When Recorded Mail To:
American Fork City
51 East Main
American Fork UT 84003

ENT 73503:2022 PG 1 of 47
ANDREA ALLEN
UTAH COUNTY RECORDER
2022 Jun 23 10:56 am FEE 0.00 BY KC
RECORDED FOR AMERICAN FORK CITY

NOTICE OF INTEREST, BUILDING REQUIREMENTS, AND ESTABLISHMENT OF RESTRICTIVE COVENANTS

This Notice is recorded to bind the attached Geotechnical Study dated FEB. 11, 2020 along with the site grading plan to the property generally located at 500 S. 1100 W. (address), American Fork, UT 84003 and therefore mandating that all construction be in compliance with said Geotechnical Study and site grading plan per the requirements of American Fork City ordinances and standards and specification including specifically Ordinance 07-10-47, Section 6-5, Restrictive Covenant Required and 6-2-4, Liquefiable Soils. Said Sections require establishment of a restrictive covenant and notice to property owners of liquefiable soils or other unique soil conditions and construction methods associated with the property.

Exhibit A – Legal Description of Property
Exhibit B – Geotechnical Study
Exhibit C – Site Grading Plan

Dated this 23 day of May, 2022.

OWNER(S):

(Signature) _____ (Signature) _____

Ken Cardner _____ (Printed Name) _____ (Printed Name)

Owner _____ (Title) _____ (Title)

STATE OF UTAH)
§
COUNTY OF Utah)

On the 23rd day of May, 2022, personally appeared before me Ken Cardner and _____, Owner(s) of said Property, as (individuals and/or authorized representatives of a company), and acknowledged to me that such individuals or company executed the within instrument freely of their own volition and pursuant to the articles of organization where applicable.

NOTARY PUBLIC
SCOTT M ROBERTS
COMM. # 711750
MY COMMISSION EXPIRES
APRIL 30, 2024
STATE OF UTAH

_____
Notary Public
My Commission Expires: 4/30/24

Approved as to form: American Fork City Attorney

Rev. 12/4/18

Rockwell Ranch Block 8 Plat

Beginning at a point being North 89°59'22" East 1,811.54 feet along section line and South 46.75 feet from the West Quarter Corner of Section 22, Township 5 South, Range 1 East, Salt Lake Base and Meridian; and running

thence Northwesterly 23.61 feet along the arc of a 15.00 foot radius curve to the right (center bears North 00°35'46" East and the chord bears North 44°18'37" West 21.24 feet with a central angle of 90°11'14");
thence North 00°11'49" West 54.12 feet;
thence East 327.71 feet;
thence South 01°17'45" West 72.64 feet;
thence North 89°23'31" West 311.06 feet to the point of beginning.

Contains 23,119 Square Feet or 0.531 Acres

CMT ENGINEERING LABORATORIES

ENGINEERING •GEOTECHNICAL •ENVIRONMENTAL (ESA I & II) •
MATERIALS TESTING •SPECIAL INSPECTIONS •
ORGANIC CHEMISTRY • PAVEMENT
DESIGN •GEOLOGY

GEOTECHNICAL ENGINEERING STUDY

Multi-Residential Development

About 500 South 1100 West
American Fork, Utah
CMT PROJECT NO. 14033

FOR:
White Horse Developers
520 South 850 East
Lehi, Utah 84043

February 11, 2020

CMT ENGINEERING LABORATORIES

February 11, 2020

Mr. Jake Horan
White Horse Developers
520 South 850 East
Lehi, Utah 84043

Subject: Geotechnical Engineering Study
Multi-Residential Development
About 500 South 1100 West
American Fork, Utah
CMT Project Number: 14033

Mr. Horan:

Submitted herewith is the report of our geotechnical engineering study for the subject site. This report contains the results of our findings and an engineering interpretation of the results with respect to the available project characteristics. It also contains recommendations to aid in the design and construction of the earth related phases of this project.

On January 15, 16 and 31, 2020, a CMT Engineering Laboratories (CMT) geologist was on-site and supervised the excavation of 14 test pits extending to depths of about 11 to 12 feet, and the drilling of 1 bore hole to a depth of about 46.5 feet, below the existing ground surface. Soil samples were obtained during the field operations and subsequently transported to our laboratory for further testing and observation.

Conventional spread and/or continuous footings may be utilized to support the proposed structures, provided the recommendations in this report are followed. A detailed discussion of design and construction criteria is presented in this report.

We appreciate the opportunity to work with you at this stage of the project. CMT offers a full range of Geotechnical Engineering, Geological, Material Testing, Special Inspection services, and Phase I and II Environmental Site Assessments. With 9 offices throughout Utah, Idaho and Arizona, our staff is capable of efficiently serving your project needs. If we can be of further assistance or if you have any questions regarding this project, please do not hesitate to contact us at (801) 492-4132.

CERTIFICATE: I hereby certify that I am a licensed professional engineer, as defined in the "Sensitive Lands Ordinance" Section of the American Fork City Ordinances. I have examined the report to which this certificate is attached and the information and conclusions contained therein are, without any reasonable reservation not stated therein, accurate and complete. The procedures and tests used in said report meet minimum applicable professional standards.

Sincerely,
CMT Engineering Laboratories

LICENSED PROFESSIONAL ENGINEER
171715
WILLIAM G. TURNER
2/11/2020
STATE OF UTAH

William G. Turner, P.E., M.ASCE
Senior Geotechnical Engineer

Reviewed by:

Jeffrey J. Egbert, P.E., LEED A.P., M.ASCE
Senior Geotechnical Engineer

CMT ENGINEERING LABORATORIES

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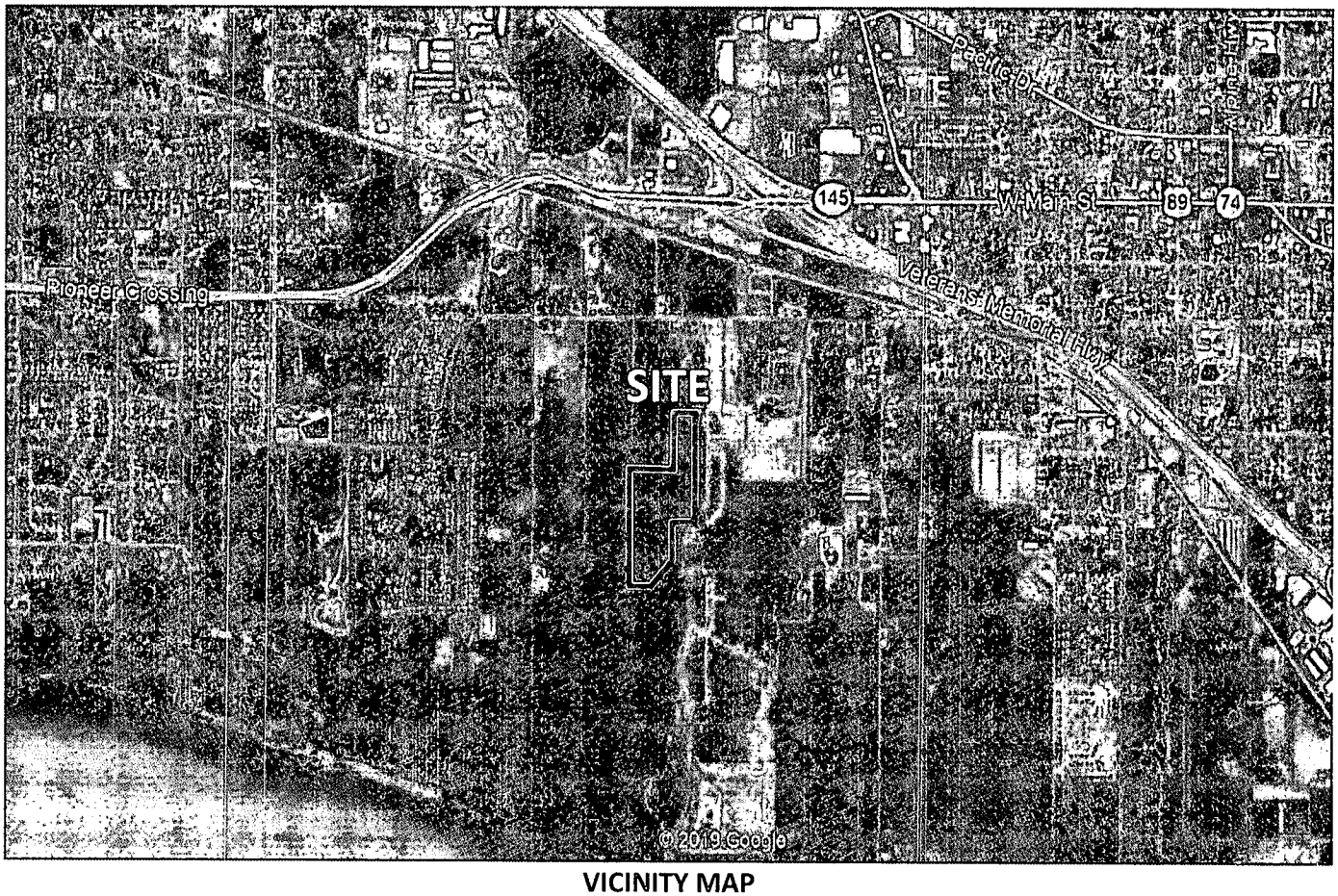
APPENDIX

Figure 1: Site Map
Figures 2: Bore Hole Log
Figures 3-16: Test-Pit Logs
Figure 17: Key to Symbols
Calculations (4 Pages)

1.0 INTRODUCTION

1.1 General

CMT Engineering Laboratories (CMT) was retained to conduct a geotechnical subsurface study for a proposed multi-residential development. The site is situated on the west side of 1100 West at about 500 South in American Fork, Utah, as shown in the **Vicinity Map** below.



VICINITY MAP

1.2 Objectives, Scope and Authorization

The objectives and scope of our study were planned in communications between Mr. Jake Horan of White Horse Developers, and Mr. Bill Turner of CMT Engineering Laboratories (CMT). In general, the objectives of this study were to define and evaluate the subsurface soil and groundwater conditions at the site, and provide appropriate foundation, earthwork, pavement and seismic recommendations to be utilized in the design and construction of the proposed development.

In accomplishing these objectives, our scope of work has included performing field exploration, which consisted of the drilling/logging/sampling of 1 bore hole and excavating/logging/sampling of 14 test pits, performing laboratory testing on representative samples of the subsurface soils collected in the explorations, and conducting an office program, which consisted of correlating available data, performing engineering analyses, and preparing this summary report. This scope of work was authorized by returning a signed copy of our proposal dated January 3, 2020 and executed that same day.

1.3 Description of Proposed Construction

We understand that the proposed construction consists of developing approximately 27 acres for the construction of multi-family residences, with about five 10-plex condominiums and the remainder being townhomes. These buildings will be 2 to 3 stories in height above existing grade, with slabs on grade. We also project that maximum structural loads will be 6,000 pounds per lineal foot for walls, 100,000 pounds for columns, and 150 pounds per square foot for floors. If the loading conditions are different than we have projected, please notify us so that any appropriate modifications to our conclusions and recommendations contained herein can be made.

