35

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

ENT 87182:2021 PG 1 of 35
ANDREA ALLEN
UTAH COUNTY RECORDER
2021 May 10 10:59 am FEE 0.00 BY JR
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 June 25, 2019 along with the site grading plan to the property generally located at 650 West 330 South (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 18 day of November, 2020.

OWNER(S):

[signature] (Signature)	(Signature)
Jeff Jackson (Printed Name)	(Printed Name)
Managing Member (Title)	(Title)

STATE OF UTAH)
§
COUNTY OF Utah)

On the 18 day of November, 2020, personally appeared before me Jeff Jackson 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.

[signature]
Notary Public
My Commission Expires: 05/15/2022

KAYE LUCHERINI
NOTARY PUBLIC -STATE OF UTAH
My Comm. Exp 05/15/2022
Commission # 700371

Approved as to form: American Fork City Attorney

Rev. 12/4/18

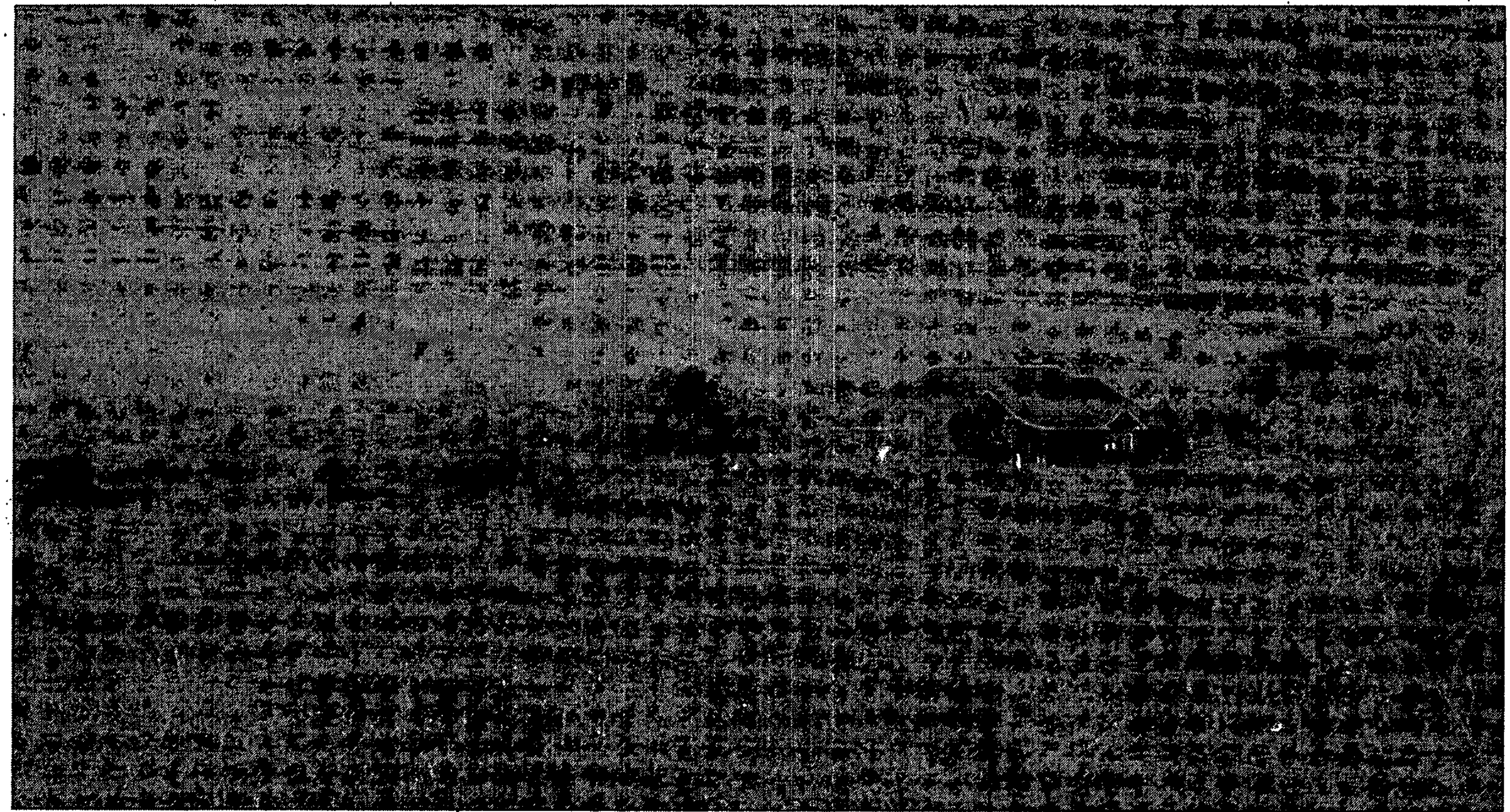
Fenn Farms Legal Description

BEGINNING AT A POINT LOCATED SOUTH 00°24'14" WEST ALONG THE SECTION LINE 2523.79 FEET AND WEST 729.57 FEET FROM THE NORTHEAST CORNER OF SECTION 22, TOWNSHIP 5 SOUTH, RANGE 1 EAST, SALT LAKE BASE AND MERIDIAN; THENCE ALONG AN ARC OF A 20.00 FOOT RADIUS CURVE TO THE RIGHT 32.09 FEET (CHORD BEARS SOUTH 44°02'24" EAST 28.75 FEET) TO THE WESTERLY RIGHT-OF-WAY OF 570 WEST STREET; THENCE ALONG THE WESTERLY RIGHT-OF-WAY OF 570 WEST STREET THE FOLLOWING FOUR (4) CALLS: SOUTH 01°55'12" WEST 160.27 FEET, SOUTH 02°48'55" WEST 122.35 FEET, SOUTH 01°46'45" WEST 289.15 FEET, SOUTH 00°44'34" WEST 230.53 FEET; THENCE NORTH 89°05'35" WEST 14.01 FEET; THENCE THENCE ALONG AN EXISTING FENCE LINE AND A BOUNDARY (FENCE) LINE AGREEMENT (ENTRY NUMBER 90530 YEAR 1996) AS RECORDED AT THE UTAH COUNTY RECORDERS OFFICE THE FOLLOWING TWO (2) CALLS: NORTH 89°05'35" WEST 489.89 FEET, SOUTH 01°04'35" WEST 234.78 FEET; THENCE NORTH 89°30'23" WEST ALONG AN EXISTING FENCE LINE AND FENCE LINE AGREEMENT (ENTRY NUMBER 48935 YEAR 2003) AS RECORDED AT THE UTAH COUNTY RECORDERS OFFICE 539.79 FEET TO THE EASTERLY PROPERTY LINE OF THE 700 WEST STREET CORRIDOR PRESERVATION DEDICATION AS RECORDED IN A WARRANTY DEED (ENTRY 56995 YEAR 2014) IN FAVOR OF AMERICAN FORK CITY; THENCE NORTH 01°10'30" EAST ALONG SAID EASTERLY PROPERTY LINE OF THE 700 WEST STREET CORRIDOR PRESERVATION DEDICATION 1248.51 FEET TO THE EASTERLY RIGHT-OF-WAY OF 700 WEST STREET; THENCE ALONG THE EASTERLY RIGHT-OF-WAY OF 700 WEST STREET THE FOLLOWING FOUR (4) CALLS: ALONG AN ARC OF A 1139.00 FOOT RADIUS CURVE TO THE LEFT 6.44 FEET (CHORD BEARS NORTH 04°53'30" WEST 6.44 FEET), NORTH 05°03'12" WEST 76.78 FEET, ALONG AN ARC OF A 1061.00 FOOT RADIUS CURVE TO THE RIGHT 108.75 FEET (CHORD BEARS NORTH 02°07'02" WEST 108.70 FEET), NORTH 00°49'09" EAST 20.30 FEET TO AN EXISTING FENCE LINE; THENCE SOUTH 89°24'00" EAST ALONG AN EXISTING FENCE LINE 269.41 FEET; THENCE SOUTH 89°40'03" EAST ALONG AN EXISTING FENCE LINE 286.68 FEET TO THE WESTERLY BOUNDARY LINE OF FENN ACRES SUBDIVISION PLAT "B"; THENCE SOUTH 01°10'30" WEST ALONG THE WESTERLY BOUNDARY LINE OF FENN ACRES PLAT "B" AND AN EXISTING FENCE LINE 386.98 FEET TO THE SOUTHERLY BOUNDARY OF FENN ACRES PLAT "B"; THENCE EAST ALONG SAID PLAT 482.28 FEET TO THE WESTERLY PROPERTY LINE OF 570 WEST STREET CORRIDOR PRESERVATION DEDICATION AS RECORDED IN A WARRANTY DEED (ENTRY 56995 YEAR 2014) IN FAVOR OF AMERICAN FORK CITY; THENCE SOUTH 00°44'34" WEST ALONG SAID WESTERLY PROPERTY LINE OF 570 WEST STREET CORRIDOR PRESERVATION DEDICATION 24.00 FEET TO THE SOUTHERLY RIGHT-OF-WAY OF 300 SOUTH STREET; THENCE EAST ALONG SAID SOUTHERLY RIGH-OF-WAY 6.70 FEET TO THE POINT OF BEGINNING.

