

Log of Test Pit TP22

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-41

Location: Guzman, Kern County, CA

Logged By: R. Alexander

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)				
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.								
							20	40	60	20	40	60	80	
0		Ground Surface												
0		SANDY SILT (ML) Well graded; brown, damp, digs easily With approximately 30% fine content												
2														
2		CLAYEY SAND (SC) Fine- to medium-grained; light orangish-brown, damp, digs easily With approximately 30% fine content												
4														
4		SILTY SAND (SM) Well graded; with CLAY, light brown, damp, digs firmly With approximately 30% fine content												
6														
6		SAND/SILTY SAND (SW-SM) Well graded; with minor GRAVEL, brown, damp, digs firmly With approximately 10% fine content												
8														
8														
10		End of Test Pit												
12														
14														
16														
18														
20														

Method: Backhoe

Excavation Date: 6-1-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Brent Snyder

Elevation: 661 Feet

Sheet: 1 of 1

Log of Test Pit TP23

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-42

Location: Guzman, Kern County, CA

Logged By: R. Alexander

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)				
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.								
							20	40	60	20	40	60	80	
0		Ground Surface												
2		SANDY SILT (ML) Fine- to medium-grained; brown, damp, digs easily With approximately 60% fine content												
4		SILTY SAND (SM) Fine- to medium-grained; with CLAY, light orangish-brown, damp, digs firmly With approximately 30% fine content												
6		SAND/SILTY SAND (SW-SM) Well graded; with minor GRAVEL, brown, damp, digs firmly With approximately 10% fine content												
8														
10		End of Test Pit												
12														
14														
16														
18														
20														

Method: Backhoe

Excavation Date: 6-1-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Brent Snyder

Elevation: 660 Feet

Sheet: 1 of 1

Log of Test Pit TP24

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-43

Location: Guzman, Kern County, CA

Logged By: Dave Adams

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.							
0		Ground Surface					20	40	60	20	40	60	80
0		CLAYEY SAND (SC) Fine- to medium-grained; dark brown, damp, digs easily With approximately 30% fine content											
2		SANDY CLAY (CL) Fine- to medium-grained; light brown, damp, digs easily With approximately 60% fine content											
4		CLAYEY SAND (SC) Fine- to medium-grained; dark brown, damp, digs firmly With approximately 40% fine content											
6													
8													
10		SAND/SILTY SAND (SW-SM) Well graded; with minor GRAVEL, brown, damp, digs firmly With approximately 10% fine content											
12		End of Test Pit											
14													
16													
18													
20													

Method: Backhoe

Excavation Date: 6-2-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Jim Watts

Elevation: 653 Feet

Sheet: 1 of 1

Log of Test Pit TP25

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-44

Location: Guzman, Kern County, CA

Logged By: Dave Adams

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)				
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.								
0		Ground Surface						20	40	60	20	40	60	80
0		CLAYEY SAND (SC) Fine- to medium-grained; dark brown, damp, digs easily With approximately 30% fine content			■						■			
2														
2		SANDY CLAY (CL) Fine- to medium-grained; reddish-brown, damp, digs firmly With approximately 60% fine content			■								■	
4														
4		SILTY SAND (SM) Fine- to medium-grained; brown, damp, digs firmly With approximately 20% fine content			■						■			
6														
6		SAND/SILTY SAND (SW-SM) Well graded; with minor GRAVEL, brown, damp, digs firmly With approximately 10% fine content			■								■	
8														
8														
10		End of Test Pit			■									
10														
12														
14														
16														
18														
20														

Method: Backhoe

Excavation Date: 6-2-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Jim Watts

Elevation: 649 Feet

Sheet: 1 of 1

Log of Test Pit TP26

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-45

Location: Guzman, Kern County, CA

Logged By: Dave Adams

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)				
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.								
0		Ground Surface						20	40	60	20	40	60	80
0		CLAYEY SAND (SC) Fine- to medium-grained; dark brown, damp, digs easily With approximately 30% fine content												
2														
4														
4		SANDY CLAY (CL) Fine- to medium-grained; reddish-brown, damp, digs firmly With approximately 60% fine content												
6														
8														
8		CLAYEY SAND (SC) Fine- to medium-grained; light brown, damp, digs firmly With approximately 20% fine content												
10														
12														
10		SANDY SILT (ML) Fine- to medium-grained; brown, damp, digs firmly With approximately 60% fine content												
12														
14														
12		End of Test Pit												
14														
16														
18														
20														

Method: Backhoe

Excavation Date: 6-2-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Jim Watts

Elevation: 665 Feet

Sheet: 1 of 1

Log of Test Pit TP27

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-46

Location: Guzman, Kern County, CA

Logged By: Dave Adams

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.							
0		Ground Surface					20	40	60	20	40	60	80
0		CLAYEY SAND (SC) Fine- to medium-grained; dark brown, damp, digs easily With approximately 40% fine content											
2													
2		With approximately 30% fine content below 3 feet											
4													
4													
6													
6													
8		SANDY CLAY (CL) Fine- to medium-grained; brown, damp, digs firmly											
8													
8		SANDY SILT (ML) Fine- to medium-grained; brown, damp, digs firmly											
10		With approximately 60% fine content											
10		End of Test Pit											
12													
14													
16													
18													
20													

Method: Backhoe

Excavation Date: 6-2-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Jim Watts

Elevation: 665 Feet

Sheet: 1 of 1

Log of Test Pit TP28

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-47

Location: Guzman, Kern County, CA

Logged By: Dave Adams

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.							
							20	40	60	20	40	60	80
0		Ground Surface											
0		CLAYEY SAND (SC) Fine- to medium-grained; dark brown, damp, digs easily With approximately 30% fine content											
2		CLAYEY SAND/SANDY CLAY (SC/CL) Fine- to medium-grained; brown, damp, digs firmly With approximately 50% fine content											
4		SANDY CLAY (CL) Fine- to medium-grained; reddish-brown, damp, digs hard With approximately 60% fine content											
6													
8													
10		CLAYEY SAND (SC) Fine- to medium-grained; brown, damp, digs hard With approximately 30% fine content											
12		End of Test Pit											
14													
16													
18													
20													

Method: Backhoe

Excavation Date: 6-2-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Jim Watts

Elevation: 649 Feet

Sheet: 1 of 1

Log of Test Pit TP28A

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-47A

Location: Guzman, Kern County, CA

Logged By: R. Alexander

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE						
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.	Penetration Test blows/ft		
							20	40	60
0		Ground Surface							
0		CLAYEY SAND (SC) Fine- to medium-grained; dark brown, damp, digs easily With approximately 30% fine content							
2		CLAYEY SAND (SC) Fine- to medium-grained; brown, damp, digs firmly With approximately 30 to 40% fine content							
4		CLAYEY SAND/SANDY CLAY (SC/CL) Fine- to medium-grained; reddish-brown, damp, digs hard With approximately 45 to 60% fine content							
6									
8		CLAYEY SAND (SC) Fine- to medium-grained; brown, damp, digs hard With approximately 40 to 45% fine content							
10		End of Test Pit							
12									
14									
16									
18									
20									

Method: Backhoe

Excavation Date: 8-28-17

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Brent Snyder

Elevation: 649 Feet

Sheet: 1 of 1

Log of Test Pit TP29

Project: Guzman Reservoir
Client: Kern Tulare Water District
Location: Guzman, Kern County, CA
Depth to Water>

Initial: None

Project No: 022-15055
Figure No.: A-48
Logged By: Dave Adams
At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)					
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.									
0		Ground Surface						20	40	60	20	40	60	80	
0		SILTY SAND (SM) Fine- to medium-grained; with CLAY, brown, damp, digs easily With approximately 30% fine content Digs firmly below 1 foot													
2															
			CLAYEY SAND/SANDY CLAY (SC/CL) Fine- to medium-grained; brown, damp, digs firmly With approximately 50% fine content												
4															
6															
8															
10			SILTY SAND (SM) Fine- to medium-grained; with CLAY, reddish-brown, damp, digs firmly With approximately 20% fine content												
			End of Test Pit												
12															
14															
16															
18															
20															

Method: Backhoe
Backhoe/Excavator: Deere 310SJ
Operator: Jim Watts

Krazan and Associates

Excavation Date: 6-2-16
Pit Size: 24 Inches
Elevation: 641 Feet
Sheet: 1 of 1

Log of Test Pit TP30

Project: Guzman Reservoir
Client: Kern Tulare Water District
Location: Guzman, Kern County, CA
Depth to Water>

Initial: None

Project No: 022-15055
Figure No.: A-49
Logged By: Dave Adams
At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft	Fine Content (%)
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.		
0		Ground Surface						
		CLAYEY SAND (SC) Fine- to medium-grained; dark brown, damp, digs easily With approximately 30% fine content						
2								
		CLAYEY SAND (SC) Fine- to medium-grained; reddish-brown, damp, digs firmly With approximately 40% fine content						
4								
6								
8								
10								
		End of Test Pit						
12								
14								
16								
18								
20								

Method: Backhoe

Backhoe/Excavator: Deere 310SJ

Operator: Jim Watts

Krazan and Associates

Excavation Date: 6-2-16

Pit Size: 24 Inches

Elevation: 637 Feet

Sheet: 1 of 1

Log of Test Pit TP31

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-50

Location: Guzman, Kern County, CA

Logged By: Dave Adams

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.							
0		Ground Surface					20	40	60	20	40	60	80
0		CLAYEY SAND/SANDY CLAY (SC/CL) Fine- to medium-grained; darkbrown, damp, digs easily With approximately 50% fine content											
2		CLAYEY SAND (SC) Fine- to medium-grained; reddish-brown, damp, digs firmly With approximately 40% fine content											
4		SILTY SAND (SM) Fine- to medium-grained; brown, damp, digs easily With approximately 20% fine content											
6		End of Test Pit											
8													
10													
12													
14													
16													
18													
20													

Method: Backhoe

Excavation Date: 6-2-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Jim Watts

Elevation: 647 Feet

Sheet: 1 of 1

Log of Test Pit TP32

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-51

Location: Guzman, Kern County, CA

Logged By: Dave Adams

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)				
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.								
0		Ground Surface						20	40	60	20	40	60	80
0		CLAYEY SILTY SAND (SM) Fine- to medium-grained; dark brown, damp, digs easily With approximately 30% fine content												
2		CLAYEY SAND (SC) Fine- to coarse-grained; with minor GRAVEL, reddish-brown, damp, digs firmly With approximately 20% fine content												
4														
6														
8		SILTY SAND (SM) Fine- to medium-grained; brown, damp, digs firmly With approximately 30% fine content												
10		End of Test Pit												
12														
14														
16														
18														
20														

Method: Backhoe

Excavation Date: 6-2-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Jim Watts

Elevation: 657 Feet

Sheet: 1 of 1

Log of Test Pit TP33

Project: Guzman Reservoir
Client: Kern Tulare Water District
Location: Guzman, Kern County, CA
Depth to Water>

Initial: None

Project No: 022-15055
Figure No.: A-52
Logged By: Dave Adams
At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.							
0		Ground Surface					20	40	60	20	40	60	80
0		CLAYEY SAND/SANDY CLAY (SC/CL) Fine- to medium-grained; brown, damp, digs easily With approximately 50% fine content											
2													
4		CLAYEY SAND (SC) Fine- to medium-grained; brown, damp, digs firmly With approximately 30% fine content											
6		SAND/CLAYEY SAND (SW-SC) Well graded; reddish-brown, damp, digs firmly With approximately 15% fine content											
8													
10		End of Test Pit											
12													
14													
16													
18													
20													

Method: Backhoe

Backhoe/Excavator: Deere 310SJ

Operator: Jim Watts

Krazan and Associates

Excavation Date: 6-2-16

Pit Size: 24 Inches

Elevation: 660 Feet

Sheet: 1 of 1

Log of Test Pit TP34

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-53

Location: Guzman, Kern County, CA

Logged By: Dave Adams

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)				
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.								
							20	40	60	20	40	60	80	
0		Ground Surface												
		CLAYEY SAND (SC) Fine- to medium-grained; dark brown, damp, digs easily With approximately 30% fine content Medium dense below 2 feet												
2														
		CLAYEY SAND/SANDY CLAY (SC/CL) Fine- to medium-grained; brown, damp, digs firmly With approximately 50% fine content												
4														
		CLAYEY SAND (SC) Fine- to medium-grained; medium brown, damp, digs firmly With approximately 40% fine content												
6														
		SILTY SAND (SM) Fine- to medium-grained; with CLAY, brown, damp, digs firmly With approximately 30% fine content												
8														
10		End of Test Pit												
12														
14														
16														
18														
20														

Method: Backhoe

Excavation Date: 6-2-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Jim Watts

Elevation: 643 Feet

Sheet: 1 of 1

Log of Test Pit TP35

Project: Guzman Reservoir

Project No: 022-15055

Client: Kern Tulare Water District

Figure No.: A-54

Location: Guzman, Kern County, CA

Logged By: R. Alexander

Depth to Water>

Initial: None

At Completion: None

SUBSURFACE PROFILE			SAMPLE				Penetration Test blows/ft			Fine Content (%)				
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.								
0		Ground Surface						20	40	60	20	40	60	80
0		SANDY SILT (ML) Fine- to medium-grained; brown, damp, digs easily With approximately 60% fine content												
2		SANDY CLAY (CL) Fine- to medium-grained; brown, damp, digs easily With approximately 60% fine content												
4		CLAYEY SAND/SANDY CLAY (SC/CL) Fine- to medium-grained; light brown, damp, digs easily With approximately 50% fine content												
6		SAND/SILTY SAND (SW-SM) Well graded; reddish-brown, damp, digs firmly With approximately 10% fine content												
8		SANDY CLAY (CL) Fine- to medium-grained; reddish-brown, damp, digs firmly With approximately 60% fine content												
10		End of Test Pit												
12														
14														
16														
18														
20														

Method: Backhoe

Excavation Date: 6-1-16

Backhoe/Excavator: Deere 310SJ

Krazan and Associates

Pit Size: 24 Inches

Operator: Brent Snyder

Elevation: 663 Feet

Sheet: 1 of 1

SPT CAL

SPT HAMMER ENERGY MEASUREMENTS

Prepared by;

SPT CAL
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Chino Hills, CA 91709

909-730-2161
bc@sptcal.com

Prepared for;
Krazan & Associates, Inc.
215 West Dakota Ave
Clovis, CA 93612

559-348-2200

Project Title: Technicon Krazan 45C-3

Person requesting service - Dave Adams

Energy Transfer Ratio = 85.6 @ 56.7 blows per minute

Testing was performed on June 1, 2015 in Clovis, California

Hammer Energy Measurements performed in accordance to ASTM D4633 using an approved and calibrated SPT Analyzer from Pile Dynamics, Inc.

PRESENTATION OF SPT ANALYZER TEST DATA

1. Introduction

This report presents the results of SPT Hammer Energy Measurements recorded with an SPT Analyzer from Pile Dynamics carried out on June 1, 2015 in Clovis, CA.

2. Field Equipment and Procedures

The drill used is a CME 45. It has an attached CME Auto Hammer

The CME Auto Hammer uses a 140 lb. weight dropped 30" on to an anvil above the bore hole. The drill rod connects the anvil to a split spoon type soil sampler inside an 8" o.d. hollow stem auger at the designated sample depth. After a seeding blow the sampler is driven 18". The number of blows required to penetrate the last 12" is referred to as the "N value", which is related to soil strength.

The first recording was taken at 30' below ground surface and then every 5' to final recording at 50'.

3. Instrumentation

An SPT Analyzer from Pile Dynamics was used to record and the process the data. The raw data was stored directly in the SPT Analyzer computer with subsequent analysis in the office with PDA-W and PDIPLOT software. The measurements and analysis were conducted in general accordance with ASTM D4945 and ASTM D6066 test standards.

The SPT Analyzer is fully compliant with the minimum digital sampling frequency requirements of ASTM D4633-05 (50 kHz) and EN ISO 22476-3:2005 (100 kHz), as well as with the low pass filter, (cutoff frequency of 5000 Hz instead of 3000 Hz) requirements of ASTM D4633-05. All equipment and analysis also conform to ASTM D6066.

A 2' instrumented section of AWJ rod, with two sets of accelerometers and strain transducers mounted on opposite sides of the drill rod, was placed below the anvil. It measured strain and acceleration of every hammer blow. The SPT Analyzer then calculates the amount of energy transferred to the rod by force and velocity measurements.

4. Observations

The drill rig motor is diesel fueled. The 56.7 blows per minute average was very consistent for every blow. The drill and sample equipment looked to be well operated and maintained.



5. Results

Results from the SPT Hammer Energy Measurements are summarized below. It shows the Energy Transfer Ratio (ETR) at each sampling depth. ETR is the ratio of the measured maximum transferred energy to rated energy of the hammer which is the product of the weight of the hammer times the height of the fall. $140 \text{ lb} \times 30'' = 4200 \text{ lb-in} = 0.350 \text{ kip-ft}$.

Energy Transfer Ratio = 85.6% at 56.7 blows per minute

$$N_{60} = (ETR/60)N$$

Depth	ETR%	BPM
30	80.4	56.1
35	89.4	56.7
40	87.2	56.0
45	85.8	57.0
50	85.0	57.6
Average	85.56	56.7

If you have any questions please do not hesitate to call or email.

Thank you,

Brian Serl
Calibration Engineer
SPT CAL
909-730-2161
bc@sptcal.com

SPT CAL

SPT HAMMER ENERGY MEASUREMENTS

Prepared by;

SPT CAL
16254 Van Gogh Ct.
Chino Hills, CA 91709

909-730-2161
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Prepared for;

Krazan & Associates, Inc.
215 West Dakota Ave
Clovis, CA 93612

559-348-2200

Project Title: Technicon Krazan 55/2

Person requesting service - Dave Adams

Energy Transfer Ratio = 75.5 @ 56 blows per minute

Testing was performed on June 1, 2015 in Clovis, California

Hammer Energy Measurements performed in accordance to ASTM D4633 using an approved and calibrated SPT Analyzer from Pile Dynamics, Inc.

PRESENTATION OF SPT ANALYZER TEST DATA

1. Introduction

This report presents the results of SPT Hammer Energy Measurements recorded with an SPT Analyzer from Pile Dynamics carried out on June 1, 2015 in Clovis, CA.

2. Field Equipment and Procedures

The drill used is a CME 55. It has an attached CME Auto Hammer

The CME Auto Hammer uses a 140 lb. weight dropped 30" on to an anvil above the bore hole. The drill rod connects the anvil to a split spoon type soil sampler inside an 8" o.d. hollow stem auger at the designated sample depth. After a seeding blow the sampler is driven 18". The number of blows required to penetrate the last 12" is referred to as the "N value", which is related to soil strength.

The first recording was taken at 30' below ground surface and then every 5' to final recording at 50'.

3. Instrumentation

An SPT Analyzer from Pile Dynamics was used to record and the process the data. The raw data was stored directly in the SPT Analyzer computer with subsequent analysis in the office with PDA-W and PDIPlot software. The measurements and analysis were conducted in general accordance with ASTM D4945 and ASTM D6066 test standards.

The SPT Analyzer is fully compliant with the minimum digital sampling frequency requirements of ASTM D4633-05 (50 kHz) and EN ISO 22476-3:2005 (100 kHz), as well as with the low pass filter, (cutoff frequency of 5000 Hz instead of 3000 Hz) requirements of ASTM D4633-05. All equipment and analysis also conform to ASTM D6066.

A 2' instrumented section of AWJ rod, with two sets of accelerometers and strain transducers mounted on opposite sides of the drill rod, was placed below the anvil. It measured strain and acceleration of every hammer blow. The SPT Analyzer then calculates the amount of energy transferred to the rod by force and velocity measurements.

4. Observations

The drill rig motor is diesel fueled. The 56 blows per minute average was very consistent for every blow. The drill and sample equipment looked to be well operated and maintained.



5. Results

Results from the SPT Hammer Energy Measurements are summarized below. It shows the Energy Transfer Ratio (ETR) at each sampling depth. ETR is the ratio of the measured maximum transferred energy to rated energy of the hammer which is the product of the weight of the hammer times the height of the fall. $140 \text{ lb} \times 30" = 4200 \text{ lb-in} = 0.350 \text{ kip-ft}$.

Energy Transfer Ratio = 75.5% at 56 blows per minute

$$N_{60} = (ETR/60)N$$

Depth	ETR%	BPM
30	73.5	56.0
35	74.2	56.1
40	78.2	56.0
45	75.8	56.1
50	75.6	56.0
Average	75.46	56.0

If you have any questions please do not hesitate to call or email.

Thank you,

Brian Serl
Calibration Engineer
SPT CAL
909-730-2161
bc@sptcal.com

SPT CAL

SPT HAMMER ENERGY MEASUREMENTS

Prepared by;

SPT CAL
5512 Belem Dr
Chino Hills, CA 91709

909-730-2161
bc@sptcal.com

Prepared for;

Krazan & Associates, Inc.
215 West Dakota Ave
Clovis, CA 93612

559-348-2200

Project Title: Technicon Krazan 55-2

Person requesting service - Dave Adams

Energy Transfer Ratio = 74.2% @ 56.4 blows per minute

Testing was performed on July 11, 2016 i in Clovis, California

Hammer Energy Measurements performed in accordance to ASTM D4633 using an approved and calibrated SPT Analyzer from Pile Dynamics, Inc.

PRESENTATION OF SPT ANALYZER TEST DATA

1. Introduction

This report presents the results of SPT Hammer Energy Measurements recorded with an SPT Analyzer from Pile Dynamics carried out on July 11, 2016 in Clovis, CA.

2. Field Equipment and Procedures

The drill used is a CME 55. It has an attached CME Auto Hammer

The CME Auto Hammer uses a 140 lb. weight dropped 30" on to an anvil above the bore hole. The drill rod connects the anvil to a split spoon type soil sampler inside an 8" o.d. hollow stem auger at the designated sample depth. After a seeding blow the sampler is driven 18". The number of blows required to penetrate the last 12" is referred to as the "N value", which is related to soil strength.

The first recording was taken at 30' below ground surface and then every 5' to final recording at 50'.

3. Instrumentation

An SPT Analyzer from Pile Dynamics was used to record and the process the data. The raw data was stored directly in the SPT Analyzer computer with subsequent analysis in the office with PDA-W and PDIPLOT software. The measurements and analysis were conducted in general accordance with ASTM D4945 and ASTM D6066 test standards.

The SPT Analyzer is fully compliant with the minimum digital sampling frequency requirements of ASTM D4633-05 (50 kHz) and EN ISO 22476-3:2005 (100 kHz), as well as with the low pass filter, (cutoff frequency of 5000 Hz instead of 3000 Hz) requirements of ASTM D4633-05. All equipment and analysis also conform to ASTM D6066.

A 2' instrumented section of AWJ rod, with two sets of accelerometers and strain transducers mounted on opposite sides of the drill rod, was placed below the anvil. It measured strain and acceleration of every hammer blow. The SPT Analyzer then calculates the amount of energy transferred to the rod by force and velocity measurements.



4. Observations

The drill rig motor is diesel fueled. The 56.4 blows per minute average was very consistent for every blow. The drill and sample equipment looked to be well operated and maintained.

5. Results

Results from the SPT Hammer Energy Measurements are summarized below. It shows the Energy Transfer Ratio (ETR) at each sampling depth. ETR is the ratio of the measured maximum transferred energy to rated energy of the hammer which is the product of the weight of the hammer times the height of the fall. $140 \text{ lb} \times 30" = 4200 \text{ lb-in} = 0.350 \text{ kip-ft}$.

Energy Transfer Ratio = 74.2% @ 56.4 blows per minute

$$N_{60} = (ETR/60)N$$

Depth	ETR%	BPM
30	74.5	56.7
35	76.2	56.2
40	71.5	56.4
45	72.1	56.4
50	76.5	56.4
Average	74.2	56.4

If you have any questions please do not hesitate to call or email.

Thank you,

Brian Serl
Calibration Engineer
SPT CAL
909-730-2161
bc@sptcal.com

SPT CAL

SPT HAMMER ENERGY MEASUREMENTS

Prepared by;

SPT CAL
5512 Belem Dr
Chino Hills, CA 91709

909-730-2161
bc@sptcal.com

Prepared for;
Krazan & Associates, Inc.
215 West Dakota Ave
Clovis, CA 93612

559-348-2200
Project Title: Technicon Krazan 45C-3

Person requesting service - Dave Adams

Energy Transfer Ratio = 86.2% @ 60.4 blows per minute

Testing was performed on July 11, 2016 in Clovis, California

Hammer Energy Measurements performed in accordance to ASTM D4633 using an approved and calibrated SPT Analyzer from Pile Dynamics, Inc.

PRESENTATION OF SPT ANALYZER TEST DATA

1. Introduction

This report presents the results of SPT Hammer Energy Measurements recorded with an SPT Analyzer from Pile Dynamics carried out on July 11, 2016 in Clovis, CA.

2. Field Equipment and Procedures

The drill used is a CME 45. It has an attached CME Auto Hammer

The CME Auto Hammer uses a 140 lb. weight dropped 30" on to an anvil above the bore hole. The drill rod connects the anvil to a split spoon type soil sampler inside an 8" o.d. hollow stem auger at the designated sample depth. After a seeding blow the sampler is driven 18". The number of blows required to penetrate the last 12" is referred to as the "N value", which is related to soil strength.

The first recording was taken at 30' below ground surface and then every 5' to final recording at 50'.

3. Instrumentation

An SPT Analyzer from Pile Dynamics was used to record and the process the data. The raw data was stored directly in the SPT Analyzer computer with subsequent analysis in the office with PDA-W and PDIPlot software. The measurements and analysis were conducted in general accordance with ASTM D4945 and ASTM D6066 test standards.

The SPT Analyzer is fully compliant with the minimum digital sampling frequency requirements of ASTM D4633-05 (50 kHz) and EN ISO 22476-3:2005 (100 kHz), as well as with the low pass filter, (cutoff frequency of 5000 Hz instead of 3000 Hz) requirements of ASTM D4633-05. All equipment and analysis also conform to ASTM D6066.

A 2' instrumented section of AWJ rod, with two sets of accelerometers and strain transducers mounted on opposite sides of the drill rod, was placed below the anvil. It measured strain and acceleration of every hammer blow. The SPT Analyzer then calculates the amount of energy transferred to the rod by force and velocity measurements.

4. Observations

The drill rig motor is diesel fueled. The drill and sample equipment looked to be well operated and maintained.



5. Results

Results from the SPT Hammer Energy Measurements are summarized below. It shows the Energy Transfer Ratio (ETR) at each sampling depth. ETR is the ratio of the measured maximum transferred energy to rated energy of the hammer which is the product of the weight of the hammer times the height of the fall. $140 \text{ lb} \times 30" = 4200 \text{ lb-in} = 0.350 \text{ kip-ft}$.

Energy Transfer Ratio = 86.2% @ 60.4 blows per minute

$$N_{60} = (ETR/60)N$$

Depth	ETR%	BPM
30	85.6	60.3
35	87.6	60.5
40	89.3	61.4
45	85.6	61.7
50	82.8	57.9
Average	86.2	60.4

If you have any questions please do not hesitate to call or email.

