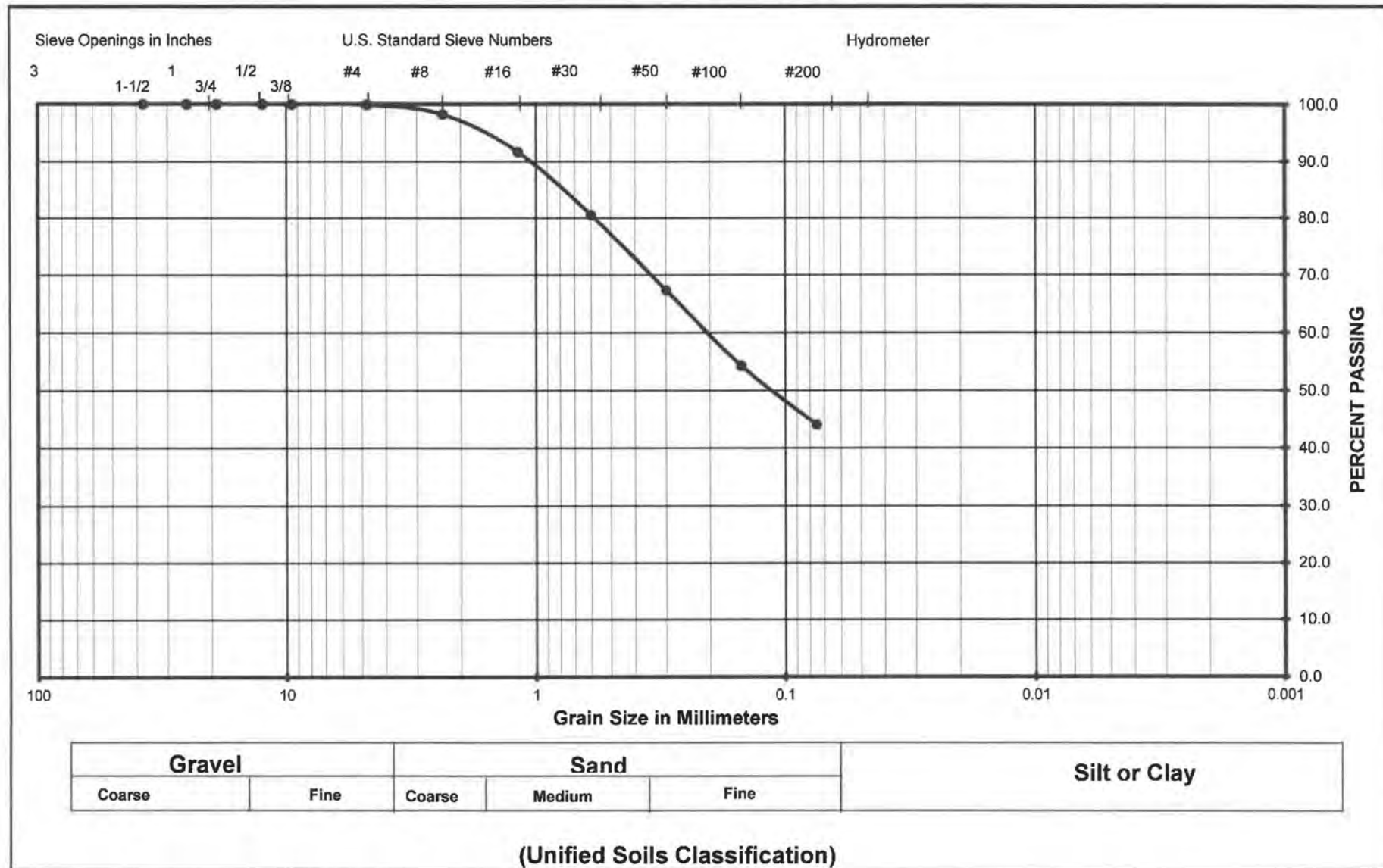
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/21/2016
Sample Location : TP27 @ 1-1.5'
Soil Classification : SC

Wet Weight	:	427.60
Dry Weight	:	410.70
Moisture Content	:	4%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.4	0.1	0.1	99.9
#8	2.36	6.7	1.6	1.7	98.3
#16	1.18	27.0	6.6	8.3	91.7
#30	0.60	45.7	11.1	19.4	80.6
#50	0.30	54.1	13.2	32.6	67.4
#100	0.15	53.7	13.1	45.7	54.3
#200	0.08	41.9	10.2	55.9	44.1

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 SC
 TP27 @ 1-1.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

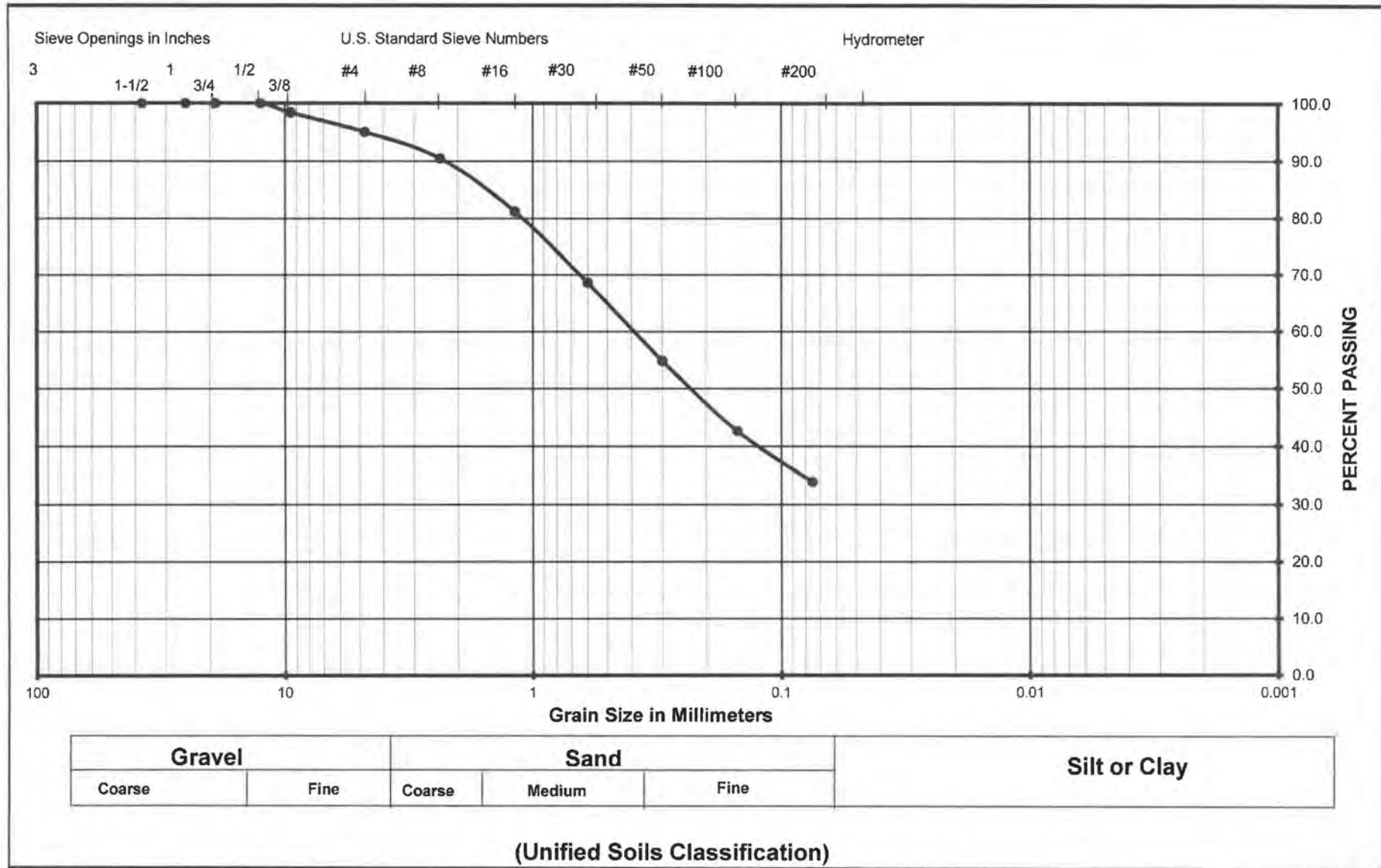
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/27/2016
Sample Location : TP27 @ 3-3.5'
Soil Classification : SC

Wet Weight	:	400.00
Dry Weight	:	386.10
Moisture Content	:	4%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50	6.2	1.6	1.6	98.4
#4	4.75	12.6	3.3	4.9	95.1
#8	2.36	17.8	4.6	9.5	90.5
#16	1.18	36.0	9.3	18.8	81.2
#30	0.60	48.4	12.5	31.3	68.7
#50	0.30	53.2	13.8	45.1	54.9
#100	0.15	47.1	12.2	57.3	42.7
#200	0.08	33.6	8.7	66.0	34.0

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC
 Sample Number: TP27 @ 3-3.5'

ASTM C136

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Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman Reservoir
Date : 10/27/2016
Sample Location : TP27 @ 5-5.5'
Soil Classification : SC

Wet Weight	:	300.00
Dry Weight	:	292.10
Moisture Content	:	3%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.7	0.2	0.2	99.8
#8	2.36	8.3	2.8	3.1	96.9
#16	1.18	21.9	7.5	10.6	89.4
#30	0.60	25.5	8.7	19.3	80.7
#50	0.30	36.2	12.4	31.7	68.3
#100	0.15	56.2	19.2	50.9	49.1
#200	0.08	49.8	17.0	68.0	32.0

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman Reservoir
Date : 10/27/2016
Sample Location : TP27 @ 5-5.5'
Soil Classification : SC

Dry Weight Used	106.2 g
Temperature	20.0 C
Soil Specific Gravity	2.65
Solution Spec. Grav.	1.003
K Value	0.01365
Correction Factor	0.00000

Elapsed Time (min)	Hydro. Reading	Hydro. Corrected	% Passing	Particle Diameter
2	1.021	1.021	27.3	0.0316
5	1.017	1.017	21.2	0.0210
15	1.015	1.015	18.2	0.0124
30	1.013	1.013	15.2	0.0090
60	1.012	1.012	13.6	0.0064
250	1.009	1.009	9.1	0.0032
1440	1.007	1.007	6.1	0.0014

Particle Diameter	Percent Passing
0.005	11.7
0.002	7.1
0	NA

Sieve Openings in Inches
3 1-1/2 1 3/4 1/2 3/8

U.S. Standard Sieve Numbers
#4 #8 #16 #30 #50 #100 #200

Hydrometer

Grain Size in Millimeters
100 10 1 0.1 0.01 0.001

PERCENT PASSING
100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0

Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

(Unified Soils Classification)

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**
 Project Number: **022-15055**
 Date Sampled: 5/31/2016
 Sampled By: DA
 Sample Number:
 Sample Location: TP27 @ 5-5.5'
 Sample Description: SC

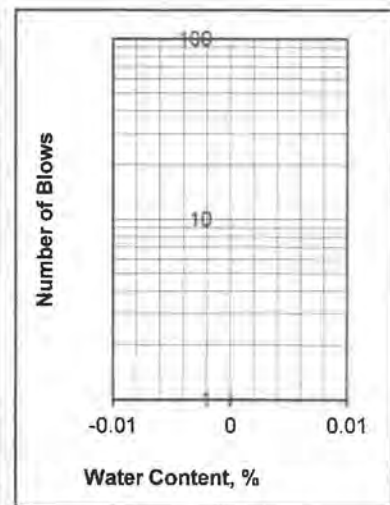
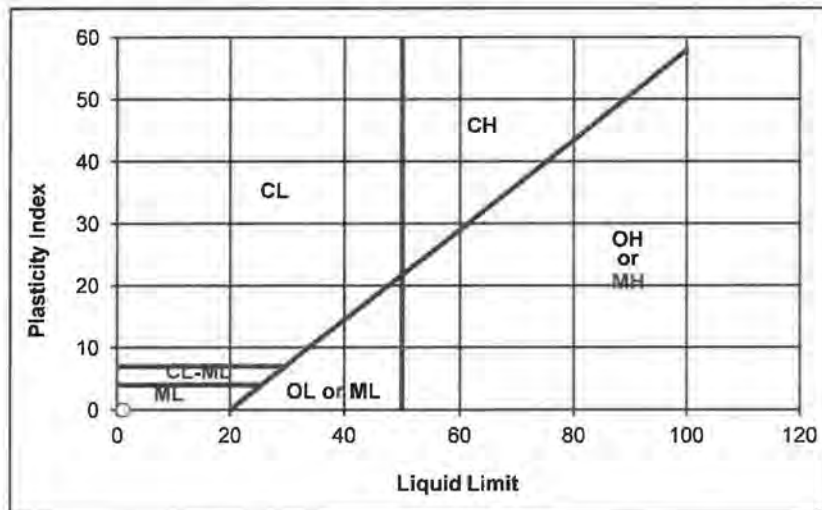
Date Tested: 10/31/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)						
Weight of Dry Soil & Tare (g)						
Weight of Tare (g)						
Weight of water (g)						
Weight of Dry Soil (g)						
Water Content (% of dry wt.)						
Number of Blows						

Plastic Limit : N/D

Liquid Limit : N/D

Plasticity Index : NON-PLASTIC
Unified Soil Classification : NON-PLASTIC
Requirement:
Approx. % of Material Retained on # 40 Sieve:



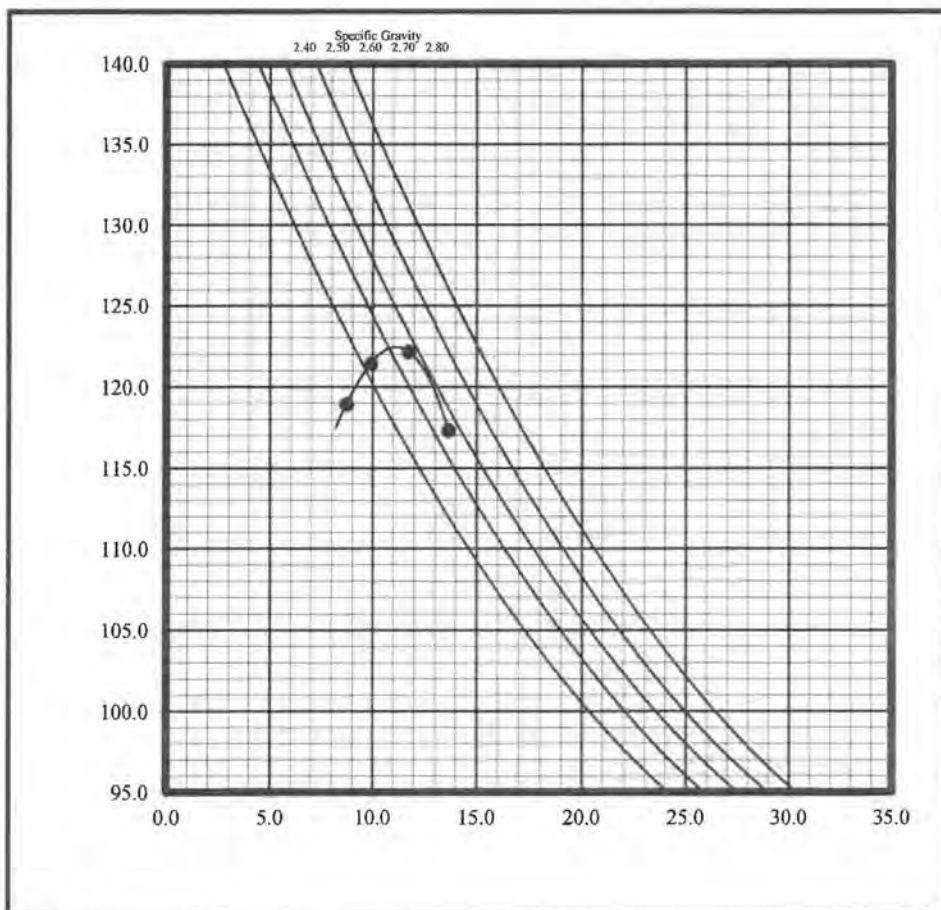
Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft. - lbf/ft³) ASTM D1557

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	SC
Technician	DJ 12075	Soil Description	Lt Brn Silty Sand
Date	10/27/2016	Method	D1557a
Sample Location	TP27 @ 5-5.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	4006.0	4052.0	4004.0	3943.0
Mass of Compaction Mold, gm	1990.0	1990.0	1990.0	1990.0
Mass of Moist Specimen, gm	2016.0	2062.0	2014.0	1953.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	133.5	136.5	133.3	129.3
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	182.0	179.0	176.0	184.0
Moisture Content (%)	9.9	11.7	13.6	8.7
Dry Density, lbs/cu.ft.	121.5	122.2	117.3	119.0



**Maximum Dry Density,
lbs.cu.ft.**

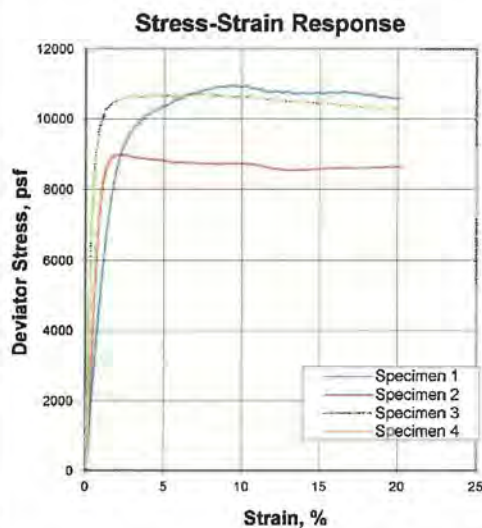
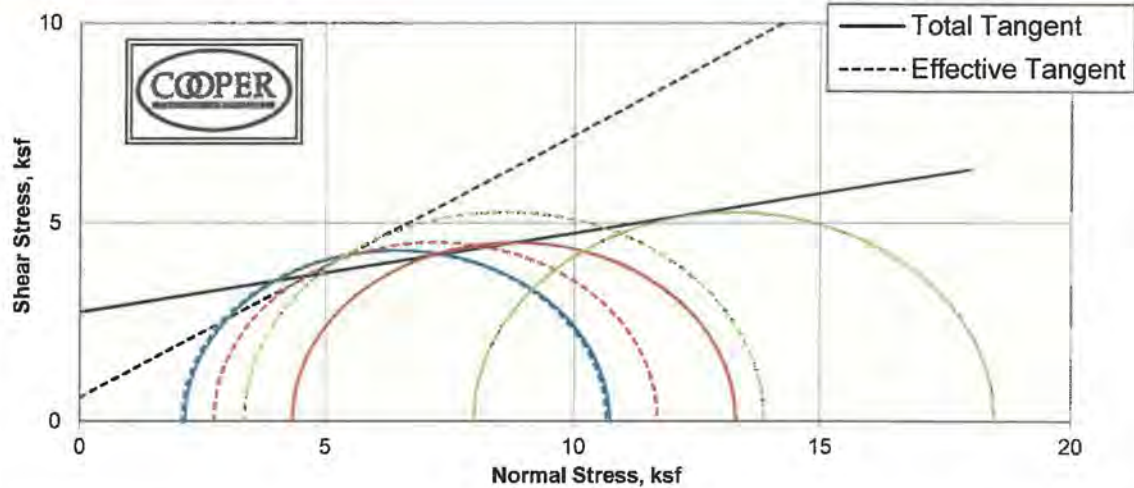
122.4

Optimum Moisture Content

11.1%

SDS#: -

Consolidated Undrained Triaxial Compression with Pore Pressure ASTM D4767

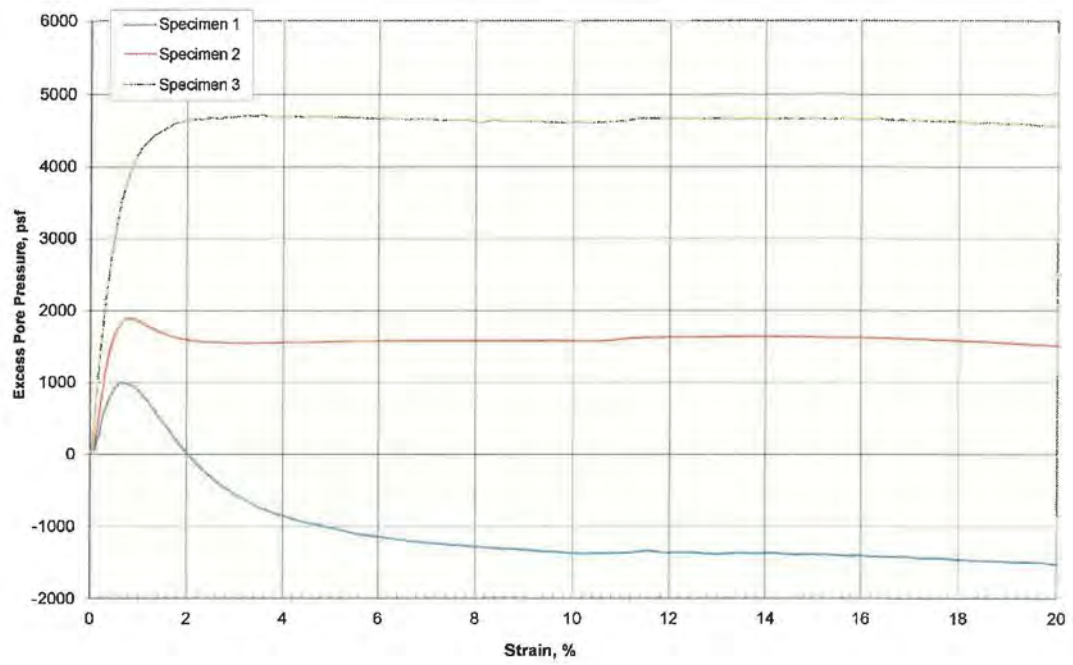


Specimen	1	2	3	4
Boring	TP 27	TP 27	TP 27	
Sample				
Depth	5-5.5	5-5.5	5-5.5	
Visual Description	Pale Brown Clayey SAND	Pale Brown Clayey SAND	Pale Brown Clayey SAND	
MC (%)	10.7	10.6	10.3	
Dry Density (pcf)	118.5	116.4	117.0	
Saturation (%)	65.4	61.6	60.7	
Void Ratio	0.449	0.475	0.468	
Diameter (in)	2.88	2.88	2.88	
Height (in)	5.68	5.79	5.78	
	Final			
MC (%)	15.3	16.0	15.0	
Dry Density (pcf)	120.8	119.2	121.5	
Saturation (%)	100.0	100.0	100.0	
Void Ratio	0.421	0.440	0.413	
Diameter (in)	2.85	2.85	2.83	
Height (in)	5.66	5.75	5.74	
Cell Pressure (psi)	115.1	129.9	155.1	
Back Pressure (psi)	100.3	100.1	99.8	
	Effective Stresses At:			
Strain (%)	2.0	2.0	2.0	
Deviator (ksf)	8.595	8.982	10.522	
Excess PP (psi)	0.5	11.1	32.1	
Sigma 1 (ksf)	10.654	11.689	13.865	
Sigma 3 (ksf)	2.059	2.707	3.343	
P (ksf)	6.356	7.198	8.604	
Q (ksf)	4.298	4.491	5.261	
Stress Ratio	5.176	4.318	4.148	
Rate (in/min)	0.0005	0.0005	0.0005	

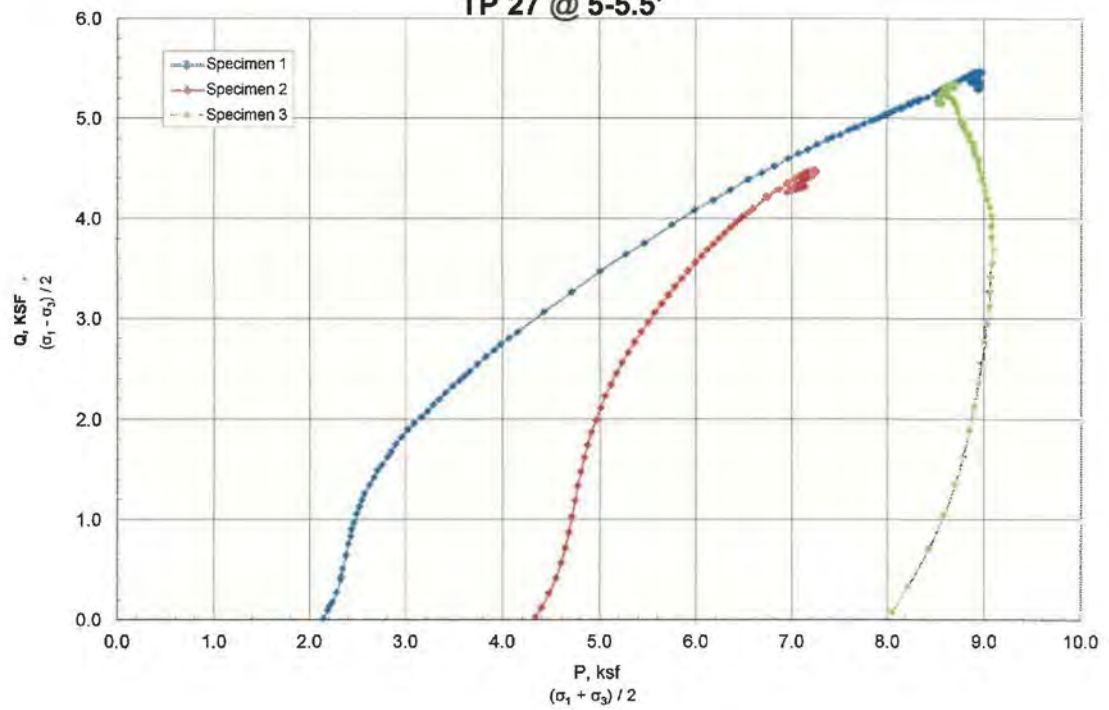
CTL Number:	504-004
Client Name:	Krazan & Associates
Project Name:	Guzman Reservoir
Project Number:	02215055
Date:	1/30/2017
By:	MD/DC
Total C	3.350 ksf
Total phi	8.4 degrees
Eff. C	1.900 ksf
Eff. Phi	23.7 degrees ©

Remarks: The samples arrived at lab remolded. Specimen 1 had a height:diameter ratio less than the required 2:1 and had the highest dry density. Specimen one reacted differently than the other samples. No phi and C is reported. Strengths were picked at 2% strain. The trend looks reasonable at 2% but the cohesion and friction angle do not look realistic. **Krazan: C and Phi reported do not consider Specimen 1**

Pore Pressure Response TP 27 @ 5-5.5'



P vs. Q TP 27 @ 5-5.5'



Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP27 @ 6-6.5'
Soil Classification : CL

Wet Weight	:	324.20
Dry Weight	:	309.50
Moisture Content	:	5%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.9	0.3	0.3	99.7
#8	2.36	4.9	1.6	1.9	98.1
#16	1.18	13.1	4.2	6.1	93.9
#30	0.60	19.0	6.1	12.2	87.8
#50	0.30	22.5	7.3	19.5	80.5
#100	0.15	22.9	7.4	26.9	73.1
#200	0.08	21.5	6.9	33.9	66.1

Hydrometer Analysis

ASTM D422

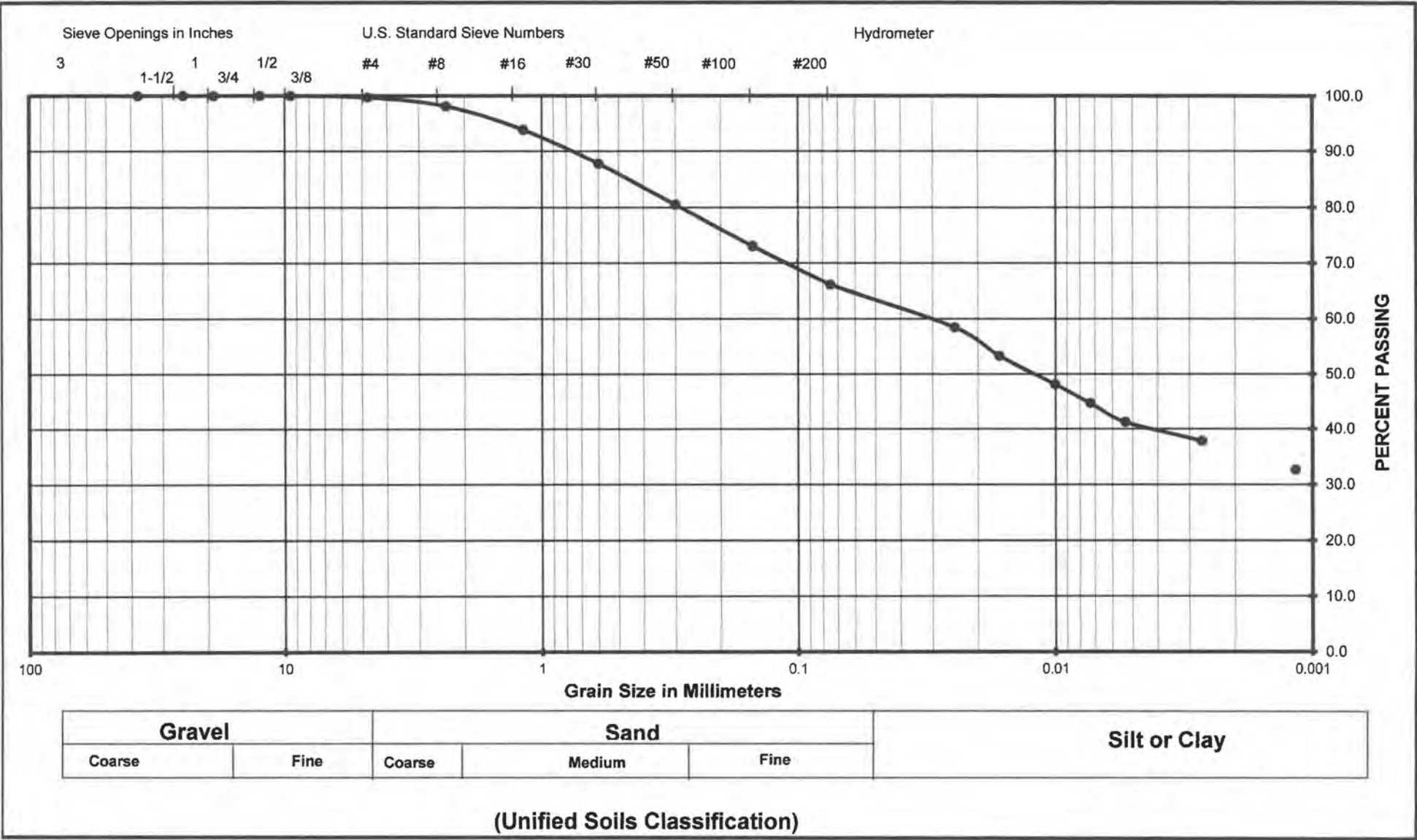
Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP27 @ 6-6.5'
Soil Classification : CL

Dry Weight Used	93.6 g
Temperature	20.0 C
Soil Specific Gravity	2.65
Solution Spec. Grav.	1.003
K Value	0.01365
Correction Factor	0.00000

Elapsed Time (min)	Hydro. Reading	Hydro. Corrected	% Passing	Particle Diameter
2	1.037	1.037	58.4	0.0246
5	1.034	1.034	53.3	0.0165
15	1.031	1.031	48.1	0.0100
30	1.029	1.029	44.7	0.0073
60	1.027	1.027	41.3	0.0053
250	1.025	1.025	37.8	0.0027
1440	1.022	1.022	32.7	0.0012

Particle Diameter	Percent Passing
0.005	40.8
0.002	35.5
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
TP27 @ 6-6.5'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**
 Project Number: **022-15055**
 Date Sampled: 5/31/2016
 Sampled By: DA
 Sample Number:
 Sample Location: TP27 @ 6-6.5'
 Sample Description: CL