LESS AND EXCEPTING PARCEL NUMBER 13:043:0084, WHICH IS CURRENTLY IN FAVOR OF VEHA T. & MIKENZE MARIE SOUPHOM, WARRANTY DEED ENTRY 71284 YEAR 2020 AND TOGETHER WITH A RIGHT-OF-WAY FOR INGRESS AND EGRESS AS RECORDED IN THE UTAH COUNTY RECORDER OFFICE.

AREA = 1,196,143.24 SQUARE FEET / 27.46 ACRES.

CMT ENGINEERING LABORATORIES



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

GEOTECHNICAL ENGINEERING UPDATE

Fenn Farms

570 West 330 South
American Fork, Utah
CMT PROJECT NO. 12827

FOR:
A.L.M. & Associates, Inc.
2230 North University Parkway, Bldg 6-D
Provo, Utah 84604

June 25, 2019

CMT ENGINEERING LABORATORIES

June 25, 2019

Mr. Mark Greenwood, P.E.
A.L.M. & Associates, Inc.
2230 North University Parkway, Bldg 6-D
Provo, Utah 84604

RE: Geotechnical Engineering Update
Fenn Farms
570 West 330 South
American Fork, Utah
CMT Job No. 12827

Mr. Greenwood,

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 June 13, 2019, a CMT Engineering Laboratories (CMT) geologist was on-site and supervised the drilling of 2 bore holes extending to depths of about 5 to 41.5 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 structure, 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 6/25/19 STATE OF UTAH

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

Reviewed by:

Steven L. Smith, P.E., M. ASCE
Senior Geotechnical Engineer

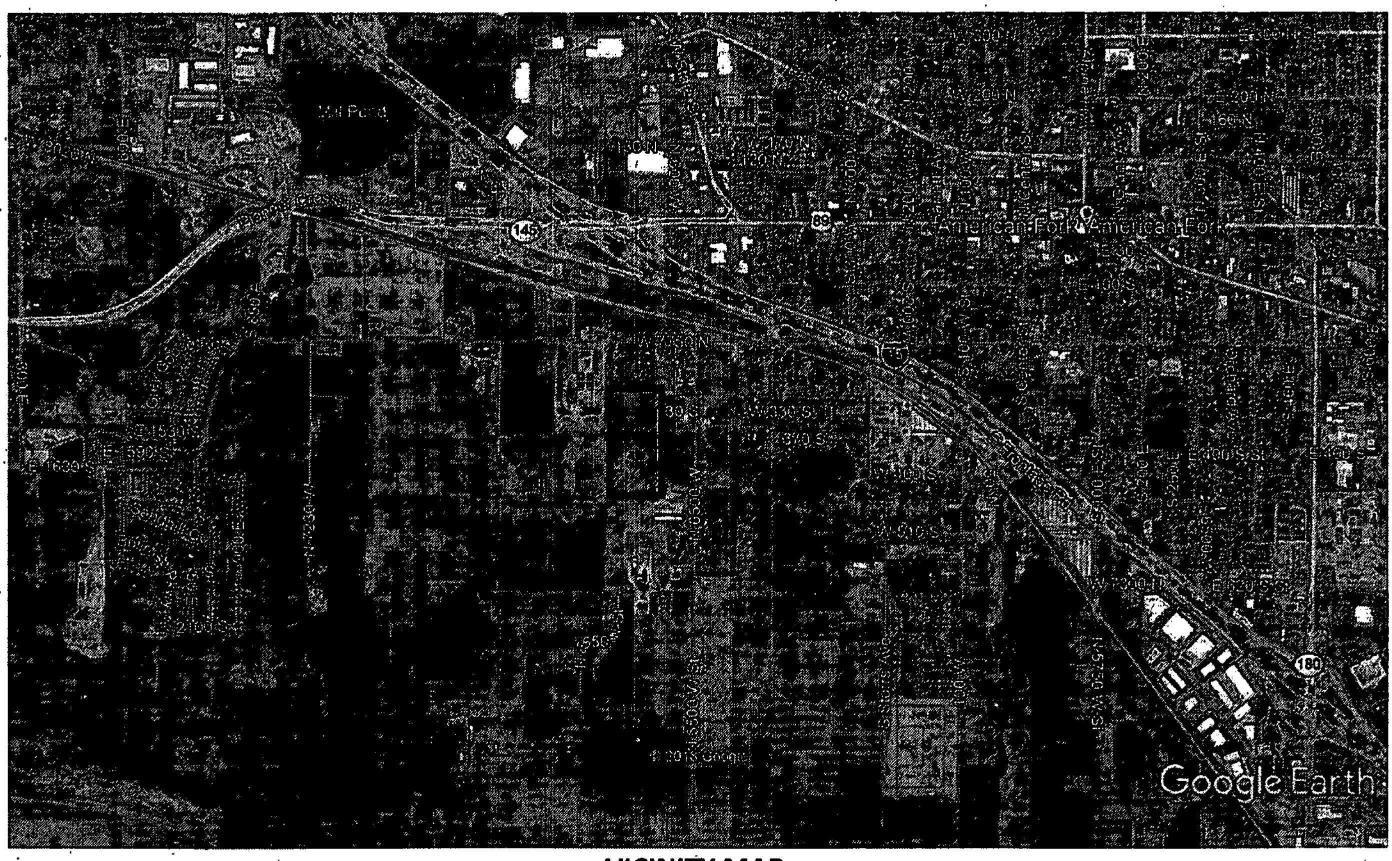
CMT ENGINEERING LABORATORIES

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General

CMT Engineering Laboratories (CMT) was retained to conduct an updated geotechnical subsurface study for the proposed Fenn Farms. The site is situated on the west side of 570 West Street at about 330 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 discussions between Mr. Mark Greenwood of A.L.M. & Associates, and Mr. Bill Turner of CMT Engineering Laboratories (CMT). In general, the objectives of this study were to update a previous geotechnical report prepared by others[1] for the site to meet the current American Fork City Sensitive Land Ordinance.

[1] "Geotechnical Study, Proposed Estates at Fenn Farms, 570 West 330 South, American Fork, Utah" Earthtec Testing & Engineering, P.C. Job No. 052783, December 5, 2005.

In accomplishing these objectives, our scope of work has included performing field exploration, which consisted of the drilling/logging/sampling of 2 bore holes and performing infiltration testing in one of the bore holes, performing laboratory testing on representative samples, 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 May 22, 2019 and executed the same day.

1.3 Description of Proposed Construction

The proposed project consists of constructing single-family residences at the site. We anticipate the residences will be 1 to 2 stories in height, with possibly partial basements and/or slabs on grade. We project maximum loads will be about 40,000 pounds for columns and 4,000 pounds/foot for walls. Floor slab loads are anticipated to be relatively light, with an average uniform loading not exceeding 100 pounds per square foot. 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.

Streets will also be constructed, which we anticipate will utilize asphalt pavement. Traffic is projected to consist of mostly automobiles and light trucks, a few daily medium-weight delivery trucks, a weekly garbage truck, and an occasional fire truck.

