BORING LOG NO. B-20

PROJECT: Proposed Street Reconstruction

CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

LOCATION See Exhibit A-3

Latitude: 48.406186° Longitude: -101.314996°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.5										
6" ASPHALT PAVEMENT										
1.6										
FILL - SILTY SAND WITH GRAVEL, light olive brown, frozen							6		NP	25
SANDY LEAN CLAY (CL), olive brown, frozen to 3.5', medium stiff to stiff, with a trace of gravel										
						66-27-17 N=44	15			
		5								
						2-3-4 N=7	15			
						6-3-4 N=7	18			
		10								
						3-4-6 N=10	18			
11.0										
Boring Terminated at 11 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2 ¼" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched with cold patch asphalt.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
2' - N-value influenced by frost

WATER LEVEL OBSERVATIONS

Not measurable before HSA removal

Midwest Testing LABORATORY, INC.
A Terracon COMPANY
1555 N. 42nd St., Unit B
Grand Forks, North Dakota

Boring Started: 12/16/2013 Boring Completed: 12/16/2013

Drill Rig: Diedrich D50 Driller: DT

Project No.: M6135013 Exhibit: A-24

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M6135013.GPJ TERRACON_STD_TEMPLATE.GDT 1/8/14

BORING LOG NO. B-21

PROJECT: Proposed Street Reconstruction

CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

LOCATION See Exhibit A-3

Latitude: 48.405394° Longitude: -101.313413°

DEPTH	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.0										
	7" ASPHALT PAVMENT									
0.6										
	FILL - SILTY SAND, light olive brown, frozen, with a trace of gravel						5			
1.4										
	SANDY LEAN CLAY (CL), olive brown, frozen to 3.5', medium stiff to stiff, with a trace of gravel									
						55-30-14 N=44	8			
		5				2-3-3 N=6	18			
						5-3-4 N=7	18			
		10				3-4-6 N=10	18			
11.0										
	Boring Terminated at 11 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2 ¼" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched with cold patch asphalt.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
2' - N-value influenced by frost

WATER LEVEL OBSERVATIONS

Not measurable before HSA removal

Midwest Testing LABORATORY, INC.
A Terracon COMPANY
1555 N. 42nd St., Unit B
Grand Forks, North Dakota

Boring Started: 12/16/2013 Boring Completed: 12/16/2013

Drill Rig: Diedrich D50 Driller: DT

Project No.: M6135013 Exhibit: A-25

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M6135013.GPJ TERRACON_STD_TEMPLATE.GDT 1/8/14

BORING LOG NO. B-22

PROJECT: Proposed Street Reconstruction

CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

LOCATION See Exhibit A-3

Latitude: 48.404434° Longitude: -101.311266°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		7.5" ASPHALT PAVEMENT									
0.6		**FILL - SILTY SAND**, light olive brown, frozen, with at trace of gravel						3			
2.1		**SANDY LEAN CLAY WITH GRAVEL (CL)**, dark olive brown, frozen to 3.5'					100/6" N=100/6"	4			
4.0		**SANDY LEAN CLAY (CL)**, olive brown, stiff, with a trace of gravel	5				5-6-7 N=13	24		47-16-31	74
							3-4-6 N=10	16			
			10				3-4-6 N=10	16			
11.0		***Boring Terminated at 11 Feet***									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2 ¼" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched with cold patch asphalt.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
2' - N-value influenced by frost

WATER LEVEL OBSERVATIONS

Not measurable before HSA removal

Midwest Testing LABORATORY, INC.
A Terracon COMPANY
1555 N. 42nd St., Unit B
Grand Forks, North Dakota

Boring Started: 12/16/2013 Boring Completed: 12/16/2013

Drill Rig: Diedrich D50 Driller: DT

Project No.: M6135013 Exhibit: A-26

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M6135013.GPJ TERRACON_STD_TEMPLATE.GDT 1/8/14

BORING LOG NO. B-23

PROJECT: Proposed Street Reconstruction

CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

LOCATION See Exhibit A-3

Latitude: 48.403441° Longitude: -101.30915°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		7" ASPHALT PAVEMENT									
0.6		**FILL - SILTY SAND WITH GRAVEL**, light olive brown, frozen						3		NP	22
2.2		**POORLY GRADED SAND WITH CLAY (SP-SC)**, olive brown, frozen to 3.5', with a trace of gravel					100/8" N=100/8"	3			
4.0		**LEAN CLAY WITH SAND (CL)**, olive brown, medium stiff to stiff	5				2-3-4 N=7	20			
							3-3-5 N=8	19			
			10				3-5-6 N=11	18			
11.0		***Boring Terminated at 11 Feet***									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2 ¼" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched with cold patch asphalt.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
2' - N-value influenced by frost

WATER LEVEL OBSERVATIONS

Not measurable before HSA removal

Midwest Testing LABORATORY, INC.
A Terracon COMPANY
1555 N. 42nd St., Unit B
Grand Forks, North Dakota

Boring Started: 12/16/2013 Boring Completed: 12/16/2013

Drill Rig: Diedrich D50 Driller: DT

Project No.: M6135013 Exhibit: A-27

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M6135013.GPJ TERRACON_STD_TEMPLATE.GDT 1/8/14

BORING LOG NO. B-24

PROJECT: Proposed Street Reconstruction

CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

LOCATION See Exhibit A-3

Latitude: 48.402305° Longitude: -101.306571°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3		**4" ASPHALT PAVEMENT**									
		FILL - SILTY SAND, light olive brown, frozen, with a trace of gravel						4			
1.9											
		SANDY LEAN CLAY (CL), olive brown, frozen to 3.5', with a trace of gravel					19-19-13 N=32	12			
4.0											
		SANDY LEAN CLAY (CL), grayish brown, medium stiff to stiff	5				3-3-3 N=6	19			
							4-4-5 N=9	17			
			10				3-4-6 N=10	17			
11.0											
		Boring Terminated at 11 Feet									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2 ¼" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched with cold patch asphalt.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
2' - N-value influenced by frost

WATER LEVEL OBSERVATIONS

Not measurable before HSA removal

Midwest Testing LABORATORY, INC. A Terracon COMPANY
1555 N. 42nd St., Unit B
Grand Forks, North Dakota

Boring Started: 12/16/2013 Boring Completed: 12/16/2013

Drill Rig: Diedrich D50 Driller: DT

Project No.: M6135013 Exhibit: A-28

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M6135013.GPJ TERRACON_STD_TEMPLATE.GDT 1/8/14