Thank you,

Brian Serl
Calibration Engineer
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909-730-2161
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APPENDIX B
LABORATORY TESTING
GUZMAN RESERVOIR
KERN COUNTY, CALIFORNIA

TABLE 1
GUZMAN LABORATORY TESTING PROGRAM

Boring and Test Pit Nos.	Depth (ft)	Soil Type	Percentage of Fine Grain Soil	Grain Size Analysis (ASTM C136)	Particle Size Analysis by Hydrometer (ASTM D422)	Atterberg Limits (ASTM D4318)	Consolidated Test (ASTM D235)	Tri-Axial Test (ASTM D4767)	In-Place Moisture & Density (ASTM D2937)	Identified of Dispersive Clays by Pinhole Tests (ASTM D4647)	Permeability Test (ASTM D5084)	Moisture-Density Relationship (ASTM D1557)	Direct Shear Test (ASTM D3080)
B2	5-6	SC	51	X	X	X			X				
	10-11	SP	4	X					X				
	15-16	SM	29	X					X				
	20-21	SC-CL	53	X		X			X				
B3	10-11	SC-CL	32	X					X		X		
	15-16	SP-SM	9	X					X				
B5	2-3	CL	28	X	X	X			X				
B6	5-6	SC-CL	48	X		X			X				
B9	5-6	CL	67	X	X	X			X				
B11	5-6	SC-CL	52	X	X	X							
B13	5-6	SC	41	X									
	10-11	CL	59	X	X	X			X			X	
	12-13	SC	37	X	X	X							

TABLE 1
GUZMAN LABORATORY TESTING PROGRAM

Boring and Test Pit Nos.	Depth (ft)	Soil Type	Percentage of Fine Grain Soil	Grain Size Analysis (ASTM C136)	Particle Size Analysis by Hydrometer (ASTM D422)	Atterberg Limits (ASTM D4318)	Consolidated Test (ASTM D235)	Tri-Axial Test (ASTM D4767)	In-Place Moisture & Density (ASTM D2937)	Identified of Dispersive Clays by Pinhole Tests (ASTM D4647)	Permeability Test (ASTM D5084)	Moisture-Density Relationship (ASTM D1557)	Direct Shear Test (ASTM D3080)
B13	15-16	SM	23	X									
	20-21	CL	60	X	X	X							
	25-26	SM	39	X									
	40-41	SC	37	X									
B14	5-6	SC	36	X									
	10-11	SM	20	X									
	17.5-18.5	CL	73	X	X	X							
	22.5-23.5	SM-ML	48	X									
	30-31	CL	64	X	X	X							
	45-46	SM	37	X									
	55-56	SC	42	X									
	65-66	SM	35	X									
B15	5-6	CL	66	X									
	7.5-8.5	CL	64	X	X	X							
	17.5-18.5	SC-CL	46	X									
	22.5-23.5	SM	26	X									
	37.5-38.5	SM	45	X									
	50-51	CL	67	X	X	X							

TABLE 1
GUZMAN LABORATORY TESTING PROGRAM

Boring and Test Pit Nos.	Depth (ft)	Soil Type	Percentage of Fine Grain Soil	Grain Size Analysis (ASTM C136)	Particle Size Analysis by Hydrometer (ASTM D422)	Atterberg Limits (ASTM D4318)	Consolidated Test (ASTM D235)	Tri-Axial Test (ASTM D4767)	In-Place Moisture & Density (ASTM D2937)	Identified of Dispersive Clays by Pinhole Tests (ASTM D4647)	Permeability Test (ASTM D5084)	Moisture-Density Relationship (ASTM D1557)	Direct Shear Test (ASTM D3080)
B16	5-8	SM	49	X					X				
	10-11	SW-SM	8						X			X	
	13-16	SM							X				
	16-19	SW-SM							X				
	19-20	SM	25	X				X	X		X		
	20-21	SW-SM	8	X									
	22-25	ML							X				
	25-28	SM-SC	31	X	X	X	X	X	X		X		
	28-32	SM							X				
	32-34	SW-SM	39	X					X		X		
	35-36	SW-SM	9	X					X				
	38-41	SM							X				
	35-36	SW-SM	9	X									
	45-46	SM	42	X									
	65-66	SW-SM	12	X									
B17	7.5-8.5	SC	37	X									
	10-11	SC	35	X									
	12.5-13.5	SC-CL	47	X	X	X							
	20-21	SP-SM	10	X									

TABLE 1
GUZMAN LABORATORY TESTING PROGRAM

Boring and Test Pit Nos.	Depth (ft)	Soil Type	Percentage of Fine Grain Soil	Grain Size Analysis (ASTM C136)	Particle Size Analysis by Hydrometer (ASTM D422)	Atterberg Limits (ASTM D4318)	Consolidated Test (ASTM D235)	Tri-Axial Test (ASTM D4767)	In-Place Moisture & Density (ASTM D2937)	Identified of Dispersive Clays by Pinhole Tests (ASTM D4647)	Permeability Test (ASTM D5084)	Moisture-Density Relationship (ASTM D1557)	Direct Shear Test (ASTM D3080)
B17	27.5-28.5	SW-SM	7	X									
	40-41	SM	14	X									
	45-46	SM	43	X	X	X							
	50-51	SP-SM	11	X									
	75-76	ML	65	X	X	X							
B18													
	5-8	SC	27	X					X				
	10-11	CL	64	X	X	X							
	11.5-13	SC	39	X	X	X	X	X	X			X	
	13-16	SC-CL	51	X			X	X	X		X		
	16-19	SM							X				
	19-22	SC-CL	48	X	X	X			X				
	20-21	SC-CL	54	X	X	X							
	22-25	SM							X				
	25-26	SM	33	X									
	27-28	SP-SM							X				
	28-32	SM							X				
	32-35	SM							X				
	35-38	SM							X				
	38-40	SM							X				

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GUZMAN LABORATORY TESTING PROGRAM

Boring and Test Pit Nos.	Depth (ft)	Soil Type	Percentage of Fine Grain Soil	Grain Size Analysis (ASTM C136)	Particle Size Analysis by Hydrometer (ASTM D422)	Atterberg Limits (ASTM D4318)	Consolidated Test (ASTM D235)	Tri-Axial Test (ASTM D4767)	In-Place Moisture & Density (ASTM D2937)	Identified of Dispersive Clays by Pinhole Tests (ASTM D4647)	Permeability Test (ASTM D5084)	Moisture-Density Relationship (ASTM D1557)	Direct Shear Test (ASTM D3080)
B18	40-41	SC	26	X									
	50-51	ML	59	X	X	X							
TP18A	2-4	SC-CL	49	X		X		X				X	
	2-3	SC	45	X									
	3-4	SC-CL	49	X									
	4-5	SC-CL	49	X									
	5-6	SC	44	X									
	6-7	SC	45	X									
	7-9	SC	33	X		X		X				X	
	7-8	SC	44	X									
	8-9	SM	29	X									
B19	10-11	SW-SM	9	X									
	20-21	SC	21	X									
	35-36	SC-CL	49	X	X	X							
	45-46	SP-SM	9	X									
TP1	5-10	SC-CL	31	X	X	X				X	X	X	X

TABLE 1
GUZMAN LABORATORY TESTING PROGRAM

Boring and Test Pit Nos.	Depth (ft)	Soil Type	Percentage of Fine Grain Soil	Grain Size Analysis (ASTM C136)	Particle Size Analysis by Hydrometer (ASTM D422)	Atterberg Limits (ASTM D4318)	Consolidated Test (ASTM D235)	Tri-Axial Test (ASTM D4767)	In-Place Moisture & Density (ASTM D2937)	Identified of Dispersive Clays by Pinhole Tests (ASTM D4647)	Permeability Test (ASTM D5084)	Moisture-Density Relationship (ASTM D1557)	Direct Shear Test (ASTM D3080)
TP7	0-5	SC	38	X	X	X				X	X	X	X
TP11	0-6	SC-CL	49	X	X	X				X	X	X	X
TP21	3-3.5	SC	45	X	X	X	X	X		X	X	X	
	4-4.5	SC	43	X									
TP21A	2-4	SC	38	X		X		X				X	
	2-3	SM	38	X									
	3-4	SC	37	X									
	4-5	SM	31	X									
	5-6	SM	25	X									
	6-7	SM	30	X		X		X				X	
	7-8	SM	30	X									
TP24	4-4.5	CL	56	X						X			
	6-6.5	SC	43	X									
TP25	3-3.5	CL	57	X									
	5-5.5	SM	43	X									

TABLE 1
GUZMAN LABORATORY TESTING PROGRAM

Boring and Test Pit Nos.	Depth (ft)	Soil Type	Percentage of Fine Grain Soil	Grain Size Analysis (ASTM C136)	Particle Size Analysis by Hydrometer (ASTM D422)	Atterberg Limits (ASTM D4318)	Consolidated Test (ASTM D235)	Tri-Axial Test (ASTM D4767)	In-Place Moisture & Density (ASTM D2937)	Identified of Dispersive Clays by Pinhole Tests (ASTM D4647)	Permeability Test (ASTM D5084)	Moisture-Density Relationship (ASTM D1557)	Direct Shear Test (ASTM D3080)
TP26	6-6.5	SC	34	X	X	X							
TP27	1-1.5	SC	44	X									
	3-3.5	SC	34	X									
	5.0-5.5	SC	32	X	X	X		X					
	6-6.5	SC	66	X	X	X							
TP28	2-2.5	SC-CL	51	X	X	X	X	X			X	X	
	4-4.5	CL	60	X									
	6-6.5	CL	75	X	X	X							
	8-8.5	CL	61	X	X	X							
TP28A	2-4	SC	41	X		X		X				X	
	2-3	SC	27	X									
	3-4	SC	44	X									
	4-6	CL	58	X		X		X				X	
	4-5	CL	59	X									
	5-6	SC-CL	49	X									
	6-7	SC	44	X									

TABLE 1
GUZMAN LABORATORY TESTING PROGRAM

Boring and Test Pit Nos.	Depth (ft)	Soil Type	Percentage of Fine Grain Soil	Grain Size Analysis (ASTM C136)	Particle Size Analysis by Hydrometer (ASTM D422)	Atterberg Limits (ASTM D4318)	Consolidated Test (ASTM D235)	Tri-Axial Test (ASTM D4767)	In-Place Moisture & Density (ASTM D2937)	Identified of Dispersive Clays by Pinhole Tests (ASTM D4647)	Permeability Test (ASTM D5084)	Moisture-Density Relationship (ASTM D1557)	Direct Shear Test (ASTM D3080)
TP29	3-3.5	SC-CL	53	X						X		X	
	5-5.5	SC-CL	57	X						X			
	7-7.5	SC-CL	47	X	X	X							
TP31	1-1.5	SC-CL	52	X									
TP31	2-2.5	SC-CL	42	X									
	3-3.5	SC-CL	45	X									
	4-4.5	SM	22	X	X	X		X				X	
	5-5.5	SM	16	X									
TP32	3-3.5	SC	20	X									
TP33	2-2.5	SC-CL	47	X						X		X	
	4-4.5	SC-CL	32	X	X	X		X				X	
TP34	1-1.5	SC	34	X						X		X	
	3-3.5	SC-CL	52	X									
	5-5.5	SC	37	X									

TABLE 1
GUZMAN LABORATORY TESTING PROGRAM

Boring and Test Pit Nos.	Depth (ft)	Soil Type	Percentage of Fine Grain Soil	Grain Size Analysis (ASTM C136)	Particle Size Analysis by Hydrometer (ASTM D422)	Atterberg Limits (ASTM D4318)	Consolidated Test (ASTM D235)	Tri-Axial Test (ASTM D4767)	In-Place Moisture & Density (ASTM D2937)	Identified of Dispersive Clays by Pinhole Tests (ASTM D4647)	Permeability Test (ASTM D5084)	Moisture-Density Relationship (ASTM D1557)	Direct Shear Test (ASTM D3080)
TP35	1-1.5	CL	63	X						X		X	
	2-2.5	CL	69	X	X	X		X				X	
	3-3.5	CL	68	X						X		X	
	4-4.5	CL	68	X									
	5-5.5	SC-CL	51	X									
	6-6.5	SC-CL	51	X									

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/9/2015
Sample Location : B2 @ 5-6'
Soil Classification : SC-CL

Wet Weight	:	100.00
Dry Weight	:	92.00
Moisture Content	:	9%

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	0.1	0.1	0.1	99.9
#8	2.36	2.2	2.4	2.5	97.5
#16	1.18	7.5	8.2	10.7	89.3
#30	0.60	10.7	11.6	22.3	77.7
#50	0.30	9.6	10.4	32.7	67.3
#100	0.15	7.8	8.5	41.2	58.8
#200	0.08	7.1	7.7	48.9	51.1

Hydrometer Analysis

ASTM D422

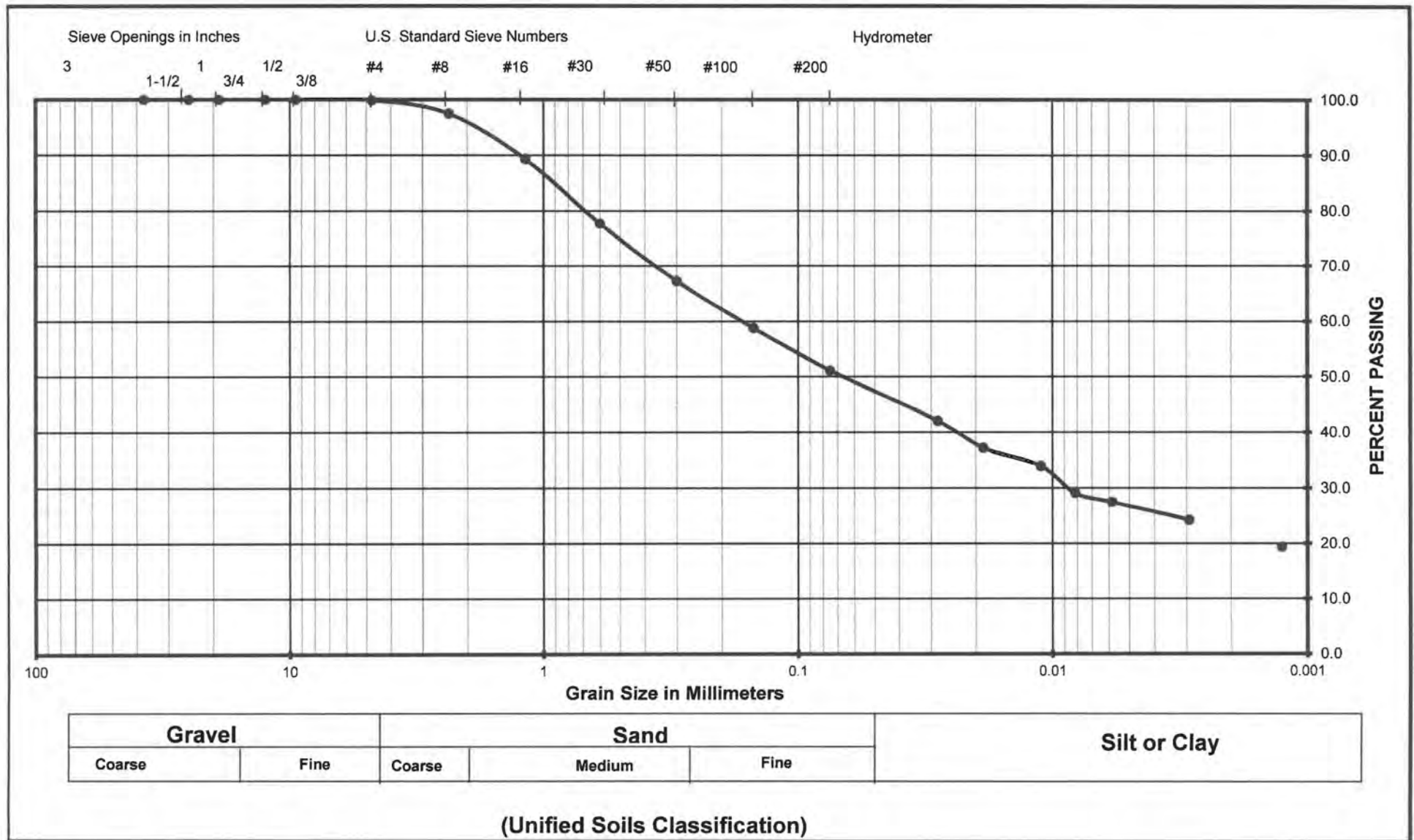
Project Number : 022-15055
Project Name : Guzman
Date : 10/9/2015
Sample Location : B2 @ 5-6'
Soil Classification : SC-CL

Dry Weight Used	99.5 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	1.029	1.029	42.0	0.0283
5	1.026	1.026	37.2	0.0187
15	1.024	1.024	34.0	0.0111
30	1.021	1.021	29.1	0.0082
60	1.02	1.02	27.5	0.0058
250	1.018	1.018	24.3	0.0029
1440	1.015	1.015	19.4	0.0013

Particle Diameter	Percent Passing
0.005	26.6
0.002	21.6
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC-CL
B2 @ 5-6'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman**
 Project Number: **022-15055**
 Date Sampled: -
 Sampled By: DA
 Sample Number: -
 Sample Location: B2 @ 5-6'
 Sample Description: SC-CL

Date Tested: 10/12/2015
 Tested By: J Dyer
 Verified By: J Gruszczynski

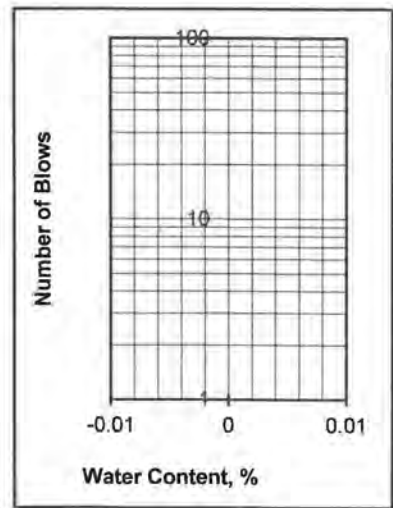
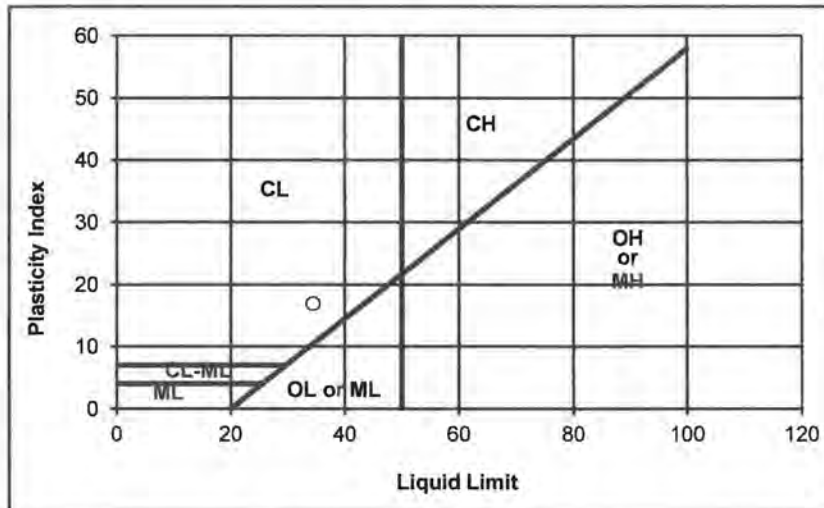
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	18.42	17.30		26.47		
Weight of Dry Soil & Tare (g)	17.79	16.76		23.46		
Weight of Tare (g)	13.96	13.76		14.72		
Weight of water (g)	0.64	0.54		3.01		
Weight of Dry Soil (g)	3.82	3.00		8.75		
Water Content (% of dry wt.)	16.7%	18.1%		34.4%		
Number of Blows				25		

Plastic Limit : 17

Liquid Limit : 34

Plasticity Index : 17
Unified Soil Classification : CL

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



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Sieve Analysis

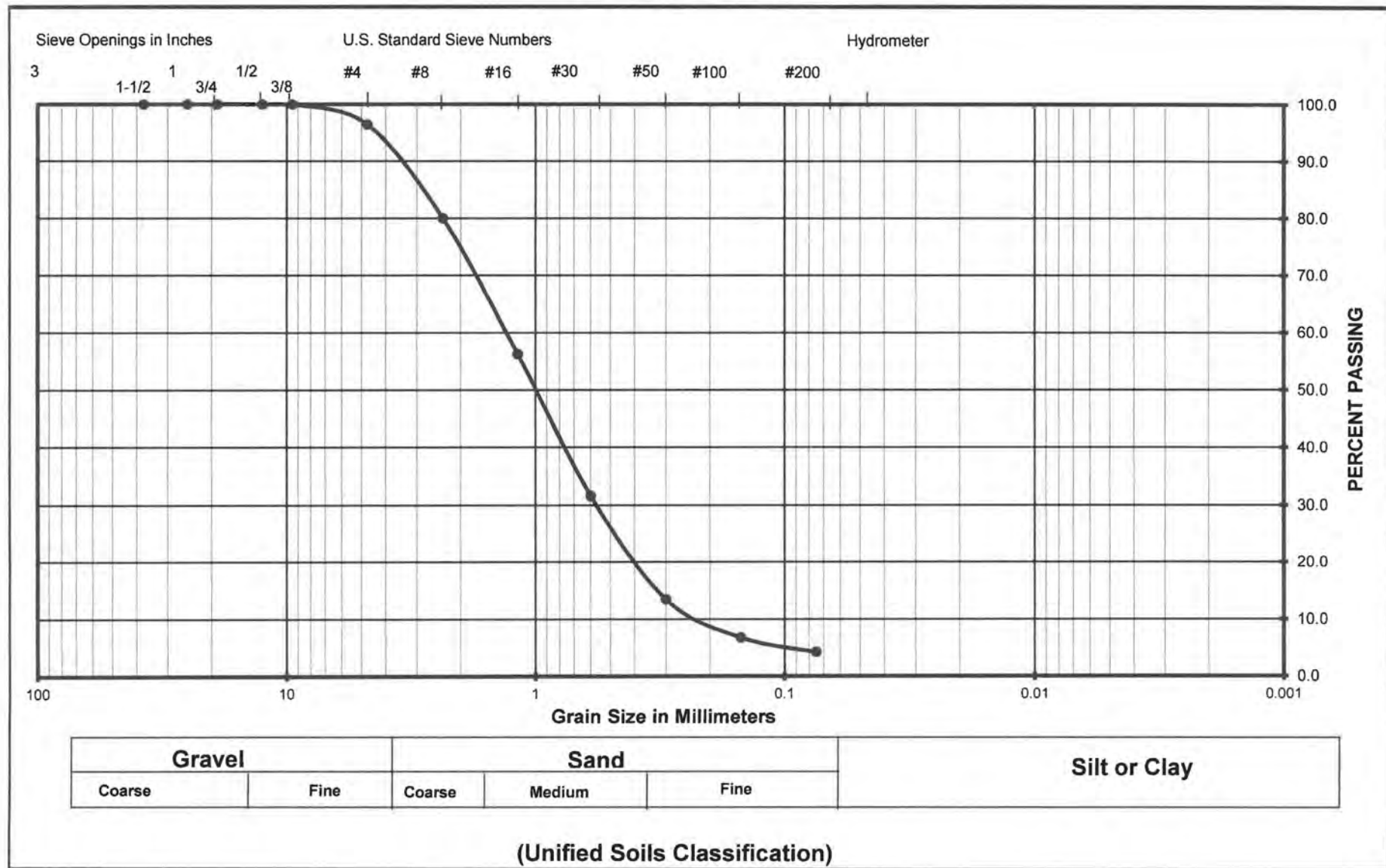
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 10/6/2015
Sample Location : B2 @ 10-11'
Soil Classification : SP w/ grvl

Wet Weight	:	200.00
Dry Weight	:	197.40
Moisture Content	:	1%

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	3.5	3.5	96.5
#8	2.36	32.4	16.4	20.0	80.0
#16	1.18	46.9	23.8	43.7	56.3
#30	0.60	48.7	24.7	68.4	31.6
#50	0.30	35.8	18.1	86.5	13.5
#100	0.15	13.2	6.7	93.2	6.8
#200	0.08	4.9	2.5	95.7	4.3

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SP w/ grvl
B2 @ 10-11'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

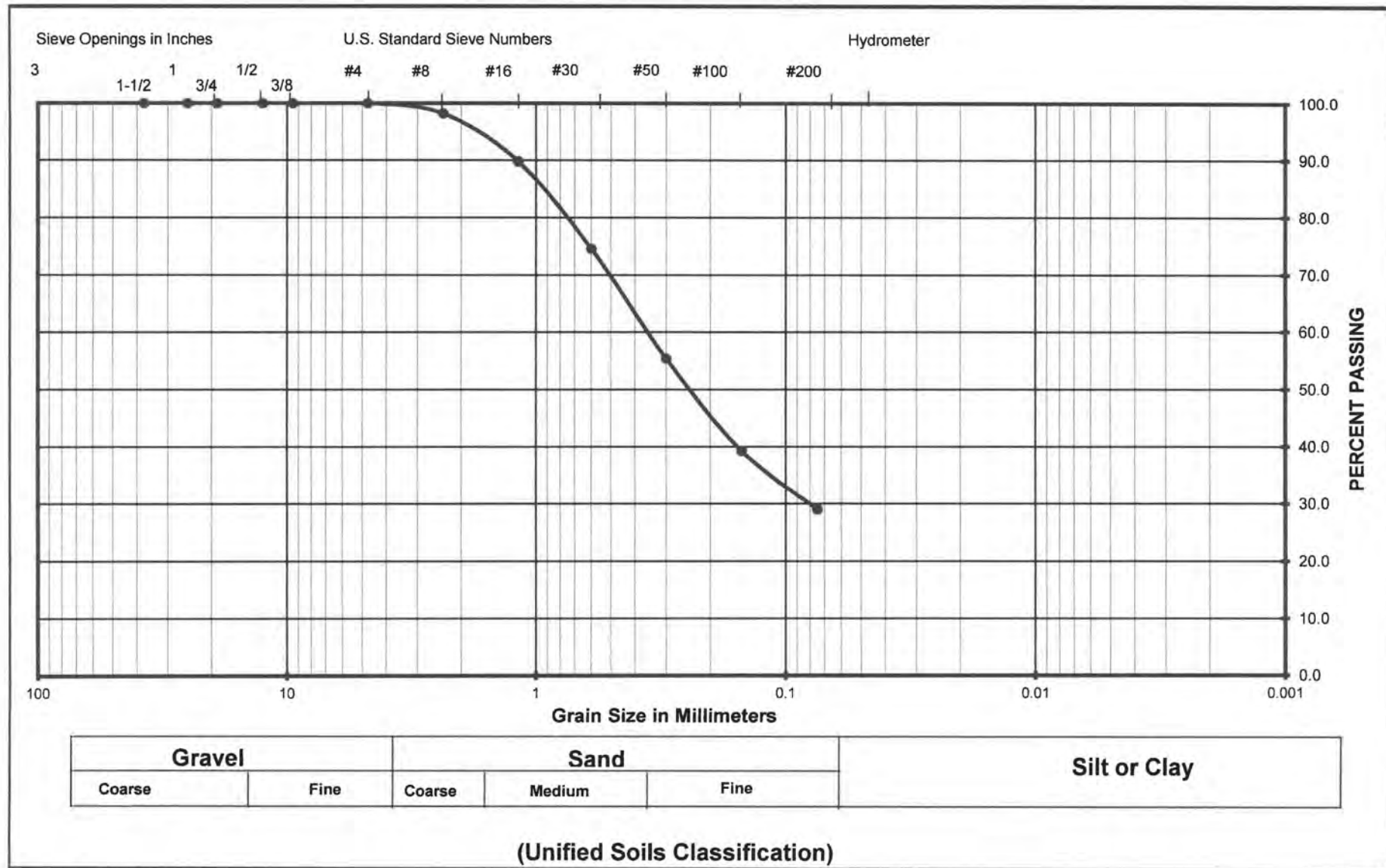
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 10/6/2015
Sample Location : B2 @ 15-16'
Soil Classification : SM

Wet Weight	:	100.00
Dry Weight	:	97.30
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				100.0
#8	2.36	1.8	1.8	1.8	98.2
#16	1.18	8.1	8.3	10.2	89.8
#30	0.60	14.8	15.2	25.4	74.6
#50	0.30	18.7	19.2	44.6	55.4
#100	0.15	15.7	16.1	60.7	39.3
#200	0.08	9.9	10.2	70.9	29.1

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SM
B2 @ 15-16'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

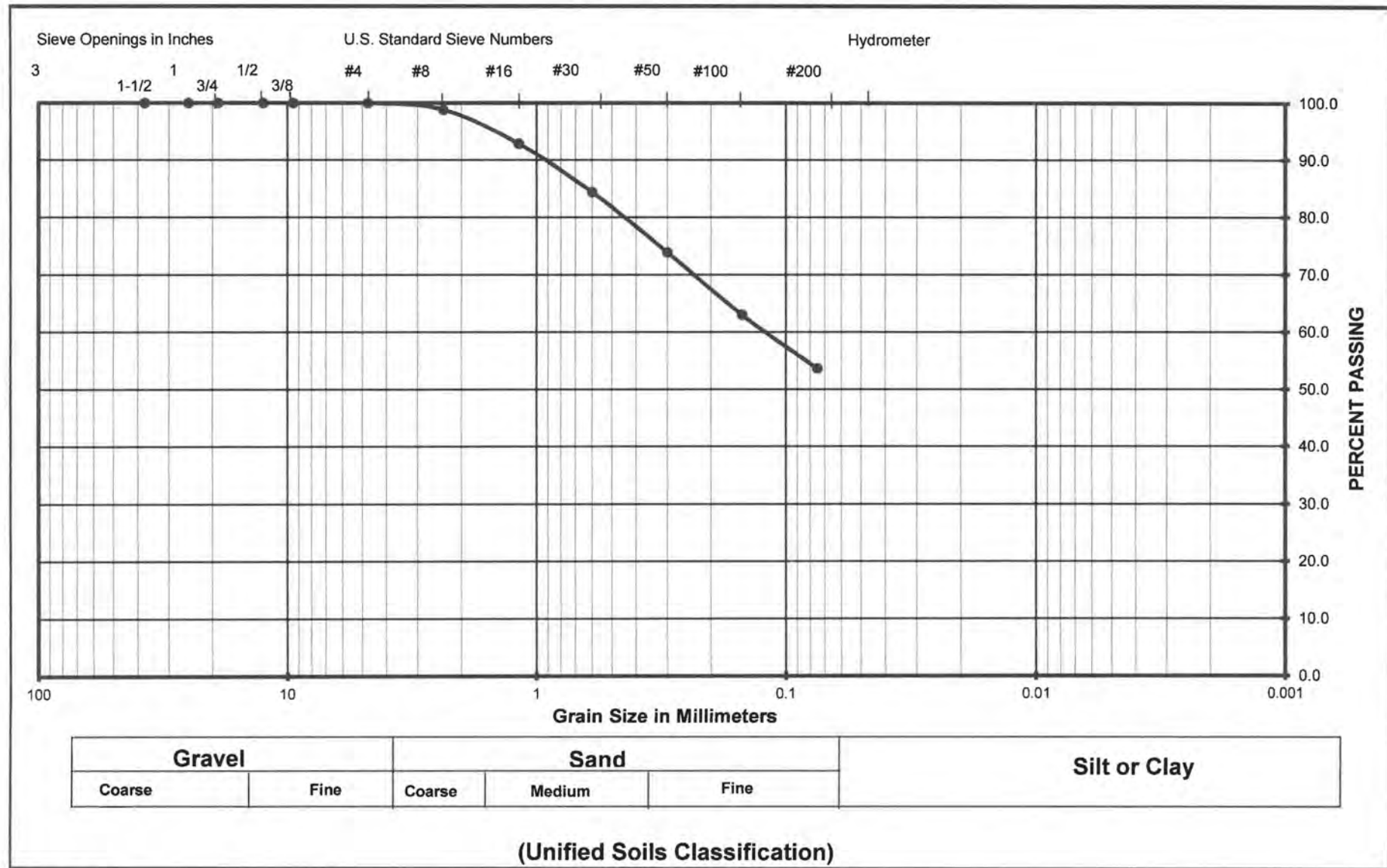
ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/9/2015
Sample Location : B2 @ 20-21'
Soil Classification : SC-CL

