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

ENT 105766:2021 PG 1 of 84
ANDREA ALLEN
UTAH COUNTY RECORDER
2021 Jun 09 3:29 pm 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 October 25, 2019, along with the site grading plan to the property generally located at 860 East Quality Drive, 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 24 day of MARCH, 2020.

OWNER(S):
Villas at Aspen Meadows, LLC, a Nevada limited liability company

(Signature) _____ (Signature) _____

Chris Webb (Printed Name) _____ (Printed Name) _____

Manager (Title) _____ (Title) _____

STATE OF UTAH)
§
COUNTY OF UTAH)

On the 24 day of MARCH, 2020, personally appeared before me CHRIS WEBB 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.

MATTHEW B. WIRTH
NOTARY PUBLIC - STATE OF UTAH
COMMISSION# 699612
COMM. EXP. 03-21-2022

_____
Notary Public
My Commission Expires: 3/21/22

Approved as to form: American Fork City Attorney

Rev. 12/4/18

Exhibit A

Legal Description

A parcel of land lying and situate in the Northeast Quarter of Section 25, Township 5 South, Range 1 East, Salt Lake Base and Meridian. Comprising 15.08 acres, 9.02 acres of Utah County Tax Parcel 13-062-0093 and the 6.06 acre remainder portion of Utah County Tax Parcel 13-062-0094. Basis of Bearing for subject description being South 45°01'56" East 3791.23 feet measured between the Utah County Survey brass cap monuments marking the North Quarter Corner and the East Quarter Corner of said Section 25. Subject parcel being more particularly described as follows:

Commencing at the North Quarter corner of said Section 25, thence South 89°35'49" East 1330.14 feet coincident with the calculated north line of said Northeast Quarter Section; Thence SOUTH 798.25 feet to a point on that particular Agreement Line described in that certain Boundary Line Agreement recorded January 19, 1994 as Entry #4974 and the TRUE POINT OF BEGINNING;

Thence North 00°41'59" East 623.95 feet to a point on the south right of way line of Quality Drive, (Vest Road Dedication, Entry #54716:2019, Map #16589 of the Utah County Records); Thence South 89°48'07" East 911.43 feet coincident with said south right of way line to the point of intersection with 860 East Street as per said Vest Road Dedication; Thence South 00°54'51" East 797.23 feet coincident with said West right of way line; Thence South 89°46'14" West 479.33 feet to a point on that particular Agreement Line described in that certain Parcel Boundary Line Adjustment Agreement and Quit Claim Deed recorded October 29, 2020 as entry #170744:2020; Thence the following two calls coincident with said Agreement line: 1) North 00°55'43" West 181.16 feet, and 2) South 89°38'19" West 449.50 feet to the point of beginning.

EXHIBIT B

Geotechnical Study

GSH

REPORT
GEOTECHNICAL STUDY
PROPOSED VEST PROPERTY APARTMENTS
860 EAST QUALITY DRIVE
AMERICAN FORK, UTAH

Submitted To:

The Ritchie Group
1245 East Brickyard Road, Suite 70
Salt Lake City, Utah 84106

Submitted By:

GSH Geotechnical, Inc.
473 West 4800 South
Salt Lake City, Utah 84123

October 25, 2019

Job No. 2093-004-19

GSH

October 25, 2019
Job No. 2093-004-19

Mr. Scott Laneri
The Ritchie Group
1245 East Brickyard Road, Suite 70
Salt Lake City, Utah 84106

Mr. Laneri:

Re: Report
Geotechnical Study
Proposed Vest Property Apartments
860 East Quality Drive
American Fork, Utah

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed Vest Property Apartments to be located at 860 East Quality Drive in American Fork, Utah. The general location of the site with respect to existing roadways, as of 2019, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing proposed facilities, existing roadways, and borings drilled in conjunction with this study is presented on Figure 2, Site Plan.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of the study were planned in discussions between Mr. Scott Laneri of The Ritchie Group and Mr. Alan Spilker of GSH Geotechnical, Inc. (GSH).

In general, the objectives of this study were to:

1. Define and evaluate the subsurface soil and groundwater conditions across the site.

2. Provide appropriate foundation, earthwork, pavement, and geoseismic recommendations to be utilized in the design and construction of the proposed facilities.

GSH Geotechnical, Inc.
473 West 4800 South
Salt Lake City, Utah 84123
Tel: 801.685.9190 Fax: 801.685.2990
www.gshgeo.com

In accomplishing these objectives, our scope has included the following:

1. A field program consisting of the drilling, logging, and sampling of 16 exploration borings.

2. A laboratory testing program.

3. An office program consisting of the correlation of available data, engineering analysis, and the preparation of this summary report.

1.3 AUTHORIZATION

Authorization was provided by returning a signed copy of the Professional Services Agreement No. 19-0911.rev1 dated September 18, 2019.

1.4 PROFESSIONAL STATEMENTS

Supporting data upon which our recommendations are based are presented in subsequent sections of this report. Recommendations presented herein are governed by the physical properties of the soils encountered in the exploration borings, projected groundwater conditions, and the layout and design data discussed in Section 2, Proposed Construction. If subsurface conditions other than those described in this report are encountered and/or if design and layout changes are implemented, GSH must be informed so that our recommendations can be reviewed and amended, if necessary.

Our professional services have been performed, our findings developed, and our recommendations prepared in accordance with generally accepted engineering principles and practices in this area at this time.

2. PROPOSED CONSTRUCTION

The project is to consist of the construction of multiple 4-level wood-framed apartment structures and associated pavements. The structures are anticipated to be placed slab on grade and supported upon conventional spread and continuous wall footings.

Maximum real column and wall loads are anticipated to be on the order of up to 200 kips and up to 7 kips per lineal foot, respectively. Real loads are defined as the total of all dead plus frequently applied (reduced) live loads.

Paved parking areas and drive lanes are planned around the structure. Projected traffic in the parking areas is anticipated to consist of a light volume of automobiles and light trucks, occasional medium-weight trucks, and no heavyweight trucks. Projected traffic in the drive lanes is anticipated to consist of a moderate volume of automobiles and light trucks, a light volume of medium-weight trucks, and occasional heavyweight trucks.

Site development will require some earthwork in the form of minor cutting and filling. At this time, we anticipate that maximum site grading cuts and fills, excluding utilities, will be on the order of 1 to 3 feet.

3. SITE INVESTIGATIONS

3.1 GENERAL

Subsurface conditions in unexplored locations or at other times may vary from those encountered at specific boring locations. If such variations are noted during construction or if project development plans are changed, GSH must review the changes and amend our recommendations, if necessary.

Boring locations were established by estimating distances and angles from site landmarks. If increased accuracy is desired by the client, we recommend that the boring locations and elevations be surveyed.

3.2 FIELD PROGRAM

To define and evaluate the subsurface soil and groundwater conditions across the site, 16 borings were drilled within the accessible areas. These borings were completed to depths ranging from 12.5 to 36.5 feet with a truck-mounted drill rig equipped with hollow-stem augers. Auger refusal within very dense granular soils terminated Boring B-1. The approximate locations of the borings are presented on Figure 2.

The field portion of our study was under the direct control and continual supervision of an experienced member of our geotechnical staff. During the course of the drilling operations, a continuous log of the subsurface conditions encountered was maintained. In addition, samples of the typical soils encountered were obtained for subsequent laboratory testing and examination. The soils were classified in the field based upon visual and textural examination. These classifications were supplemented by subsequent inspection and testing in our laboratory. Graphical representation of the subsurface conditions encountered is presented on Figures 3A through 3P, Boring Logs. Soils were classified in accordance with the nomenclature described on Figure 4, Key to Boring Log (USCS).

At select locations and depths 3.25- and 3.0-inch outside diameter, 2.42-inch inside diameter drive samplers (Dames & Moore) and a 2.0-inch outside diameter, 1.38-inch inside diameter drive sampler (SPT) were utilized. The blow counts recorded on the boring logs were those required to drive the sampler 12 inches with a 140-pound hammer dropping 30 inches.

Following completion of excavation operations, 1.25-inch diameter slotted PVC pipe was installed in each boring to provide a means of monitoring the groundwater fluctuations. The borings were backfilled with auger cuttings.

3.3 LABORATORY TESTING

3.3.1 General

To provide data necessary for our engineering analysis, a laboratory testing program was performed. This program included moisture, density, partial gradation, Atterberg limits, consolidation, and chemical tests. The following paragraphs describe the tests and summarize the test data.

3.3.2 Moisture and Density Tests

To provide index parameters and to correlate other test data, moisture and density tests were performed on selected samples. The results of these tests are presented on the boring logs, Figures 3A through 3P.

3.3.3 Partial Gradation Tests

To aid in classifying the granular soils, partial gradation tests were performed. Results of the tests are tabulated below and presented on the boring logs, Figures 3A through 3P.

Boring No.	Depth (feet)	Percent Passing No. 200 Sieve	Moisture Content Percent	Soil Classification
B-1	30.0	26.0	4.8	SP
B-2	2.5	12.6	36.5	SM
B-3	15.0	34.2	41.6	CL*
B-4	7.5	17.9	24.9	CL*
B-5	10.0	30.7	47.8	CL*
B-6	10.0	28.6	48.6	CL*

* Sample tested contained layers of sand

3.3.4 Atterberg Limits Test

To aid in classifying the soils, an Atterberg limits test was performed on a sample of the fine-grained cohesive soils. Results of the test are tabulated below and presented on the boring logs, Figures 3A through 3P:

Boring No.	Depth (feet)	Liquid Limit (percent)	Plastic Limit (percent)	Plasticity Index (percent)	Soil Classification
B-1	15.0	44	29	15	ML

3.3.5 Consolidation Tests

To provide data necessary for our settlement analysis, consolidation testing was performed on 4 representative samples of the natural fine-grained clay soils encountered at the site. The results of these tests indicate that the samples tested were moderately over-consolidated and will exhibit moderate strength and compressibility characteristics under the anticipated loading. Detailed results of the tests are maintained within our files and can be transmitted to you, upon your request.

