

CHANDLER KOEHN CONSULTING

May 30, 2017

Reference No.: 2016042

Guillon Inc.
Development & Construction
Attn.: Steve Honeycutt
2550 Lakewest Drive, Suite 50
Chico CA 95928
Sent via email to: steve@guilloninc.com

Subject: Preliminary - Supplemental Geotechnical Feasibility Study for the Proposed Development at 165 Lovers Lane, Ukiah, California - AP 170-030-06 and 170-040-05

Reference: My, "Geotechnical Feasibility Study for the Proposed Developmental at 165 Lovers Lane, Ukiah, California - AP 170-030-06 and 170-040-05," dated December 5, 2016.

Dear Mr. Honeycutt:

In accordance with your request, I have prepared a Supplemental Geotechnical feasibility study for the subject site. The purpose of my supplemental investigation was to determine site soil conditions for preliminary design of an on-site storm water infiltration system. My scope of work consisted of the following tasks:

- Subsurface exploration including 4 machine borings.
- Laboratory testing on samples obtained during the subsurface exploration.
- Engineering analysis.
- Preparation of this report describing site soil conditions, results of my field and laboratory testing investigation, and preliminary soil design recommendations for an on-site storm water infiltration system.

It is my understanding that the proposed project includes an approximately 23 acre residential subdivision. Proposed subdivision includes 121 lots for single family residences. Please note this report is limited to my opinions and recommendations regarding the geotechnical engineering aspects of your proposed project.

SITE CONDITIONS

Subject site is located at 165 Lovers Lane approximately 2 miles north of downtown Ukiah, California as shown on the attached Site Location Map, Figure 2. Site is further located within the upper western margin of Ukiah Valley approximately 1 mile west of the Russian River. Closest river coarse is Ackerman Creek located approximately 2,000 feet north of the project site. Site slopes gently to the southeast at 2 to 5%.

Site is surrounded by vineyard to the west, a private road and Orr Springs Road to the north, State Highway 101 to the east, and a residential subdivision to the south. The site is currently planted with vineyards and is zoned for agriculture use.

The project area occupies a surface underlain by stream terrace deposits referred to as valley fill. Valley fill is divided into three units in the Ukiah Valley. Valley fill units include recent alluvium, terrace deposits (younger and older based on elevation), and basin deposits. Terrace deposits are commonly described as partially to loosely cemented layers of gravel, sand, silt, and clay. The thickness of the terrace deposits underlying the project

area are probably 10 to 20 feet thick. Published literature and geologic maps of the region indicate native site soils are Pleistocene aged younger continental terrace deposits underlain by Paleocene aged Continental basin deposits (USGS, 1986). Stream terrace and basin deposits are derived from weathered Franciscan Complex bedrock sources (DMG, 1960). Valley infill sediments at the site overlie bedrock associated with the Cretaceous to Tertiary age Coastal belt of the Franciscan Complex, specifically the Coastal terrane (USGS, 1986).

The USDA soil websurvey identifies the soils in the northern and eastern project vicinity as Pinole loam (2 to 8% slopes), Yokayo sandy loam in the center portion, and Russian loam in the southern portion (USDA, 2013). Risk of corrosion for concrete is identified as low and risk of uncoated steel corrosion as moderate to high (USDA, 2013).

FIELD INVESTIGATION AND LABORATORY TESTING PROGRAM

My field investigation was limited to reconnaissance of the project site and supervising the drilling of 4 vertical borings. The exploratory borings were advanced to a maximum depth of 6 feet below the adjacent ground surface with an all track mounted drill rig equipped with flight auger. Boring locations are shown on the attached Site Image, Figure 2.

During boring advancement relatively undisturbed samples were obtained for laboratory testing. Relatively undisturbed samples were obtained with a 3 inch Shelby tube sampler and with a modified California split spoon sampler (with an outside diameter of 3.0 inches with a brass liner). The drill rig hammer used for sample driving consisted of a 140-pound downhole slip jar hammer dropped 30 inches with a aircraft wire cable spool and pulley assembly. The MC blow counts are converted to equivalent SPT values based on empirical data as noted on the boring logs.