Wet Weight	:	100.00
Dry Weight	:	92.80
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	1.1	1.2	1.2	98.8
#16	1.18	5.5	5.9	7.1	92.9
#30	0.60	7.9	8.5	15.6	84.4
#50	0.30	9.7	10.5	26.1	73.9
#100	0.15	10.1	10.9	37.0	63.0
#200	0.08	8.7	9.4	46.3	53.7

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC-CL
B2 @ 20-21'

ASTM C136

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman**
 Project Number: **022-15055**
 Date Sampled: -
 Sampled By: DA
 Sample Number: -
 Sample Location: B2 @ 20-21'
 Sample Description: SC-CL

Date Tested: 10/27/2015
 Tested By: J Dyer
 Verified By: J Gruszczynski

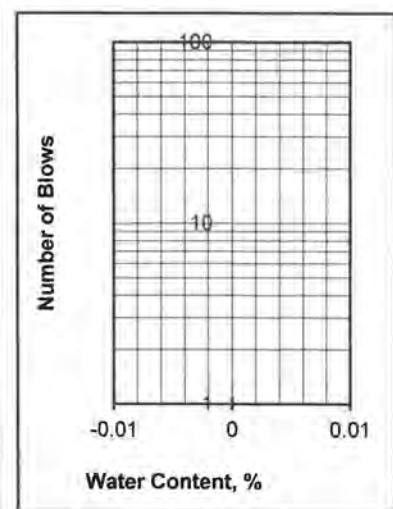
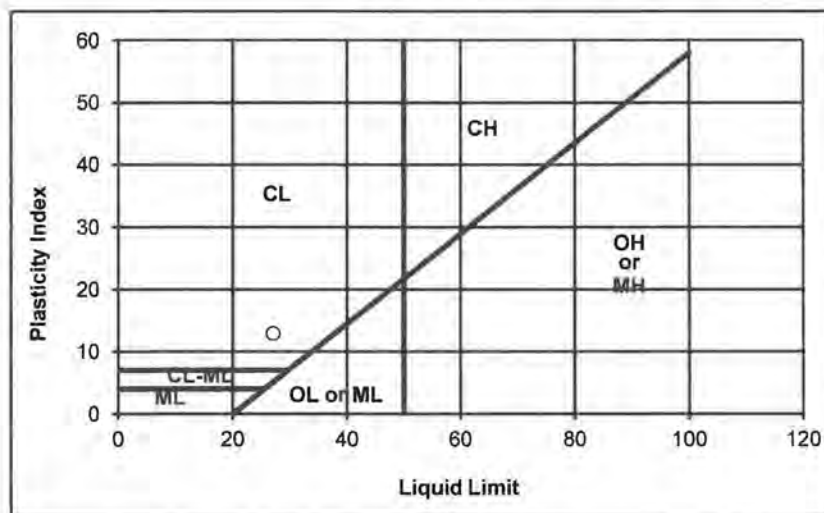
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	17.61	18.96		25.94	26.34	
Weight of Dry Soil & Tare (g)	17.14	18.39		23.51	23.69	
Weight of Tare (g)	13.76	14.25		14.58	13.82	
Weight of water (g)	0.47	0.56		2.43	2.65	
Weight of Dry Soil (g)	3.38	4.14		8.93	9.88	
Water Content (% of dry wt.)	13.9%	13.6%		27.2%	26.8%	
Number of Blows				21	30	

Plastic Limit : 14

Liquid Limit : 27

Plasticity Index : 13
Unified Soil Classification : CL

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



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Sieve Analysis

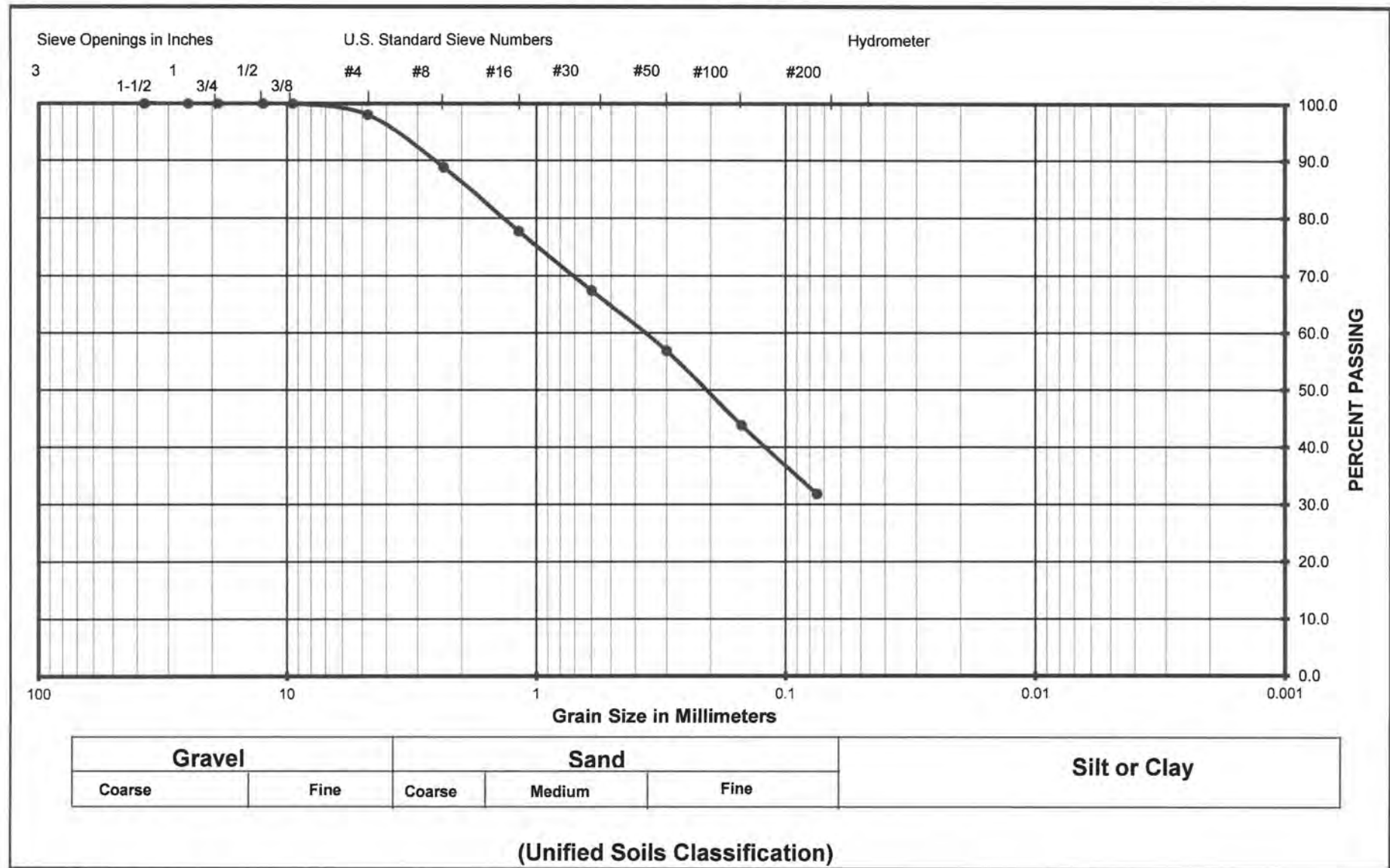
ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/6/2015
Sample Location : B3 @ 10-11'
Soil Classification : SC

Wet Weight	:	200.00
Dry Weight	:	177.50
Moisture Content	:	13%

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	3.5	2.0	2.0	98.0
#8	2.36	16.3	9.2	11.2	88.8
#16	1.18	19.7	11.1	22.3	77.7
#30	0.60	18.3	10.3	32.6	67.4
#50	0.30	18.7	10.5	43.1	56.9
#100	0.15	23.2	13.1	56.2	43.8
#200	0.08	21.3	12.0	68.2	31.8

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC
 Sample Number: B3 @ 10-11'

ASTM C136

Krazan Testing Laboratory

Soil Permeability

Flexible Wall, Falling Head (Rising Tail)

ASTM D - 5084 / CAL 220

Project Number : 022-15055
 Project Name : Guzman
 Date : 10/8/2015
 Sample Number : --
 Sample Location : B3 @ 10-11'
 Soil Classification : SC

Max Dry Density, lbs/cu.ft	--	Degree of Sat. %		Max. Particle Size	4.75mm
Optimum Moisture, %	--	%Over Optimum		% Passing 3/8"	100.0
Initial Dry Density, lbs/cu.ft	126.2	Initial Diameter, cm	3.55	% Passing # 10	85.0
Initial Moisture, %	12.7	Initial Length, cm	7.36	% Passing # 200	31.8
Sample Compaction, %	--	Initial Area sq.cm	9.90	Temperature	22.0
Final Dry Density, lbs/cu.ft	--	Final Diameter, cm	3.55	Type of Permeant	Tap Water
Final Moisture, %	--	Final Length, cm	7.36	$\Delta\mu$ (Pore Pressure)	10.0
Specific Gravity (Assumed)	2.7	Final Area, sq.cm	9.90	$\Delta\sigma$ (Cell Pressure)	10.0
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	5:14	6:05	1.1	4.6	28.7	25.2	27.7	25.2	28.7
2	6:06	6:39	4.7	6.9	25.2	22.9	27.7	25.2	28.7
3									
4									
5									
6									

Test	Time sec	h1/h2 Ratio	K cm/sec	k20 cm/sec
1	3060	0.96428	4.0E-06	3.81E-06
2	1980	0.97620	4.1E-06	3.9E-06
3				
4				
5				
6				

Permeability
3.86E-06 cm/sec
3.86E-08 m/sec

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/6/2015
Sample Location : B3 @ 15-16'
Soil Classification : SP-SM

Wet Weight	:	200.00
Dry Weight	:	194.10
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	0.6	0.3	0.3	99.7
#8	2.36	17.1	8.8	9.1	90.9
#16	1.18	46.7	24.1	33.2	66.8
#30	0.60	39.5	20.4	53.5	46.5
#50	0.30	38.7	19.9	73.5	26.5
#100	0.15	24.9	12.8	86.3	13.7
#200	0.08	8.6	4.4	90.7	9.3

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 SP-SM
 B3 @ 15-16'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/6/2015
Sample Location : B5 @ 2-3'
Soil Classification : CL

Wet Weight	:	100.00
Dry Weight	:	93.40
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				100.0
#8	2.36	1.3	1.4	1.4	98.6
#16	1.18	4.9	5.2	6.6	93.4
#30	0.60	6.8	7.3	13.9	86.1
#50	0.30	8.1	8.7	22.6	77.4
#100	0.15	9.2	9.9	32.4	67.6
#200	0.08	8.7	9.3	41.8	58.2

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman
Date : 10/6/2015
Sample Location : B5 @ 2-3'
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	1.033	1.033	52.4	0.0266
5	1.031	1.031	48.9	0.0174
15	1.028	1.028	43.7	0.0105
30	1.026	1.026	40.2	0.0076
60	1.025	1.025	38.4	0.0055
250	1.024	1.024	36.7	0.0027
1440	1.02	1.02	29.7	0.0012

Particle Diameter	Percent Passing
0.005	38.1
0.002	33.4
0	NA

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: CL
 Sample Number: B5 @ 2-3'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman**
 Project Number: **022-15055**
 Date Sampled: -
 Sampled By: DA
 Sample Number: -
 Sample Location: B5 @ 2-3'
 Sample Description: CL

Date Tested: 10/12/2015
 Tested By: J Dyer
 Verified By: J Gruszczynski

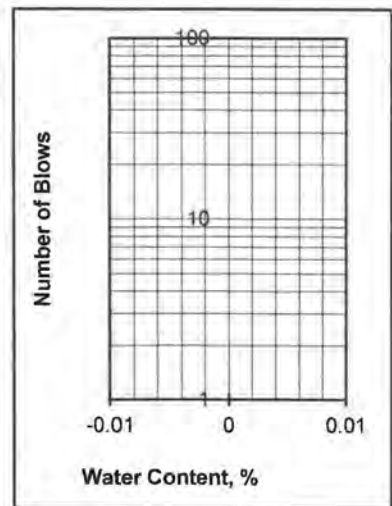
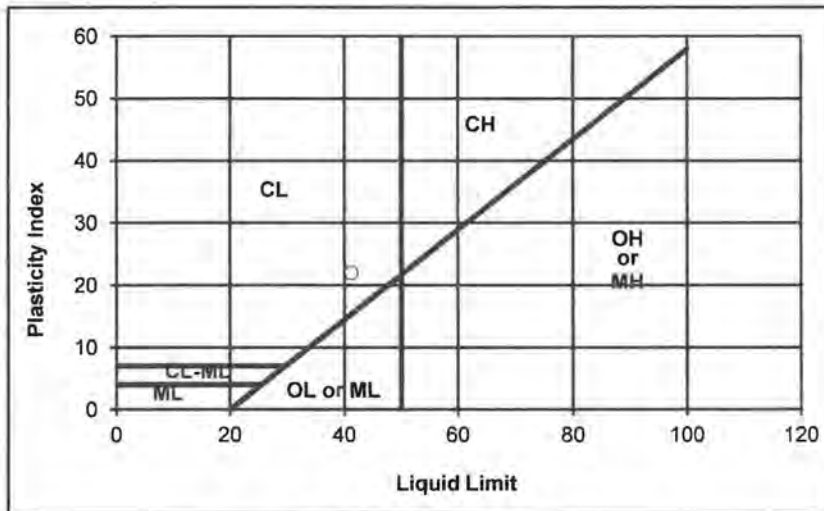
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	17.51	17.39		25.88		
Weight of Dry Soil & Tare (g)	16.95	16.86		22.36		
Weight of Tare (g)	14.03	14.00		13.83		
Weight of water (g)	0.56	0.53		3.51		
Weight of Dry Soil (g)	2.93	2.86		8.53		
Water Content (% of dry wt.)	19.1%	18.7%		41.2%		
Number of Blows				25		

Plastic Limit : 19

Liquid Limit : 41

Plasticity Index : 22
Unified Soil Classification : CL

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



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Sieve Analysis

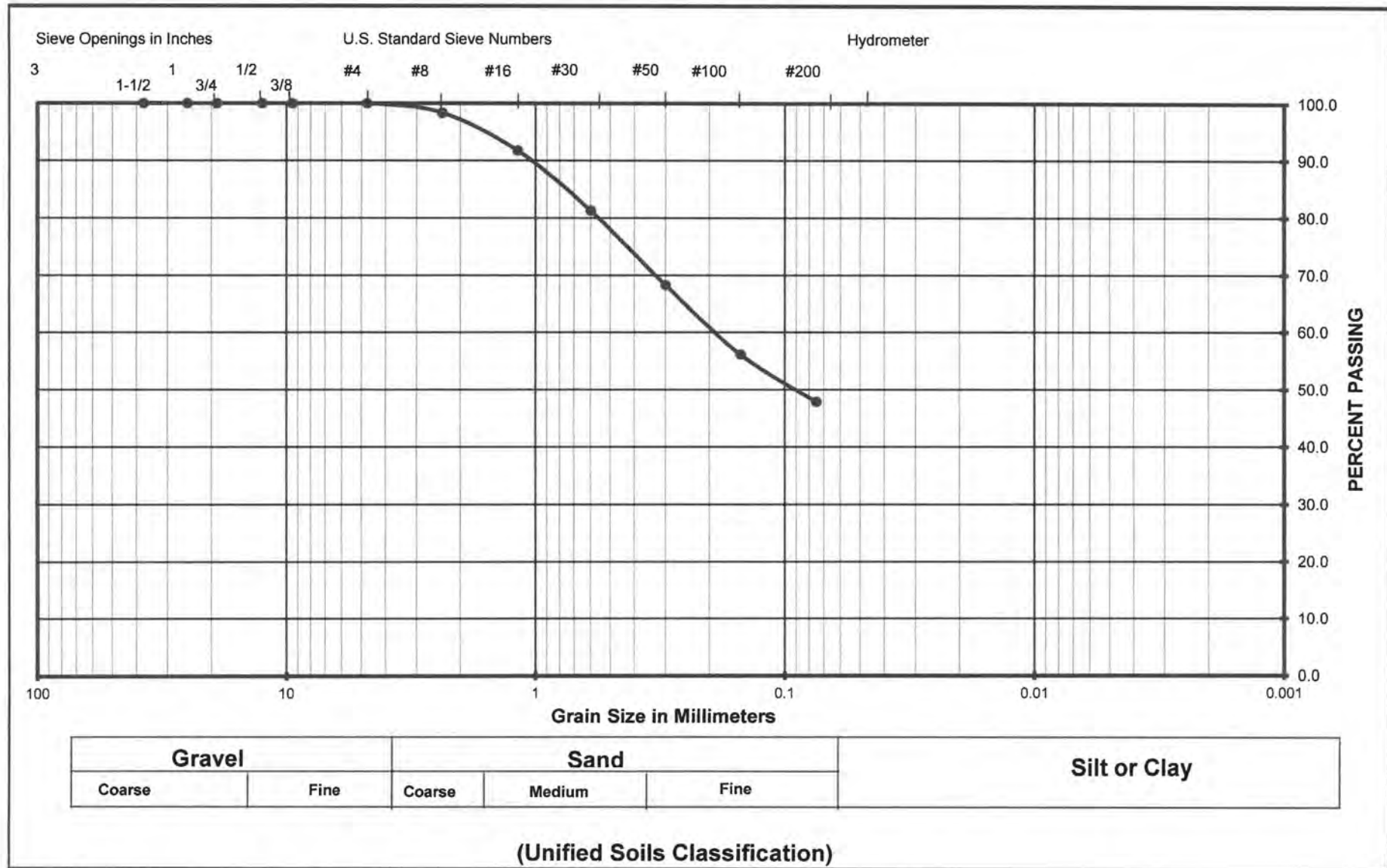
ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 10/6/2015
Sample Location : B6 @ 5-6'
Soil Classification : SC-CL

Wet Weight	:	200.00
Dry Weight	:	186.80
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				100.0
#8	2.36	3.1	1.7	1.7	98.3
#16	1.18	12.3	6.6	8.2	91.8
#30	0.60	19.5	10.4	18.7	81.3
#50	0.30	24.3	13.0	31.7	68.3
#100	0.15	22.7	12.2	43.8	56.2
#200	0.08	15.5	8.3	52.1	47.9

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC-CL
 Sample Number: B6 @ 5-6'

ASTM C136

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman**

Project Number: **022-15055**

Date Sampled: -

Sampled By: DA

Sample Number: -

Sample Location: B6 @ 5-6'

Sample Description: SC-CL

Date Tested: 10/27/2015

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)	17.79	17.76		26.31		
Weight of Dry Soil & Tare (g)	17.22	17.33		23.30		
Weight of Tare (g)	13.63	14.53		14.41		
Weight of water (g)	0.57	0.43		3.02		
Weight of Dry Soil (g)	3.59	2.80		8.89		
Water Content (% of dry wt.)	15.9%	15.4%		33.9%		
Number of Blows				25		

Plastic Limit : 16

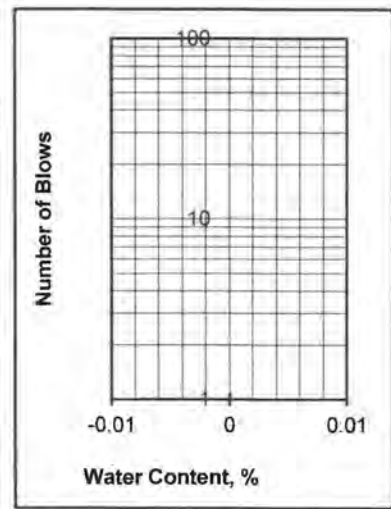
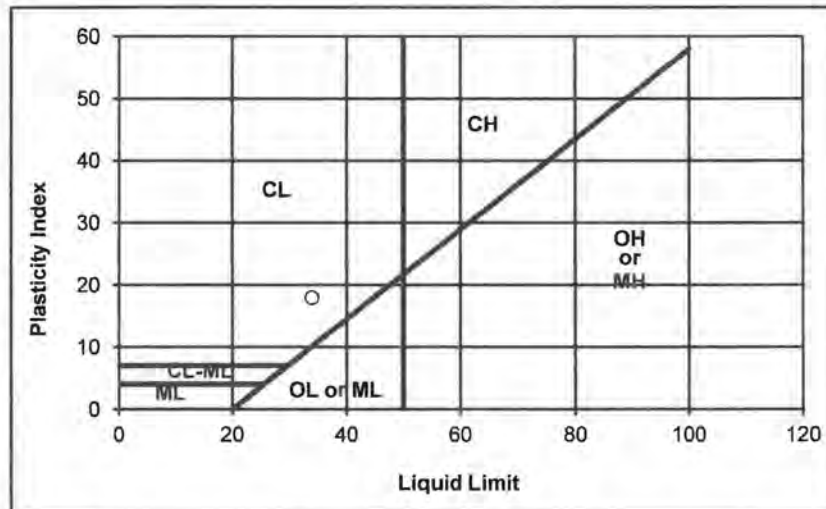
Liquid Limit : 34

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

Project Number : 022-15055
Project Name : Guzman
Date : 10/6/2015
Sample Location : B9 @ 5-6'
Soil Classification : CL

Wet Weight	:	200.00
Dry Weight	:	181.60
Moisture Content	:	10%

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	0.8	0.4	0.4	99.6
#16	1.18	3.7	2.0	2.5	97.5
#30	0.60	8.5	4.7	7.2	92.8
#50	0.30	13.2	7.3	14.4	85.6
#100	0.15	16.9	9.3	23.7	76.3
#200	0.08	17.0	9.4	33.1	66.9

Hydrometer Analysis

ASTM D422

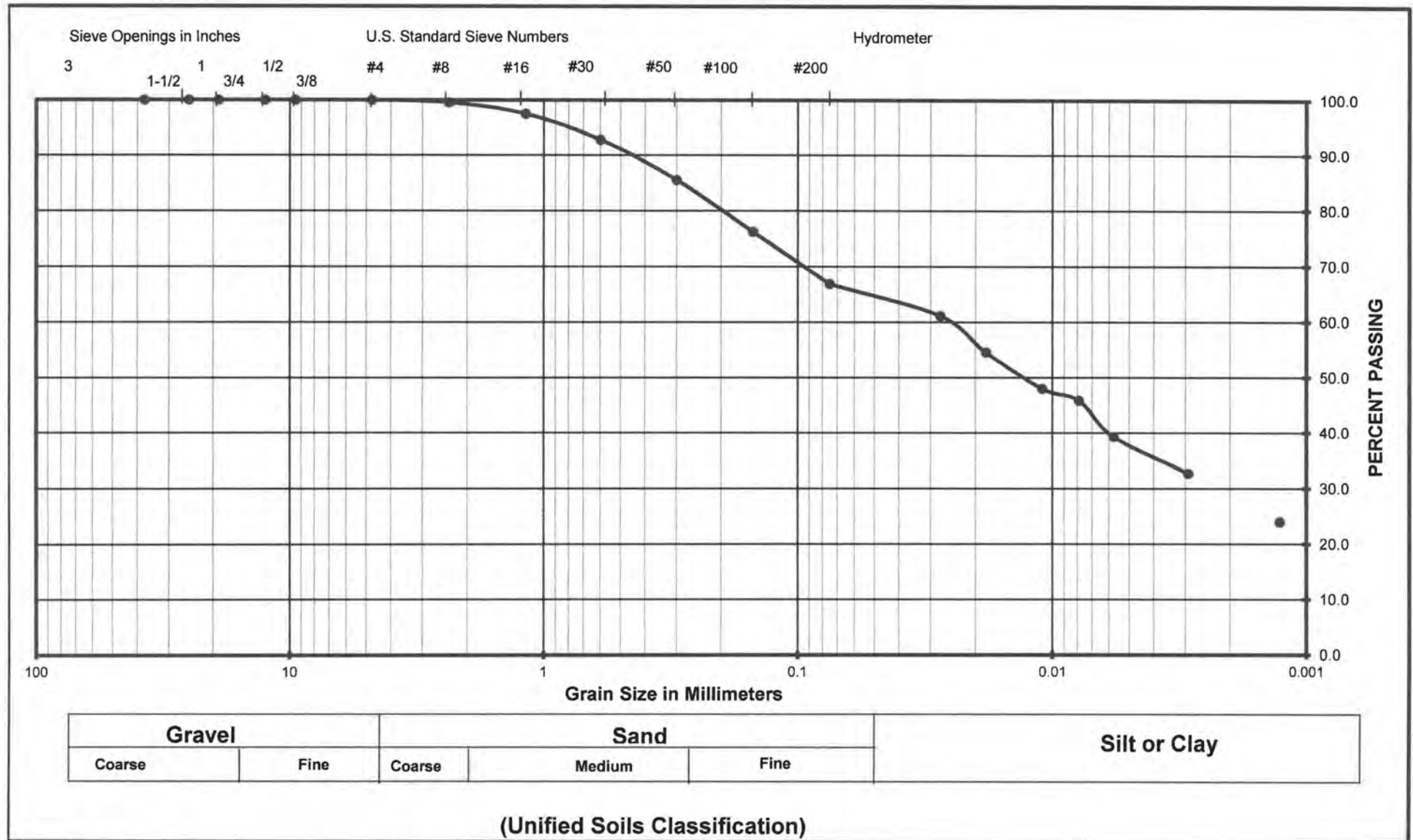
Project Number : 022-15055
Project Name : Guzman
Date : 10/6/2015
Sample Location : B9 @ 5-6'
Soil Classification : CL

Dry Weight Used	73.7 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	1.031	1.031	61.1	0.0275
5	1.028	1.028	54.6	0.0182
15	1.025	1.025	48.0	0.0110
30	1.024	1.024	45.8	0.0079
60	1.021	1.021	39.3	0.0058
250	1.018	1.018	32.7	0.0029
1440	1.014	1.014	24.0	0.0013

Particle Diameter	Percent Passing
0.005	37.5
0.002	27.8
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
B9 @ 5-6'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman**

Project Number: **022-15055**

Date Sampled: -

Sampled By: DA

Sample Number: -

Sample Location: B9 @ 5-6'

Sample Description: CL

Date Tested: 10/12/2015

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)	17.48	18.21		22.91		
Weight of Dry Soil & Tare (g)	16.92	17.59		20.48		
Weight of Tare (g)	13.63	14.02		14.42		
Weight of water (g)	0.56	0.62		2.43		
Weight of Dry Soil (g)	3.30	3.57		6.06		
Water Content (% of dry wt.)	17.1%	17.4%		40.1%		
Number of Blows				25		

Plastic Limit : 17

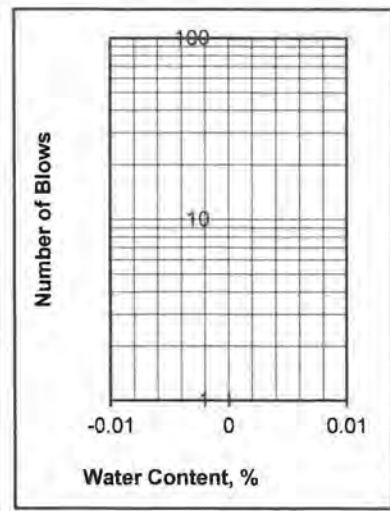
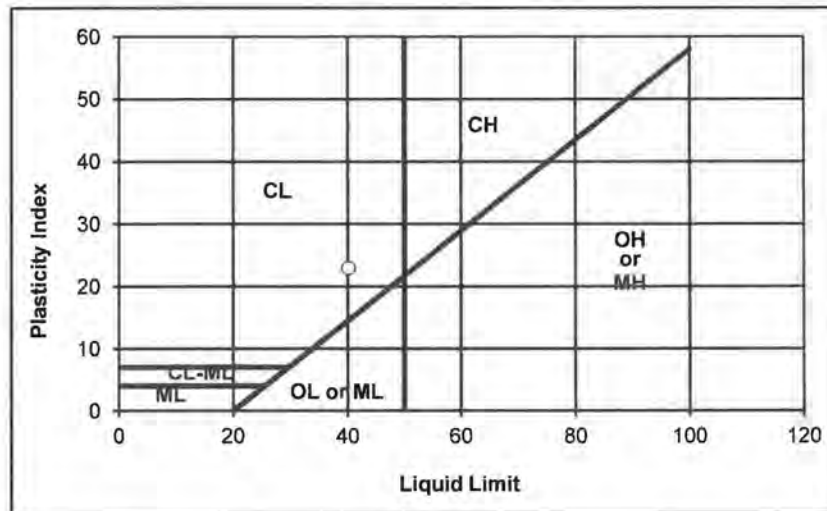
Liquid Limit : 40