City master-planned roadways will also be constructed, including part of 1100 West, 620 South and 350 South, which we project will utilize asphalt surfacing. Paved parking/drive areas will also be constructed, which we anticipate will utilize asphalt and possibly concrete pavements. Traffic is projected to consist of mostly automobiles and light trucks, a few weekly medium-weight delivery trucks and a weekly garbage truck

Site development will require some earthwork in the form of minor cutting and filling. A site grading plan was not available at the time of this report, but we project that maximum cuts and fills may be on the order of 3 to 4 feet. If deeper cuts or fills are planned, CMT should be notified to provide additional recommendations, if needed.

1.4 Executive Summary

The most significant geotechnical aspects regarding site development include the following:

1. Topsoil blankets the site, which will require removal beneath buildings, pavement and flatwork.
2. Groundwater was encountered during field explorations at depths as shallow as 2 feet below the existing site grades. Dewatering of excavations should be anticipated.
3. Subsurface natural soils consisted of CLAY (CL) and Silty SAND (SM) to the maximum depth explored of 46.5 feet below the existing site grades. Our analysis indicates that liquefaction will not occur within these sandy layers.
4. Footings should be constructed on a minimum 18 inches of structural fill to limit settlements.

CMT must assess that topsoil, non-engineered fill, debris, disturbed or unsuitable soils have been removed and that suitable soils have been encountered prior to placing site grading fills, footings, slabs, and pavements.

In the following sections, detailed discussions pertaining to the site and subsurface descriptions, geologic/seismic setting, earthwork, foundations, lateral resistance, lateral pressure, floor slabs, and pavements are provided.

2.0 FIELD EXPLORATION

In order to define and evaluate the subsurface soil and groundwater conditions, 14 test pits were excavated to depths of about 11 to 12 feet and 1 bore hole was drilled to a depth of about 46.5 feet, below the existing ground surface. Locations of these explorations are presented on **Figure 1.**

Samples of the subsurface soils encountered in the bore hole were collected at varying depths through the hollow stem drill augers. Disturbed samples were collected utilizing a standard split spoon sampler. This standard split spoon sampler was driven 18 inches into the soils below the drill augers using a 140-pound hammer free-falling a distance of 30 inches. The number of hammer blows needed for each 6-inch interval was recorded. The sum of the hammer blows for the final 12 inches of penetration is known as a standard penetration test and this 'blow count' was recorded on the bore hole logs. The blow count provides a reasonable approximation of the relative density of granular soils, but only a limited indication of the relative consistency of fine-grained soils because the consistency of these soils is significantly influenced by the moisture content.

Representative soil samples from the test pits were collected by obtaining disturbed "grab" samples and utilizing a 2.5-inch outside diameter thin-wall drive sampler from within the test pits. The samples were placed in sealed plastic bags and containers prior to transport to the laboratory.

Soil samples were collected as described above, and were classified in the field in general accordance with ASTM[1] D-2488 based upon visual and textural examination. These field classifications were supplemented by subsequent examination and testing of select samples in our laboratory. Logs of the explorations, including a description of the soil strata encountered, are presented on the Bore Hole Log and each individual Test-Pit Log, **Figures 2 through 16**, included in the Appendix. Sampling information and other pertinent data and observations are also included on the logs. In addition, a Key to Symbols defining the terms and symbols used on the logs is provided as **Figure 17** in the Appendix.

Following completion of excavation and logging operations, 1.25-inch diameter slotted PVC pipe was installed in the test pits to allow subsequent water level measurements.

3.0 LABORATORY TESTING

Selected samples of the subsurface soils were subjected to various laboratory tests to assess pertinent engineering properties, as follows:

[1]American Society for Testing and Materials

1. Moisture Content, ASTM D-2216, Percent moisture representative of field conditions
2. Dry Density, ASTM D-2937, Dry unit weight representing field conditions
3. Atterberg Limits, ASTM D-4318, Plasticity and workability
4. Gradation Analysis, ASTM D-1140/C-117, Grain Size Analysis
5. One Dimension Consolidation, ASTM D-2435, Consolidation properties

To provide data necessary for our settlement analyses, a consolidation test was performed on each of 4 representative sample of the surficial clay soils encountered across the site. Based upon data obtained from the consolidation testing, the clay soils at this site are moderately over-consolidated and moderately compressible under additional loading. Detailed results of the consolidation tests are maintained within our files and can be transmitted to you, if so desired.

Laboratory test results are presented on the bore hole logs (**Figures 2 through 16**) and in the following Lab Summary Table:

LAB SUMMARY TABLE

TEST	DEPTH	SOIL	SAMPLE	MOISTURE	DRY DENSITY	GRADATION			ATTERBERG LIMITS			COLLAPSE (-)/
PIT	(feet)	CLASS	TYPE	CONTENT(%)	(pcf)	GRAV.	SAND	FINES	LL	PL	PI	EXPANSION(+)
B-1	7.5	CL	SPT	21				84	33	18	15	
	10	SM	SPT	23				23				
	25	SM	SPT	22				41				
TP-1	7	CL	Bag	35				89				
TP-3	2.5	CL	Thin Wall	20	91				27	18	9	+0.3%
TP-5	5	CL	Bag	27				90				
TP-7	2.5	CL	Thin Wall	30	94				41	23	18	+0.0%
	9	CL	Bag	38				91				
TP-10	5	CL	Thin Wall	20	103				43	21	23	+0.2%
TP-11	2.5	CL	Thin Wall	28				85				
TP-13	1.5	CL	Thin Wall	46	74				45	24	21	-0.1%

4.0 GEOLOGIC & SEISMIC CONDITIONS

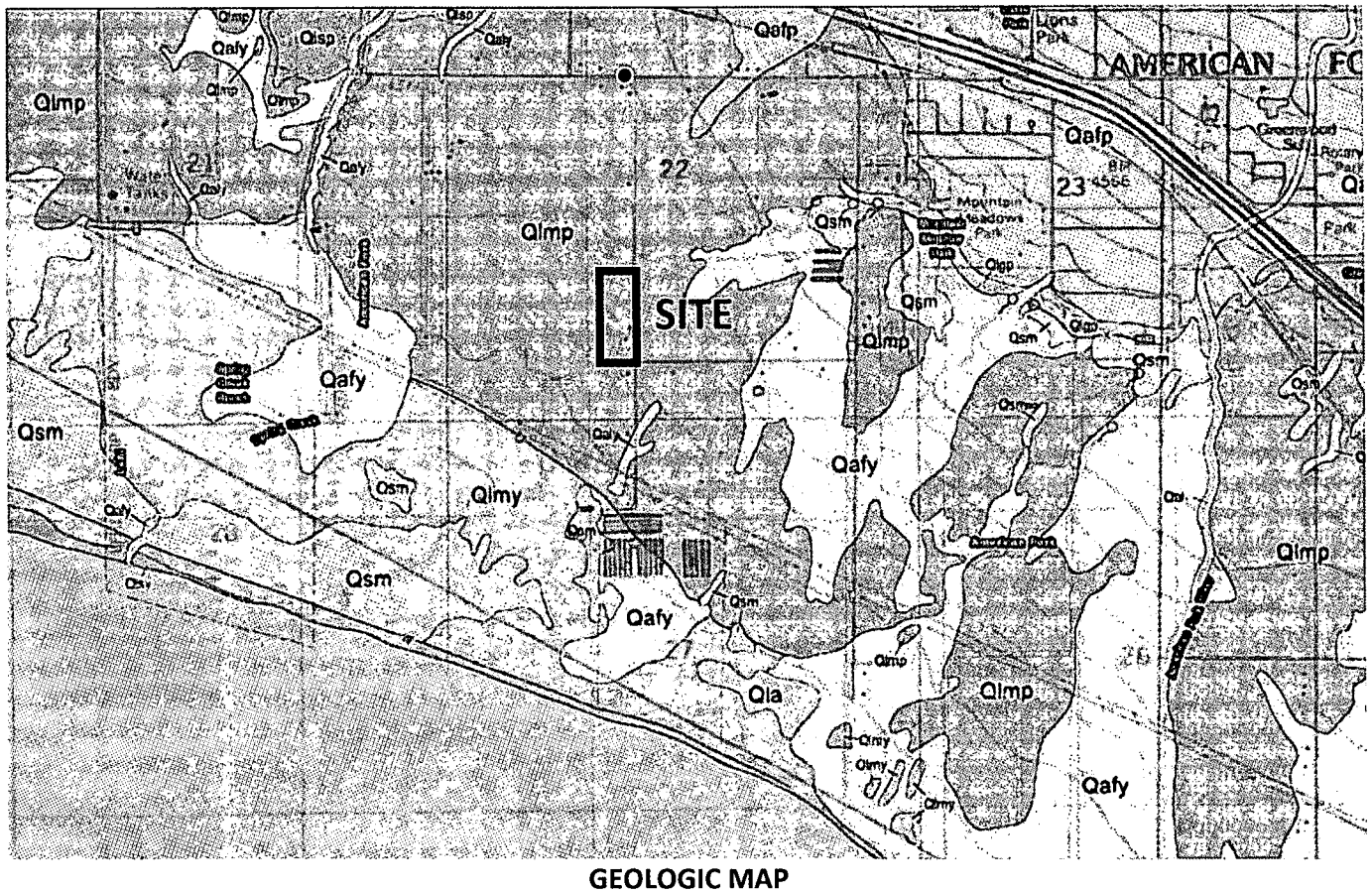
4.1 Geologic Setting

The subject site is located in the north-central portion of Utah Valley in north-central Utah at an elevation of approximately 4,506 feet above sea level. Utah Valley is a deep, sediment-filled basin that is part of the Basin and Range Physiographic Province. The valley was formed by extensional tectonic processes during the Tertiary and Quaternary geologic time periods, and is bordered by the Wasatch Mountain Range on the east and Lake Mountain and West Mountain on the west. Utah Valley is located within the Intermountain Seismic Belt, a zone of ongoing tectonism and seismic activity extending from southwestern Montana to southwestern Utah. The active (evidence of movement in the last 10,000 years) Wasatch Fault Zone is part of the Intermountain Seismic Belt and extends from southeastern Idaho to central Utah along the western base of the Wasatch Mountain Range.

Much of northwestern Utah, including Utah Valley, was also previously covered by the Pleistocene age Lake Bonneville. Utah Lake, which currently occupies much of the western portion of the valley, is a remnant of this ancient fresh water lake. Lake Bonneville reached a high-stand elevation of between approximately 5,160 and 5,200 feet above sea level at between 18,500 and 17,400 years ago. Approximately 17,400 years ago, the lake breached its basin in southeastern Idaho and dropped by almost 300 feet relatively fast as water drained into the Snake River. Following this catastrophic release, the lake level continued to drop slowly over time, primarily driven by drier climatic conditions, until reaching the current levels of Utah Lake and the larger Great Salt Lake to the north. Shoreline terraces formed at the high-stand elevation of the lake and several subsequent lower lake levels are visible in places on the mountain slopes surrounding the valley. Much of the sediment within Utah Valley was deposited as lacustrine sediments during both the transgressive (rise) and regressive (fall) phases of Lake Bonneville and in older, pre-Bonneville lakes that previously occupied the basin.

