



October 8, 2015

Town of Marana
11555 West Civic Center Drive
Marana, Arizona 85653

Attn: Mr. Morris Reyna

Phone: 520-382-2600

Fax: 520-382-2641

E-mail: mreyna@maranaaz.gov

Re: **Characterization of Existing Fill Profile**
North Mountain Stone Pine Road: N Douglas Fir Dr to W Scotch Pine Ln
Town of Marana
Pima County, Arizona
Terracon Project No. 63155056

Dear Mr. Reyna:

At the request of the Town of Marana, Terracon Consultants, Inc. (Terracon) has prepared this letter report with the results of the field exploration for North Mountain Stone Pine Road from North Douglas Fir Drive to West Scotch Pine Lane in Marana, Arizona.

Mr. Morris Reyna, Town of Marana met with Louis Braun, E.I.T. and Brent M. Borchers, P.E., of Terracon at the site on September 29, 2015. As directed by Mr. Reyna, the locations of the borings were selected at that time. Areas of visible settlement were observed along the roadway. It is our understanding that Eurofoam has been injected within portions of the existing fill to minimize additional settlement in areas beneath existing roadway section and adjacent sidewalks where distress is being experienced. We understand there is concern the existing fill is greater in depth than originally anticipated.

We understand this project is to better define the extents of existing fill in an area along North Mountain Stone Pine Road east of North Douglas Fir Drive. Terracon provided a Geotechnical Engineering Report No. 63045225, dated December 8, 2004 for the residential area with fill up to depths of 27 feet was located on the site. We were provided with a Pattison Engineering, LLC (Pattison) report for Richmond American Homes, Report No. 15-034, dated March 30, 2015 with three (3) borings to help define the extent of the fill. One boring performed by Pattinson, P(B-1), is displayed within our Fence Diagram (Exhibit A-1b) to supplement the characterization of the existing fill.

Terracon Consultants, Inc. 355 S. Euclid, Suite 107 Tucson, Arizona 85719
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Field Exploration Description

Terracon performed three (3) borings, designated B-1 through B-3 on October 5, 2015, to depths of approximately 21 to 36 feet below the existing ground surface. Logs of the borings along with a Site Plan and Boring Locations Diagram (Exhibit A-1a) and Fence Diagram (Exhibit A-1b), are attached to this report. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are also attached to this report.

The test borings were advanced with a truck-mounted CME-75 drill rig utilizing 8-inch diameter hollow-stem augers. The boring locations are marked on the attached Site Plan and Boring Locations Diagram. The elevations were interpolated from Pima County MapGuide.

Continuous lithologic logs of each boring were recorded by the field geologist during the drilling operations. At selected intervals, samples of the subsurface materials were taken by driving split-spoon (SPT) or ring-lined barrel samplers. Bulk samples of subsurface materials were also obtained from auger cuttings.

In the split-spoon sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel-sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound C.M.E. auto-hammer with a free fall of 30 inches, is the standard penetration resistance value (SPT-N). A similar sampling procedure is used to advance a 3-inch O.D. split-barrel, ring-lined, sampler a total of 12 inches. This value is used to estimate the in-situ relative density of cohesionless soils and consistency of cohesive soils.

Groundwater conditions were evaluated in each boring at the time of site exploration.

Subsurface Profile

Specific conditions encountered at each boring location are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; in-situ, the transition between materials may be gradual. Details for each of the borings can be found on the boring logs attached. Based on the results of the borings, existing fill varied in depth from 16 to 34 feet below the existing surface. The generally consisted of clayey sand to sandy lean clay with varying amounts gravel. The underlying soil consists of poorly graded sand with silt and gravel.

The granular fill material varied from loose to dense in relative density, and fine grained granular soil varied from soft to very stiff in consistency.

Laboratory Testing

Samples retrieved during the field exploration were taken to the laboratory for further observation by the project geotechnical engineer and were classified in accordance with the Unified Soil Classification System (USCS). At that time, the field descriptions were confirmed or modified as necessary and an applicable laboratory testing program was formulated to determine engineering properties of the subsurface materials.