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 : 10/9/2015
Sample Location : B11 @ 5-6'
Soil Classification : SC-CL

Wet Weight	:	100.00
Dry Weight	:	94.20
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				100.0
#8	2.36	0.6	0.6	0.6	99.4
#16	1.18	5.0	5.3	5.9	94.1
#30	0.60	10.3	10.9	16.9	83.1
#50	0.30	12.8	13.6	30.5	69.5
#100	0.15	10.4	11.0	41.5	58.5
#200	0.08	6.3	6.7	48.2	51.8

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman
Date : 10/9/2015
Sample Location : B11 @ 5-6'
Soil Classification : SC-CL

Dry Weight Used	87.7 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	1.028	1.028	45.9	0.0288
5	1.026	1.026	42.2	0.0187
15	1.024	1.024	38.5	0.0111
30	1.022	1.022	34.9	0.0081
60	1.021	1.021	33.0	0.0058
250	1.019	1.019	29.4	0.0029
1440	1.017	1.017	25.7	0.0012

Particle Diameter	Percent Passing
0.005	32.0
0.002	27.4
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC-CL
B11 @ 5-6'

ASTM C136 /
D422

Krazan Testing Laboratory

Plasticity Index of Soils

ASTM D4318/AASHTO T89 T90/CT 204

Project: **Guzman**

Project Number: **022-15055**

Date Sampled: -

Sampled By: DA

Sample Number:

Sample Location: B11 @ 5-6'

Sample Description: SC

Date Tested: 10/12/2015

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)	25.63	17.23		24.92		
Weight of Dry Soil & Tare (g)	25.11	16.73		21.93		
Weight of Tare (g)	21.77	13.72		13.96		
Weight of water (g)	0.52	0.50		2.99		
Weight of Dry Soil (g)	3.35	3.00		7.97		
Water Content (% of dry wt.)	15.5%	16.8%		37.6%		
Number of Blows				25		

Plastic Limit : 16

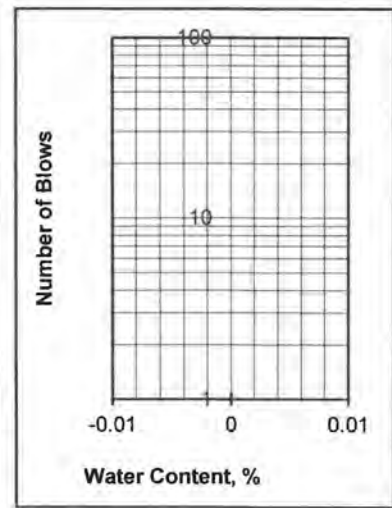
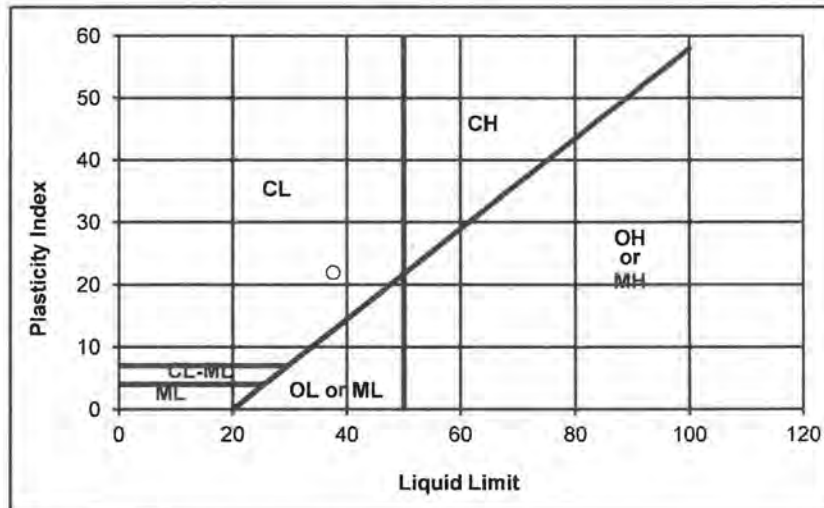
Liquid Limit : 38

Plasticity Index : 22

Unified Soil Classification : CL

Requirement:

Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Sieve Analysis

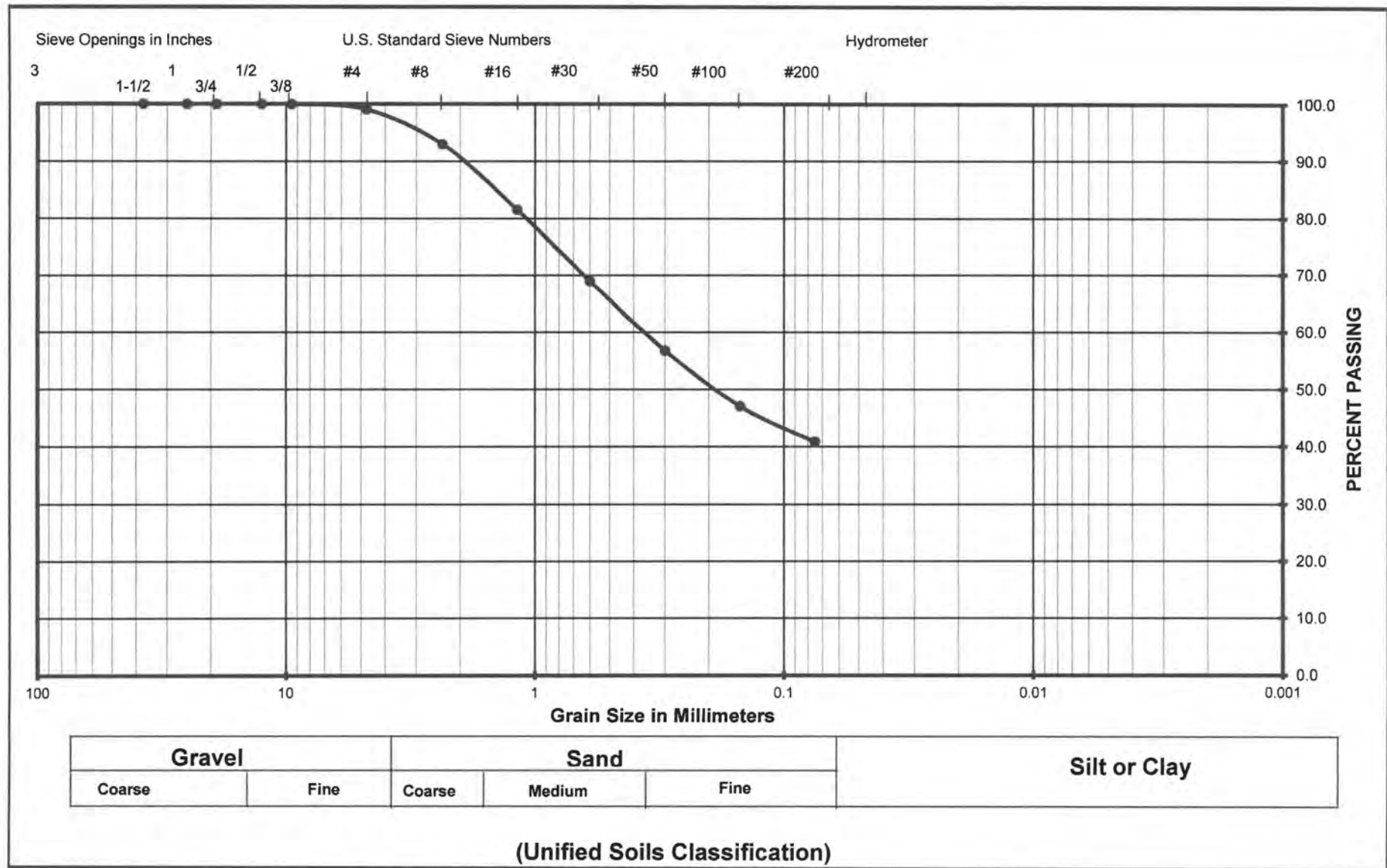
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B13 @ 5-6'
Soil Classification : SC

Wet Weight	:	200.00
Dry Weight	:	191.30
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	1.8	0.9	0.9	99.1
#8	2.36	11.6	6.1	7.0	93.0
#16	1.18	21.9	11.4	18.5	81.5
#30	0.60	24.0	12.5	31.0	69.0
#50	0.30	23.3	12.2	43.2	56.8
#100	0.15	18.7	9.8	53.0	47.0
#200	0.08	11.8	6.2	59.1	40.9

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 SC
 B13 @ 5-6'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B13 @ 10-11'
Soil Classification : CL

Wet Weight	:	150.00
Dry Weight	:	134.70
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	0.9	0.7	0.7	99.3
#8	2.36	4.6	3.4	4.1	95.9
#16	1.18	7.1	5.3	9.4	90.6
#30	0.60	7.5	5.6	14.9	85.1
#50	0.30	8.9	6.6	21.5	78.5
#100	0.15	13.7	10.2	31.7	68.3
#200	0.08	12.1	9.0	40.7	59.3

Hydrometer Analysis

ASTM D422

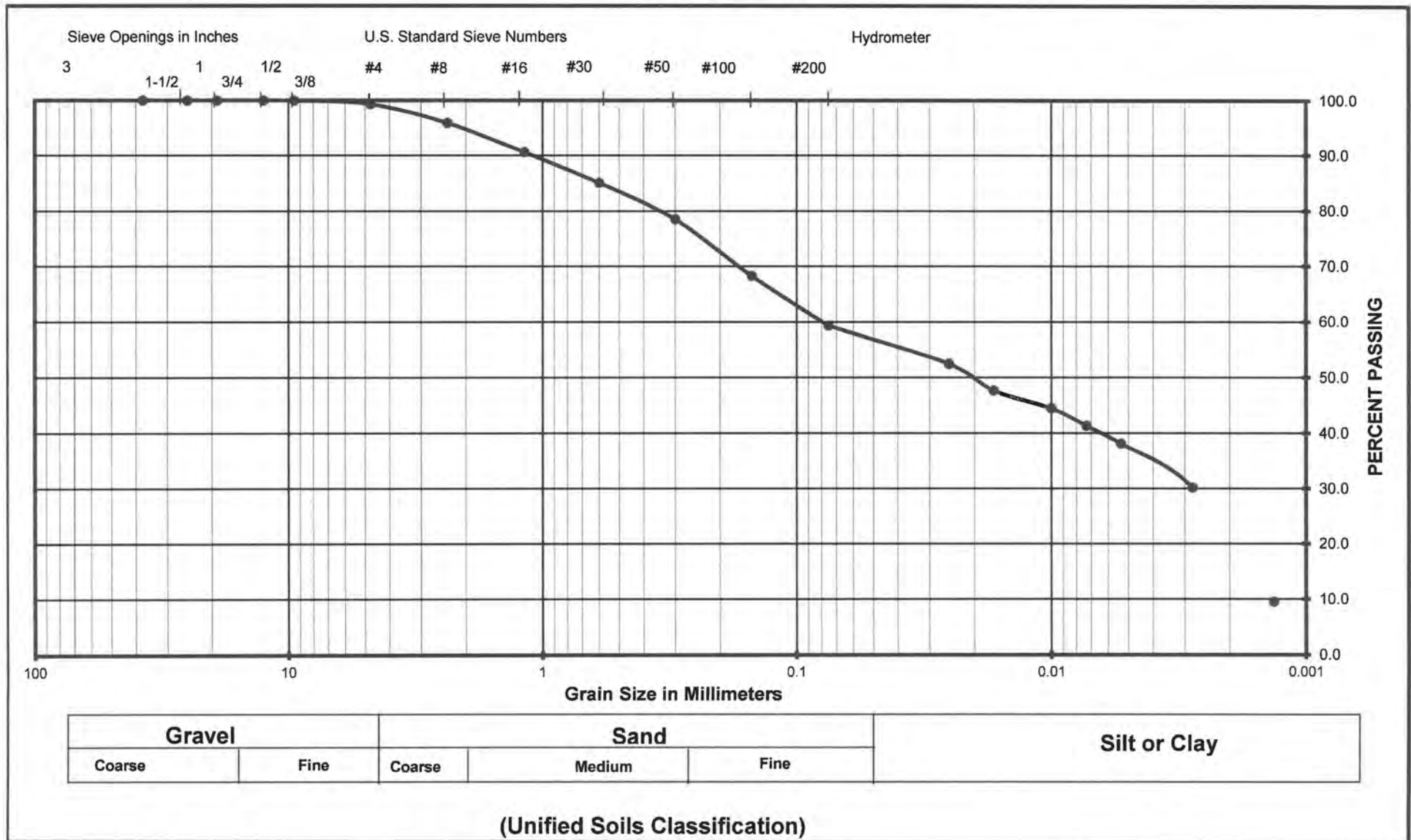
Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B13 @ 10-11'
Soil Classification : CL

Dry Weight Used	101.3 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	1.036	1.036	52.4	0.0252
5	1.033	1.033	47.7	0.0168
15	1.031	1.031	44.5	0.0100
30	1.029	1.029	41.3	0.0073
60	1.027	1.027	38.1	0.0053
250	1.022	1.022	30.2	0.0028
1440	1.009	1.009	9.5	0.0013

Particle Diameter	Percent Passing
0.005	37.0
0.002	18.9
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
B13 @ 10-11'

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: B13 @ 10-11'
 Sample Description: CL

Date Tested: 7/14/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

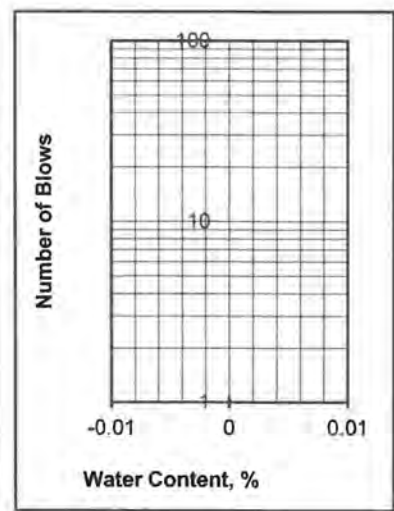
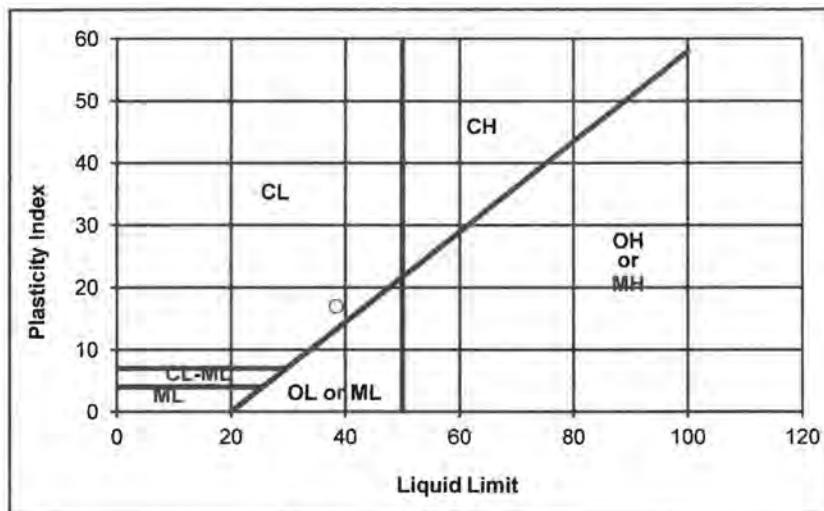
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	20.44	17.80		25.08	24.96	
Weight of Dry Soil & Tare (g)	19.45	17.23		22.06	22.06	
Weight of Tare (g)	14.50	14.55		14.22	14.41	
Weight of water (g)	0.99	0.57		3.02	2.90	
Weight of Dry Soil (g)	4.96	2.68		7.84	7.65	
Water Content (% of dry wt.)	19.9%	21.4%		38.5%	37.9%	
Number of Blows				22	31	

Plastic Limit : 21

Liquid Limit : 38

Plasticity Index : 17
 Unified Soil Classification : CL

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



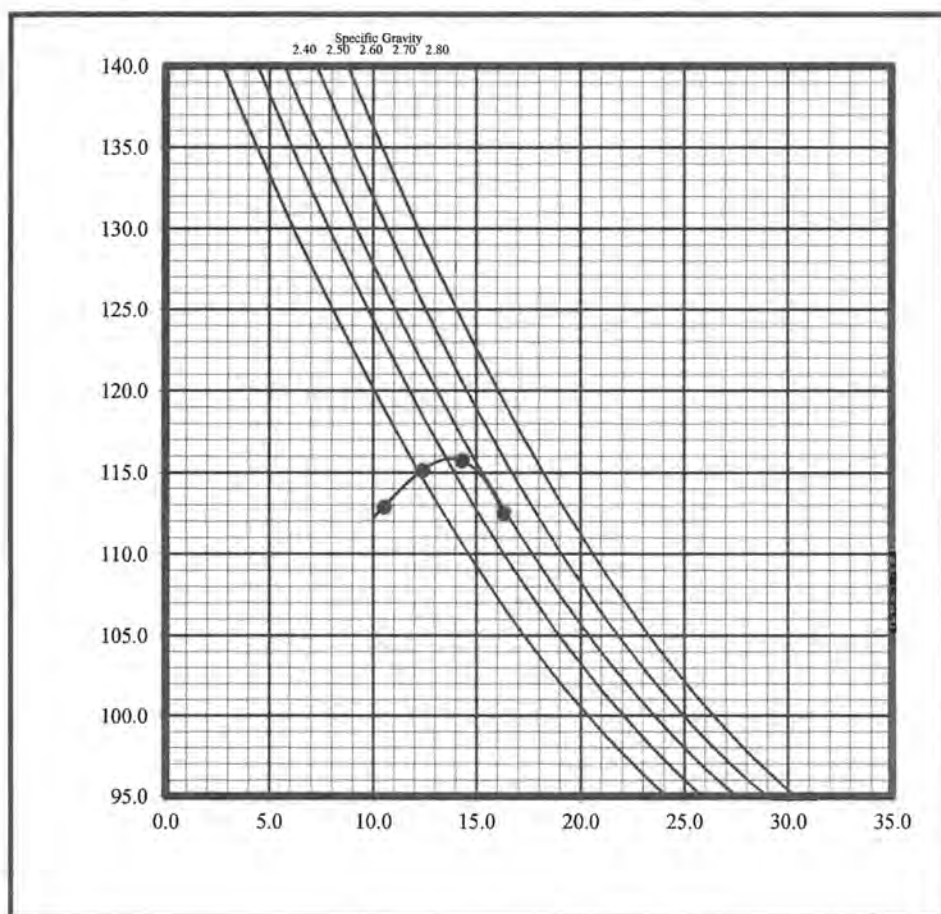
Departures from Outlined Procedure:

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	CL
Technician	DJ 12075	Soil Description	Brn Sandy Clay
Date	10/31/2016	Method	D1557a
Sample Location	B13 @ 10-11'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	3944.0	3988.0	3966.0	3874.0
Mass of Compaction Mold, gm	1990.0	1990.0	1990.0	1990.0
Mass of Moist Specimen, gm	1954.0	1998.0	1976.0	1884.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	129.4	132.3	130.8	124.7
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.	115.1	115.7	112.5	112.9



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

115.9

Optimum Moisture Content

13.8%

SDS#: -

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 12/9/2016
Sample Location : B13 @ 12-13'
Soil Classification : SC

Wet Weight	:	200.00
Dry Weight	:	183.10
Moisture Content	:	9%

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	1.1	1.1	98.9
#8	2.36	13.2	7.2	8.3	91.7
#16	1.18	24.7	13.5	21.8	78.2
#30	0.60	24.3	13.3	35.1	64.9
#50	0.30	22.2	12.1	47.2	52.8
#100	0.15	17.1	9.3	56.5	43.5
#200	0.08	10.2	5.6	62.1	37.9

Hydrometer Analysis

ASTM D422

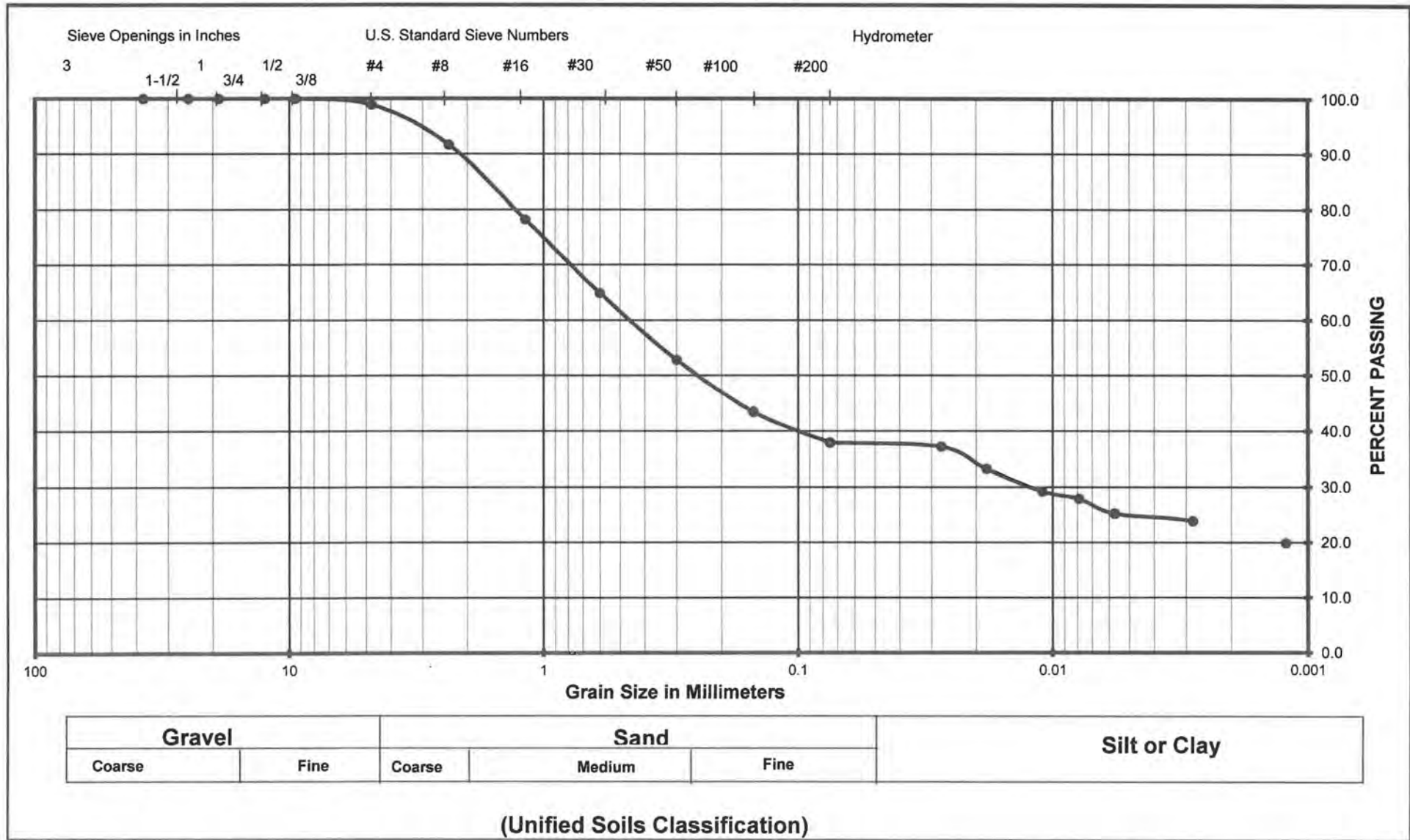
Project Number : 022-15055
Project Name : Guzman
Date : 12/9/2016
Sample Location : B13 @ 12-13'
Soil Classification : SC

Dry Weight Used	121.2 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	1.031	1.031	37.2	0.0275
5	1.028	1.028	33.2	0.0182
15	1.025	1.025	29.2	0.0110
30	1.024	1.024	27.9	0.0079
60	1.022	1.022	25.2	0.0057
250	1.021	1.021	23.9	0.0028
1440	1.018	1.018	19.9	0.0012

Particle Diameter	Percent Passing
0.005	24.9
0.002	21.9
0	NA

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC
 Sample Number: B13 @ 12-13'

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: B13 @ 12-13'
 Sample Description: SC

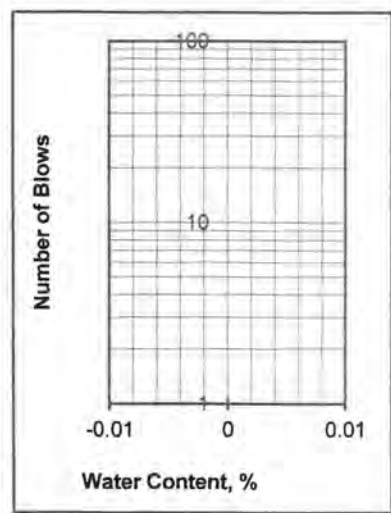
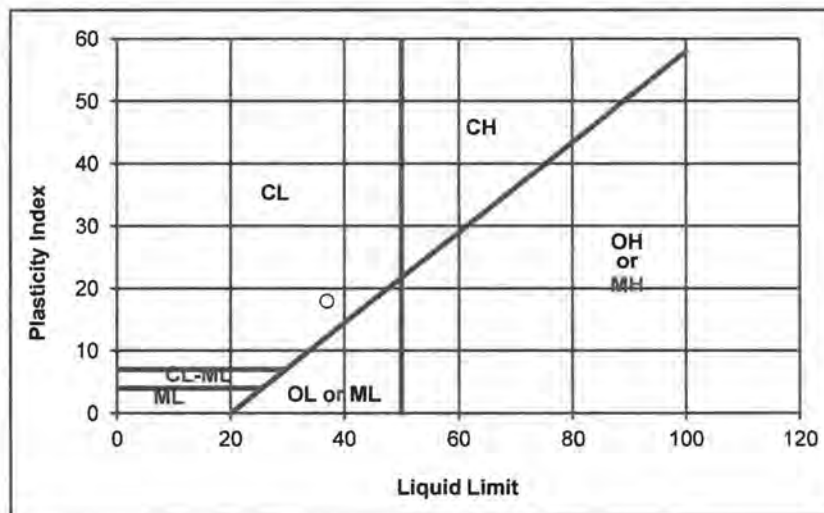
Date Tested: 12/12/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	18.17	18.13		23.59		
Weight of Dry Soil & Tare (g)	17.55	17.55		21.09		
Weight of Tare (g)	14.37	14.20		14.32		
Weight of water (g)	0.63	0.58		2.50		
Weight of Dry Soil (g)	3.18	3.35		6.77		
Water Content (% of dry wt.)	19.7%	17.3%		36.9%		
Number of Blows				25		

Plastic Limit : 19

Liquid Limit : 37

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

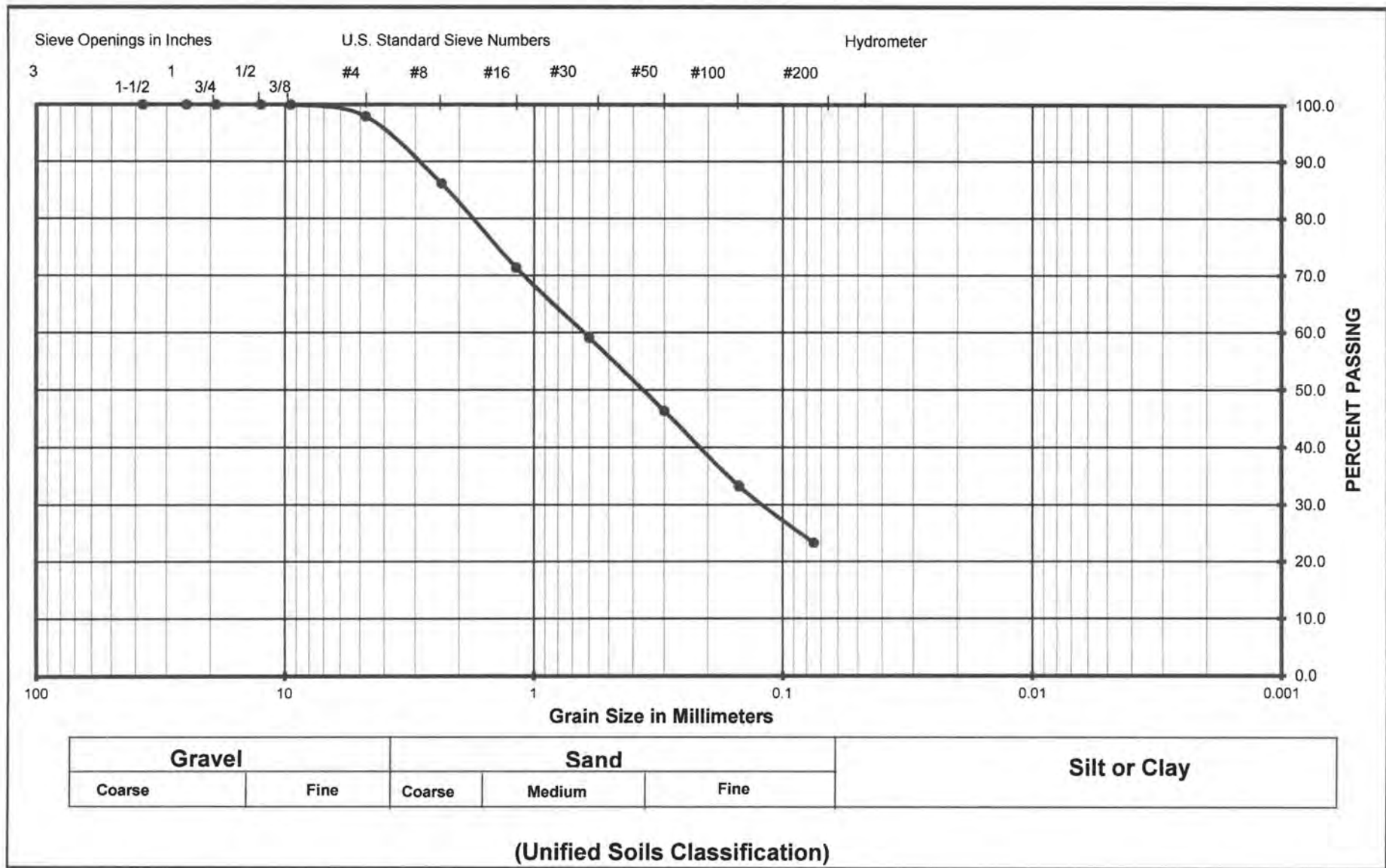
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B13 @ 15-16'
Soil Classification : SM