The geology of USGS "Pelican Point, Utah" 7.5 Minute Quadrangle, which includes the location of the subject site, has been mapped by the Utah Geological Survey[2]. The surficial geology on the majority of the subject site and adjacent properties is mapped as "Lacustrine silt and clay" (Map Unit Qlmp) dated to be upper Pleistocene. Unit Qlmp is described in the referenced mapping as "Calcareous silt (marl) and clay with minor fine sand; typically laminated or thin bedded; ostracodes locally common; deposited in quiet water in moderately deep parts of the Bonneville basin and in sheltered bays; overlies lacustrine silt and clay of the transgressive phase and grades upslope into lacustrine sand and silt (Qlsp); locally buried by loess veneer; regressive lacustrine shorelines typically poorly developed; extensive exposure within two miles (3 km) of the Utah Lake shore incised by young alluvial fans (Qafy), and small remnants south of Pelican Point. Machette (1992) reported that silt and clay of the regressive phase can be differentiated from silt and clay of the transgressive phase by the presence of conchoidal fractures in blocks of transgressive deposits and their absence in regressive deposits, but Qlmp may include some undifferentiated transgressive deposits. Exposed thickness less than 15 feet (5 m), but total thickness may exceed several tens of feet." No fill has been mapped at the location of the property on the geologic map. Refer to the **Geologic Map**, shown below.

[2] Solomon, B.J., Biek, R.F., and Ritter, S.M., 2009, Geologic Map of the Pelican Point Quadrangle, Utah County, Utah; Utah Geological Survey Map 244, Scale 1:24,000.



GEOLOGIC MAP

4.2 Faulting

No surface fault traces are shown on the referenced geologic map crossing or projecting toward the subject site. The nearest mapped active fault is a segment of the Utah Lake faults, located approximately 2.1 miles to the southwest.

4.3 Seismicity

4.3.1 Site Class

Utah has adopted the International Building Code (IBC) 2018, which determines the seismic hazard for a site based upon 2014 mapping of bedrock accelerations prepared by the United States Geologic Survey (USGS) and the soil site class. The USGS values are presented on maps incorporated into the IBC code and are also available based on latitude and longitude coordinates (grid points). For site class definitions, IBC 2018 Section 1613.2.2 refers to Chapter 20, Site Classification Procedure for Seismic Design, of ASCE[3] 7-16. Given the subsurface soils encountered in our explorations at the site, and the subsurface conditions encountered in a bore hole drilled for the Pioneer Crossing Interchange approximately 2,000 feet north of the site, which extended to a depth of

[3]American Society of Civil Engineers

103 feet, it is our opinion the site best fits Site Class D – Stiff Soil Profile (with data), which we recommend for seismic structural design.

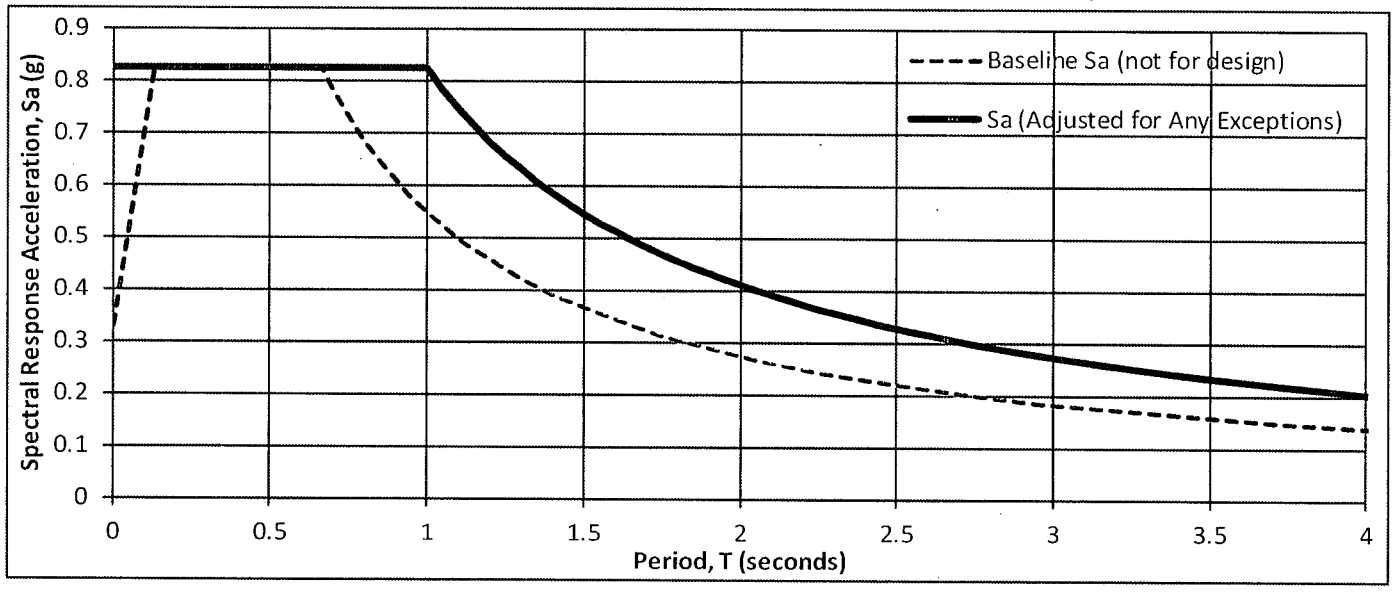
4.3.2 Ground Motions

The 2014 USGS mapping utilized by the IBC provides values of peak ground, short period and long period accelerations for the Site Class B/C boundary and the Maximum Considered Earthquake (MCE). This Site Class B/C boundary represents average bedrock values for the Western United States and must be corrected for local soil conditions. The following table summarizes the peak ground, short period and long period accelerations for the MCE event, and incorporates appropriate soil correction factors and any possible exceptions for a Site Class D soil profile at site grid coordinates of 40.3662 degrees north latitude and -111.8248 degrees west longitude (also see response spectrum on the following page):

SPECTRAL ACCELERATION VALUE, T	SITE CLASS B/C BOUNDARY [mapped values] (g)	SITE COEFFICIENT	SITE CLASS D* [adjusted for site class effects] (g)	MULTI-PLIER	DESIGN VALUES (g)
Peak Ground Acceleration	PGA = **0.547**	F_{pga} = 1.100	PGA_M = 0.602	1.000	PGA_M = 0.602
0.2 Seconds (Long Period Acceleration)	S_S = **1.225**	F_a = 1.010	S_{MS} = 1.237	0.667	S_{DS} = 0.825
	(exceptions, if any)	F_a = (N/A)	S_{MS} = (N/A)	0.667	S_{DS} = (N/A)
1.0 Second (Long Period Acceleration)	S_1 = **0.442**	F_v = N/A	S_{M1} = N/A	0.667	S_{D1} = N/A
	(exceptions, if any)	F_v = **(1.858)**	S_{M1} = **(0.821)**	0.667	S_{D1} = **(0.547)**

NOTES: *** Site Class D With Data**

1. T_L = 8 seconds
2. Site Class: **D**
3. Have data to verify? **yes**
4. **ASCE 7-16 requires Site Specific Ground Motion Hazard Analysis (S1 ≥ 0.2), OR Can Use Exception 2**



4.3.3 Liquefaction

The site is located within an area designated by the Utah Geologic Survey[4], and in the American Fork Sensitive Lands Ordinance[5] as having "High" liquefaction potential. Liquefaction is defined as the condition when saturated, loose, sandy soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event. Clayey soils, even if saturated, will generally not liquefy during a major seismic event.

We evaluated the liquefaction potential of the site using the procedures described in Youd et al[6] and Idriss & Boulanger[7], and only apply to the saturated sandy deposits. Our evaluation indicates that the saturated sandy soils will not liquefy due to a seismic event. Thus, liquefaction mitigation is not necessary.

4.4 Other Geologic Hazards

No landslide deposits or features are mapped on or adjacent to the site. The site is not located within a currently known or mapped potential debris flow, stream flooding, or rock fall hazard area.

5.0 SITE CONDITIONS

5.1 Surface Conditions

At the time the field work was performed for this study the site consisted of vacant fields. Overall, the site is relatively flat, with a very slight slope downward to the south. Based upon aerial photos dating back to 1993 that are readily available on the internet, the site has been used for farming/agricultural purposes since that time. The site is bordered on the north, south and west by undeveloped land, on the east by a graded road (not yet paved) and on the southeast by 2 single-family structures (see **Vicinity Map** in **Section 1.1** above).

5.2 Subsurface Soils

At the locations of the explorations we encountered approximately 2 to 4 inches of topsoil at the surface. Natural soils were observed beneath the topsoil, consisting of CLAY (CL) and Silty SAND (SM), extending to the full depth penetrated, 46 feet.

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[4] Utah Geological Survey, "Liquefaction-Potential Map for a Part of Utah County, Utah," Utah Geological Survey Public Information Series 28, August 1994. https://ugspub.nr.utah.gov/publications/public_information/pi-28.pdf

[5] American Fork City Sensitive Lands, Sensitive Lands Ordinance and Reference Materials, 2007, Proposed Liquefaction Hazards Map

[6] Youd, T.L.; Idriss, I.M.; Andrus, R.D.; Arango, I.; Castro, G.; Christian, J.T.; Dobry, R.; Finn, W.D.L.; Harder, L.F. Jr.; Hynes, M.E.; Ishihara, K.; Koester, J.P.; Liao, S.C.; Marcuson, W.F. III; Martin, G.R.; Mitchell, J.K.; Moriwaki, Y.; Power, M.S.; Robertson, P.K.; Seed, R.B.; and Stokoe, K.H. II; October 2001, "Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils," ASCE Journal of Geotechnical and Geoenvironmental Engineering, p 817-833.

[7] Idriss, I.M. and Boulanger, R.W., December 2010, "SPT-Based Liquefaction Triggering Procedures," Department of Civil & Environmental Engineering, University of California at Davis, Report No. UCD/CGM 10/02, 259 p.

The silt/clay soils were moist to wet, brown to dark gray in color, and estimated to be medium stiff to very stiff in consistency. They also exhibited moderate over consolidation and strength characteristics, as well as a very slight potential for swelling when wetted.

The natural sand soils were wet, gray to dark gray in color, and estimated to be dense. They will also exhibit moderately high strength and low compressibility characteristics.

For a more descriptive interpretation of subsurface conditions, please refer to the exploration logs, **Figures 2 through 16**, which graphically represent the subsurface conditions encountered. The lines designating the interface between soil types on the logs generally represent approximate boundaries - in situ, the transition between soil types may be gradual.