Laboratory tests were conducted on selected soil samples and the test results are attached. The laboratory test results were used for the geotechnical engineering analyses, and the development of foundation and earthwork recommendations. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Selected soil samples obtained from the site were tested for the following engineering properties:

- In-situ Water Content
- In-situ Dry Density
- Moisture-Density Relationship (Standard Proctor)

The dry unit weight and water content of the fill material was measured on select samples. The unit weight varied from 97 pcf to 122 pcf with the moisture contents ranging from 5 to 15 percent.

Conclusions

As requested, Terracon performed three (3) borings along North Mountain Stone Pine Road from North Douglas Fir Drive to West Scotch Pine Lane to help characterize the profile of the depth of the existing fill. Fill up to 34 feet was encountered at boring B-2. Existing fills up to and potentially greater in depth than 34 feet may be encountered during remediation activities. However, we believe due to the relative close spacing of the borings within North Mountain Stone Pine Road from North Douglas Fir Drive to West Scotch Pine Lane, fill considerably greater in depth along the roadway alignment is not likely.

This letter report was generated exclusively for our client. No engineering analyses were performed for this report due to the limited scope of services and purpose of the report. This report does not reflect variations that may occur between test locations or across the site. This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made.

We appreciate the opportunity to be of service to you on this project. If you have any questions regarding this report, or if we may be of further service to you in other ways, please let us know.

Sincerely,








Louis D. Braun, E.I.T.
Geotechnical Field Engineer

Brent M. Borchers, P.E.
Senior Associate

ATTACHMENTS:

Site Plan and Boring Locations Diagram	Exhibit A-1a
Fence Diagram	Exhibit A-1b
Field Exploration Description	Exhibit A-2
General Notes	Exhibit A-3
Unified Soil Classification	Exhibit A-4
Boring Logs	Exhibits A-5 to A-7
Laboratory Testing	Exhibit B-1
Moisture Density Relationship.....	Exhibit B-2
Summary of Laboratory Results.....	Exhibit B-3




 APPROXIMATE BORING LOCATION
 APPROXIMATE BORING LOCATION
 TERRACON PROJECT NO. 63045225
 APPROXIMATE BORING LOCATION
 PATTISON PROJECT NO. 15-034