Wet Weight	:	300.00
Dry Weight	:	287.60
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	6.0	2.1	2.1	97.9
#8	2.36	34.0	11.8	13.9	86.1
#16	1.18	42.2	14.7	28.6	71.4
#30	0.60	35.3	12.3	40.9	59.1
#50	0.30	36.8	12.8	53.7	46.3
#100	0.15	37.6	13.1	66.7	33.3
#200	0.08	28.6	9.9	76.7	23.3

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SM
 Sample Number: B13 @ 15-16'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B13 @ 20-21'
Soil Classification : CL

Wet Weight	:	250.00
Dry Weight	:	221.50
Moisture Content	:	13%

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	2.1	0.9	0.9	99.1
#16	1.18	8.4	3.8	4.7	95.3
#30	0.60	15.6	7.0	11.8	88.2
#50	0.30	21.6	9.8	21.5	78.5
#100	0.15	21.3	9.6	31.2	68.8
#200	0.08	19.3	8.7	39.9	60.1

Hydrometer Analysis

ASTM D422

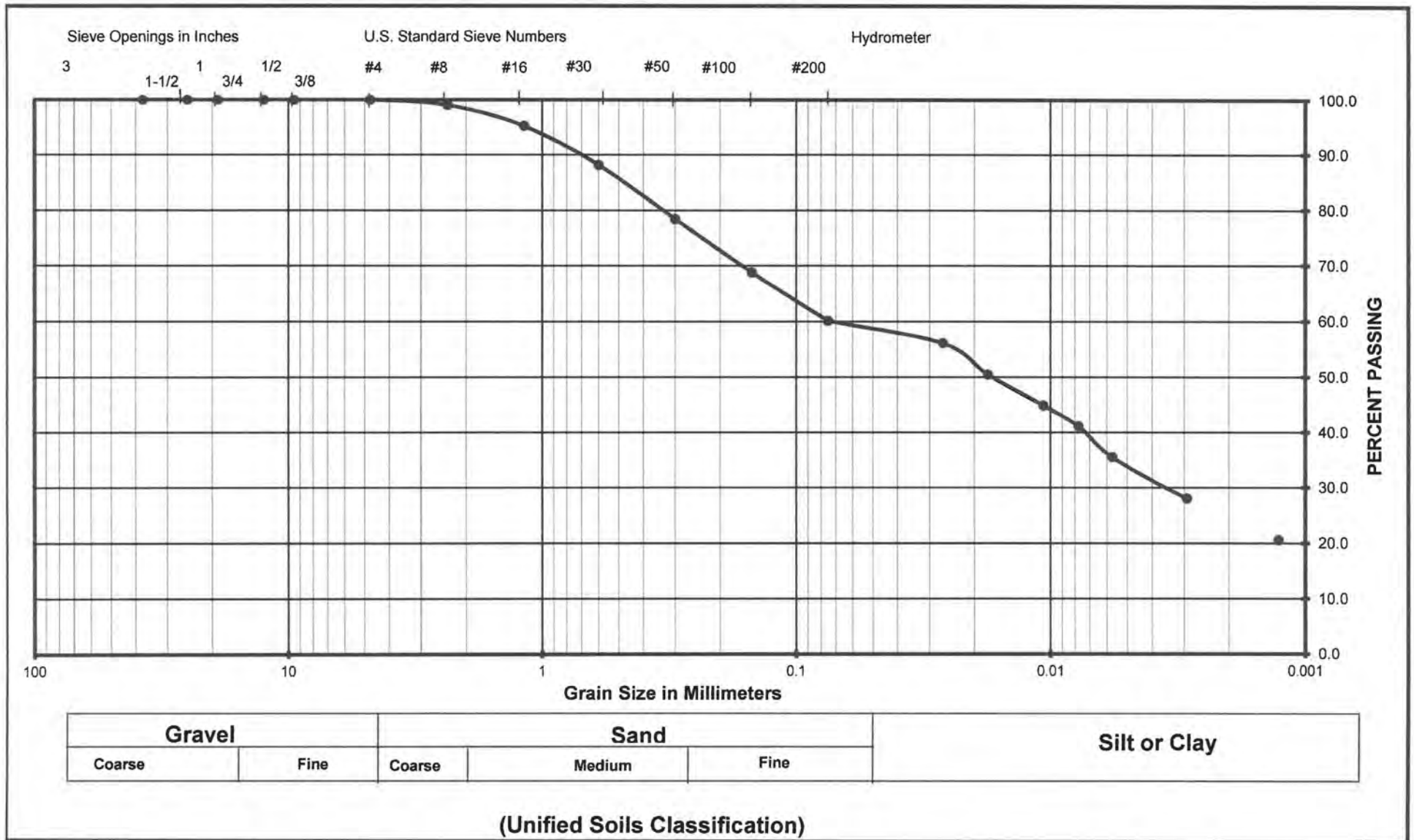
Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B13 @ 20-21'
Soil Classification : CL

Dry Weight Used	86.0 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	56.1	0.0266
5	1.03	1.03	50.5	0.0177
15	1.027	1.027	44.9	0.0107
30	1.025	1.025	41.2	0.0078
60	1.022	1.022	35.5	0.0057
250	1.018	1.018	28.1	0.0029
1440	1.014	1.014	20.6	0.0013

Particle Diameter	Percent Passing
0.005	33.6
0.002	23.9
0	NA

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: CL
 Sample Number: B13 @ 20-21'

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: B13 @ 20-21'

Sample Description: CL

Date Tested: 7/14/2016

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)	18.87	18.60		24.51	25.13	
Weight of Dry Soil & Tare (g)	18.15	17.91		21.73	22.29	
Weight of Tare (g)	14.33	14.24		14.13	14.47	
Weight of water (g)	0.72	0.69		2.79	2.85	
Weight of Dry Soil (g)	3.83	3.67		7.60	7.82	
Water Content (% of dry wt.)	18.8%	18.7%		36.6%	36.4%	
Number of Blows				18	28	

Plastic Limit : 19

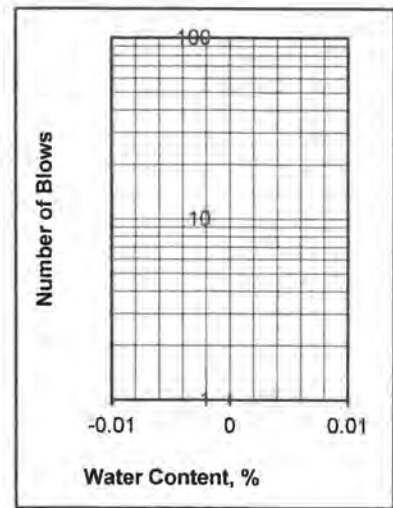
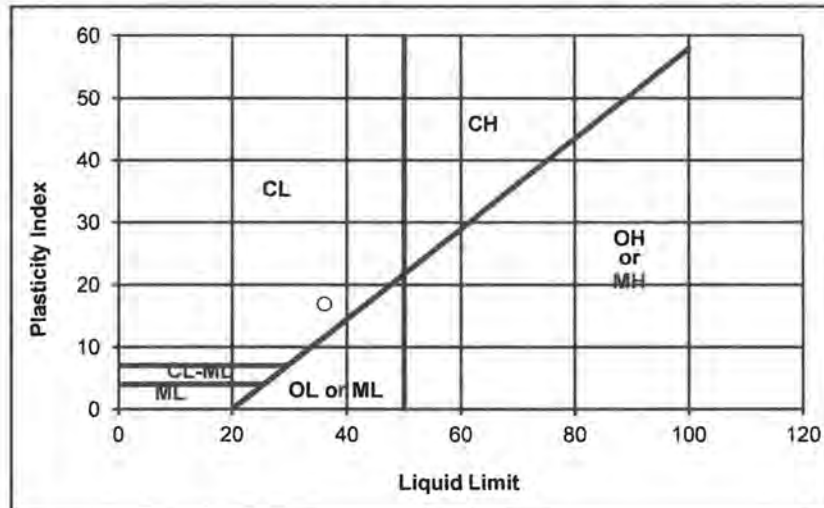
Liquid Limit : 36

Plasticity Index : 17

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 : 7/11/2016
Sample Location : B13 @ 25-26'
Soil Classification : SM

Wet Weight	:	300.00
Dry Weight	:	282.60
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	3.4	1.2	1.2	98.8
#8	2.36	10.3	3.6	4.8	95.2
#16	1.18	20.0	7.1	11.9	88.1
#30	0.60	27.8	9.8	21.8	78.2
#50	0.30	37.0	13.1	34.9	65.1
#100	0.15	44.2	15.6	50.5	49.5
#200	0.08	31.2	11.0	61.5	38.5

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SM
B13 @ 25-26'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B13 @ 40-41'
Soil Classification : SC

Wet Weight	:	250.00
Dry Weight	:	241.20
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	1.1	0.5	0.5	99.5
#8	2.36	5.0	2.1	2.5	97.5
#16	1.18	17.1	7.1	9.6	90.4
#30	0.60	26.9	11.2	20.8	79.2
#50	0.30	36.0	14.9	35.7	64.3
#100	0.15	40.1	16.6	52.3	47.7
#200	0.08	26.5	11.0	63.3	36.7

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC
 Sample Number: B13 @ 40-41'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B14 @ 5-6'
Soil Classification : SC

Wet Weight	:	220.00
Dry Weight	:	209.20
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	2.1	1.0	1.0	99.0
#8	2.36	9.7	4.6	5.6	94.4
#16	1.18	19.8	9.5	15.1	84.9
#30	0.60	27.1	13.0	28.1	71.9
#50	0.30	30.8	14.7	42.8	57.2
#100	0.15	28.2	13.5	56.3	43.7
#200	0.08	16.0	7.6	63.9	36.1

Grain Size Analysis



Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B14 @ 10-11'
Soil Classification : SM w/ trace of clay

Wet Weight	:	175.00
Dry Weight	:	168.30
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	4.3	2.6	2.6	97.4
#8	2.36	13.1	7.8	10.3	89.7
#16	1.18	26.5	15.7	26.1	73.9
#30	0.60	28.6	17.0	43.1	56.9
#50	0.30	29.5	17.5	60.6	39.4
#100	0.15	22.9	13.6	74.2	25.8
#200	0.08	10.6	6.3	80.5	19.5

Grain Size Analysis



Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B14 @ 17.5-18.5'
Soil Classification : CL

Wet Weight	:	300.00
Dry Weight	:	256.50
Moisture Content	:	17%

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	0.6	0.2	0.2	99.8
#16	1.18	4.0	1.6	1.8	98.2
#30	0.60	6.7	2.6	4.4	95.6
#50	0.30	9.7	3.8	8.2	91.8
#100	0.15	18.5	7.2	15.4	84.6
#200	0.08	30.3	11.8	27.2	72.8

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B14 @ 17.5-18.5'
Soil Classification : CL

Dry Weight Used	80.0 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	1.035	1.035	64.4	0.0255
5	1.031	1.031	56.3	0.0174
15	1.027	1.027	48.3	0.0107
30	1.024	1.024	42.2	0.0079
60	1.021	1.021	36.2	0.0058
250	1.016	1.016	26.1	0.0030
1440	1.011	1.011	16.1	0.0013

Particle Diameter	Percent Passing
0.005	33.4
0.002	20.2
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
B14 @ 17.5-18.5'

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: B14 @ 17.5-18.5'

Sample Description: CL

Date Tested: 7/14/2016

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)	21.93	22.08		27.70	25.82	
Weight of Dry Soil & Tare (g)	21.19	21.32		25.03	22.92	
Weight of Tare (g)	16.83	17.04		17.01	14.07	
Weight of water (g)	0.74	0.76		2.67	2.90	
Weight of Dry Soil (g)	4.36	4.28		8.02	8.85	
Water Content (% of dry wt.)	17.0%	17.8%		33.3%	32.7%	
Number of Blows				18	26	

Plastic Limit : 17

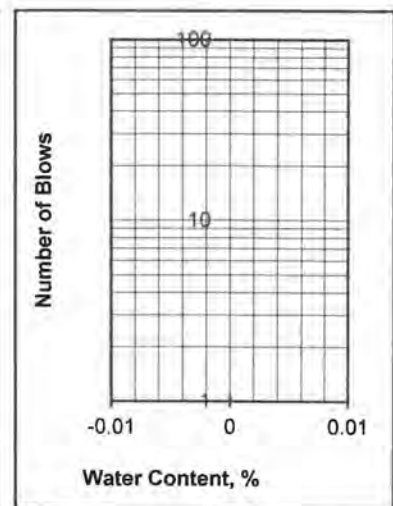
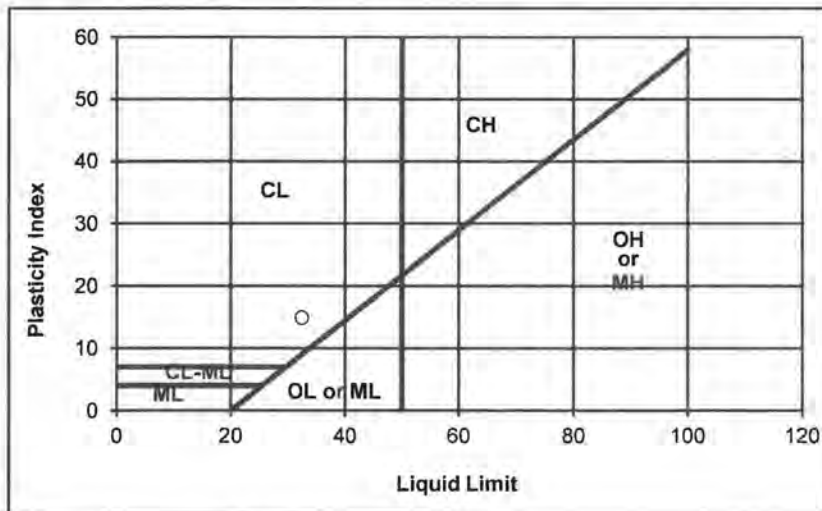
Liquid Limit : 32

Plasticity Index : 15

Unified Soil Classification : CL

Requirement:

Approx. % of Material Retained on # 40 Sieve:



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Sieve Analysis

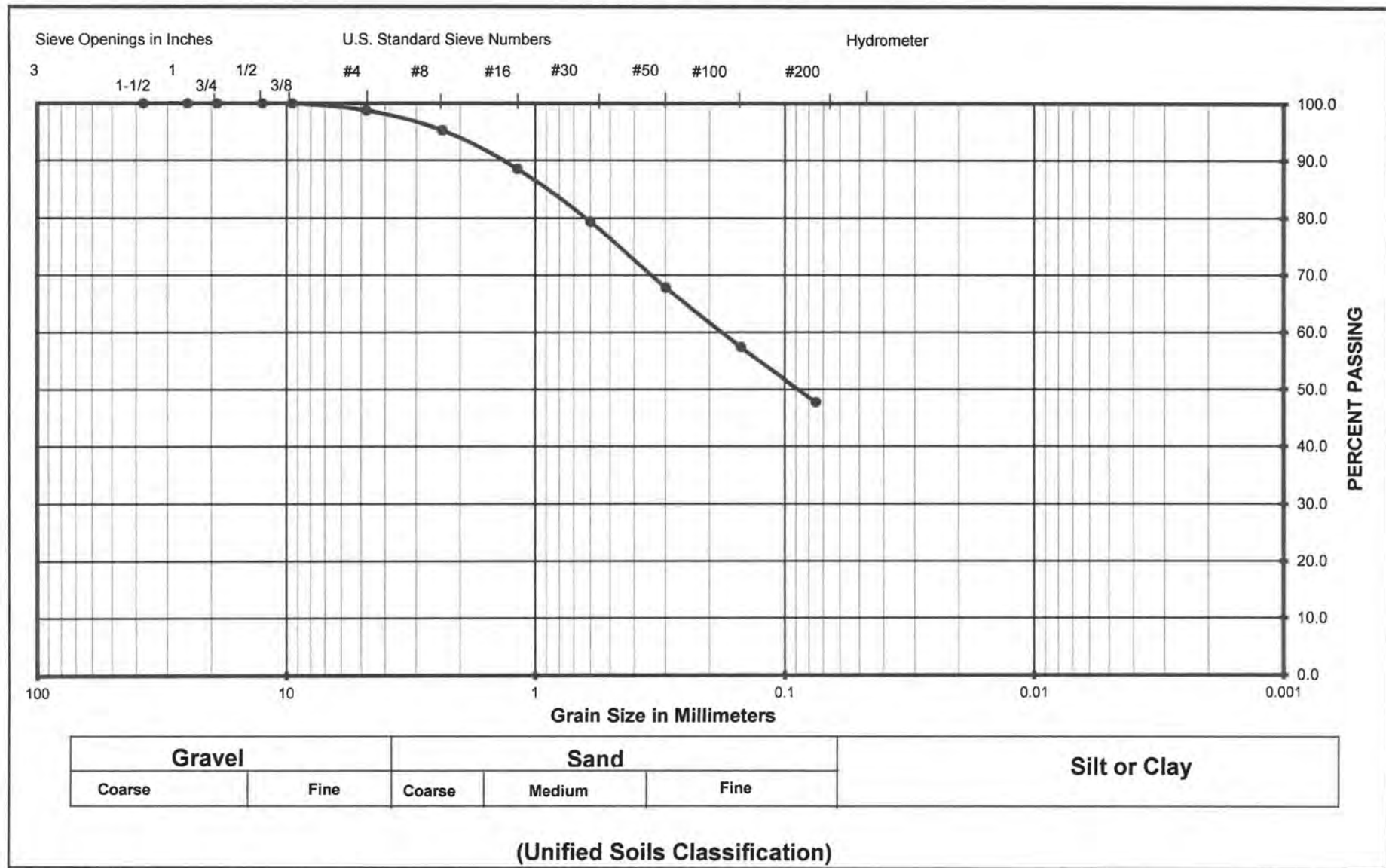
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B14 @ 22.5-23.5'
Soil Classification : SM-ML

Wet Weight	:	300.00
Dry Weight	:	266.10
Moisture Content	:	13%

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	3.3	1.2	1.2	98.8
#8	2.36	9.2	3.5	4.7	95.3
#16	1.18	17.9	6.7	11.4	88.6
#30	0.60	24.6	9.2	20.7	79.3
#50	0.30	30.5	11.5	32.1	67.9
#100	0.15	27.8	10.4	42.6	57.4
#200	0.08	25.8	9.7	52.3	47.7

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 SM-ML
 B14 @ 22.5-23.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B14 @ 30-31'
Soil Classification : CL

Wet Weight	:	300.00
Dry Weight	:	262.10
Moisture Content	:	14%

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	0.6	0.6	99.4
#8	2.36	4.1	1.6	2.2	97.8
#16	1.18	7.9	3.0	5.2	94.8
#30	0.60	11.5	4.4	9.6	90.4
#50	0.30	17.8	6.8	16.4	83.6
#100	0.15	26.0	9.9	26.3	73.7
#200	0.08	26.5	10.1	36.4	63.6

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B14 @ 30-31'
Soil Classification : CL

Dry Weight Used	89.7 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	1.037	1.037	61.0	0.0246
5	1.034	1.034	55.6	0.0165
15	1.031	1.031	50.2	0.0100
30	1.029	1.029	46.6	0.0073
60	1.027	1.027	43.0	0.0053
250	1.022	1.022	34.1	0.0028
1440	1.014	1.014	19.7	0.0013

Particle Diameter	Percent Passing
0.005	41.8
0.002	26.6
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
B14 @ 30-31'

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: B14 @ 30-31'

Sample Description: CL

Date Tested: 7/14/2016

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)	18.95	18.89		24.02	26.08	
Weight of Dry Soil & Tare (g)	18.27	18.19		21.40	22.71	
Weight of Tare (g)	14.52	14.46		14.41	13.94	
Weight of water (g)	0.68	0.71		2.62	3.37	
Weight of Dry Soil (g)	3.75	3.73		6.99	8.78	
Water Content (% of dry wt.)	18.1%	19.0%		37.5%	38.4%	
Number of Blows				30	17	

Plastic Limit : 19

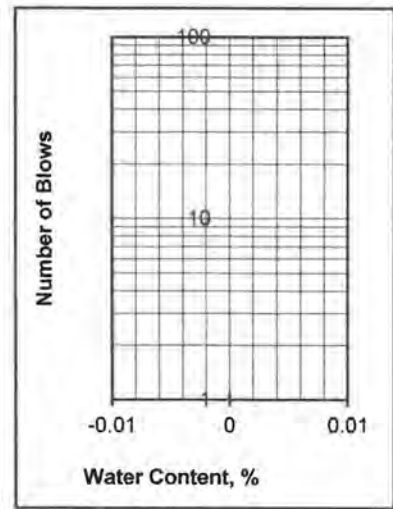
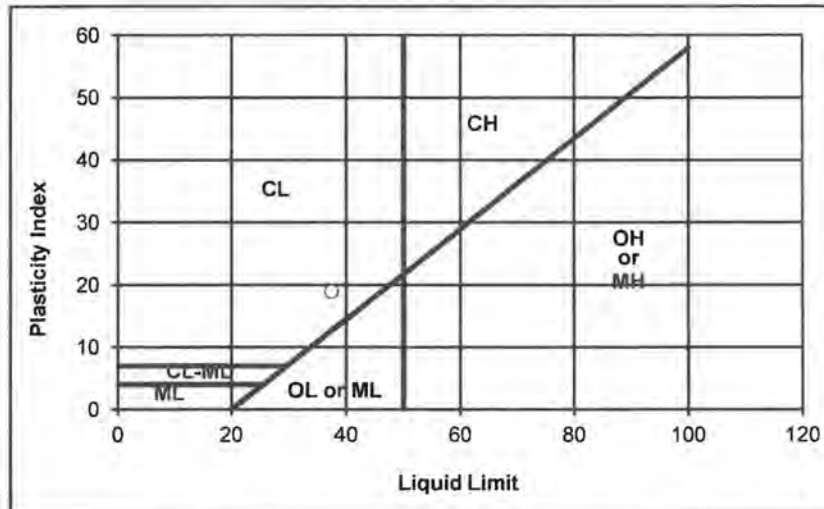
Liquid Limit : 38

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 : 7/11/2016
Sample Location : B14 @ 45-46'
Soil Classification : SM

Wet Weight	:	300.00
Dry Weight	:	271.50
Moisture Content	:	10%

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	0.6	0.6	99.4
#8	2.36	6.8	2.5	3.1	96.9
#16	1.18	21.2	7.8	10.9	89.1
#30	0.60	29.3	10.8	21.7	78.3
#50	0.30	37.1	13.7	35.4	64.6
#100	0.15	42.7	15.7	51.1	48.9
#200	0.08	32.6	12.0	63.1	36.9

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 SM
 B14 @ 45-46'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B14 @ 55-56'
Soil Classification : SC

Wet Weight	:	300.00
Dry Weight	:	269.90
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	0.9	0.3	0.3	99.7
#8	2.36	3.4	1.3	1.6	98.4
#16	1.18	10.5	3.9	5.5	94.5
#30	0.60	16.1	6.0	11.4	88.6
#50	0.30	26.4	9.8	21.2	78.8
#100	0.15	55.5	20.6	41.8	58.2
#200	0.08	44.7	16.6	58.4	41.6

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC
B14 @ 55-56'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/11/2016
Sample Location : B14 @ 65-66'
Soil Classification : SM

Wet Weight	:	300.00
Dry Weight	:	274.80
Moisture Content	:	9%

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	0.6	0.6	99.4
#8	2.36	15.4	5.6	6.2	93.8
#16	1.18	33.3	12.1	18.3	81.7
#30	0.60	39.4	14.3	32.7	67.3
#50	0.30	41.5	15.1	47.8	52.2
#100	0.15	31.2	11.4	59.1	40.9
#200	0.08	15.8	5.7	64.9	35.1

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SM
B14 @ 65-66'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

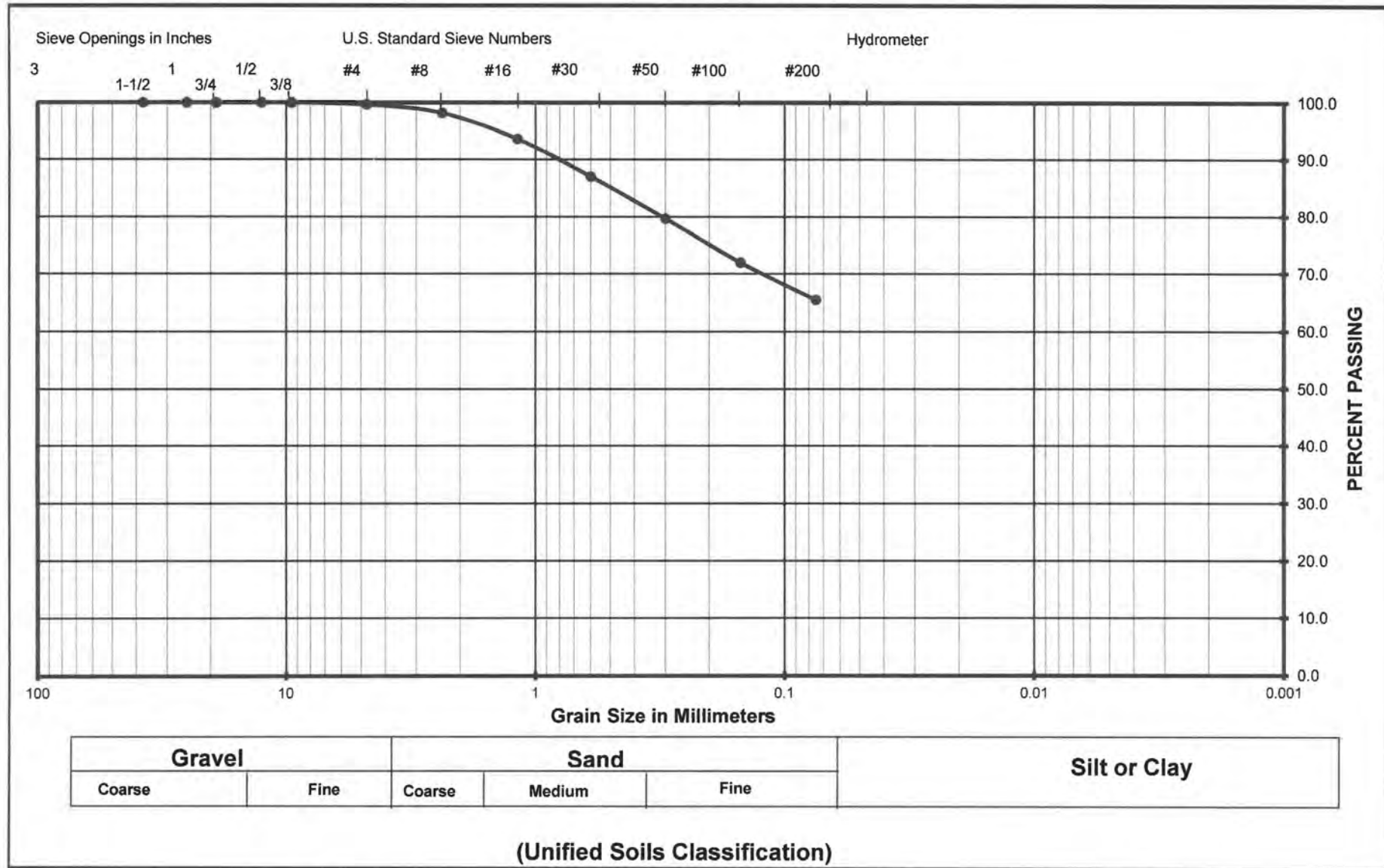
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B15 @ 5-6'
Soil Classification : CL