3.3.6 Chemical Tests

To determine if the site soils will react detrimentally with concrete, chemical tests were performed on a representative sample of the near-surface soil encountered at the site. The results of the chemical tests are tabulated below:

Boring No.	Depth (feet)	Soil Classification	pH	Total Water Soluble Sulfate (mg/kg-dry)
B-1	2.5	CL	8.32	7.14

4. SITE CONDITIONS

4.1 SURFACE

The site is located at 860 East Quality Drive in American Fork, Utah. The site is currently vacant/undeveloped land previously used for agricultural purposes with a dried up river/irrigation ditch bisecting the site running north to south on the west side of the site. The topography of the site is relatively flat, grading down to the southeast with a total relief of approximately 12 to 14 feet. Site vegetation consists of various weeds and brush/grass throughout with sporadic mature trees on the west side of the site.

The site is bounded to the north by vacant/undeveloped agricultural grass land followed by multi-family residential structures; to the east by 4850 West Street followed by multi-family residential structures along with vacant/undeveloped and agricultural grass land; to the south by vacant/undeveloped agricultural grass land followed by wooded land along with a commercial structure with 930 South Street beyond; and to the west by vacant/undeveloped wooded land along with commercial structures followed by 600 East Street.

4.2 SUBSURFACE SOIL

The following paragraphs provide generalized descriptions of the subsurface profiles and soil conditions encountered within the borings conducted during this study. As previously noted, soil conditions may vary in unexplored locations.

The borings were drilled to depths ranging from 12.5 to 36.5 feet. The soil conditions encountered in each of the borings, to the depths penetrated, were generally similar across the boring locations.

- Approximately 3 to 6 inches of topsoil was encountered in each boring. Topsoil thickness is frequently erratic and thicker zones of topsoil should be anticipated.

- Non-engineered fill soils were encountered in Borings B-7, B-10, B-12, B-14, B-15, and B-16, to depths ranging from 2.5 to 6.0 feet beneath the existing ground surface. The non-engineered fill soils primarily consisted of clay with varying silt, sand, and gravel content, sand with varying clay, silt, and gravel content.

- Natural soils were encountered below the non-engineered fill or the ground surface in each boring. The natural soils consisted primarily of clay with varying silt, sand, and gavel content and sand with varying clay, silt, and gravel content.

The natural clay soils were soft to very stiff, dry to saturated, gray, brown, and dark brown in color, and moderately over-consolidated. The natural clay soils are anticipated to exhibit moderate strength and compressibility characteristics under the anticipated loading.

The natural sand soils were very loose to very dense, dry to saturated, and brownish-yellow and brown in color. The natural sand soils are anticipated to exhibit moderately high strength and moderately low compressibility characteristics under the anticipated load range.

For a more descriptive interpretation of subsurface conditions, please refer to Figures 3A through 3P, Boring Logs. The lines designating the interface between soil types on the boring logs generally represent approximate boundaries. In situ, the transition between soil types may be gradual.

4.3 GROUNDWATER

On October 23, 2019 (22 days following drilling), groundwater was measured within the PVC pipes installed as tabulated below:

Boring No.	Groundwater Depth (feet)
	August 7, 2018
B-1	6.8
B-2	5.6
B-3	7.2
B-4	7.9

Boring No.	Groundwater Depth (feet)
	August 7, 2018
B-5	10.1
B-6	8.6
B-7	4.1
B-8	3.3
B-9	4.6
B-10	8.9
B-11	4.2
B-12	10.8
B-13	3.1
B-14	6.9
B-15	6.8
B-16	5.9

Groundwater levels vary with changes in season and rainfall, construction activity, irrigation, snow melt, surface water run-off, and other site-specific factors.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The proposed structures may be supported upon conventional spread and continuous wall foundations supported upon suitable natural soils and/or structural fill extending to suitable natural soils.

The most significant geotechnical aspects at the site are:

1. The existing non-engineered fills across much of the site.
2. The relatively shallow depth to groundwater.
3. The potentially liquefiable sand layer encountered in Boring B-1.

Prior to proceeding with construction, removal of any existing debris, surface vegetation, root systems, topsoil, non-engineered fill, and any deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed structure footprint and 3 feet beyond rigid pavements and exterior flatwork areas will be required. All existing utility locations should be reviewed to assess their impact on the proposed construction and abandoned and/or relocated as appropriate.

Due to the developed nature of this site and the surrounding area, additional non-engineered fills may exist in unexplored areas of the site. Based on our experience, non-engineered fills are frequently erratic in composition and consistency. All surficial loose/disturbed soils and non-engineered fills must be removed below all footings, floor slabs, and rigid pavements. The in situ, non-engineered fills may remain below flexible pavements if free of any deleterious materials, of limited thickness, and if properly prepared, as discussed later in this report.

Some of the on-site non-engineered fill soils encountered were granular. On-site granular soils, including existing non-engineered fills, may be re-utilized as structural site grading fill if they meet the criteria for such, as stated later in this report.

Groundwater was measured as shallow as 3.1 feet below the ground surface. GSH recommends placing floor slabs no closer than 4 feet from the highest groundwater elevation. Site grading fill may be utilized to raise the overall grade to achieve the required separation between the floor slab and the highest groundwater elevation.

Proof rolling of the natural clay subgrade must not be completed if cuts extend to within 1 foot of the groundwater surface. In areas where cuts are to extend to within 1 foot of the groundwater surface, stabilization must be anticipated.

To reduce disturbance of the natural soils during excavation, it is recommended that low-impact, track-mounted equipment with smooth edge buckets/blades be utilized.

A medium dense, saturated sand layer was encountered in Boring B-1. Our analysis indicates that this layer could liquefy during the design seismic event (see Section 5.9.5, Liquefaction). The potential settlements due to liquefaction are anticipated to be less than 1.3 inch. This magnitude of settlement can typically be tolerated by an adequately designed structure to protect life safety. Additionally, with the layer of non-liquefiable material overlying the potentially liquefiable soils and relatively small amount of calculated settlement, associated settlements at the foundation level are anticipated to be less. Surface rupture and lateral spreading are not anticipated to occur.

Field work has been completed for a ground motion hazard study for the site. Settlements due to liquefaction will be addressed within the study, and proper recommendations will be determined. Further engineering analysis is needed to complete the study and will be transmitted to you upon completion.

Detailed discussions pertaining to earthwork, foundations, pavements, and the geoseismic setting of the site are presented in the following sections.

5.2 EARTHWORK

5.2.1 Site Preparation

Initial site preparation will consist of the removal of any existing debris, non-engineered fills, surface vegetation, root systems, topsoil, and any deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed structure footprint and 3 feet beyond rigid pavements and exterior flatwork areas. All existing utility locations should be reviewed to assess their impact on the proposed construction and abandoned and/or relocated as appropriate.

In situ, non-engineered fills may remain below flexible pavements if free of debris and deleterious materials, less than 3 feet in thickness, and if properly prepared. Proper preparation below pavements will consist of the scarification of the upper 12 inches below asphalt concrete (flexible pavement), followed by moisture preparation and re-compaction to the requirements of structural fill. Even with proper preparation, pavements established overlying non-engineered fills may encounter some long-term movements unless the non-engineered fills are completely removed.

It must be noted that from a handling and compaction standpoint, soils containing high amounts of fines (silts and clays) are inherently more difficult to rework and 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. Additionally, the on-site soils are likely above optimum moisture content for compacting at present and would require some drying prior to re-compacting.

Subsequent to stripping and prior to the placement of floor slabs, foundations, structural site grading fills, exterior flatwork, and pavements, 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 beneath footings, they must be completely removed. If removal depth required is greater than 2 feet below footings, GSH must be notified to provide further recommendations. In pavement, floor slab, and outside flatwork areas, unsuitable natural soils should be removed to a maximum depth of 2 feet and replaced with compacted granular structural fill.

Subgrade preparation as described must be completed prior to placing overlying structural site grading fills.

Due to the relatively high groundwater, site grading cuts should be kept to a minimum. Cuts extending to within 1 foot of the groundwater elevation will likely disturb the natural clay soils and proof rolling must not be completed. Stabilization must be anticipated in areas where cuts are to extend to within 1 foot of the groundwater surface.

To reduce disturbance of the natural soils during excavation, it is recommended that low-impact, track-mounted equipment with smooth edge buckets/blades be utilized.

GSH must be notified prior to the placement of structural site grading fills, floor slabs, footings, and pavements to verify that all loose/disturbed soils and non-engineered fills have been completely removed and/or properly prepared.

5.2.2 Temporary Excavations

Temporary excavations up to 8 feet deep in fine-grained cohesive soils, above or below the water table, may be constructed with sideslopes no steeper than one-half horizontal to one vertical (0.5H:1.0V). Excavations deeper than 8 feet are not anticipated at the site.

For granular (cohesionless) soils, construction excavations above the water table, not exceeding 4 feet, should be no steeper than one-half horizontal to one vertical (0.5H:1.0V). For excavations up to 8 feet, in granular soils and above the water table, the slopes should be no steeper than one horizontal to one vertical (1H:1V). Excavations encountering saturated cohesionless soils will be very difficult and will require very flat sideslopes and/or shoring, bracing, and dewatering.

To reduce disturbance of the natural soils during excavation, it is recommended that low-impact, track-mounted equipment with smooth edge buckets/blades be utilized.

The static groundwater table was encountered as shallow as 3.1 feet below the existing surface and may be shallower with seasonal fluctuations. Consideration for dewatering of utility trenches, excavations for the removal of non-engineered fill, and other excavations below this level should be incorporated into the design and bidding process.

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.

5.2.3 Structural Fill

Structural fill is defined as all fill which will ultimately be subjected to structural loadings, such as imposed by footings, floor slabs, pavements, etc. Structural fill will be required as backfill over foundations and utilities, as site grading fill, and as replacement fill below footings. All structural fill must be free of surface vegetation, root systems, rubbish, topsoil, frozen soil, and other deleterious materials.

Structural site grading fill is defined as structural fill placed over relatively large open areas to raise the overall grade. For structural site grading fill, the maximum particle size shall not exceed 4 inches; although, occasional larger particles, not exceeding 8 inches in diameter, may be incorporated if placed randomly in a manner such that "honeycombing" does not occur and the desired degree of compaction can be achieved. The maximum particle size within structural fill placed within confined areas shall be restricted to 2 inches.

