Construction • Materials • Technologies Geotechnical, Environmental, & Materials Engineering/Testing/Research

July 16, 2021

Mr. Jeremy Krause 2166 East Wild Pine Drive Ogden, Utah 84403

Subject: Geotechnical Consultation Proposed Charly's Acres About 8450 East 500 South Huntsville, Utah CMT Project Number: 900090

Mr. Krause:

#### INTRODUCTION

We understand that plans are to develop the referenced 38.23-acre property for a residential subdivision. Associated roadways are to be paved with asphaltic concrete. It is our understanding that Weber County has requested the minimum pavement section for residential development meeting the following thicknesses:

Material	County Minimum Residential Pavement Section Thickness (inches)
Asphalt	3.0
Road-Base	6.0
4 inch Minus Subbase	8.0
Total Thickness	17.0

CMT has been asked to further evaluate the onsite near surface soils by completing shallow test pits, soil sampling, and subsequent laboratory testing, followed by an engineering design review with respect to anticipated traffic and laboratory soil California Bearing Ratios (CBR) of the recovered near surface soil.

#### ESTIMATAD TRAFFIC

The estimated traffic over the lifetime for the residential roadways is likely to consist of a light to moderate volume of automobiles/light pick-up trucks, up to about 6 daily medium weight delivery trucks (I.E. UPS/FedEx/Amazon etc.), and occasional to one heavy weight trucks per day (I.E., garbage trucks and larger delivery trucks).

Based on this estimated traffic described above, a total daily ESAL of 6 per day was calculated.

#### FIELD EXPLORATION

On June 18, 2021, CMT personnel arrived on site and visually logged and sampled soils from two shallow test pits extending to depths of about 3.5 feet (test pit TP-1) and 4.0 feet below existing site grades (test pit TP-2). The general location of the test pits is shown on the attached **Figure 1 Site Map**. Further, a graphical representation of the visually logged soils are presented as **Figures 2 and 3 Test Pits**, attached.

At the surface, a layer of topsoil ranging from a few inches to about 12 inches thick was observed. When stripping and grubbing, topsoil should be distinguished by the apparent organic content and not solely by color; thus, we estimate that topsoil stripping will need to include the upper 4 to 12 inches. However, given the past agricultural uses of the site, the upper 12 to 15 inches may have been disturbed during farming.

Below the topsoil at test pit TP-1, natural soils visually consisted of silty CLAY to about 2 feet below the surface underlain by clayey SILT extending to the full depth penetrated, about 3.5 feet.

Below the topsoil at test pit TP-3, natural soils visually consisted of silty CLAY with sand and minor gravel to about 2.5 feet underlain by clayey SAND and GRAVEL soils extending to the full depth penetrated, about 4.0 feet.

#### LABORATORY TESTING

#### <u>General</u>

Bulk soil samples were obtained from the test pits which were subjected to the following laboratory testing:

- 1. Laboratory Compaction Test, AASHTO T-180, Modified Proctor density
- 2. California Bearing Ratio, ASTM D-2937, Subgrade support properties

### Compaction Testing (Laboratory Proctor)

A bulk sample of the natural Silty CLAY was taken from below the topsoil at test pits TP-1. Similarly, a bulk sample of the natural Clayey SAND and GRAVEL soils was taken from the test pit TP-2. A compaction test and subsequent California Bearing Ratio (CBR) test was performed on each of these two samples. The compaction tests were completed in accordance with the (AASHTO<sup>1</sup> T-180) specifications.

<sup>1</sup> American Association of State Highway and Transportation Officials

Location	Sample Depth (feet)	Unified Soil Classification	Optimum Moisture Content (percent)	Maximum Dry Density (pcf)
TP-1	About 1 to 2 feet	CL	11.7	115.3
TP-2	About 2.5 to 3.5 feet	GC-SC	9.7	126.6

#### California Bearing Ration (CBR) Test

To determine subgrade characteristics and to provide data for design of pavements, a California Bearing Ratio (CBR) test was performed on each of the two bulk soil sample described above in the section Compaction Testing (laboratory Proctor). The results of the CBR tests are presented inf the following table:

Location	Moisture Content at Compaction (%)	Compacted Dry Density (PCF)	Percent Compaction	Percent Swell	Measured CBR (0.1/0.2)
TP-1	11.8	112.1	97.2	1.89	16/18
TP-2	8.8	118.9	94	0.9	35/39

#### SUMMARY/RECOMENDATIONS

Utilizing the lowest CBR test value and assuming some reduction due to potential saturated subgrade soil conditions, the minimum pavement section required by the County, as described above, is more than adequate for the estimated traffic conditions.