Wet Weight	:	300.00
Dry Weight	:	275.10
Moisture Content	:	9%

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	4.0	1.5	1.8	98.2
#16	1.18	12.7	4.6	6.4	93.6
#30	0.60	18.0	6.5	12.9	87.1
#50	0.30	20.3	7.4	20.3	79.7
#100	0.15	21.2	7.7	28.0	72.0
#200	0.08	17.7	6.4	34.5	65.5

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
B15 @ 5-6'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B15 @ 7.5-8.5'
Soil Classification : CL

Wet Weight	:	275.00
Dry Weight	:	246.10
Moisture Content	:	12%

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	1.1	0.4	0.4	99.6
#16	1.18	3.9	1.6	2.0	98.0
#30	0.60	8.8	3.6	5.6	94.4
#50	0.30	16.9	6.9	12.5	87.5
#100	0.15	27.9	11.3	23.8	76.2
#200	0.08	29.2	11.9	35.7	64.3

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B15 @ 7.5-8.5'
Soil Classification : CL

Dry Weight Used	83.2 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	1.032	1.032	56.1	0.0270
5	1.029	1.029	50.3	0.0179
15	1.026	1.026	44.5	0.0108
30	1.024	1.024	40.6	0.0079
60	1.022	1.022	36.7	0.0057
250	1.019	1.019	30.9	0.0029
1440	1.014	1.014	21.3	0.0013

Particle Diameter	Percent Passing
0.005	35.3
0.002	25.6
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
B15 @ 7.5-8.5'

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: B15 @ 7.5-8.5'
 Sample Description: CL

Date Tested: 7/14/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

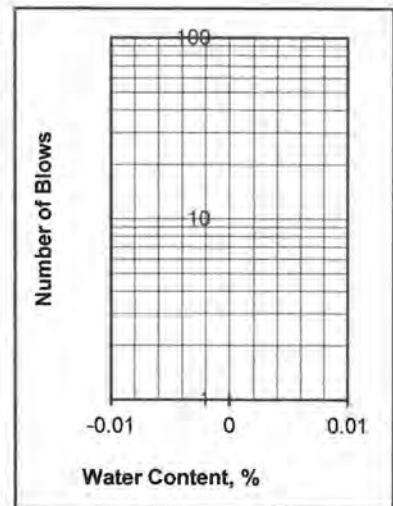
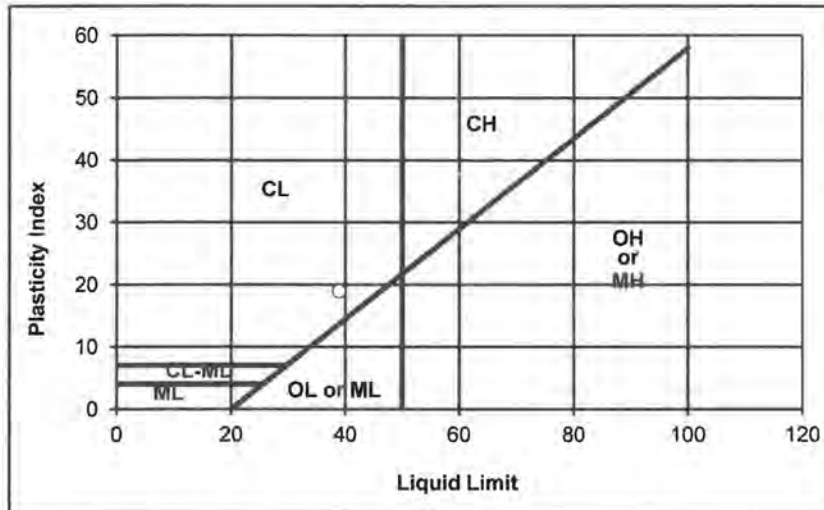
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	18.70	18.76		31.98	24.83	
Weight of Dry Soil & Tare (g)	17.96	18.01		29.21	21.95	
Weight of Tare (g)	14.38	14.20		22.03	14.61	
Weight of water (g)	0.74	0.75		2.77	2.88	
Weight of Dry Soil (g)	3.58	3.81		7.18	7.34	
Water Content (% of dry wt.)	20.7%	19.7%		38.6%	39.2%	
Number of Blows				28	22	

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 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B15 @ 17.5-18.5'
Soil Classification : SC-CL

Wet Weight	:	300.00
Dry Weight	:	273.60
Moisture Content	:	10%

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	1.1	0.4	0.4	99.6
#8	2.36	4.7	1.7	2.1	97.9
#16	1.18	16.3	6.0	8.1	91.9
#30	0.60	26.4	9.6	17.7	82.3
#50	0.30	37.4	13.7	31.4	68.6
#100	0.15	36.9	13.5	44.9	55.1
#200	0.08	26.1	9.5	54.4	45.6

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC-CL
B15 @ 17.5-18.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

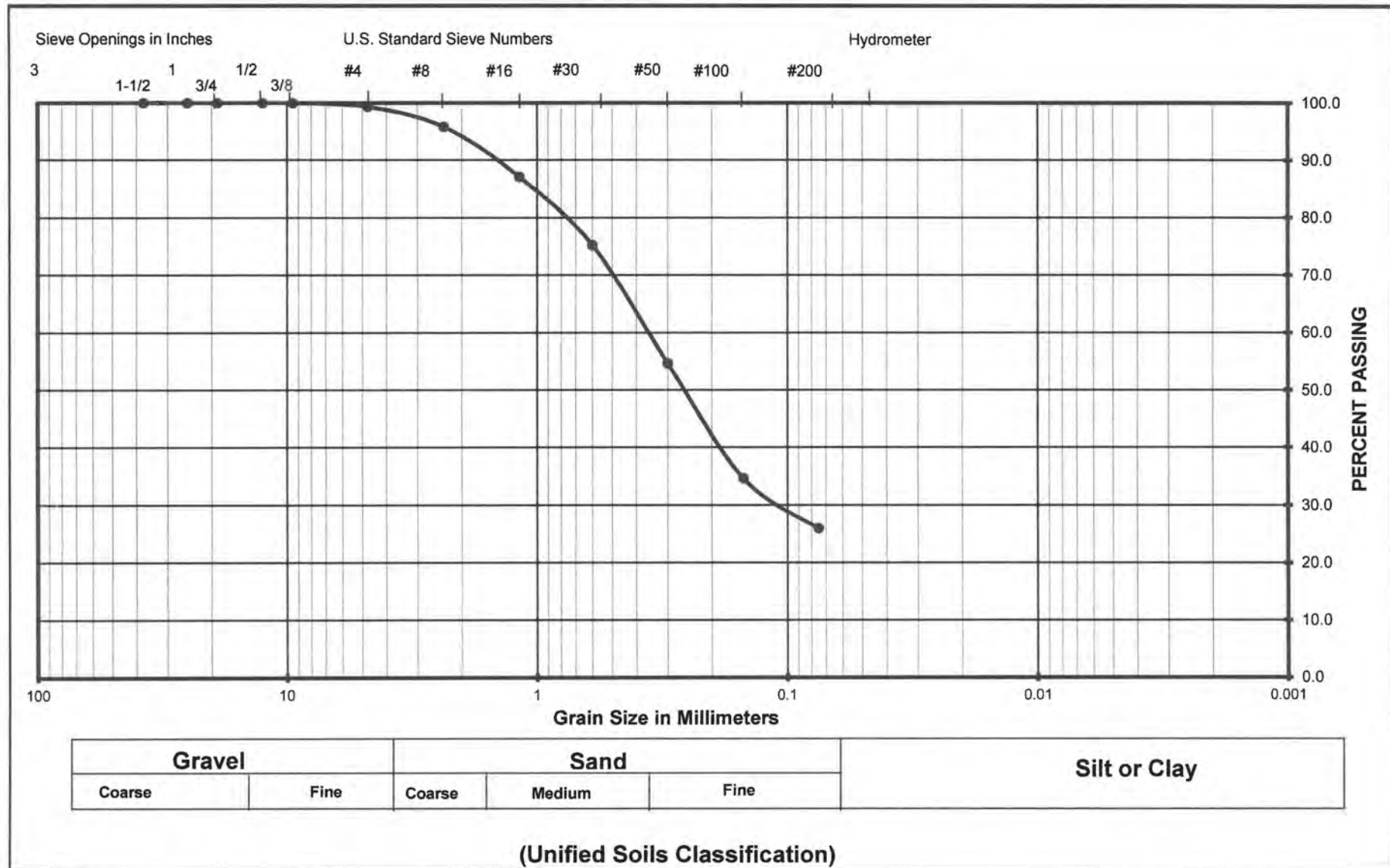
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B15 @ 22.5-23.5'
Soil Classification : SM

Wet Weight	:	300.00
Dry Weight	:	276.70
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	1.8	0.7	0.7	99.3
#8	2.36	9.6	3.5	4.1	95.9
#16	1.18	24.2	8.7	12.9	87.1
#30	0.60	33.0	11.9	24.8	75.2
#50	0.30	56.9	20.6	45.4	54.6
#100	0.15	55.4	20.0	65.4	34.6
#200	0.08	23.9	8.6	74.0	26.0

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SM
B15 @ 22.5-23.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B15 @ 37.5-38.5'
Soil Classification : SM

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	12.9	4.6	5.0	95.0
#16	1.18	25.1	8.9	13.9	86.1
#30	0.60	31.0	11.0	24.8	75.2
#50	0.30	33.3	11.8	36.6	63.4
#100	0.15	30.5	10.8	47.4	52.6
#200	0.08	23.1	8.2	55.5	44.5

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SM
 Sample Number: B15 @ 37.5-38.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B15 @ 50-51'
Soil Classification : CL

Wet Weight	:	250.00
Dry Weight	:	216.90
Moisture Content	:	15%

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	0.6	0.6	99.4
#8	2.36	3.9	1.8	2.4	97.6
#16	1.18	11.8	5.4	7.8	92.2
#30	0.60	14.8	6.8	14.7	85.3
#50	0.30	14.6	6.7	21.4	78.6
#100	0.15	13.9	6.4	27.8	72.2
#200	0.08	10.9	5.0	32.8	67.2

Hydrometer Analysis

ASTM D422

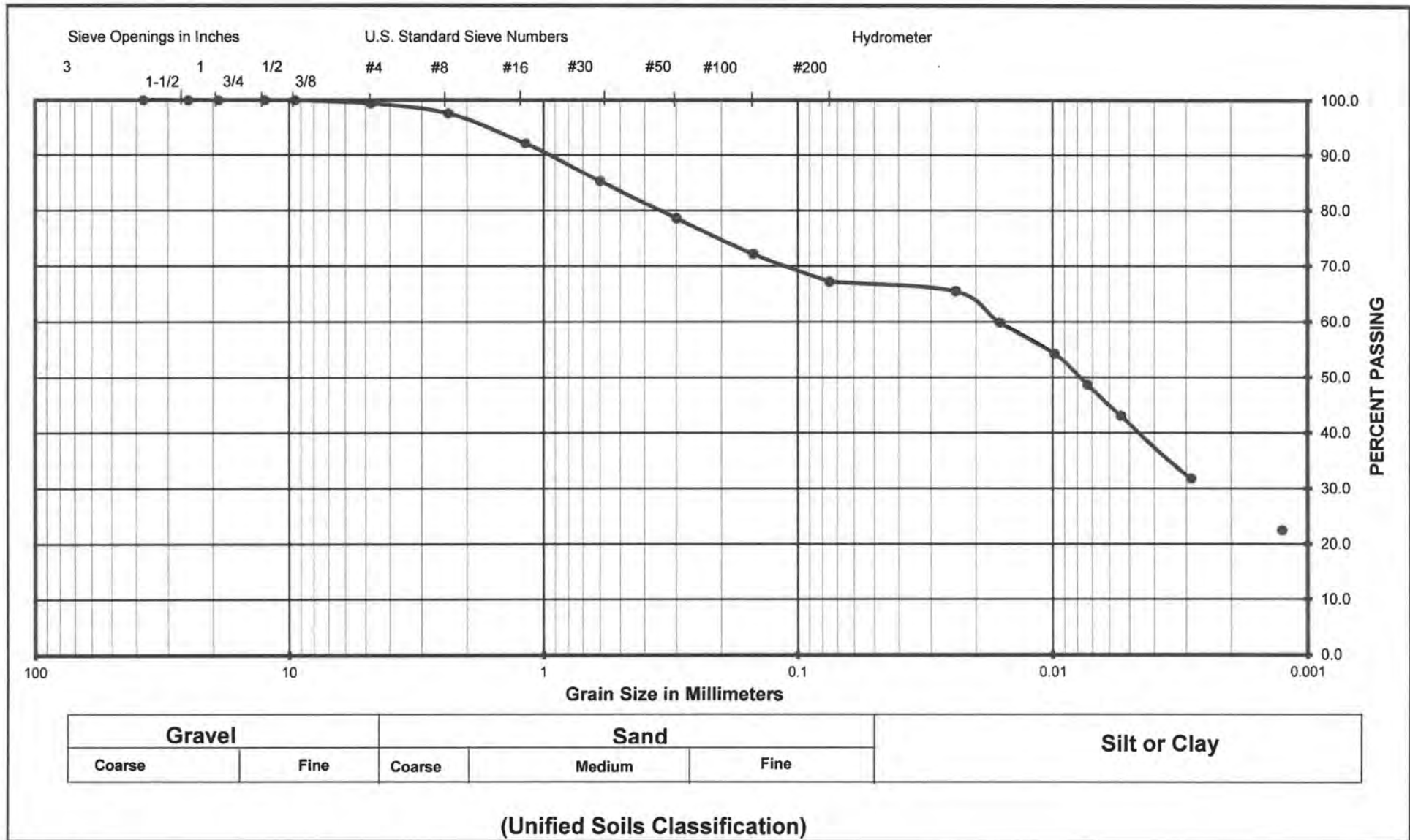
Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B15 @ 50-51'
Soil Classification : CL

Dry Weight Used	86.0 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	1.038	1.038	65.5	0.0240
5	1.035	1.035	59.9	0.0162
15	1.032	1.032	54.3	0.0098
30	1.029	1.029	48.6	0.0073
60	1.026	1.026	43.0	0.0054
250	1.02	1.02	31.8	0.0029
1440	1.015	1.015	22.5	0.0013

Particle Diameter	Percent Passing
0.005	41.3
0.002	26.8
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
CL
B15 @ 50-51'

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: B15 @ 50-51'

Sample Description: CL

Date Tested: 7/14/2016

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)	18.35	18.27		24.76		
Weight of Dry Soil & Tare (g)	17.66	17.55		21.80		
Weight of Tare (g)	14.44	14.20		14.50		
Weight of water (g)	0.69	0.72		2.96		
Weight of Dry Soil (g)	3.21	3.35		7.30		
Water Content (% of dry wt.)	21.5%	21.4%		40.6%		
Number of Blows				25		

Plastic Limit : 21

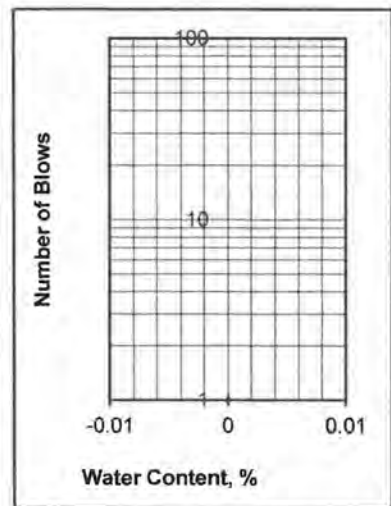
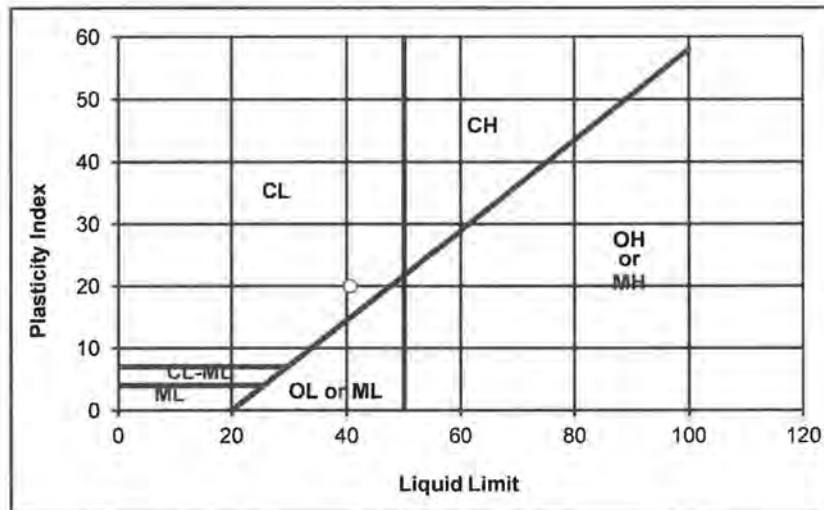
Liquid Limit : 41

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 : 12/6/2016
Sample Location : B16 @ 5-8'
Soil Classification : SM-ML w/ clay

Wet Weight	:	200.00
Dry Weight	:	185.10
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	3.0	1.6	1.6	98.4
#16	1.18	9.8	5.3	6.9	93.1
#30	0.60	13.8	7.5	14.4	85.6
#50	0.30	18.3	9.9	24.3	75.7
#100	0.15	24.0	13.0	37.2	62.8
#200	0.08	26.2	14.2	51.4	48.6

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SM-ML w/ clay
 Sample Number: B16 @ 5-8'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B16 @ 10-11'
Soil Classification : SW-SM w/ trace of clay

Wet Weight	:	300.00
Dry Weight	:	291.40
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	2.0	0.7	0.7	99.3
#4	4.75	6.3	2.2	2.8	97.2
#8	2.36	37.5	12.9	15.7	84.3
#16	1.18	48.1	16.5	32.2	67.8
#30	0.60	62.9	21.6	53.8	46.2
#50	0.30	62.8	21.6	75.4	24.6
#100	0.15	36.3	12.5	87.8	12.2
#200	0.08	11.0	3.8	91.6	8.4

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SW-SM w/ trace of clay
B16 @ 10-11'

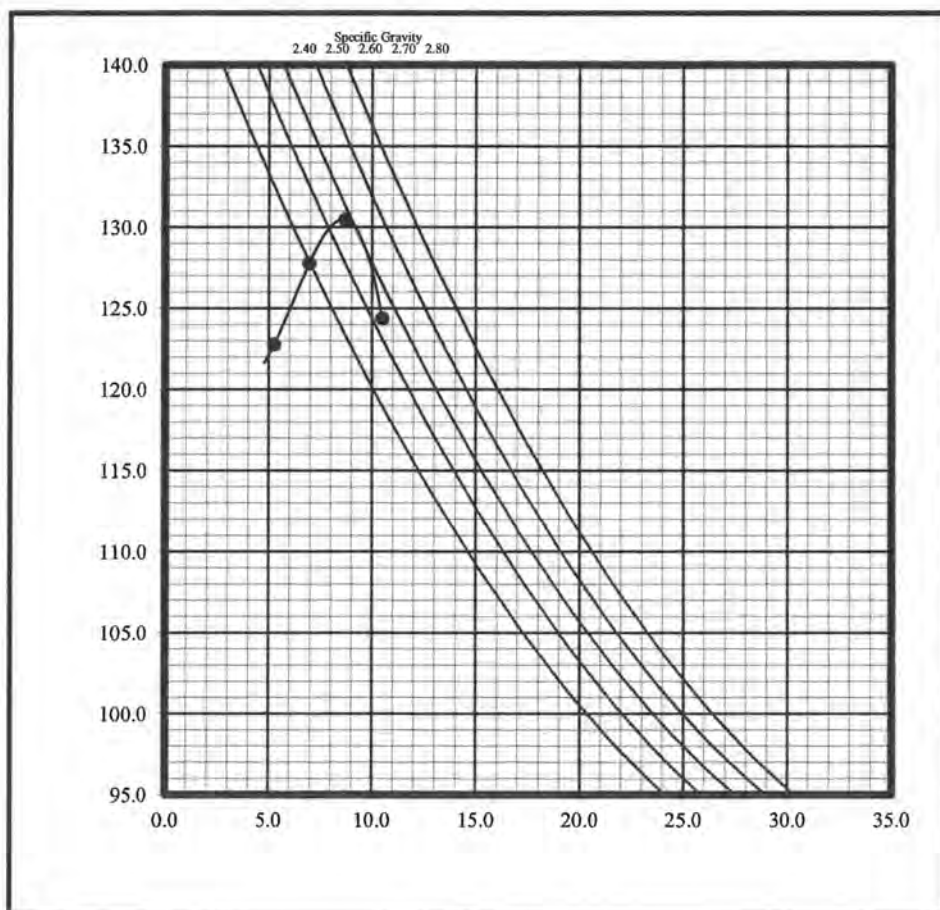
ASTM C136

Krazan Testing Laboratory

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

Project Number	022-15055	Sample Number	Bulk B
Project Name	Guzman Reservoir	Soil Classification	SM
Technician	DJ 12075	Soil Description	Brn Silty Sand
Date	11/23/2016	Method	D1557a
Sample Location	B16 @ 10-13'		

	1	2	3	4
Mass of Moist Specimen & Mold, gm	4048.0	4126.0	4060.0	3936.0
Mass of Compaction Mold, gm	1984.0	1984.0	1984.0	1984.0
Mass of Moist Specimen, gm	2064.0	2142.0	2076.0	1952.0
Volume of Mold, cu./ft.	0.0333	0.0333	0.0333	0.0333
Wet Density, lbs./cu.ft.	136.6	141.8	137.4	129.2
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.	127.8	130.5	124.4	122.8



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

130.5

Optimum Moisture Content

8.6%

SDS#: _____

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 12/6/2016
Sample Location : B16 @ 19-20'
Soil Classification : SM

Wet Weight	:	250.00
Dry Weight	:	235.80
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	4.1	1.7	1.7	98.3
#8	2.36	21.3	9.0	10.8	89.2
#16	1.18	38.0	16.1	26.9	73.1
#30	0.60	38.0	16.1	43.0	57.0
#50	0.30	36.6	15.5	58.5	41.5
#100	0.15	25.6	10.9	69.4	30.6
#200	0.08	14.0	5.9	75.3	24.7

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SM
B16 @ 19-20'

ASTM C136

Krazan Testing Laboratory

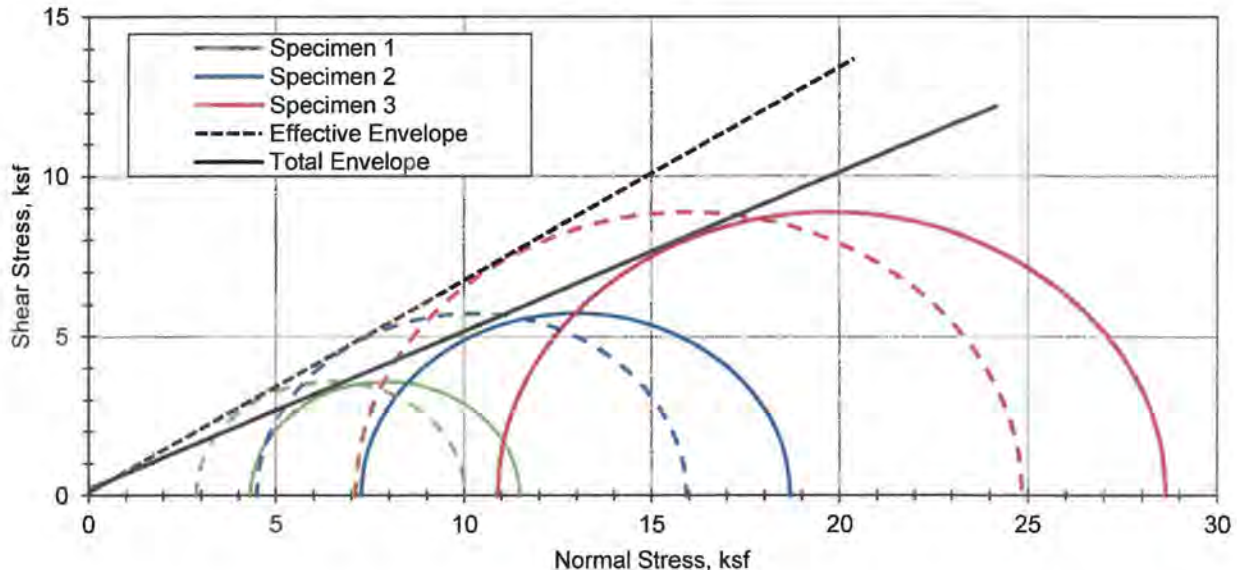


Consolidated-Undrained Triaxial Test

ASTM D4767

Project: Guzman Reservoir
 Project Number: 022-15055
 Sampling Date: 2/6/2017
 Location: B16 @ 19-20'
 Client Name: Kern Tulare Water District

Sample Number: B16 @ 19-20'
 Sample Type: Intact
 Sample Description: Brown Silty Sand
 Sample Depth (ft): 19-20



	Total	Effective
Friction Angle, ϕ	26.4	33.7
Cohesion, c (ksf)	0.20	0.10

Failure Criteria: Specified Strain %
 Plastic Limit: --
 Liquid Limit: --
 Specific Gravity: 2.72
 ASSUMED

Initial Parameters			
	Specimen 1	Specimen 2	Specimen 3
Moisture Content (%)	5.2	8.1	4.8
Dry Density (psf)	112.9	125.0	118.2
Void Ratio	0.503	0.359	0.437
Saturation (%)	28.2	61.4	30.1
Height (in)	5.79	5.80	5.79
Diameter (in)	2.85	2.84	2.86

Saturation Parameters			
B-Value	0.98	0.97	0.98

Consolidation Parameters			
Back Pressure (psi)	24.1	23.0	23.6
Effective Pressure (psi)	30.0	50.0	75.0
Height (in)	5.75	5.73	4.69
Area (in ²)	6.18	6.25	7.49
Void Ratio	0.443	0.321	0.356
Saturation (%)	100	100.0	100.0

Final Parameters at Failure			
Deviator Stress (ksf)	7.2	11.4	17.8
σ'_1 (ksf)	10.0	15.9	24.8
σ'_3 (ksf)	2.9	4.5	7.1
Excess PP (ksf)	1.45	2.8	3.8
Axial Strain (%)	5.0	5.0	5.0
Rate of Strain (%/min)	0.102	0.099	0.097

Remarks:

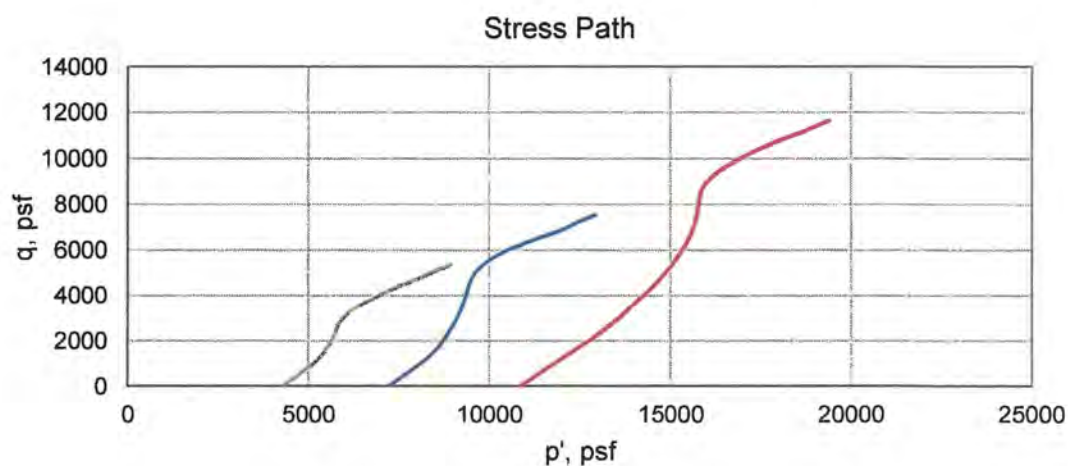
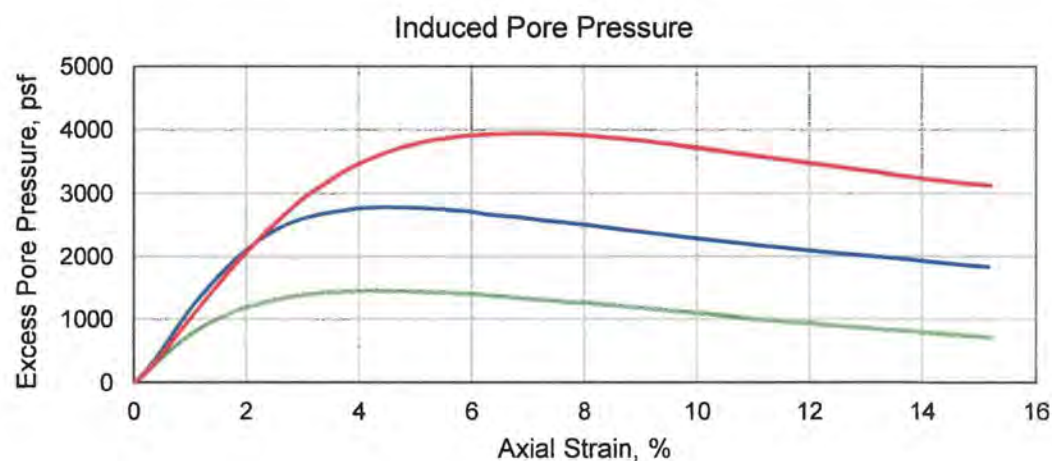
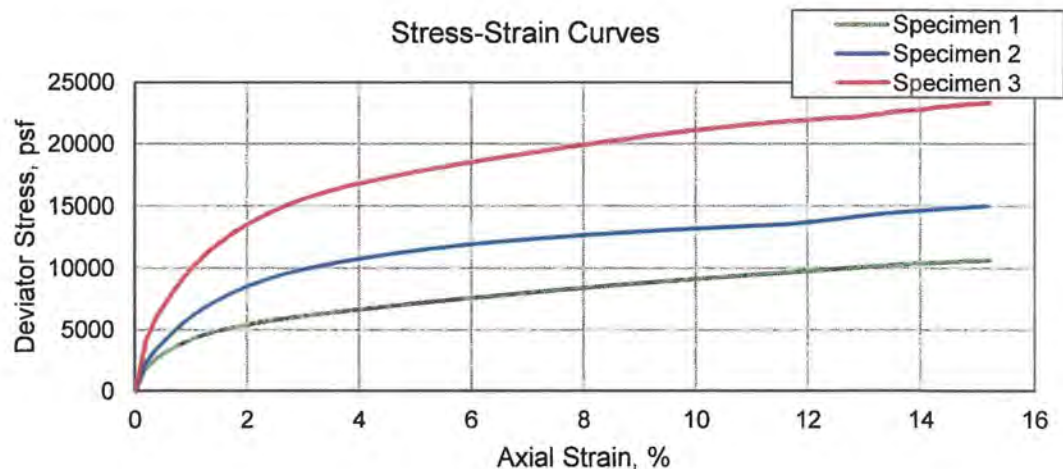