On-site soils, including existing non-engineered fills, may be re-utilized as structural site grading fill if they do not contain construction debris or deleterious material and meet the requirements of structural fill. Fine-grained soils will require very close moisture control and may be very difficult, if not impossible, to properly place and compact during wet and cold periods of the year.

Imported structural fill below foundations and floor slabs shall consist of a well graded sand and gravel mixture with less than 30 percent retained on the three-quarter-inch sieve and less than 20 percent passing the No. 200 Sieve (clays and silts).

To stabilize soft subgrade conditions (if encountered) or where structural fill is required to be placed closer than 2.0 feet above the water table at the time of construction, a mixture of coarse angular gravels and cobbles and/or 1.5- to 2.0-inch gravel (stabilizing fill) should be utilized. It may also help to utilize a stabilization fabric, such as Mirafi 600X or equivalent, placed on the natural ground if 1.5- to 2.0-inch gravel is used as stabilizing fill.

5.2.4 Fill Placement and Compaction

All structural fill shall be placed in lifts not exceeding 8 inches in loose thickness. Structural fills shall be compacted in accordance with the percent of the maximum dry density as determined by the AASHTO[1] T180 (ASTM[2] D1557) compaction criteria in accordance with the following table:

Location	Total Fill Thickness (feet)	Minimum Percentage of Maximum Dry Density
Beneath an area extending at least 5 feet beyond the perimeter of the structure	0 to 10	95
Site grading fills outside area defined above	0 to 5	90
Site grading fills outside area defined above	5 to 10	95
Utility trenches within structural areas	--	96
Road base	--	96

Structural fills greater than 10 feet thick are not anticipated at the site.

Subsequent to stripping and prior to the placement of structural site grading fill, the subgrade shall be prepared as discussed in Section 5.2.1, Site Preparation, of this report. In confined areas, subgrade preparation should consist of the removal of all loose or disturbed soils.

1 American Association of State Highway and Transportation Officials
2 American Society for Testing and Materials

Coarse angular gravel and cobble mixtures (stabilizing fill), if utilized, shall be end dumped, spread to a maximum loose lift thickness of 15 inches, and compacted by dropping a backhoe bucket onto the surface continuously at least twice. As an alternative, the stabilizing fill may be compacted by passing moderately heavy construction equipment or large self-propelled compaction equipment at least twice. Subsequent fill material placed over the coarse gravels and cobbles shall be adequately compacted so that the "fines" are "worked into" the voids in the underlying coarser gravels and cobbles. Where soil fill materials are to be placed directly over more than about 18 inches of clean gravel, a separation geofabric, such as Mirafi 140N or equivalent, is recommended to be placed between the gravel and subsequent soil fills.

Non-structural fill may be placed in lifts not exceeding 12 inches in loose thickness and compacted by passing construction, spreading, or hauling equipment over the surface at least twice.

5.2.5 Utility Trenches

All utility trench backfill material below structurally loaded facilities (footings, floor slabs, flatwork, pavements, etc.) shall be placed at the same density requirements established for structural fill. If the surface of the backfill becomes disturbed during the course of construction, the backfill shall be proof rolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proof rolling shall be performed by passing moderately loaded rubber tire-mounted construction equipment uniformly over the surface at least twice. If excessively loose or soft areas are encountered during proof rolling, they shall be removed to a maximum depth of 2 feet below design finish grade and replaced with structural fill.

Many utility companies and City-County governments are now requiring that Type A-1a or A-1b (AASHTO Designation – granular soils with limited fines) soils be used as backfill over utilities. These organizations are also requiring that in public roadways, the backfill over major utilities be compacted over the full depth of fill to at least 96 percent of the maximum dry density as determined by the AASHTO T180 (ASTM D1557) method of compaction. GSH recommends that as the major utilities continue onto the site that these compaction specifications are followed.

Fine-grained soils, such as silts and clays, are not recommended for utility trench backfill in structural areas.

The static groundwater table was encountered as shallow as 3.1 feet below the existing surface and may be shallower with seasonal fluctuations. Dewatering of utility trenches and other excavations below this level should be anticipated.

To reduce disturbance of the natural soils during excavation, it is recommended that low-impact, track-mounted equipment with smooth edge buckets/blades be utilized.

5.3 GROUNDWATER

On October 23, 2019 (22 days following drilling), groundwater was measured within the PVC pipes installed as tabulated below:

Boring No.	Groundwater Depth (feet)
	August 7, 2018
B-1	6.8
B-2	5.6
B-3	7.2
B-4	7.9
B-5	10.1
B-6	8.6
B-7	4.1
B-8	3.3
B-9	4.6
B-10	8.9
B-11	4.2
B-12	10.8
B-13	3.1
B-14	6.9
B-15	6.8
B-16	5.9

Based on the anticipated cuts necessary to reach design subgrades, we anticipate temporary and permanent dewatering will be necessary. Floor slabs must be placed a minimum of 4 feet from the stabilized groundwater elevation. Site grading fill may be utilized to raise the overall grade to achieve the required separation between the floor slab and the highest groundwater elevation.

The groundwater measurements presented are conditions at the time of the field exploration and may not be representative of other times or locations. Groundwater levels may vary seasonally and with precipitation, as well as other factors including irrigation. Evaluation of these factors is beyond the scope of this study. Groundwater levels may, therefore, be at shallower or deeper

depths than those measured during this study, including during construction and over the life of the structure.

The extent and nature of any dewatering required during construction will be dependent on the actual groundwater conditions prevalent at the time of construction and the effectiveness of construction drainage to prevent run-off into open excavations.

5.4 SPREAD AND CONTINUOUS WALL FOUNDATIONS

5.4.1 Design Data

The results of our analysis indicate that the proposed structures may be supported upon conventional spread and continuous wall foundations established upon suitable natural soils and/or structural fill extending to suitable natural soils. Under no circumstances shall foundations be established over non-engineered fills, loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. More heavily loaded footings will require a certain amount of granular structural replacement fill as specified in Section 5.4.3, Settlements, of this report. For design, the following parameters are provided:

Minimum Recommended Depth of Embedment for Frost Protection	- 30 inches
Minimum Recommended Depth of Embedment for Non-frost Conditions	- 15 inches
Recommended Minimum Width for Continuous Wall Footings	- 18 inches
Minimum Recommended Width for Isolated Spread Footings	- 24 inches
Recommended Net Bearing Capacity for Real Load Conditions For Footings Placed on 1.5 Feet of Granular Structural Fill	- 2,000 pounds per square foot
Bearing Capacity Increase for Seismic Loading	- 50 percent

The term "net bearing capacity" refers to the allowable pressure imposed by the portion of the structure located above lowest adjacent final grade. Therefore, the weight of the footing and backfill to lowest adjacent final grade need not be considered. Real loads are defined as the total

of all dead plus frequently applied live loads. Total load includes all dead and live loads, including seismic and wind.

5.4.2 Installation

Under no circumstances shall the footings be installed upon non-engineered fills, loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, or other deleterious materials. If unsuitable soils are encountered, they must be removed and replaced with compacted granular fill. If granular soils become loose or disturbed, they must be recompacted prior to pouring the concrete.

The width of structural replacement fill below footings should be equal to the width of the footing plus one foot for each foot of fill thickness.

5.4.3 Settlements

Footings must be placed over a minimum of 1.5 feet of granular structural fill.

Based on column loadings, soil bearing capacities, and the foundation recommendations as discussed above, we expect primary total settlement beneath individual foundations to be less than one inch.

The amount of differential settlement is difficult to predict because the subsurface and foundation loading conditions can vary considerably across the site. However, we anticipate differential settlement between adjacent foundations could vary from 0.5 to 0.75 inch. The final deflected shape of the structure will be dependent on actual foundation locations and loading.

5.5 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 friction of 0.35 may be utilized for the footing interface with in situ natural clay soils and 0.40 for footing interface with natural granular soils or granular structural fill. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 300 pounds per cubic foot. Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pounds per cubic foot.

A combination of passive earth resistance and friction may be utilized provided that the friction component of the total is divided by 1.5.

5.6 FLOOR SLABS

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

Additionally, GSH recommends that floor slabs be constructed a minimum of 4.0 feet from the stabilized groundwater elevation. Site grading fill may be utilized to raise the overall grade to achieve the required separation between the floor slab and the highest groundwater elevation.

To facilitate curing of the concrete and to provide a capillary moisture break, it is recommended that floor slabs be directly underlain by at least 4 inches of "free-draining" fill, such as "pea" gravel or three-quarters to one inch minus clean gap-graded gravel.

Settlement of lightly loaded floor slabs designed according to previous recommendations (average uniform pressure of 200 pounds per square foot or less) is anticipated to be less than one-quarter of an inch.

5.7 PAVEMENTS

The natural clay soils and non-engineered fills will exhibit poor pavement support characteristics when saturated. All pavement areas must be prepared as previously discussed (see Section 5.2.1, Site Preparation). Under no circumstances shall pavements be established over unprepared non-engineered fills, loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. With the subgrade soils and the projected traffic as discussed in Section 2, Proposed Construction, the following pavement sections are recommended:

Parking Areas

(Light Volume of Automobiles and Light Trucks,
Occasional Medium-Weight Trucks,
and No Heavyweight Trucks)
[2 equivalent 18-kip axle loads per day]

Flexible Pavements:
(Asphalt Concrete)

2.5 inches	Asphalt concrete
7.0 inches	Aggregate base

Over	Properly prepared and stabilized fills, natural subgrade soils, and/or structural site grading fill extending to properly prepared and stabilized fills and/or natural subgrade soils

Rigid Pavements:
(Non-reinforced Concrete)

5.0 inches	Portland cement concrete (non-reinforced)
5.0 inches	Aggregate base
Over	Properly prepared and stabilized natural subgrade soils and/or structural site grading fill extending to properly prepared natural subgrade soils

Drive Lanes

(Moderate Volume of Automobiles and Light Trucks,
Light Volume of Medium-Weight Trucks,
and Occasional Heavyweight Trucks)
[6 equivalent 18-kip axle loads per day]

Flexible Pavements:
(Asphalt Concrete)

3.0 inches	Asphalt concrete
9.0 inches	Aggregate base
Over	Properly prepared and stabilized fills, natural subgrade soils, and/or structural site grading fill extending to properly prepared and stabilized fills and/or natural subgrade soils

Rigid Pavements:
(Non-reinforced Concrete)

5.0 inches	Portland cement concrete (non-reinforced)

5.0 inches	Aggregate base
Over	Properly prepared and stabilized natural subgrade soils and/or structural site grading fill extending to properly prepared natural subgrade soils

For dumpster pads, we recommend a pavement section consisting of 6.5 inches of Portland cement concrete, 5.0 inches of aggregate base, over properly prepared natural subgrade or site grading structural fills. Dumpster pads should not be constructed overlying non-engineered fills under any circumstances.