Date Tested: 10/31/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

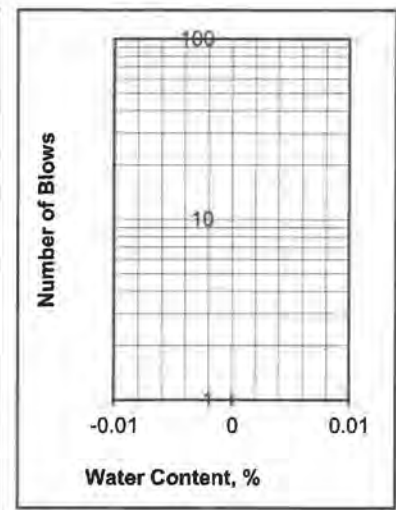
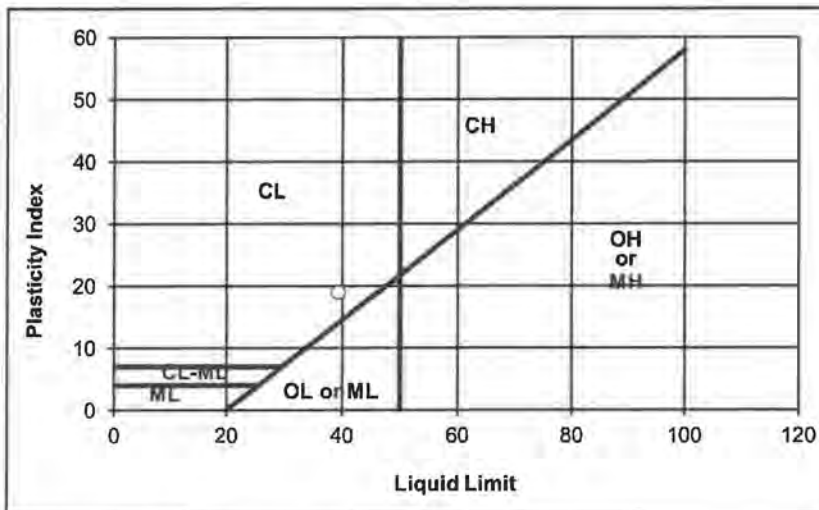
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	19.00	19.14		25.89		
Weight of Dry Soil & Tare (g)	18.24	18.38		22.73		
Weight of Tare (g)	14.47	14.39		14.69		
Weight of water (g)	0.76	0.76		3.16		
Weight of Dry Soil (g)	3.77	3.99		8.04		
Water Content (% of dry wt.)	20.1%	19.1%		39.3%		
Number of Blows				25		

Plastic Limit : 20

Liquid Limit : 39

Plasticity Index : 19
 Unified Soil Classification : CL

Requirement:
 Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP28 @ 2-2.5'
Soil Classification : SC-CL

Wet Weight	:	411.00
Dry Weight	:	395.70
Moisture Content	:	4%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.3	0.1	0.1	99.9
#8	2.36	7.3	1.8	1.9	98.1
#16	1.18	23.4	5.9	7.8	92.2
#30	0.60	37.4	9.5	17.3	82.7
#50	0.30	45.2	11.4	28.7	71.3
#100	0.15	44.1	11.1	39.9	60.1
#200	0.08	37.1	9.4	49.2	50.8

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP28 @ 2-2.5'
Soil Classification : SC-CL

Dry Weight Used	102.7 g
Temperature	20.0 C
Soil Specific Gravity	2.65
Solution Spec. Grav.	1.003
K Value	0.01365
Correction Factor	0.00000

Elapsed Time (min)	Hydro. Reading	Hydro. Corrected	% Passing	Particle Diameter
2	1.033	1.033	47.0	0.0266
5	1.031	1.031	43.9	0.0174
15	1.029	1.029	40.7	0.0103
30	1.028	1.028	39.2	0.0074
60	1.026	1.026	36.0	0.0054
250	1.024	1.024	32.9	0.0027
1440	1.019	1.019	25.1	0.0012

Particle Diameter	Percent Passing
0.005	35.6
0.002	29.1
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC-CL
TP28 @ 2-2.5'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**
 Project Number: **022-15055**
 Date Sampled: 5/31/2016
 Sampled By: DA
 Sample Number:
 Sample Location: TP28 @ 2-2.5'
 Sample Description: SC-CL

Date Tested: 10/31/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

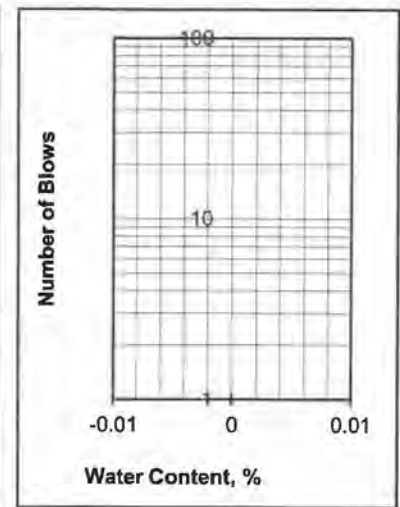
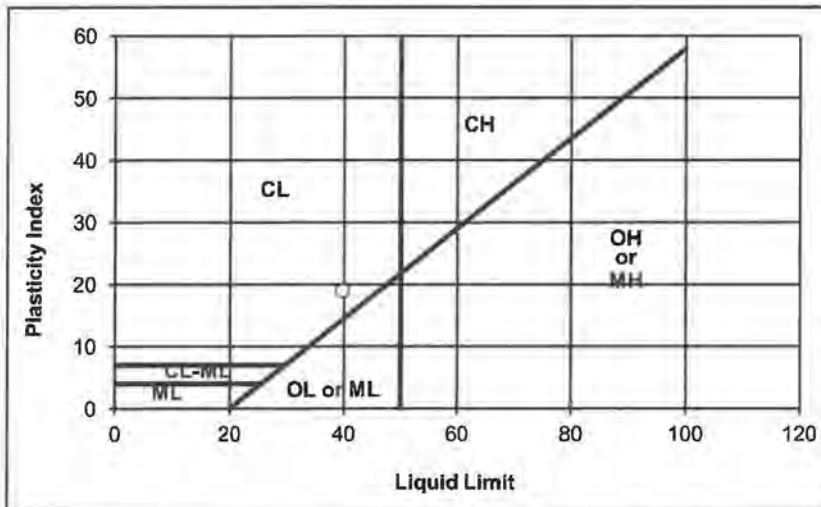
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	18.16	19.41		25.88		
Weight of Dry Soil & Tare (g)	17.57	18.53		22.60		
Weight of Tare (g)	14.68	14.40		14.35		
Weight of water (g)	0.59	0.88		3.28		
Weight of Dry Soil (g)	2.89	4.13		8.25		
Water Content (% of dry wt.)	20.3%	21.2%		39.7%		
Number of Blows				25		

Plastic Limit : 21

Liquid Limit : 40

Plasticity Index : 19
 Unified Soil Classification : CL

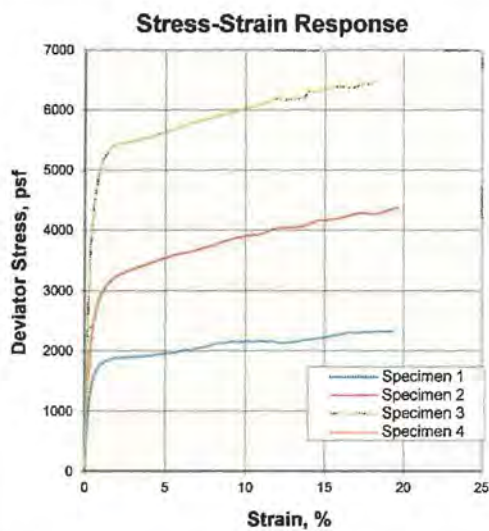
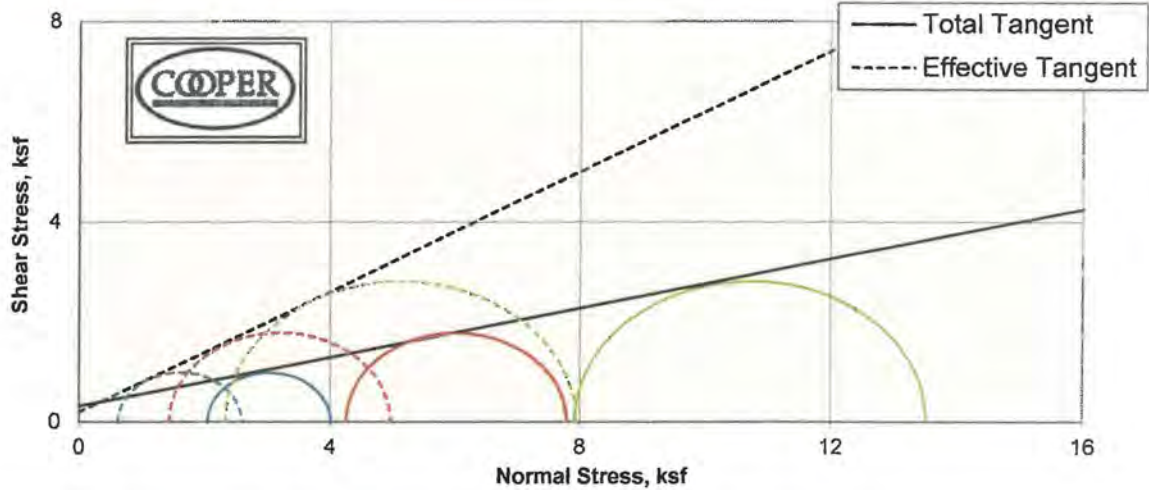
Requirement:
 Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

**Consolidated Undrained Triaxial Compression with Pore Pressure
ASTM D4767**

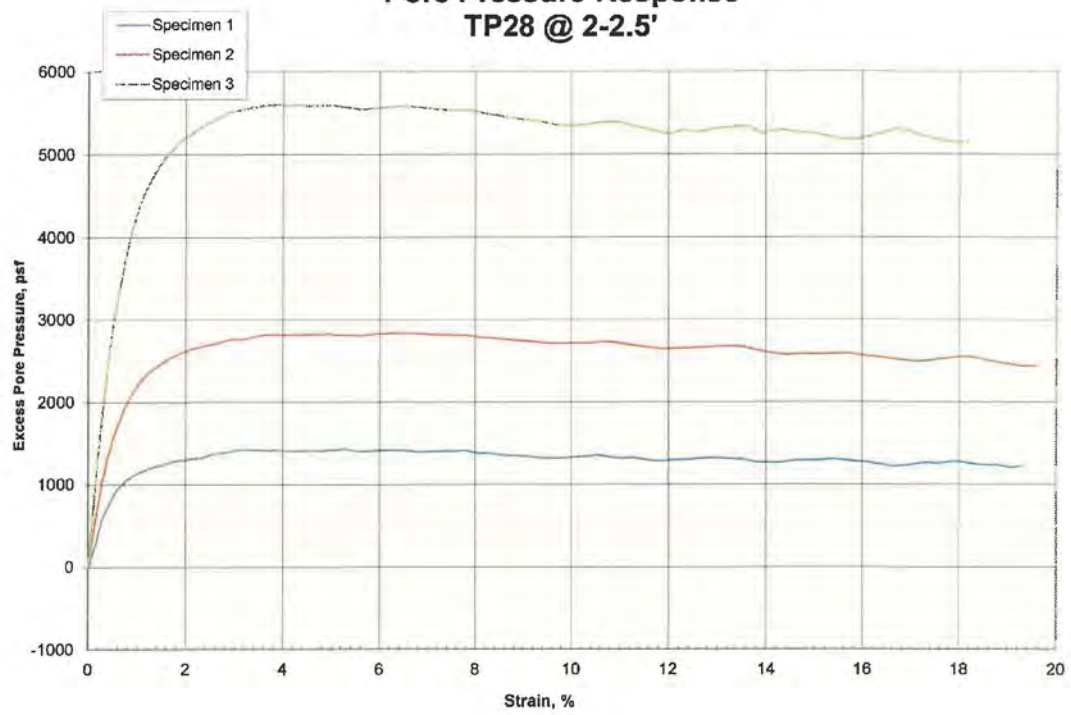


Specimen	1	2	3	4
Boring	TP28	TP28	TP28	
Sample	1	2	3	
Depth	2-2.5	2-2.5	2-2.5	
Visual Description	Dark Brown Clayey SAND w/ organics	Dark Brown Clayey SAND w/ organics	Dark Brown Clayey SAND w/ organics	
MC (%)	11.3	11.7	11.7	
Dry Density (pcf)	109.2	108.2	109.1	
Saturation (%)	54.1	54.9	56.0	
Void Ratio	0.572	0.587	0.573	
Diameter (in)	2.88	2.89	2.88	
Height (in)	5.77	5.78	5.79	
	Final			
MC (%)	19.6	18.1	16.4	
Dry Density (pcf)	111.6	114.6	118.3	
Saturation (%)	100.0	100.0	100.0	
Void Ratio	0.539	0.498	0.451	
Diameter (in)	2.85	2.82	2.80	
Height (in)	5.77	5.70	5.66	
Cell Pressure (psi)	94.6	110.3	134.9	
Back Pressure (psi)	80.5	80.8	80.0	
	Effective Stresses At:			
Strain (%)	5.0	5.0	5.0	
Deviator (ksf)	1.977	3.543	5.623	
Excess PP (psi)	9.9	19.6	38.8	
Sigma 1 (ksf)	2.585	4.964	7.946	
Sigma 3 (ksf)	0.608	1.421	2.323	
P (ksf)	1.597	3.193	5.135	
Q (ksf)	0.989	1.772	2.811	
Stress Ratio	4.252	3.493	3.420	
Rate (in/min)	0.0001	0.0001	0.0001	

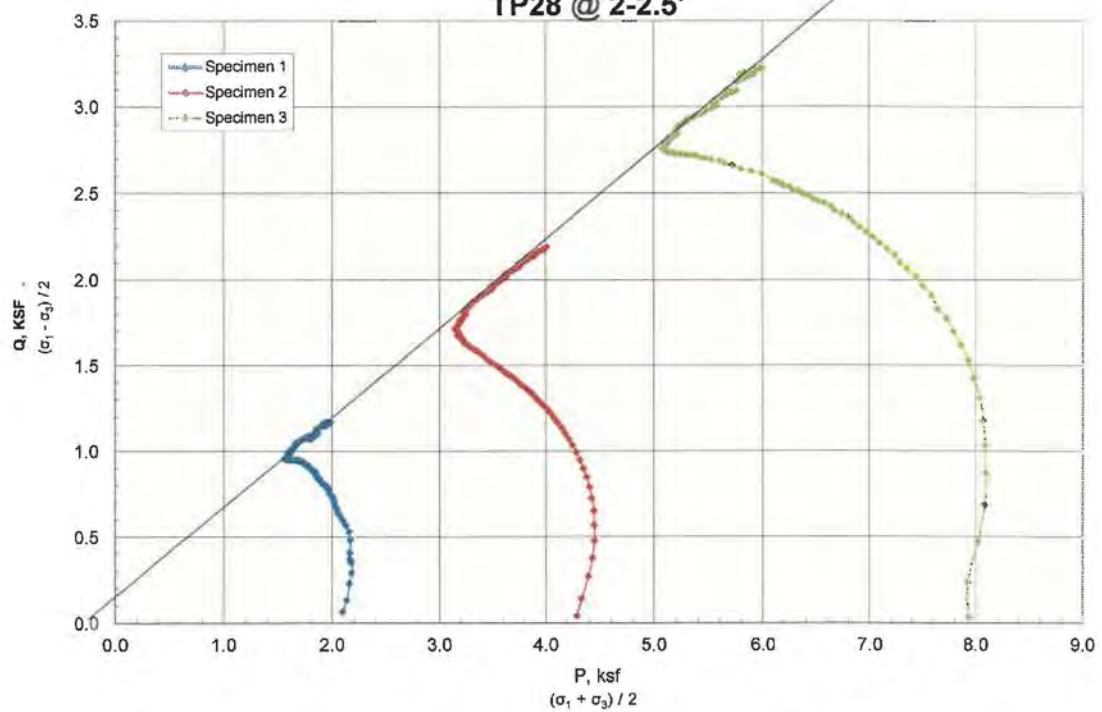
CTL Number:	504-005		
Client Name:	Krazan & Associates		
Project Name:	Guzman Reservoir		
Project Number:	022-15055		
Date:	2/16/2017	By:	MD/DC
Total C	0.320	ksf	
Total phi	13.8	degrees	
Eff. C	0.200	ksf	
Eff. Phi	31.0	degrees	

©

Pore Pressure Response TP28 @ 2-2.5'



P vs. Q TP28 @ 2-2.5'



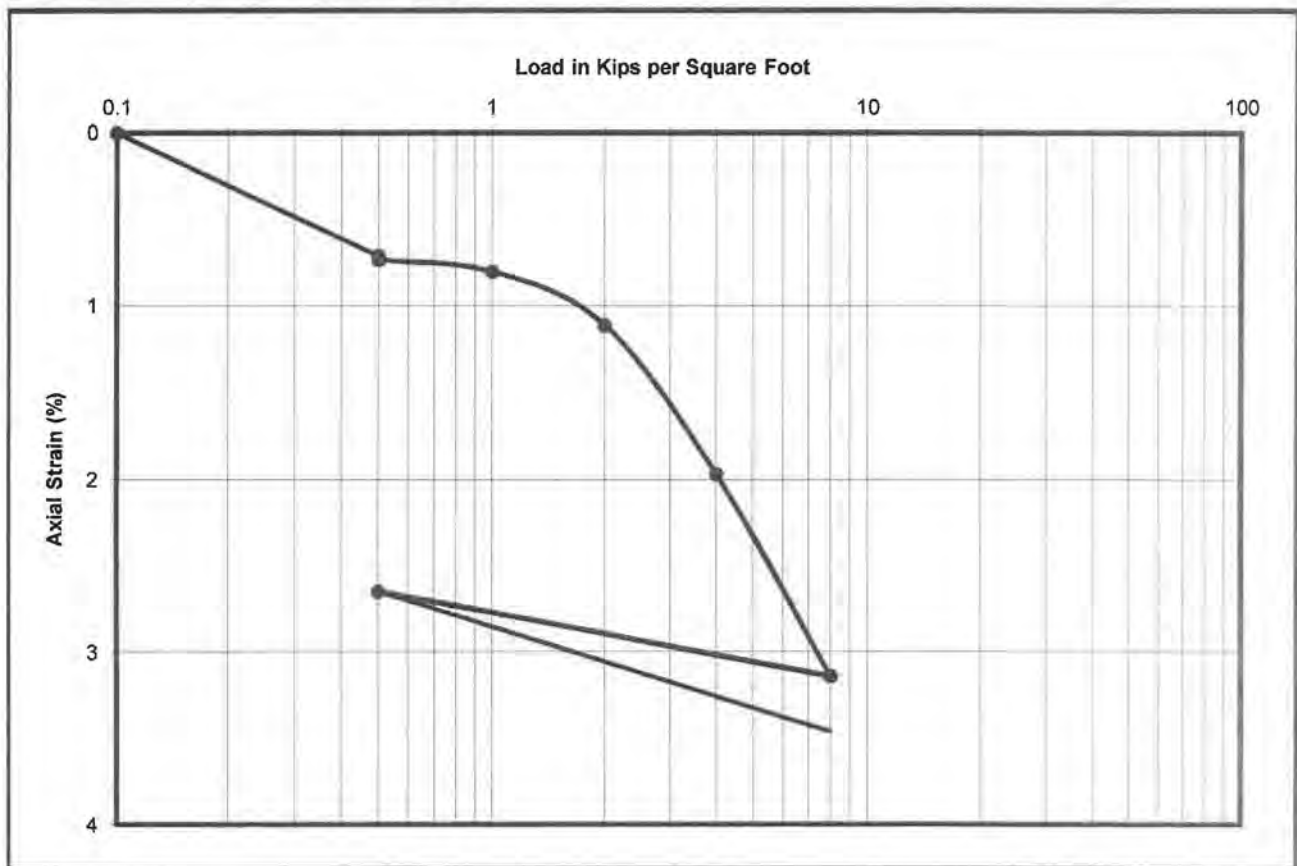
One Dimensional Consolidation Properties of Soil

ASTM D - 2435 / AASHTO T - 216

Project Number : 022-15055
 Project Name : Guzman
 Date : 2/27/2017
 Sample Location : TP28 @ 2-2.5'
 Soil Classification : SC-CL
 Sample Condition : Remolded to 95%

Load (ksf)	Axial Strain (%)	Void Ratio, e
0.1	0	0.358
0.5	0.71	0.348
Satur.	0.73	0.348
1	0.8	0.347
2	1.11	0.343
4	1.97	0.331
8	3.14	0.315
0.5	2.65	0.322
8	3.46	0.311

	Initial	Final
Water Content (%)	12.5	17.6
Dry Unit Weight (pcf)	128.2	112.0
Void Ratio	0.358	0.311
Saturation (%)	97.5	88.6
Preconsolidation Pressure (psf)	2100	
Specific Gravity (assumed)	2.79	



Soil Permeability

Flexible Wall, Falling Head (Rising Tail)

ASTM D - 5084 / CAL 220

Project Number : 022-15055
 Project Name : Guzman
 Date : 11/21/2016
 Sample Number : --
 Sample Location : TP28 @ 2-2.5'
 Soil Classification : SC-CL

Max Dry Density, lbs/cu.ft	124.1	Degree of Sat. %		Max. Particle Size	0.0
Optimum Moisture, %	10.9	%Over Optimum		% Passing 3/8"	--
Initial Dry Density, lbs/cu.ft	117.9	Initial Diameter, cm	3.56	% Passing # 10	--
Initial Moisture, %	10.9	Initial Length, cm	7.11	% Passing # 200	--
Sample Compaction, %	--	Initial Area sq.cm	9.95	Temperature	20.0
Final Dry Density, lbs/cu.ft	--	Final Diameter, cm	3.56	Type of Permeant	Tap Water
Final Moisture, %	--	Final Length, cm	7.11	$\Delta\mu$ (Pore Pressure)	5.0
Specific Gravity (Assumed)	2.7	Final Area, sq.cm	9.95	$\Delta\sigma$ (Cell Pressure)	5.0
Comp. Procedure	Undisturbed			$\Delta\mu/\Delta\sigma$ (B Value)	1.00

Test	Start Time	Finish Time	H in Start	H in Final	H out Start	H out Final	Back Press	Tail Press.	Cell Press
1	12:25	12:40	2.20	2.24	7.70	7.64	29.0	19.0	30.0
2	12:41	13:02	2.24	2.30	7.64	7.56	29.0	19.0	30.0
3	13:03	13:19	2.30	2.36	7.56	7.50	29.0	19.0	30.0
4									
5									
6									

Test	Time sec	h1/h2	K cm/sec	k20 cm/sec
1	900	0.99897	1.1E-07	1.071E-07
2	1260	0.99861	1.0E-07	1.041E-07
3	960	0.99890	1.1E-07	1.082E-07
4				
5				
6				

Permeability
1.06E-07 cm/sec
1.06E-09 m/sec

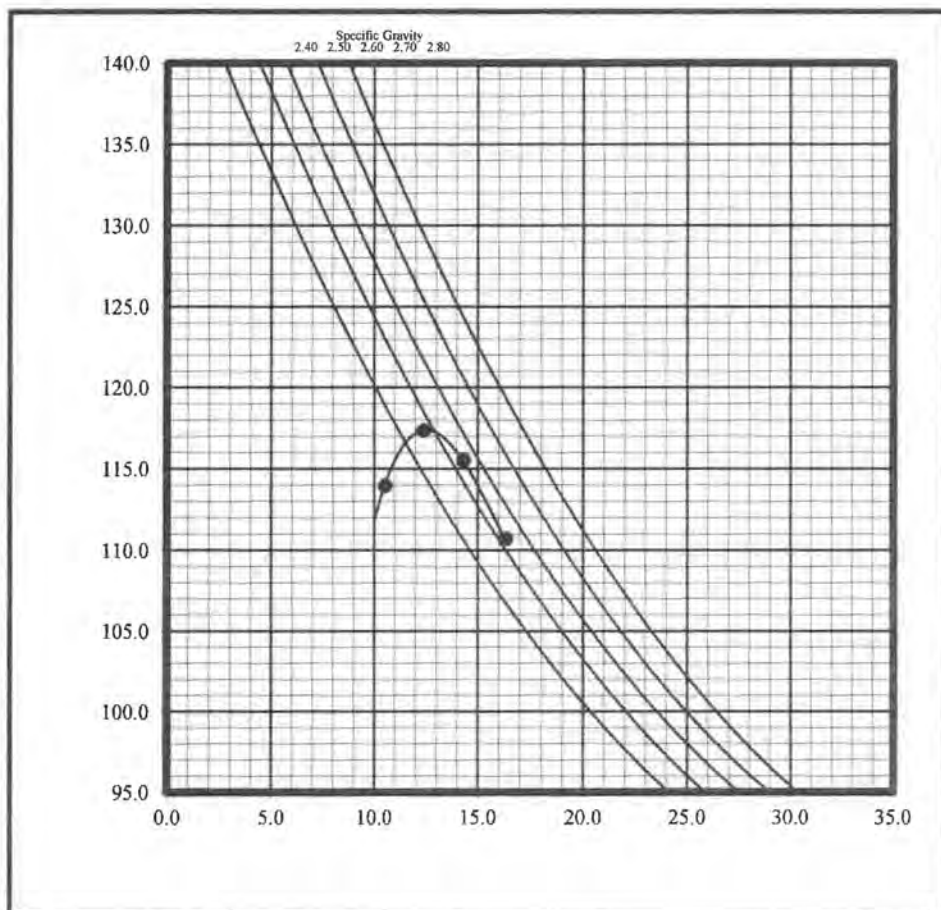
**& ASSOCIATES, INC.**

GEOTECHNICAL ENGINEERING ENVIRONMENTAL ENGINEERING CONSTRUCTION TESTING & INSPECTION

**Laboratory Compaction Characteristics
of Soil using Modified Effort (56,000 ft. - lbf/ft³)
ASTM D1557**

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	SC-CL
Technician	DJ 12075	Soil Description	Brn Clayey Sand/Sandy Clay
Date	11/3/2016	Method	D1557a
Sample Location	TP28 @ 2-2.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	3982.0	3984.0	3892.0	3934.0
Mass of Compaction Mold, gm	1990.0	1990.0	1990.0	1990.0
Mass of Moist Specimen, gm	1992.0	1994.0	1902.0	1944.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	131.9	132.0	125.9	128.7
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	178.0	175.0	181.0	172.0
Moisture Content (%)	12.4	14.3	10.5	16.3
Dry Density, lbs/cu.ft.	117.4	115.5	114.0	110.7



**Maximum Dry Density,
lbs.cu.ft.**

117.4

Optimum Moisture Content

12.5%

SDS#: -

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/21/2016
Sample Location : TP28 @ 4-4.5'
Soil Classification : CL

Wet Weight	:	400.60
Dry Weight	:	378.10
Moisture Content	:	6%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	1.6	0.4	0.4	99.6
#8	2.36	12.3	3.3	3.7	96.3
#16	1.18	25.1	6.6	10.3	89.7
#30	0.60	28.9	7.6	18.0	82.0
#50	0.30	29.9	7.9	25.9	74.1
#100	0.15	27.8	7.4	33.2	66.8
#200	0.08	27.2	7.2	40.4	59.6

Grain Size Analysis



Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP28 @ 6-6.5'
Soil Classification : CL

Wet Weight	:	308.80
Dry Weight	:	291.20
Moisture Content	:	6%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.3	0.1	0.1	99.9
#8	2.36	2.4	0.8	0.9	99.1
#16	1.18	7.0	2.4	3.3	96.7
#30	0.60	12.7	4.4	7.7	92.3
#50	0.30	15.4	5.3	13.0	87.0
#100	0.15	17.3	5.9	18.9	81.1
#200	0.08	19.2	6.6	25.5	74.5

Hydrometer Analysis

ASTM D422

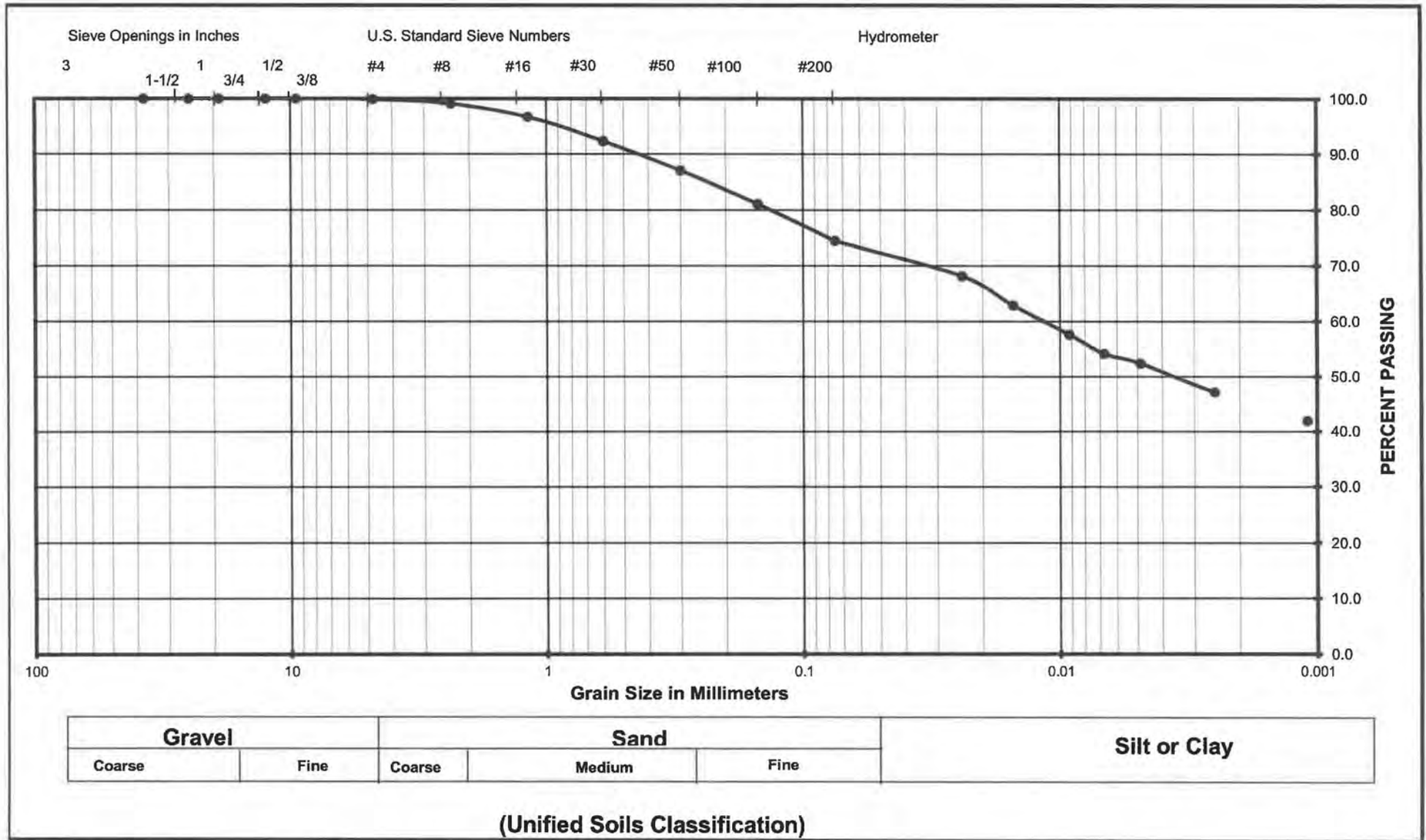
Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP28 @ 6-6.5'
Soil Classification : CL

Dry Weight Used	92.1 g
Temperature	20.0 C
Soil Specific Gravity	2.65
Solution Spec. Grav.	1.003
K Value	0.01365
Correction Factor	0.00000

Elapsed Time (min)	Hydro. Reading	Hydro. Corrected	% Passing	Particle Diameter
2	1.042	1.042	68.1	0.0240
5	1.039	1.039	62.9	0.0152
15	1.036	1.036	57.7	0.0092
30	1.034	1.034	54.2	0.0067
60	1.033	1.033	52.4	0.0049
250	1.03	1.03	47.2	0.0025
1440	1.027	1.027	41.9	0.0011

Particle Diameter	Percent Passing
0.005	52.5
0.002	45.3
0	NA

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 CL
 TP28 @ 6-6.5'

ASTM C136 /
 D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**
 Project Number: **022-15055**
 Date Sampled: 5/31/2016
 Sampled By: DA
 Sample Number:
 Sample Location: TP28 @ 6-6.5'
 Sample Description: CL