Site development will require some earthwork in the form of minor cutting and filling, which we understand will have maximum cuts and fills 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. Approximately 12 inches of topsoil/disturbed soils blankets the site; foundations should not be placed on topsoil/disturbed soils.
2. Groundwater was encountered in the bore holes and later measured at a relatively shallow depth of 2.5 feet, which will affect excavations and construction.
3. Foundations and floor slabs may be constructed on suitable undisturbed natural soils or on structural/engineered fill which extends to natural soils.

CMT must assess that topsoil, undocumented fills, 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

2.1 General

In order to define and evaluate the subsurface soil and groundwater conditions at the site, 2 bore holes were drilled at the site to depths of approximately 5 to 41.5 feet below the existing ground surface. Locations of the bore holes are presented on **Figure 1.**

Samples of the subsurface soils encountered in the bore holes were collected at varying depths through the hollow stem drill augers. Relatively undisturbed samples of the subsurface soils were obtained by driving a split-spoon sampler with 2.5-inch outside diameter rings/liners into the undisturbed soils below the 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.

The subsurface soils encountered in the bore holes were logged and described in general accordance with ASTM[2] D-2488. Soil samples were collected as described above, and were classified in the field 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 bore holes, including a description of the soil strata encountered, is presented on each individual Bore Hole Log, **Figures 2 and 3**, 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 4** in the Appendix.

Following completion of drilling operations, 1.25-inch diameter slotted PVC pipe was installed in bore hole B-1 to allow subsequent water level measurements.

2.2 Infiltration Testing

Infiltration testing was also performed as part of our field exploration within bore hole B-2, at a depth of about 2 feet. The testing consisted of filling the inside of the augers with water, and measuring the rate of water drop over a certain time period (i.e. 10 minutes). This process was repeated multiple times until subsequent readings were the same. The results of this test indicate that the surficial silty clay with sand soils at this site have an infiltration rate of about 34 minutes per inch. To account for potential siltation, we recommend designing using an infiltration rate of 40 minutes per inch.

[2]American Society for Testing and Materials

3.0 LABORATORY TESTING

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

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

Laboratory test results are presented on the bore hole logs (**Figures 2 and 3**) and in the following Lab Summary Table:

LAB SUMMARY TABLE

Bore Hole	Depth (feet)	Soil Class	Sample Type	Moisture Content (%)	Dry Denstiy (pcf)	Gradation			Atterberg Limits			Collapse (-) or Expansion (+)
						Grav	Sand	Fines	LL	PL	PI	
B-1	5	CL-ML	Rings	28	102							
B-1	7.5	CL-ML	SPT	35				80	28	22	6	
B-1	10	CL-ML	Rings	28	90							
B-1	20	GP-GM	SPT	6				6				
B-1	25	OH	SPT	64				88				
B-1	30	OH	SPT	48				94	50	24	26	
B-1	35	CL	SPT	28				98				

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 4,705 feet above sea level. The 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. The valley 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 active tectonism and seismic activity extending from southwestern Montana to southwestern Utah. The active (evidence of movement within the past 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 approximately 5,092 feet above sea level at between 18,500 and 17,400 years ago. Approximately 17,400 years ago, the lake breached its basin in

4.3.2 Ground Motions

The 2008 USGS mapping utilized by the IBC provides values of peak ground, short period and long period accelerations for the Site Class B boundary and the Maximum Considered Earthquake (MCE). This Site Class B 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 the appropriate soil correction factor for a Site Class D soil profile at site grid coordinates of 40.3695 degrees north latitude and -111.8164 degrees west longitude:

SPECTRAL ACCELERATION VALUE, T	SITE CLASS B BOUNDARY [Mapped Values] (g)	SITE COEFFICIENT	SITE CLASS D [Adjusted for Site Class Effects] (g)	DESIGN VALUES (g)
Peak Ground Acceleration	0.490	F_a = 1.010	0.495	0.495
Short Period Acceleration (0.2 Seconds)	S_S = 1.157	F_a = 1.037	S_{MS} = 1.200	S_{DS} = 0.800
Short Period Acceleration (1.0 Second)	S_1 = 0.393	F_v = 1.614	S_{M1} = 0.634	S_{D1} = 0.423

4.3.3 Liquefaction

The site is located within an area designated by the Utah Geologic Survey[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. Medium to higher plasticity 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]. Our evaluation indicates that the saturated gravelly/sandy soils between depths of 15.5 and 24.3 feet in B-1 will not liquefy during a major seismic event. However, we encountered low plasticity soils (silty clay with a Plasticity Index less than 12 and a moisture content to Plasticity Index ratio greater than 0.85) in the upper 15.5 feet that appear susceptible to liquefaction. Maximum anticipated settlement resulting from the liquefaction of this soil layer would be in the range of about 1.5 to 3 inches. This amount of settlement is considered tolerable for residential structures and utilities, although some damage to residences would be possible. Lateral spreading due to liquefaction is anticipated to be minimal (less than ½ inch). The results of our liquefaction evaluation are included at the end of the **Appendix**.

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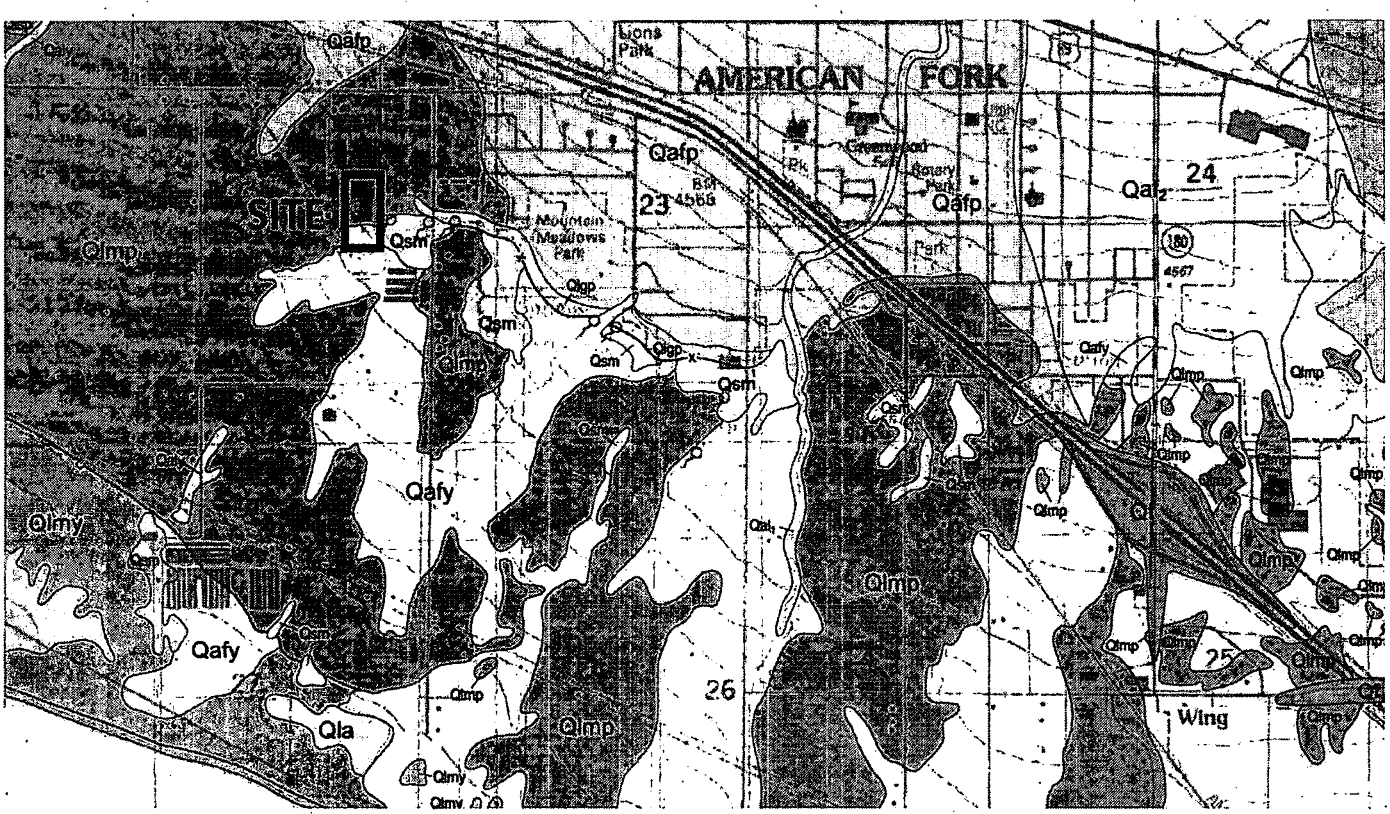
[5] Utah Geological Survey, "Liquefaction-Potential Map for a Part of Utah County, Utah," Utah Geological Survey Public Information Series 28, August 1994. https://ugspub.nr.utah.gov/publications/public_information/pi-28.pdf

[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.