5.3 Groundwater

Groundwater was encountered in the explorations during drilling/excavations at depths of about 2 to 9.5 feet below existing grades. These depths to groundwater will likely affect excavations at this site. Historic groundwater levels were not available at this site and visual indicators (i.e. oxidation) were not observed within the soil samples obtained during drilling; therefore, it is our opinion a groundwater level of 2 feet can be used as the historic groundwater level for this project area.

Groundwater levels can fluctuate as much as 1.5 to 2 feet seasonally. Numerous other factors such as heavy precipitation, irrigation of neighboring land, and other unforeseen factors, may also influence ground water elevations at the site. The detailed evaluation of these and other factors, which may be responsible for ground water fluctuations, is beyond the scope of this study.

5.4 Site Subsurface Variations

Based on the results of the subsurface explorations and our experience, variations in the continuity and nature of subsurface conditions should be anticipated. Due to the heterogeneous characteristics of natural soils, care should be taken in interpolating or extrapolating subsurface conditions between or beyond the exploratory locations.

6.0 SITE PREPARATION AND GRADING

6.1 General

All deleterious materials should be stripped from the site prior to commencement of construction activities. This includes vegetation, topsoil, loose and disturbed soils, etc. Based upon the conditions observed at the locations of the explorations, there is topsoil on the surface of the site which we estimated to be about 2 to 4 inches in thickness. 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 inches. However, given the past agricultural uses of the site, the upper 12 to 15 inches may have been disturbed during

farming. Where trees are/were located, large roots and/or root balls likely extend deeper and must also be removed from building and pavement areas. Due to the shallow groundwater, stripping and grubbing should be kept to the minimum amount required to remove vegetation and the most significant amount of organic material.

The site should be examined by a CMT geotechnical engineer to assess that suitable natural soils have been exposed and any deleterious materials, loose and/or disturbed soils have been removed or prepared as described above, prior to placing site grading fills, footings, slabs, and pavements.

Fill placed over large areas to raise overall site grades can induce settlements in the underlying natural soils. If more than 3 feet of site grading fill is anticipated over the natural ground surface, we should be notified to assess potential settlements and provide additional recommendations as needed. These recommendations may include placement of the site grading fill far in advance to allow potential settlements to occur prior to construction.

6.2 Temporary Excavations

Excavations deeper than 8 feet are not anticipated at the site. Groundwater as shallow as 2 feet was encountered at this site. We anticipate that excavations extending 2 feet below the existing site grades could encounter groundwater and dewatering of excavations will likely be required.

The near-surface natural soils encountered at this site predominantly consisted of clay. In clayey (cohesive) soils, temporary construction excavations not exceeding 4 feet in depth may be constructed with near-vertical side slopes. Temporary excavations up to 8 feet deep, above or below groundwater, may be constructed with side slopes no steeper than one-half horizontal to one vertical (0.5H:1V).

For sandy (cohesionless) soils, temporary construction excavations not exceeding 4 feet in depth should be no steeper than one-half horizontal to one vertical (0.5H:1V). For excavations up to 8 feet and above groundwater, side slopes should be no steeper than one horizontal to one vertical (1H:1V). Excavations encountering saturated cohesionless soils will be very difficult to maintain, and will require very flat side slopes and/or shoring, bracing and dewatering.

To reduce disturbance of the natural soils during excavation, we recommend that smooth edge buckets/blades be utilized.

All excavations must be inspected periodically by qualified personnel. If any signs of instability or excessive sloughing are noted, immediate remedial action must be initiated. All excavations should be made following OSHA safety guidelines.

6.3 Fill Material

Following are our recommendations for the various fill types we anticipate will be used at this site:

FILL MATERIAL TYPE	DESCRIPTION | RECOMMENDED SPECIFICATION
Structural Fill	Placed below structures, flatwork and pavement. Well-graded sand/gravel mixture, with maximum particle size of 4 inches, a minimum 70% passing 3/4-inch sieve, a maximum 20% passing the No. 200 sieve, and a maximum Plasticity Index of 10.
Site Grading Fill	Placed over larger areas to raise the site grade. Sandy to gravelly soil, with a maximum particle size of 6 inches, a minimum 70% passing 3/4-inch sieve, and a maximum 50% passing No. 200 sieve.
Non-Structural Fill	Placed below non-structural areas, such as landscaping. On-site soils or imported soils, with a maximum particle size of 8 inches, including silt/clay soils not containing excessive amounts of degradable/organic material (see discussion below).
Stabilization Fill	Placed to stabilize soft areas prior to placing structural fill and/or site grading fill. Coarse angular gravels and cobbles 1 inch to 8 inches in size. May also use 1.5- to 2.0-inch gravel placed on stabilization fabric, such as Mirafi RS280i, or equivalent (see **Section 6.6**).

On-site soils could be used as site grading fill and non-structural fill, but many of these soils are likely well above optimum moisture content and will be inherently more difficult to work with in proper moisture conditioning (they are very sensitive to changes in moisture content), requiring very close moisture control during placement and compaction. This will be very difficult, if not impossible, during wet and cold periods of the year. We also recommend the site grading fill thickness using on-site soils not exceed 2 feet below structures, to minimize potential settlements.

All fill material should be approved by a CMT geotechnical engineer prior to placement.

6.4 Fill Placement and Compaction

The various types of compaction equipment available have their limitations as to the maximum lift thickness that can be compacted. For example, hand operated equipment is limited to lifts of about 4 inches and most "trench compactors" have a maximum, consistent compaction depth of about 6 inches. Large rollers, depending on soil and moisture conditions, can achieve compaction at 8 to 12 inches. The full thickness of each lift should be compacted to at least the following percentages of the maximum dry density as determined by ASTM D-1557 (or AASHTO[8] T-180) in accordance with the following recommendations:

LOCATION	TOTAL FILL THICKNESS (FEET)	MINIMUM PERCENTAGE OF MAXIMUM DRY DENSITY
Beneath an area extending at least 4 feet beyond the perimeter of structures, and below flatwork and pavement (applies to structural fill and site grading fill) extending at least 2 feet beyond the perimeter	0 to 5 5 to 8	95 98
Site grading fill outside area defined above	0 to 5 5 to 8	92 95
Utility trenches within structural areas	--	96

[8] American Association of State Highway and Transportation Officials

LOCATION	TOTAL FILL THICKNESS (FEET)	MINIMUM PERCENTAGE OF MAXIMUM DRY DENSITY
Roadbase and subbase	-	96
Non-structural fill	0 to 5 5 to 8	90 92

Structural fills greater than 8 feet thick are not anticipated at the site. For best compaction results, we recommend that the moisture content for structural fill/backfill be within 2% of optimum. Field density tests should be performed on each lift as necessary to verify that proper compaction is being achieved.

6.5 Utility Trenches

For the bedding zone around the utility, we recommend utilizing sand bedding fill material that meets current APWA[9] requirements.

All utility trench backfill material below structurally loaded facilities (foundations, floor slabs, flatwork, parking lots/drive areas, etc.) should be placed at the same density requirements established for structural fill in the previous section.

Most utility companies and local governments are requiring Type A-1a or A-1b (AASHTO Designation) soils (sand/gravel soils with limited fines) be used as backfill over utilities within public rights of way, and the backfill be compacted over the full depth above the bedding zone to at least 96% of the maximum dry density as determined by AASHTO T-180 (ASTM D-1557). The majority of soils at this site will not meet these specifications.

Where the utility does not underlie structurally loaded facilities and public rights of way, on-site fill and natural soils may be utilized as trench backfill above the bedding layer, provided they are properly moisture conditioned and compacted to the minimum requirements stated above in **Section 6.4**.

6.6 Stabilization

The natural clay soils at this site, which predominate near the surface, will be susceptible to rutting and pumping. The likelihood of disturbance or rutting and/or pumping of the existing natural soils is a function of the load applied to the surface, as well as the frequency of the load. Consequently, rutting and pumping can be minimized by avoiding concentrated traffic, minimizing the load applied to the surface by using lighter equipment and/or partial loads, by working in drier times of the year, or by providing a working surface for the equipment. Rubber-tired equipment particularly, because of high pressures, promotes instability in moist/wet, soft soils.

[9] American Public Works Association

If rutting or pumping occurs, traffic should be stopped and the disturbed soils should be removed and replaced with stabilization material. Typically, a minimum of 18 inches of the disturbed soils must be removed to be effective. However, deeper removal is sometimes required.

To stabilize soft subgrade conditions (if encountered), a mixture of coarse, clean, angular gravels and cobbles and/or 1.5- to 2.0-inch clean gravel should be utilized. Often the amount of gravelly material can be reduced with the use of a geotextile fabric such as Mirafi RS280i, or equivalent. Its use will also help avoid mixing of the subgrade soils with the gravelly material. After excavating the soft/disturbed soils, the fabric should be spread across the bottom of the excavation and up the sides a minimum of 18 inches. Otherwise, it should be placed in accordance with the manufacturer's recommendation, including proper overlaps. The gravel material can then be placed over the fabric in compacted lifts as described above.

7.0 FOUNDATION RECOMMENDATIONS

The following recommendations have been developed on the basis of the previously described project characteristics, the subsurface conditions observed in the field and the laboratory test data, as well as common geotechnical engineering practice.

7.1 Foundation Recommendations

Based on our geotechnical engineering analyses, the proposed structures may be supported upon conventional spread and/or continuous wall foundations placed on a minimum 18 inches of structural fill extending to suitable natural soils (see **Section 7.3 below**). Footings may be designed using a net bearing pressure of 1,500 psf. The term "net bearing pressure" refers to the pressure imposed by the portion of the structure located above lowest adjacent final grade, thus the weight of the footing and backfill to lowest adjacent final grade need not be considered. The allowable bearing pressure may be increased by 1/3 for temporary loads such as wind and seismic forces.

We also recommend the following:

1. Exterior footings subject to frost should be placed at least 30 inches below final grade.
2. Interior footings not subject to frost should be placed at least 16 inches below grade.
3. Continuous footing widths should be maintained at a minimum of 18 inches.
4. Spot footings should be a minimum of 24 inches wide.

7.2 Installation

Under no circumstances shall foundations be placed on non-engineered fill, topsoil with organics, sod, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water.

If unsuitable soils are encountered, they must be completely removed and replaced with properly compacted structural fill. Deep, large roots may be encountered where trees and larger bushes are located or were previously located at the site; such large roots should also be removed. Excavation bottoms should be examined

by a CMT geotechnical engineer to confirm that suitable bearing soils have been exposed prior to forming for footings or placing structural fill.

All structural fill should meet the requirements for such, and should be placed and compacted in accordance with **Section 6** above. The width of structural replacement fill below footings should be equal to the width of the footing plus 1 foot for each foot of fill thickness. For instance, if the footing width is 2 feet and the structural fill depth beneath the footing is 2 feet, the fill replacement width should be 4 feet, centered beneath the footing.