Project Mngr:	LDB
Drawn By:	LDB
Checked By:	BMB
Approved By:	BMB

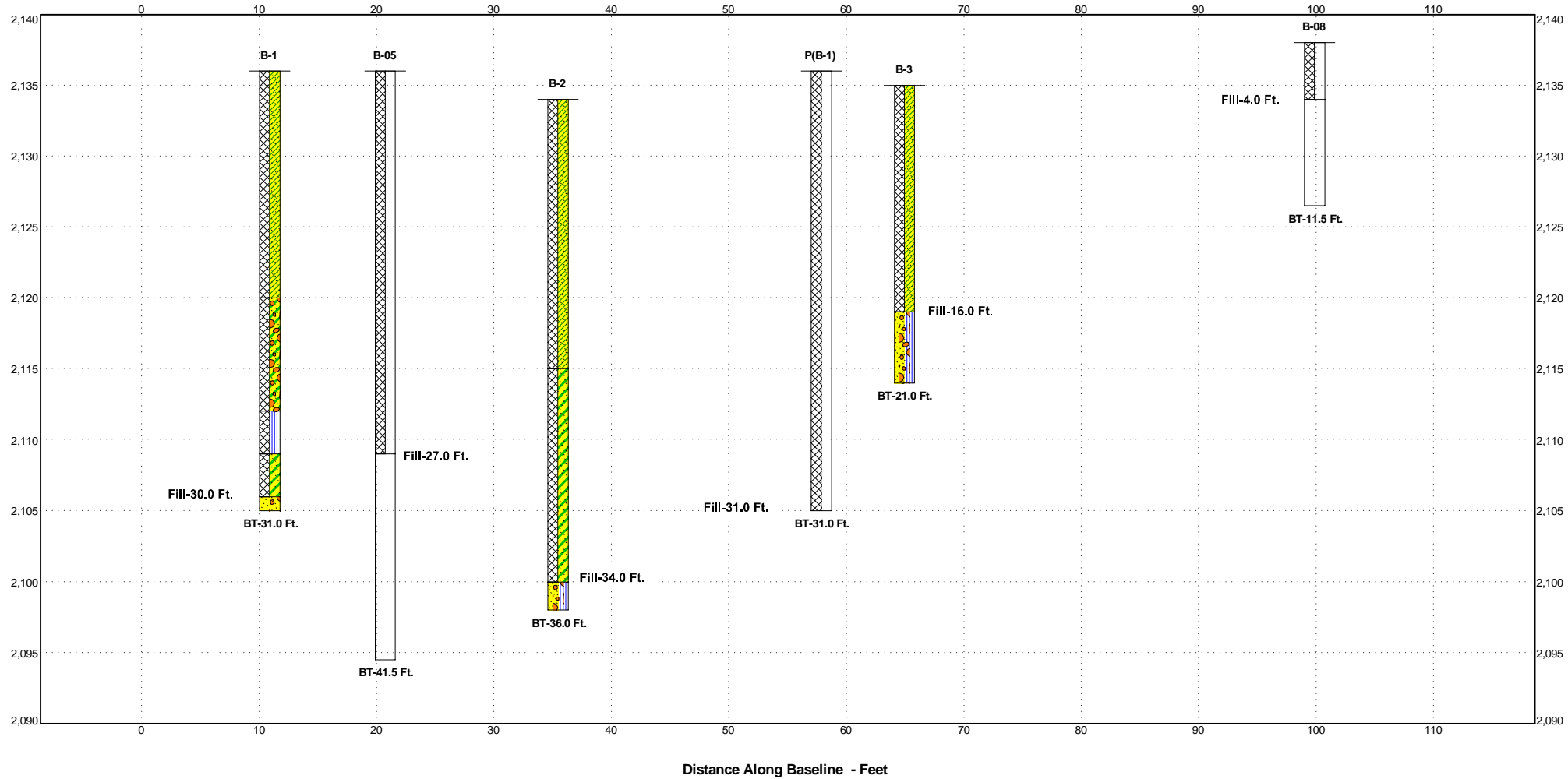
Project No.	63155056
Scale:	N/A
File No.	63155056.DWG
Date:	10/2015


 Consulting Engineers and Scientists
 355 S EUCLID, SUITE 107 TUCSON, AZ 85719
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SITE PLAN & BORING LOCATIONS DIAGRAM
 NORTH MOUNTAIN STONE PINE ROAD
 N DOUGLAS FIR DR TO W SCOTCH PINE LN
 TOWN OF MARANA ARIZONA

EXHIBIT
 A-1a

Elevation - Feet



Distance Along Baseline - Feet

Explanation

- B-1 Borehole Number
- Moisture Content — %w
- Sampling (See General Notes)
- AR BT Borehole Termination Type
- Water Level Reading at time of drilling.
- Water Level Reading after drilling.
- LL PL Liquid and Plastic Limits
- Borehole Lithology

- Sandy Lean Clay
- Clayey Sand with Gravel
- Poorly-graded Sand with Silt
- Clayey Sand
- Poorly-graded Sand with Gravel
- Poorly-graded Sand with Silt and Gravel

NOTES:
 See Exhibit A-2 for orientation of soil profile.
 See General Notes in Appendix C for symbols and soil classifications.
 Soils profile provided for illustration purposes only.
 Soils between borings may differ
 AR - Auger Refusal
 BT - Boring Termination