Date Tested: 10/31/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

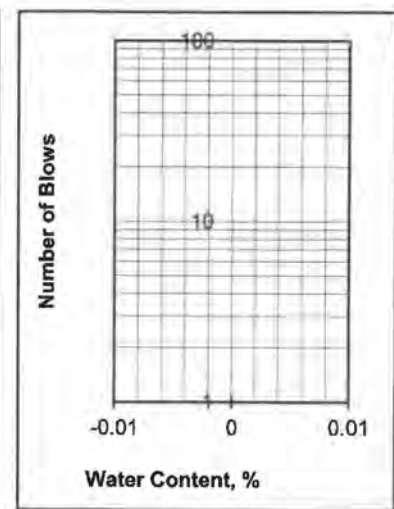
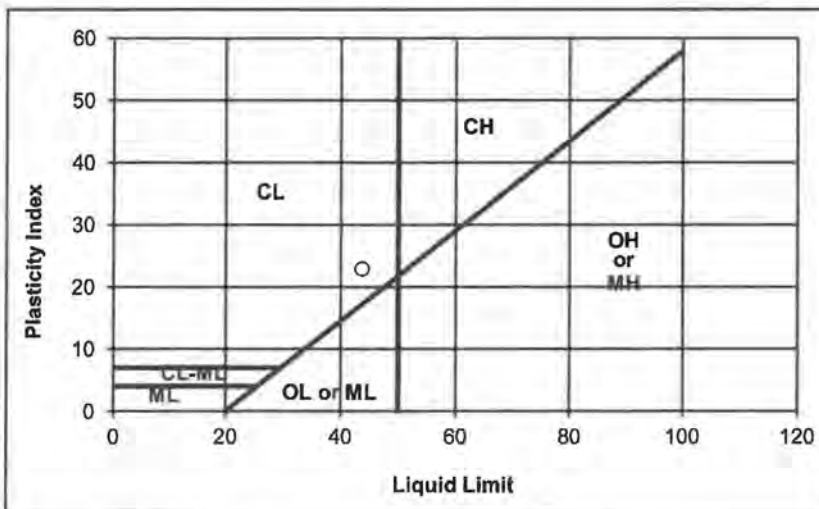
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	17.74	18.00		26.73		
Weight of Dry Soil & Tare (g)	17.13	17.37		23.05		
Weight of Tare (g)	14.16	14.35		14.64		
Weight of water (g)	0.61	0.63		3.68		
Weight of Dry Soil (g)	2.97	3.02		8.41		
Water Content (% of dry wt.)	20.5%	20.8%		43.7%		
Number of Blows				25		

Plastic Limit : 21

Liquid Limit : 44

Plasticity Index : 23
 Unified Soil Classification : CL

Requirement:
 Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP28 @ 8-8.5'
Soil Classification : CL

Wet Weight	:	303.00
Dry Weight	:	280.30
Moisture Content	:	8%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75				100.0
#8	2.36	3.1	1.1	1.1	98.9
#16	1.18	14.0	5.0	6.1	93.9
#30	0.60	20.6	7.3	13.4	86.6
#50	0.30	24.6	8.8	22.2	77.8
#100	0.15	25.9	9.2	31.5	68.5
#200	0.08	21.7	7.7	39.2	60.8

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP28 @ 8-8.5'
Soil Classification : CL

Dry Weight Used	94.1 g
Temperature	20.0 C
Soil Specific Gravity	2.65
Solution Spec. Grav.	1.003
K Value	0.01365
Correction Factor	0.00000

Elapsed Time (min)	Hydro. Reading	Hydro. Corrected	% Passing	Particle Diameter
2	1.034	1.034	53.0	0.0261
5	1.03	1.03	46.2	0.0177
15	1.027	1.027	41.0	0.0107
30	1.024	1.024	35.9	0.0079
60	1.021	1.021	30.8	0.0058
250	1.015	1.015	20.5	0.0030
1440	1.012	1.012	15.4	0.0013

Particle Diameter	Percent Passing
0.005	27.9
0.002	17.5
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
TP28 @ 8-8.5'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**
 Project Number: **022-15055**
 Date Sampled: 5/31/2016
 Sampled By: DA
 Sample Number:
 Sample Location: TP28 @ 8-8.5'
 Sample Description: CL

Date Tested: 10/31/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

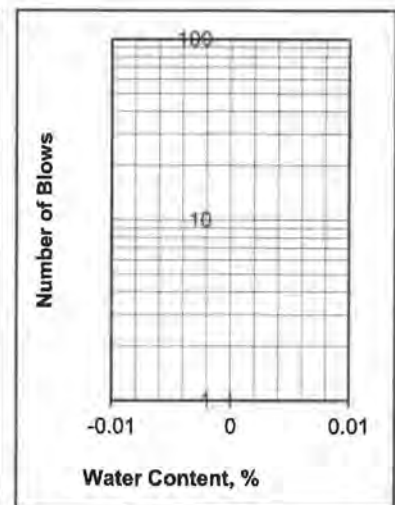
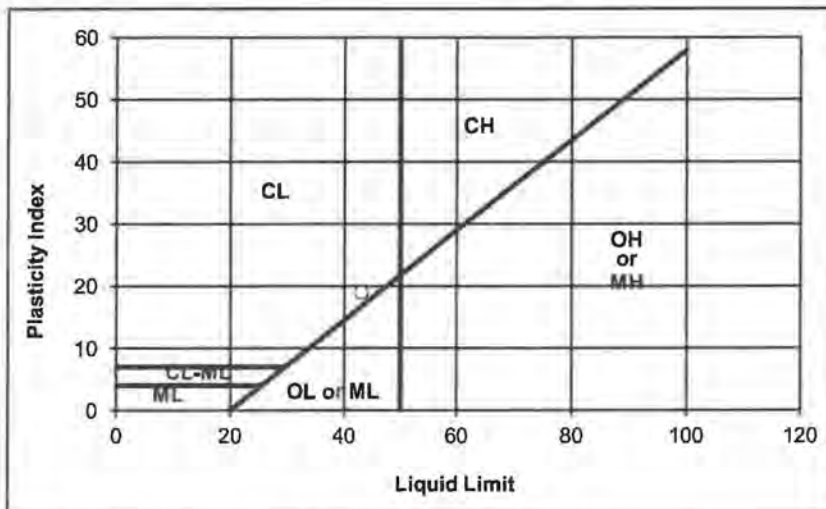
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	18.89	19.06		24.18	33.23	
Weight of Dry Soil & Tare (g)	18.03	18.21		21.10	29.88	
Weight of Tare (g)	14.54	14.49		13.94	22.11	
Weight of water (g)	0.86	0.84		3.08	3.35	
Weight of Dry Soil (g)	3.49	3.72		7.16	7.77	
Water Content (% of dry wt.)	24.5%	22.7%		42.9%	43.1%	
Number of Blows				20	32	

Plastic Limit : 24

Liquid Limit : 43

Plasticity Index : 19
 Unified Soil Classification : CL

Requirement:
 Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Sieve Analysis

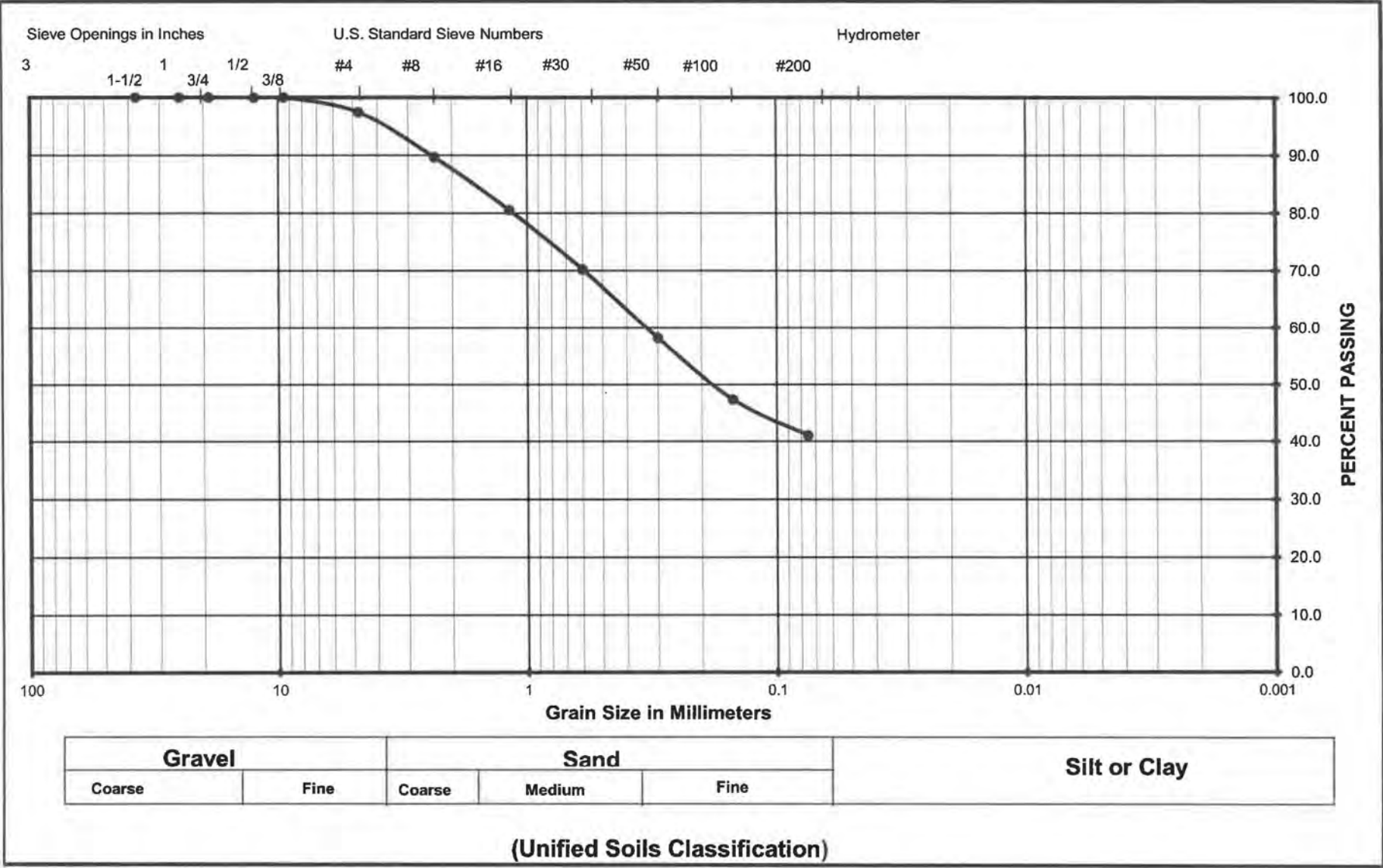
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 9/14/2017
Sample Location : TP28A @ 2-4'
Soil Classification : SC

Wet Weight	:	300.00
Dry Weight	:	292.10
Moisture Content	:	3%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	7.5	2.6	2.6	97.4
#8	2.36	22.6	7.7	10.3	89.7
#16	1.18	26.7	9.1	19.4	80.6
#30	0.60	30.2	10.3	29.8	70.2
#50	0.30	34.9	11.9	41.7	58.3
#100	0.15	31.8	10.9	52.6	47.4
#200	0.08	18.4	6.3	58.9	41.1

Grain Size Analysis



Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**
 Project Number: **022-15055**
 Date Sampled: 8/28/2017
 Sampled By: DA
 Sample Number:
 Sample Location: TP28a @ 2-4'
 Sample Description: SC

Date Tested: 9/13/2017
 Tested By: J Mitchell
 Verified By: J Gruszczynski

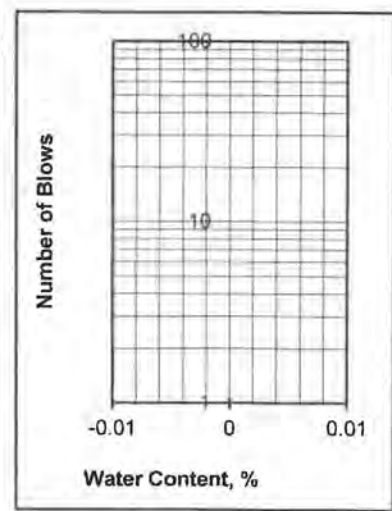
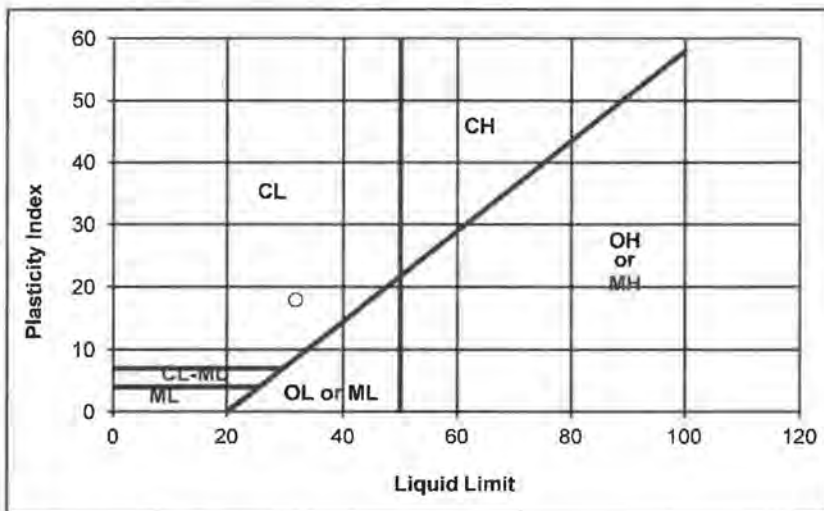
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	24.23	26.75		28.96		
Weight of Dry Soil & Tare (g)	23.06	25.21		25.37		
Weight of Tare (g)	14.21	14.32		14.13		
Weight of water (g)	1.17	1.54		3.58		
Weight of Dry Soil (g)	8.85	10.89		11.25		
Water Content (% of dry wt.)	13.3%	14.1%		31.8%		
Number of Blows				25		

Plastic Limit : 14

Liquid Limit : 32

Plasticity Index : 18
 Unified Soil Classification : CL

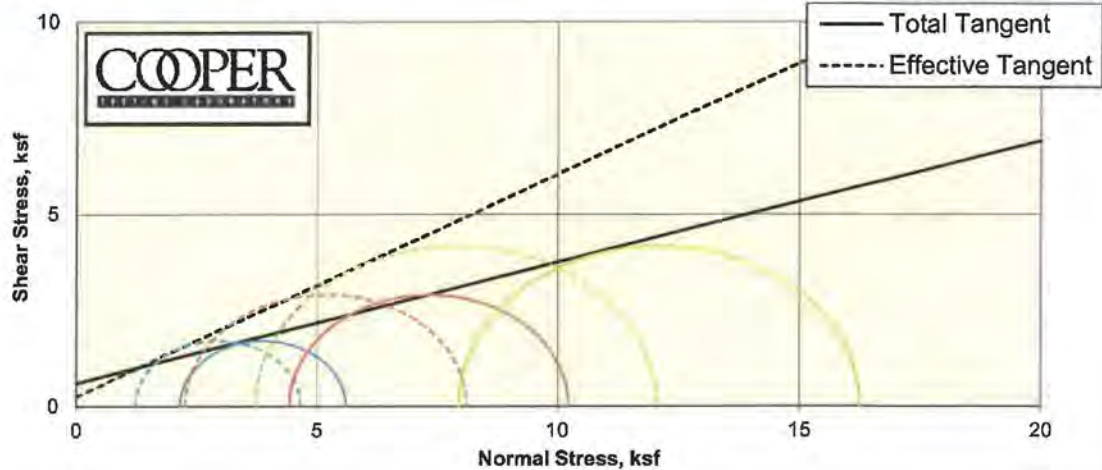
Requirement:
 Approx. % of Material Retained on # 40 Sieve:



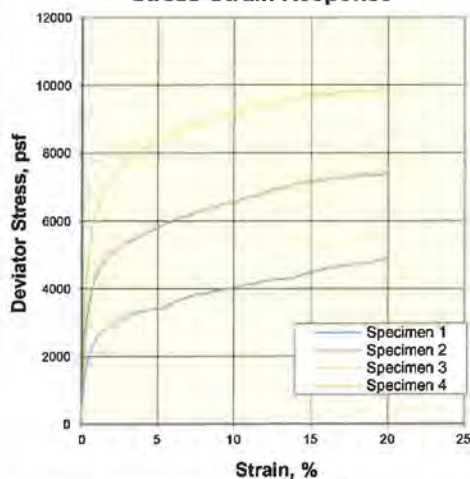
Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

**Consolidated Undrained Triaxial Compression with Pore Pressure
ASTM D4767**



Stress-Strain Response

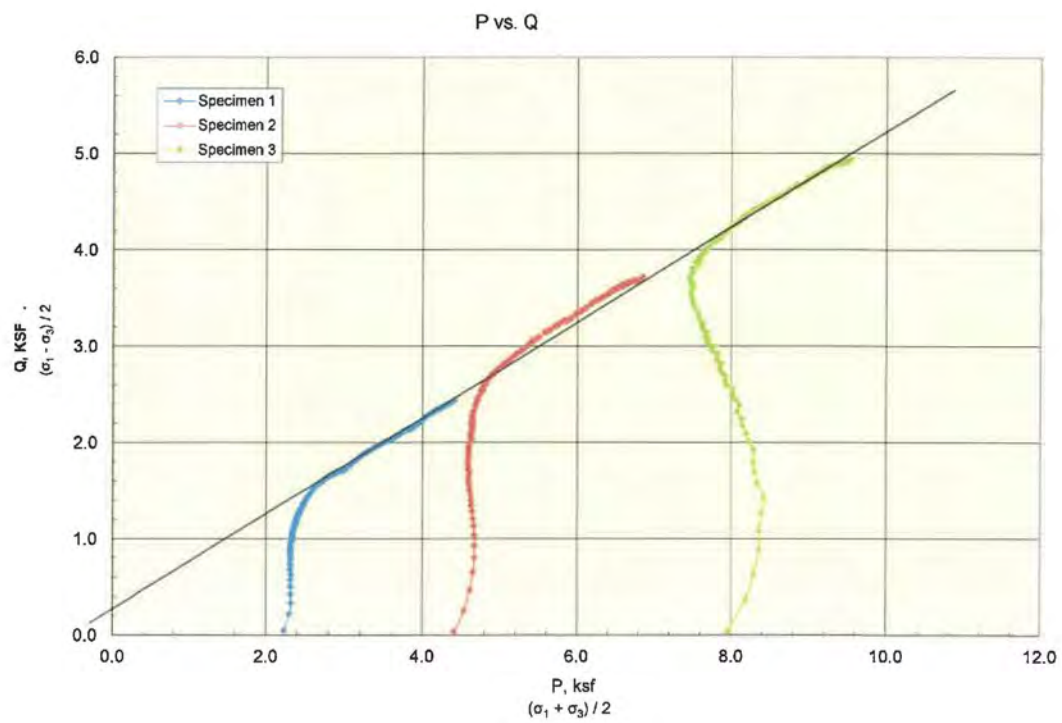
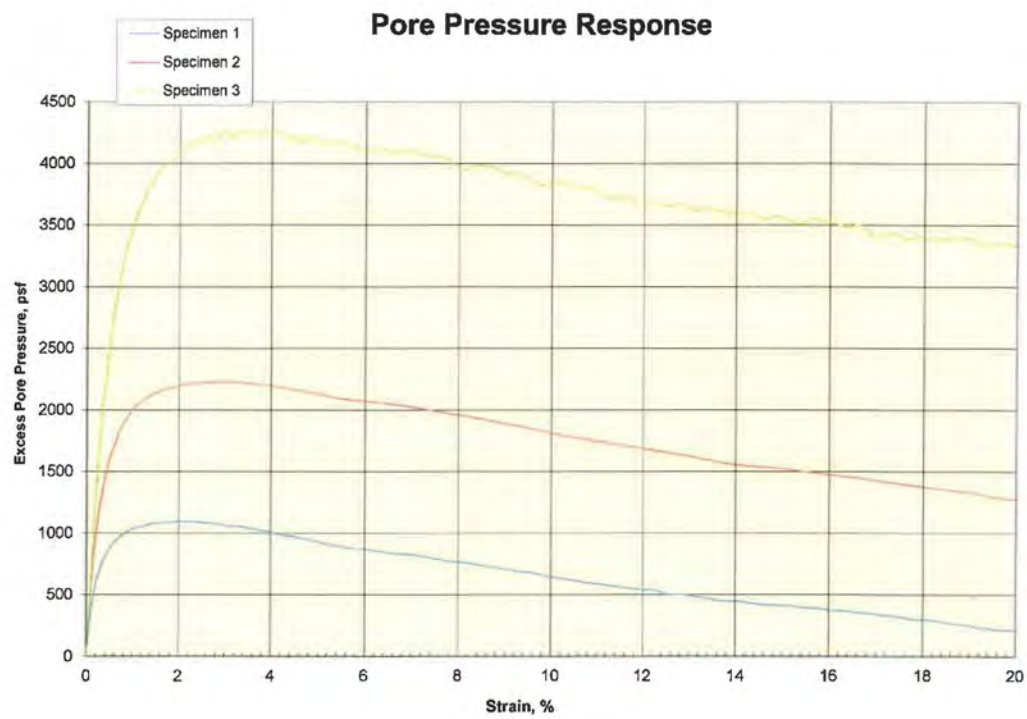


CTL Number:	504-006		
Client Name:	Krazan Associates		
Project Name:	Guzman Reservoir		
Project Number:	022-15055		
Date:	10/20/2017	By:	MD/DC
Total C	0.600	ksf	
Total phi	17.5	degrees	
Eff. C	0.250	ksf	
Eff. Phi	30.0	degrees	©

Remarks: Remolded to 95% of 126.7 pcf @ 11.5%(OPT+/-2%)

Specimen	1	2	3	4
Boring	TP28a	TP28a	TP28a	
Sample				
Depth	2-4	2-4	2-4	
Visual Description	Brown Clayey SAND	Brown Clayey SAND	Brown Clayey SAND	
MC (%)	11.4	11.4	11.4	
Dry Density (pcf)	120.2	120.2	120.2	
Saturation (%)	70.3	70.3	70.3	
Void Ratio	0.454	0.454	0.454	
Diameter (in)	2.38	2.38	2.38	
Height (in)	5.00	5.00	5.00	
	Final			
MC (%)	15.8	14.6	14.7	
Dry Density (pcf)	121.1	124.1	123.8	
Saturation (%)	100.0	100.0	100.0	
Void Ratio	0.443	0.408	0.412	
Diameter (in)	2.37	2.34	2.35	
Height (in)	4.98	4.97	4.97	
Cell Pressure (psf)	104.8	119.9	145.0	
Back Pressure (psf)	89.6	89.2	90.0	
	Effective Stresses At:			
Strain (%)	5.0	5.0	5.0	
Deviator (ksf)	3.413	5.813	8.338	
Excess PP (psi)	6.5	14.8	29.1	
Sigma 1 (ksf)	4.661	8.097	12.072	
Sigma 3 (ksf)	1.248	2.283	3.735	
P (ksf)	2.955	5.190	7.903	
Q (ksf)	1.707	2.907	4.169	
Stress Ratio	3.734	3.546	3.233	
Rate (in/min)	0.0004	0.0004	0.0004	

TP28a, 2-4 ft





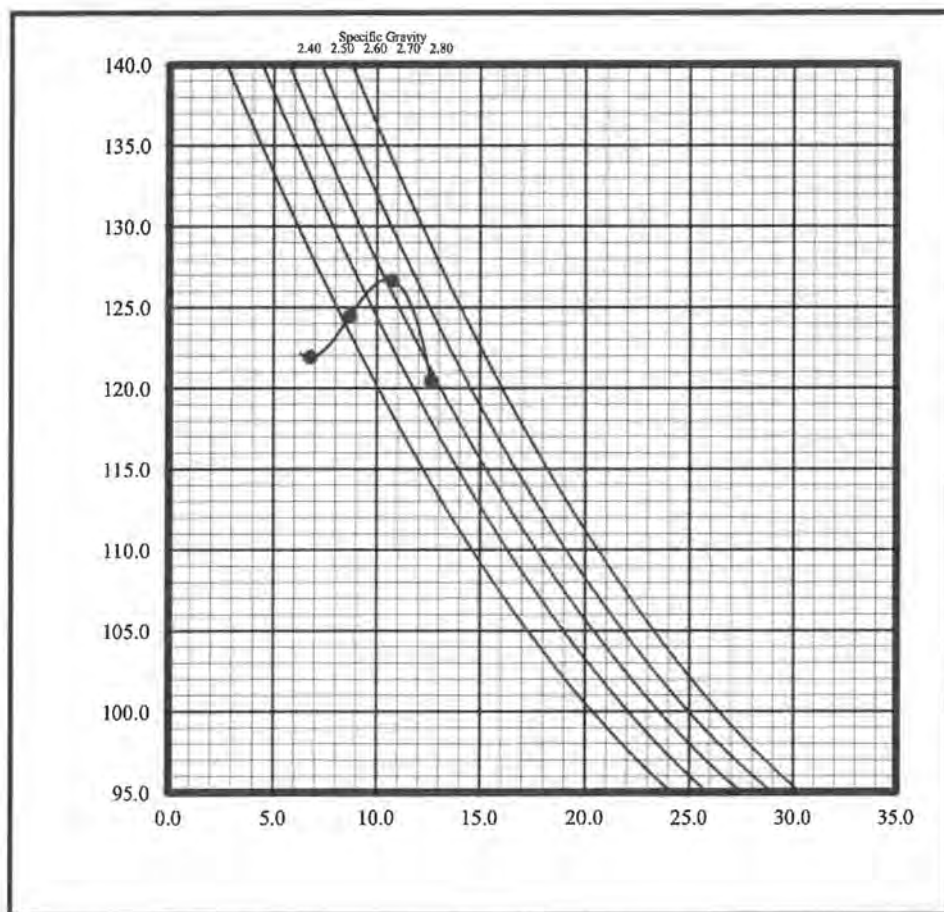
& ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING ENVIRONMENTAL ENGINEERING CONSTRUCTION TESTING & INSPECTION

**Laboratory Compaction Characteristics
of Soil using Modified Effort (56,000 ft. - lbf/ft³)
ASTM D1557**

Project Number	022-15055	Sample Number	-
Project Name	Guzman	Soil Classification	SC
Technician	SH	Soil Description	Brn Clayey Sand
Date	9/11/2017	Method	D1557b
Sample Location	TP28A @ 2-4'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	4023.6	4098.8	4029.0	3946.5
Mass of Compaction Mold, gm	1980.0	1980.0	1980.0	1980.0
Mass of Moist Specimen, gm	2043.6	2118.8	2049.0	1966.5
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	135.3	140.3	135.7	130.2
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	184.0	180.6	177.6	187.3
Moisture Content (%)	8.7	10.7	12.6	6.8
Dry Density, lbs/cu.ft.	124.5	126.7	120.5	121.9



**Maximum Dry Density,
lbs.cu.ft.**

126.7

Optimum Moisture Content

10.5%

SDS#: -

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 9/6/2017
Sample Location : TP28A @ 2-3'
Soil Classification : SC w/ grvl

Wet Weight	:	300.00
Dry Weight	:	288.00
Moisture Content	:	4%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50	20.6	7.2	7.2	92.8
#4	4.75	7.6	2.6	9.8	90.2
#8	2.36	24.7	8.6	18.4	81.6
#16	1.18	38.2	13.3	31.6	68.4
#30	0.60	36.6	12.7	44.3	55.7
#50	0.30	37.0	12.8	57.2	42.8
#100	0.15	30.1	10.5	67.6	32.4
#200	0.08	16.4	5.7	73.3	26.7

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC w/ grvl
 Sample Number: TP28A @ 2-3'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

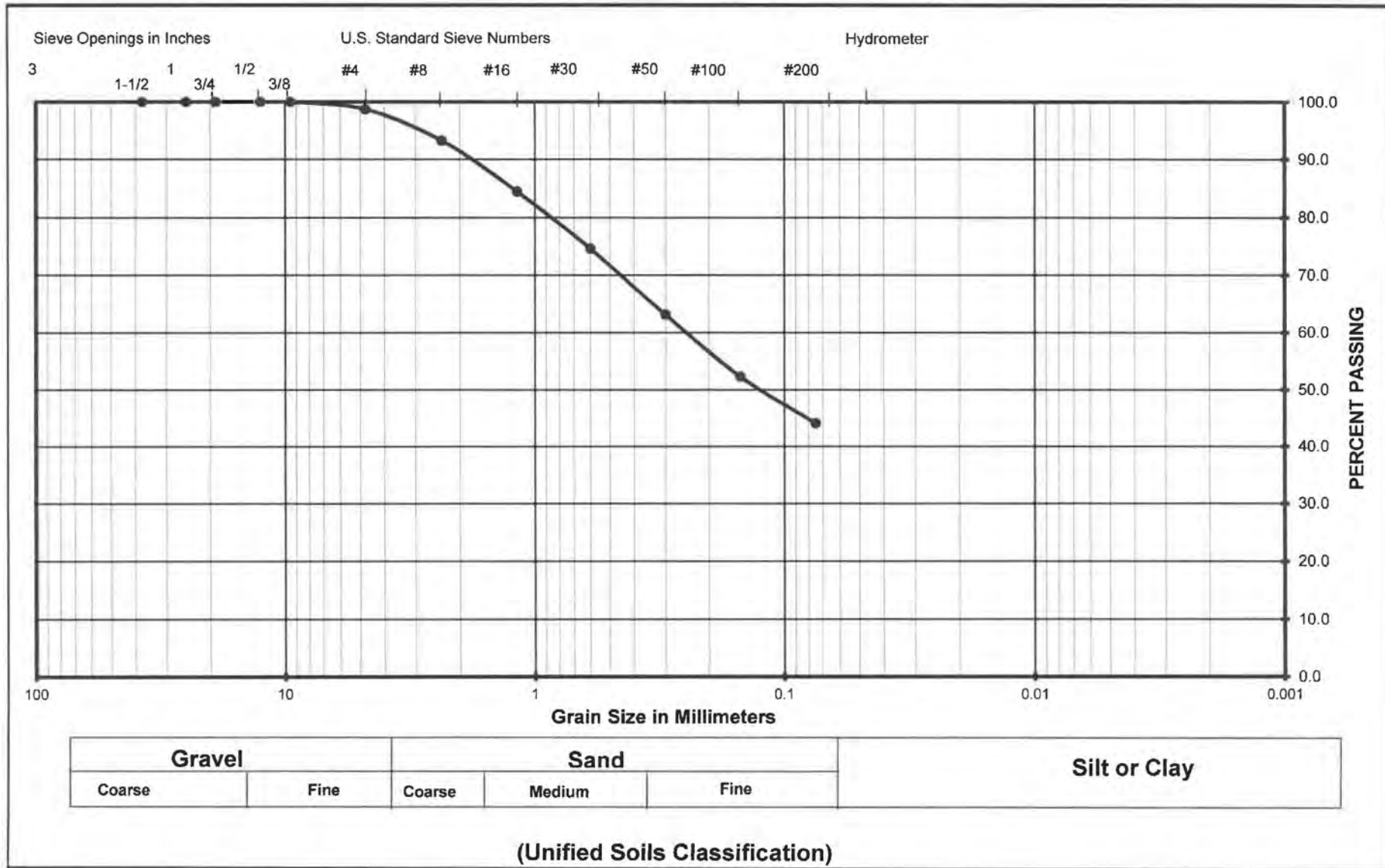
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 9/6/2017
Sample Location : TP28A @ 3-4'
Soil Classification : SC

Wet Weight	:	300.00
Dry Weight	:	284.40
Moisture Content	:	5%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	3.7	1.3	1.3	98.7
#8	2.36	15.5	5.5	6.8	93.2
#16	1.18	25.0	8.8	15.5	84.5
#30	0.60	28.0	9.8	25.4	74.6
#50	0.30	32.7	11.5	36.9	63.1
#100	0.15	30.7	10.8	47.7	52.3
#200	0.08	23.3	8.2	55.9	44.1

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 SC
 TP28A @ 3-4'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
 Project Name : Guzman
 Date : 9/14/2017
 Sample Location : TP28A @ 4-6'
 Soil Classification : CL

Wet Weight	:	300.00
Dry Weight	:	287.10
Moisture Content	:	4%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.4	0.1	0.1	99.9
#8	2.36	4.8	1.7	1.8	98.2
#16	1.18	11.7	4.1	5.9	94.1
#30	0.60	19.3	6.7	12.6	87.4
#50	0.30	27.3	9.5	22.1	77.9
#100	0.15	32.0	11.1	33.3	66.7
#200	0.08	26.4	9.2	42.5	57.5

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
TP28A @ 4-6'

ASTM C136

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**

Project Number: **022-15055**

Date Sampled: 8/28/2017

Sampled By: DA

Sample Number:

Sample Location: TP28a @ 4-6'

Sample Description: CL

Date Tested: 9/18/2017

Tested By: J Mitchell

Verified By: J Gruszczynski

Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	21.18	25.48		30.44		
Weight of Dry Soil & Tare (g)	20.58	23.91		26.22		
Weight of Tare (g)	16.86	13.97		13.45		
Weight of water (g)	0.60	1.57		4.23		
Weight of Dry Soil (g)	3.72	9.94		12.77		
Water Content (% of dry wt.)	16.1%	15.8%		33.1%		
Number of Blows				25		