The minimum thickness of structural fill below footings should be equivalent to one-third the thickness of structural fill below any other portion of the foundations. For example, if footings will cross over an area where an old basement was backfilled, and the maximum depth of structural fill used for the backfill is 6 feet, all footings for the new structure should be underlain by a minimum 2 feet of structural fill.

7.3 Estimated Settlement

Foundations designed and constructed in accordance with our recommendations could experience some settlement, but we anticipate that total settlements of footings founded as recommended above will not exceed 1 inch, with differential settlements on the order of 0.5 inches over a distance of 25 feet. We expect approximately 50% of the total settlement to initially take place during construction.

7.4 Lateral Resistance

Lateral loads imposed upon foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footings and the supporting soils. In determining frictional resistance, a coefficient of 0.40 for structural fill may be utilized for design. Passive resistance provided by properly placed and compacted structural fill above the water table may be considered equivalent to a fluid with a density of 400 pcf. A combination of passive earth resistance and friction may be utilized if the friction component of the total is divided by 1.5.

8.0 LATERAL EARTH PRESSURES

We anticipate that retaining walls up to 4 feet high might be constructed at this site. The lateral earth pressure values given below are for a backfill material that will consist of drained sand/gravel soils (less than 10% passing No. 200 sieve) placed and compacted in accordance with the recommendations presented herein. If other soil types will be used as backfill, we should be notified so that appropriate modifications to these values can be provided, as needed.

The lateral pressures imposed upon subgrade facilities will depend upon the relative rigidity and movement of the backfilled structure. Following are the recommended lateral pressure values, which also assume that the soil surface behind the wall is horizontal and that the backfill within 3 feet of the wall will be compacted with hand-operated compacting equipment.

CONDITION	EQUIVALENT FLUID PRESSURE (psf/ft)	
	STATIC	SEISMIC
Active Pressure (wall is allowed to yield, i.e. move away from the soil, with a minimum 0.001H movement/rotation at the top of the wall, where "H" is the total height of the wall)	35	61
At-Rest Pressure (wall is not allowed to yield)	55	---
Passive Pressure (wall moves into the soil)	400	500

9.0 FLOOR SLABS

Floor slabs may be established upon suitable, undisturbed, natural soils and/or on structural fill extending to suitable natural soils. Under no circumstances shall floor slabs be established directly on any topsoil, non-engineered fills, loose or disturbed soils, sod, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water.

In order to facilitate curing of the concrete, we recommend that floor slabs be directly underlain by at least 4 inches of "free-draining" fill, such as "pea" gravel or 3/4-inch quarters to 1-inch minus, clean, gap-graded gravel. To help control normal shrinkage and stress cracking, the floor slabs should have the following features:

1. Adequate reinforcement for the anticipated floor loads with the reinforcement continuous through interior floor joints;
2. Frequent crack control joints; and
3. Non-rigid attachment of the slabs to foundation walls and bearing slabs.

10.0 DRAINAGE RECOMMENDATIONS

It is important to the long-term performance of foundations and floor slabs that water not be allowed to collect near the foundation walls and infiltrate into the underlying soils. We recommend the following:

1. All areas around each structure should be sloped to provide drainage away from the foundations. We recommend a minimum slope of 4 inches in the first 10 feet away from the structure. This slope should be maintained throughout the lifetime of the structure.

2. All roof drainage should be collected in rain gutters with downspouts designed to discharge at least 10 feet from the foundation walls or well beyond the backfill limits, whichever is greater.

3. Adequate compaction of the foundation backfill should be provided. We suggest a minimum of 90% of the maximum laboratory density as determined by ASTM D-1557. Water consolidation methods should not be used under any circumstances.

4. Landscape sprinklers should be aimed away from the foundation walls. The sprinkling systems should be designed with proper drainage and be well-maintained. Over watering should be avoided.

5. Other precautions that may become evident during construction.

11.0 PAVEMENTS

All parking/drive pavement areas must be prepared as discussed above in **Section 6.1**. Under no circumstances shall pavements be established over topsoil, unprepared non-engineered fills, loose or disturbed soils, sod, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water.

In roadway areas, subsequent to stripping and prior to the placement of pavement materials, the exposed subgrade must be proof rolled by passing moderate-weight rubber tire-mounted construction equipment over the surface at least twice. If excessively soft or otherwise unsuitable soils are encountered, we recommend they be removed to a minimum of 18 inches below the subgrade level and replaced with structural fill.

We anticipate the natural near surface clay soils will exhibit poor pavement support characteristics when saturated or nearly saturated. Based on our laboratory testing experience with similar soils, our pavement design is based upon a California Bearing Ratio (CBR) of 3 for the natural clay soils.

Given the projected traffic as discussed above in **Section 1.3**, the following pavement sections are recommended for the given ESAL's (18-kip equivalent single-axle loads) per day:

MATERIAL	PAVEMENT SECTION THICKNESS (inches)					
	PARKING AREAS (3 ESAL'S per day)			DRIVE AREAS (8 ESAL'S per day)		
Asphalt	3	3	---	3	3	---
Concrete	---	--	5	---	---	6
Road-Base	8	4	5	12	5	5
Subbase	0	6	0	0	8	0
Total Thickness	11	13	10	15	16	11

Untreated base course (UTBC) should conform to city specifications, or to 1-inch-minus UDOT specifications for A–1-a/NP, and have a minimum CBR value of 70%. Material meeting our specification for structural fill can be used for subbase, as long as the fines content (percent passing No. 200 sieve) does not exceed 15%. Roadbase and subbase material should be compacted as recommended above in **Section 6.4**. Asphalt material generally should conform to APWA requirements, having a ½-inch maximum aggregate size, a 75-gyration Superpave mix containing no more than 15% of recycled asphalt (RAP) and a PG58-28 binder.

Concrete pavement should typically have a minimum 28-day strength of 3,000 psi, and should be saw-cut at appropriate intervals and at the proper time to control the locations of shrinkage cracking.

12.0 QUALITY CONTROL

We recommend that CMT be retained as part of a comprehensive quality control testing and observation program. With CMT onsite we can help facilitate implementation of our recommendations and address, in a timely manner, any subsurface conditions encountered which vary from those described in this report. Without such a program CMT cannot be responsible for application of our recommendations to subsurface conditions which may vary from those described herein. This program may include, but not necessarily be limited to, the following:

12.1 Field Observations

Observations should be completed during all phases of construction such as site preparation, foundation excavation, structural fill placement and concrete placement.

12.2 Fill Compaction

Compaction testing by CMT is required for all structural supporting fill materials. Maximum Dry Density (Modified Proctor, ASTM D-1557) tests should be requested by the contractor immediately after delivery of any fill materials. The maximum density information should then be used for field density tests on each lift as necessary to ensure that the required compaction is being achieved.

12.3 Excavations

All excavation procedures and processes should be observed by a geotechnical engineer from CMT or his representative. In addition, for the recommendations in this report to be valid, all backfill and structural fill placed in trenches and all pavements should be density tested by CMT. We recommend that freshly mixed concrete be tested by CMT in accordance with ASTM designations.

12.4 Vibration Monitoring

Construction activities, particularly site grading and fill placement, can induce vibrations in existing structures adjacent to the site. Such vibrations can cause damage to adjacent buildings, depending on the building composition and underlying soils. It can be prudent to monitor vibrations from construction activities to maintain records that vibrations did not exceed a pre-defined threshold known to potentially cause damage. CMT can provide this monitoring if desired.

13.0 LIMITATIONS

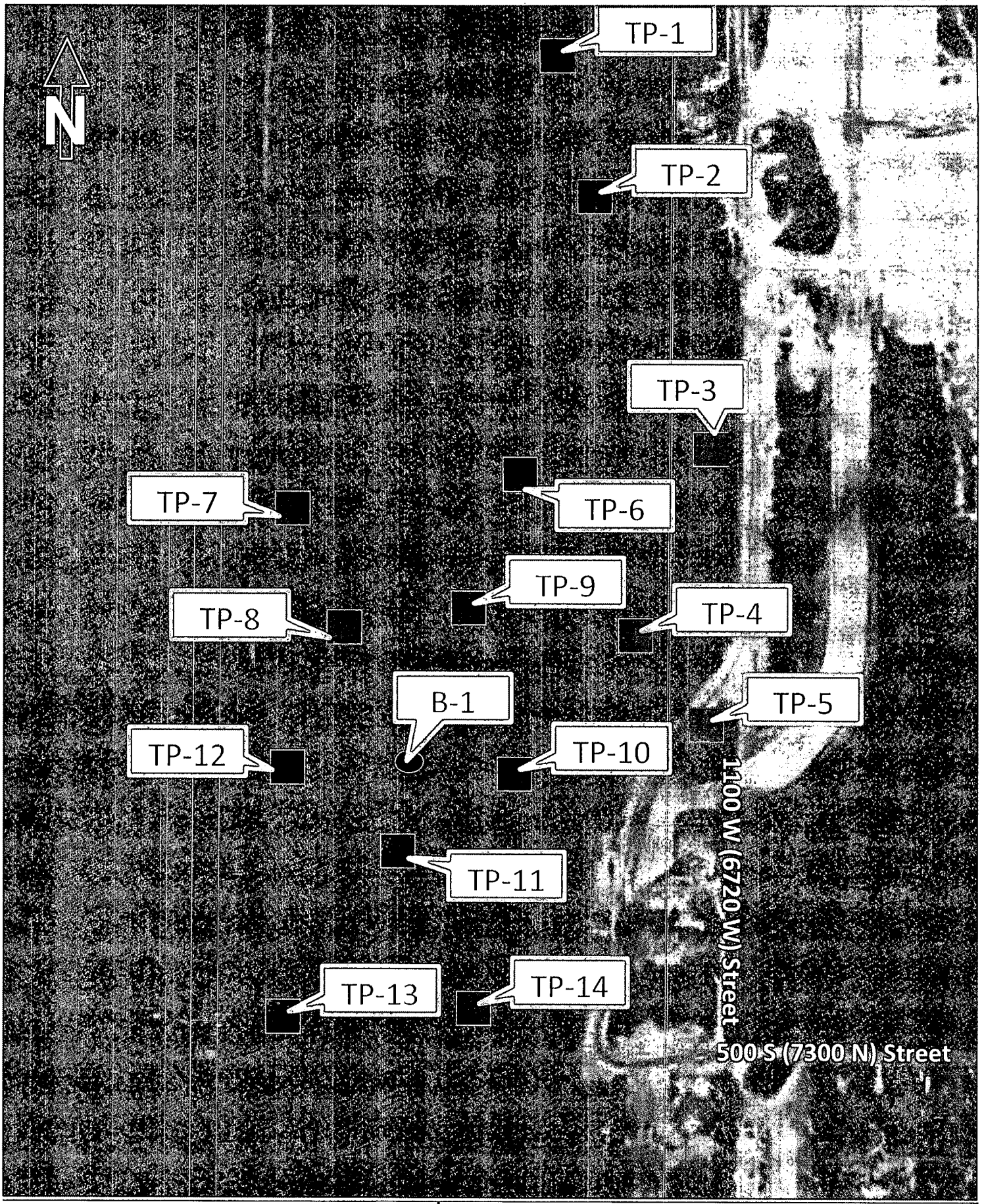
The recommendations provided herein were developed by evaluating the information obtained from the subsurface explorations and soils encountered therein. The exploration logs reflect the subsurface conditions only at the specific location at the particular time designated on the logs. Soil and ground water conditions may differ from conditions encountered at the actual exploration locations. The nature and extent of any variation in the

explorations may not become evident until during the course of construction. If variations do appear, it may become necessary to re-evaluate the recommendations of this report after we have observed the variation.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

We appreciate the opportunity to be of service to you on this project. If we can be of further assistance or if you have any questions regarding this project, please do not hesitate to contact us at (801) 492-4132. To schedule materials testing, please call (801) 381-5141.