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 trace is a segment of the Utah Lake fault system located about 2.5 miles southwest of the site.

4.3 Seismicity

4.3.1 Site Class

Utah has adopted the International Building Code (IBC) 2015. IBC 2015 determines the seismic hazard for a site based upon 2008 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 2015 (Section 1613.3.2) refers to Chapter 20, Site Classification Procedure for Seismic Design, of ASCE[4] 7. Given the subsurface soils at the site, including our projection of soils within the upper 100 feet of the soil profile, it is our opinion the site best fits Site Class D – Stiff Soil Profile, which we recommend for seismic structural design.

[4]American Society of Civil Engineers

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.

The geology of the USGS 7.5 Pelican Point, Utah Quadrangle, including the location of the subject site, has been mapped by the UGS[3]. The surficial geology on the majority of the subject site is mapped as "Lacustrine silt and clay" (Map Unit Qlmp) dated to be upper Pleistocene. The geology on the southernmost portion of the site is mapped as "Young alluvial-fan deposits, undivided" (Map Unit Qafy) dated to be Holocene to upper Pleistocene. Map Unit Qlmp is described 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); ... Exposed thickness less than 15 feet (5 m), but total thickness may exceed several tens of feet." Map Unit Qafy is described as " Poorly to moderately sorted, pebble to cobble gravel with boulders near bedrock sources, with a matrix of sand, silt, and clay, grading to mixtures of sand, silt, and clay on gentler slopes; deposited by debris flows, debris floods, and streams at the mouths of mountain canyons near the base of the Lake Mountains near Pelican Point and at the mouths of American Fork, Dry Creek, and Spring Creek as they flowed toward the north shore of Utah Lake, where they may include undifferentiated deltaic sediment deposited by streams flowing into the lake; ... Thickness variable, probably less than 30 feet (10 m)." No fill has been mapped at the location of the site on the geologic map. Refer to the **Geologic Map**, shown below.

[3] Biek, R.F., 2005, Geologic Map of the Lehi Quadrangle and Part of the Timpanogos Cave Quadrangle, Salt Lake and Utah Counties, Utah; Utah Geological Survey Map 210, Scale 1:24,000.

4.4 Other Geologic Hazards

No landslide deposits or features, including lateral spread deposits, 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

The site is currently undeveloped except for a single-family residence located within the south-central area of the site. Vegetation consists of grasses and weeds, with some trees and bushes in the middle and around some of the site periphery. Based upon aerial photos dating back to 1993 that are readily available on the internet, the existing home was constructed between 1993 and 1997, with most of the remainder of the site being used for agricultural (farming) purposes. Overall, the site slopes gently downward to the south-southwest. The site is bordered on the northwest to the northeast by existing residences, on the east by similar undeveloped land and 570 West Street, and on the south and west by similar undeveloped land (see **Vicinity Map in Section 1.1** above).

5.2 Subsurface Soils

At the locations of the bore holes we encountered approximately 12 inches of topsoil. Natural soils were observed beneath the topsoil, consisting of SILTY CLAY with sand (CL-ML), Sandy GRAVEL with silt (GP-GM), Organic CLAY (OH), and Silty CLAY (CL), extending to the bottom of the bore holes.

The silt/clay soils were moist to wet, light brown to gray in color, and very soft to stiff in consistency. The sandy gravel soils were wet, gray in color, and dense.

For a more descriptive interpretation of subsurface conditions, please refer to the bore hole logs, **Figures 2 and 3**, 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 bore holes at depths of about 2.5 to 3.5 feet below existing grade at the time of our field exploration. On June 25, 2019, CMT personnel returned to the site to measure the groundwater level at a depth of 2.5 feet within a slotted PVC pipe installed in bore hole B-1. Therefore, groundwater will likely affect excavations and basement depths (if used).

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 loose and disturbed soils, topsoil, vegetation, etc. Based upon the conditions observed in the bore holes there is topsoil on the surface of the site which we estimated to be about 12 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.

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, 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. Relatively shallow groundwater was encountered and later measured at this site at depths of about 2.5 feet below the existing ground surface. We anticipate that excavations extending below a depth of about 2 feet will likely encounter groundwater, and dewatering of such excavations will likely be required.

The near-surface natural soils encountered at this site mostly 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/gravelly (cohesionless) soils (which may be encountered within the southern portion of the site), 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 clay 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 600X, or equivalent (see **Section 6.6**).

On-site silt/clay soils may be used only as non-structural fill, but are also moisture-sensitive. Note that such moisture-sensitive soils are 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. <u>This will be very difficult, if not impossible, during wet and cold periods of the year</u>.

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	95
Site grading fill outside area defined above	0 to 5	92
Utility trenches within structural areas	--	96
Roadbase and subbase	-	96
Non-structural fill	0 to 5	90

Structural fills greater than 5 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).

[8] American Association of State Highway and Transportation Officials
[9] American Public Works Association

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 silt/clay soils at this site will likely 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.

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 residences may be supported upon conventional spread and/or continuous wall foundations placed on suitable, undisturbed natural soils and/or on structural fill extending to suitable natural soils. Footings may be designed using a net bearing pressure of 1,200 psf if placed on suitable, undisturbed, natural soils or 1,500 psf if placed on a minimum 18 inches of structural fill. 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 undocumented fill, topsoil with organics, sod, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water.

Deep, large roots may be encountered where trees and larger bushes are located or were previously located at the site; such large roots should be removed. If unsuitable soils are encountered, they must be completely removed and replaced with properly compacted structural fill. Excavation bottoms should be examined by a qualified geotechnical engineer to confirm that suitable bearing materials soils have been exposed.

All structural fill should meet the requirements for such, and should be placed and compacted in accordance with **Section 6** above. Placing footings on structural fill might extend excavation depths below groundwater; in such cases, the structural fill should consist of clean, angular gravel ¾ inch to 3 inches in size, placed on a separation fabric (Mirafi 140N or equivalent). 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 the maximum depth of structural fill 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 0.30 for natural silt/clay soils or 0.40 for natural sand/gravel soils and 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 350 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 below-grade 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 above groundwater, 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	55
At-Rest Pressure (wall is not allowed to yield)	55	---
Passive Pressure (wall moves into the soil)	350	550

9.0 FLOOR SLABS

Floor slabs may be established upon suitable, undisturbed, natural soils and/or on structural fill extending to suitable natural soils (same as for foundations). 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 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

10.1 Surface Drainage

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 the 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.

10.2 Foundation Subdrains

Groundwater at this site is very shallow. If floor slabs will be placed deeper than the existing ground surface elevation, we recommend that perimeter foundation subdrains be installed.

Foundation subdrains should consist of a 4-inch diameter perforated or slotted plastic or PVC pipe surrounded by clean gravel. The invert of the subdrain should be at least 2 feet below the top of the lowest adjacent floor slab. The gravel portion of the drain should extend a minimum 2 inches laterally and below the perforated pipe and at least 1 foot above the top of the lowest adjacent floor slab. The gravel zone must be installed immediately adjacent to the perimeter footings and the foundation walls. To reduce the possibility of plugging, the gravel must be wrapped with a geotextile, such as Mirafi 140N or equivalent. Prior to the installation of the footing subdrain, the below-grade walls should be dampproofed. The slope of the subdrain should be at least 0.5%. The gravel placed around the drain pipe should be clean 3/4-inch to 1-inch minus gap-graded gravel and/or "pea" gravel. The foundation subdrains can be discharged into the area subdrains, storm drains, or other suitable down-gradient location.