Project Manager: LDB
 Drawn by: LDB
 Approved by: BMB
 Date: 10/7/2015

Project No.: 63155056
 Scale: N.T.S.
 File Name: 63155056

Terracon
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 Tucson, Arizona
 PH. 520-770-1789 FAX. 520-792-2539

SUBSURFACE PROFILE













NORTH MOUNTAIN STONE PINE ROAD
 N DOUGLAS FIR DR TO W SCOTCH PINE LN
 TOWN OF MARANA, ARIZONA

EXHIBIT
 A-1b

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART PENCE 63155056.GPJ TERRACON\2012\GDI_10/7/15

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING				WATER LEVEL		Water Initially Encountered	FIELD TESTS	(HP) Hand Penetrometer
						Water Level After a Specified Period of Time		(T) Torvane
						Water Level After a Specified Period of Time		(b/f) Standard Penetration Test (blows per foot)
					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.			(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 Includes gravels, sands and silts.			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.	Ring Sampler Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-Value Blows/Ft.	Ring Sampler Blows/Ft.
	Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
	Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
	Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8	5 - 9
	Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
	Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
				Hard	> 8,000	> 30	> 42

RELATIVE PROPORTIONS OF SAND AND GRAVEL

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

RELATIVE PROPORTIONS OF FINES

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

GRAIN SIZE TERMINOLOGY

<u>Major Component of Sample</u>	<u>Particle Size</u>
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)

PLASTICITY DESCRIPTION

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

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		OH	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		OH	Organic silt ^{K,L,M,Q}	
					PT	Peat	
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

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

^F If soil contains $\geq 15\%$ 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 $\geq 15\%$ 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 $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

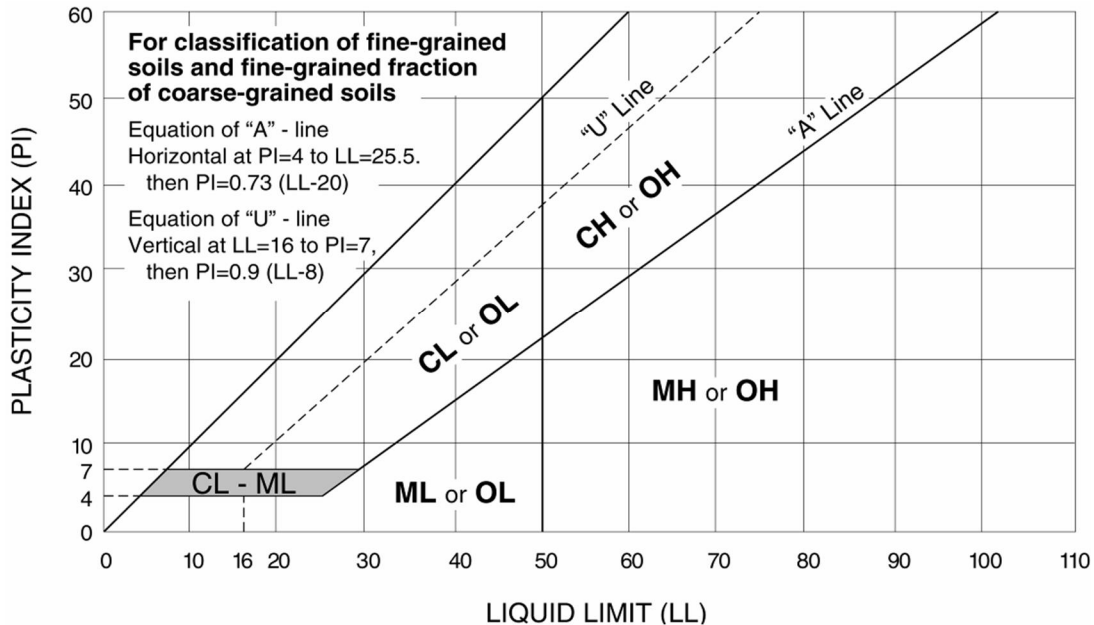
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ 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.