BORING LOG NO. B-25

PROJECT: Proposed Street Reconstruction

CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

LOCATION See Exhibit A-3

Latitude: 48.401559° Longitude: -101.303313°

DEPTH	GRAPHIC LOG		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.4		**4.25" ASPHALT PAVEMENT**									
		FILL - SILTY SAND, light olive brown, frozen, with a trace of gravel						3			
1.7											
		SANDY LEAN CLAY (CL), dark olive brown, frozen to 3.5', medium stiff					18-18-10 N=28	16			
			5				3-3-4 N=7	18			
7.0		**SANDY LEAN CLAY (CL)**, olive brown, stiff, with a trace of gravel					3-4-5 N=9	18			
			10				3-4-7 N=11	17			
11.0		***Boring Terminated at 11 Feet***									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2 ¼" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched with cold patch asphalt.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
2' - N-value influenced by frost

WATER LEVEL OBSERVATIONS

Not measurable before HSA removal

Midwest Testing LABORATORY, INC.
A Terracon COMPANY
1555 N. 42nd St., Unit B
Grand Forks, North Dakota

Boring Started: 12/16/2013 Boring Completed: 12/16/2013

Drill Rig: Diedrich D50 Driller: DT

Project No.: M6135013 Exhibit: A-29

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M6135013.GPJ TERRACON_STD_TEMPLATE.GDT 1/8/14

BORING LOG NO. B-26

PROJECT: Proposed Street Reconstruction

CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

LOCATION See Exhibit A-3

Latitude: 48.401465° Longitude: -101.299936°

DEPTH	GRAPHIC LOG	DESCRIPTION	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (Ft.)	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
0.3		**3" ASPHALT PAVEMENT**									
		FILL - SILTY SAND WITH GRAVEL, light olive brown, frozen						5		NP	22
1.8		**SANDY LEAN CLAY**, olive brown, frozen to 3.5', medium stiff to stiff, with a trace of gravel					13-5-2 N=7	20			
			5				2-3-4 N=7	18			
							2-3-4 N=7	20			
			10				2-4-5 N=9	18			
11.0		***Boring Terminated at 11 Feet***									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
2 ¼" Hollow Stem Auger

Abandonment Method:
Borings backfilled with soil cuttings upon completion and patched with cold patch asphalt.

See Exhibit A-4 for description of field procedures
See Appendix B for description of laboratory procedures and additional data (if any).
See Appendix C for explanation of symbols and abbreviations.

Notes:
2' - N-value influenced by frost

WATER LEVEL OBSERVATIONS

Not measurable before HSA removal

Midwest Testing LABORATORY, INC.
A Terracon COMPANY
1555 N. 42nd St., Unit B
Grand Forks, North Dakota

Boring Started: 12/16/2013	Boring Completed: 12/16/2013
Drill Rig: Diedrich D50	Driller: DT
Project No.: M6135013	Exhibit: A-30

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL M6135013.GPJ TERRACON_STD_TEMPLATE.GDT 1/8/14

APPENDIX B
SUPPORTING INFORMATION

Laboratory Testing

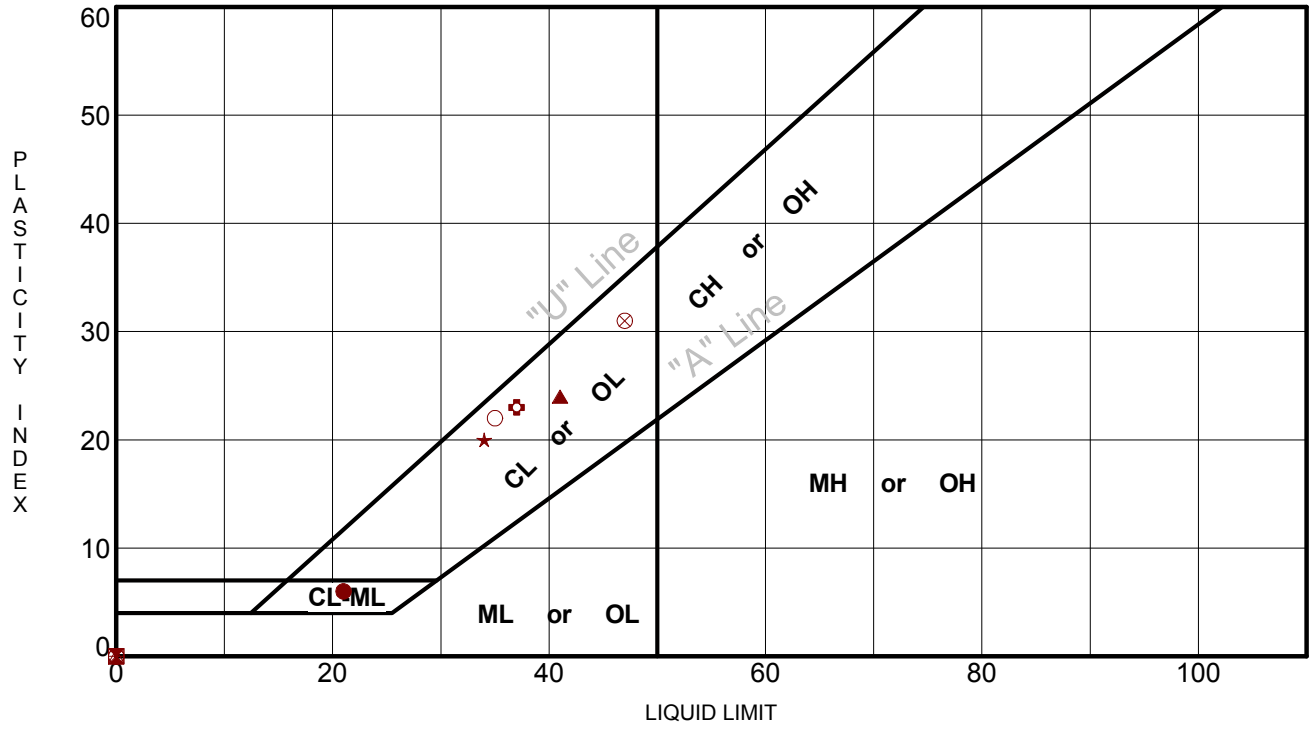
Representative samples were selected for laboratory analysis. The testing program consisted of determining moisture content, dry density,grain size distribution, Atterberg limits, and percent passing the number 200 sieve. The laboratory test results can be found on the boring logs, opposite the samples they represent or on the following laboratory data sheets.

Also, one bulk sample of the subgrade soils was tested to determine the standard Proctor maximum density and California Bearing Ratio (CBR). The test results can be found on the attached laboratory data sheets.

Descriptive classifications of the soils indicated on the boring logs are in accordance with the General Notes in Appendix C and the Unified Soil Classification System. Also shown are estimated Unified Soil Classification Symbols. A brief description of this classification system is included in Appendix C of this report. All classification was by visual manual procedures.