11.0 PAVEMENTS

We anticipate the natural silt/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 silt/clay soils.

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

Given the projected traffic as discussed above in **Section 1.3**, the following pavement sections are recommended for the local/residential streets per American Fork City Standards for areas within sensitive lands:

MATERIAL	PAVEMENT SECTION THICKNESS (inches)
Asphalt	**3**
Road-Base	**8**
Subbase	**12**
Total Thickness	**23**

Given the shallow depths to groundwater at this site, stabilization may be necessary to construct the pavement section given above. 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.

12.0 QUALITY CONTROL

We recommend that CMT be retained to 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

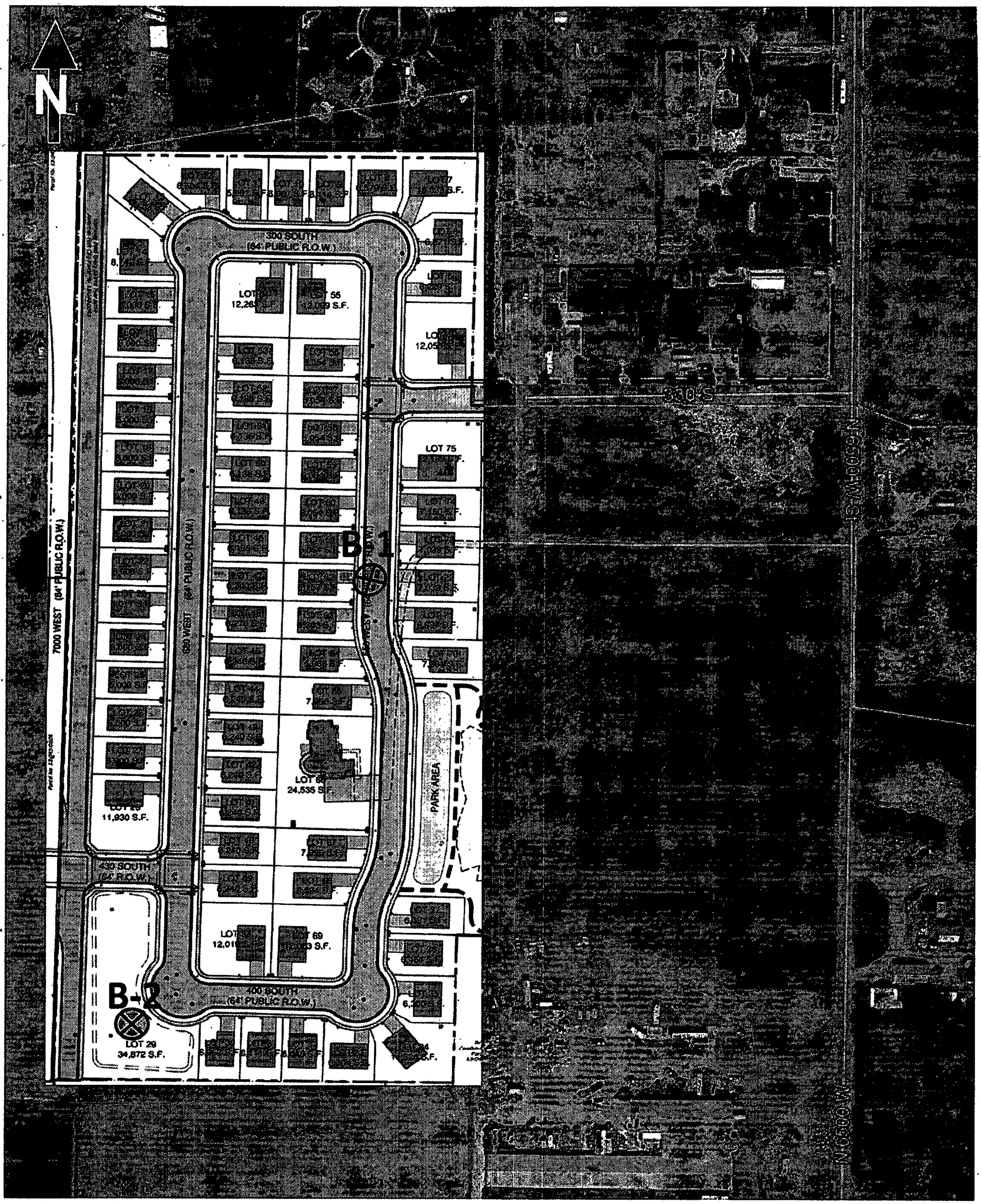
The recommendations provided herein were developed by evaluating the information obtained from the subsurface explorations and soils encountered therein. The exploration logs reflect the subsurface conditions only at the specific location at the particular time designated on the logs. Soil and ground 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



Fenn Farms Geotech Update

570 West 330 South, American Fork, Utah

CMT ENGINEERING LABORATORIES

Site Map

Date: 24-Jun-19

Job # 12827

Figure 1

Fenn Farms Geotechnical Update — Bore Hole Log — B-1

570 West 330 South, American Fork, Utah

Boring Type: Hollow-Stem Auger
Surface Elev. (approx):

Total Depth: 41.5'
Water Depth: 3.5', 2.5'

Date: 6/13/19
Job #: 12827

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Blows (N)	Total	Moisture (%)	Dry Density(pcf)	Gravel %	Sand %	Fines %	LL	PL	PI
0		TOPSOIL												
		Light brown to gray SILTY CLAY with sand (CL-ML) moist, very soft												
4		wet		1	1 0 1	1								
		soft		2	2 3 2	5	28	102						
8				3	1 1 2	3	35				80	28	22	6
		stiff; 6-inch thick sand lense at 10.5'		4	4 7 5	12	28	90						
12														
16		Gray Sandy GRAVEL with silt (GP-GM) wet, dense		5	5 17 20	37								
20				6	22 18 20	38	6				6			
24		Gray Organic CLAY (OL), some sand wet, medium stiff		7	1 2 2	4	64				88			
28														

Remarks: Groundwater encountered during drilling at depth of 3.5 feet and measured on 6/25/19 at depth of 2.5 feet.
Slotted PVC pipe installed to depth of 41.5 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Drilled By: Great Basin Drilling
Logged By: Sterling Howell

Figure: 2

Fenn Farms Geotechnical Update

Bore Hole Log

B-1

570 West 330 South, American Fork, Utah

Boring Type: Hollow-Stem Auger	Total Depth: 41.5'	Date: 6/13/19
Surface Elev. (approx):	Water Depth: 3.5', 2.5'	Job #: 12827

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														
		some sand lenses up to 2" thick		8	1 2 3	5	48				94	50	24	26
32		gravel lense at 32.5 feet												
		Gray Silty CLAY (CL), trace sand wet, medium stiff												
36				9	1 3 3	6	28				98			
40		stiff		10	10 8 8	16								
		END AT 41.5'												
44														
48														
52														
56														

Remarks: Groundwater encountered during drilling at depth of 3.5 feet and measured on 6/25/19 at depth of 2.5 feet.
Slotted PVC pipe installed to depth of 41.5 feet to facilitate water level measurements.