BORING LOG NO. B-1

PROJECT: North Mountain Stone Pine Road

CLIENT: Town of Marana
Marana, Arizona

SITE: N Douglas Fir Dr to W Scotch Pine Ln
Town of Marana, Arizona

GRAPHIC LOG	LOCATION See Exhibit A-1 Latitude: 32.36006° Longitude: -111.09911° Surface Elev.: 2136 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)
DEPTH							
0	FILL - SANDY LEAN CLAY (CL) , trace gravel, brown, stiff			↑			
5	medium stiff		↓		5-8		
10			↓		4-4	11	97
15	16.0 very stiff	2120	↓		5-16	8	99
20	FILL - CLAYEY SAND WITH GRAVEL (SC) , brown, dense		↓		30-35		
25	medium dense		↓		15-16	6	101
30	loose		↓		6-7	5	98
31.0	24.0 FILL - POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, brown, loose	2112	↓		6-5	4	103
	27.0 FILL - CLAYEY SAND (SC) , trace gravel, brown, loose	2109	↓		5-6	9	99
	30.0 POORLY GRADED SAND WITH GRAVEL (SP) , brown, medium dense	2106	↓		14-14		
	31.0 Boring Terminated at 31 Feet	2105					

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix A for explanation of symbols and abbreviations.
Elevations were interpolated from Pima County Mapguide.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 10/5/2015

Boring Completed: 10/5/2015

Drill Rig: CME-75

Driller: Southlands

Project No.: 63155056

Exhibit: A-5

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_63155056.GPJ TERRACON2015.GDT 10/7/15

BORING LOG NO. B-2

PROJECT: North Mountain Stone Pine Road

CLIENT: Town of Marana
Marana, Arizona

SITE: N Douglas Fir Dr to W Scotch Pine Ln
Town of Marana, Arizona

GRAPHIC LOG	LOCATION See Exhibit A-1 Latitude: 32.35997° Longitude: -111.09887° Surface Elev.: 2134 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)
DEPTH							
FILL - SANDY LEAN CLAY (CL), trace gravel, brown, very stiff				↑			
		5		↓	9-14	11	116
stiff				↓	6-10	11	112
		10		↓	9-6	7	114
		15		↓			
19.0 very stiff	2115			↓	8-25	15	102
FILL - CLAYEY SAND (SC), trace gravel, brown, medium dense				↓			
		20		↓	25-28	8	122
loose				↓	8-11	6	113
		25		↓	7-7	8	110
		30		↓	6-8	8	115
		34.0		↓	6-8	10	111
34.0	2100			↓	5-7	8	112
POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM), brown, medium dense				↓			
		35		↓	11-12		
36.0	2098			↓			
Boring Terminated at 36 Feet							

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix A for explanation of symbols and abbreviations.
Elevations were interpolated from Pima County Mapguide.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 10/5/2015

Boring Completed: 10/5/2015

Drill Rig: CME-75

Driller: Southlands

Project No.: 63155056

Exhibit: A-6


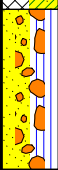
THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_63155056.GPJ TERRACON2015.GDT 10/7/15

BORING LOG NO. B-3

PROJECT: North Mountain Stone Pine Road

CLIENT: Town of Marana
Marana, Arizona

SITE: N Douglas Fir Dr to W Scotch Pine Ln
Town of Marana, Arizona

GRAPHIC LOG	LOCATION See Exhibit A-1 Latitude: 32.35982° Longitude: -111.09861° Surface Elev.: 2135 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)
DEPTH							
	FILL - SANDY LEAN CLAY (CL) , trace gravel, brown, soft			↑ ↓			
	very stiff	5		X	2-2	10	98
	stiff	10		X	11-13	5	106
	16.0	15		X	6-6	8	105
	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) , brown, medium dense	21.0		X	8-14		
	21.0	20		X	12-22		
	Boring Terminated at 21 Feet						

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

Hammer Type: Automatic

Advancement Method:
Hollow Stem Auger

See Exhibit A-3 for description of field procedures.
See Appendix B for description of laboratory procedures and additional data (if any).