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
Bag 1	1.0	21	15	6	26	SC-SM	SILTY, CLAYEY SAND with GRAVEL
B-2	0.0	NP	NP	NP	23	SM	SILTY SAND with GRAVEL
B-2	2.0	41	17	24	75	CL	LEAN CLAY with SAND
B-7	9.5	34	14	20	65	CL	SANDY LEAN CLAY
B-8	0.0	NP	NP	NP	15	SM	SILTY SAND with GRAVEL
B-10	7.0	37	14	23	65	CL	SANDY LEAN CLAY
B-17	2.0	35	13	22	58	CL	SANDY LEAN CLAY
B-20	0.0	NP	NP	NP	25	CL	SANDY LEAN CLAY (CL)
B-22	4.5	47	16	31	74	CL	LEAN CLAY with SAND
B-23	0.0	NP	NP	NP	22	SM	SILTY SAND with GRAVEL
B-26	0.0	NP	NP	NP	22	SM	SILTY SAND with GRAVEL

PROJECT: Proposed Street Reconstruction

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

Midwest Testing Laboratory, Inc.
A Terracon Company

1555 N. 42nd St., Unit B
Grand Forks, North Dakota

PROJECT NUMBER: M6135013

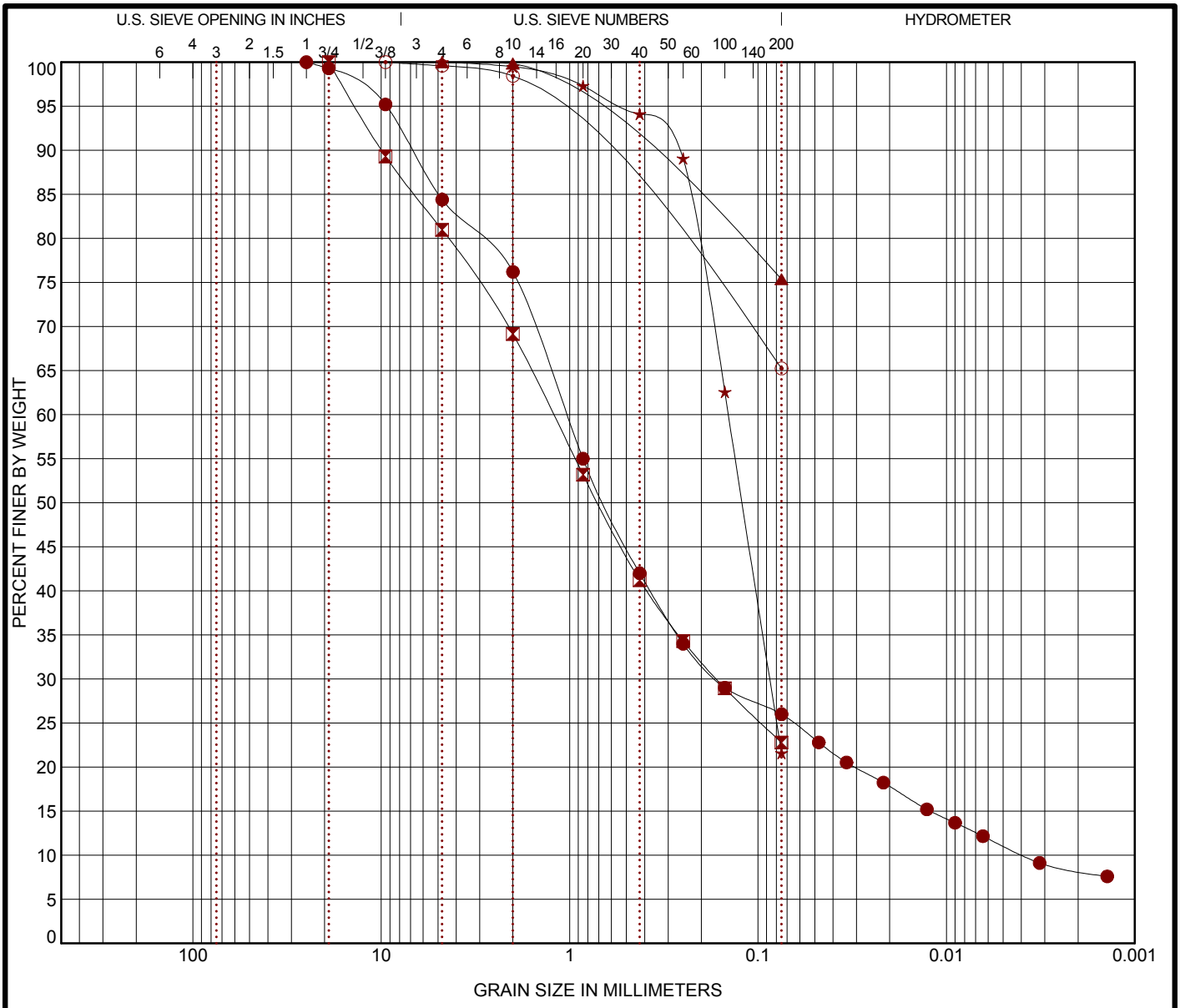
CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

EXHIBIT: B-2

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS M6135013.GPJ TERRACON2012.GDT 1/8/14

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
●	Bag 1	1.0	SILTY, CLAYEY SAND with GRAVEL(SC-SM)	21	15	6	6.79	265.94
⊠	B-2	0.0	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
▲	B-2	2.0	LEAN CLAY with SAND(CL)	41	17	24		
★	B-5	4.5	CLAYEY SAND (SC)					
⊙	B-7	9.5	SANDY LEAN CLAY(CL)	34	14	20		

	Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	Bag 1	1.0	25	1.04	0.166	0.004	15.6	58.4	14.9	11.1
⊠	B-2	0.0	19	1.225	0.166		19.0	58.2	22.8	
▲	B-2	2.0	4.75				0.0	24.6	75.4	
★	B-5	4.5	4.75	0.144	0.086		0.0	78.4	21.6	
⊙	B-7	9.5	9.5				0.4	34.4	65.2	