Plastic Limit : 16

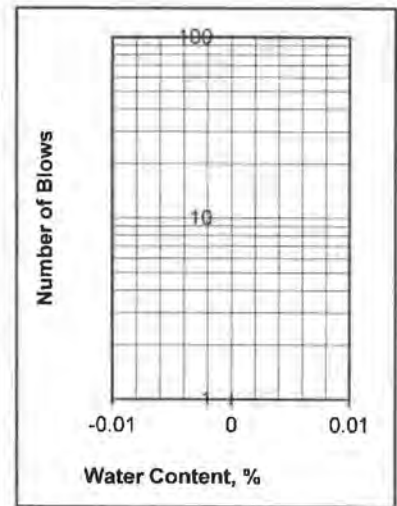
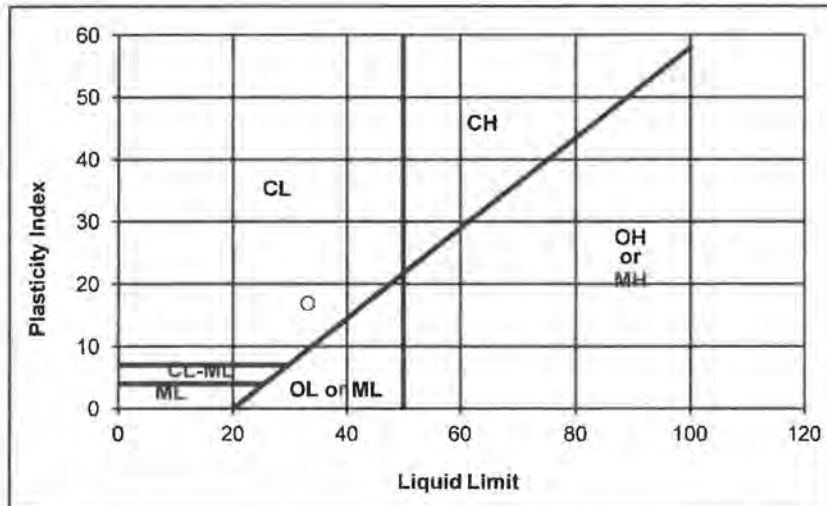
Liquid Limit : 33

Plasticity Index : 17

Unified Soil Classification : CL

Requirement:

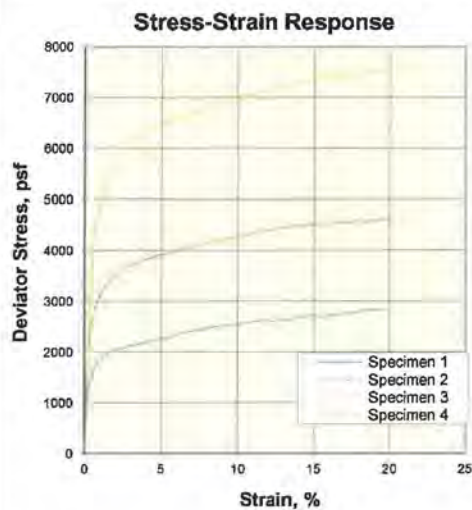
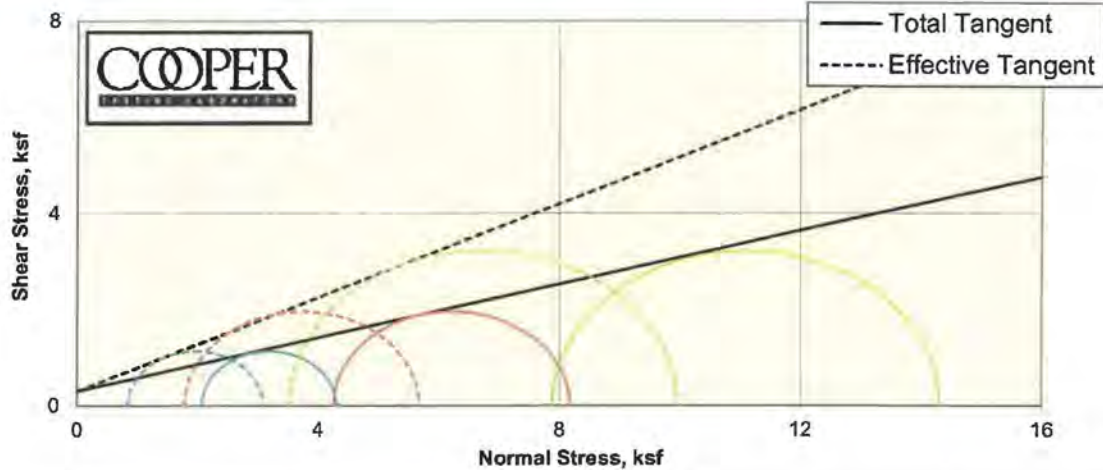
Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

**Consolidated Undrained Triaxial Compression with Pore Pressure
ASTM D4767**



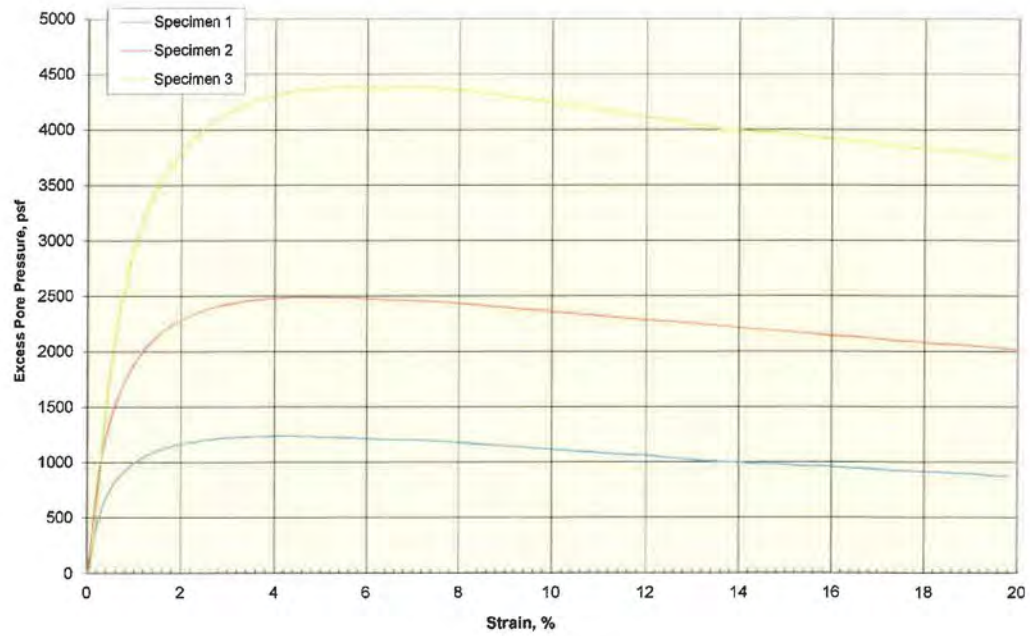
CTL Number:	504-006		
Client Name:	Krazan Associates		
Project Name:	Guzman Reservoir		
Project Number:	022-15055		
Date:	10/19/2017	By:	MD/DC
Total C	0.300	ksf	
Total phi	15.5	degrees	
Eff. C	0.300	ksf	
Eff. Phi	26.0	degrees	©

Remarks: Remolded to 95% of 119.3 pcf @ 12.6%(OPT+/-2%)

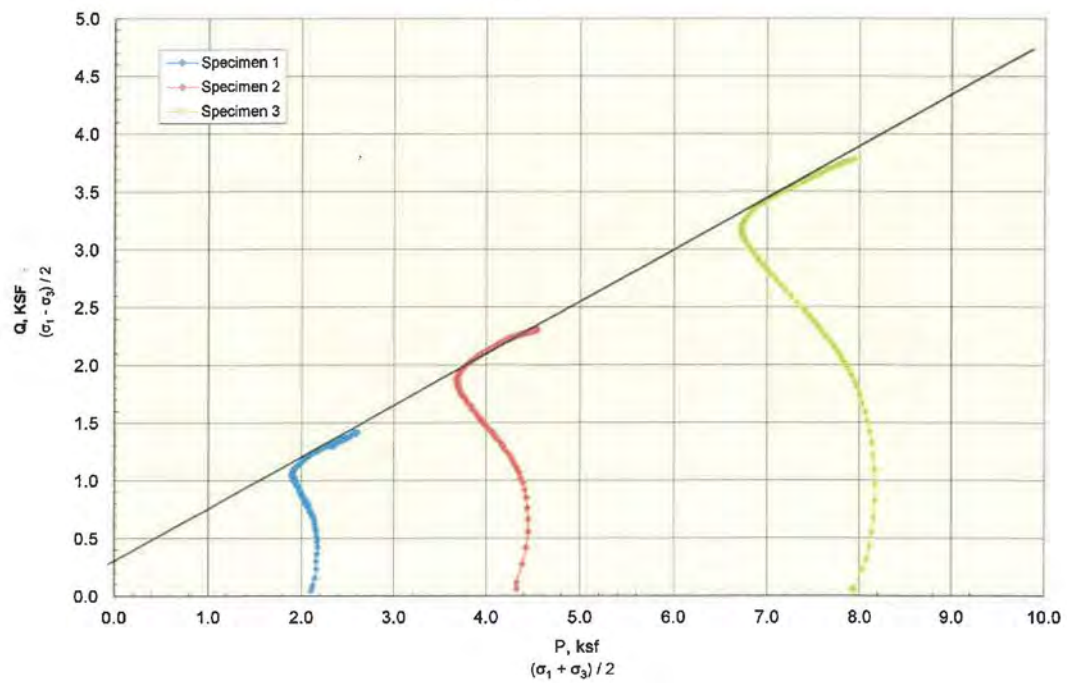
Specimen	1	2	3	4
Boring	TP28a	TP28a	TP28a	
Sample				
Depth	4-6'	4-6'	4-6'	
Visual Description	Strong Brown Clayey SAND/ Sandy CLAY	Strong Brown Clayey SAND/ Sandy CLAY	Strong Brown Clayey SAND/ Sandy CLAY	
MC (%)	12.6	12.5	12.5	
Dry Density (pcf)	112.6	112.7	112.7	
Saturation (%)	63.7	63.7	63.7	
Void Ratio	0.552	0.551	0.551	
Diameter (in)	2.38	2.38	2.38	
Height (in)	5.00	5.00	5.00	
	Final			
MC (%)	21.2	19.7	17.8	
Dry Density (pcf)	109.7	112.7	116.8	
Saturation (%)	100.0	100.0	100.0	
Void Ratio	0.594	0.551	0.497	
Diameter (in)	2.40	2.37	2.34	
Height (in)	5.04	5.00	4.97	
Cell Pressure (psi)	104.7	119.7	145.2	
Back Pressure (psi)	90.5	90.1	90.4	
	Effective Stresses At:			
Strain (%)	5.0	5.0	5.0	
Deviator (ksf)	2.261	3.919	6.443	
Excess PP (psi)	8.5	17.3	30.4	
Sigma 1 (ksf)	3.091	5.697	9.959	
Sigma 3 (ksf)	0.830	1.778	3.516	
P (ksf)	1.960	3.738	6.737	
Q (ksf)	1.130	1.959	3.221	
Stress Ratio	3.724	3.204	2.833	
Rate (in/min)	0.0004	0.0004	0.0004	

TP28a, 4-6 ft

Pore Pressure Response



P vs. Q





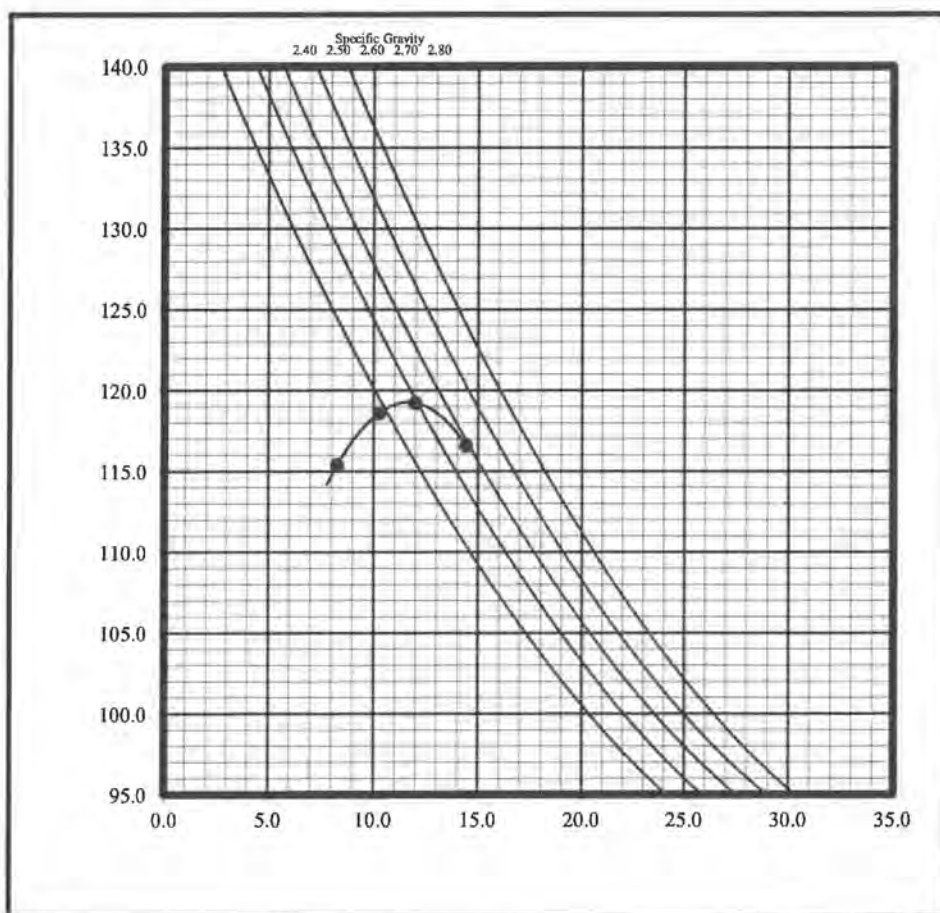
& ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING ENVIRONMENTAL ENGINEERING CONSTRUCTION TESTING & INSPECTION

**Laboratory Compaction Characteristics
of Soil using Modified Effort (56,000 ft. - lbf/ft³)
ASTM D1557**

Project Number	022-15055	Sample Number	-
Project Name	Guzman	Soil Classification	SC
Technician	JJ	Soil Description	Brn Clayey Sand
Date	9/11/2017	Method	D1557b
Sample Location	TP28A @ 4-6'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	3959.2	4000.8	3998.8	3871.4
Mass of Compaction Mold, gm	1984.0	1984.0	1984.0	1984.0
Mass of Moist Specimen, gm	1975.2	2016.8	2014.8	1887.4
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	130.8	133.5	133.4	125.0
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	181.4	178.6	174.8	184.7
Moisture Content (%)	10.3	12.0	14.4	8.3
Dry Density, lbs/cu.ft.	118.6	119.2	116.6	115.4



SDS#: -

Sieve Analysis

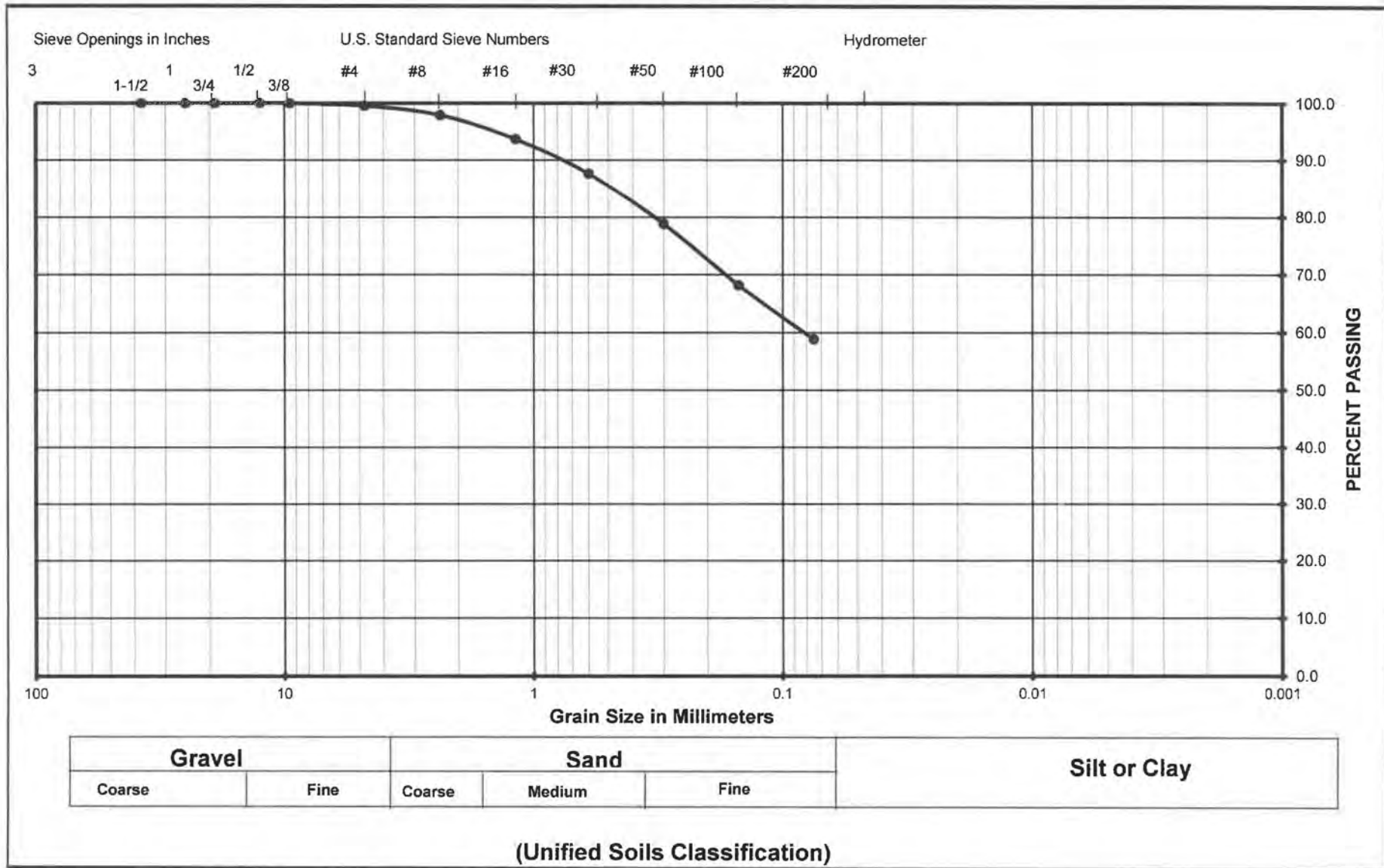
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 9/6/2017
Sample Location : TP28A @ 4-5'
Soil Classification : CL

Wet Weight	:	300.00
Dry Weight	:	284.00
Moisture Content	:	6%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	1.3	0.5	0.5	99.5
#8	2.36	4.6	1.6	2.1	97.9
#16	1.18	11.8	4.2	6.2	93.8
#30	0.60	17.4	6.1	12.4	87.6
#50	0.30	24.9	8.8	21.1	78.9
#100	0.15	30.2	10.6	31.8	68.2
#200	0.08	26.7	9.4	41.2	58.8

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
TP28A @ 4-5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

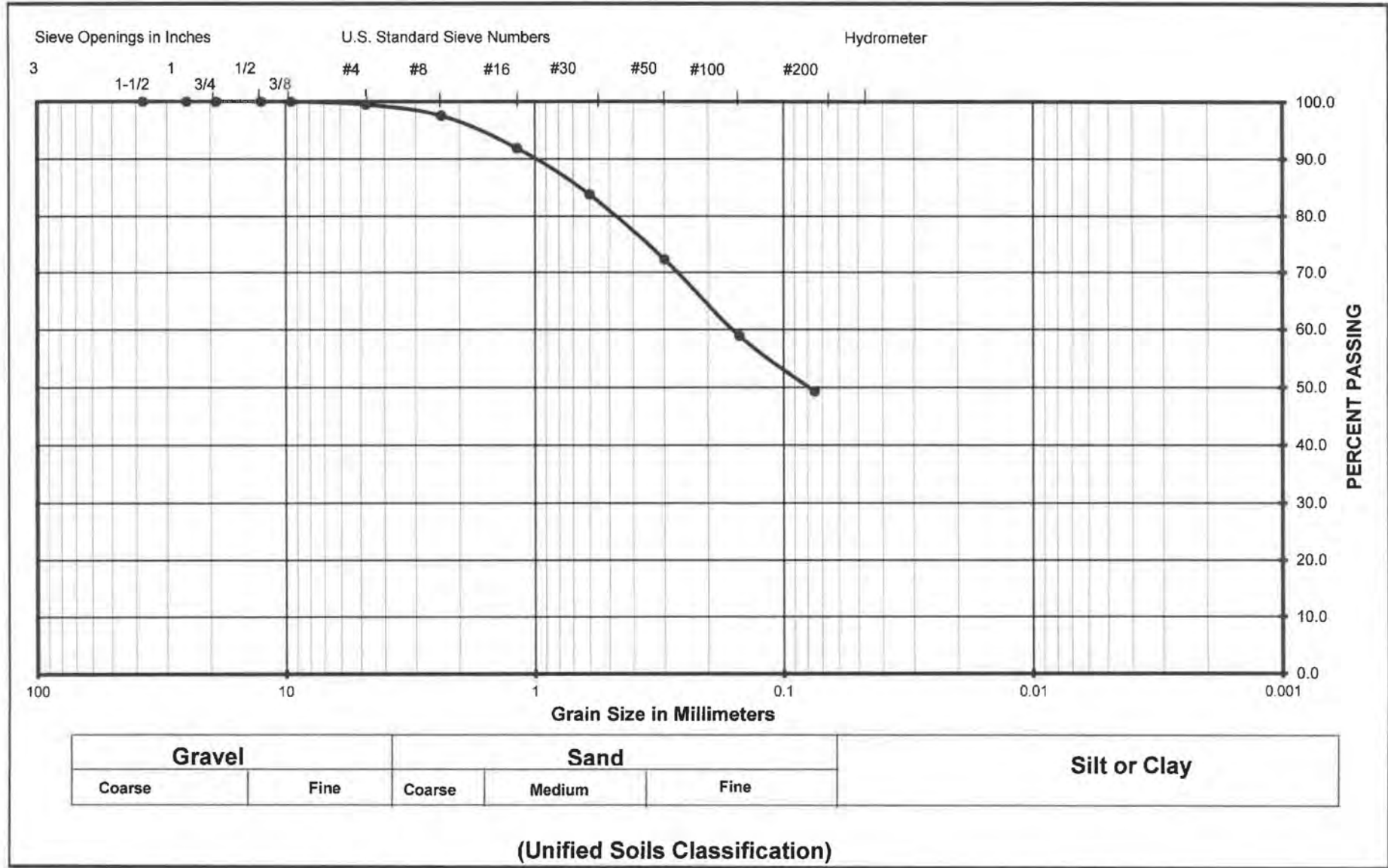
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 9/6/2017
Sample Location : TP28A @ 5-6'
Soil Classification : SC-CL

Wet Weight	:	300.00
Dry Weight	:	284.00
Moisture Content	:	6%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained, %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	1.5	0.5	0.5	99.5
#8	2.36	5.5	1.9	2.5	97.5
#16	1.18	15.9	5.6	8.1	91.9
#30	0.60	23.2	8.2	16.2	83.8
#50	0.30	32.4	11.4	27.6	72.4
#100	0.15	38.2	13.5	41.1	58.9
#200	0.08	27.2	9.6	50.7	49.3

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC-CL
TP28A @ 5-6'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 9/6/2017
Sample Location : TP28A @ 6-7'
Soil Classification : SC

Wet Weight	:	300.00
Dry Weight	:	283.10
Moisture Content	:	6%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	1.3	0.5	0.5	99.5
#8	2.36	4.7	1.7	2.1	97.9
#16	1.18	14.6	5.2	7.3	92.7
#30	0.60	22.8	8.1	15.3	84.7
#50	0.30	36.2	12.8	28.1	71.9
#100	0.15	43.6	15.4	43.5	56.5
#200	0.08	34.2	12.1	55.6	44.4

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC
TP28A @ 6-7'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 9/6/2017
Sample Location : TP28A @ 7-8'
Soil Classification : SC

Wet Weight	:	300.00
Dry Weight	:	284.00
Moisture Content	:	6%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	2.2	0.8	0.8	99.2
#8	2.36	8.2	2.9	3.7	96.3
#16	1.18	21.3	7.5	11.2	88.8
#30	0.60	29.7	10.5	21.6	78.4
#50	0.30	37.0	13.0	34.6	65.4
#100	0.15	43.5	15.3	50.0	50.0
#200	0.08	28.0	9.9	59.8	40.2

Grain Size Analysis



Sieve Analysis

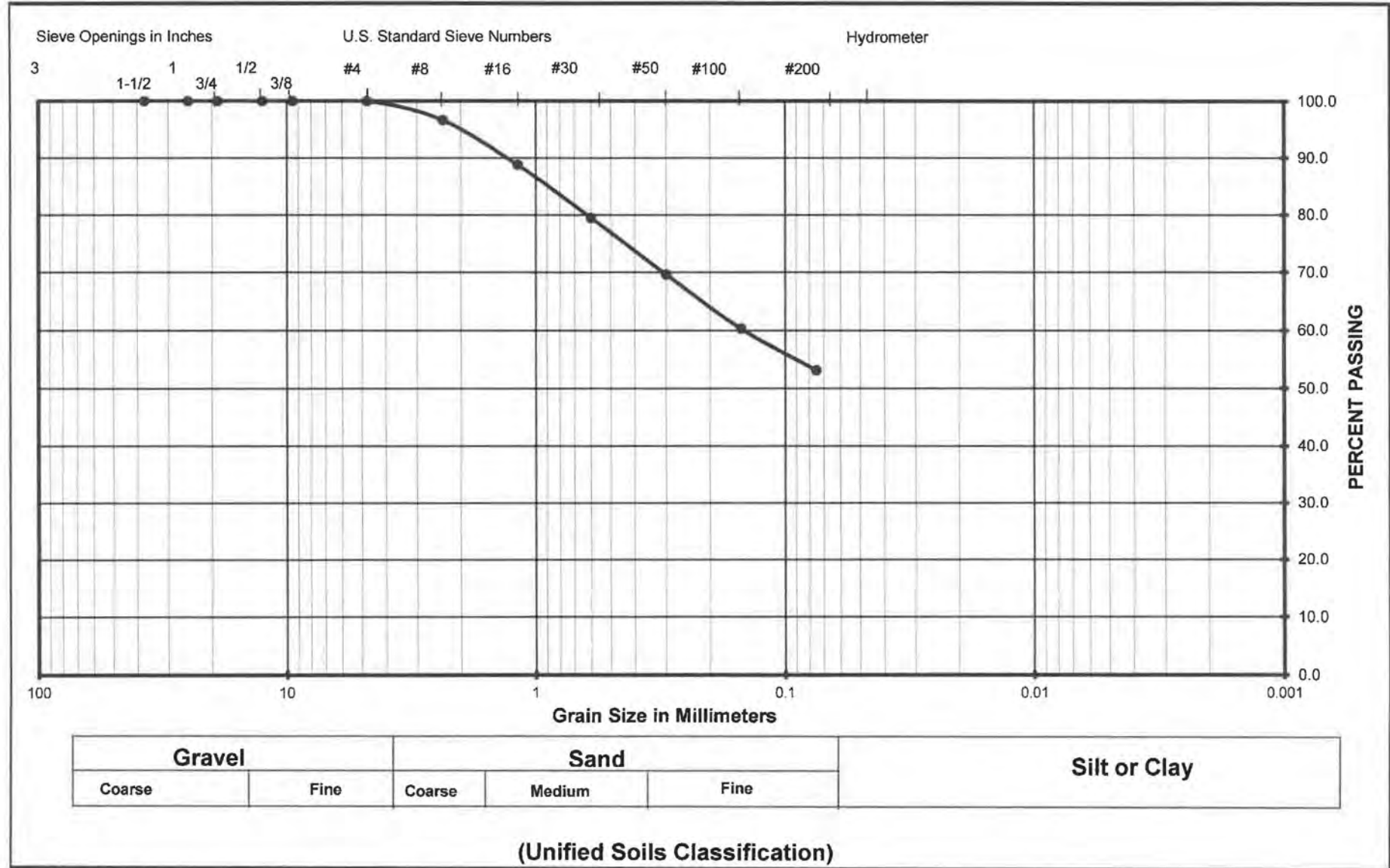
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/21/2016
Sample Location : TP29 @ 3-3.5'
Soil Classification : SC-CL

Wet Weight	:	375.00
Dry Weight	:	358.30
Moisture Content	:	5%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75				100.0
#8	2.36	12.0	3.3	3.3	96.7
#16	1.18	28.2	7.9	11.2	88.8
#30	0.60	33.3	9.3	20.5	79.5
#50	0.30	35.2	9.8	30.3	69.7
#100	0.15	33.5	9.3	39.7	60.3
#200	0.08	25.6	7.1	46.8	53.2

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC-CL
 Sample Number: TP29 @ 3-3.5'

ASTM C136

Krazan Testing Laboratory

ASTM D4647-06

Date:	11/18/2016
Project Name	Guzman Reservoir
Project Number	022-15055
Sample Location	TP29 @ 3-3.5'
Water Content	12.60%
Compaction Characteristics	D1557
Curing Time	24 Hrs +

[illegible]

Final Hole Diameter 1.0 mm

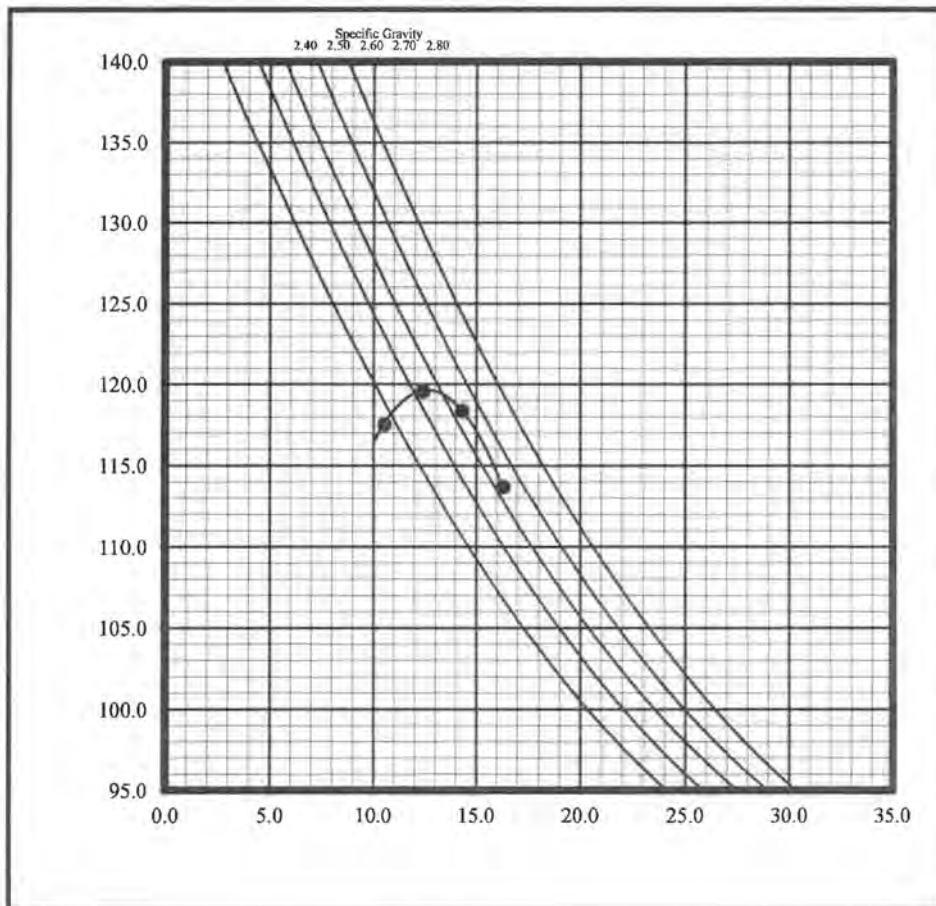
Technician **J Jensen**



**Laboratory Compaction Characteristics
of Soil using Modified Effort (56,000 ft. - lbf/ft³)
ASTM D1557**

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	SC-CL
Technician	DJ 12075	Soil Description	Brn Clayey Sand/Sandy Clay
Date	10/31/2016	Method	D1557a
Sample Location	TP29 @ 3-3.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	4020.0	4034.0	3952.0	3987.0
Mass of Compaction Mold, gm	1990.0	1990.0	1990.0	1990.0
Mass of Moist Specimen, gm	2030.0	2044.0	1962.0	1997.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	134.4	135.3	129.9	132.2
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	178.0	175.0	181.0	172.0
Moisture Content (%)	12.4	14.3	10.5	16.3
Dry Density, lbs/cu.ft.	119.6	118.4	117.6	113.7



**Maximum Dry Density,
lbs.cu.ft.**

119.6

Optimum Moisture Content

12.6%

SDS#: _____

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/27/2016
Sample Location : TP29 @ 5-5.5'
Soil Classification : SC-CL