Notes:

Abandonment Method:
Borings backfilled with soil cuttings upon completion.

See Appendix A for explanation of symbols and abbreviations.
Elevations were interpolated from Pima County Mapguide.

WATER LEVEL OBSERVATIONS

Groundwater not encountered



Boring Started: 10/5/2015

Boring Completed: 10/5/2015

Drill Rig: CME-75

Driller: Southlands

Project No.: 63155056

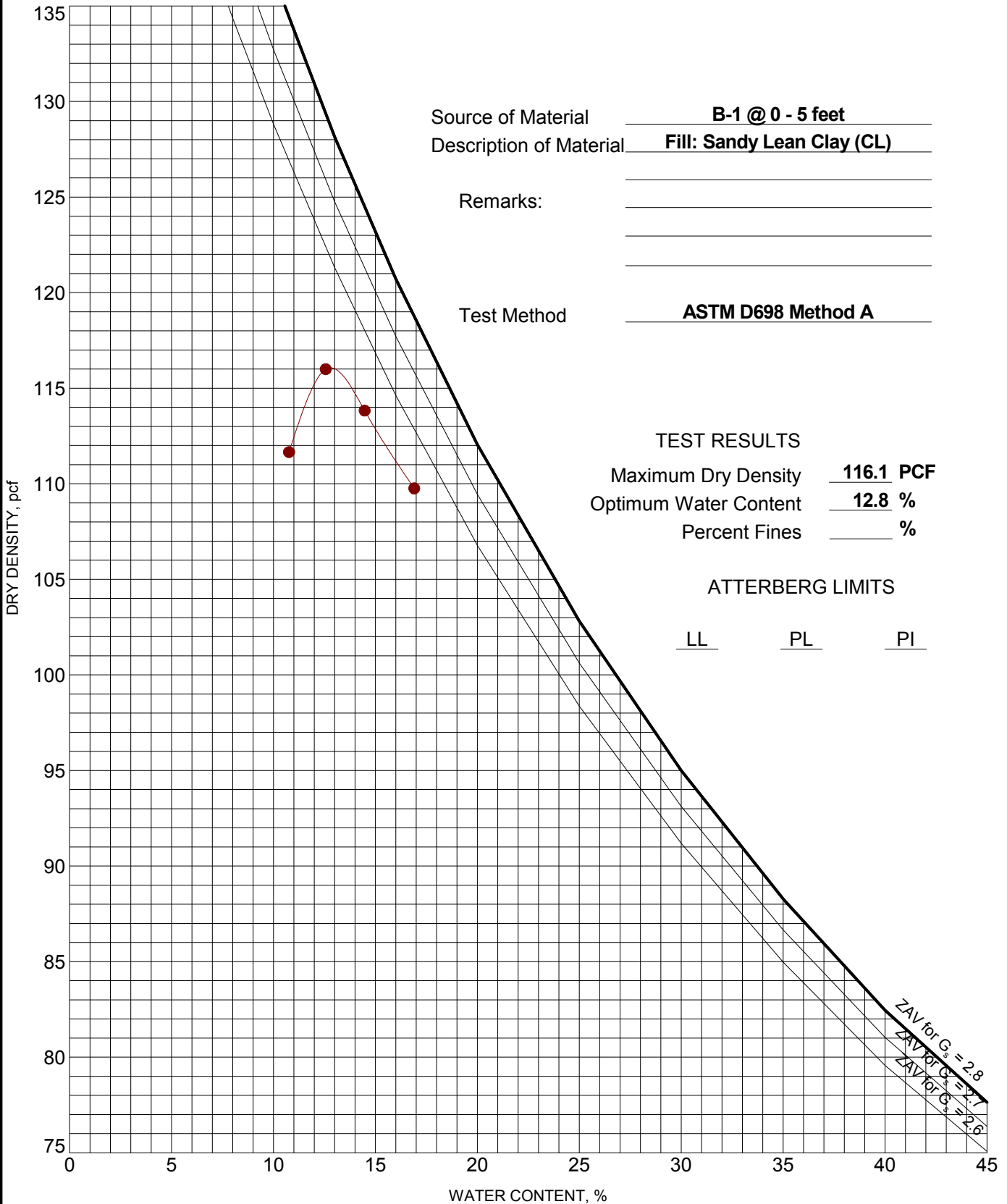
Exhibit: A-7

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL_63155056.GPJ TERRACON2015.GDT 10/7/15

MOISTURE-DENSITY RELATIONSHIP

ASTM D698/D1557

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. COMPACTION - V2 63155056.GPJ TERRACON2012.GDT 10/7/15



Source of Material B-1 @ 0 - 5 feet
 Description of Material Fill: Sandy Lean Clay (CL)

Remarks: _____

Test Method ASTM D698 Method A

TEST RESULTS

Maximum Dry Density 116.1 PCF
 Optimum Water Content 12.8 %
 Percent Fines _____ %

ATTERBERG LIMITS

LL PL PI

ZAV for G_s = 2.8
 ZAV for G_s = 2.7
 ZAV for G_s = 2.6

PROJECT: North Mountain Stone Pine Road

SITE: N Douglas Fir Dr to W Scotch Pine Ln
 Town of Marana, Arizona



PROJECT NUMBER: 63155056

CLIENT: Town of Marana
 Marana, Arizona

EXHIBIT: B-2

SUMMARY OF LABORATORY RESULTS

Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification			Expansion Testing					Corrosivity				Remarks	
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	Atterberg Limits			Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI ₅₀	pH	Resistivity (ohm-cm)	Sulfates (ppm)		Chlorides (ppm)