APPENDIX | SUPPORTING DOCUMENTATION



Proposed Multi-Residential Development

About 500 South 1100 West, American Fork, Utah

CMT ENGINEERING LABORATORIES

Site Map

Date:	6-Jan-20
Job #	14033

Figure: 1

Multi-Residential Development

Bore Hole Log

B-1

About 500 South 1100 West, American Fork, Utah

Boring Type:	Hollow-Stem Auger	Total Depth:	46.5'	Date:	1/31/20
Surface Elev. (approx):	N/A	Water Depth:	9.5'	Job #:	14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Blows (N)	Total	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil												
		Light Brown to Gray Lean CLAY (CL) moist												
		medium stiff to stiff		1	3 5 3	8								
4				2	2 3 4	7								
8				3	4 5 7	12	21				84	33	18	15
		Gray Silty SAND (SM) wet medium dense		4	7 19 14	33	23				23			
12														
16				5	6 15 17	32								
20				6	7 14 18	32								
24				7	6 14 16	30	22				41			
28														

Remarks: Groundwater encountered during drilling at depth of 9.5 feet.

Figure 2

CMT ENGINEERING LABORATORIES

Drilled By: Great Basin Drilling
Logged By: Sterling H
Page: 1 of 2

Multi-Residential Development

Bore Hole Log

B-1

About 500 South 1100 West, American Fork, Utah

Boring Type:	Hollow-Stem Auger	Total Depth:	46.5'	Date:	1/31/20
Surface Elev. (approx):	N/A	Water Depth:	9.5'	Job #:	6/2/38

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Blows (N)	Total	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
28														
		Dark Gray Lean CLAY (CL) wet, very stiff		8	12 13 14	27								
32														
				9	5 9 14	23								
36														
40				10	7 8 15	23								
44		Dark Gray Silty SAND (SM) wet, medium dense to dense		11	14 25 12	37								
		END AT 46.5'												
48														
52														
56														

Remarks: Groundwater encountered during drilling at depth of 9.5 feet.

CMT ENGINEERING LABORATORIES

Drilled By: Great Basin Drilling
Logged By: Sterling H
Page: 2 of 2

Figure: 2

Multi-Residential Development

Test Pit Log

TP-1

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/15/20

Surface Elev. (approx): | Water Depth: 6.5' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand moist, medium stiff										
2												
3				1								
4												
5												
6												
▽		wet										
7				2	35.2				89.1			
8												
9												
10				3								
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 6.5 feet.

Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided

Logged By: Hogan Wright

Page: 1 of 1

Figure 3

Multi-Residential Development

Test Pit Log

TP-2

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/15/20
Surface Elev. (approx): | Water Depth: 7.5' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand moist, medium stiff										
2												
3												
4				4								
5												
6												
7												
▽		wet										
8				5								
9												
10												
11				6								
12		END AT 12'										
13												
14												

Remarks: Groundwater encountered during excavation at depth of 7.5 feet.
Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided
Logged By: Hogan Wright
Page: 1 of 1

Figure 4

Multi-Residential Development

Test Pit Log

TP-3

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/15/20
Surface Elev. (approx): | Water Depth: 6' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand moist, medium stiff										
2												
3				7	19.8	91				27	18	9
4												
5				8								
		wet										
7												
8												
9												
10				9								
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 6 feet.
Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided
Logged By: Hogan Wright
Page: 1 of 1

Figure 5

Multi-Residential Development

Test Pit Log

TP-4

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe	Total Depth: 11'	Date: 1/15/20
Surface Elev. (approx):	Water Depth: 7'	Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation: Gravel %	Gradation: Sand %	Gradation: Fines %	Atterberg: LL	Atterberg: PL	Atterberg: PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand moist, medium stiff										
2												
3				10								
4												
5												
6				11								
▽		wet										
8												
9												
10				12								
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 7 feet.
Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided
Logged By: Hogan Wright
Page: 1 of 1

Figure 6

Multi-Residential Development

Test Pit Log

TP-5

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/15/20

Surface Elev. (approx): | Water Depth: 6' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation: Gravel %	Gradation: Sand %	Gradation: Fines %	Atterberg: LL	Atterberg: PL	Atterberg: PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand moist, medium stiff										
2												
3				13								
4												
5				14	27.3				90.3			
▽		wet										
7												
8												
9				15								
10												
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 6 feet.

Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided

Logged By: Hogan Wright

Page: 1 of 1

Figure 7

Multi-Residential Development

Test Pit Log

TP-6

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 12' | Date: 1/15/20

Surface Elev. (approx): | Water Depth: 3.5' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand moist, medium stiff										
2												
3				16								
▽		wet										
4												
5												
6				17								
7												
8												
9												
10												
11				18								
12		END AT 12'										
13												
14												

Remarks: Groundwater encountered during excavation at depth of 3.5 feet.

Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided

Logged By: Hogan Wright

Page: 1 of 1

Figure 8

Multi-Residential Development

Test Pit Log

TP-7

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/15/20
Surface Elev. (approx): | Water Depth: 3.5' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand very moist, medium stiff										
2												
3				19	29.8	94				41	23	18
4		wet										
5												
6				20								
7												
8												
9				21	37.6				91.4			
10												
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 3.5 feet.
Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided
Logged By: Hogan Wright
Page: 1 of 1

Figure 9

Multi-Residential Development

Test Pit Log

TP-8

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/15/20

Surface Elev. (approx): | Water Depth: 3' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand very moist, medium stiff										
2				22								
3		wet										
4												
5				23								
6												
7												
8												
9				24								
10												
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 3 feet.

Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided

Logged By: Hogan Wright

Page: 1 of 1

Figure 10

Multi-Residential Development

Test Pit Log

TP-9

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/16/20

Surface Elev. (approx): | Water Depth: 6' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand very moist, medium stiff										
2												
3												
4				25								
5												
▽		wet										
7				26								
8												
9												
10				27								
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 6 feet.

Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided

Logged By: Hogan Wright

Page: 1 of 1

Figure 11

Multi-Residential Development

Test Pit Log

TP-10

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/16/20
Surface Elev. (approx): | Water Depth: 9' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation: Gravel %	Gradation: Sand %	Gradation: Fines %	Atterberg: LL	Atterberg: PL	Atterberg: PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand very moist, medium stiff										
2												
3												
4												
5		grades with slightly cemented nodules		28	19.9	103				47	24	23
6												
7				29								
8												
▽		wet										
10				30								
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 9 feet.
Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided
Logged By: Hogan Wright
Page: 1 of 1

Figure 12

Multi-Residential Development

Test Pit Log

TP-11

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/16/20

Surface Elev. (approx): | Water Depth: 3' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand very moist, medium stiff										
2												
▽				31	28.0				85.3			
		wet										
4												
5												
6				32								
7												
8												
9												
10				33								
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 3 feet.

Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided

Logged By: Hogan Wright

Page: 1 of 1

Figure 13

Multi-Residential Development

Test Pit Log

TP-12

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/16/20
Surface Elev. (approx): | Water Depth: 3' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand very moist, medium stiff										
2												
▽				34								
		wet										
4												
5				35								
6												
7												
8												
9				36								
10												
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 3 feet.
Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided
Logged By: Hogan Wright
Page: 1 of 1

Figure 14

Multi-Residential Development

Test Pit Log

TP-13

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/16/20

Surface Elev. (approx): | Water Depth: 2.5' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with trace fine sand moist, medium stiff										
2				37	46.2	74				45	24	21
3		wet										
4												
5												
6				38								
7												
8												
9				39								
10												
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 2.5 feet.

Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided

Logged By: Hogan Wright

Page: 1 of 1

Figure 15

Multi-Residential Development

Test Pit Log

TP-14

About 500 S 1100 W, American Fork, Utah

Equipment: Rubber Tire Backhoe | Total Depth: 11' | Date: 1/16/20

Surface Elev. (approx): | Water Depth: 2.5' | Job #: 14033

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Moisture (%)	Dry Density(pcf)	Gradation: Gravel %	Gradation: Sand %	Gradation: Fines %	Atterberg: LL	Atterberg: PL	Atterberg: PI
0		Topsoil 2-4" loose 6"										
1		Brown Silty CLAY (CL) with some fine sand moist, medium stiff										
2				40								
▽		wet										
3												
4												
5												
6				41								
7												
8												
9												
10				42								
11		END AT 11'										
12												
13												
14												

Remarks: Groundwater encountered during excavation at depth of 2.5 feet.

Slotted PVC pipe installed to depth of 10.0 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Excavated By: Owner Provided

Logged By: Hogan Wright

Page: 1 of 1

Figure: 16

Multi-Residential Development

About 500 South 1100 West, American Fork, Utah

Key to Symbols

Date: 1/31/20
Job #: 14033

Depth (ft) ①	GRAPHIC LOG ②	Soil Description ③	Sample Type ④	Sample # ⑤	Blows(N) Total ⑥⑦	Moisture (%) ⑧	Dry Density(pcf) ⑨	Gradation ⑩ Gravel %	Gradation ⑩ Sand %	Gradation ⑩ Fines %	Atterberg ⑪ LL	Atterberg ⑪ PL	Atterberg ⑪ PI

COLUMN DESCRIPTIONS

① **Depth (ft.):** Depth (feet) below the ground surface (including groundwater depth - see water symbol below).

② **Graphic Log:** Graphic depicting type of soil encountered (see ② below).

③ **Soil Description:** Description of soils encountered, including Unified Soil Classification Symbol (see below).

④ **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below-right.

⑤ **Sample #:** Consecutive numbering of soil samples collected during field exploration.

⑥ **Blows:** Number of blows to advance sampler in 6" increments, using a 140-lb hammer with 30" drop.

⑦ **Total Blows:** Number of blows to advance sampler the 2nd and 3rd 6" increments.

⑧ **Moisture (%):** Water content of soil sample measured in laboratory (percentage of dry weight of sample).

⑨ **Dry Density (pcf):** The dry density of a soil measured in laboratory (pounds per cubic foot).