Wet Weight	±	400.00
Dry Weight	±	380.30
Moisture Content	:	5%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.2	0.1	0.1	99.9
#8	2.36	10.3	2.7	2.8	97.2
#16	1.18	23.3	6.1	8.9	91.1
#30	0.60	30.9	8.1	17.0	83.0
#50	0.30	34.5	9.1	26.1	73.9
#100	0.15	35.4	9.3	35.4	64.6
#200	0.08	28.8	7.6	43.0	57.0

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC-CL
TP29 @ 5-5.5'

ASTM C136

Krazan Testing Laboratory

ASTM D4647-06

Date:	11/2/2016
Project Name	Guzman Reservoir
Project Number	022-15055
Sample Location	TP29 @ 5-5.5'
Water Content	12.60%
Compaction Characteristics	D1557
Curing Time	24 Hrs +

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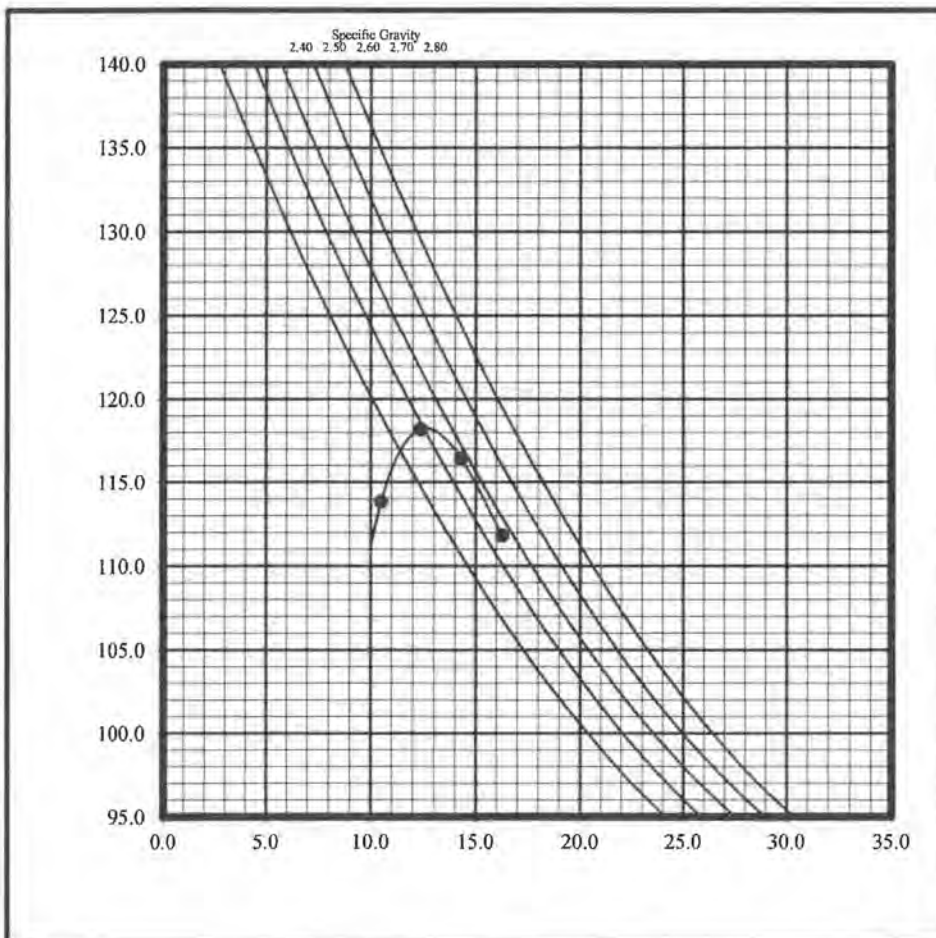
Final Hole Diameter 1.0 mm

Technician **J Jensen**

Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft. - lbf/ft³) ASTM D1557

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	SC-CL
Technician	DJ 12075	Soil Description	Bm Clayey Sand/Sandy Clay
Date	10/26/2016	Method	D1557a
Sample Location	TP29 @ 5-5.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	3996.0	4000.0	3890.0	3954.0
Mass of Compaction Mold, gm	1990.0	1990.0	1990.0	1990.0
Mass of Moist Specimen, gm	2006.0	2010.0	1900.0	1964.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	132.8	133.1	125.8	130.0
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	178.0	175.0	181.0	172.0
Moisture Content (%)	12.4	14.3	10.5	16.3
Dry Density, lbs/cu.ft.	118.2	116.4	113.8	111.8



**Maximum Dry Density,
lbs.cu.ft.**

118.3

Optimum Moisture Content

12.6%

SDS#: -

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP29 @ 7-7.5'
Soil Classification : SC-CL

Wet Weight	:	300.00
Dry Weight	:	284.30
Moisture Content	:	6%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.6	0.2	0.2	99.8
#8	2.36	9.3	3.3	3.5	96.5
#16	1.18	21.1	7.4	10.9	89.1
#30	0.60	28.5	10.0	20.9	79.1
#50	0.30	35.3	12.4	33.3	66.7
#100	0.15	33.3	11.7	45.1	54.9
#200	0.08	23.1	8.1	53.2	46.8

Hydrometer Analysis

ASTM D422

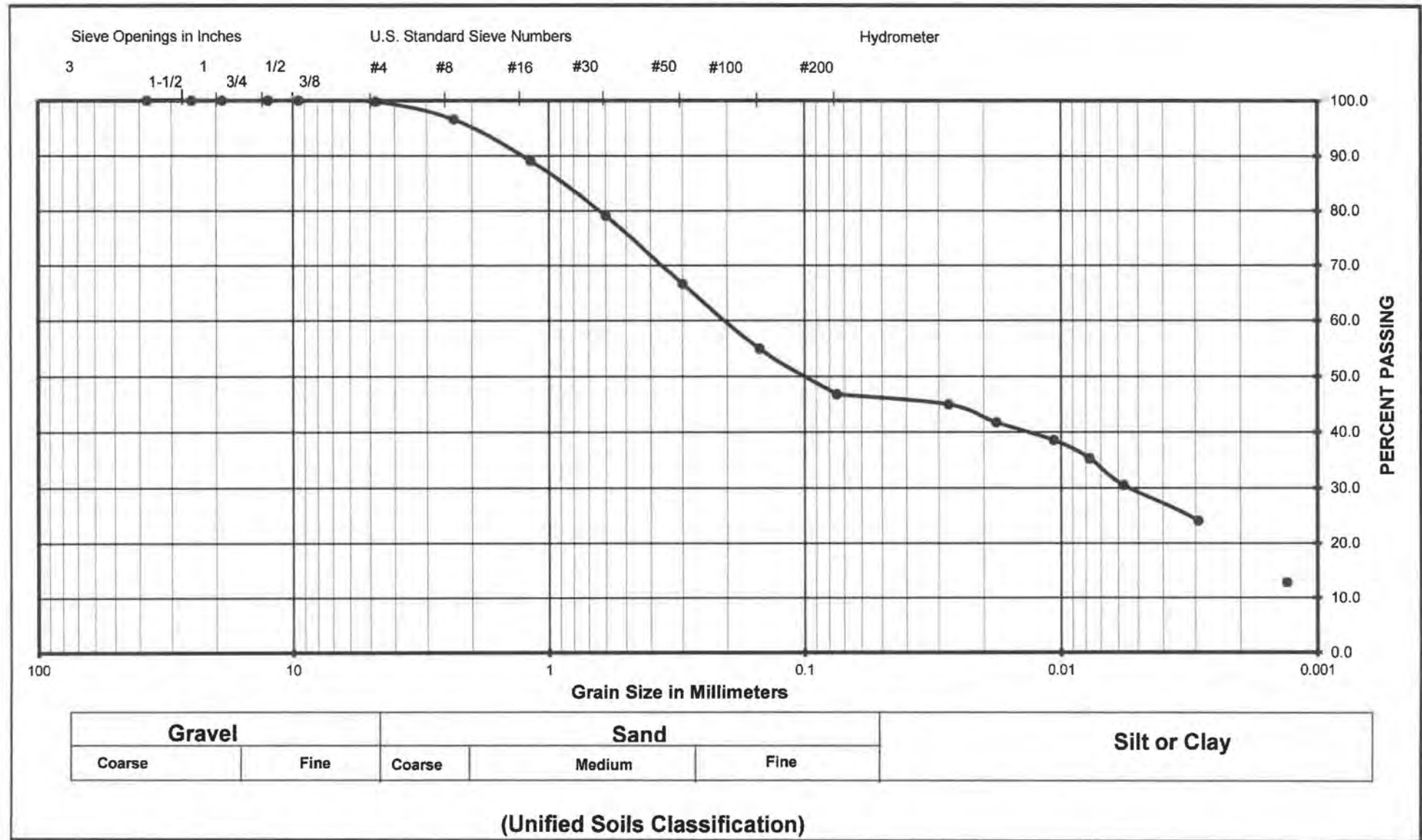
Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP29 @ 7-7.5'
Soil Classification : SC-CL

Dry Weight Used	100.1 g
Temperature	20.0 C
Soil Specific Gravity	2.65
Solution Spec. Grav	1.003
K Value	0.01365
Correction Factor	0.00000

Elapsed Time (min)	Hydro. Reading	Hydro. Corrected	% Passing	Particle Diameter
2	1.031	1.031	45.0	0.0275
5	1.029	1.029	41.8	0.0179
15	1.027	1.027	38.6	0.0107
30	1.025	1.025	35.4	0.0078
60	1.022	1.022	30.5	0.0057
250	1.018	1.018	24.1	0.0029
1440	1.011	1.011	12.9	0.0013

Particle Diameter	Percent Passing
0.005	28.9
0.002	17.6
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC-CL
TP29 @ 7-7.5'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**

Project Number: **022-15055**

Date Sampled: 5/31/2016

Sampled By: DA

Sample Number:

Sample Location: TP29 @ 7-7.5'

Sample Description: SC-CL

Date Tested: 10/31/2016

Tested By: J Dyer

Verified By: J Gruszczynski

Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	17.03	18.18		23.64		
Weight of Dry Soil & Tare (g)	16.50	17.49		20.86		
Weight of Tare (g)	14.21	14.38		14.40		
Weight of water (g)	0.52	0.69		2.79		
Weight of Dry Soil (g)	2.29	3.11		6.45		
Water Content (% of dry wt.)	22.9%	22.3%		43.2%		
Number of Blows				25		

Plastic Limit : 23

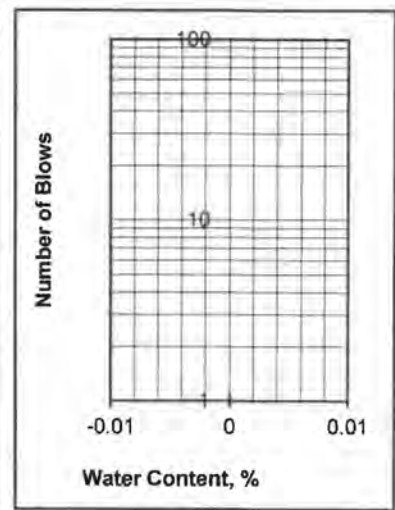
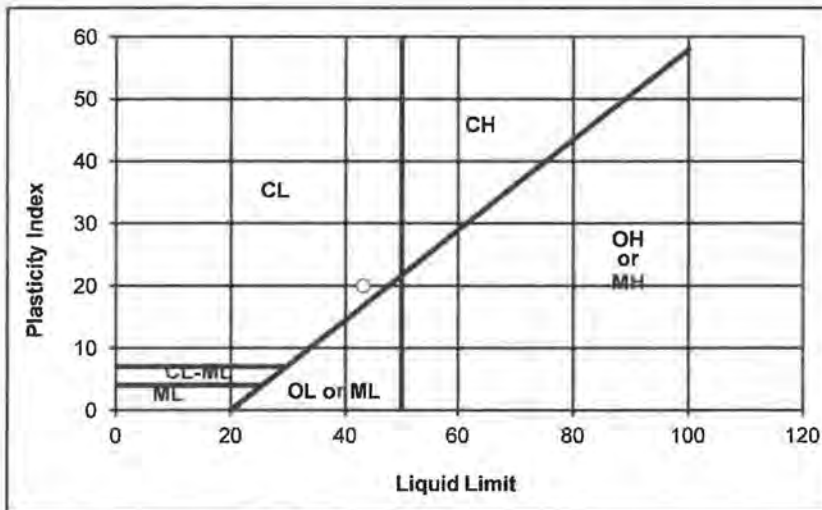
Liquid Limit : 43

Plasticity Index : 20

Unified Soil Classification : CL

Requirement:

Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/27/2016
Sample Location : TP31 @ 1-1.5'
Soil Classification : SC-CL

Wet Weight	:	400.00
Dry Weight	:	383.90
Moisture Content	:	4%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.8	0.2	0.2	99.8
#8	2.36	10.4	2.7	2.9	97.1
#16	1.18	25.4	6.6	9.5	90.5
#30	0.60	31.5	8.2	17.7	82.3
#50	0.30	38.1	9.9	27.7	72.3
#100	0.15	41.7	10.9	38.5	61.5
#200	0.08	37.1	9.7	48.2	51.8

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC-CL
 Sample Number: TP31 @ 1-1.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

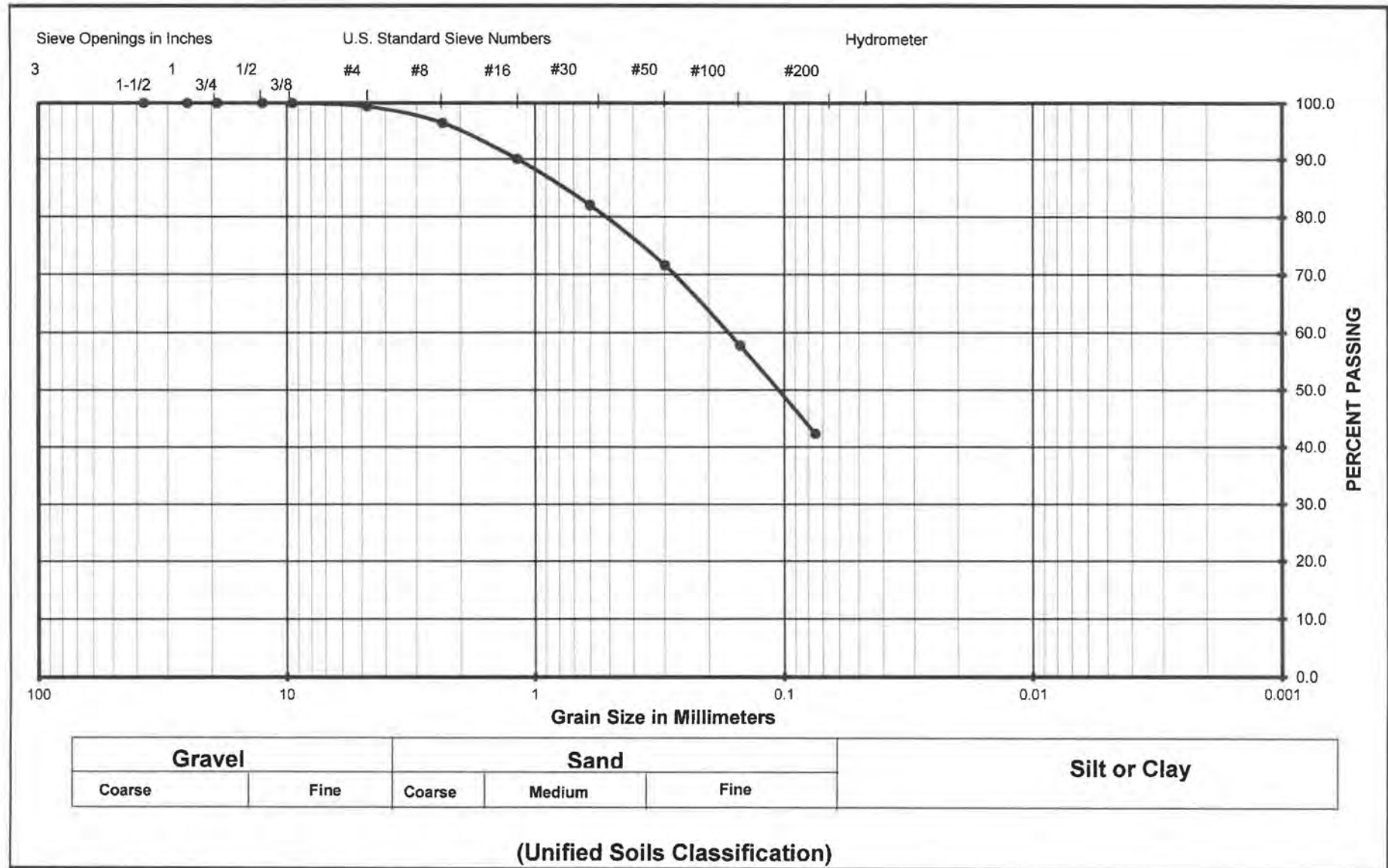
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/22/2016
Sample Location : TP31 @ 2-2.5'
Soil Classification : SC

Wet Weight	:	400.00
Dry Weight	:	384.50
Moisture Content	:	4%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	2.5	0.7	0.7	99.3
#8	2.36	11.3	2.9	3.6	96.4
#16	1.18	24.4	6.3	9.9	90.1
#30	0.60	31.0	8.1	18.0	82.0
#50	0.30	39.8	10.4	28.3	71.7
#100	0.15	53.5	13.9	42.3	57.7
#200	0.08	59.1	15.4	57.6	42.4

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC
 Sample Number: TP31 @ 2-2.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/22/2016
Sample Location : TP31 @ 3-3.5'
Soil Classification : SC

Wet Weight	:	375.00
Dry Weight	:	358.50
Moisture Content	:	5%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.4	0.1	0.1	99.9
#8	2.36	5.1	1.4	1.5	98.5
#16	1.18	12.7	3.5	5.1	94.9
#30	0.60	15.7	4.4	9.5	90.5
#50	0.30	19.7	5.5	15.0	85.0
#100	0.15	44.5	12.4	27.4	72.6
#200	0.08	99.7	27.8	55.2	44.8

Grain Size Analysis



Project Name	Guzman
Project Number	022-15055
Soil Classification	SC
Sample Number	TP31 @ 3-3.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP31 @ 4-4.5'
Soil Classification : SM

Wet Weight	:	400.00
Dry Weight	:	390.20
Moisture Content	:	3%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50	1.9	0.5	0.5	99.5
#4	4.75	8.3	2.1	2.6	97.4
#8	2.36	30.3	7.8	10.4	89.6
#16	1.18	49.7	12.7	23.1	76.9
#30	0.60	54.9	14.1	37.2	62.8
#50	0.30	58.1	14.9	52.1	47.9
#100	0.15	52.7	13.5	65.6	34.4
#200	0.08	46.8	12.0	77.6	22.4

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP31 @ 4-4.5'
Soil Classification : SM

Dry Weight Used	113.8 g
Temperature	20.0 C
Soil Specific Gravity	2.65
Solution Spec. Grav	1.003
K Value	0.01365
Correction Factor	0.00000

Elapsed Time (min)	Hydro. Reading	Hydro. Corrected	% Passing	Particle Diameter
2	1.017	1.017	19.8	0.0332
5	1.016	1.016	18.4	0.0212
15	1.015	1.015	17.0	0.0124
30	1.014	1.014	15.6	0.0088
60	1.013	1.013	14.1	0.0063
250	1.012	1.012	12.7	0.0031
1440	1.01	1.01	9.9	0.0013

Particle Diameter	Percent Passing
0.005	13.6
0.002	11.0
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SM
TP31 @ 4-4.5'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

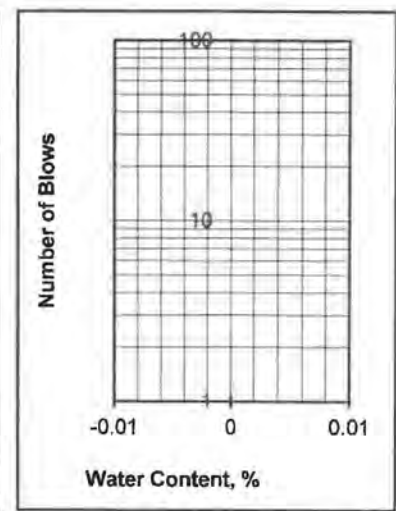
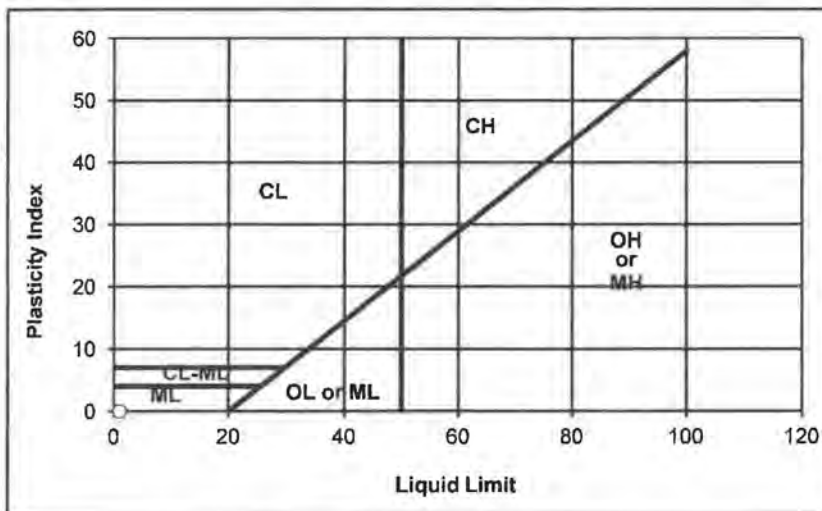
ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**
 Project Number: **022-15055**
 Date Sampled: 5/31/2016
 Sampled By: DA
 Sample Number:
 Sample Location: TP31 @ 4-4.5'
 Sample Description: SM

Date Tested: 10/31/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)						
Weight of Dry Soil & Tare (g)						
Weight of Tare (g)						
Weight of water (g)						
Weight of Dry Soil (g)						
Water Content (% of dry wt.)						
Number of Blows						
Plastic Limit : N/D			Liquid Limit : N/D			

Plasticity Index : NON-PLASTIC
Unified Soil Classification : NON-PLASTIC
Requirement:
Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

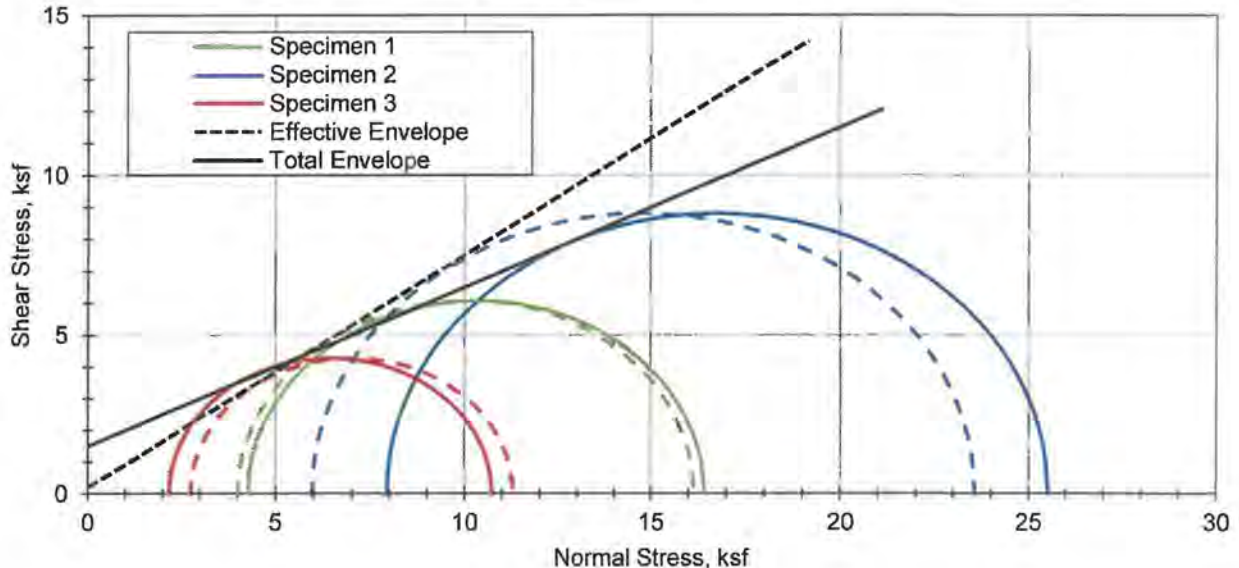


Consolidated-Undrained Triaxial Test

ASTM D4767

Project: Guzman Reservoir
 Project Number: 022-15055
 Sampling Date: 6/1/2016
 Location: TP31 @ 4-4.5'
 Client Name: Kern Tulare Water District

Sample Number: TP31 @ 4-4.5'
 Sample Type: Reconstituted
 Sample Description: Silty Sand
 Sample Depth (ft): 4-4.5



	Total	Effective
Friction Angle, ϕ	26.6	36.1
Cohesion, c (ksf)	1.50	0.20

Failure Criteria: Specified Strain %

Plastic Limit: --

Liquid Limit: --

Specific Gravity: 2.72
 ASSUMED

Initial Parameters

Specimen	1	2	3
Moisture Content (%)	14.3	14.7	15.0
Dry Density (psf)	117.2	116.5	116.2
Void Ratio	0.449	0.458	0.461
Saturation (%)	86.8	87.5	88.2
Height (in)	5.53	5.74	5.52
Diameter (in)	2.87	2.87	2.87

Saturation Parameters

B-Value	0.96	0.95	0.96
---------	------	------	------

Consolidation Parameters

Back Pressure (psi)	18.2	18.6	20.3
Effective Pressure (psi)	30.0	55.0	15.0
Height (in)	5.43	5.61	5.46
Area (in ²)	6.32	6.44	6.16
Void Ratio	0.389	0.418	0.376
Saturation (%)	100	95.9	100.0

Final Parameters at Failure

Deviator Stress (ksf)	12.1	17.6	8.6
σ'_1 (ksf)	16.2	23.6	11.3
σ'_3 (ksf)	4.0	5.9	2.7
Excess PP (ksf)	0.26	2.0	-0.6
Axial Strain (%)	5.1	5.1	5.1
Rate of Strain (%/min)	0.100	0.095	0.104

Remarks:

Krazan and Associates

215 W. Dakota • Clovis, CA 93612 • (559) 348-2200 • FAX (559) 348-2201

With Offices Serving The Western United States

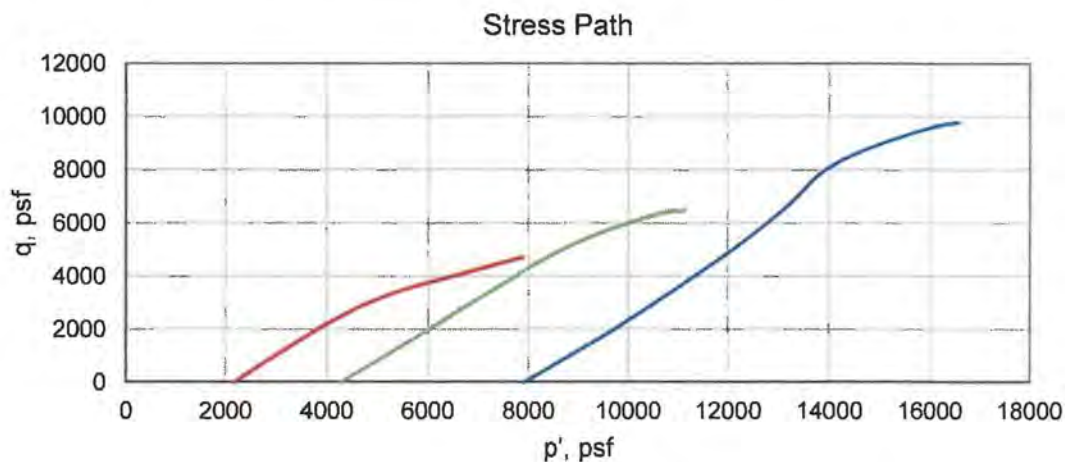
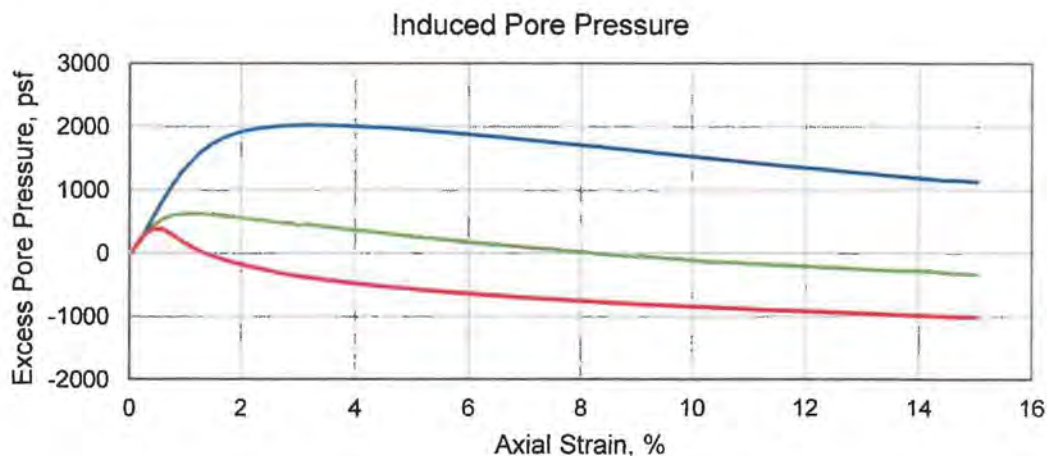
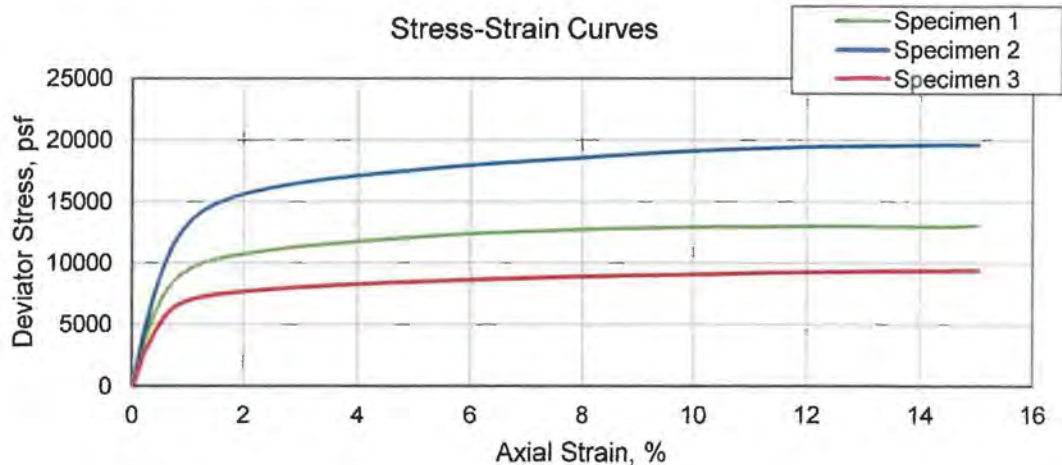


Consolidated-Undrained Triaxial Test

ASTM D4767

Project: Guzman Reservoir
Project Number: 022-15055
Sampling Date: 6/1/2016
Location: TP31 @ 4-4.5'
Client Name: Kern Tulare Water District

Sample Number: TP31 @ 4-4.5'
Sample Type: Reconstituted
Sample Description: Silty Sand
Sample Depth (ft): 4-4.5