PROJECT: Proposed Street Reconstruction

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

Midwest Testing LABORATORY, INC. A Terracon COMPANY

1555 N. 42nd St., Unit B
Grand Forks, North Dakota

PROJECT NUMBER: M6135013

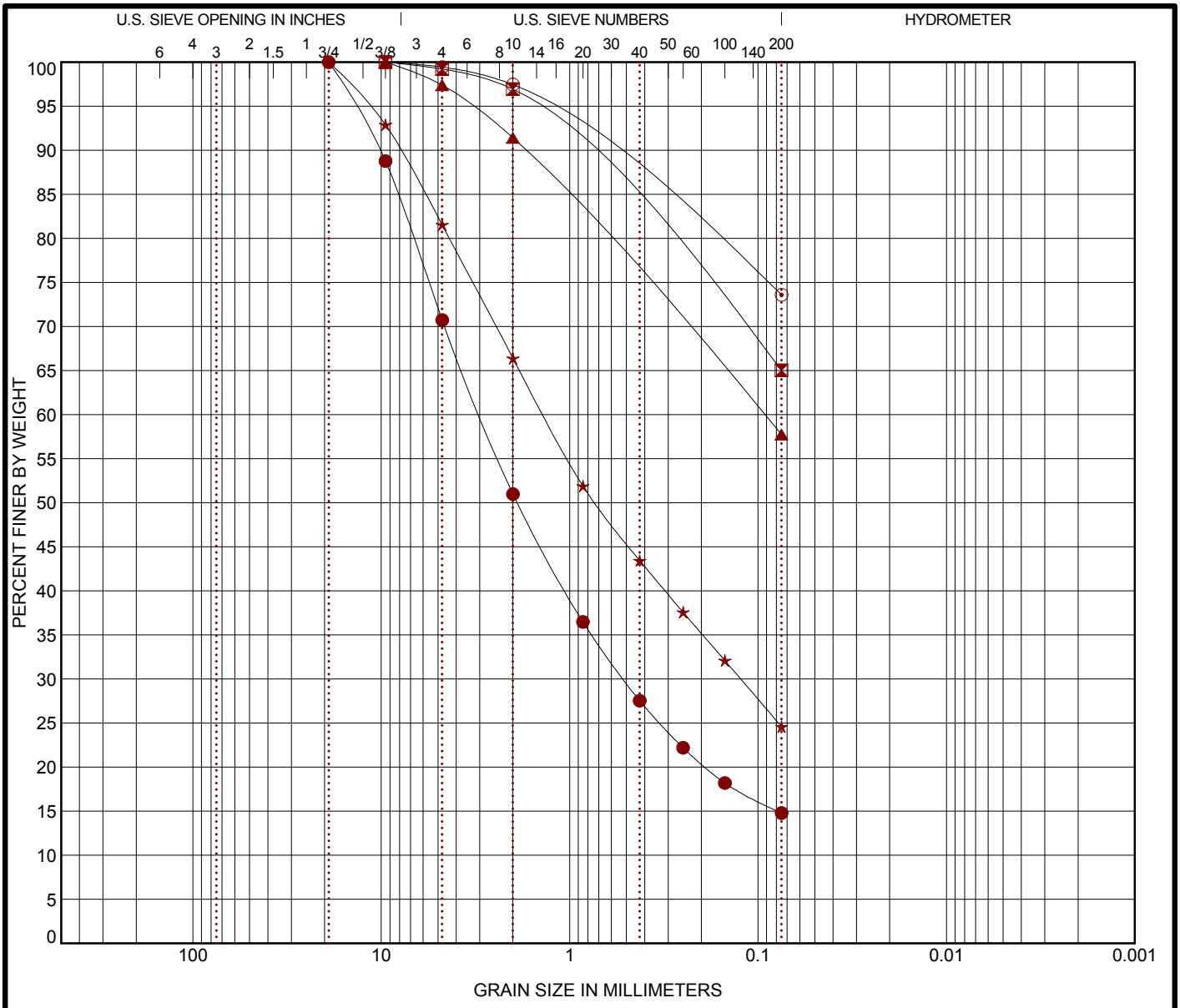
CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 M6135013.GPJ TERRACON2012.GDT 1/8/14

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
●	B-8	0.0	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
⊠	B-10	7.0	SANDY LEAN CLAY(CL)	37	14	23		
▲	B-17	2.0	SANDY LEAN CLAY(CL)	35	13	22		
★	B-20	0.0	SANDY LEAN CLAY (CL)	NP	NP	NP		
⊙	B-22	4.5	LEAN CLAY with SAND(CL)	47	16	31		

	Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	B-8	0.0	19	2.968	0.514		29.3	56.0	14.8	
⊠	B-10	7.0	9.5				0.8	34.2	65.0	
▲	B-17	2.0	9.5	0.093			2.6	39.6	57.7	
★	B-20	0.0	19	1.372	0.124		18.4	57.0	24.6	
⊙	B-22	4.5	9.5				0.6	25.8	73.6	

PROJECT: Proposed Street Reconstruction

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

Midwest Testing LABORATORY, INC.
A Terracon COMPANY
1555 N. 42nd St., Unit B
Grand Forks, North Dakota

PROJECT NUMBER: M6135013

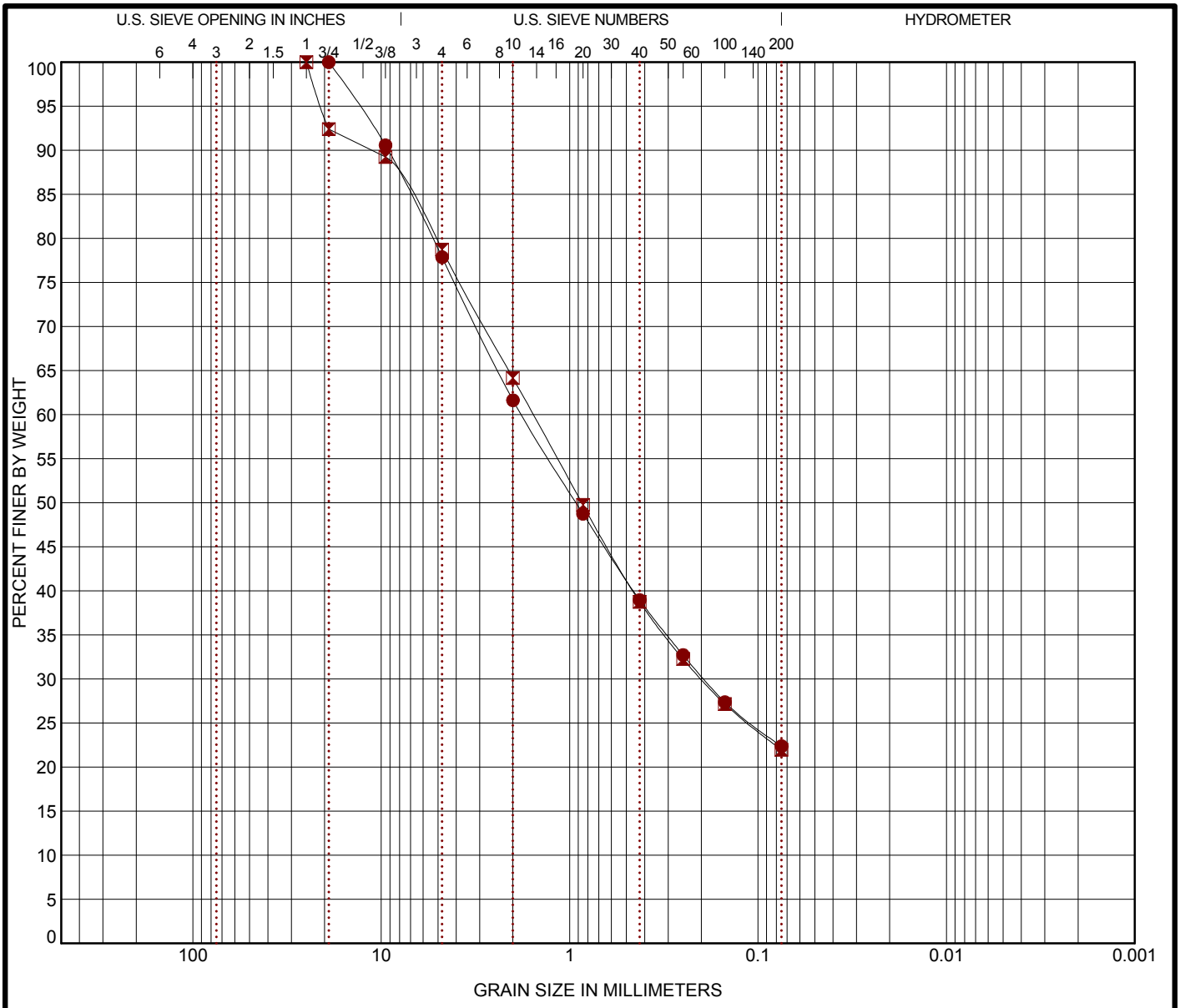
CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