Our calculations, indicate that the following recommended minimum pavement section required for the estimated traffic conditions and a reduced CBR value from 16 to 8 percent for in-situ variability in subgrade compaction and moisture:

MATERIAL	PAVEMENT SECTION THICKNESS (inches)
Asphalt	3
Road-Base	8
Subbase	0
Total Thickness	11

Geotechnical Consultation Charly's Acres, Huntsville, Utah CMT Project No. 900090

Minimal site preparation should consist of removing the topsoil/organics followed by the scarification, moisture conditioning and recompacting the exposed 6 to 8 inches of natural soil to a minimum of 92 percent of the Modified Proctor density (AASHTO T-180/ASTM<sup>2</sup> D1557).

#### **CLOSURE**

We appreciate the opportunity to provide geotechnical services on your project. Please call with any questions at 801-590-0394.

Sincerely,

**CMT Engineering Laboratories** FESSIO YAN N. ROBERTS 20

Bryan N. Roberts Senior Geotechnical Engineer

Attachments: Figure 1 Site Map; Figures 2 and 3 Test Pit Logs Laboratory CBR Test Sheets (2) Pavement Calculations

Addressee (email)

Reviewed by:

Andrew M Harris, P.E. Geotechnical Division Manager

<sup>2</sup> American Society for Testing Materials



		Huntsville Pavement	٦	ſes	st F	Pit	Lo	g		٢P	)_^	1
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					epin.	(566		adat	ion	ου #. Λ++		
Depth (ft)	GRAPHIC LOG	Soil Description	sample Type	sample #	Aoisture (%)	/ Density(pc	Bravel %	and %	ines %		2	- G
0		1' Topsoil		0,	2	5		0,			<u> </u>	
1 -		Dark Brown Silty CLAY (CL) moist, stiff		1								
2 -		Reddish-Tan Clayey SILT (ML) moist, stiff										
3 -				2								
4 -		END AT 3.5'										
5 -												
6 -												
7 -												
8 -												
9 -												
10 -												
11 -												
12 -												
13 -												
14												
Rem	arke	Groundwater net encountered during exception										

Coordinates: °, ° Surface Elev. (approx): Not Given Equipment: Rubber Tire Backhoe Excavated By: Farrer Excavation Logged By: Nate Pack Figure:

2

Page: 1 of 1



## **Huntsville Pavement**

Near 8450 East 500 South, Huntsville, Utah

Test Pit	Log
Total Depth: 4'	

Water Depth: (see Remarks)

Date: 2/20/17 Job #: (enter job #

	0		be		(%	ocf)	Gra	adat	ion	Att	erb	erg
Depth (ft	GRAPHIC LOG	Soil Description	Sample Ty	Sample #	Moisture (9	Dry Density(I	Gravel %	Sand %	Fines %	ΓΓ	ЪГ	₫
0		Topsoil, about 12 inches; dark brown silty clay with minor gravel moist, medium dense										
1 -		Dark Brown Silty CLAY (CL) with sand and minor gravel										
2 -												
3 -		Red Brown Clayey fine GRAVEL(GC) with Sand moist, dense										
4 -		END AT 4'		3								
5 -												
6 -												
7 -												
8 -												
9 -												
10 -	-											
11 -												
12 -												
13 -												
14												

Remarks: Groundwater not encountered during excavation.