These above rigid pavement sections are for non-reinforced Portland cement concrete. Concrete should be designed in accordance with the American Concrete Institute (ACI) and joint details should conform to the Portland Cement Association (PCA) guidelines. The concrete should have a minimum 28-day unconfined compressive strength of 4,000 pounds per square inch and contain 6 percent ±1 percent air-entrainment.

The crushed stone should conform to applicable sections of the current Utah Department of Transportation (UDOT) Standard Specifications. All asphalt material and paving operations should meet applicable specifications of the Asphalt Institute and UDOT. A GSH technician shall observe placement and perform density testing of the base course material and asphalt.

Please note that the recommended pavement section is based on estimated post-construction traffic loading. If the pavement is to be constructed and utilized by construction traffic, the above pavement section may prove insufficient for heavy truck traffic, such as concrete trucks or tractor-trailers used for construction delivery. Unexpected distress, reduced pavement life, and/or premature failure of the pavement section could result if subjected to heavy construction traffic and the owner should be made aware of this risk. If the estimated traffic loading stated herein is not correct, GSH must review actual pavement loading conditions to determine if revisions to these recommendations are warranted.

5.8 CEMENT TYPES

The laboratory tests indicate that the natural soils tested contain a negligible amount of water soluble sulfates. Based on our test results, concrete in contact with the on-site soil will have a low potential for sulfate reaction (ACI 318, Table 4.3.1). Therefore, all concrete which will be in contact with the site soils may be prepared using Type I or IA cement.

5.9 GEOSEISMIC SETTING

5.9.1 General

Utah municipalities have adopted the International Building Code (IBC) 2018. The IBC 2018 code refers to ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7-16) determines the seismic hazard for a site based upon 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).

5.9.2 Faulting

Based on our review of available literature, no active faults pass through or immediately adjacent to the site. The nearest active mapped fault consists of the Utah Lake Faults, located about 2.1 miles to the southwest of the site.

5.9.3 Soil Class

Due to liquefiable soils being present, the site has been determined to be Site Class F (in accordance with Section 20.3.1, Site Class F of ASCE 7-16). According to ASCE 7-16, a site-specific response analysis is required. Section 20.3.1 of ASCE 7-16 provides exception to this requirement under certain conditions. These options will need to be reviewed and evaluated by the project structural engineer. If needed, GSH can provide additional information and analysis including a complete site-specific response analysis.

Field work has been completed for a ground motion hazard study for the site. Settlements due to liquefaction will be addressed within the study, and proper recommendations will be determined. Further engineering analysis is needed to complete the study and will be transmitted to you upon completion.

5.9.4 Ground Motions

The IBC 2018 code is based on USGS mapping, which provides values of short and long period accelerations for average bedrock values for the Western United States and must be corrected for local soil conditions. The table on the following page summarizes the peak ground and short and long period accelerations for the MCE event and incorporates the appropriate soil amplification factor for a Site Class D soil profile. Based on the site latitude and longitude (40.3605 degrees north and 111.7751 degrees west, respectively), the values for this site are tabulated on the following page.

Spectral Acceleration Value, T	Bedrock Boundary [mapped values] (% g)	Site Coefficient	Site Class * [adjusted for site class effects] (% g)	Design Values* (% g)
Peak Ground Acceleration	*	F_a = *	*	*
0.2 Seconds (Short Period Acceleration)	S_S = *	F_a = *	S_{MS} = *	S_{DS} = *
1.0 Second (Long Period Acceleration)	S_1 = *	F_v = *	S_{M1} = *	S_{D1} = *

*See Section 5.9.3, Soil Class.

5.9.5 Liquefaction

The site is located in an area that has been identified by the Utah Geological Survey (UGS) as being a "high" liquefaction potential zone. Liquefaction is defined as the condition when saturated, loose, granular 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.

Calculations were performed using the procedures described in the 2008 Soil Liquefaction During Earthquakes Monograph by Idriss and Boulanger[3]. Our calculations indicate the medium dense, saturated sand layer encountered in Boring B-1 could liquefy during the design seismic event. Calculated settlement associated with the liquefaction of each layer within the borings was less than 1.3 inch. This magnitude of settlement should be tolerable to design for life safety. Additionally, lateral spread and ground rupture are unlikely to occur.

Field work has been completed for a ground motion hazard study for the site. Settlements due to liquefaction will be addressed within the study, and proper recommendations will be determined. Further engineering analysis is needed to complete the study and will be transmitted to you upon completion.

5.10 SITE VISITS

GSH must verify that all topsoil/disturbed soils and any other unsuitable soils have been removed, that non-engineered fills have been removed and/or properly prepared, and that suitable soils have been encountered prior to placing site grading fills, footings, slabs, and pavements. Additionally,

[3] Idriss, I. M., and Boulanger, R. W. (2008), Soil liquefaction during earthquakes: Monograph MNO-12, Earthquake Engineering Research Institute, Oakland, CA, 261 pp.

GSH must observe fill placement and verify in-place moisture content and density of fill materials placed at the site.

5.11 CLOSURE

If you have any questions or would like to discuss these items further, please feel free to contact us at (801) 685-9190.

Respectfully submitted,

GSH Geotechnical, Inc.

REGISTERED PROFESSIONAL ENGINEER No. 334228 ALAN D. SPILKER STATE OF UTAH

Alan D. Spilker, P.E.
State of Utah No. 334228
President/Senior Geotechnical Engineer

Reviewed by:

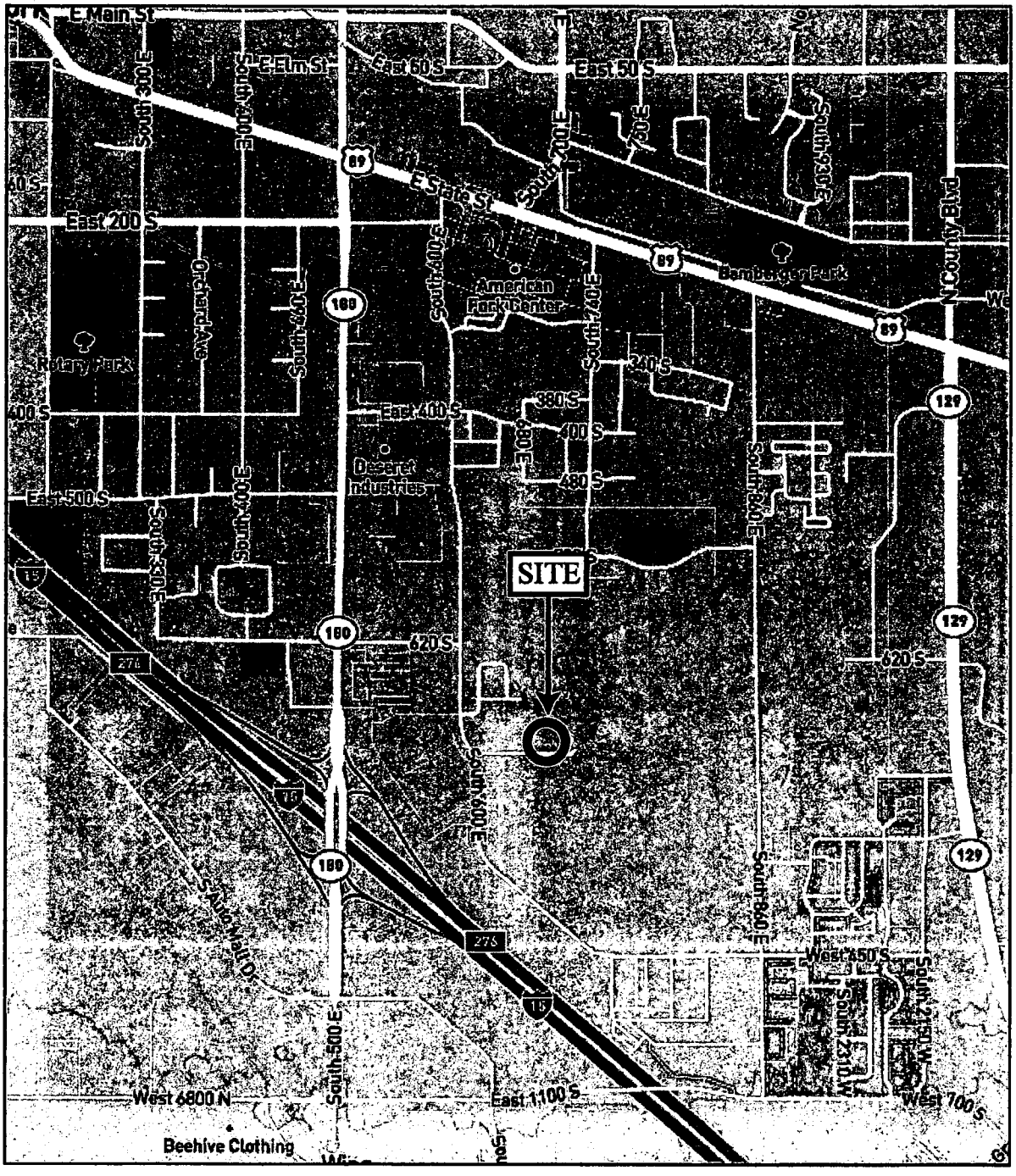
Kylie S. Bailey, E.I.T.
Staff Geotechnical Engineer