EXHIBIT: B-4

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 M6135013.GPJ TERRACON2012.GDT 1/8/14

GRAIN SIZE DISTRIBUTION

ASTM D422



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	LL	PL	PI	Cc	Cu
●	B-23	0.0	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
⊠	B-26	0.0	SILTY SAND with GRAVEL(SM)	NP	NP	NP		

Boring ID		Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	B-23	0.0	19	1.795	0.193		22.1	55.5	22.4	
⊠	B-26	0.0	25	1.563	0.199		21.3	56.8	22.0	

PROJECT: Proposed Street Reconstruction

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

Midwest Testing LABORATORY, INC. A Terracon COMPANY

1555 N. 42nd St., Unit B
Grand Forks, North Dakota

PROJECT NUMBER: M6135013

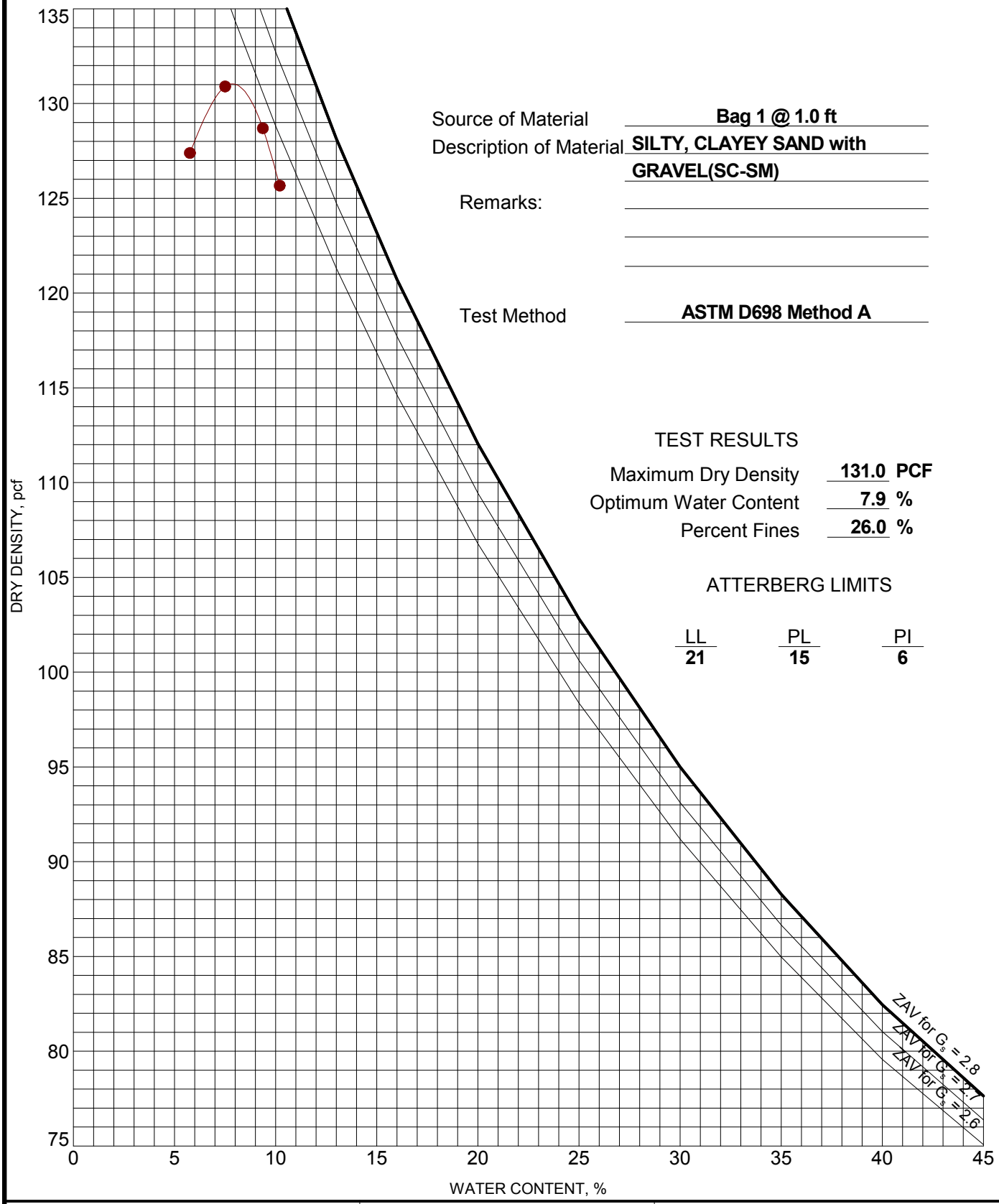
CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

EXHIBIT: B-5

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 M6135013.GPJ TERRACON2012.GDT 1/8/14

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557



Source of Material: **Bag 1 @ 1.0 ft**

Description of Material: **SILTY, CLAYEY SAND with GRAVEL(SC-SM)**

Remarks:

Test Method: **ASTM D698 Method A**

TEST RESULTS

Maximum Dry Density	**131.0**	**PCF**
Optimum Water Content	**7.9**	**%**
Percent Fines	**26.0**	**%**

ATTERBERG LIMITS

LL	PL	PI
21	**15**	**6**

PROJECT: Proposed Street Reconstruction

SITE: Bomber Boulevard
Minot Air Force Base, North Dakota

Midwest Testing Laboratory, Inc. A Terracon Company

1555 N. 42nd St., Unit B
Grand Forks, North Dakota

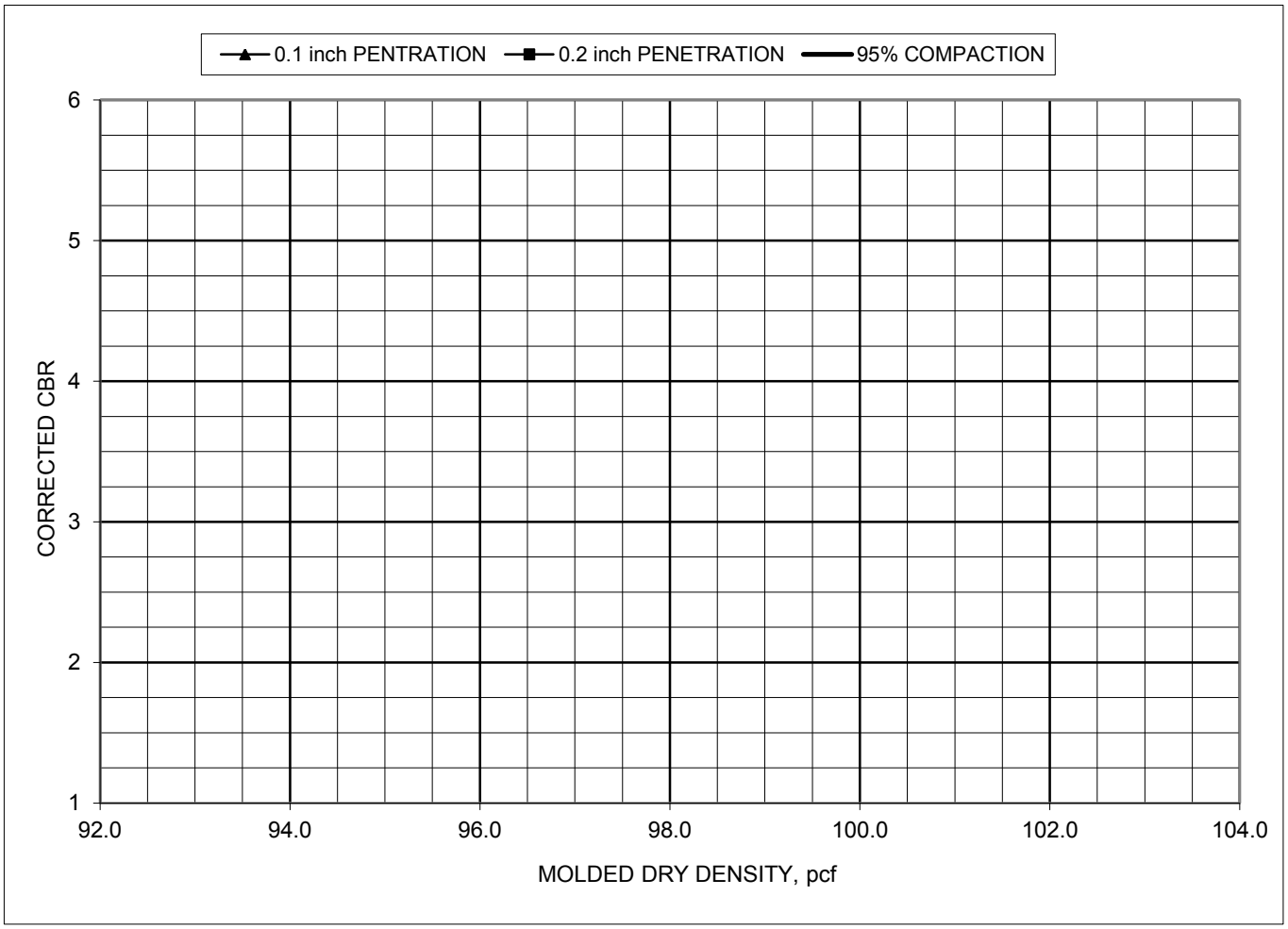
PROJECT NUMBER: M6135013

CLIENT: FourFront Design, Inc.
Rapid City, South Dakota

EXHIBIT: B-6

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 M6135013.GPJ TERRACON2012.GDT 1/8/14

CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOILS
ASTM D1883



MOLDED WATER CONTENT, %	MOLDED DRY DENSITY, pcf	MOLDED COMPACTION, %	CORRECTED CBR 0.1 inch	CORRECTED CBR 0.2 inch
5.9	122.2	93.3	5.8	5.6
7.9	125.1	95.5	8.1	8.1
9.9	123.2	94.0	NA	2.4

BORING NO. Bag 1 SAMPLE NO. 1 DEPTH, feet 0.0 to 5.0

DESCRIPTION Silty Clayey Sand with Gravel

JOB NAME: Bomber Blvd. MAXIMUM DENSITY, pcf 131.0

JOB LOCATION: Minot Air Force Base OPTIMUM MOISTURE, % 7.9

JOB NO.: M6135013 LIQUID LIMIT 21

DATE: 1/6/2014 PLASTICITY INDEX 6

TESTED BY: _____ APPROVED BY: _____

N:\Projects\2013\M6135013\Working Files\Laboratory-Field Data-Boring Logs\[M6135013 Multi Point.xlsx]DATA ENTRY

Terracon

California Bearing Ratio of Laboratory-Compacted Soils

Report Number: M6135013
Service Date: 12/30/13
Report Date: 01/06/14
Task: 95% at +2%

Client
FourFront Design

Project
Bomber Blvd.