Laboratory testing was performed on select samples in accordance with the latest American Society for Testing and Materials (ASTM) test procedures. Testing of soil engineering properties included in-place moisture content, in-place density, in-place unconfined compressive strength by pocket penetrometer (PP), and hydrometer or texture analysis. The borings were logged in general conformance with the Unified Soil Classification System and ASTM D 2488. See the attached boring logs for detailed soil descriptions, sample depths, penetration resistance test results, and laboratory testing results.

SUBSURFACE CONDITIONS

In general, soils encountered in the subsurface exploration consisted of terrace deposits. Terrace deposits underlie a thin layer of top soil and were generally reddish yellow to reddish brown, moist, medium dense, soft to loose, sandy silty clay to clayey sand with gravel. Terrace deposits were encountered at a depth of approximately 1 to 2 feet in all the borings. No groundwater or seepage was encountered in the subsurface exploration.

CONCLUSIONS AND DISCUSSION

Based on the results of my investigation, it is my opinion that an on-site storm water infiltration system is feasible from a Geotechnical standpoint; provided my recommendations are followed and that noted conditions and risks are acknowledged.

I recommend using a preliminary design infiltration rate of 0.40 gallons per square foot per day for storm water leach system. An alternate infiltration rate of 0.80 gallons per square foot per day can be utilized for preliminary design; provided the storm water infiltration system is located in the northern quarter of the site along with additional soil infiltration

testing prior to final design. Note infiltration rates apply for site soils extending from 1 to 6 feet below existing site grades.

LIMITATIONS

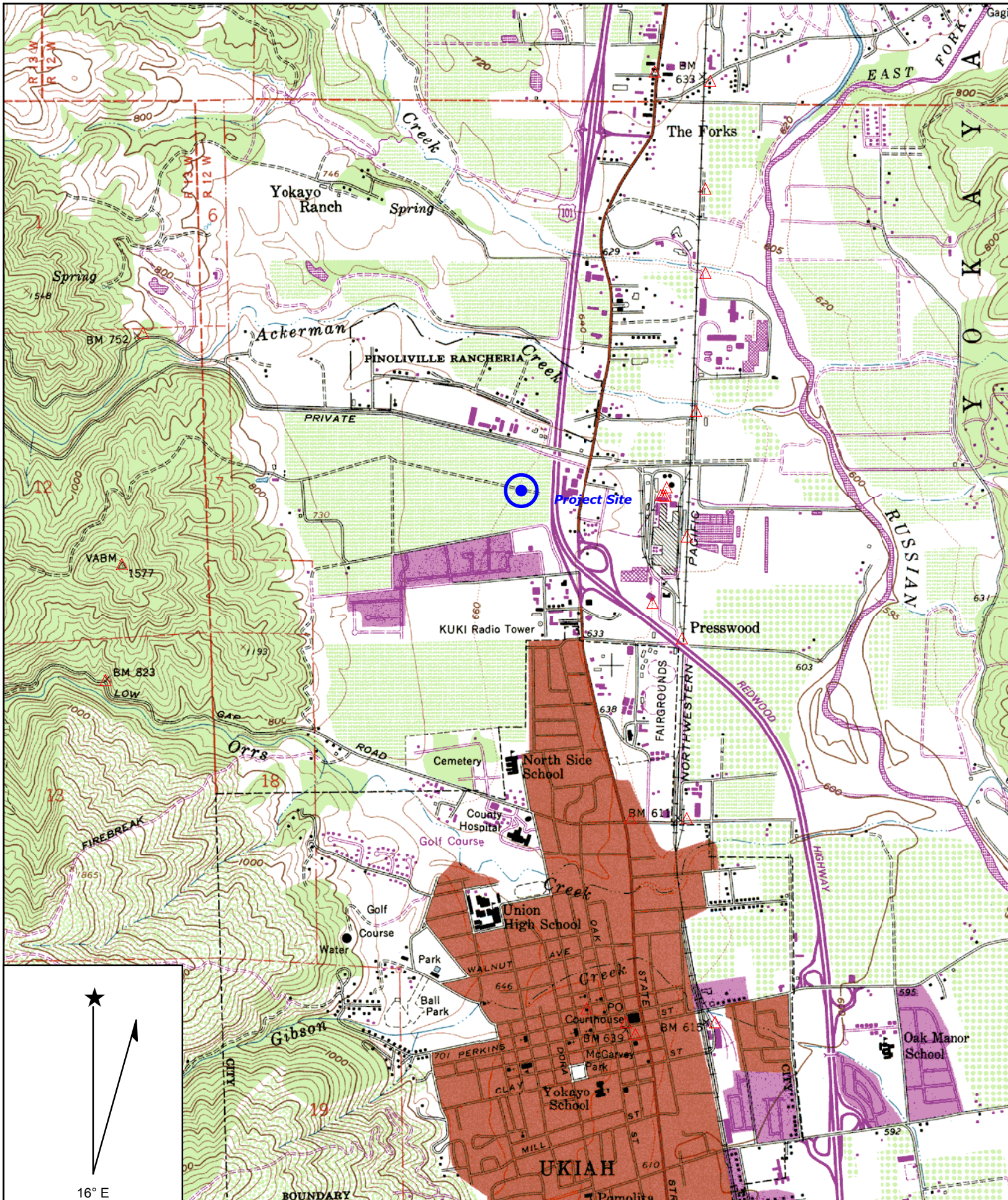
The findings, discussions, and opinions contained in this report are based on site conditions that we observed at the time of our reconnaissance visit, and on our experience with similar projects in similar geotechnical environments. Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Soils Engineers and Geologists practicing in this or similar localities. No other warranty, express or implied, is made as to the conclusions and professional advice included in this report.