ADS/KSB:jlh

Encl. Figure 1, Vicinity Map
Figure 2, Site Plan
Figures 3A through 3P, Log of Borings
Figure 4, Key to Boring Log (USCS)

Addressee (email)

THE RITCHIE GROUP
JOB NO. 2093-004-19



200 0 200 400 600 800 1000 M 1200

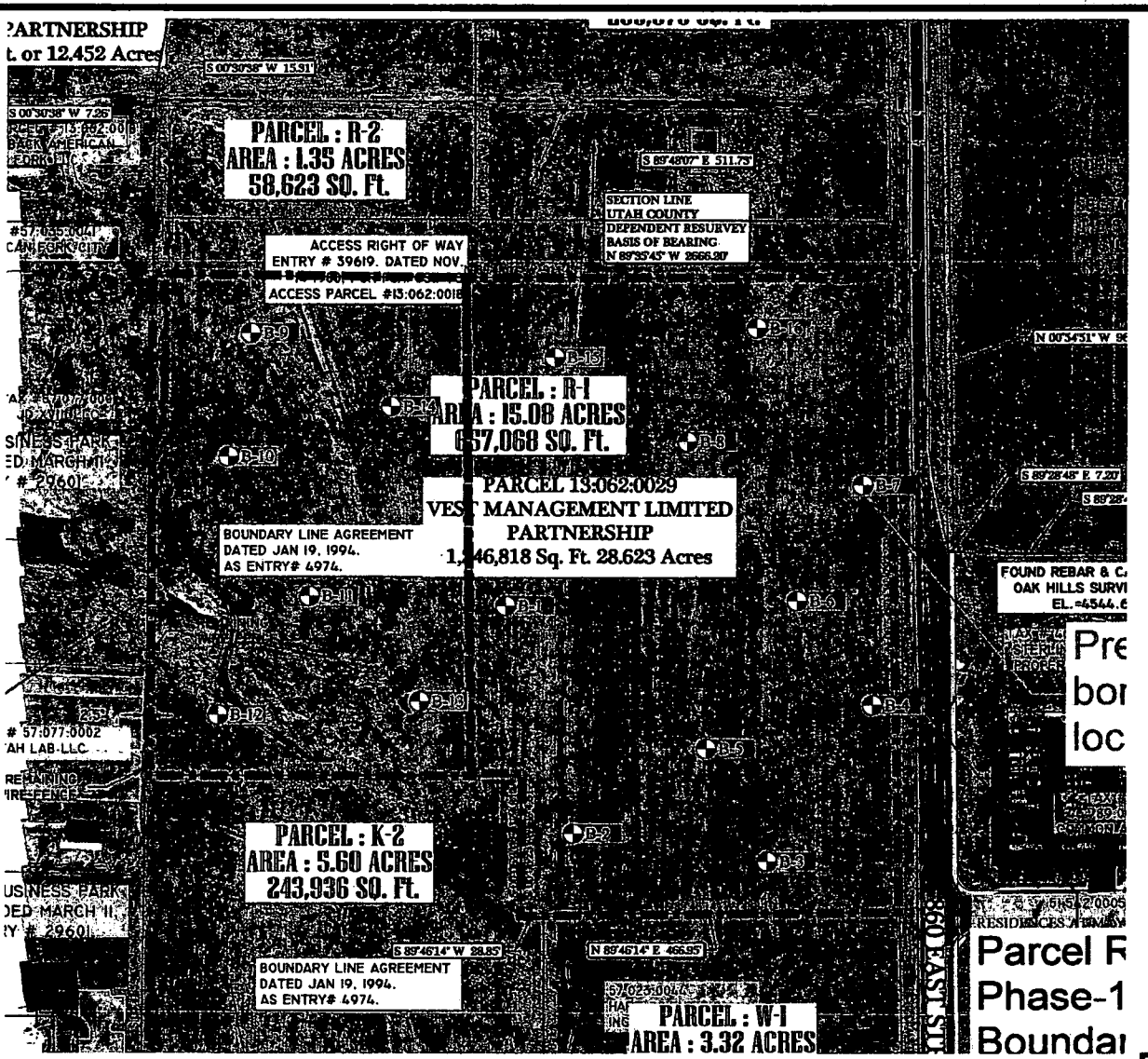
0.2 0 0.2 0.4 MI 0.6

FIGURE 1
VICINITY MAP

REFERENCE:
ALL TRAILS - NATIONAL GEOGRAPHIC TERRAIN
DATED 2019

GSH

THE RITCHIE GROUP
JOB NO. 2093-004-19



REFERENCE:
ADAPTED FROM DRAWING ENTITLED
"MILLENNIAL DEVELOPMENT PARTNES, SHEET 1" BY JOHANSON SURVEYING
DATED 5-08-2019

APPROXIMATE SCALE IN FEET
70 0 70 140

FIGURE 2
SITE PLAN

GSH

GSH BORING LOG

Page: 1 of 2

BORING: B-1

CLIENT: The Ritchie Group — PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments — DATE STARTED: 9/29/19 — DATE FINISHED: 9/29/19

LOCATION: 860 East Quality Drive, American Fork, Utah — GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger — HAMMER: Automatic — WEIGHT: 140 lbs — DROP: 30"

GROUNDWATER DEPTH: 6.8' (10/23/19) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with some fine to medium sand; major roots (topsoil) to 3"; brown									slightly moist
				7							medium stiff
		grades fine sandy clay	5								
▼				2							soft
											saturated
			10								
				8							medium stiff
	ML	CLAYEY SILT with some fine sand; brown	15								saturated
				12					44	15	stiff
			20								
				21							very stiff
	SP	FINE TO COARSE SAND with some fine and coarse gravel; brown									very stiff saturated medium dense
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3A

GSH

BORING LOG

Page: 2 of 2

BORING: B-1

CLIENT: The Ritchie Group | PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments | DATE STARTED: 9/29/19 | DATE FINISHED: 9/29/19

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
			25								
				27							
		grades coarse sand with trace clay	30								
				13		26.0		4.8			
		grades with some fine and coarse gravel	35								
				50/4"							very dense
		Refusal at 36.5' on gravel. Installed 1.25" diameter slotted PVC pipe to 36.5'.	40								
			45								
			50								

See Subsurface Conditions section in the report for additional information.

FIGURE 3A
(continued)

GSH	BORING LOG Page: 1 of 1	BORING: B-2

CLIENT: The Ritchie Group — PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments — DATE STARTED: 9/29/19 — DATE FINISHED: 9/29/19

LOCATION: 860 East Quality Drive, American Fork, Utah — GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger — HAMMER: Automatic — WEIGHT: 140 lbs — DROP: 30"

GROUNDWATER DEPTH: 5.6' (10/23/19) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	SM	SILTY FINE TO MEDIUM SAND with some fine gravel; major roots (topsoil) to 5"; brown									dry
				15		12.6		36.5			loose
▼			5								saturated
		grades with fine to coarse sand		17							
			10								
	CL	SILTY CLAY with some fine to coarse sand and fine gravel; brown		7							saturated medium stiff
		End of Exploration at 12.5'. Installed 1.25" diameter slotted PVC pipe to 12.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3B

GSH BORING LOG

Page: 1 of 1

BORING: B-3

CLIENT: The Ritchie Group | PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments | DATE STARTED: 9/29/19 | DATE FINISHED: 9/29/19

LOCATION: 860 East Quality Drive, American Fork, Utah | GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: 7.2' (10/23/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 6"; brown									dry
				24							very stiff
		grades with occasional layers of silty fine sand up to 3" thick	5	4							medium stiff
▼											saturated
		grades with layers of fine to coarse sand up to 6" thick	10	6							
			15	2		34.2		41.6			soft
		End of Exploration at 16.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3C

GSH

BORING LOG

Page: 1 of 1

BORING: B-4

CLIENT: The Ritchie Group — PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments — DATE STARTED: 9/29/19 — DATE FINISHED: 9/29/19

LOCATION: 860 East Quality Drive, American Fork, Utah — GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger — HAMMER: Automatic — WEIGHT: 140 lbs — DROP: 30"

GROUNDWATER DEPTH: 7.9' (10/23/19) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with fine sand; major roots (topsoil) to 6"; brown									slightly moist
				11							medium stiff
			5								
▼		grades with occasional layers of silty fine sand up to 3" thick									moist
				7		17.9		24.9			saturated
			10								
				7							
		End of Exploration at 12.5'. Installed 1.25" diameter slotted PVC pipe to 12.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3D

GSH

BORING LOG

Page: 1 of 1

BORING: B-5

CLIENT: The Ritchie Group — PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments — DATE STARTED: 9/29/19 — DATE FINISHED: 9/29/19

LOCATION: 860 East Quality Drive, American Fork, Utah — GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger — HAMMER: Automatic — WEIGHT: 140 lbs — DROP: 30"

GROUNDWATER DEPTH: 10.1' (10/23/19) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with fine sand; major roots (topsoil) to 6"; brown									dry
				17							stiff
			5								
				6							medium stiff
▼		grades with occasional layers of fine to coarse sand up to 6" thick	10								
				6		30.7		47.8			saturated
			15	4							
		End of Exploration at 16.0'. Installed 1.25" diameter slotted PVC pipe to 16.0'.									
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3E

GSH	BORING LOG Page: 1 of 1	BORING: B-6

CLIENT: The Ritchie Group — PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments — DATE STARTED: 9/29/19 — DATE FINISHED: 9/29/19

LOCATION: 860 East Quality Drive, American Fork, Utah — GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger — HAMMER: Automatic — WEIGHT: 140 lbs — DROP: 30"

GROUNDWATER DEPTH: 8.6' (10/23/19) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	SC	CLAYEY FINE SAND with trace silt; major roots (topsoil) to 6"; brown									dry loose
				13							
	CL	SILTY CLAY with fine sand; brown	5								slightly moist stiff
▼				10		25.9	100				saturated
			10								
		grades with occasional layers of silty fine sand up to 5" thick		6		28.6		48.6			medium stiff
		End of Exploration at 12.5'. Installed 1.25" diameter slotted PVC pipe to 12.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3F