Project No. M6135013

SAMPLE INFORMATION

Sample Number:	1	Proctor Method:	ASTM D698 - Method A
Boring Number:	Bag 1	Maximum Dry Density (pcf):	131.0
Sample Location:		Optimum Moisture:	7.9
Depth:	0-5'	Liquid Limit:	21
Material Description:		Plasticity Index:	6

CBR TEST DATA

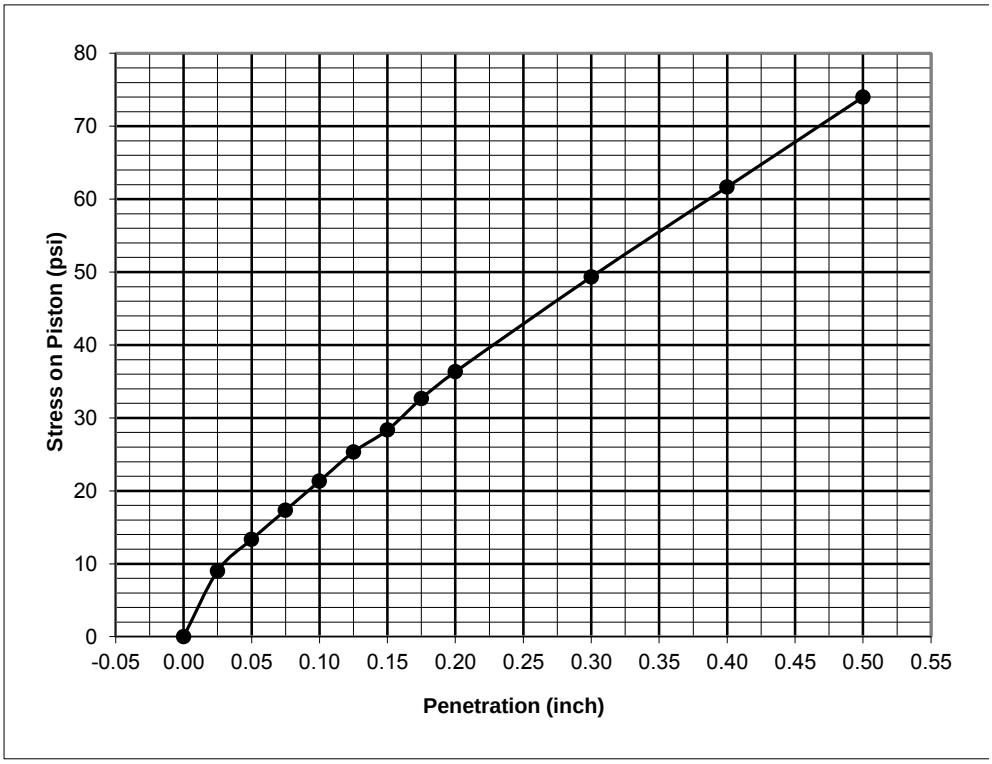
CBR Value at 0.100 inch	**NA**
CBR Value at 0.200 inch	**2.4**
Surcharge Weight (lbs)	10
Soaking Condition	Soaked
Length of Soaking (hours)	96
Swell (%)	2.1

DENSITY DATA

Dry Density Before Soaking (pcf)	123.2
Compaction of Proctor (%)	94.1

MOISTURE DATA

Before Compaction (%)	9.8
After Compaction (%)	10.0
Top 1" After Soaking (%)	10.3
Average After Soaking (%)	10.0



Comments:
Test Methods: ASTM D1883

Exhibit B-8

California Bearing Ratio of Laboratory-Compacted Soils

Report Number: M6135013
Service Date: 12/30/13
Report Date: 01/06/14
Task: 95% at Opt

Client
FourFront Design

Project
Bomber Blvd.

Project No. M6135013

SAMPLE INFORMATION

Sample Number:	1	Proctor Method:	ASTM D698 - Method A
Boring Number:	Bag 1	Maximum Dry Density (pcf):	131.0
Sample Location:		Optimum Moisture:	7.9
Depth:	0-5'	Liquid Limit:	21
Material Description:		Plasticity Index:	6

CBR TEST DATA

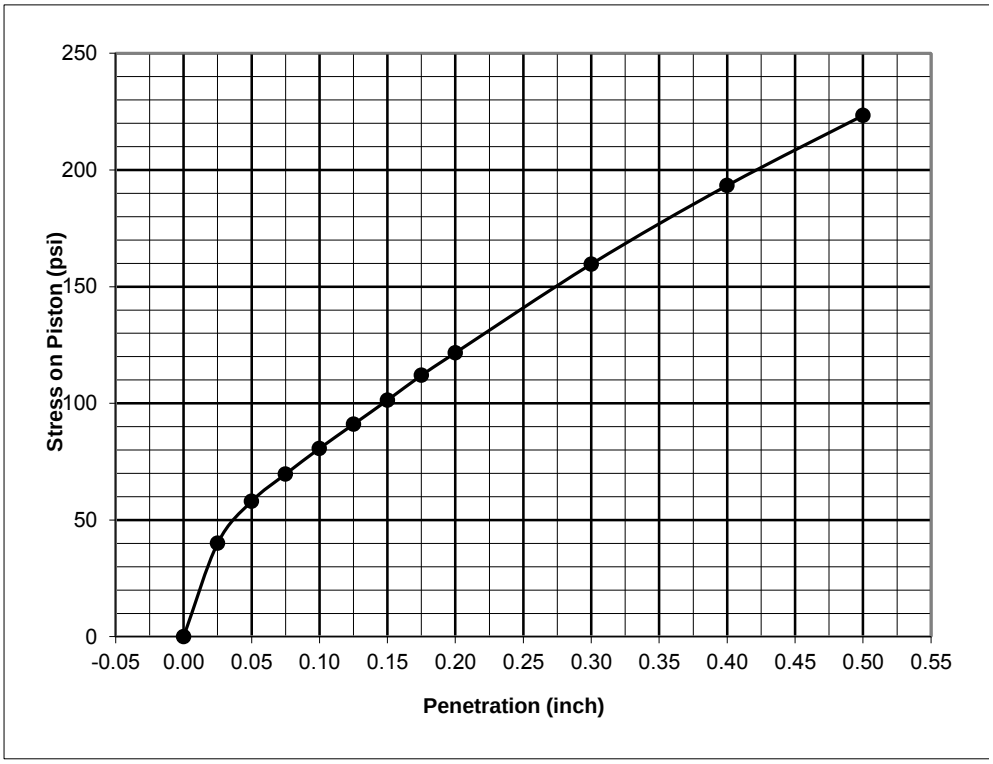
CBR Value at 0.100 inch	**8.1**
CBR Value at 0.200 inch	**8.1**
Surcharge Weight (lbs)	10
Soaking Condition	Soaked
Length of Soaking (hours)	96
Swell (%)	4.4

DENSITY DATA

Dry Density Before Soaking (pcf)	125.1
Compaction of Proctor (%)	95.5

MOISTURE DATA

Before Compaction (%)	7.8
After Compaction (%)	7.9
Top 1" After Soaking (%)	10.9
Average After Soaking (%)	9.9



Comments:
Test Methods: ASTM D1883

Exhibit B-9

California Bearing Ratio of Laboratory-Compacted Soils

Report Number: M6135013
Service Date: 12/30/13
Report Date: 01/06/14
Task: 95% at -2%

Terracon

Client
FourFront Design

Project
Bomber Blvd.