						LL	PL	PI										
B-1	5.0 - 6.0	CL	97	11														1, 2
B-1	10.0 - 11.0	CL	112	12														1, 2
B-1	15.0 - 16.0	CL	99	8														1, 2
B-1	20.0 - 21.0	SC	101	6														1, 2
B-1	22.5 - 23.5	SC	98	5														1, 2
B-1	25.0 - 26.0	SP-SM	103	4														1, 2
B-1	27.5 - 28.5	SC	99	9														1, 2
B-2	3.0 - 4.0	CL	116	11														1, 2
B-2	8.0 - 9.0	CL	112	11														1, 2
B-2	13.0 - 14.0	CL	114	7														1, 2
B-2	18.0 - 19.0	CL	102	15														1, 2
B-2	20.0 - 21.0	SC	122	8														1, 2
B-2	22.5 - 23.5	SC	113	6														1, 2
B-2	25.0 - 26.0	SC	110	8														1, 2
B-2	27.5 - 28.5	SC	115	8														1, 2
B-2	30.0 - 31.0	SC	111	10														1, 2
B-2	32.5 - 33.5	SC	112	8														1, 2
B-3	2.0 - 3.0	CL	98	10														1, 2
B-3	7.0 - 8.0	CL	106	5														1, 2
B-3	12.0 - 13.0	CL	105	8														1, 2

REMARKS

1. Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
2. Visual Classification.
3. Submerged to approximate saturation.
4. Expansion Index in accordance with ASTM D4829-95.
5. Air-Dried Sample

PROJECT: North Mountain Stone Pine Road	 355 S. Euclid, Suite 107 Tucson, Arizona	PROJECT NUMBER: 63155056
SITE: N Douglas Fir Dr to W Scotch Pine Ln Town of Marana, Arizona	PH. 520-770-1789 FAX. 520-792-2539	CLIENT: Town of Marana Marana, Arizona
		EXHIBIT: B-3

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SOIL PROPERTIES 2. 63155056.GPJ TERRACON2012.GDT 10/7/15