CMT ENGINEERING LABORATORIES

Drilled By: Great Basin Drilling
Logged By: Sterling Howell

Figure: 2

Fenn Farms Geotechnical Update — Bore Hole Log — B-2

570 West 330 South, American Fork, Utah

Boring Type: Hollow-Stem Auger	Total Depth: 4'	Date: 6/13/19
Surface Elev. (approx):	Water Depth: 2.5'	Job #: 12827

Depth (ft)	GRAPHIC LOG	Soil Description	Sample Type	Sample #	Blows (N)	Blows (N) Total	Moisture (%)	Dry Density(pcf)	Gradation Gravel %	Gradation Sand %	Gradation Fines %	Atterberg LL	Atterberg PL	Atterberg PI
0		TOPSOIL												
		Dark brown SILTY CLAY with sand (CL-ML), some sand lenses; moist, medium stiff; -infiltration rate of 34 minutes/inch; wet												
4		END AT 4'												
8														
12														
16														
20														
24														
28														

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

CMT ENGINEERING LABORATORIES

Drilled By: Great Basin Drilling
Logged By: Sterling Howell

Figure: 3

Fenn Farms Geotechnical Update

570 West 330 South, American Fork, Utah

Key to Symbols

Date: 6/13/19
Job #: 12827

① Depth (ft)	GRAPHIC LOG	Soil Description ③	④ Sample Type	⑤ Sample #	Blows(N) ⑥	⑦ Total	⑧ Moisture (%)	⑨ Dry Density(pcf)	Gradation ⑩ Gravel %	Sand %	Fines %	Atterberg LL	PL	PI

COLUMN DESCRIPTIONS

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

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

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

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

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

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

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

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

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

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

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		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
			CL		Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean
			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: 4

Company: CMT Engineering	Project: Fenn Farms	
Location: American Fork, Utah	Designer: Bill Turner	Checked by:
Project #: 12827	Date: 6/25/2019	Date:

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

PGA =	0.580		Hammer Efficiency =	80	%	Distance to fault =	6.59	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	2.5	4	1	112	3	80	0	0	CL-ML	Yes?
B-1	5	4	3	112	3	80	0	0	CL-ML	Yes?
B-1	7.5	4	3	112	3	80	0	0	CL-ML	Yes?
B-1	10	4	6	114	3	80	0	0	CL-ML	Yes?
B-1	15	4	37	124	5	6	1	0	GP-GM	Yes
B-1	20	4	38	124	5	6	1	0	GP-GM	Yes
B-1	25	4	4	113	5	88	0	0	OL	No
B-1	30	4	5	113	5	94	0	0	OL	No
B-1	35	4	6	114	5	98	0	0	CL	No
B-1	40	4	16	118	5	98	0	0	CL	No

Company: CMT Engineering	**Project:** Fenn Farms	
Location: American Fork, Utah	**Designer:** Bill Turner	**Checked by:**
Project #: 12827	**Date:** 6/25/2019	**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		
		$(N_1)_{60,cs}$	$FS_{Liq.}$	∑S (in)	$(N_1)_{60,cs}$	$FS_{Liq.}$	∑S (in)	$(N_1)_{60,cs}$	$FS_{Liq.}$	∑S (in)
B-1	2.5	7.5	#N/A	1.8	7.7	#N/A	2.7	4.4	#N/A	3.5
B-1	5	12.5	0.5	1.8	12.4	0.4	2.7	9.2	0.4	3.5
B-1	7.5	12.2	0.4	1.2	12.4	0.4	1.7	9.2	0.3	2.2
B-1	10	19.8	0.6	0.5	20.1	0.5	0.7	17.8	0.5	0.9
B-1	15	91.1	> 100	0.0	75.9	> 100	0.0	96.6	> 100	0.0
B-1	20	86.2	> 100	0.0	75.7	> 100	0.0	91.9	77.6	0.0
B-1	25	13.6	#N/A	0.0	13.0	#N/A	0.0	10.6	#N/A	0.0
B-1	30	15.7	#N/A	0.0	14.5	#N/A	0.0	12.0	#N/A	0.0
B-1	35	17.1	#N/A	0.0	15.6	#N/A	0.0	13.3	#N/A	0.0
B-1	40	39.1	#N/A	0.0	34.3	#N/A	0.0	33.8	#N/A	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
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#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
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#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A

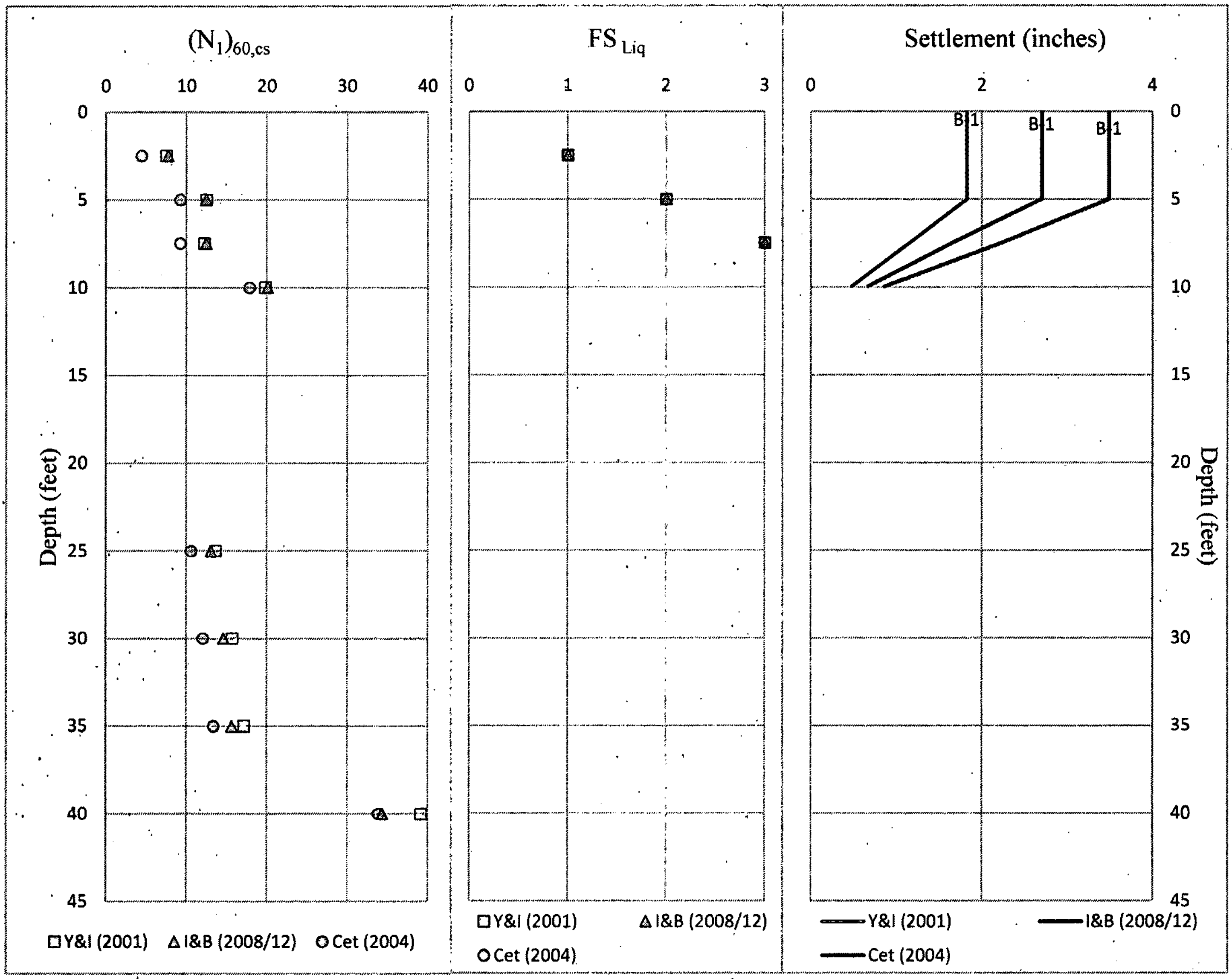
NOTES:

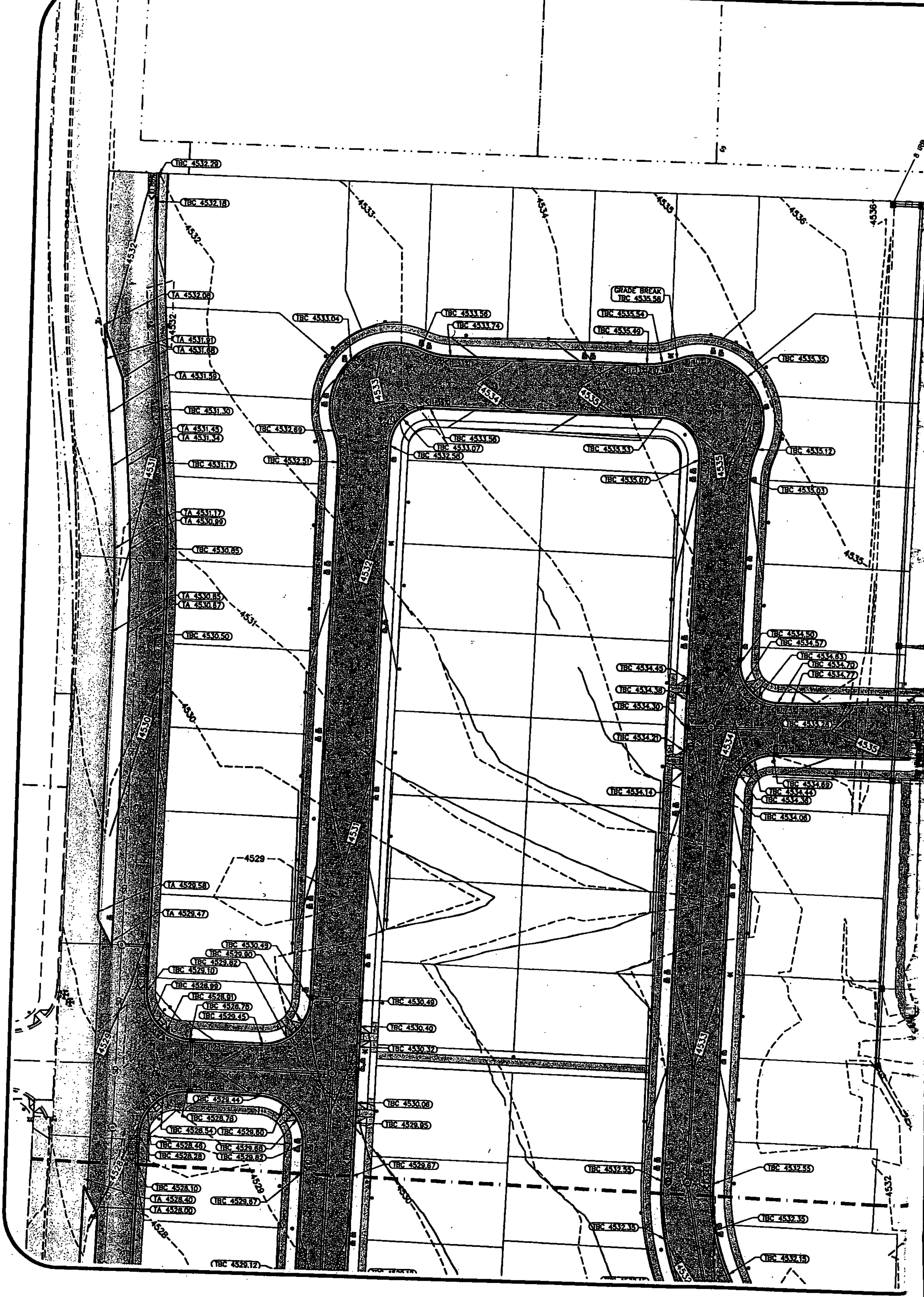
1. Youd & Idriss et al (2001); Tokimatsu & Seed (1987)
2. Idriss & Boulanger (2008, 2012); Ishihara & Yoshimine (1992)
3. Cetin et al. (2004, 2009)

Company: CMT Engineering	Project: Fenn Farms	
Location: American Fork, Utah	Designer: Bill Turner	Checked by:
Project #: 12827	Date: 6/25/2019	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	1.82	2.70	3.49	1.52	80.00	0.01	0.04





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TA 4532.08
TA 4531.91
TA 4531.68
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TBC 4531.17
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TA 4530.99
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GRADE BREAK
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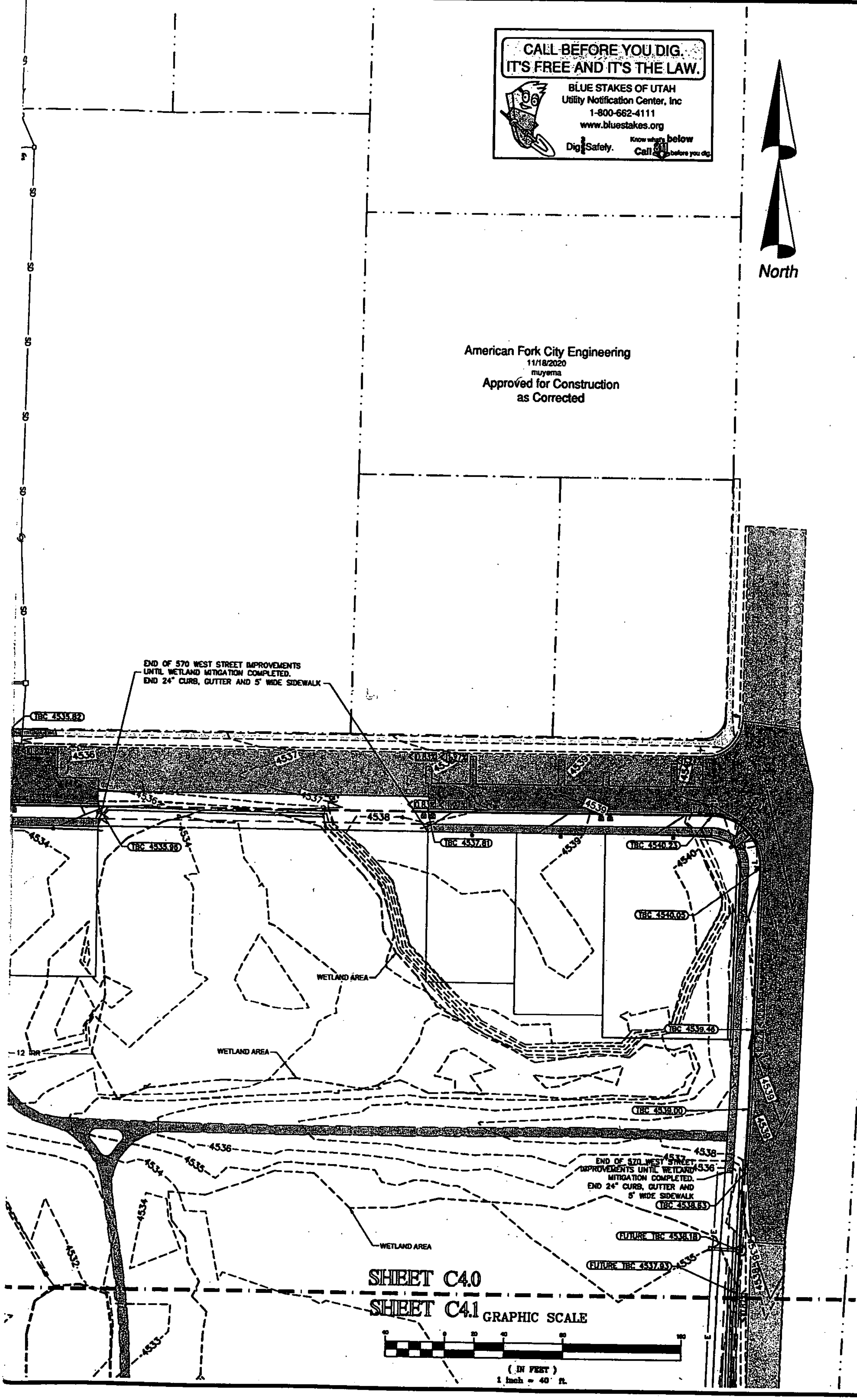


SEAL

A.L.M. & Associates, Inc.