GSH

BORING LOG

Page: 1 of 1

BORING: B-7

CLIENT: The Ritchie Group | PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments | DATE STARTED: 9/29/19 | DATE FINISHED: 9/29/19

LOCATION: 860 East Quality Drive, American Fork, Utah | GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: 4.1' (10/23/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL FILL	SILTY CLAY, FILL with fine gravel and fine to coarse sand; major roots (topsoil) to 6"; brown		24							dry very stiff
▼	CL	SILTY CLAY with some fine sand; brown									soft saturated
			5	3							
		grades with occasional layers of silty fine sand up to 4" thick	10	11							stiff
		grades with some fine sand and trace fine gravel	15	3							soft
		End of Exploration at 16.0'. Installed 1.25" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3G

GSH

BORING LOG

Page: 1 of 1

BORING: B-8

CLIENT: The Ritchie Group — PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments — DATE STARTED: 9/29/19 — DATE FINISHED: 9/29/19

LOCATION: 860 East Quality Drive, American Fork, Utah — GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger — HAMMER: Automatic — WEIGHT: 140 lbs — DROP: 30"

GROUNDWATER DEPTH: 3.3' (10/23/19) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SANDY CLAY with some fine sand; major roots (topsoil) to 6"; brown									dry medium stiff
▼				4							saturated
			5								
	ML	FINE TO COARSE SANDY SILT brown									saturated
				4							soft
			10								
				6							medium stiff
		End of Exploration at 12.5'. Installed 1.25" diameter slotted PVC pipe to 12.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3H

GSH

BORING LOG

Page: 1 of 1

BORING: B-9

CLIENT: The Ritchie Group | PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments | DATE STARTED: 10/1/19 | DATE FINISHED: 10/1/19

LOCATION: 860 East Quality Drive, American Fork, Utah | GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: 4.6' (10/23/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	SM	SILTY FINE SAND with major roots (topsoil) to 4"; brown									dry medium dense
				28							
▼			5								saturated
				7							loose
	CL	FINE SANDY CLAY with silt; dark brown									saturated stiff
			10	10							
	SC/SM	CLAYEY/SILTY FINE TO MEDIUM SAND brown									medium dense saturated
			15	19		27.1	95				
		End of Exploration at 16.0'. Installed 1.25" diameter slotted PVC pipe to 16.0'.									
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3I

GSH	BORING LOG Page: 1 of 1	BORING: B-10

CLIENT: The Ritchie Group — PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments — DATE STARTED: 10/1/19 — DATE FINISHED: 10/1/19

LOCATION: 860 East Quality Drive, American Fork, Utah — GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger — HAMMER: Automatic — WEIGHT: 140 lbs — DROP: 30"

GROUNDWATER DEPTH: 8.9' (10/23/19) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	SP/ SM FILL	FINE TO COARSE SAND, FILL with fine and coarse gravel and some silt; major roots (topsoil) to 4"; gray									dry medium dense
				53							
	CL	FINE SANDY CLAY with some silt; gray	5								slightly moist medium stiff
▼				7		31.2	91				saturated
			10								
				14							stiff
		grades with trace fine gravel; gray									
		End of Exploration at 12.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 12.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3J

GSH

BORING LOG

Page: 1 of 1

BORING: B-11

CLIENT: The Ritchie Group — PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments — DATE STARTED: 10/1/19 — DATE FINISHED: 10/1/19

LOCATION: 860 East Quality Drive, American Fork, Utah — GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger — HAMMER: Automatic — WEIGHT: 140 lbs — DROP: 30"

GROUNDWATER DEPTH: 4.2' (10/23/19) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	FINE TO COARSE SANDY CLAY with silt; major roots (topsoil) to 6"; brown									slightly moist soft
▼				3							
			5								saturated
	CL	SILTY CLAY with some fine sand; brown									saturated medium stiff
				9							
		grades fine sandy clay with silt	10								
				7							
		End of Exploration at 12.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 12.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3K

GSH

BORING LOG

Page: 1 of 1

BORING: B-12

CLIENT: The Ritchie Group | PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments | DATE STARTED: 10/1/19 | DATE FINISHED: 10/1/19

LOCATION: 860 East Quality Drive, American Fork, Utah | GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: 10.8' (10/23/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	SM/ SC/ FILL	SILTY FINE TO MEDIUM SAND, FILL with some clay and some fine gravel; major roots (topsoil) to 4; brown									dry
				23							loose
	SP/ SM	FINE TO COARSE SAND with some silt and fine gravel; brownish-yellow									moist loose
			5	22		17.7	111				
	CL	FINE SANDY CLAY with silt; brown									moist medium stiff
▼		grades silty clay with some fine to coarse sand and layers of fine gravel up to 1/2" thick	10	10		29.2	94				saturated
			15	6							
		End of Exploration at 16.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3L

GSH	BORING LOG Page: 1 of 1	BORING: B-13

CLIENT: The Ritchie Group — PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments — DATE STARTED: 10/1/19 — DATE FINISHED: 10/1/19

LOCATION: 860 East Quality Drive, American Fork, Utah — GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger — HAMMER: Automatic — WEIGHT: 140 lbs — DROP: 30"

GROUNDWATER DEPTH: 3.1' (10/23/19) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 4"; brown									slightly moist
▼				2							soft saturated
		grades with some fine sand	5								
				6							medium stiff
	SP	FINE TO MEDIUM SAND with layers of silty clay up to 2" thick; brown	10								saturated loose
				8							
		End of Exploration at 12.5'. Installed 1.25" diameter slotted PVC pipe to 12.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3M

GSH

BORING LOG

Page: 1 of 1

BORING: B-14

CLIENT: The Ritchie Group | PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments | DATE STARTED: 10/1/19 | DATE FINISHED: 10/1/19

LOCATION: 860 East Quality Drive, American Fork, Utah | GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: 6.9' (10/23/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	SP/ SM FILL	FINE SAND, FILL with some silt and some fine gravel; major roots (topsoil) to 4"; brown		34							dry medium dense
	CL	SILTY CLAY with trace fine sand; brown	5	12							dry stiff
▼	SM	SILTY FINE TO MEDIUM SAND with trace clay; brown	10	9							saturated very stiff
	CL	SILTY CLAY with some fine to medium sand; brown	15	6							saturated very stiff
		End of Exploration at 16.0'. Installed 1.25" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3N

GSH

BORING LOG

Page: 1 of 1

BORING: B-15

CLIENT: The Ritchie Group | PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments | DATE STARTED: 10/1/19 | DATE FINISHED: 10/1/19

LOCATION: 860 East Quality Drive, American Fork, Utah | GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: 6.8' (10/23/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP FILL	FINE AND COARSE GRAVELLY FINE TO COARSE SAND, FILL with trace silt; major roots (topsoil) to 4"; brown									dry medium dense
				55							
	CL	SILTY CLAY with trace fine sand; brown	5								moist medium stiff
▼											saturated
				5							
			10								
				5							
		End of Exploration at 12.5'. Installed 1.25" diameter slotted PVC pipe to 12.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3O

GSH

BORING LOG

Page: 1 of 1

BORING: B-16

CLIENT: The Ritchie Group — PROJECT NUMBER: 2093-004-19

PROJECT: Vest Property Apartments — DATE STARTED: 10/1/19 — DATE FINISHED: 10/1/19

LOCATION: 860 East Quality Drive, American Fork, Utah — GSH FIELD REP.: JM

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger — HAMMER: Automatic — WEIGHT: 140 lbs — DROP: 30"

GROUNDWATER DEPTH: 5.9' (10/23/19) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	SM FILL	SILTY FINE TO COARSE SAND, FILL with some fine gravel; major roots (topsoil) to 4"; brown		16							slightly moist loose
▼	SP	FINE TO COARSE SAND with some fine and coarse gravel and trace silt; brown	5	40							medium dense saturated
		gravel grades out									medium dense
			10	35							
	CL	SILTY CLAY with some fine sand and layers of fine to coarse sand up to 1" thick; brown	15	6							saturated medium stiff
		End of Exploration at 16.0'. Installed 1.25" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3P

CLIENT: The Ritchie Group
PROJECT: Vest Property Apartments
PROJECT NUMBER: 2093-004-19

KEY TO BORING LOG

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫

COLUMN DESCRIPTIONS

① **Water Level:** Depth to measured groundwater table. See symbol below.

② **USCS:** (Unified Soil Classification System) Description of soils encountered; typical symbols are explained below.

③ **Description:** Description of material encountered; may include color, moisture, grain size, density/consistency,

④ **Depth (ft.):** Depth in feet below the ground surface.

⑤ **Blow Count:** Number of blows to advance sampler 12" beyond first 6", using a 140-lb hammer with 30" drop.

⑥ **Sample Symbol:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

⑦ **Moisture (%):** Water content of soil sample measured in laboratory; expressed as percentage of dryweight of

⑧ **Dry Density (pcf):** The density of a soil measured in laboratory; expressed in pounds per cubic foot.

⑨ **% Passing 200:** Fines content of soils sample passing a No. 200 sieve; expressed as a percentage.

⑩ **Liquid Limit (%):** Water content at which a soil changes from plastic to liquid behavior.

⑪ **Plasticity Index (%):** Range of water content at which a soil exhibits plastic properties.

⑫ **Remarks:** Comments and observations regarding drilling or sampling made by driller or field personnel. May include other field and laboratory test results using the following abbreviations:

CEMENTATION:	MODIFIERS:	MOISTURE CONTENT (FIELD TEST):
Weakly: Crumbles or breaks with handling or slight finger pressure.	**Trace** <5%	**Dry:** Absence of moisture, dusty, dry to the touch.
Moderately: Crumbles or breaks with considerable finger pressure.	**Some** 5-12%	**Moist:** Damp but no visible water.
Strongly: Will not crumble or break with finger pressure.	**With** > 12%	**Saturated:** Visible water, usually soil below water table.

Descriptions and stratum lines are interpretive; field descriptions may have been modified to reflect lab test results. Descriptions on the logs apply only at the specific boring locations and at the time the borings were advanced; they are not warranted to be representative of subsurface conditions at other locations or times.