Coordinates: °, ° Surface Elev. (approx): Not Given



Equipment: Rubber Tire Backhoe Excavated By: Farrer Excavation Logged By: Nate Pack Figure:

# **Huntsville Pavement**

Near 8450 East 500 South, Huntsville, Utah

# Key to Symbols

Date: 2/20/17

Job #: (enter job #)

													Gra	adat	tion	Att	erb	erg	
1	2					4	5	6	Cl		8			9					
Depth (ft)	GRAPHIC LOC			Soil De			Sample Type	Sample #	Moisture (%)	Dry Density(p	Gravel %	Sand %	Fines %	E	PL	Ы			
	COLUMN DESCRIPTIONS																		
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2	Graphic (see 2	<b>Log:</b> Obelow).	Graphic depict	ing type of soil er	ncountered		<u>LL = Liqui</u> plastic to liq	<b>id Limit (%</b> juid behavi	<u>6):</u> W or.	ater (	conte	nt at w	/hich a	a soil	chang	jes fro	m		
3	Soil Des Unified S	scriptio Soil Clas	on: Description ssification Syr	n of soils encount mbol (see below).	ered, including		PL = Plast to plastic be	tic Limit (9 ehavior.	<u>%):</u> V	Vater	conte	ent at v	which	a soil	chang	ges fro	om liq	quid	
4	<u>Sample</u> shown; s	Type: ampler	Type of soil sa symbols are	ample collected a explained below-	t depth interval right.		PI = Plasti plastic prope	<b>icity Index</b> erties (= Li	(%): iquid	: Ran Limit	ge of - Plas	water stic Lir	conte nit).	ent at v	which	a soil	exhib	oits	
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6	Moistur	<u>e (%):</u> V	Nater content	of soil sample m	easured in		Description	Thickness	5		┨Ё	Trac	Э	Dry: /	bsen	ce of r	noist	ure,	
$\overline{\mathcal{T}}$	Dry Den	sity (perc	<u>cf):</u> The dry de	ensity of a soil me	easured in		Seam Lense	Up to ½ I Up to 12	ncn inche	es		<5%	e	Moist	: Dam	np / mo	ouch. Dist to	D	
$\odot$	laborator Gradatio	ry (pour <b>on:</b> Per	nds per cubic	foot). Gravel, Sand and	Fines		Layer Occasional	Greater to 1 or less	han ´ per f	12 in. oot		5-12% With	6 1	the to water.	uch, b	ut no	visible	e	
8	(Silt/Clay No. 4 an	/), obtai d No. 2	ined from lab	test results of soi	l passing the		Frequent	More that	n 1 p	er foc	ot	> 12%	6	Wet:	Visible	e wate	r,		
Ι.										nd No. 200 sieves.									
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2. The subsurface conditions represented on the logs are for the locations specified. Caution should be exercised if interpolating between or extrapolating beyond the exploration locations.

3. The information presented on each log is subject to the limitations, conclusions, and recommendations presented in this report.



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July 6, 2021 Jeremy Krause 2166 E. Wild Pine Dr. Ogden, UT 84403

### California Bearing Ratio ASTM D-1883

			Job No: 90	0090	
Project: Charly's Acr	es		Date Tested: 6/	18/2021	
Soil Description: Silty Clay			Lab No: 89	7339	
Proctor Method: T-180	Blows:	56	Technician: E	/	
Location: Existing					
Visual Soil Classification:			Dry Density:	112.1	PCF
Proctor Valu	les		Moisture Content as compacted:	11.8	%
Maximum Dry Density (pcf):	115.3		Percent Compaction:	97.2	%
Optimum Moisture (%):	11.7		Surcharge (lbs.):	10	Lbs.
			Immersion duration:	96	hrs.



Sesan And

Manager

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July 6, 2021 Jeremy Krause 2166 E. Wild Pine Dr. Ogden, UT 84403

### California Bearing Ratio ASTM D-1883

			Job No: 9	00090	
Project: Charly's Acr	es		Date Tested: 6	/18/2021	
Soil Description: Silty Clayey	Sand wit	h Gravel	Lab No: 8	97339	
Proctor Method: T-180	Blows:	56	Technician: E	V	
Location: Existing					
Visual Soil Classification:			Dry Density:	118.9	PCF
Proctor Valu	les		Moisture Content as compacted:	8.8	%
Maximum Dry Density (pcf):	126.6		Percent Compaction:	93.9	%
Optimum Moisture (%):	9.7		Surcharge (lbs.):	10	Lbs.
			Immersion duration:	96	hrs.





Susan And

Manager

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