⑩ **Gradation:** Percentages of Gravel, Sand and Fines (Silt/Clay), obtained from lab test results of soil passing the No. 4 and No. 200 sieves.

⑪ **Atterberg:** Individual descriptions of Atterberg Tests are as follows:

LL = Liquid Limit (%): Water content at which a soil changes from plastic to liquid behavior.

PL = Plastic Limit (%): Water content at which a soil changes from liquid to plastic behavior.

PI = Plasticity Index (%): Range of water content at which a soil exhibits plastic properties (= Liquid Limit - Plastic Limit).

STRATIFICATION	
Description	Thickness
Seam	Up to ½ inch
Lense	Up to 12 inches
Layer	Greater than 12 in.
Occasional	1 or less per foot
Frequent	More than 1 per foot

MODIFIERS
Trace
<5%
Some
5-12%
With
> 12%

MOISTURE CONTENT
Dry: Absence of moisture, dusty, dry to the touch.
Moist: Damp / moist to the touch, but no visible water.
Saturated: Visible water, usually soil below groundwater.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS SYMBOLS	②	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS More than 50% of material is larger than No. 200 sieve size.	GRAVELS The coarse fraction retained on No. 4 sieve.	CLEAN GRAVELS (< 5% 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 (≥ 12% fines)	GM		Silty Gravels, Gravel-Sand-Silt Mixtures
			GC		Clayey Gravels, Gravel-Sand-Clay Mixtures
	SANDS The coarse fraction passing through No. 4 sieve.	CLEAN SANDS (< 5% fines)	SW		Well-Graded Sands, Gravelly Sands, Little or No Fines
			SP		Poorly-Graded Sands, Gravelly Sands, Little or No Fines
		SANDS WITH FINES (≥ 12% 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 o f Low Plasticity
	SILTS AND CLAYS Liquid Limit greater than 50%		MH		Inorganic Silts, Micacious or Diatomacious Fine Sand or Silty Soils
			CH		Inorganic Clays of High Plasticity, Fat Clays
			OH		Organic Silts and Organic Clays of Medium to High Plasticity
HIGHLY ORGANIC SOILS			PT		Peat, Humus, Swamp Soils with High Organic Contents

Note: Dual Symbols are used to indicate borderline soil classifications (i.e. GP-GM, SC-SM, etc.).

SAMPLER SYMBOLS

- Block Sample
- Bulk/Bag Sample
- Modified California Sampler 3.5" OD, 2.42" ID D&M Sampler
- Rock Core
- Standard Penetration Split Spoon Sampler
- Thin Wall (Shelby Tube)

WATER SYMBOL

- Encountered Water Level
- Measured Water Level (see Remarks on Logs)

1. The results of laboratory tests on the samples collected are shown on the logs at the respective sample depths.
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.

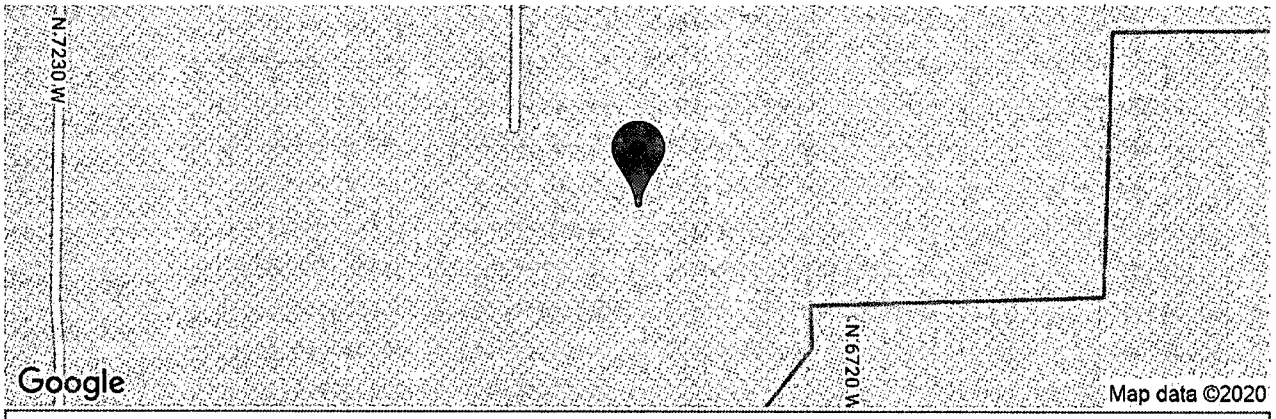
CMT ENGINEERING LABORATORIES

Figure 17

OSHPD

AF Multi-Family Residential

Latitude, Longitude: 40.3659, -111.82496



Date	2/3/2020, 2:23:48 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.224	MCE_R ground motion. (for 0.2 second period)
S_1	0.442	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.237	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	0.824	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.01	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.546	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.601	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.224	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.396	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	3.003	Factored deterministic acceleration value. (0.2 second)
S1RT	0.442	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.497	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.164	Factored deterministic acceleration value. (1.0 second)
PGAd	1.164	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.876	Mapped value of the risk coefficient at short periods
C_{R1}	0.888	Mapped value of the risk coefficient at a period of 1 s

Company: CMT Engineering	**Project:** Multi-Family Residential	
Location: American Fork, Utah	**Designer:** Bill Turner	**Checked by:**
Project #: 14033	**Date:** 2/10/2020	**Date:**

Summary of Inputs for Liquefaction Initiation, Settlement and Lateral Spreading:

PGA =	0.601		Hammer Efficiency =	60	%	Distance to fault =	3	km
M_w =	7.09		Sampler Liner =	No		Ground Slope, S =	0.1	%
Vs,12 =	623	ft/s	Borehole Diameter =	8	in	Free-Face Ratio, W =		%
Percentile =	85	%	Rod Stickup Length =	5	ft	Percentile =	50	%

Boring No.	Top Samp Depth(ft)	Depth to Water (ft)	Measured SPT N	γ (lb/ft^3)	Thickness (ft)	Fines (%)	D50 (mm)	$K_{(aging)}$	Soil Type	Susceptible?
B-1	10	3	26	121	5	23	0	0	SM	Yes
B-1	15	3	32	123	5	23	0	0	SM	Yes
B-1	20	3	32	123	5	23	0	0	SM	Yes
B-1	25	3	30	122	5	41	0	0	SM	Yes
B-1	45	3	37	124	5	41	0	0	SM	Yes

Company: CMT Engineering	**Project:** Multi-Family Residential	
Location: American Fork, Utah	**Designer:** Bill Turner	**Checked by:**
Project #: 14033	**Date:** 2/10/2020	**Date:**

Results of Deterministic Liquefaction Initiation and Settlement:

Boring No.	Top Samp Depth(ft)	Youd and Idriss (2001) - See Note 1			Idriss & Boulanger(2008,2012)-See Note 2			Cetin et al. (2004, 2009) - See Note 3		
		$(N_1)_{60,cs}$	$FS_{Liq.}$	$\sum S$ (in)	$(N_1)_{60,cs}$	$FS_{Liq.}$	$\sum S$ (in)	$(N_1)_{60,cs}$	$FS_{Liq.}$	$\sum S$ (in)
B-1	10	54.7	> 100	0.0	48.2	> 100	0.0	58.7	8.7	0.0
B-1	15	67.7	> 100	0.0	57.4	> 100	0.0	66.2	12.7	0.0
B-1	20	62.9	> 100	0.0	54.9	> 100	0.0	61.9	8.4	0.0
B-1	25	61.0	> 100	0.0	50.7	> 100	0.0	56.7	5.4	0.0
B-1	45	61.3	> 100	0.0	56.7	> 100	0.0	54.9	4.0	0.0
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

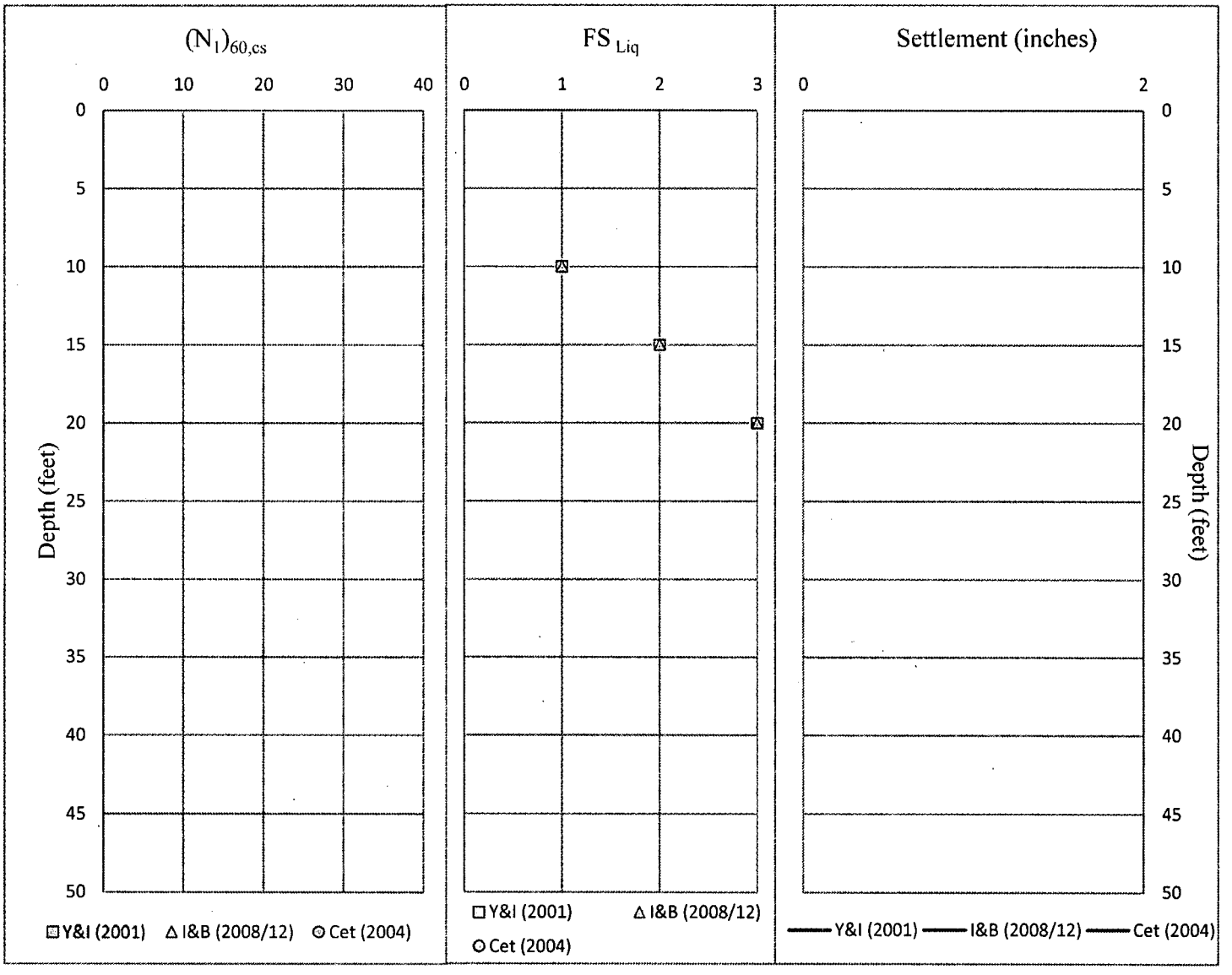
NOTES:

1. Youd & Idriss et al (2001); Tokimatsu & Seed (1987)
2. Idriss & Boulanger (2008, 2012); Ishihara & Yoshimine (1992)
3. Cetin et al. (2004, 2009)

Company: CMT Engineering	**Project:** Multi-Family Residential	
Location: American Fork, Utah	**Designer:** Bill Turner	**Checked by:**
Project #: 14033	**Date:** 2/10/2020	**Date:**

Summary of Deterministic Liquefaction Settlement and Lateral Spreading:

Boring No.	Deterministic Settlement			T_{15} (m)	F_{15} (%)	$D50_{15}$ (mm)	Lat.Spread. Dh (ft)
	Y&S(1987)	I&Y(1992)	Cetin(2009)				
B-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00



CALL BLUESTAKES @ 811 AT LEAST 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION

BENCHMARK

NW CORNER OF SECTION 22
TOWNSHIP 5 SOUTH, RANGE 1 EAST
SALT LAKE BASE AND MERIDIAN

ELEV = 4524.28'

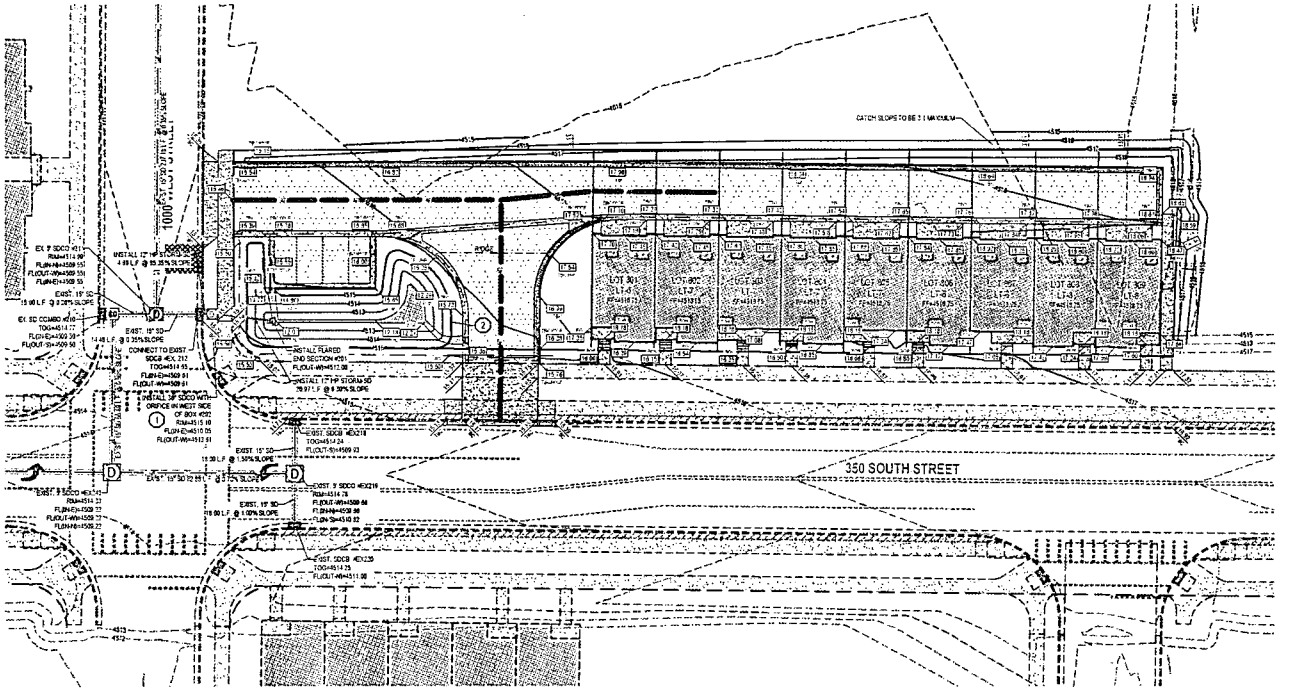
SCOPE OF WORK:
PROVIDE, INSTALL AND/OR CONSTRUCT THE FOLLOWING PER THE SPECIFICATIONS GIVEN OR REFERENCED THE DETAILS NOTED AND/OR AS SHOWN ON THE CONSTRUCTION DRAWINGS

① 1.38" Ø ORIFICE PLATE PER DETAIL 9/C-501 INSTALLED ON OUTLET PIPE ON WEST SIDE OF STORM DRAIN BOX. FLOW LINE OF ORIFICE PLATE TO BE INSTALLED AT 4513.85.

② DETENTION BASIN WITH RETENTION OF 80TH PERCENTILE STORM
80TH PERCENTILE RETENTION STORAGE REQUIRED = 847 CU. FT.
TOTAL DETENTION & RETENTION STORAGE REQUIRED = 2,039 CU. FT.
TOTAL STORAGE PROVIDED = 2,166 CU. FT.
TOP OF BASIN = 4519.00
BOTTOM OF BASIN = 4512.00

GENERAL NOTES

1. ALL WORK TO COMPLY WITH THE GOVERNING AGENCY'S STANDARDS AND SPECIFICATIONS
2. ALL IMPROVEMENTS MUST COMPLY WITH ADA STANDARDS AND RECOMMENDATIONS
3. ALL WORK SHALL COMPLY WITH THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER POSSIBLY INCLUDING, BUT NOT LIMITED TO, REMOVAL OF UNCONSOLIDATED FILL, ORGANICS, AND DEBRIS, PLACEMENT OF SUBSURFACE DRAIN LINES AND GEOTEXTILE AND OVEREXCAVATION OF UNSUITABLE BEARING MATERIALS AND PLACEMENT OF ACCEPTABLE FILL MATERIAL.
4. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE EXISTING SOIL CONDITIONS.
5. ELEVATIONS MAY HAVE BEEN TRUNCATED FOR CLARITY. XX.XX REPRESENTS AN ELEVATION OF 4XXX.XX ON THESE PLANS
6. LANDSCAPED AREAS REQUIRE SUBGRADE TO BE MAINTAINED AT A SPECIFIC ELEVATION BELOW FINISHED GRADE AND REQUIRE SUBGRADE TO BE PROPERLY PREPARED AND SCARIFIED. SEE LANDSCAPE PLANS FOR ADDITIONAL INFORMATION.
7. SLOPE ALL LANDSCAPED AREAS AWAY FROM BUILDING FOUNDATIONS TOWARD CURB AND GUTTER OR STORM DRAIN INLETS
8. EXISTING UNDERGROUND UTILITIES AND IMPROVEMENTS ARE SHOWN IN THEIR APPROXIMATE LOCATIONS BASED UPON RECORD INFORMATION AVAILABLE AT THE TIME OF PREPARATION OF THESE PLANS. LOCATIONS MAY NOT HAVE BEEN VERIFIED IN THE FIELD AND NO GUARANTEE IS MADE AS TO THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE EXISTENCE AND LOCATION OF THE UTILITIES SHOWN ON THESE PLANS OR INDICATED IN THE FIELD BY LOCATING SERVICES. ANY ADDITIONAL COSTS INCURRED AS A RESULT OF THE CONTRACTOR'S FAILURE TO VERIFY THE LOCATIONS OF EXISTING UTILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION IN THEIR VICINITY SHALL BE BORNE BY THE CONTRACTOR AND ASSUMED INCLUDED IN THE CONTRACT. THE CONTRACTOR IS TO VERIFY ALL CONNECTION POINTS WITH THE EXISTING UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE CAUSED TO THE EXISTING UTILITIES AND UTILITY STRUCTURES THAT ARE TO REMAIN. IF CONFLICTS WITH EXISTING UTILITIES OCCUR, THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO CONSTRUCTION TO DETERMINE IF ANY FIELD ADJUSTMENTS SHOULD BE MADE.
9. ALL STORM DRAIN INFRASTRUCTURE TO BE INSTALLED PER GOVERNING AGENCY OR APWA STANDARD PLANS AND SPECIFICATIONS
10. ENSURE MINIMUM COVER OVER ALL STORM DRAIN PIPES PER MANUFACTURER'S RECOMMENDATIONS. NOTIFY ENGINEER IF MINIMUM COVER CANNOT BE ATTAINED.
11. IT IS RECOMMENDED ALL DOWNSPOUTS/ROOF DRAINS SHALL SURFACE FLOW ACROSS THE LANDSCAPE AND BE PROTECTED FROM EROSION WITH APPLICABLE DEVICES OR SWPPS.
12. THE CONTRACTOR SHALL ADJUST TO GRADE ALL EXISTING UTILITIES AS NEEDED PER LOCAL GOVERNING AGENCY'S STANDARDS AND SPECIFICATIONS
13. NOTIFY ENGINEER OF ANY DISCREPANCIES IN DESIGN OR STAKING BEFORE PLACING CONCRETE, ASPHALT, OR STORM DRAIN STRUCTURES OR PIPES.
14. THE CONTRACTOR IS TO PROTECT AND PRESERVE ALL EXISTING IMPROVEMENTS, UTILITIES AND SIGNS, ETC. UNLESS OTHERWISE NOTED ON THESE PLANS.
15. ALL UNDERGROUND UTILITIES MUST BE INSPECTED AND APPROVED BY THE CITY INSPECTOR BEFORE TRENCH BACKFILLING IS COMPLETED.
16. EXISTING IF SUBSURFACE CROSS DRAINS ARE WITHIN THE CURVED AND TSSD EASEMENTS AND SHOULD BE PROTECTED IN PLACE. CONTRACTOR TO LOCATE AND NOTIFY ENGINEER OF ANY CONFLICTS. WHERE CONFLICTS EXIST, THE LINE WILL NEED TO BE RE-ROUTED OR CONNECTED TO A STORM DRAIN SYSTEM TO ENSURE CONTINUED OPERATION.
17. INSTALL RIP RAP AT BOTTOM OF POND PER DETAIL 9/C-300



NORTH

HORIZONTAL GRAPHIC SCALE

0 5 10 20 40
(IN FEET)
HORZ. 1 inch = 20 ft.

ENSIGN
THE STANDARD IN ENGINEERING

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LICENSED PROFESSIONAL ENGINEER
No. 7875112-2202
JARED K. FORD
3-29-2022
STATE OF UTAH

GRADING AND DRAINAGE PLAN

PROJECT NUMBER 67900
PRINT DATE 3/29/2022
DRAWN BY E. FISHER
CHECKED BY J. FORD
PROJECT MANAGER J. FORD

C-200