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 More than 50% of coarse fraction retained on No. 4 sieve.	CLEAN GRAVELS (little or no fines)	GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			GP	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
		GRAVELS WITH FINES (appreciable amount of fines)	GM	Silty Gravels, Gravel-Sand-Silt Mixtures
			GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	SANDS More than 50% of coarse fraction passing through No. 4 sieve.	CLEAN SANDS (little or no fines)	SW	Well-Graded Sands, Gravelly Sands, Little or No Fines
			SP	Poorly-Graded Sands, Gravelly Sands, Little or No Fines
		SANDS WITH FINES (appreciable amount of fines)	SM	Silty Sands, Sand-Silt Mixtures
			SC	Clayey Sands, Sand-Clay Mixtures
FINE-GRAINED SOILS More than 50% of material is smaller than No. 200 sieve size.	SILTS AND CLAYS Liquid Limit less than 50%		ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
			OL	Organic Silts and Organic Silty Clays 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.

STRATIFICATION:

DESCRIPTION	THICKNESS
Seam	up to 1/8"
Layer	1/8" to 12"
Occasional:	One or less per 6" of thickness
Numerous;	More than one per 6" of thickness

TYPICAL SAMPLER GRAPHIC SYMBOLS

- Bulk/Bag Sample
- Standard Penetration Split Spoon Sampler
- Rock Core
- No Recovery
- 3.25" OD, 2.42" ID D&M Sampler
- 3.0" OD, 2.42" ID D&M Sampler
- California Sampler
- Thin Wall

WATER SYMBOL

- Water Level

FIGURE 4

GSH

GSH

December 3, 2019
Job No. 2093-004-19

Mr. Scott Laneri
The Ritchie Group
1245 East Brickyard Road, Suite 70
Salt Lake City, Utah 84106

Mr. Ritchie

Re: Addendum
Geotechnical Study
Proposed Vest Property Apartments
860 East Quality Drive
American Fork, Utah

As requested by Mr. Tyler Ritchie of Ritchie Group, GSH Geotechnical, Inc. (GSH) is providing a letter for the proposed Vest Property Apartments in American Fork, Utah. This letter serves as an addendum to the geotechnical study previously completed by GSH for the above-referenced site dated October 25, 2019[1]. Since the completion of the original report, foundation design and depth have been modified and a site-specific site class determination was completed as per the procedure presented in ASCE 7-16. This letter provides additional groundwater and drainage recommendations for footings as well as a proposed pool. The results of the site-specific Ground Motion Hazards Study are provided.

1.1 GROUNDWATER

On October 23, 2019 (22 days following drilling), groundwater was measured within the PVC pipes installed as tabulated on the following page.

---

1 "Report, Geotechnical Study, Proposed Vest Property Apartments, 860 East Quality Drive American Fork, Utah," GSH Job No. 2093-004-19.

GSH Geotechnical, Inc.
473 West 4800 South
Salt Lake City, Utah 84123
Tel: 801.685.9190 Fax: 801.685.2990
www.gshgeo.com

GSH

Boring No.	Groundwater Depth (feet)
	October 23, 2019
B-1	6.8
B-2	5.6
B-3	7.2
B-4	7.9
B-5	10.1
B-6	8.6
B-7	4.1
B-8	3.3
B-9	4.6
B-10	8.9
B-11	4.2
B-12	10.8
B-13	3.1
B-14	6.9
B-15	6.8
B-16	5.9

Groundwater levels vary with changes in season and rainfall, construction activity, irrigation, snow melt, surface water run-off, and other site-specific factors.

Areas with relatively shallow groundwater, as shallow as 3.1 feet, were encountered at the site. It is our recommendation that the top of the lowest floor slabs be placed a minimum of 4 feet above stabilized groundwater. If groundwater is to be controlled with a perimeter foundation/area drain with interior drains every 30 feet on center, the top of floor slabs may be placed 2 feet above controlled groundwater. A typical foundation drain detail is provided in Figure 1, Typical Foundation/Chimney Subdrain Detail.

It is our understanding that a pool is proposed at the site. Temporary dewatering will likely be necessary for the installation of the pool. GSH recommends that during the pool installation, hydrostatic relief valves be placed in the bottom to allow for groundwater to enter into the pool in the event that the pool is completed evacuated of water. This will prevent damage from the pool shell during floating. Maintenance staff should be made aware so that a full draw down is not attempted.

GSH

1.2 SITE GRADING

It is our understanding the site grading will be completed. GSH observed non-engineered fills in Borings B-7, B-10, B-12, B-14, B-15 and B-16. These fills must be completely removed under footings but may remain under pavement and floor slabs if they are property prepared. Non-engineered fills in pavement areas must be prepared as per Section 5.2.1, Site Preparation in the October 25, 2019 report. Non-engineered fills remaining in floor slab areas must be prepared by removing the upper 12 inches of fills, scarifying the underlying/exposed fills to a depth of 12 inches and compacting to the requirements of structural fill as per the geotechnical report. Subsequently, the previously removed fills may be placed and compacted to the requirements of structural fill as per the geotechnical report. Any additional fills must also be compacted per specified requirements.

1.3 GEOSEISMIC SETTING

1.3.1 General

Utah municipalities have adopted the International Building Code (IBC) 2018. The IBC 2018 code refers to ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7-16) for determination of the seismic hazard at a site.

1.3.2 Site Classification

Due to liquefiable soils being present, the site has been determined to be Site Class F (in accordance with Section 20.3.1 of ASCE 7-16). According to Section 20.3.1 of ASCE 7-16, a site-specific response analysis is therefore required. Section 20.3.1 of ASCE 7-16 provides exception to this requirement under certain conditions. It is our understanding that the structural engineer has determined that the structures at the site do not meet the exceptions and, therefore, a site-specific response analysis was completed for this study and the results are presented in the following sections.

It should be noted that without the liquefiable soils condition, the site would be classified based on the results of the ReMi testing (average shear wave velocity in the upper 100 feet of 736 feet per second) as a Site Class D, Stiff Soil. Site Class D will, therefore, be utilized in calculating various parameters in the site-specific analysis.

1.3.3 Mapped Ground Motions

The IBC 2018 code is based on USGS mapping, which provides values of short and long period accelerations for average bedrock values for the Western United States and must be corrected for local soil conditions. The table on the following page summarizes the peak ground and short and long period accelerations for the MCE event and incorporates the appropriate soil amplification factor for

Site Class D soil profile. Based on the site latitude and longitude (40.6833 degrees north and 111.9408 degrees west, respectively), the values for this site are tabulated on the following table:

Spectral Acceleration Value, T	Bedrock Boundary [mapped values] (% g)	Site Coefficient	Site Class D* [adjusted for site class effects] (% g)
Peak Ground Acceleration	57.2	F_a = 1.000	57.2
0.2 Seconds (Short Period Acceleration)	S_S = 148.0	F_a = 1.000	S_{MS} = 148.0
1.0 Second (Long Period Acceleration)	S_1 = 51.7	F_v = 1.783	S_{M1} = 92.2

* **As previously mentioned, the site is classified as a Site Class F, and these Site Class D values will be utilized in calculating various parameter in the site-specific analysis (see the following section) and should not be utilized directly for the design of the structures.**

1.3.4 Site-Specific Ground Motions (Design Values)

According to Section 20.3.1 of ASCE 7-16 and information provided by the structural engineer, a site-specific response analysis is required for the site. A site-specific response analysis was, therefore, completed in accordance with Section 21.1 of ASCE 7-16.

The structural engineer indicated the fundamental period for the structure will likely be 0.43 seconds.

Base ground motions were based on the MCE_R response spectrum developed in accordance with Section 11.4.6 of ASCE 7-16. This response spectrum was utilized to select and scale 5 recorded ground motions that had similar magnitudes and fault distances to the site. The site condition model was based on the borings and ReMi testing completed at the site.

The site response analysis was completed in accordance with Section 21.1.3 of ASCE 7-16 and the design response spectrum determined in accordance with Section 21.3 of ASCE 7-16 (including changes made in ASCE 7-16, Supplement 1).

The values obtained from the site-specific analysis are presented in the following table:

Spectral Acceleration Value, T	Site Specific (% g)	Design Values (% g)
0.43 Seconds	S_{aM} = 125.8	$S_a = 2/3(S_{aM})$ = 83.9

GSH

Closure

If you have any questions or would like to discuss these items further, please feel free to contact us at 801.685.9190.

Respectfully submitted,

GSH Geotechnical, Inc.

REGISTERED PROFESSIONAL ENGINEER No. 334228 ALAN D. SPILKER STATE OF UTAH

Alan D. Spilker, P.E.
State of Utah No. 334228
President/Senior Geotechnical Engineer

ADS:jlh

Addressee (email)

cc: Mr. Rich Arave (email)
Architectural Nexus

Mr. David Abraham (email)
Architectural Nexus

Mr. Doug Thimm (email)
Architectural Nexus

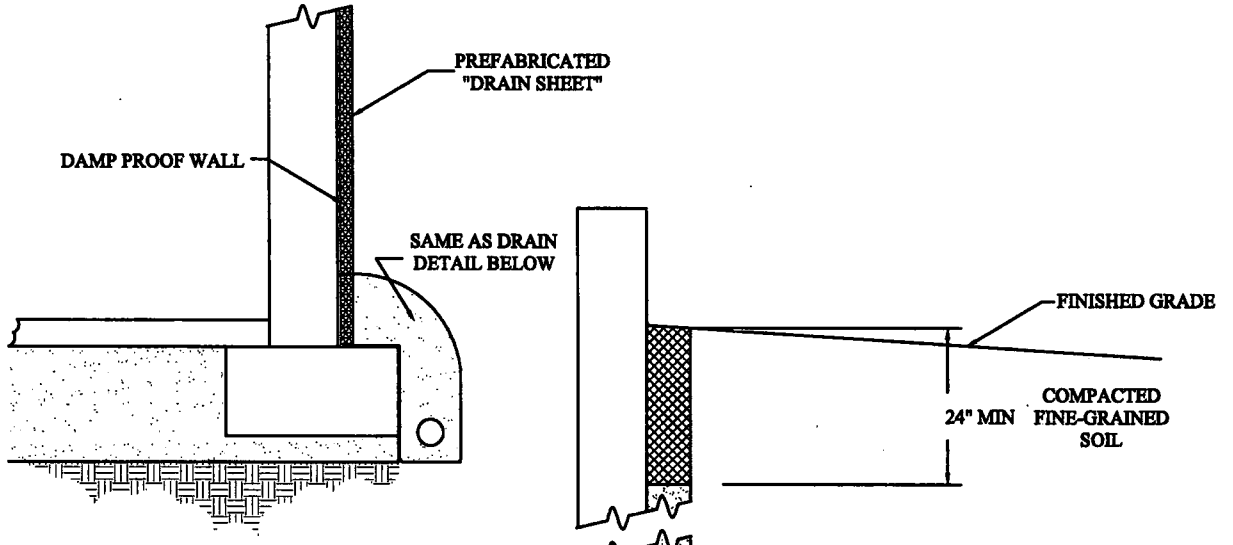
Mr. Mihnea Dobre (email)
Architectural Nexus