I hope this report presents the information that is needed at this time. If you have any questions, please feel free to contact me at (707) 972-2897.

Sincerely,

Chandler H. Koehn, P.E., G.E.
Geotechnical Engineer

Attachments: Tentative Subdivision Map, Figure 1
 Site Location Map, Figure 2
 Appendix A - Soil Key and Boring Logs B-1 through B-4



Name: UKIAH
 Date: 12/5/2016
 Scale: 1 inch equals 2000 feet

Location: 039° 10' 10.24" N 123° 12' 52.46" W
 Caption: Site Location Map
 Reference No. 2016042
 Figure 1

Markers

Name: Project Site

Short Name: PrjctS

Coordinates: 039° 10' 28.88" N, 123° 12' 48.15" W



Figure 1

Vineyard Crossing Subdivision

Reference No. 2016042

APPENDIX A

CK Boring Logs

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS



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BORING NUMBER B-1

PAGE 1 OF 1

CLIENT	Guillon Inc., Development & Construction	PROJECT NAME	Vineyard Crossing Subdivision
PROJECT NUMBER	2016042	PROJECT LOCATION	165 Lovers Lane, Ukiah, CA
DATE STARTED	3/17/17	COMPLETED	3/17/17
GROUND ELEVATION	660 ft	HOLE SIZE	5-inch
DRILLING CONTRACTOR	Pearson	GROUND WATER LEVELS:	
DRILLING METHOD	Flight Auger Track Rig	AT TIME OF DRILLING	---
LOGGED BY	CHK	CHECKED BY	CHK
AT END OF DRILLING	---	AFTER DRILLING	---
NOTES			

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		(CL-ML) @ 0-1 ft: TOPSOIL - Olive brown sandy silty clay, wet, soft; abundant rootlets										
2.5		(CL-ML) @ 1-6 ft: TERRACE DEPOSITS - Olive gray and reddish yellow sandy silty clay, wet; plastic and mottled										
		@ 2.5 ft: Becomes very moist and firm (TA - Zone 3)	SH			1.1	93	24				59
5.0		@ 5 ft: Becomes moist and stiff (TA - Zone 3)	SH			4.8	97	19				60

Bottom of borehole at 6.0 feet.