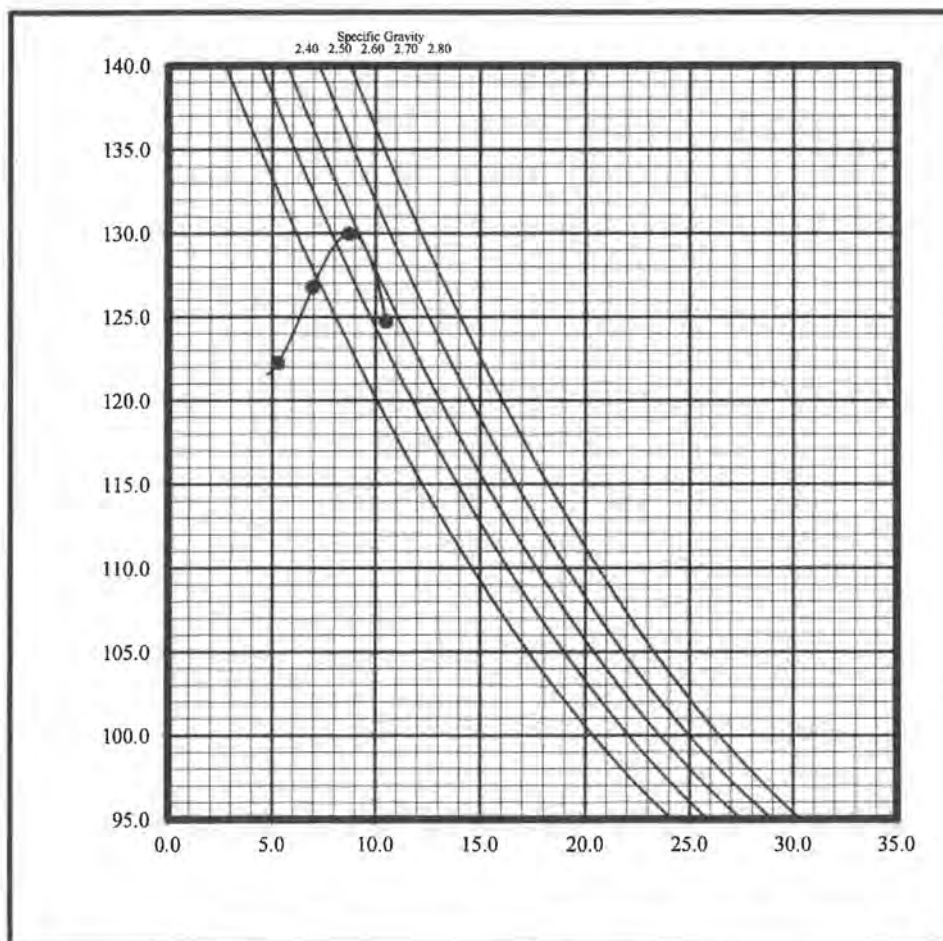




**Laboratory Compaction Characteristics
of Soil using Modified Effort (56,000 ft. - lbf/ft³)
ASTM D1557**

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	SM
Technician	DJ 12075	Soil Description	Brn Silty Sand
Date	10/25/2016	Method	D1557a
Sample Location	TP31 @ 4-4.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	4038.0	4124.0	4072.0	3934.0
Mass of Compaction Mold, gm	1990.0	1990.0	1990.0	1990.0
Mass of Moist Specimen, gm	2048.0	2134.0	2082.0	1944.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	135.6	141.3	137.8	128.7
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	187.0	184.0	181.0	190.0
Moisture Content (%)	7.0	8.7	10.5	5.3
Dry Density, lbs/cu.ft.	126.8	130.0	124.7	122.3



**Maximum Dry Density,
lbs.cu.ft.**

130.0

Optimum Moisture Content

8.8%

SDS#: -

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/27/2016
Sample Location : TP31 @ 5-5.5'
Soil Classification : SM

Wet Weight	:	400.00
Dry Weight	:	391.80
Moisture Content	:	2%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	7.0	1.8	1.8	98.2
#8	2.36	27.0	6.9	8.7	91.3
#16	1.18	39.7	10.1	18.8	81.2
#30	0.60	48.9	12.5	31.3	68.7
#50	0.30	68.5	17.5	48.8	51.2
#100	0.15	89.2	22.8	71.5	28.5
#200	0.08	50.2	12.8	84.4	15.6

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SM
 Sample Number: TP31 @ 5-5.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/21/2016
Sample Location : TP32 @ 3-3.5'
Soil Classification : SC w/ grvl

Wet Weight	:	400.00
Dry Weight	:	387.80
Moisture Content	:	3%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00	18.2	4.7	4.7	95.3
1/2"	12.50	15.0	3.9	8.6	91.4
3/8"	9.50	5.2	1.3	9.9	90.1
#4	4.75	5.0	1.3	11.2	88.8
#8	2.36	19.2	5.0	16.1	83.9
#16	1.18	36.5	9.4	25.6	74.4
#30	0.60	52.7	13.6	39.1	60.9
#50	0.30	72.1	18.6	57.7	42.3
#100	0.15	62.1	16.0	73.7	26.3
#200	0.08	23.3	6.0	79.8	20.2

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC w/ grvl
 Sample Number: TP32 @ 3-3.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

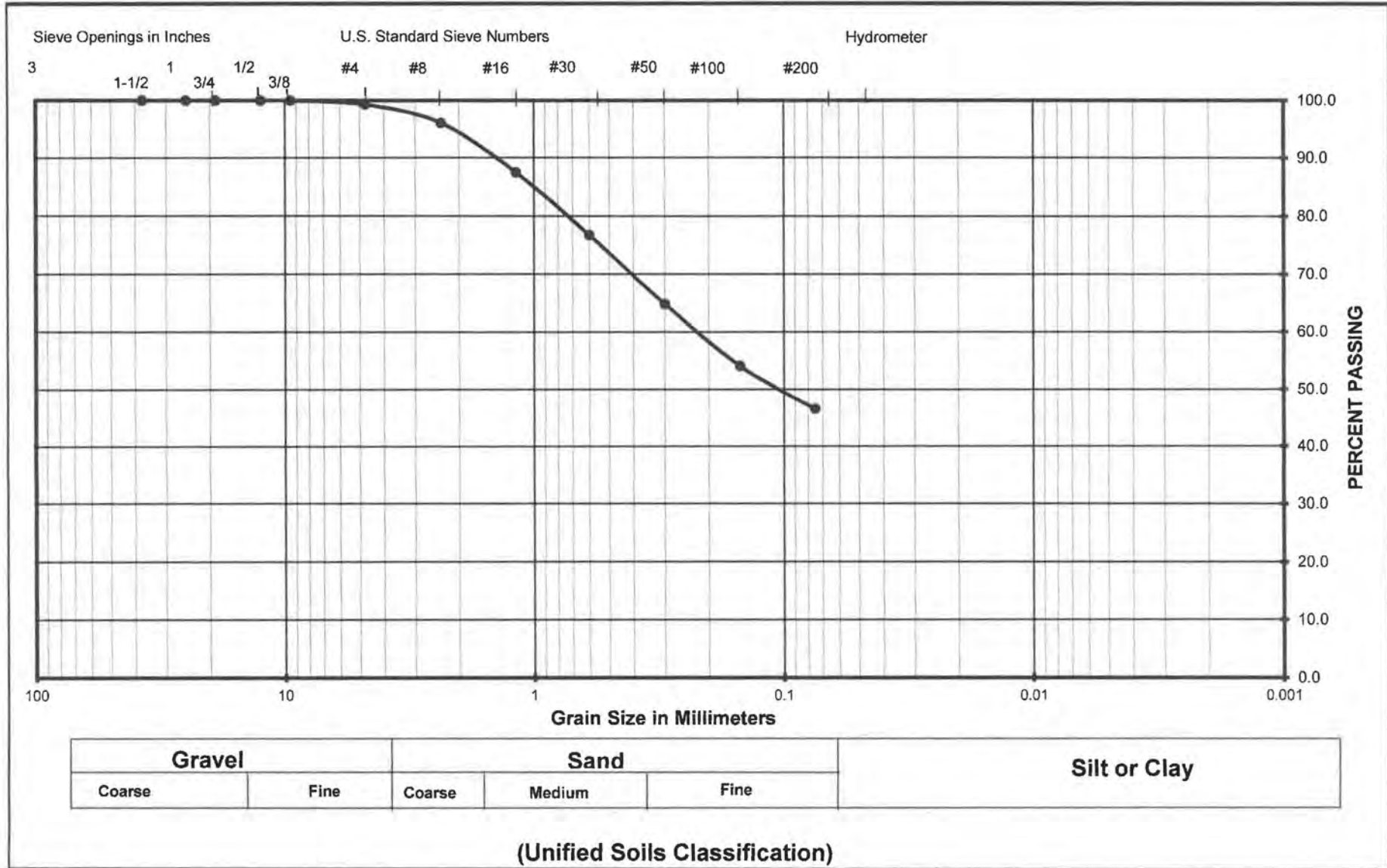
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/21/2016
Sample Location : TP33 @ 2-2.5'
Soil Classification : SC-CL

Wet Weight	:	370.00
Dry Weight	:	355.20
Moisture Content	:	4%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	2.5	0.7	0.7	99.3
#8	2.36	11.5	3.2	3.9	96.1
#16	1.18	30.5	8.6	12.5	87.5
#30	0.60	38.1	10.7	23.3	76.7
#50	0.30	42.2	11.9	35.1	64.9
#100	0.15	38.3	10.8	45.9	54.1
#200	0.08	26.6	7.5	53.4	46.6

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC-CL
 Sample Number: TP33 @ 2-2.5'

ASTM C136

Krazan Testing Laboratory

ASTM D4647-06

Date:	10/28/2016
Project Name	Guzman Reservoir
Project Number	022-15055
Sample Location	TP33 @ 2-2.5'
Water Content	11.80%
Compaction Characteristics	D1557
Curing Time	24 Hrs +

[illegible]

Final Hole Diameter 1.0 mm

Technician **J Jensen**



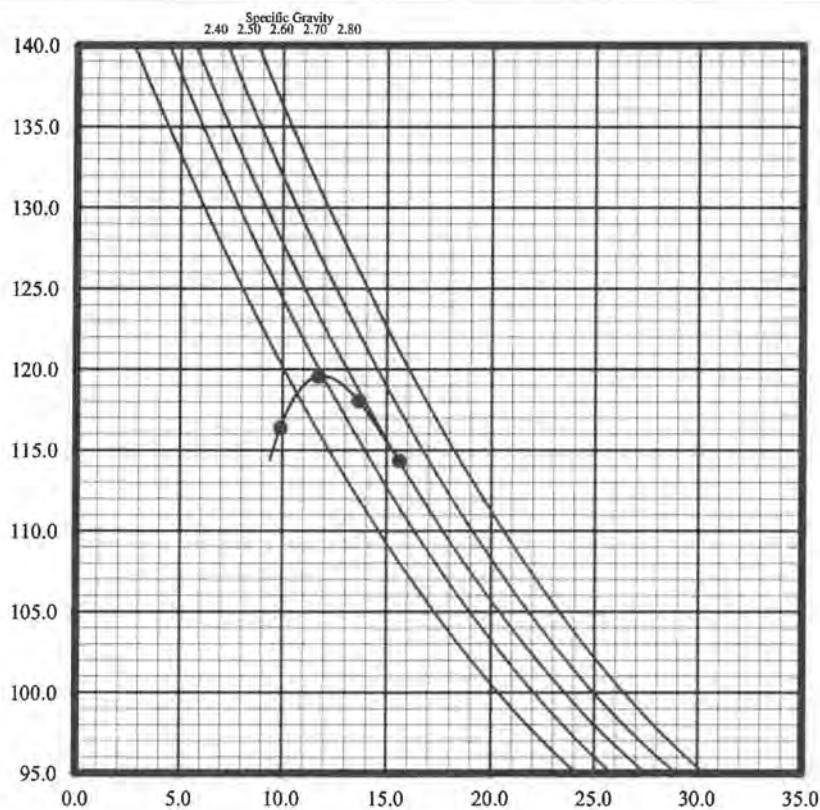
& ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING ENVIRONMENTAL ENGINEERING CONSTRUCTION TESTING & INSPECTION

**Laboratory Compaction Characteristics
of Soil using Modified Effort (56,000 ft. - lbf/ft³)
ASTM D1557**

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	SC-CL
Technician	DJ 12075	Soil Description	Brn Clayey Sand/Sandy Clay
Date	10/25/2016	Method	D1557a
Sample Location	TP33 @ 2-2.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	4008.0	4016.0	3922.0	3987.0
Mass of Compaction Mold, gm	1990.0	1990.0	1990.0	1990.0
Mass of Moist Specimen, gm	2018.0	2026.0	1932.0	1997.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	133.6	134.1	127.9	132.2
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	179.0	176.0	182.0	173.0
Moisture Content (%)	11.7	13.6	9.9	15.6
Dry Density, lbs/cu.ft.	119.6	118.0	116.4	114.4



**Maximum Dry Density,
lbs.cu.ft.**

119.6

Optimum Moisture Content

11.9%

SDS#: -

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP33 @ 4-4.5'
Soil Classification : SC

Wet Weight	:	375.00
Dry Weight	:	357.50
Moisture Content	:	5%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	3.1	0.9	0.9	99.1
#8	2.36	18.6	5.2	6.1	93.9
#16	1.18	37.1	10.4	16.4	83.6
#30	0.60	42.7	11.9	28.4	71.6
#50	0.30	47.8	13.4	41.8	58.2
#100	0.15	51.1	14.3	56.1	43.9
#200	0.08	42.3	11.8	67.9	32.1

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman
Date : 10/31/2016
Sample Location : TP33 @ 4-4.5'
Soil Classification : SC

Dry Weight Used	100.8 g
Temperature	20.0 C
Soil Specific Gravity	2.65
Solution Spec. Grav.	1.003
K Value	0.01365
Correction Factor	0.00000

Elapsed Time (min)	Hydro. Reading	Hydro. Corrected	% Passing	Particle Diameter
2	1.021	1.021	28.7	0.0316
5	1.019	1.019	25.5	0.0205
15	1.017	1.017	22.3	0.0121
30	1.015	1.015	19.2	0.0087
60	1.013	1.013	16.0	0.0063
250	1.011	1.011	12.8	0.0032
1440	1.008	1.008	8.0	0.0014

Particle Diameter	Percent Passing
0.005	14.6
0.002	9.7
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC
TP33 @ 4-4.5'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**
 Project Number: **022-15055**
 Date Sampled: 5/31/2016
 Sampled By: DA
 Sample Number:
 Sample Location: TP33 @ 4-4.5'
 Sample Description: SC

Date Tested: 10/31/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

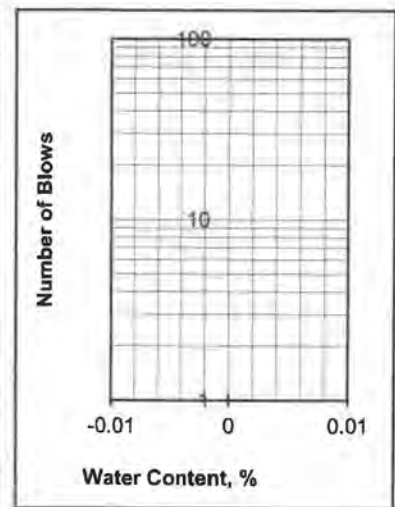
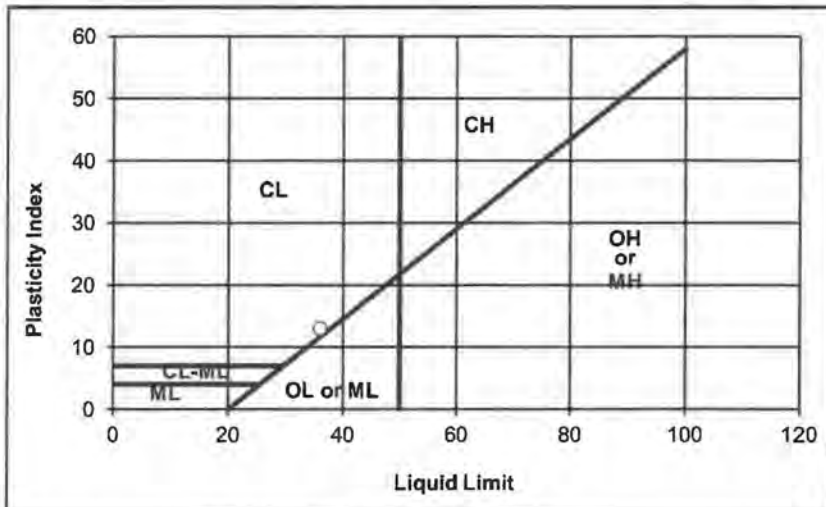
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	26.78	26.34		24.01	25.36	
Weight of Dry Soil & Tare (g)	25.89	25.45		21.38	22.44	
Weight of Tare (g)	21.87	21.62		13.95	14.48	
Weight of water (g)	0.89	0.89		2.63	2.92	
Weight of Dry Soil (g)	4.02	3.83		7.43	7.95	
Water Content (% of dry wt.)	22.1%	23.2%		35.4%	36.7%	
Number of Blows				29	21	

Plastic Limit : 23

Liquid Limit : 36

Plasticity Index : 13
 Unified Soil Classification : CL

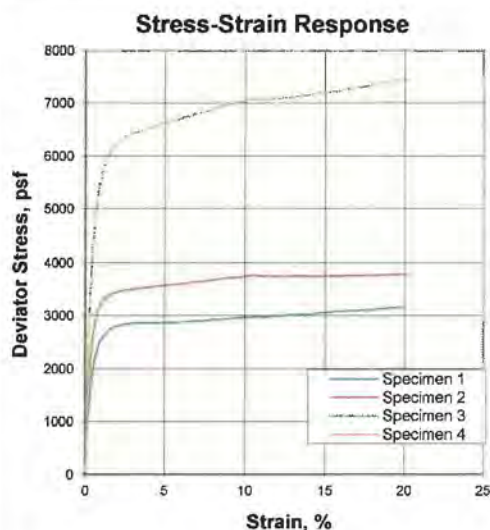
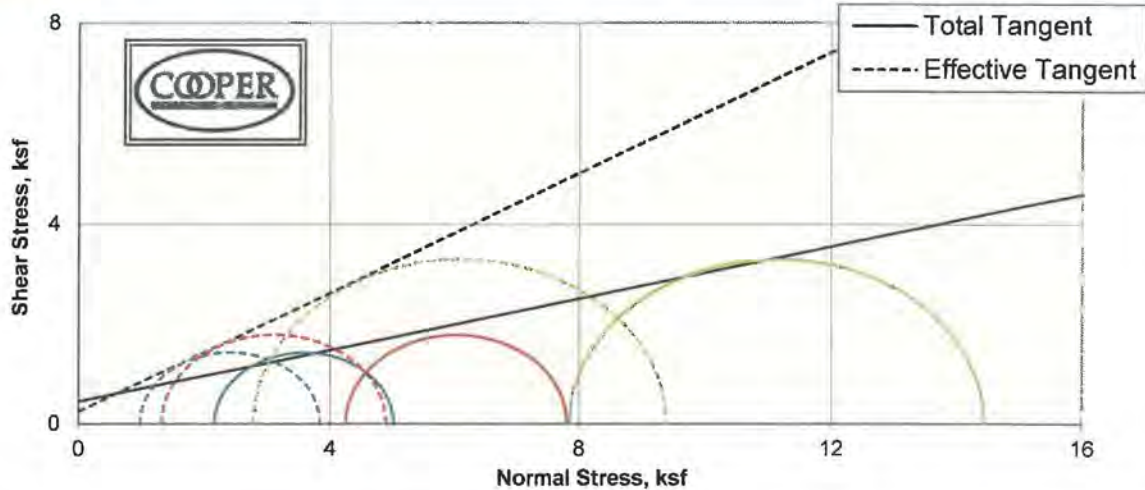
Requirement:
 Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

**Consolidated Undrained Triaxial Compression with Pore Pressure
ASTM D4767**

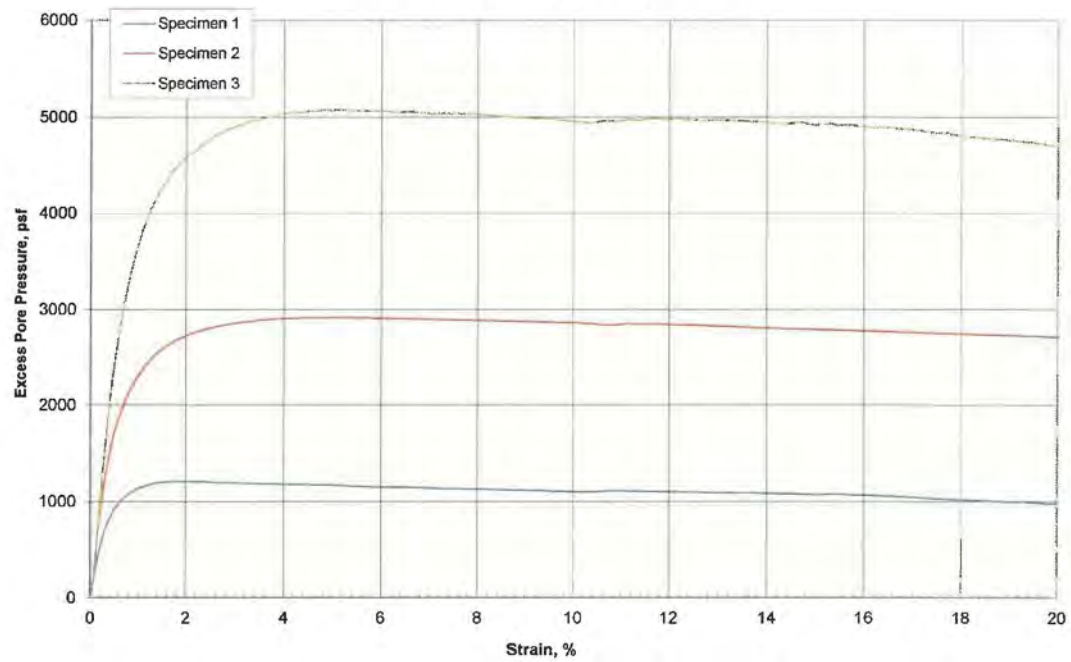


CTL Number:	504-004		
Client Name:	Krazan & Associates		
Project Name:	Guzman Reservoir		
Project Number:	02215055		
Date:	1/31/2017	By:	MD/DC
Total C	0.450	ksf	
Total phi	14.5	degrees	
Eff. C	0.250	ksf	
Eff. Phi	30.8	degrees	©

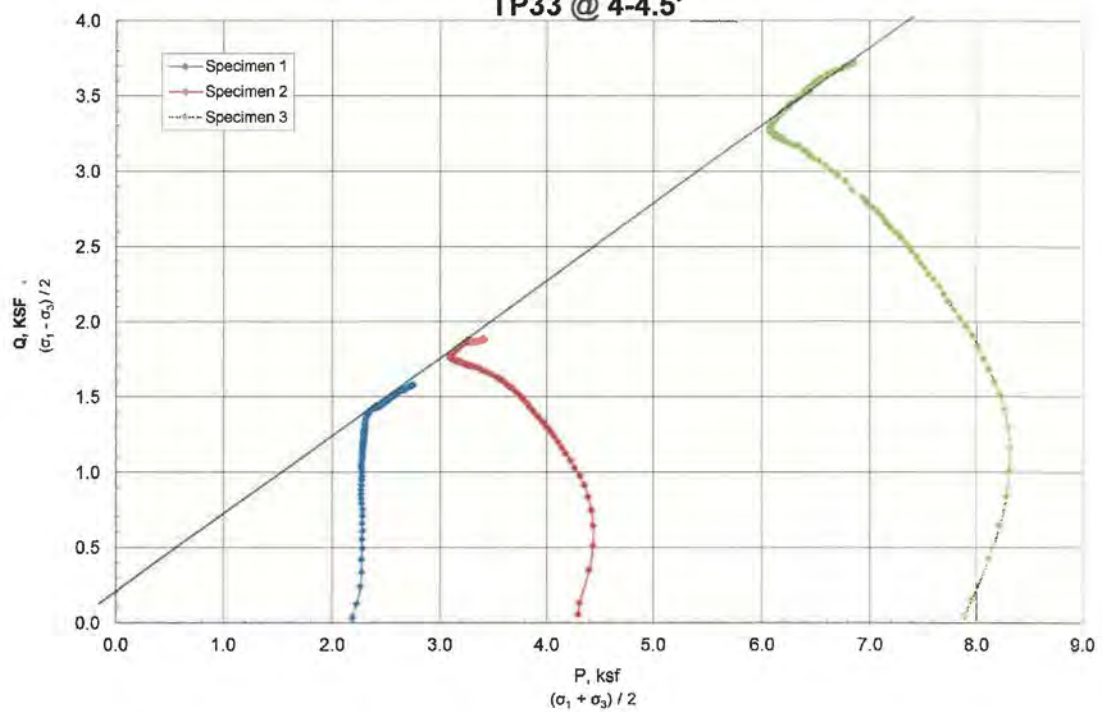
Remarks: Strengths picked at 5% strain. Samples arrived at lab remolded.

Specimen	1	2	3	4
Boring	TP 33	TP 33	TP 33	
Sample				
Depth	4-4.5	4-4.5	4-4.5	
Visual Description	Pale Brown Clayey SAND	Pale Brown Clayey SAND	Pale Brown Clayey SAND	
MC (%)	12.1	12.2	12.0	
Dry Density (pcf)	113.5	112.5	113.5	
Saturation (%)	64.7	63.9	64.6	
Void Ratio	0.513	0.526	0.513	
Diameter (in)	2.87	2.88	2.88	
Height (in)	5.75	5.77	5.77	
Final				
MC (%)	18.7	18.3	17.0	
Dry Density (pcf)	113.4	114.2	117.0	
Saturation (%)	100.0	100.0	100.0	
Void Ratio	0.514	0.503	0.467	
Diameter (in)	2.88	2.87	2.85	
Height (in)	5.74	5.73	5.70	
Cell Pressure (psi)	115.0	129.9	155.2	
Back Pressure (psi)	100.1	100.5	100.7	
Effective Stresses At:				
Strain (%)	5.0	5.0	5.0	
Deviator (ksf)	2.861	3.566	6.607	
Excess PP (psi)	8.1	20.3	35.2	
Sigma 1 (ksf)	3.839	4.882	9.388	
Sigma 3 (ksf)	0.978	1.316	2.781	
P (ksf)	2.409	3.099	6.084	
Q (ksf)	1.430	1.783	3.304	
Stress Ratio	3.924	3.711	3.376	
Rate (in/min)	0.0005	0.0005	0.0005	

Pore Pressure Response TP33 @ 4-4.5'



P vs. Q TP33 @ 4-4.5'





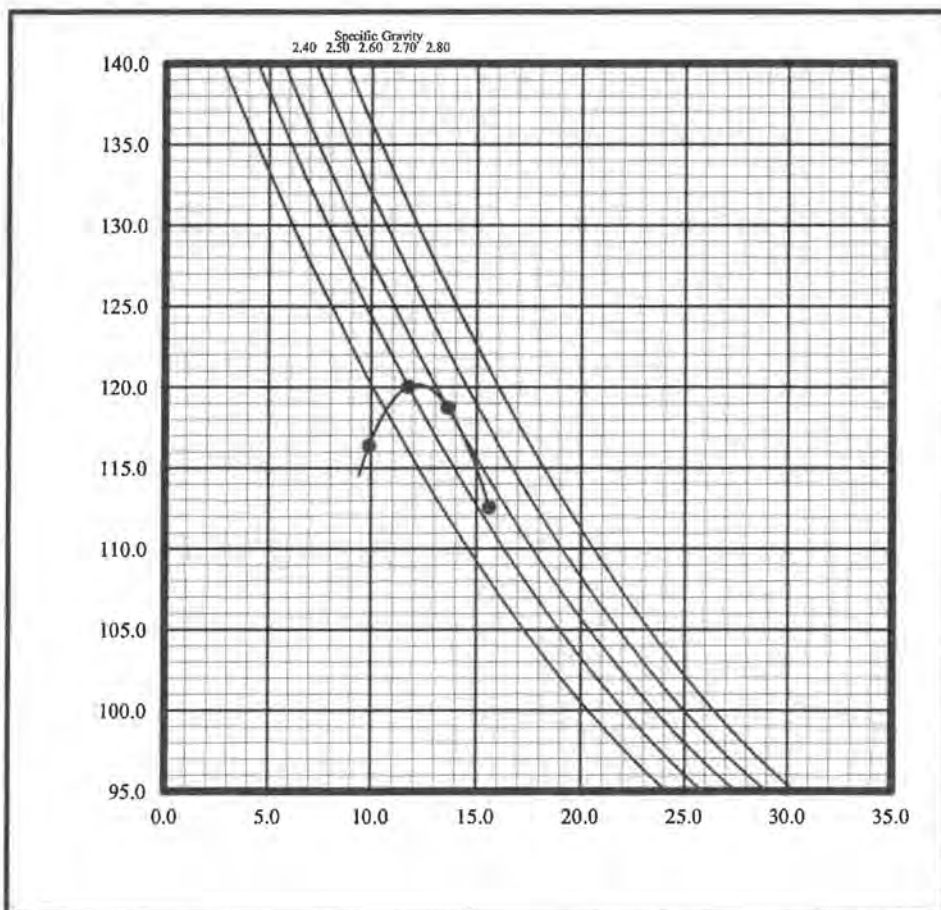
& ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING ENVIRONMENTAL ENGINEERING CONSTRUCTION TESTING & INSPECTION

**Laboratory Compaction Characteristics
of Soil using Modified Effort (56,000 ft. - lbf/ft³)
ASTM D1557**

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	SC-CL
Technician	DJ 12075	Soil Description	Bm Clayey Sand/Sandy Clay
Date	10/25/2016	Method	D1557a
Sample Location	TP33 @ 4-4.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	4016.0	4028.0	3922.0	3956.0
Mass of Compaction Mold, gm	1990.0	1990.0	1990.0	1990.0
Mass of Moist Specimen, gm	2026.0	2038.0	1932.0	1966.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	134.1	134.9	127.9	130.2
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	179.0	176.0	182.0	173.0
Moisture Content (%)	11.7	13.6	9.9	15.6
Dry Density, lbs/cu.ft.	120.0	118.7	116.4	112.6



**Maximum Dry Density,
lbs.cu.ft.**

120.2

Optimum Moisture Content

12.2%

SDS#: -

Sieve Analysis

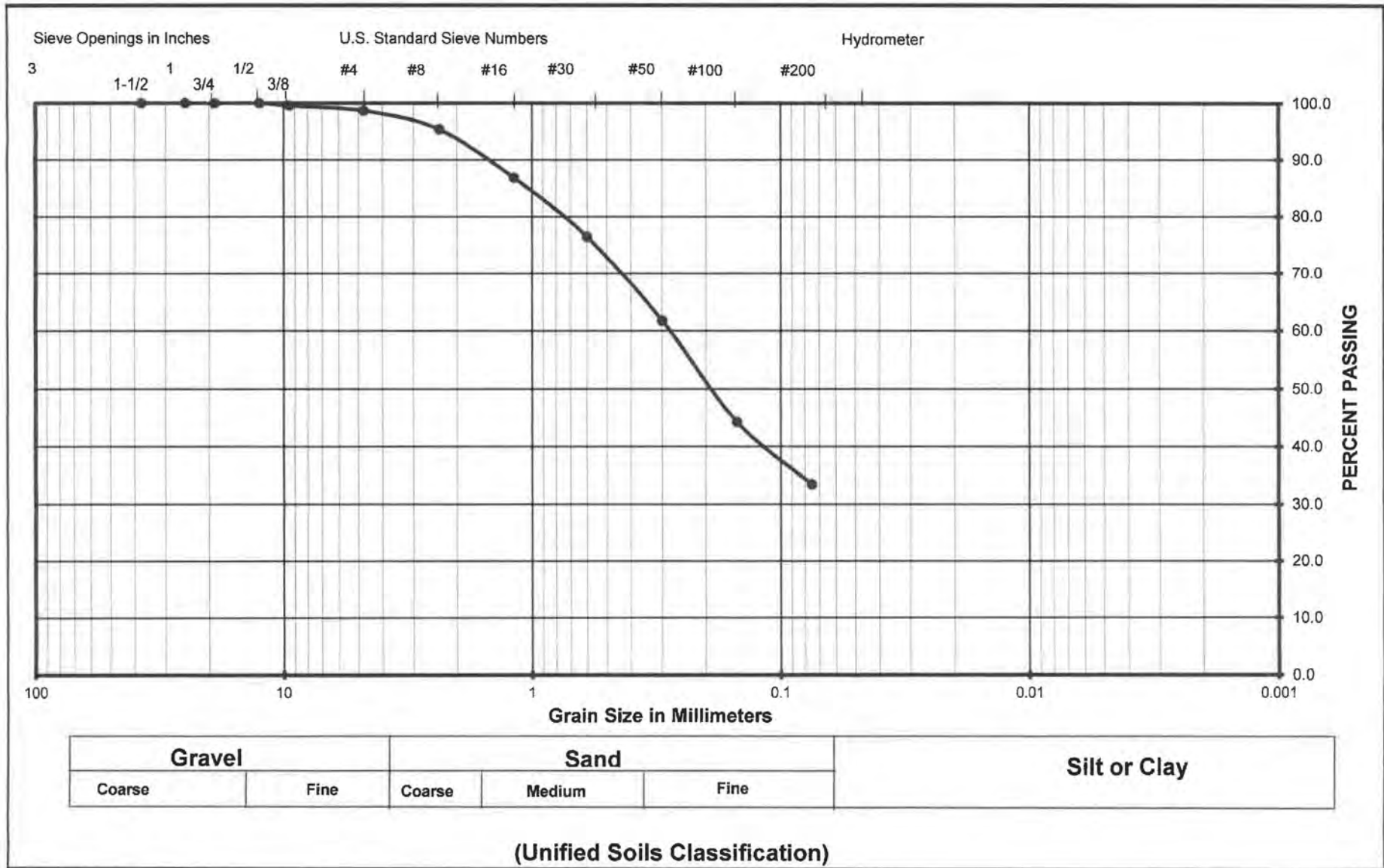
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/22/2016
Sample Location : TP34 @ 1-1.5'
Soil Classification : SC