Project No. M6135013

SAMPLE INFORMATION

Sample Number:	1	Proctor Method:	ASTM D698 - Method A
Boring Number:	Bag 1	Maximum Dry Density (pcf):	131.0
Sample Location:		Optimum Moisture:	7.9
Depth:	0-5'	Liquid Limit:	21
Material Description:		Plasticity Index:	6

CBR TEST DATA

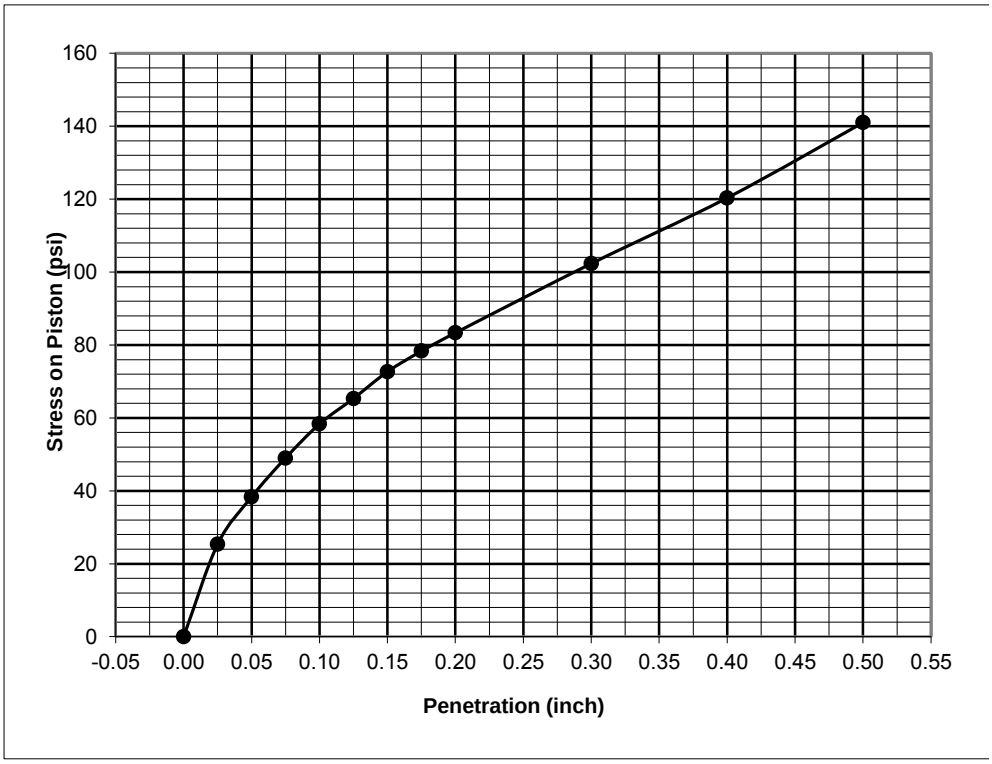
CBR Value at 0.100 inch	**5.8**
CBR Value at 0.200 inch	**5.6**
Surcharge Weight (lbs)	10
Soaking Condition	Soaked
Length of Soaking (hours)	96
Swell (%)	4.7

DENSITY DATA

Dry Density Before Soaking (pcf)	122.2
Compaction of Proctor (%)	93.2

MOISTURE DATA

Before Compaction (%)	5.8
After Compaction (%)	5.9
Top 1" After Soaking (%)	13.0
Average After Soaking (%)	11.3



Comments:
Test Methods: ASTM D1883

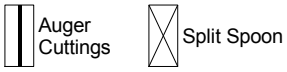
Exhibit B-10

APPENDIX C
SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING



WATER LEVEL

Water Initially Encountered

Water Level After a Specified Period of Time

Water Level After a Specified Period of Time

Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

FIELD TESTS

(HP)	Hand Penetrometer
(T)	Torvane
(DCP)	Dynamic Cone Penetrometer
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (psf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 500	0 - 1
Loose	4 - 9	Soft	500 to 1,000	2 - 4
Medium Dense	10 - 29	Medium Stiff	1,000 to 2,000	4 - 8
Dense	30 - 50	Stiff	2,000 to 4,000	8 - 15
Very Dense	> 50	Very Stiff	4,000 to 8,000	15 - 30
		Hard	> 8,000	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Midwest Testing LABORATORY, INC. A Terracon COMPANY

Exhibit: C-1

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

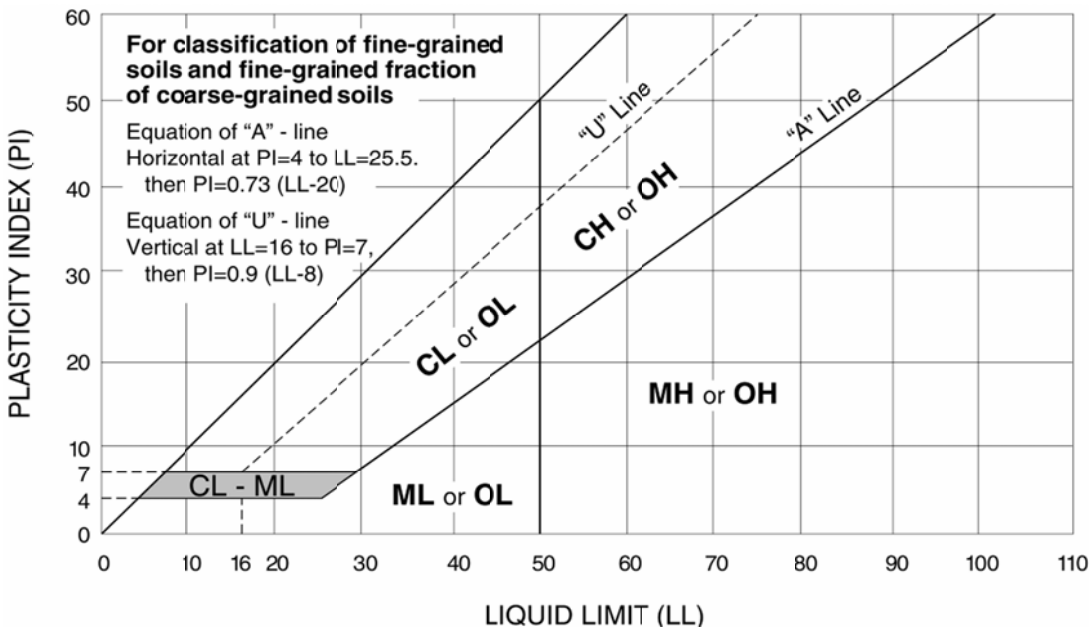
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



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