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BORING NUMBER B-2

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CLIENT Guillon Inc., Development & Construction

PROJECT NAME Vineyard Crossing Subdivision

PROJECT NUMBER 2016042

PROJECT LOCATION 165 Lovers Lane, Ukiah, CA

DATE STARTED 3/17/17 COMPLETED 3/17/17

GROUND ELEVATION 655 ft HOLE SIZE 5-inch

DRILLING CONTRACTOR Pearson

GROUND WATER LEVELS:

DRILLING METHOD Flight Auger Track Rig

AT TIME OF DRILLING ---

LOGGED BY CHK CHECKED BY CHK

AT END OF DRILLING ---

NOTES

AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		(CL-ML) @ 0-2 ft: TOPSOIL - Dark brown sandy silt with gravel, moist to wet, loose; abundant rootlets										
2.5		(SC-SM) @ 2-4 ft: TERRACE DEPOSITS - Brown to reddish brown silty sand with gravel to clayey sand with gravel, very moist, loose to medium dense; gravel and cobble up to 3 inches in diameter @ 3 ft: Increase in cobble frequency	○ NR									

Refusal at 4.0 feet.
Bottom of borehole at 4.0 feet.



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BORING NUMBER B-3

PAGE 1 OF 1

CLIENT	Guillon Inc., Development & Construction	PROJECT NAME	Vineyard Crossing Subdivision
PROJECT NUMBER	2016042	PROJECT LOCATION	165 Lovers Lane, Ukiah, CA
DATE STARTED	3/17/17	COMPLETED	3/17/17
DRILLING CONTRACTOR	Pearson	GROUND ELEVATION	658 ft
DRILLING METHOD	Flight Auger Track Rig	HOLE SIZE	5-inch
LOGGED BY	CHK	CHECKED BY	CHK
NOTES			
GROUND WATER LEVELS:		AT TIME OF DRILLING ---	
		AT END OF DRILLING ---	
		AFTER DRILLING ---	

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		(CL-ML) @ 0-2 ft: TOPSOIL - Dark brown sandy silt with gravel, moist to wet, loose; abundant rootlets										
2.5		(SC-SM) @ 2-5.5 ft: TERRACE DEPOSITS - Yellow brown to reddish brown silty sand with gravel to clayey sand with gravel, very moist, loose (TA - Zone 2A/2B)	MC		2-3-3 (6)		90	11				32
5.0		@ 4 ft: Becomes medium dense with less fines (TA -Zone 2A)	MC		3-4-6 (10)		95	12				23
Bottom of borehole at 5.5 feet.												

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BORING NUMBER B-4

PAGE 1 OF 1

CLIENT	Guillon Inc., Development & Construction	PROJECT NAME	Vineyard Crossing Subdivision
PROJECT NUMBER	2016042	PROJECT LOCATION	165 Lovers Lane, Ukiah, CA
DATE STARTED	3/17/17	COMPLETED	3/17/17
DRILLING CONTRACTOR	Pearson	GROUND ELEVATION	670 ft
DRILLING METHOD	Flight Auger Track Rig	HOLE SIZE	5-inch
LOGGED BY	CHK	CHECKED BY	CHK
NOTES			
GROUND WATER LEVELS:		AT TIME OF DRILLING ---	
		AT END OF DRILLING ---	
		AFTER DRILLING ---	

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		(SC-SM) @ 0-2 ft: TOPSOIL - Dark brown clayey sand to silty sand with gravel, moist to wet, very loose; abundant rootlets										
2.5		(SC-SM) @ 2-5.5 ft: TERRACE DEPOSITS - Yellow brown to reddish brown silty sand with gravel to clayey sand with gravel, moist, very loose (TA - Zone 2B)	MC		1-1-2 (3)		100	13				33
5.0		@ 4 ft: Becomes loose with less fines (TA - Zone 2A)	MC		1-3-3 (6)		99	14				25

Bottom of borehole at 5.5 feet.