Consolidated-Undrained Triaxial Test

ASTM D4767

Project: Guzman Reservoir
Project Number: 022-15055
Sampling Date: 2/6/2017
Location: B16 @ 19-20'
Client Name: Kern Tulare Water District

Sample Number: B16 @ 19-20'
Sample Type: Intact
Sample Description: Brown Silty Sand
Sample Depth (ft): 19-20



Soil Permeability

Flexible Wall, Falling Head (Rising Tail)

ASTM D - 5084 / CAL 220

Project Number : 022-15055
 Project Name : Guzman Reservoir
 Date : 12/6/2016
 Sample Number : --
 Sample Location : B16 @ 19-20'
 Soil Classification : SM

Max Dry Density, lbs/cu.ft	--	Degree of Sat. %	-	Max. Particle Size	--
Optimum Moisture, %	--	%Over Optimum	6.0	% Passing 3/8"	--
Initial Dry Density, lbs/cu.ft	87.1	Initial Diameter, cm	3.63	% Passing # 10	--
Initial Moisture, %	6.0	Initial Length, cm	6.99	% Passing # 200	--
Sample Compaction, %	-	Initial Area sq.cm	10.36	Temperature	20.0
Final Dry Density, lbs/cu.ft	--	Final Diameter, cm	--	Type of Permeant	Tap Water
Final Moisture, %	--	Final Length, cm	--		
Specific Gravity (Assumed)	2.7	Final Area, sq.cm	--		
Comp. Procedure	Remolded				

Test	Start Time	Finish Time	H in Start	H in Final	H out Start	H out Final	Back Press	Tail Press.	Cell Press
1	13:33	13:48	1.54	2.74	9.02	7.92	10.5	10.0	11.0
2	13:49	14:10	2.74	4.50	7.92	6.18	10.5	10.0	11.0
3	14:15	14:26	4.50	5.48	6.18	5.26	10.5	10.0	11.0
4									
5									
6									

Test	Time sec	h1/h2 Ratio	K cm/sec	k20 cm/sec
1	900	0.95866	4.2E-06	4.162E-06
2	1260	0.94082	4.3E-06	4.296E-06
3	660	0.96887	4.3E-06	4.251E-06
4				
5				
6				

Permeability
4.24E-06 cm/sec
4.24E-08 m/sec

Sieve Analysis

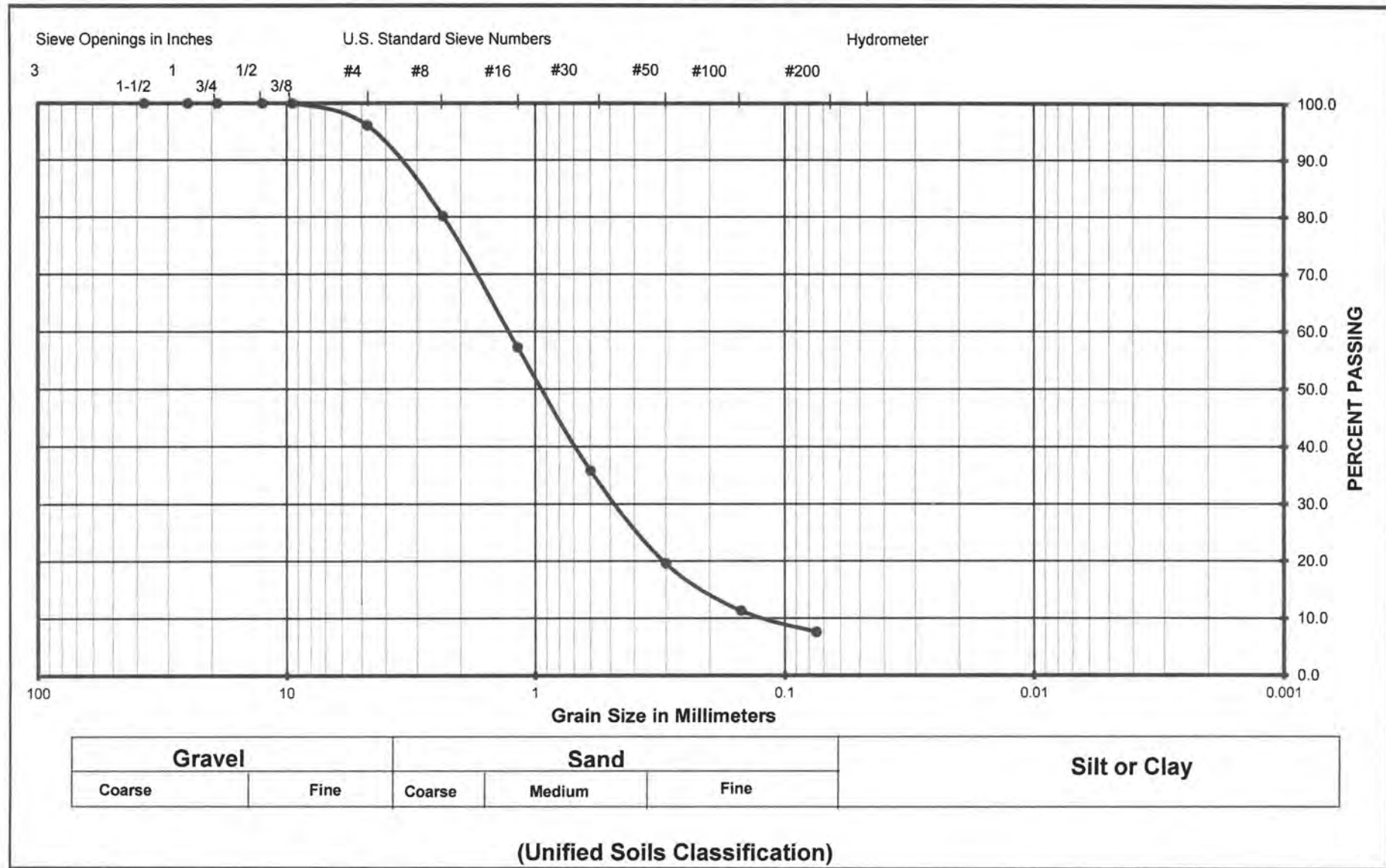
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B16 @ 20-21'
Soil Classification : SW-SM

Wet Weight	:	300.00
Dry Weight	:	295.20
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	11.4	3.9	3.9	96.1
#8	2.36	47.2	16.0	19.9	80.1
#16	1.18	67.6	22.9	42.8	57.2
#30	0.60	63.3	21.4	64.2	35.8
#50	0.30	47.9	16.2	80.4	19.6
#100	0.15	24.3	8.2	88.7	11.3
#200	0.08	11.0	3.7	92.4	7.6

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SW-SM
B16 @ 20-21'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 12/6/2016
Sample Location : B16 @ 25-28'
Soil Classification : SC

Wet Weight	:	200.00
Dry Weight	:	185.40
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	0.2	0.2	99.8
#8	2.36	7.8	4.2	4.4	95.6
#16	1.18	24.9	13.4	17.9	82.1
#30	0.60	33.5	18.1	35.9	64.1
#50	0.30	30.8	16.6	52.5	47.5
#100	0.15	19.1	10.3	62.8	37.2
#200	0.08	10.7	5.8	68.6	31.4

Hydrometer Analysis

ASTM D422

Project Number : 022-15055
Project Name : Guzman
Date : 12/6/2016
Sample Location : B16 @ 25-28'
Soil Classification : SC

Dry Weight Used	113.5 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	1.022	1.022	26.9	0.0313
5	1.02	1.02	24.1	0.0202
15	1.018	1.018	21.3	0.0120
30	1.017	1.017	19.8	0.0086
60	1.015	1.015	17.0	0.0062
250	1.012	1.012	12.8	0.0031
1440	1.01	1.01	9.9	0.0013

Particle Diameter	Percent Passing
0.005	15.4
0.002	11.0
0	NA

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SC
B16 @ 25-28'

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: -
 Sampled By: DA
 Sample Number:
 Sample Location: B16 @ 25-28'
 Sample Description: SC

Date Tested: 12/5/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

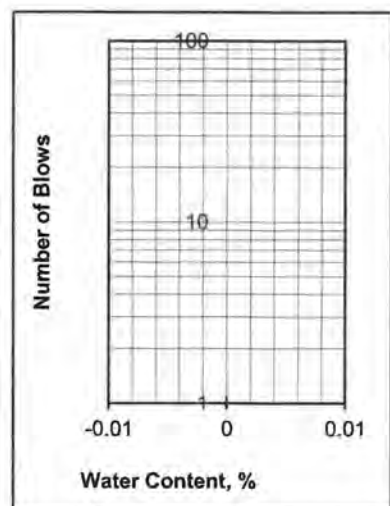
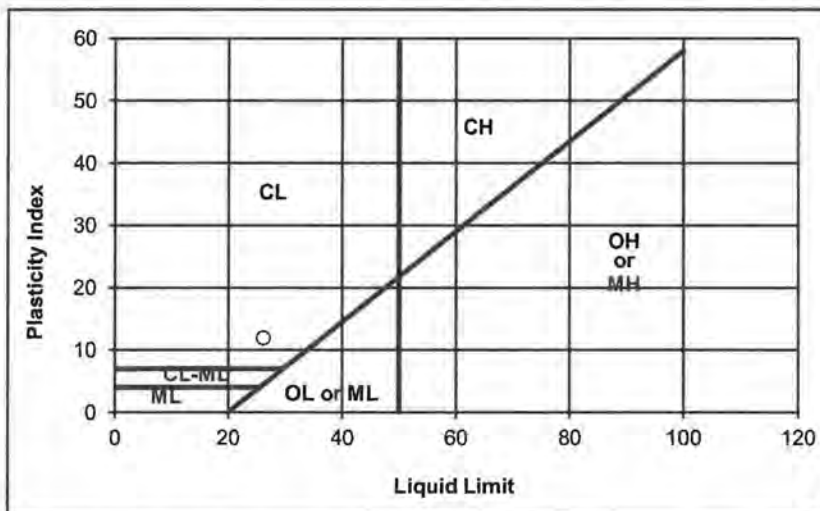
Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	21.90	18.08		26.04	29.34	
Weight of Dry Soil & Tare (g)	21.30	17.60		23.56	26.10	
Weight of Tare (g)	16.84	14.11		13.71	14.40	
Weight of water (g)	0.60	0.48		2.48	3.24	
Weight of Dry Soil (g)	4.46	3.49		9.85	11.70	
Water Content (% of dry wt.)	13.4%	13.7%		25.2%	27.6%	
Number of Blows				27	19	

Plastic Limit : 14

Liquid Limit : 26

Plasticity Index : 12
 Unified Soil Classification : CL

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



Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Soil Permeability

Flexible Wall, Falling Head (Rising Tail)

ASTM D - 5084 / CAL 220

Project Number : 022-15055
 Project Name : Guzman Reservoir
 Date : 12/7/2016
 Sample Number : --
 Sample Location : B16 @ 25-28'
 Soil Classification : SC

Max Dry Density, lbs/cu.ft	--	Degree of Sat. %	-	Max. Particle Size	--
Optimum Moisture, %	--	%Over Optimum	7.9	% Passing 3/8"	--
Initial Dry Density, lbs/cu.ft	83.9	Initial Diameter, cm	3.63	% Passing # 10	--
Initial Moisture, %	7.9	Initial Length, cm	6.99	% Passing # 200	--
Sample Compaction, %	-	Initial Area sq.cm	10.36	Temperature	20.0
Final Dry Density, lbs/cu.ft	--	Final Diameter, cm	--	Type of Permeant	Tap Water
Final Moisture, %	--	Final Length, cm	--		
Specific Gravity (Assumed)	2.7	Final Area, sq.cm	--		
Comp. Procedure	Remolded				

Test	Start Time	Finish Time	H in Start	H in Final	H out Start	H out Final	Back Press	Tail Press.	Cell Press
1	9:55	11:44	0.38	3.38	9.40	6.44	15.0	14.8	16.0
2	11:45	12:50	3.38	5.68	6.44	4.18	15.0	14.8	16.0
3	12:51	13:31	5.68	7.16	4.18	2.72	15.0	14.8	16.0
4									
5									
6									

Test	Time sec	h1/h2 Ratio	K cm/sec	k20 cm/sec
1	6540	0.78209	3.3E-06	3.335E-06
2	3900	0.85710	3.5E-06	3.508E-06
3	2400	0.91564	3.3E-06	3.258E-06
4				
5				
6				

Permeability
3.37E-06 cm/sec
3.37E-08 m/sec

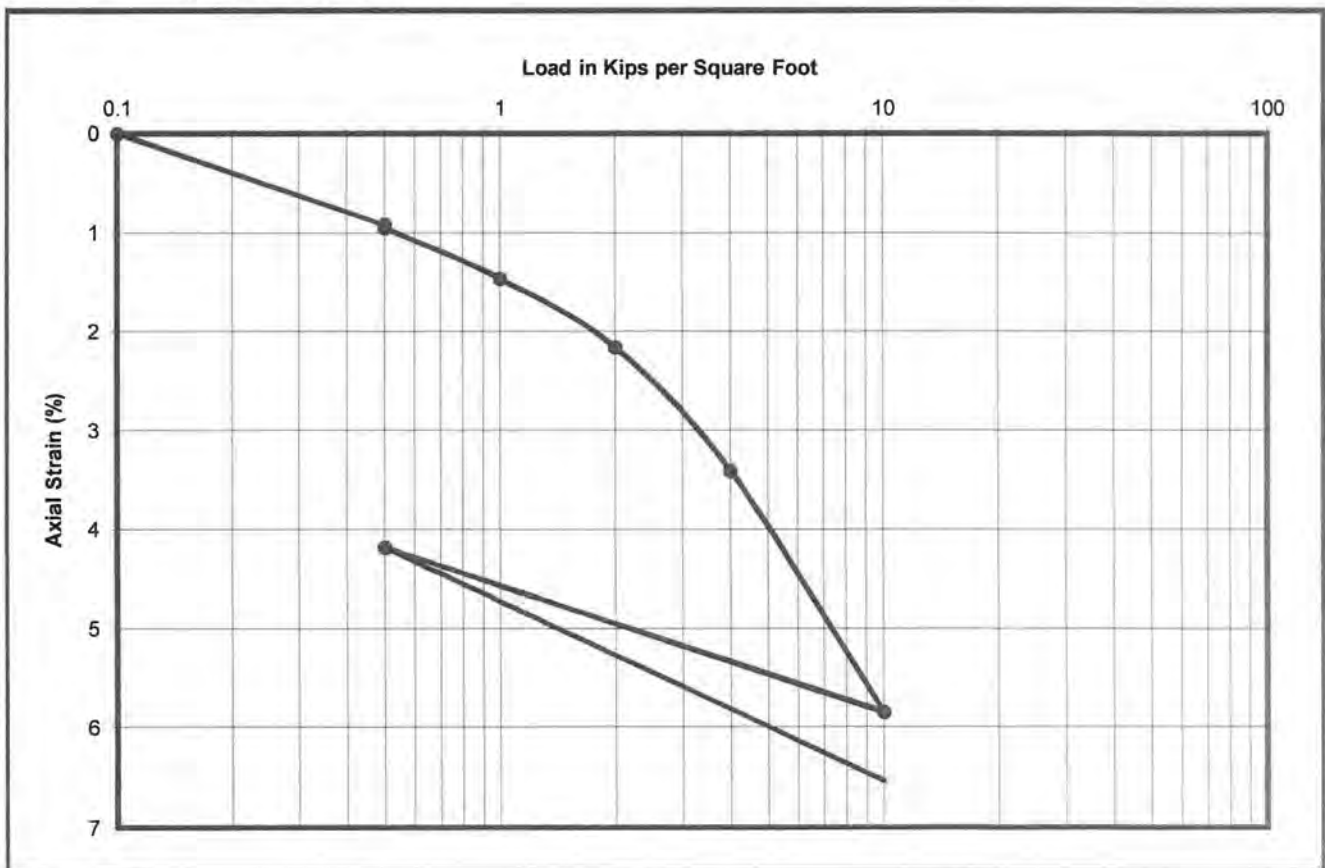
One Dimensional Consolidation Properties of Soil

ASTM D - 2435 / AASHTO T - 216

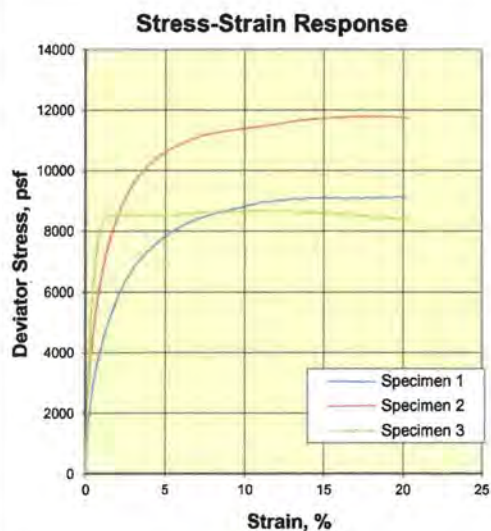
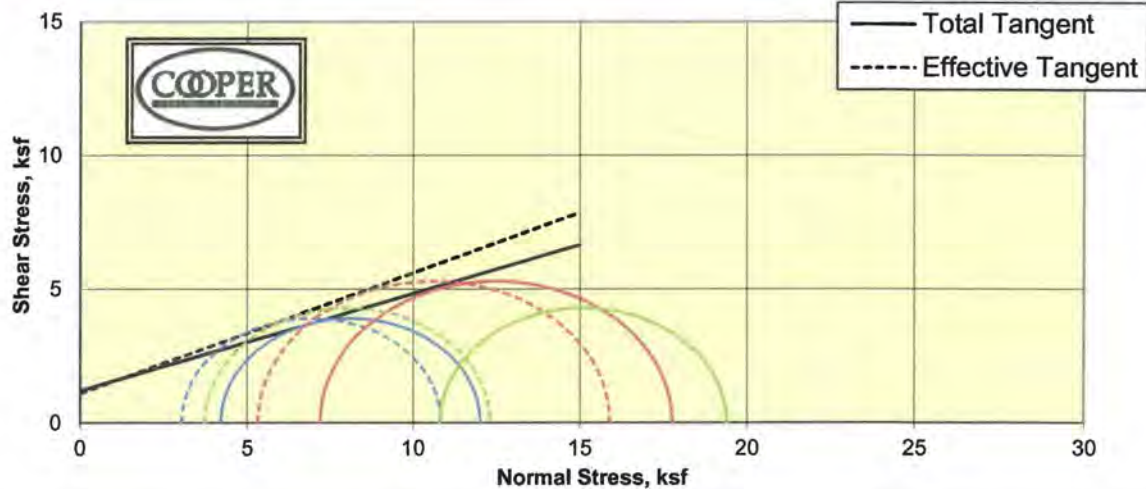
Project Number : 022-15055
 Project Name : Guzman
 Date : 2/9/2017
 Sample Location : B16 @ 25 ft
 Soil Classification : SC
 Sample Condition : Undisturbed

Load (ksf)	Axial Strain (%)	Void Ratio, e
0.1	0	0.526
0.5	0.92	0.512
Satur.	0.95	0.512
1	1.46	0.504
2	2.16	0.493
4	3.41	0.474
10	5.85	0.437
0.5	4.18	0.462
10	6.54	0.426

	Initial	Final
Water Content (%)	15.2	15.6
Dry Unit Weight (pcf)	114.5	122.8
Void Ratio	0.526	0.426
Saturation (%)	80.9	99.0
Preconsolidation Pressure (psf)	3000	
Specific Gravity (assumed)	2.8	



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



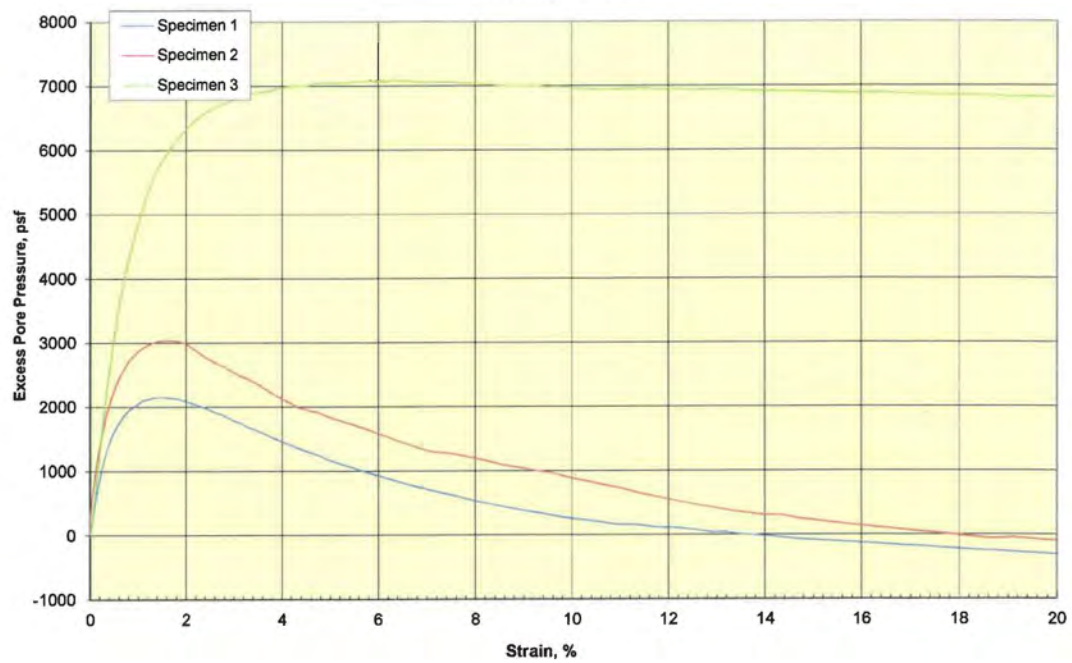
CTL Number:	504-005		
Client Name:	Krazan & Associates		
Project Name:	Guzman Reservoir		
Project Number:	022-15055		
Date:	2/3/2017	By:	MD/DC
Total C	1.200	ksf	
Total phi	20.0	degrees	
Eff. C	1.100	ksf	
Eff. Phi	24.2	degrees	©

Remarks: The samples arrived at lab remolded. Specimen 3 had a significantly lower density than the other 2 specimens and exhibited markedly different behavior during shear. No total stress phi or C is reported. Effective values were picked at the peak stress ratio.

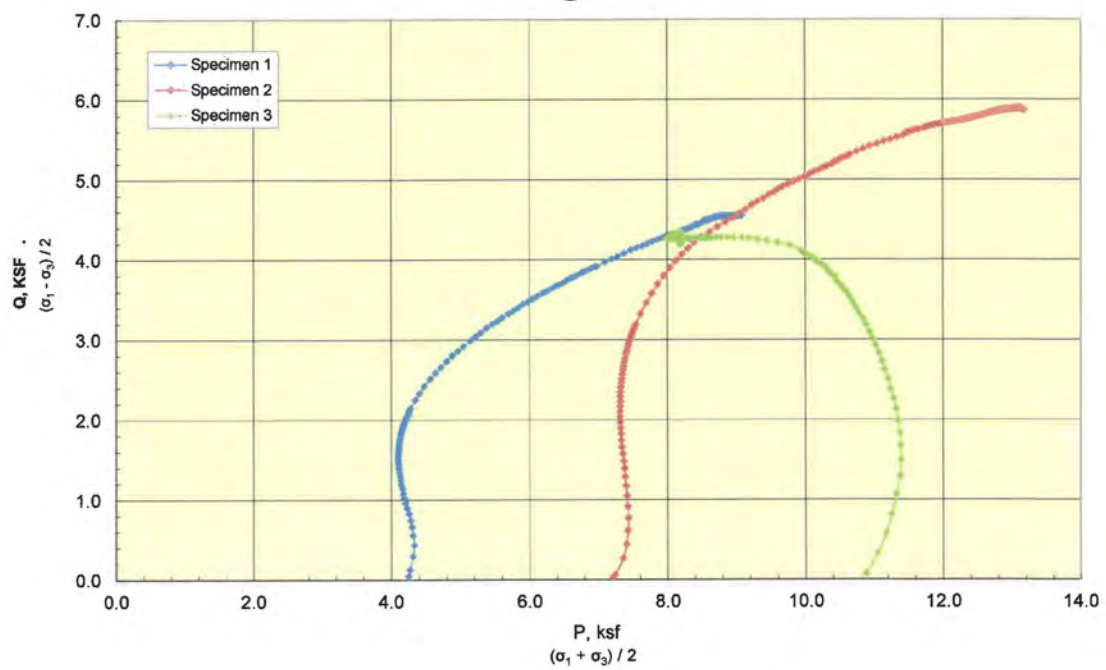
Krazan edits: Sample was undisturbed, not remolded. Specimen 3 disregarded. Total and effective C and phi based on Specimen 1 & 2. Failure criteria taken at 5% strain.