Engineering · Surveying · Development · Planning

2230 North University Parkway, Building 6D, Provo, Utah 84604 ph:(801) 374 - 6262

THE ESTATES AT FENN FARMS PLAT "A"

MICHAEL BECK

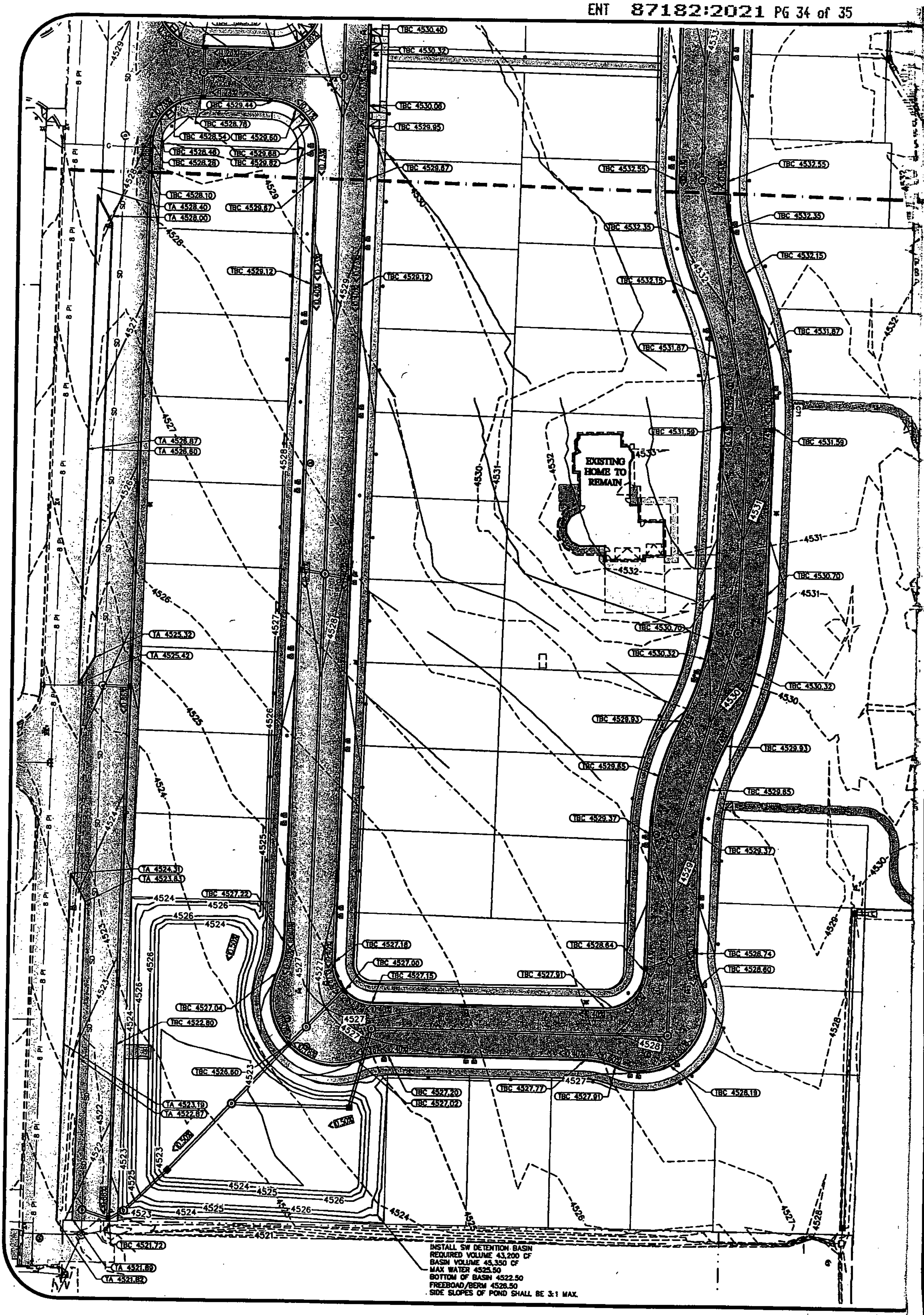
GRADING PLAN

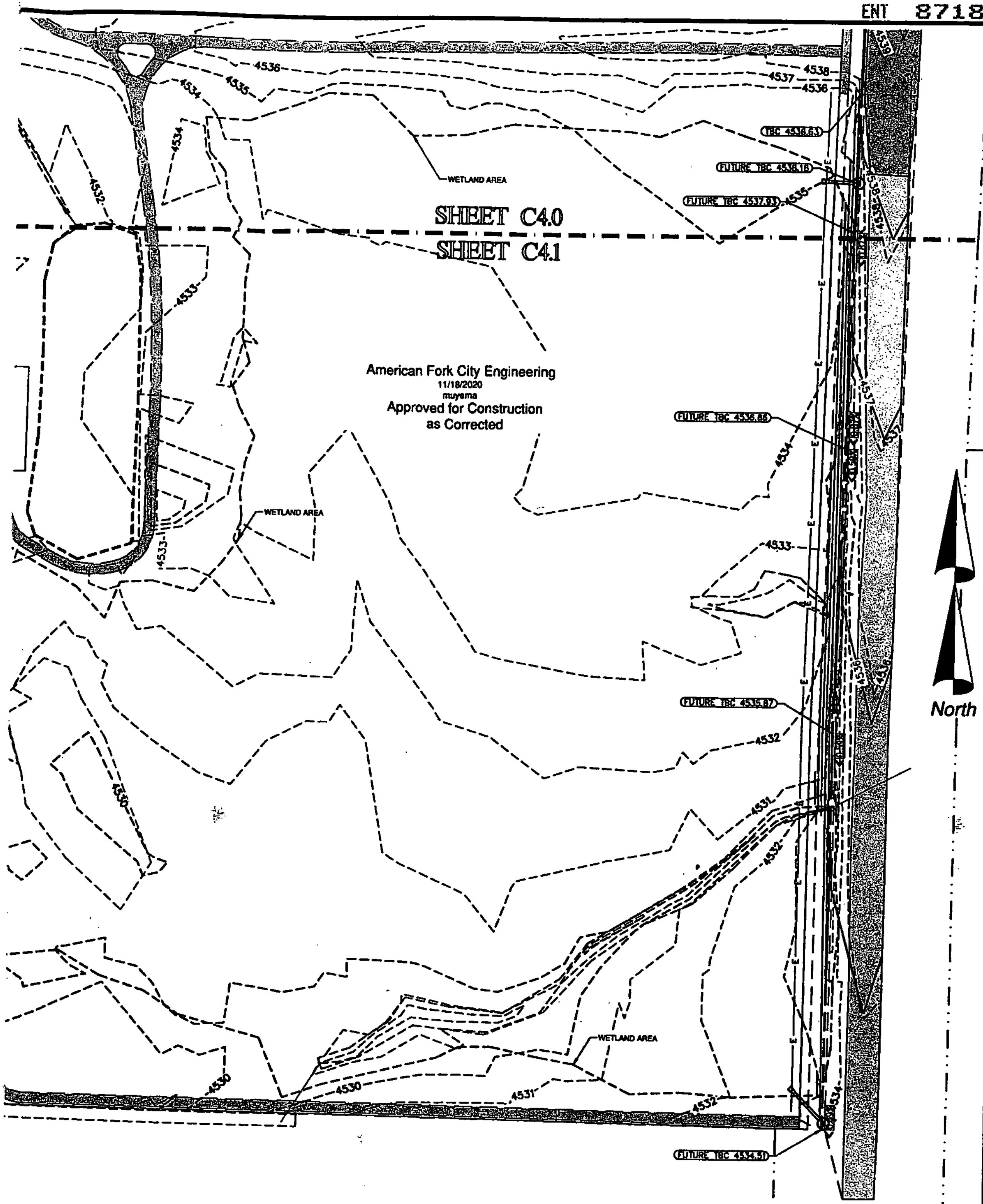
No.	Revision	Date

C4.0

OF SHEETS

Proj # 730 - 1224


EXISTING HOME TO REMAIN
INSTALL SW DETENTION BASIN
REQUIRED VOLUME 43,200 CF
BASIN VOLUME 45,350 CF
MAX WATER 4525.50
BOTTOM OF BASIN 4522.50
FREEBOAD/BERM 4526.50
SIDE SLOPES OF POND SHALL BE 3:1 MAX.



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GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
1 inch = 40 ft.

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THE ESTATES AT FENN FARMS PLAT "A"

MICHAEL BECK

GRADING PLAN

No.	Revision	Date

C4.1
OF SHEETS

Proj # 730 - 1224