Wet Weight	:	400.00
Dry Weight	:	387.90
Moisture Content	:	3%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50	1.8	0.5	0.5	99.5
#4	4.75	3.4	0.9	1.3	98.7
#8	2.36	12.7	3.3	4.6	95.4
#16	1.18	33.2	8.6	13.2	86.8
#30	0.60	40.2	10.4	23.5	76.5
#50	0.30	57.0	14.7	38.2	61.8
#100	0.15	67.8	17.5	55.7	44.3
#200	0.08	41.8	10.8	66.5	33.5

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC
 Sample Number: TP34 @ 1-1.5'

ASTM C136

Krazan Testing Laboratory

ASTM D4647-06

Date:	11/3/2016
Project Name	Guzman Reservoir
Project Number	022-15055
Sample Location	TP34 @ 1-1.5'
Water Content	14.00%
Compaction Characteristics	D1557
Curing Time	24 Hrs +

[illegible]

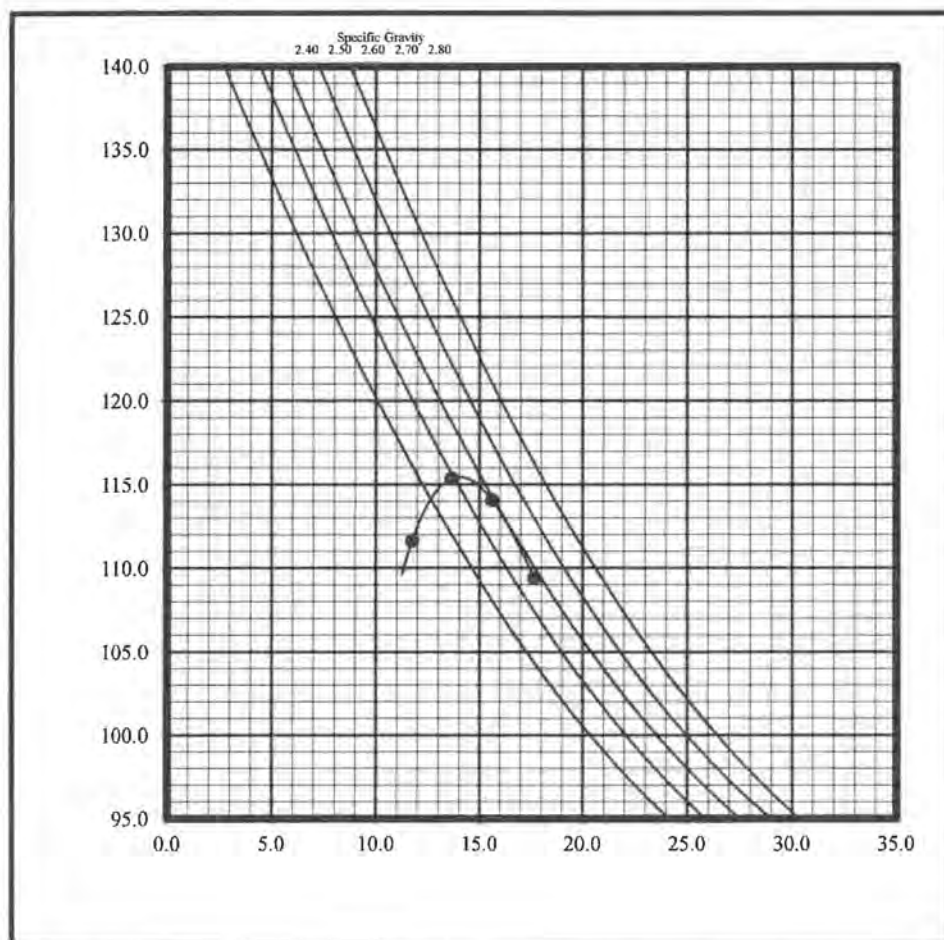
Final Hole Diameter 1.0 mm

Technician **J Jensen**

Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft. - lbf/ft³) ASTM D1557

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	SC
Technician	DJ 12075	Soil Description	Brn Clayey Sand
Date	10/31/2016	Method	D1557a
Sample Location	TP34 @ 1-1.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	3970.0	3982.0	3874.0	3934.0
Mass of Compaction Mold, gm	1990.0	1990.0	1990.0	1990.0
Mass of Moist Specimen, gm	1980.0	1992.0	1884.0	1944.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	131.1	131.9	124.7	128.7
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	176.0	173.0	179.0	170.0
Moisture Content (%)	13.6	15.6	11.7	17.6
Dry Density, lbs/cu.ft.	115.4	114.1	111.6	109.4



**Maximum Dry Density,
lbs.cu.ft.**

115.5

Optimum Moisture Content

14.0%

SDS#: -

Sieve Analysis

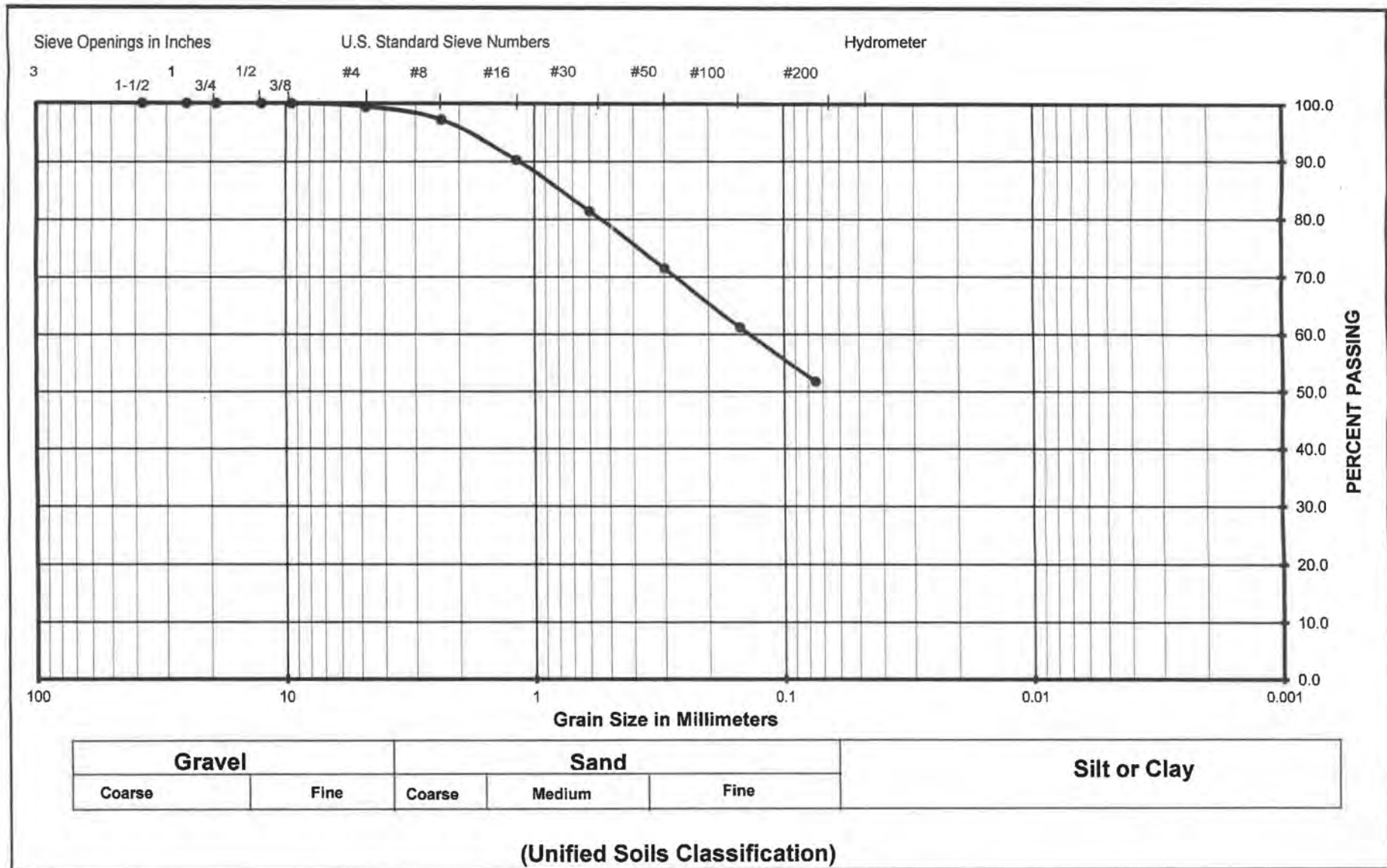
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/22/2016
Sample Location : TP34 @ 3-3.5'
Soil Classification : SC-CL

Wet Weight	:	400.00
Dry Weight	:	382.00
Moisture Content	:	5%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	2.0	0.5	0.5	99.5
#8	2.36	8.2	2.1	2.7	97.3
#16	1.18	26.8	7.0	9.7	90.3
#30	0.60	33.8	8.8	18.5	81.5
#50	0.30	38.0	9.9	28.5	71.5
#100	0.15	39.4	10.3	38.8	61.2
#200	0.08	36.0	9.4	48.2	51.8

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC-CL
 Sample Number: TP34 @ 3-3.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

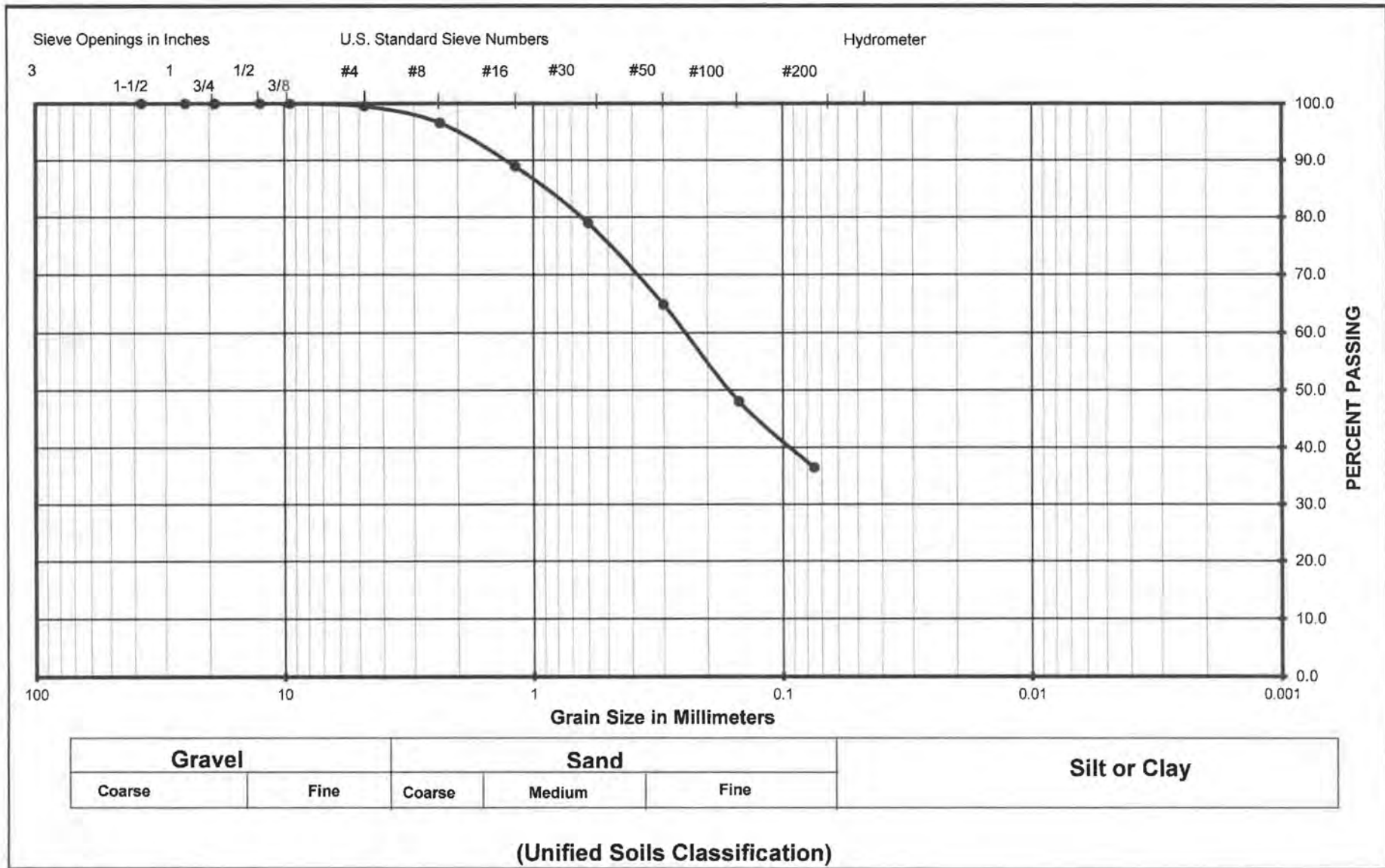
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/21/2016
Sample Location : TP34 @ 5-5.5'
Soil Classification : SC

Wet Weight	:	375.00
Dry Weight	:	364.00
Moisture Content	:	3%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	1.7	0.5	0.5	99.5
#8	2.36	10.8	3.0	3.4	96.6
#16	1.18	27.9	7.7	11.1	88.9
#30	0.60	36.3	10.0	21.1	78.9
#50	0.30	51.3	14.1	35.2	64.8
#100	0.15	61.0	16.8	51.9	48.1
#200	0.08	42.2	11.6	63.5	36.5

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 SC
 TP34 @ 5-5.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

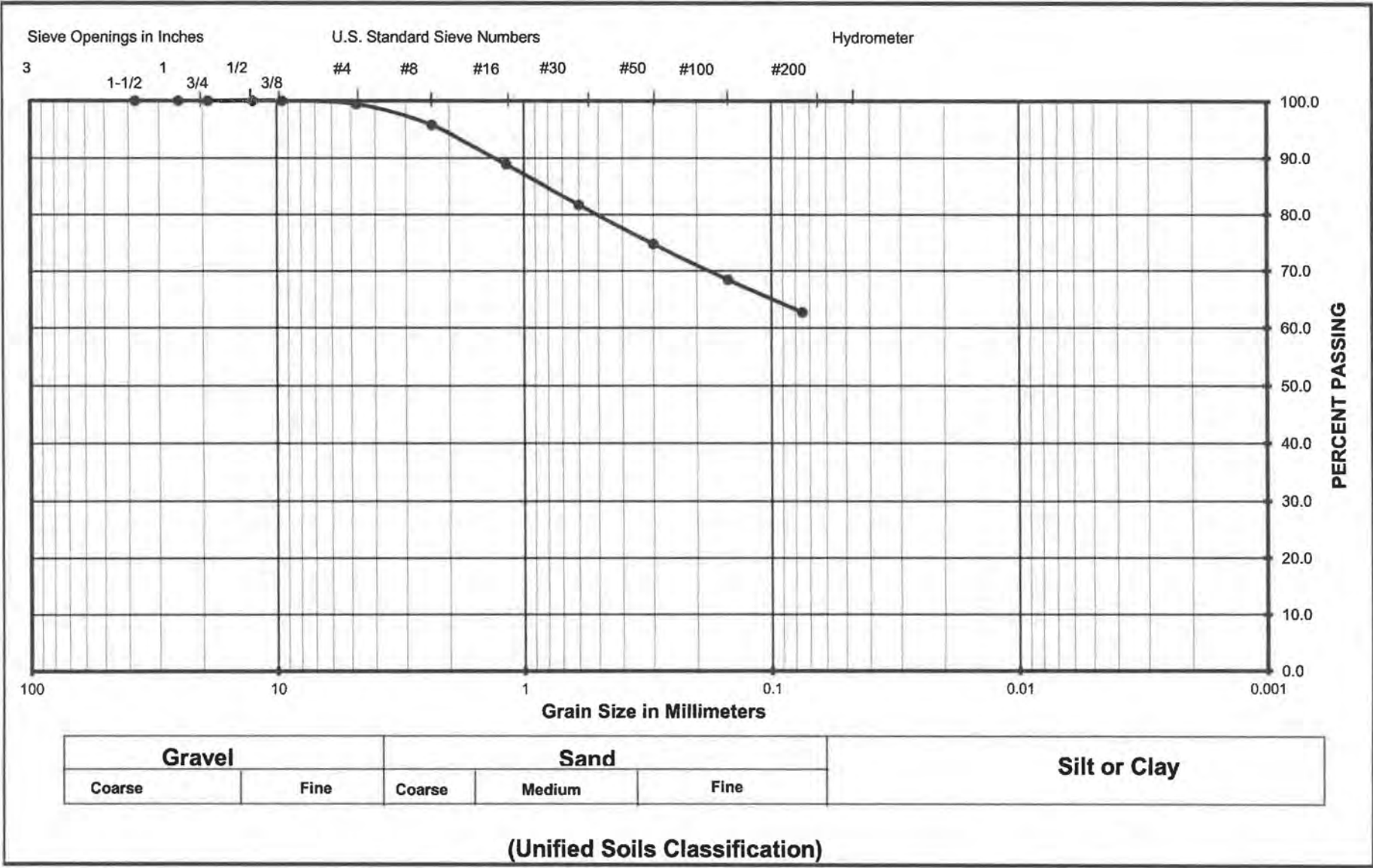
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/21/2016
Sample Location : TP35 @ 1-1.5'
Soil Classification : CL

Wet Weight	:	400.00
Dry Weight	:	376.00
Moisture Content	:	6%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	2.2	0.6	0.6	99.4
#8	2.36	13.9	3.7	4.3	95.7
#16	1.18	25.7	6.8	11.1	88.9
#30	0.60	26.9	7.2	18.3	81.7
#50	0.30	26.1	6.9	25.2	74.8
#100	0.15	23.9	6.4	31.6	68.4
#200	0.08	21.5	5.7	37.3	62.7

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
TP35 @ 1-1.5'

ASTM C136

Identification and Classification of Dispersive Clay Soils by the Pinhole Test

ASTM D4647-06

Date:	11/4/2017
Project Name	Guzman Reservoir
Project Number	022-15055
Sample Location	TP35 @ 1'
Water Content	13.80%
Compaction Characteristics	D1557
Curing Time	24 Hrs +

[illegible]

Final Hole Diameter 1.0 mm

Technician **J Jensen**



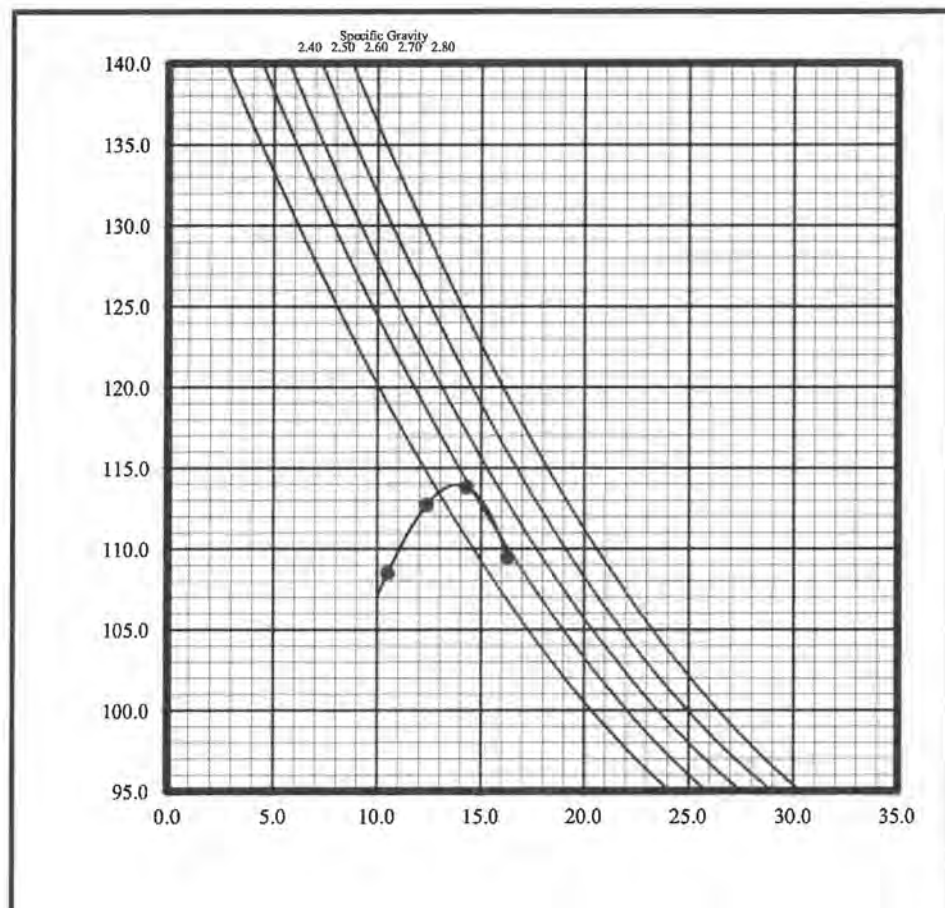
& ASSOCIATES, INC.

GEOTECHNICAL ENGINEERING ENVIRONMENTAL ENGINEERING CONSTRUCTION TESTING & INSPECTION

**Laboratory Compaction Characteristics
of Soil using Modified Effort (56,000 ft. - lbf/ft³)
ASTM D1557**

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	CL
Technician	DJ 12075	Soil Description	Bm Sandy Clay
Date	12/30/2016	Method	D1557a
Sample Location	TP35 @ 1-1.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	3896.0	3948.0	3906.0	3794.0
Mass of Compaction Mold, gm	1983.0	1983.0	1983.0	1983.0
Mass of Moist Specimen, gm	1913.0	1965.0	1923.0	1811.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	126.6	130.1	127.3	119.9
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	178.0	175.0	172.0	181.0
Moisture Content (%)	12.4	14.3	16.3	10.5
Dry Density, lbs/cu.ft.	112.7	113.8	109.5	108.5



**Maximum Dry Density,
lbs.cu.ft.**

114.0

Optimum Moisture Content

13.8%

SDS#: _____

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 1/4/2017
Sample Location : TP35 @ 2-2.5'
Soil Classification : CL

Wet Weight	:	250.00
Dry Weight	:	225.00
Moisture Content	:	11%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75				100.0
#8	2.36	0.3	0.1	0.1	99.9
#16	1.18	7.1	3.2	3.3	96.7
#30	0.60	25.0	11.1	14.4	85.6
#50	0.30	13.5	6.0	20.4	79.6
#100	0.15	12.7	5.6	26.0	74.0
#200	0.08	12.2	5.4	31.5	68.5

Hydrometer Analysis

ASTM D422

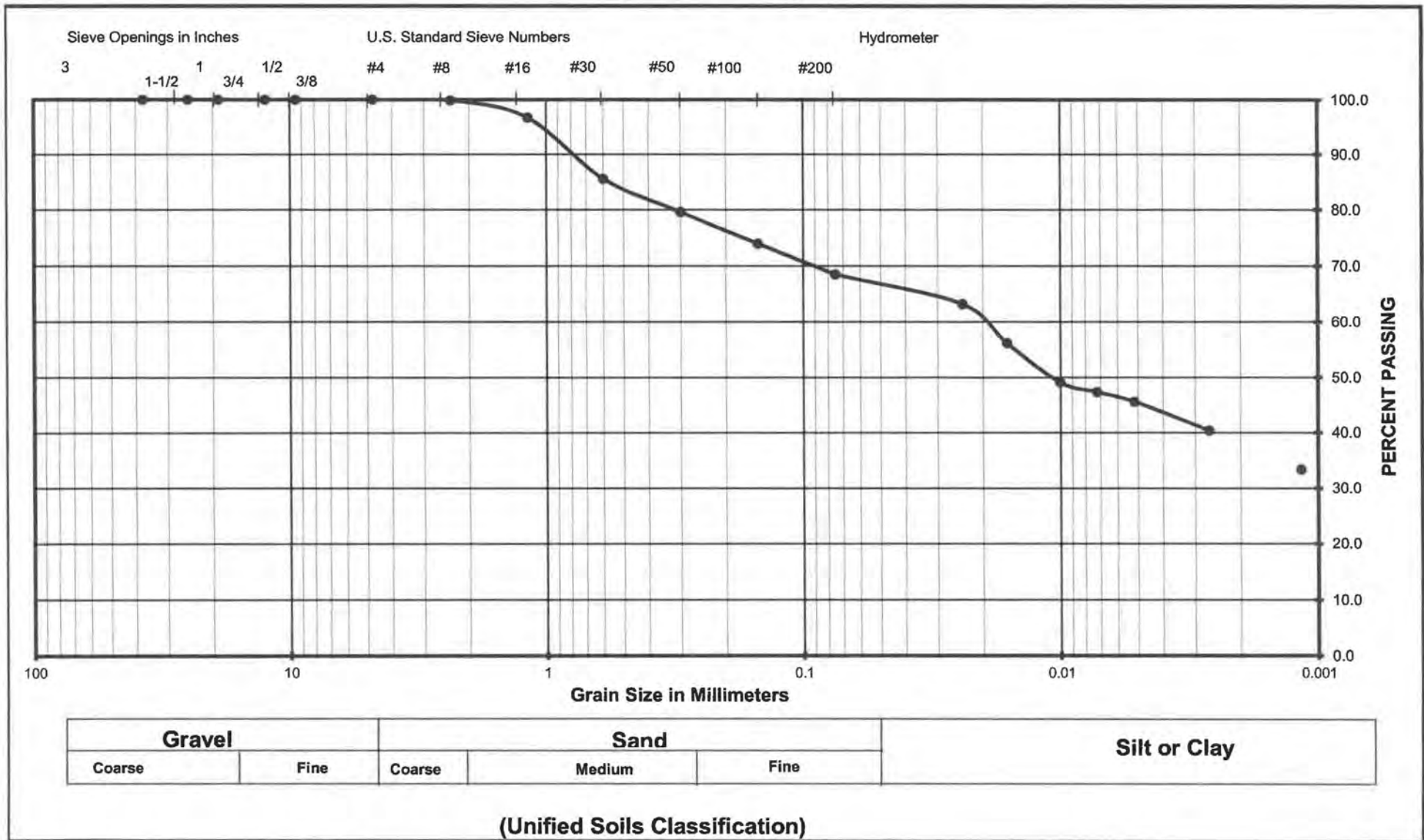
Project Number : 022-15055
Project Name : Guzman
Date : 1/4/2017
Sample Location : TP35 @ 2-2.5'
Soil Classification : CL

Dry Weight Used	91.7 g
Temperature	20.0 C
Soil Specific Gravity	2.65
Solution Spec. Grav.	1.003
K Value	0.01365
Correction Factor	0.00000

Elapsed Time (min)	Hydro. Reading	Hydro. Corrected	% Passing	Particle Diameter
2	1.039	1.039	63.2	0.0240
5	1.035	1.035	56.1	0.0162
15	1.031	1.031	49.1	0.0100
30	1.03	1.03	47.4	0.0072
60	1.029	1.029	45.6	0.0052
250	1.026	1.026	40.4	0.0026
1440	1.022	1.022	33.3	0.0012

Particle Diameter	Percent Passing
0.005	45.3
0.002	37.3
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
TP35 @ 2-2.5'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman Reservoirs**
 Project Number: **022-15055**
 Date Sampled: 6/1/2016
 Sampled By: DA
 Sample Number:
 Sample Location: TP35 @ 2-2.5'
 Sample Description: CL

Date Tested: 1/4/2017
 Tested By: J Dyer
 Verified By: J Gruszczynski

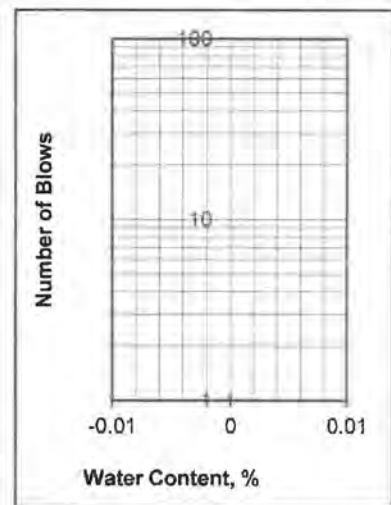
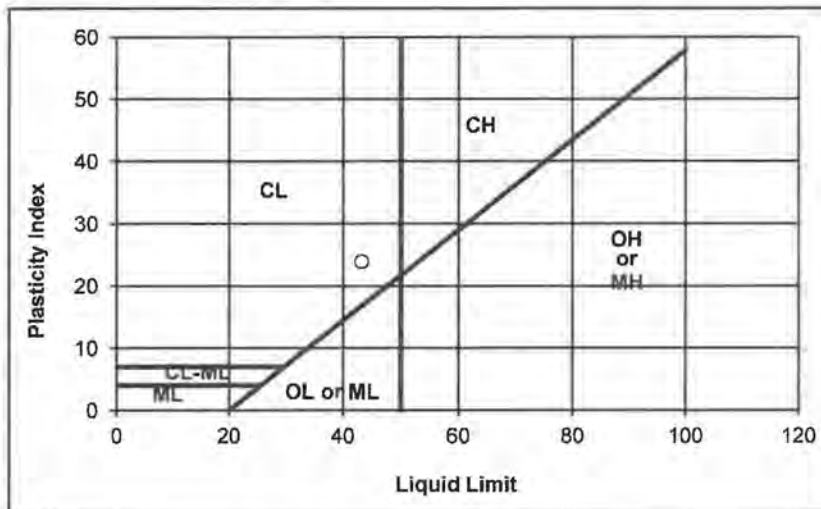
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	18.83	17.42		34.76	33.90	
Weight of Dry Soil & Tare (g)	18.19	16.94		30.85	30.18	
Weight of Tare (g)	14.90	14.44		22.06	21.53	
Weight of water (g)	0.64	0.48		3.91	3.72	
Weight of Dry Soil (g)	3.30	2.50		8.78	8.65	
Water Content (% of dry wt.)	19.3%	19.4%		44.5%	43.0%	
Number of Blows				19	27	

Plastic Limit : 19

Liquid Limit : 43

Plasticity Index : 24
Unified Soil Classification : CL

Requirement:
Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

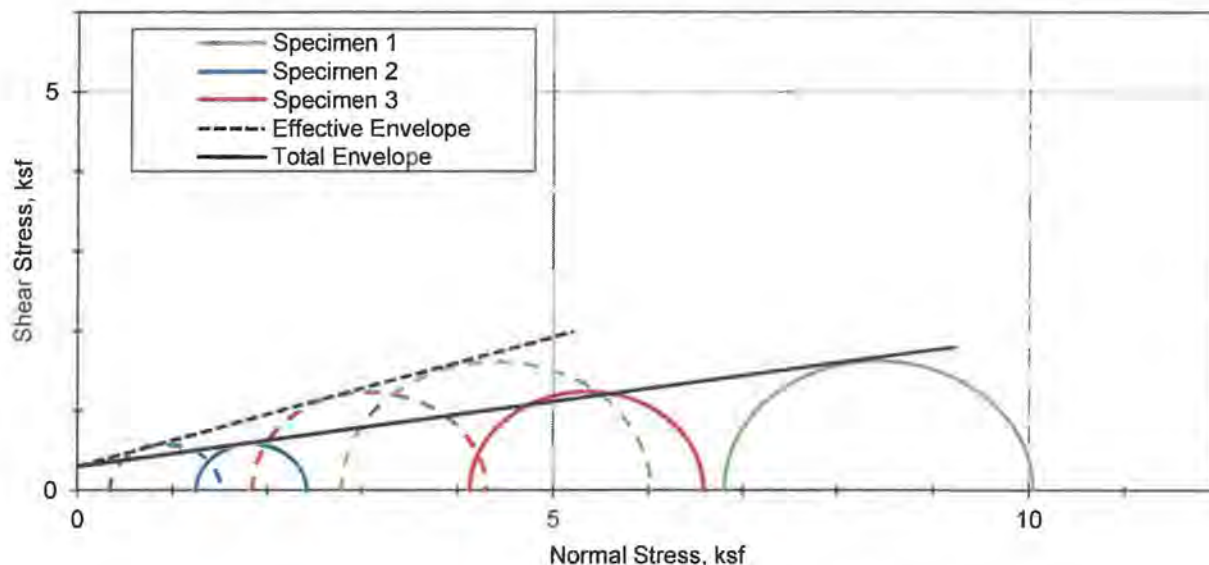
Unusual Conditions, Other Notes:



Consolidated-Undrained Triaxial Test

ASTM D4767

Project:	Guzman Reservoir	Sample Number:	TP35 @ 2-2.5'
Project Number:	022-15055	Sample Type:	Reconstituted
Sampling Date:	2/6/2017	Sample Description:	0
Location:	TP35 @ 2-2.5'	Sample Depth (ft):	2-2.5
Client Name:	Kern Tulare Water District		



Initial Parameters			
	Total	Effective	Specimen
Friction Angle, ϕ	9.2	18.0	1
Cohesion, c (ksf)	0.30	0.30	2
			3
Failure Criteria: Specified Strain %			
Plastic Limit:	19		
Liquid Limit:	43		
Specific Gravity:	2.72		
	ASSUMED		
Saturation Parameters			
B-Value	0.98	0.96	0.97
Consolidation Parameters			
Back Pressure (psi)	24.8	13.8	23.2
Effective Pressure (psi)	55.0	9.0	30.0
Height (in)	5.63	5.77	5.67
Area (in ²)	6.04	6.34	6.16
Void Ratio	0.444	0.561	0.492
Saturation (%)	100	100.0	100.0
Final Parameters at Failure			
Deviator Stress (ksf)	3.2	1.2	2.5
σ'_1 (ksf)	6.0	1.5	4.3
σ'_3 (ksf)	2.8	0.3	1.8
Excess PP (ksf)	4.02	0.9	2.3
Axial Strain (%)	4.9	5.0	5.1
Rate of Strain (%/min)	0.104	0.103	0.104

Remarks:

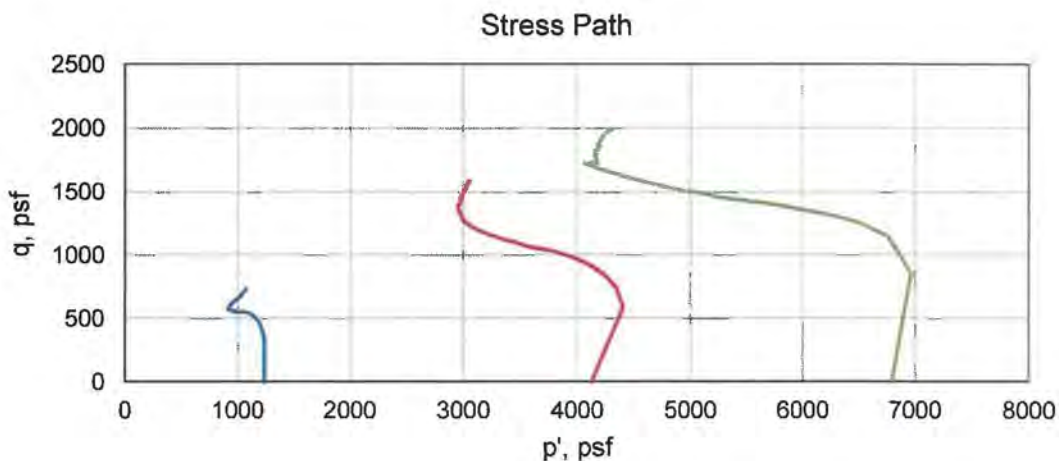
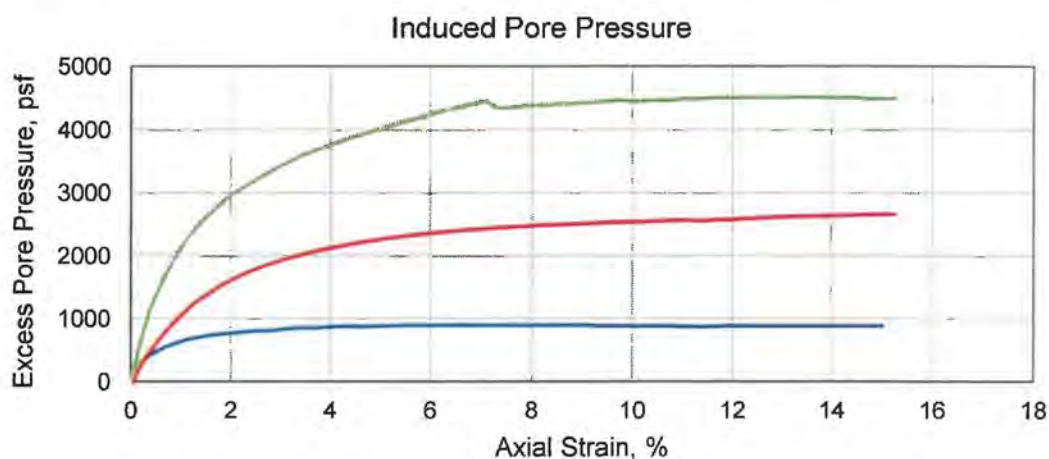
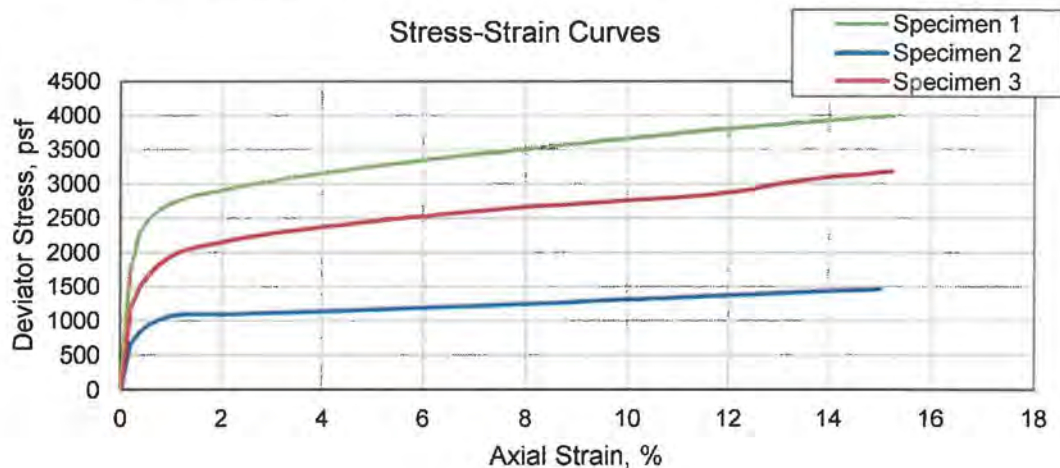


Consolidated-Undrained Triaxial Test

ASTM D4767

Project: Guzman Reservoir
Project Number: 022-15055
Sampling Date: 2/6/2017
Location: TP35 @ 2-2.5'
Client Name: Kern Tulare Water District

Sample Number: TP35 @ 2-2.5'
Sample Type: Reconstituted
Sample Description: 0
Sample Depth (ft): 2-2.5





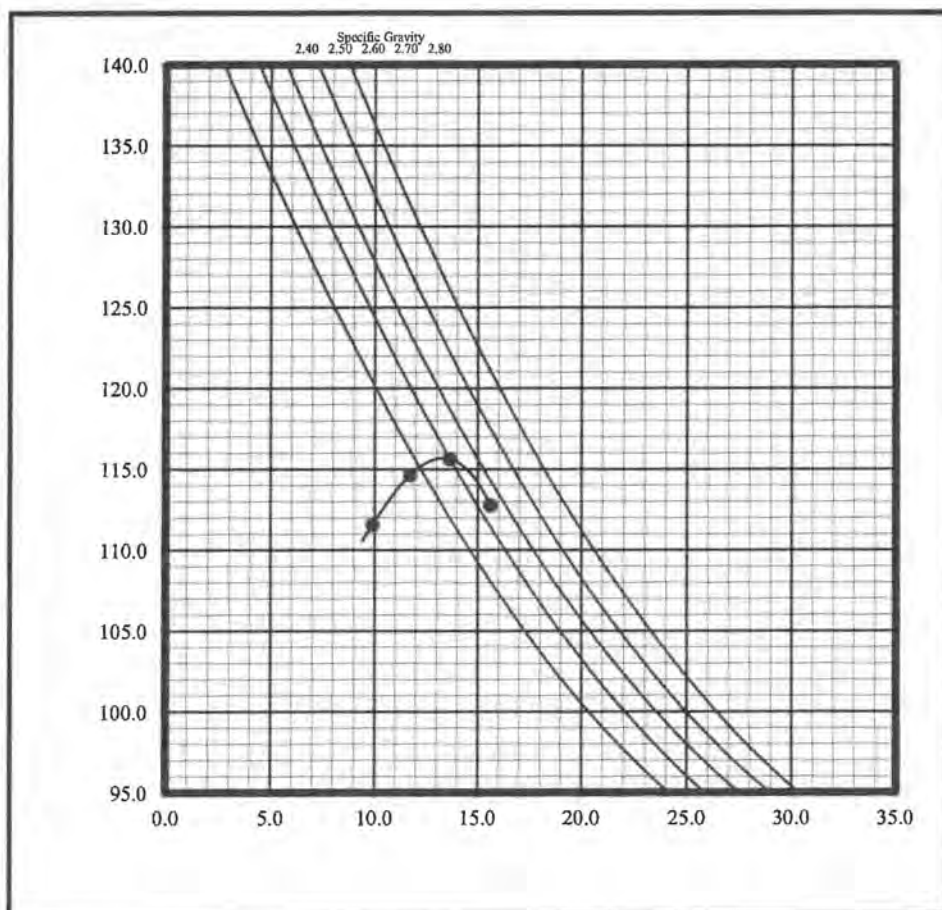
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GEOTECHNICAL ENGINEERING ENVIRONMENTAL ENGINEERING CONSTRUCTION TESTING & INSPECTION

**Laboratory Compaction Characteristics
of Soil using Modified Effort (56,000 ft. - lbf/ft³)
ASTM D1557**

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	CL
Technician	DJ 12075	Soil Description	Brn Sandy Clay
Date	12/30/2016	Method	D1557a
Sample Location	TP35 @ 2-2.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	3918.0	3968.0	3952.0	3835.0
Mass of Compaction Mold, gm	1983.0	1983.0	1983.0	1983.0
Mass of Moist Specimen, gm	1935.0	1985.0	1969.0	1852.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	128.1	131.4	130.4	122.6
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	179.0	176.0	173.0	182.0
Moisture Content (%)	11.7	13.6	15.6	9.9
Dry Density, lbs/cu.ft.	114.7	115.6	112.8	111.6



**Maximum Dry Density,
lbs.cu.ft.**

115.7

Optimum Moisture Content

13.3%

SDS#: -

Sieve Analysis

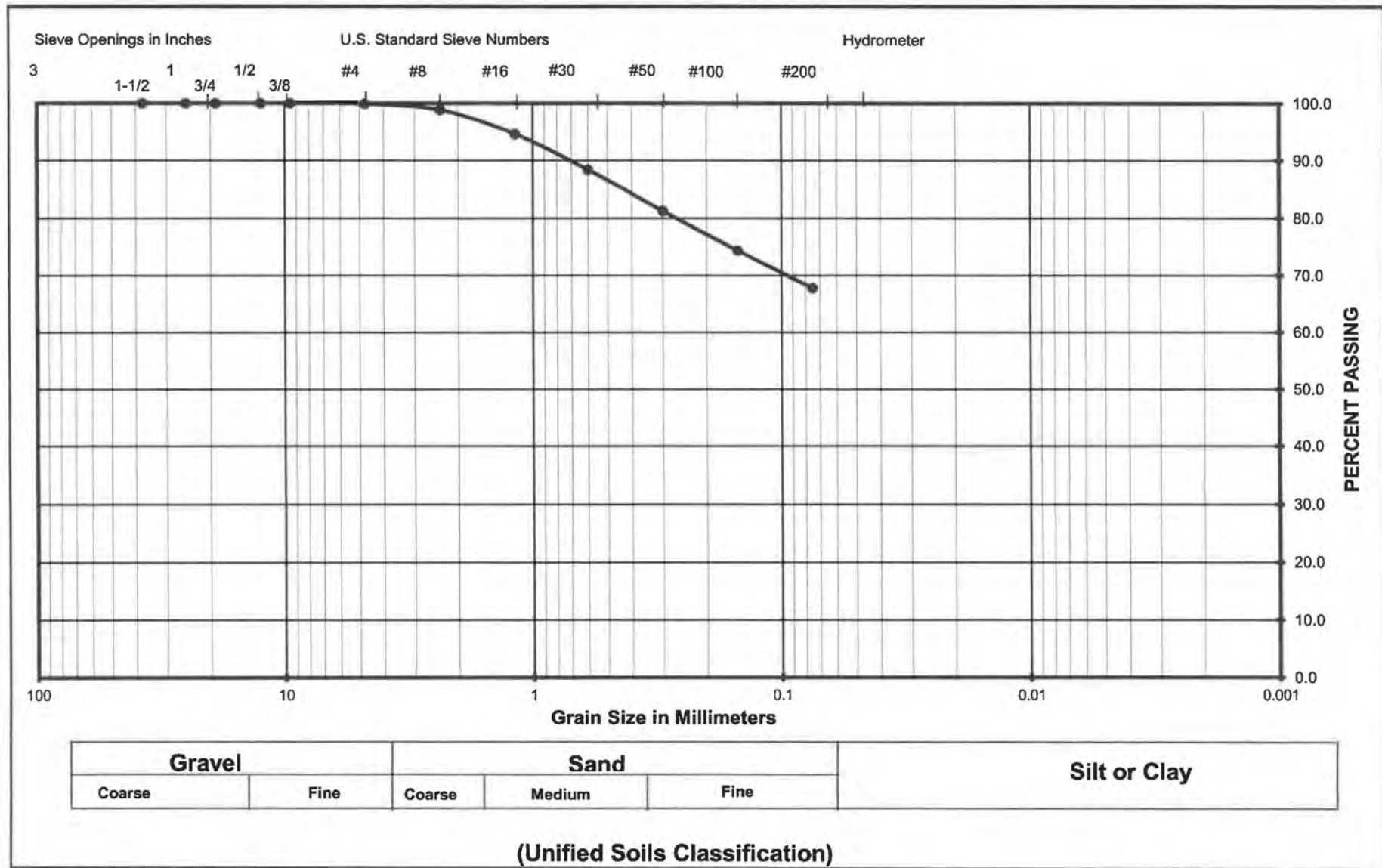
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/21/2016
Sample Location : TP35 @ 3-3.5'
Soil Classification : CL

Wet Weight	:	386.10
Dry Weight	:	361.70
Moisture Content	:	7%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.4	0.1	0.1	99.9
#8	2.36	3.9	1.1	1.2	98.8
#16	1.18	15.2	4.2	5.4	94.6
#30	0.60	22.4	6.2	11.6	88.4
#50	0.30	25.8	7.1	18.7	81.3
#100	0.15	25.0	6.9	25.6	74.4
#200	0.08	23.7	6.6	32.2	67.8

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: CL
 Sample Number: TP35 @ 3-3.5'

ASTM C136

Krazan Testing Laboratory

Identification and Classification of Dispersive Clay Soils by the Pinhole Test

Date:	11/4/2017
Project Name	Guzman Reservoir
Project Number	022-15055
Sample Location	TP35 @ 3'
Water Content	13.10%
Compaction Characteristics	D1557
Curing Time	24 Hrs +

[illegible]

Final Hole Diameter 1.0 mm

Technician J Jensen

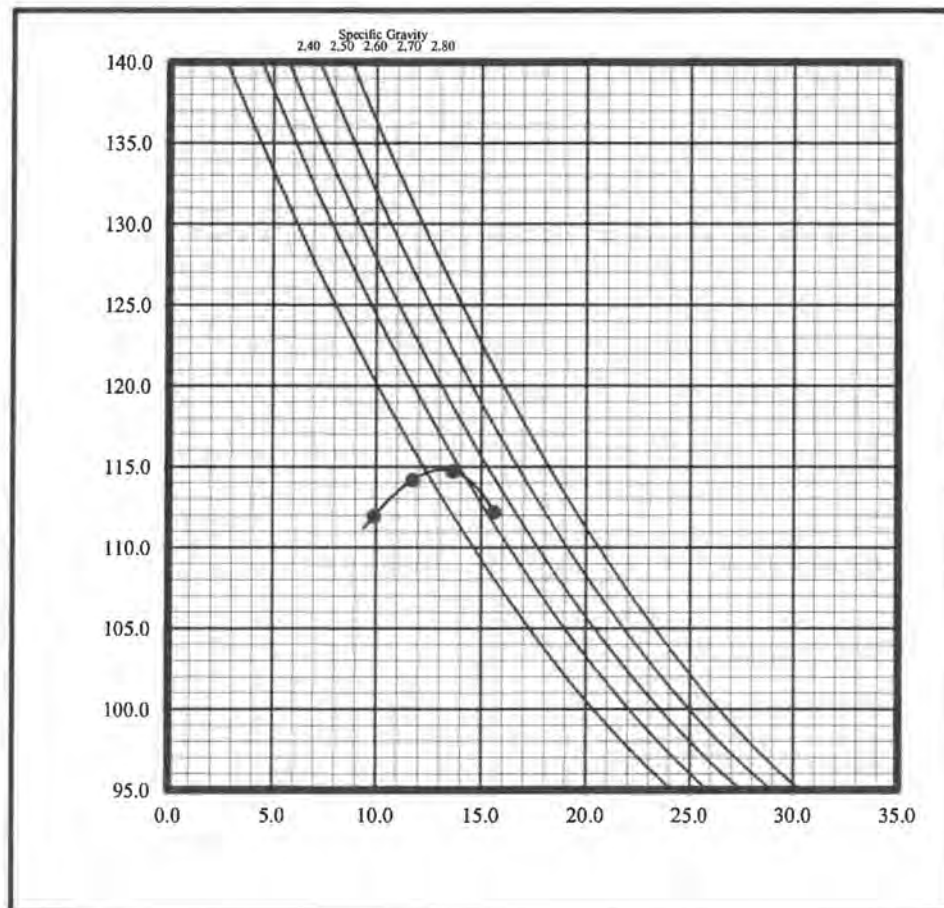
**& ASSOCIATES, INC.**

GEOTECHNICAL ENGINEERING ENVIRONMENTAL ENGINEERING CONSTRUCTION TESTING & INSPECTION

**Laboratory Compaction Characteristics
of Soil using Modified Effort (56,000 ft. - lbf/ft³)
ASTM D1557**

Project Number	022-15055	Sample Number	-
Project Name	Guzman Reservoir	Soil Classification	CL
Technician	DJ 12075	Soil Description	Brn Sandy Clay
Date	12/30/2016	Method	D1557a
Sample Location	TP35 @ 3-3.5'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	3952.0	3942.0	3910.0	3841.0
Mass of Compaction Mold, gm	1983.0	1983.0	1983.0	1983.0
Mass of Moist Specimen, gm	1969.0	1959.0	1927.0	1858.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	130.4	129.7	127.6	123.0
Mass of Moisture (Wet), gm	200.0	200.0	200.0	200.0
Mass of Moisture (Dry), gm	176.0	173.0	179.0	182.0
Moisture Content (%)	13.6	15.6	11.7	9.9
Dry Density, lbs/cu.ft.	114.7	112.2	114.2	111.9



**Maximum Dry Density,
lbs.cu.ft.**

114.8

Optimum Moisture Content

13.1%

SDS#: -

Sieve Analysis

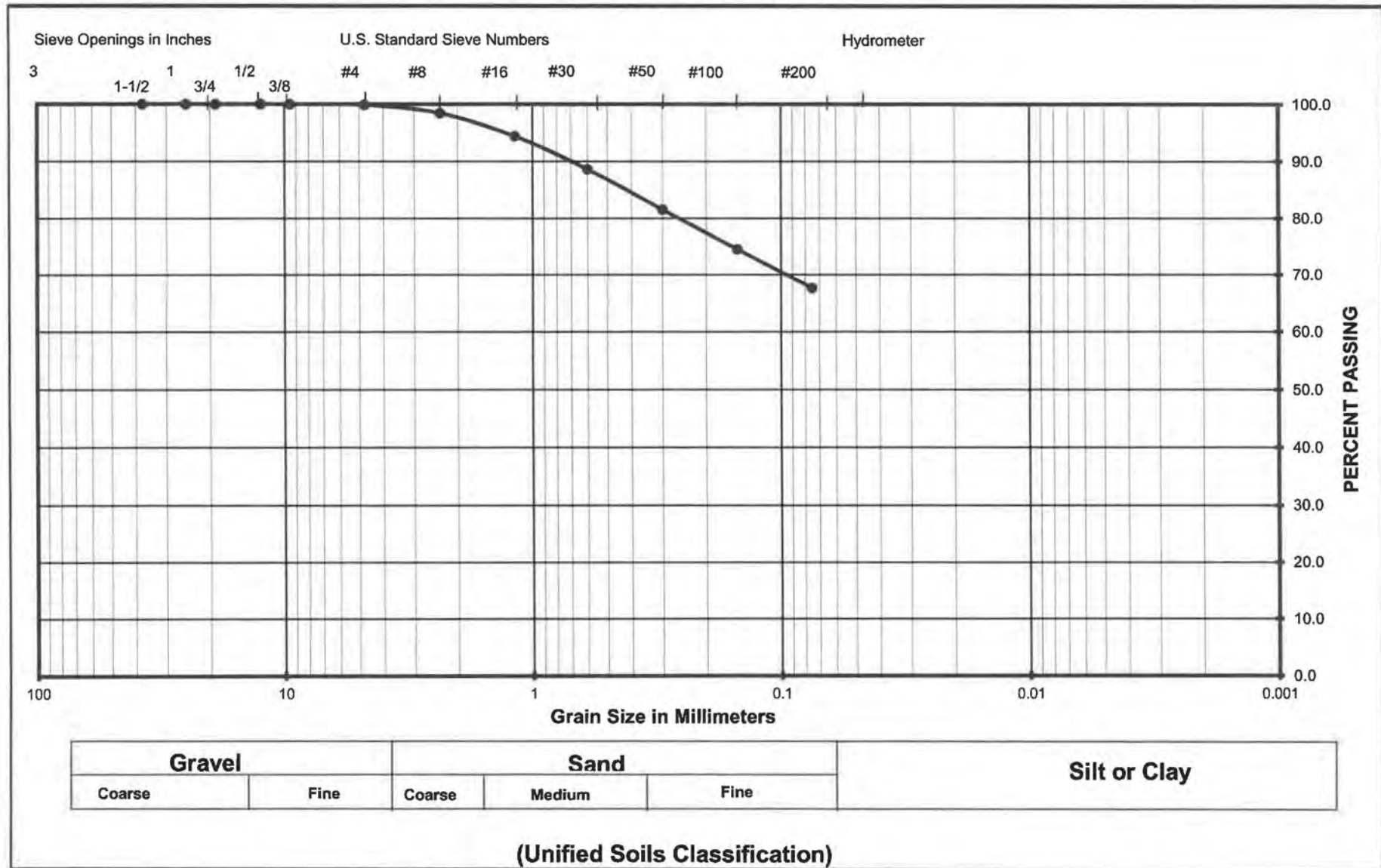
ASTM C136 / CT 202

Project Number : 022-15055
 Project Name : Guzman
 Date : 6/21/2016
 Sample Location : TP35 @ 4-4.5'
 Soil Classification : CL

Wet Weight	:	375.00
Dry Weight	:	348.50
Moisture Content	:	8%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.4	0.1	0.1	99.9
#8	2.36	5.1	1.5	1.6	98.4
#16	1.18	13.8	4.0	5.5	94.5
#30	0.60	20.4	5.9	11.4	88.6
#50	0.30	24.5	7.0	18.4	81.6
#100	0.15	24.6	7.1	25.5	74.5
#200	0.08	24.0	6.9	32.4	67.6

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
TP35 @ 4-4.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
 Project Name : Guzman
 Date : 6/21/2016
 Sample Location : TP35 @ 5-5.5'
 Soil Classification : SC-CL

Wet Weight	:	399.50
Dry Weight	:	390.50
Moisture Content	:	2%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	1.2	0.3	0.3	99.7
#8	2.36	7.7	2.0	2.3	97.7
#16	1.18	28.4	7.3	9.6	90.4
#30	0.60	37.9	9.7	19.3	80.7
#50	0.30	42.3	10.8	30.1	69.9
#100	0.15	40.5	10.4	40.5	59.5
#200	0.08	34.8	8.9	49.4	50.6

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 SC-CL
 TP35 @ 5-5.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 6/21/2016
Sample Location : TP35 @ 6-6.5'
Soil Classification : SC-CL

Wet Weight	:	394.20
Dry Weight	:	382.40
Moisture Content	:	3%

Sieves Size/Number	Sieve Size, mm	Retained Weight	Retained. %	Cum % Retained	Cum. % Passing.
1-1/2"	37.50				100.0
1"	25.00				100.0
3/4"	19.00				100.0
1/2"	12.50				100.0
3/8"	9.50				100.0
#4	4.75	0.9	0.2	0.2	99.8
#8	2.36	9.3	2.4	2.7	97.3
#16	1.18	25.3	6.6	9.3	90.7
#30	0.60	34.2	8.9	18.2	81.8
#50	0.30	40.7	10.6	28.9	71.1
#100	0.15	41.1	10.7	39.6	60.4
#200	0.08	34.9	9.1	48.7	51.3

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC-CL
 Sample Number: TP35 @ 6-6.5'

ASTM C136

Krazan Testing Laboratory

EXHIBIT D – SPECIAL CONDITIONS

Recipient acknowledges and agrees to the following special conditions:

Environmental:

The documents identified below are incorporated by reference and the Recipient shall comply with the conditions and recommendations therein:

1. The adopted August 11, 2016 Mitigation Monitoring and Reporting Program, including (but not limited) to the following mitigation measures (MM):
 - MM 4.3-1 for air quality,
 - MM 4.9-1 through MM 4.9-5 for hydrology/water quality,
 - MM 4.4-1 through MM 4.4-7 for biological resources, and
 - MM 4.5-1 through MM 4.5-5 for cultural resources.

The Recipient shall make no changes in the Project, construction area, or special conditions, without obtaining the appropriate and necessary prior approval(s) from the State Water Board.

REPORTING TO THE STATE WATER BOARD

1. In its status reports submitted pursuant to this Agreement, the Recipient shall include a discussion of the status of its compliance with environmental measures identified in this Exhibit D.
2. In its Project Completion Report submitted pursuant to this Agreement, the Recipient shall include a discussion of compliance with environmental measures identified in this Exhibit D.

Technical:

1. The Recipient must submit a complete Report of Waste Discharge to the Central Valley Regional Board prior to funds being disbursed.
2. The Recipient must provide a copy of the amended Waste Discharge Requirement permit prior to construction funds being disbursed.
3. The Recipient must submit an amended agreement with Hathaway and Jasmin Ranchos Mutual Water Company extending their term to match the full term of the proposed financing agreement prior to construction funds being disbursed.

Legal:

1. As a condition precedent to this Agreement, the Recipient must deliver an opinion of general counsel satisfactory to the State Water Board's counsel.

MITIGATION MONITORING REPORTING PROGRAM

Air Quality

Impact	Mitigation Measure	Timeframe	Responsible Monitoring Agency	Date	Initials
	MM 4.3-1: PM10 REDUCTION MEASURES During construction, the District shall comply with the following dust control measures to ensure compliance with required Regulation VIII (Fugitive PM10 Prohibitions):	During construction	District		
4.3-1	- Water previously exposed surfaces (soil) whenever visible dust is capable of drifting from the site or approaches 20% opacity. - Water exposed area three times per day. - Water all unpaved haul roads a minimum of three-times/day or whenever visible dust from such roads is capable of drifting from the site or approaches 20% opacity. - Reduce speed on unpaved roads to less than 15 miles per hour. - Install and maintain a track out control device that meets the specifications of SJVAPCD Rule 8041 if the site exceeds 150 vehicle trips per day or more than 20 vehicle trips per day by vehicles with three or more axles. - Stabilize all disturbed areas, including storage piles, which are not being actively utilized for production purposes using water, chemical stabilizers or by covering with a tarp or other suitable cover. - Control fugitive dust emissions during land	Steps to Compliance: - The construction contractor(s) shall implement the listed measures at the construction site. - The District shall periodically inspect the construction site to ensure that the measures are being implemented.			

Impact	Mitigation Measure	Timeframe	Responsible Monitoring Agency	Date	Initials
	clearing, grubbing, scraping, excavation, leveling, grading, or cut and fill operations with application of water or by presoaking. • When transporting materials offsite, maintain a freeboard limit of at least 6 inches and cover or effectively wet to limit visible dust emissions. • Limit and remove the accumulation of mud and/or dirt from adjacent public roadways at the end of each workday. (Use of dry rotary brushes is prohibited except when preceded or accompanied by sufficient wetting to limit visible dust emissions and use of blowers is expressly forbidden).				

Biological Resources

Impact	Mitigation Measure	Timeframe	Responsible Monitoring Agency	Date	Initials
	MM 4.4-1: PRECONSTRUCTION SURVEYS AND AVOIDANCE BUFFERS No less than 14 days and no more than 30 days prior to the inception of any Project-related activity throughout the entire construction period, preconstruction surveys shall be conducted by a qualified biologist. If any evidence of occupation of the Project site by special-status species is observed, the following buffers shall be established by the biologist that results in sufficient avoidance to comply with applicable regulations: • San Joaquin kit fox or American badger potential den: 50 feet; • San Joaquin kit fox or American badger known den: 100 feet; • San Joaquin kit fox or American badger pupping den: contact U.S. Fish and Wildlife Service and California Department of Fish and Wildlife; • Burrowing owl burrow: see table below; • Protected raptor nest during breeding season: 500 feet or as recommended by qualified biologist; • Protected migratory bird during breeding season: as recommended by qualified biologist; and • Other special-status wildlife species: as recommended by qualified biologist.	Prior to construction	District, California Department of Fish and Wildlife (CDFW) (if needed), U.S. Fish and Wildlife Service (if needed)		
4.4-1		Steps to Compliance: • The District shall contract with a qualified biologist to conduct a preconstruction survey no less than 14 days and no more than 30 days, and in compliance with additional species-specific survey requirements specified in this mitigation, prior to the inception of any project activity. • If necessary, avoidance buffers shall be established by the qualified biologist in accordance with this mitigation. • If sufficient buffers cannot be established, then U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) shall be contacted for further guidance and the District shall adhere to any wildlife agency recommendations.			

Impact	Mitigation Measure	Timeframe	Responsible Monitoring Agency	Date	Initials
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Burrowing Owl Burrow Buffers

Location	Time of Year	Level of Disturbance		
		Low	Medium	High
Nesting sites	Apr 1 – Aug 1	656 feet	1,640 feet	1,640 feet
Nesting sites	Aug 1 – Oct 15	656 feet	656 feet	1,640 feet
Any occupied burrow	Oct 16 – Mar 31	164 feet	328 feet	1,640 feet

CDFW 2012.

If sufficient avoidance buffers cannot be established, the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife shall be contacted for further guidance and consultation on additional measures.

Bald Eagles and Raptors

Specific to bald eagle and other raptors, the qualified biologist shall conduct surveys on and within 500 feet of an activity site for active raptor nests prior to onsite activities. If raptors are found to occur, their active nest shall be avoided by 500 feet. The 500-foot, no-disturbance area can be reduced if it is determined by a qualified biologist that activities do not affect breeding success. If found to occur, active golden eagle nests shall be avoided by 1 mile and activities shall not occur within line-of-sight of active nests.

Migratory Birds

Specific to other migratory birds protected by the Migratory Bird Treaty Act, the qualified biologist shall conduct the survey for active bird nests at an activity site if activities at the site are scheduled to occur during the breeding season (February 15 through September 15). The survey shall include the site and no less than

Impact	Mitigation Measure	Timeframe	Responsible Monitoring Agency	Date	Initials
	500 feet outside of site boundaries. If active nests are located within the site boundaries, construction activities shall be restricted as necessary to avoid disturbance of the nest until it is abandoned or a qualified biologist deems disturbance potential to be minimal (in consultation with U.S. Fish and Wildlife Service and California Department of Fish and Wildlife). Restrictions may include establishment of avoidance buffers (no ingress of personnel or equipment at a minimum radius of 50 feet or more around the nest as recommended by the biologist) or alteration of the construction schedule. All observed nests shall be monitored by a qualified biologist to determine nest status and the potential for nest abandonment. Burrowing Owl Specific to burrowing owls, a qualified biologist shall conduct surveys for burrowing owl according to the <i>Staff Report on Burrowing Owl Mitigation</i> (CDFW 2012) and <i>Burrowing Owl Survey Protocol and Mitigation Guidelines</i> (California Burrowing Owl Consortium 1993). Pre-activity surveys of an activity area and a 500-foot perimeter of the activity area shall be conducted. If burrowing owls are present on an activity site (or within 250 feet of the activity site) during the breeding season (February 1 through August 31), a buffer (see table above) shall be established between the nest site or active burrow and any earth-moving activity or other potential disturbance. This buffer may be removed once				