Specimen	1	2	3	4
Boring	B16	B16	B16	
Sample	1	2	3	
Depth	25-28	25-28	25-28	
Visual Description	Yellowish Brown Clayey SAND	Yellowish Brown Clayey SAND	Yellowish Brown Clayey SAND	
MC (%)	18.8	20.2	20.0	
Dry Density (pcf)	108.9	106.9	103.1	
Saturation (%)	89.6	91.6	82.9	
Void Ratio	0.576	0.606	0.665	
Diameter (in)	2.88	2.88	2.88	
Height (in)	5.76	5.77	5.78	
Final				
MC (%)	20.5	19.8	22.6	
Dry Density (pcf)	109.8	111.2	105.9	
Saturation (%)	100.0	100.0	100.0	
Void Ratio	0.564	0.544	0.622	
Diameter (in)	2.88	2.85	2.86	
Height (in)	5.71	5.67	5.69	
Cell Pressure (psi)	119.9	139.8	164.9	
Back Pressure (psi)	90.6	89.9	89.8	
Effective Stresses At:				
Strain (%)	5.0	5.0	6.6	
Deviator (ksf)	7.823	10.587	8.586	
Excess PP (psi)	8.1	12.9	49.1	
Sigma 1 (ksf)	10.859	15.907	12.327	
Sigma 3 (ksf)	3.036	5.320	3.741	
P (ksf)	6.948	10.614	8.034	
Q (ksf)	3.912	5.293	4.293	
Stress Ratio	3.577	2.990	3.295	
Rate (in/min)	0.0005	0.0005	0.0005	

Pore Pressure Response B16 @ 25-28'



P vs. Q B16 @ 25-28'



Sieve Analysis

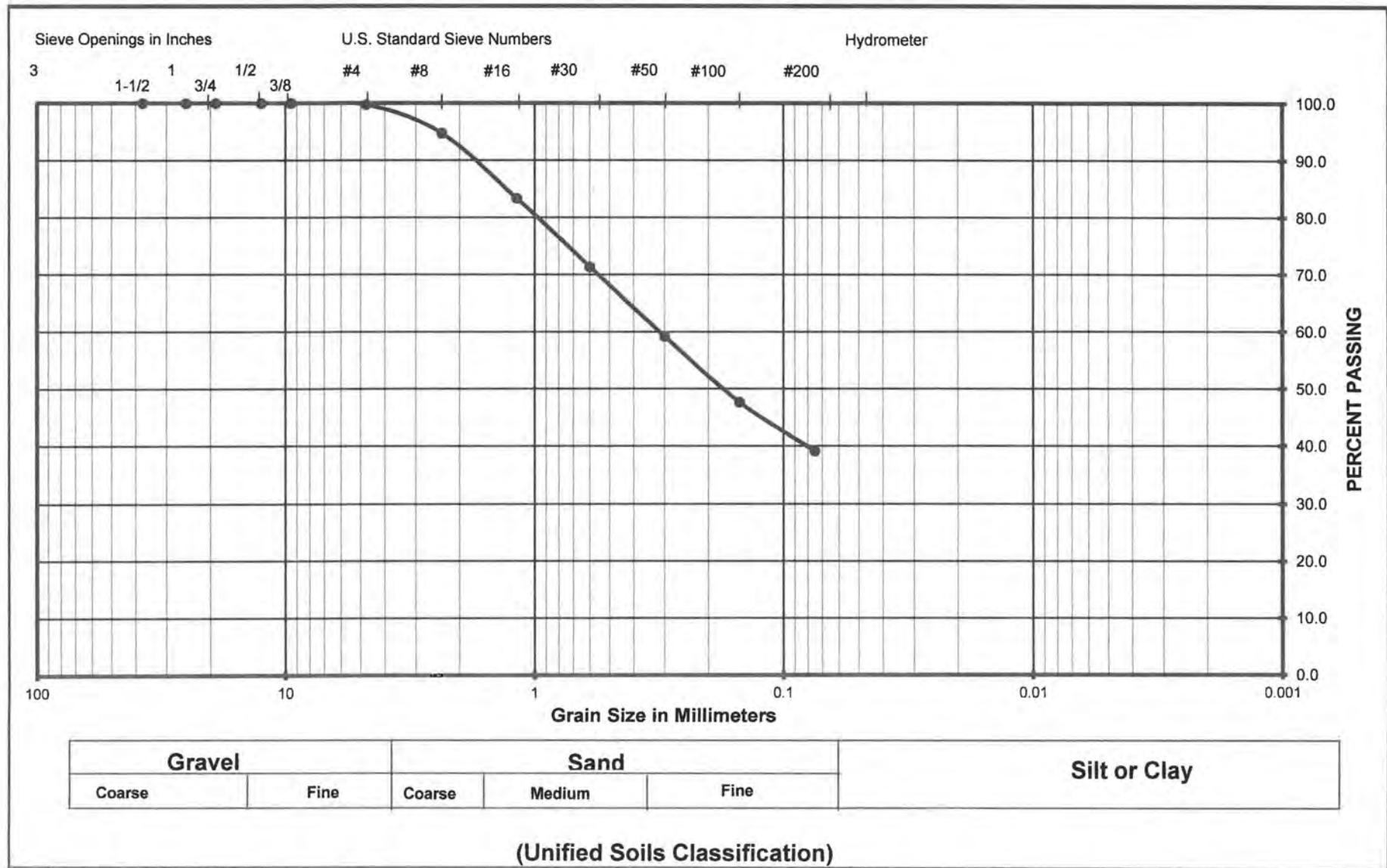
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 12/6/2016
Sample Location : B16 @ 32-34'
Soil Classification : SM

Wet Weight	:	300.00
Dry Weight	:	271.70
Moisture Content	:	10%

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	0.3	0.3	99.7
#8	2.36	13.6	5.0	5.3	94.7
#16	1.18	30.9	11.4	16.6	83.4
#30	0.60	32.5	12.0	28.6	71.4
#50	0.30	33.1	12.2	40.8	59.2
#100	0.15	31.3	11.5	52.3	47.7
#200	0.08	23.2	8.5	60.8	39.2

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 SM
 B16 @ 32-34'

ASTM C136

Krazan Testing Laboratory

Soil Permeability

Flexible Wall, Falling Head (Rising Tail)

ASTM D - 5084 / CAL 220

Project Number : 022-15055
 Project Name : Guzman Reservoir
 Date : 12/9/2016
 Sample Number : --
 Sample Location : B16 @ 32-34'
 Soil Classification : SM

Max Dry Density, lbs/cu.ft	--	Degree of Sat. %	-	Max. Particle Size	--
Optimum Moisture, %	--	%Over Optimum	10.4	% Passing 3/8"	--
Initial Dry Density, lbs/cu.ft	83.4	Initial Diameter, cm	3.63	% Passing # 10	--
Initial Moisture, %	10.4	Initial Length, cm	6.99	% Passing # 200	--
Sample Compaction, %	-	Initial Area sq.cm	10.36	Temperature	20.0
Final Dry Density, lbs/cu.ft	--	Final Diameter, cm	--	Type of Permeant	Tap Water
Final Moisture, %	--	Final Length, cm	--		
Specific Gravity (Assumed)	2.7	Final Area, sq.cm	--		
Comp. Procedure	Remolded				

Test	Start Time	Finish Time	H in Start	H in Final	H out Start	H out Final	Back Press	Tail Press.	Cell Press
1	15:54	16:02	1.74	2.42	7.60	6.90	15.0	14.5	16.0
2	16:03	16:21	2.42	4.02	6.90	5.28	15.0	14.5	16.0
3	16:22	16:31	4.02	4.90	5.28	4.40	15.0	14.5	16.0
4									
5									
6									

Test	Time sec	h1/h2 Ratio	K cm/sec	k20 cm/sec
1	480	0.97551	4.6E-06	4.584E-06
2	1080	0.94594	4.6E-06	4.566E-06
3	540	0.97130	4.8E-06	4.785E-06
4				
5				
6				

Permeability
4.64E-06 cm/sec
4.64E-08 m/sec

Sieve Analysis

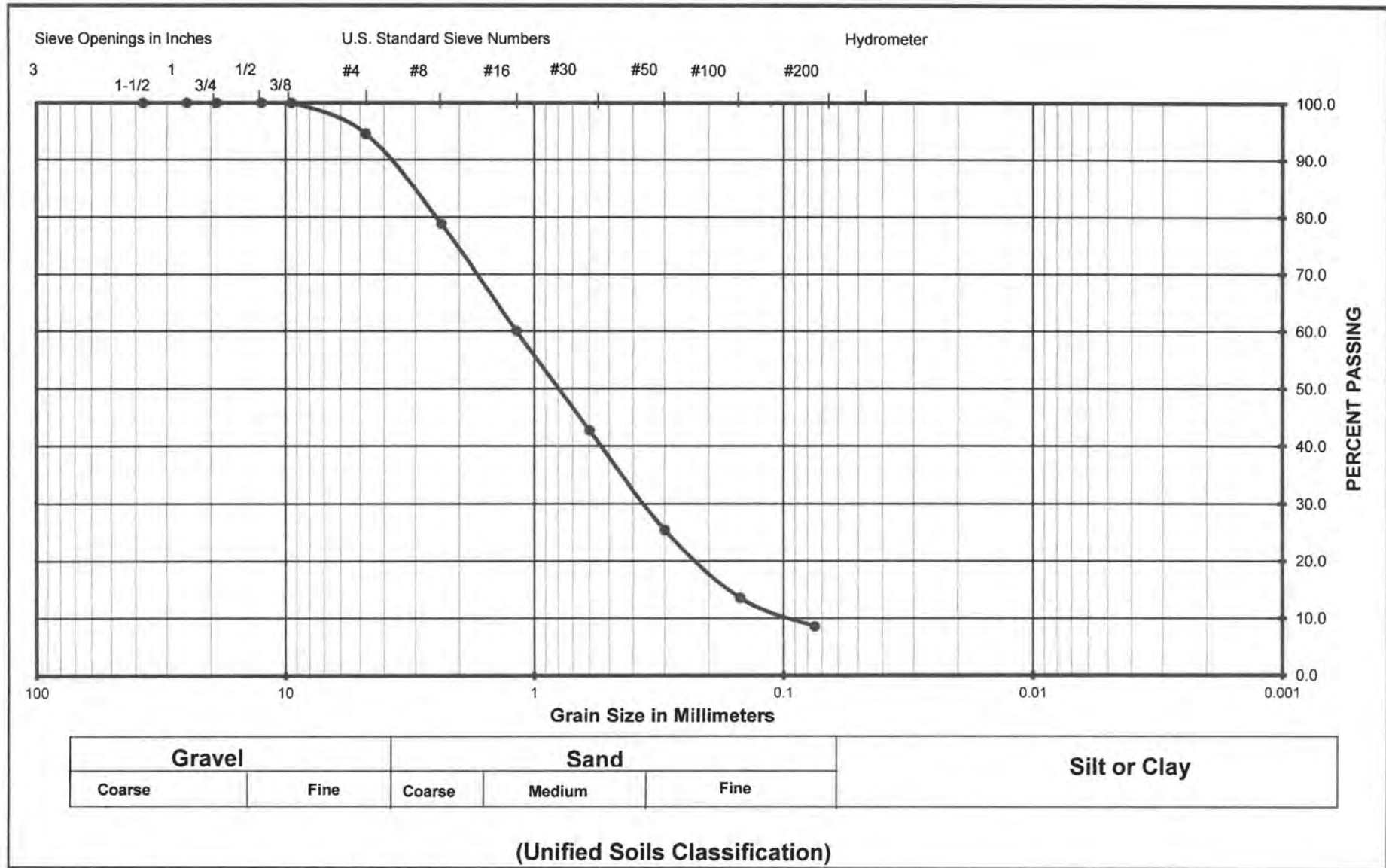
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B16 @ 35-36'
Soil Classification : SW-SM

Wet Weight	:	300.00
Dry Weight	:	293.00
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	15.8	5.4	5.4	94.6
#8	2.36	46.3	15.8	21.2	78.8
#16	1.18	54.9	18.7	39.9	60.1
#30	0.60	50.7	17.3	57.2	42.8
#50	0.30	50.7	17.3	74.5	25.5
#100	0.15	34.9	11.9	86.5	13.5
#200	0.08	14.6	5.0	91.4	8.6

Grain Size Analysis



Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B16 @ 45-46'
Soil Classification : SM

Wet Weight	:	300.00
Dry Weight	:	268.80
Moisture Content	:	12%

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	0.6	0.6	99.4
#8	2.36	8.2	3.1	3.7	96.3
#16	1.18	20.6	7.7	11.3	88.7
#30	0.60	28.3	10.5	21.9	78.1
#50	0.30	33.6	12.5	34.4	65.6
#100	0.15	32.7	12.2	46.5	53.5
#200	0.08	30.7	11.4	58.0	42.0

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SM
B16 @ 45-46'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B16 @ 65-66'
Soil Classification : SW-SM

Wet Weight	:	300.00
Dry Weight	:	293.90
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	3.1	1.1	1.1	98.9
#4	4.75	17.1	5.8	6.9	93.1
#8	2.36	49.8	16.9	23.8	76.2
#16	1.18	49.8	16.9	40.8	59.2
#30	0.60	43.3	14.7	55.5	44.5
#50	0.30	43.2	14.7	70.2	29.8
#100	0.15	34.4	11.7	81.9	18.1
#200	0.08	18.6	6.3	88.2	11.8

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SW-SM
B16 @ 65-66'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B17 @ 7.5-8.5'
Soil Classification : SC

Wet Weight	:	300.00
Dry Weight	:	282.40
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	4.9	1.7	1.7	98.3
#8	2.36	16.7	5.9	7.6	92.4
#16	1.18	31.6	11.2	18.8	81.2
#30	0.60	36.4	12.9	31.7	68.3
#50	0.30	36.3	12.9	44.6	55.4
#100	0.15	31.5	11.2	55.7	44.3
#200	0.08	20.9	7.4	63.1	36.9

Grain Size Analysis



Project Name
 Project Number
 Soil Classification
 Sample Number

Guzman
 022-15055
 SC
 B17 @ 7.5-8.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B17 @ 10-11'
Soil Classification : SC

Wet Weight	:	300.00
Dry Weight	:	272.30
Moisture Content	:	10%

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	0.3	0.3	99.7
#8	2.36	7.2	2.6	2.9	97.1
#16	1.18	20.7	7.6	10.5	89.5
#30	0.60	32.0	11.8	22.3	77.7
#50	0.30	39.4	14.5	36.8	63.2
#100	0.15	46.5	17.1	53.8	46.2
#200	0.08	29.3	10.8	64.6	35.4

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC
 Sample Number: B17 @ 10-11'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

ASTM C136

Project Number : 022-15055
Project Name : Guzman
Date : 7/19/2016
Sample Location : B17 @ 12.5-13.5'
Soil Classification : SC-CL

Wet Weight	:	200.00
Dry Weight	:	180.20
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	0.8	0.4	0.4	99.6
#8	2.36	3.1	1.7	2.2	97.8
#16	1.18	12.2	6.8	8.9	91.1
#30	0.60	17.2	9.5	18.5	81.5
#50	0.30	21.1	11.7	30.2	69.8
#100	0.15	23.7	13.2	43.3	56.7
#200	0.08	17.8	9.9	53.2	46.8

Hydrometer Analysis

ASTM D422

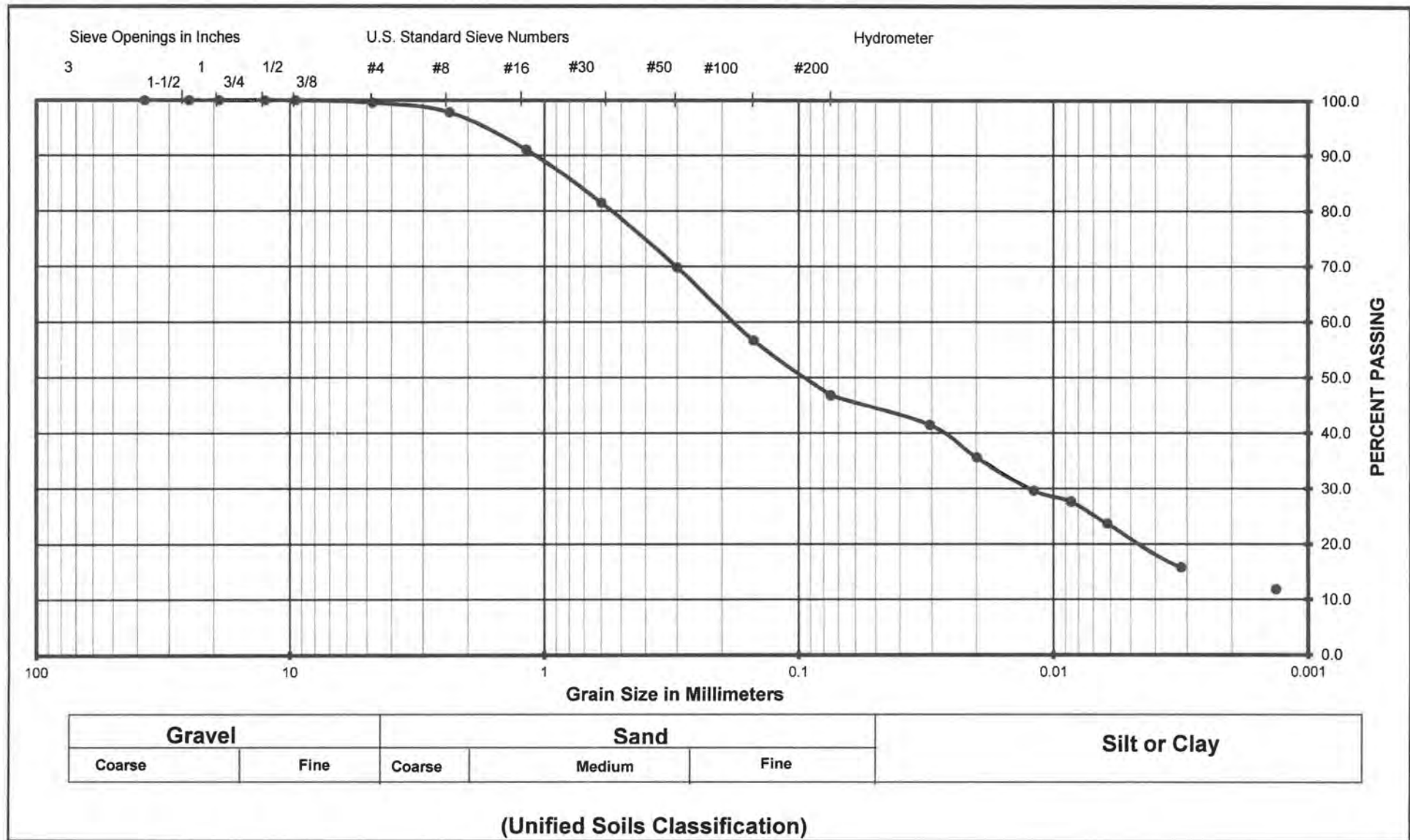
Project Number : 022-15055
Project Name : Guzman
Date : 7/19/2016
Sample Location : B17 @ 12.5-13.5'
Soil Classification : SC-CL

Dry Weight Used	81.5 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	1.024	1.024	41.5	0.0305
5	1.021	1.021	35.5	0.0200
15	1.018	1.018	29.6	0.0120
30	1.017	1.017	27.6	0.0086
60	1.015	1.015	23.7	0.0062
250	1.011	1.011	15.8	0.0032
1440	1.009	1.009	11.8	0.0013

Particle Diameter	Percent Passing
0.005	20.6
0.002	13.3
0	NA

Grain Size Analysis



Project Name: Guzman
 Project Number: 022-15055
 Soil Classification: SC-CL
 Sample Number: B17 @ 12.5-13.5'

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: B17 @ 12.5-13.5'
 Sample Description: SC-CL

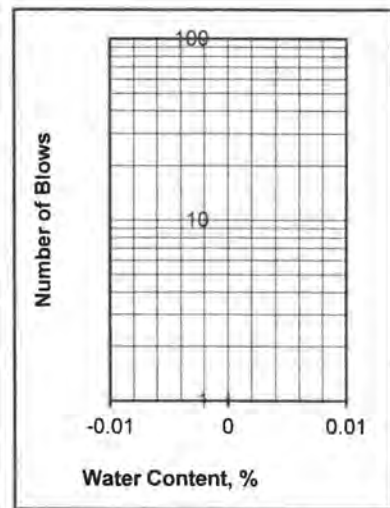
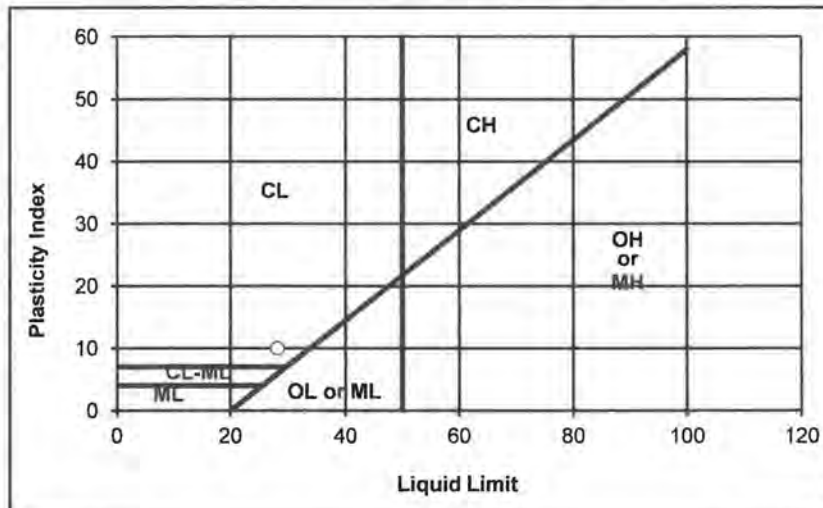
Date Tested: 7/18/2016
 Tested By: J Dyer
 Verified By: J Gruszczynski

Trial Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare (g)	19.81	19.45		25.19	24.96	
Weight of Dry Soil & Tare (g)	19.00	18.66		22.71	22.63	
Weight of Tare (g)	14.52	14.15		14.33	14.27	
Weight of water (g)	0.81	0.79		2.47	2.34	
Weight of Dry Soil (g)	4.48	4.52		8.38	8.35	
Water Content (% of dry wt.)	18.0%	17.4%		29.5%	28.0%	
Number of Blows				18	25	

Plastic Limit : 18

Liquid Limit : 28

Plasticity Index : 10
 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 : 7/15/2016
Sample Location : B17 @ 20-21'
Soil Classification : SP-SM

Wet Weight	:	300.00
Dry Weight	:	291.40
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	3.2	1.1	1.1	98.9
#4	4.75	16.6	5.7	6.8	93.2
#8	2.36	56.4	19.4	26.1	73.9
#16	1.18	54.6	18.7	44.9	55.1
#30	0.60	47.4	16.3	61.2	38.8
#50	0.30	44.3	15.2	76.4	23.6
#100	0.15	27.3	9.4	85.7	14.3
#200	0.08	12.7	4.4	90.1	9.9

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SP-SM
B17 @ 20-21'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

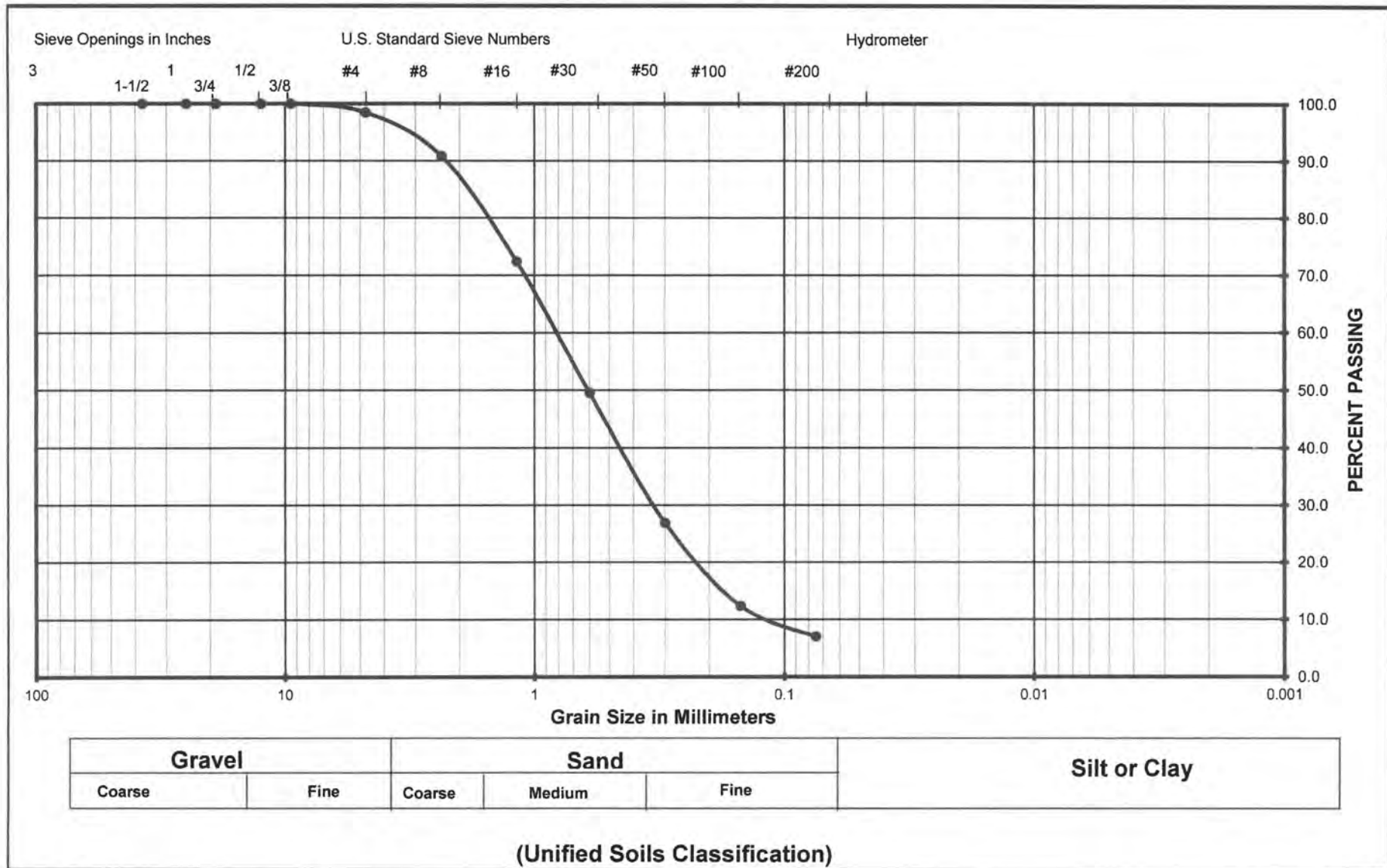
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B17 @ 27.5-28.5'
Soil Classification : SW-SM

Wet Weight	:	300.00
Dry Weight	:	293.20
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	4.5	1.5	1.5	98.5
#8	2.36	22.4	7.6	9.2	90.8
#16	1.18	54.0	18.4	27.6	72.4
#30	0.60	67.1	22.9	50.5	49.5
#50	0.30	66.3	22.6	73.1	26.9
#100	0.15	42.6	14.5	87.6	12.4
#200	0.08	15.5	5.3	92.9	7.1

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SW-SM
B17 @ 27.5-28.5'

ASTM C136

Krazan Testing Laboratory

Sieve Analysis

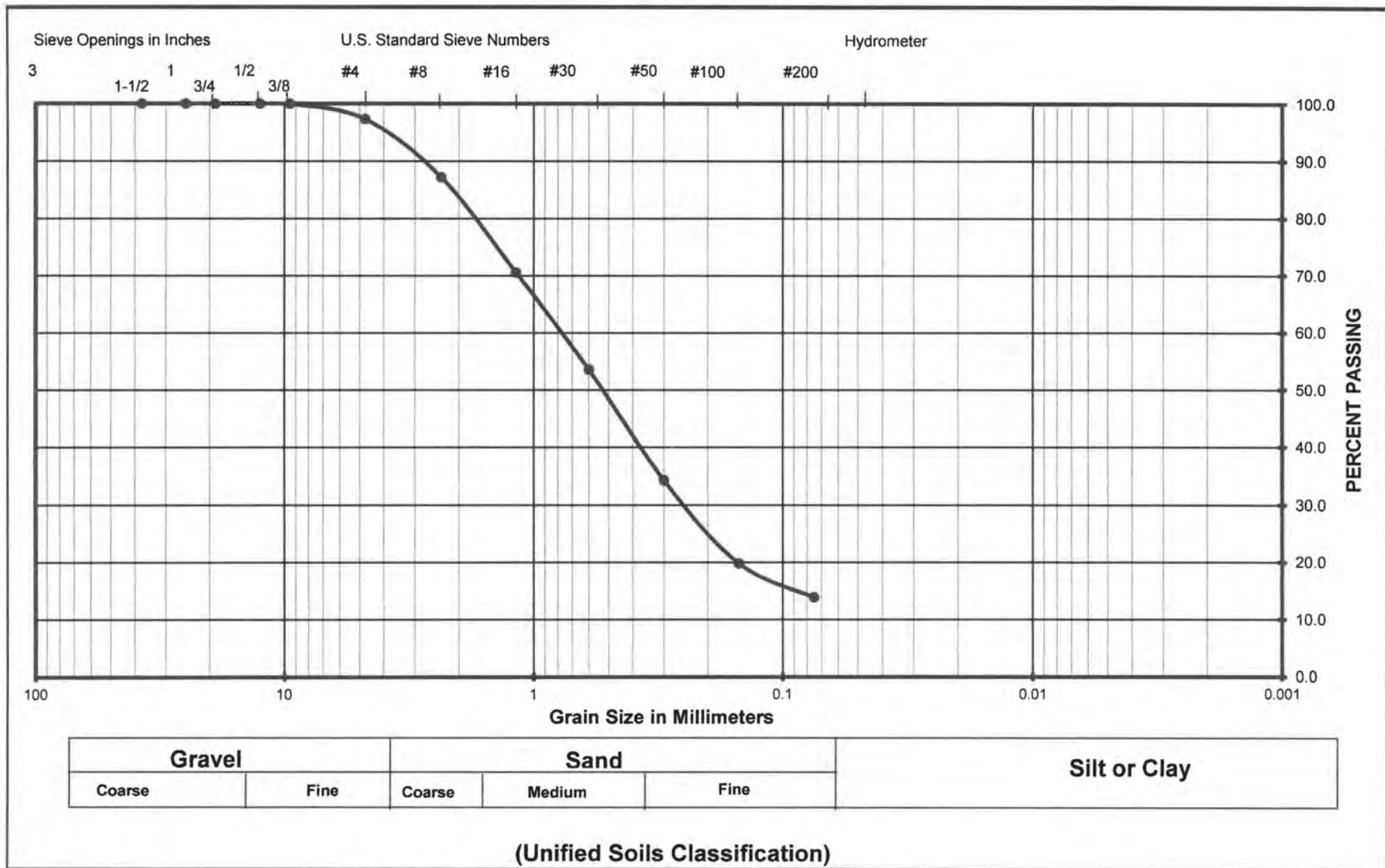
ASTM C136 / CT 202

Project Number : 022-15055
Project Name : Guzman
Date : 7/15/2016
Sample Location : B17 @ 40-41'
Soil Classification : SM

Wet Weight	:	300.00
Dry Weight	:	289.70
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	7.7	2.7	2.7	97.3
#8	2.36	29.3	10.1	12.8	87.2
#16	1.18	48.1	16.6	29.4	70.6
#30	0.60	49.3	17.0	46.4	53.6
#50	0.30	56.0	19.3	65.7	34.3
#100	0.15	41.8	14.4	80.2	19.8
#200	0.08	17.1	5.9	86.1	13.9

Grain Size Analysis



Project Name
Project Number
Soil Classification
Sample Number

Guzman
022-15055
SM
B17 @ 40-41'

ASTM C136

Krazan Testing Laboratory