Mr. Scott Carlson (email)
Twin Peaks

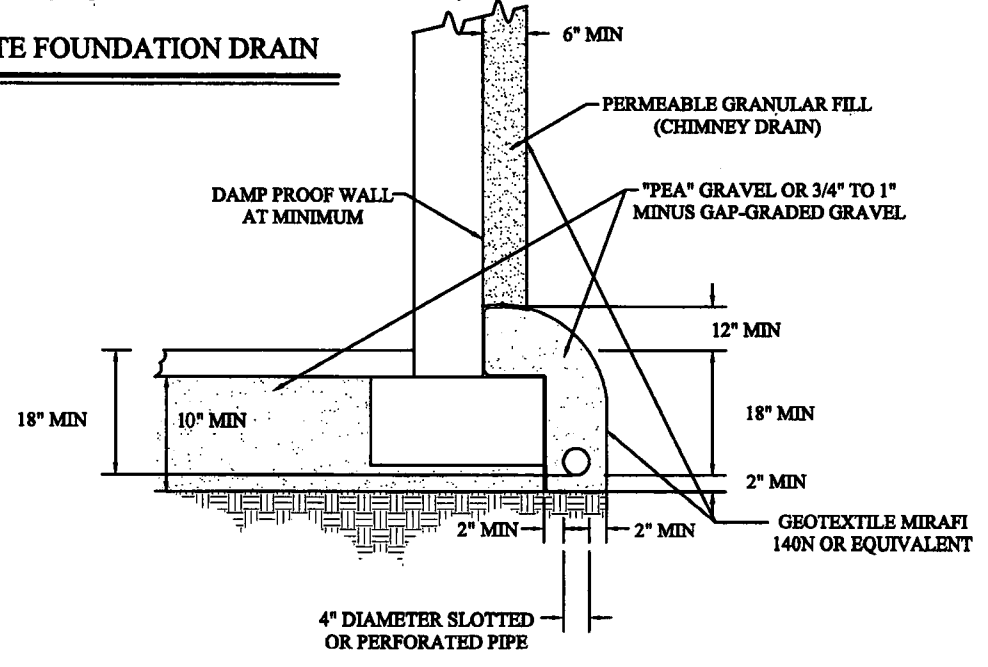
Ms. Hanna Thompson
Architectural Nexus

Encl: Figure 1, Typical Foundation/Chimney Subdrain Detail

TYPICAL FOUNDATION/CHIMNEY SUBDRAIN DETAIL



ALTERNATE FOUNDATION DRAIN



TYPICAL FOUNDATION DRAIN

(NOT TO SCALE)

GSH

FIGURE 1

GSH

April 2, 2020
Job No. 2093-004-19

Mr. Scott Laneri
The Ritchie Group
1245 East Brickyard Road, Suite 70
Salt Lake City, Utah 84106

Mr. Laneri:

Re: Letter
Geotechnical Study Review Comments Response
American Fork 860 (Vest) Apartments
860 East Quality Drive
American Fork, Utah 84003

GSH Geotechnical, Inc. (GSH) was requested to provide responses to review comments from William G. Turner of CMT Engineering Laboratories on behalf of American Fork City. GSH completed the original geotechnical study for the site dated October 25, 2019[1].

Review Comment 1

The strength of existing soils, bearing capacity of supporting soils, and soil settlement estimates were addressed, but were not substantiated; we request that calculations for settlement and bearing capacity (including any consolidation graphs) be provided for review. Later pressures were not provided since it was anticipated that below-grade walls will not be constructed. Pavement sections were provided for parking and drive areas, which appear appropriate. Trench excavation limitations were addressed via recommendations for temporary excavations

Review Response 1

Attached are graphical solutions for the bearing capacity based on the consolidation curves. (FIGURE 1 - Consol Curves w/ Preconsolidation Pressures) and settlement calculations (FIGURE 2 - Settlement Calculations).

[1] "Report, Geotechnical Study, Proposed Vest Property Apartment, 860 East Quality Drive, American Fork, Utah 84003," GSH Geotechnical, Inc., Project No. 2093-004-19, October 25, 2019.

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www.gshgeo.com

Mr. Scott Laneri
The Ritchie Group
Job No. 2093-004-10
Geotechnical Study Review Comments Response – American Fork (Vest) Apartments
April 2, 2020

GSH

Review Comment 2

Geologic and hydrologic hazards per Section 4-2-4 of the Ordinance were appropriately addressed in the report, but the Geotechnical/Geologic certificate was not provided.

Review Response 2

Attached is the requested geologic certificate provided by Alan D. Spilker, P.E. of GSH Geotechnical, Inc. (Figure 3)

Review Comment 3

Soil constraints, such as compressible soils, high groundwater, organic soils (topsoil), and liquefaction, were addressed in the report and addendum. A site-specific ground motion study was completed, as reported in the referenced addendum report, but calculations used in the study were not provided; we request that the calculations (including the ReMi results and the 5 ground motion data/information) be provided for review.

Review Response 2

Attached are the requested site-specific ground motion study calculations (Figure 4) and results (Figure 5).

Closure

If you have any questions or would like to discuss these items further, please feel free to contact us at (801) 685-9190.

Respectfully submitted,

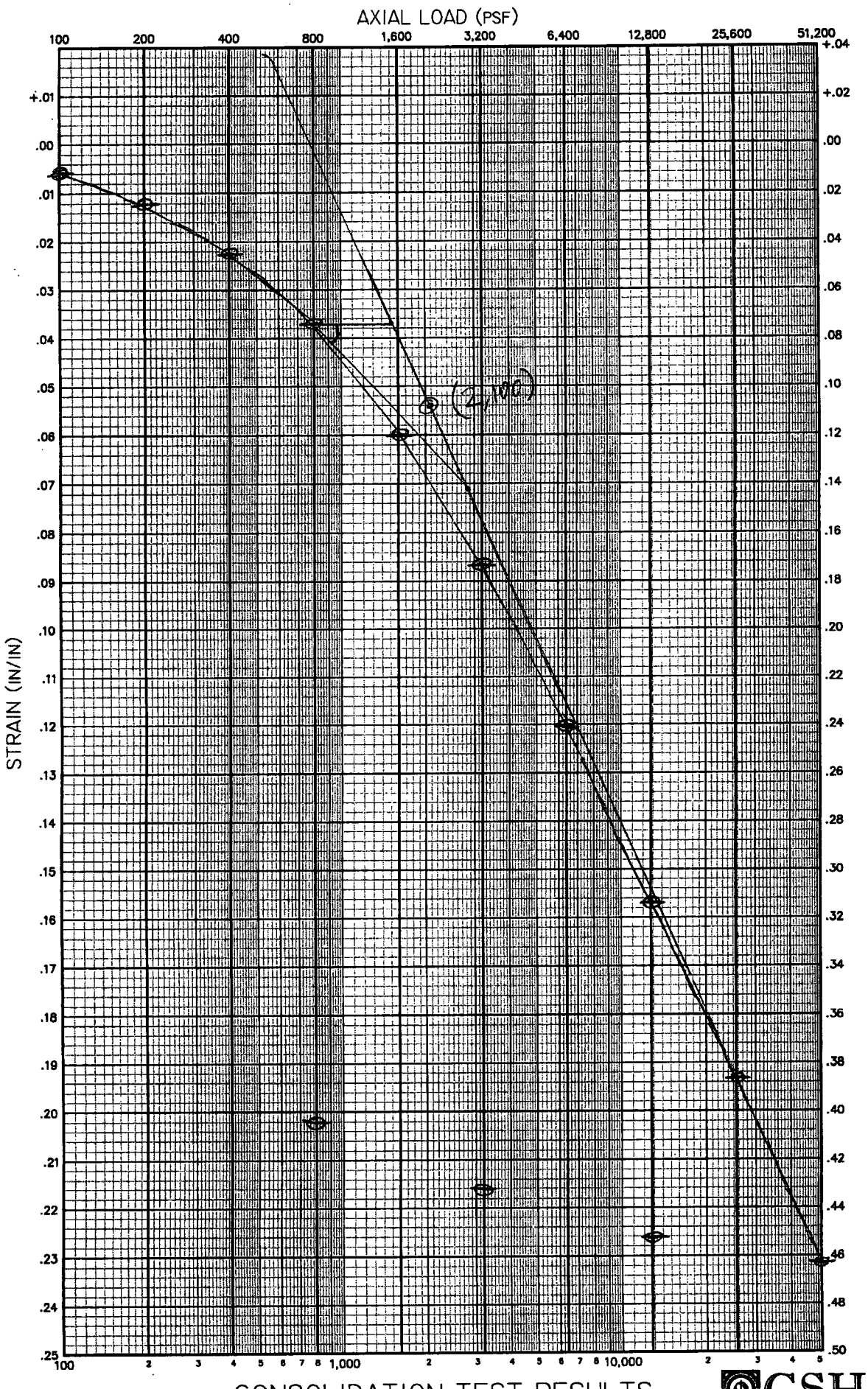
GSH Geotechnical, Inc.

REGISTERED PROFESSIONAL ENGINEER
No. 334228
ALAN D. SPILKER
STATE OF UTAH

Alan D. Spilker, P.E.
State of Utah No. 334228
President/Senior Geotechnical Engineer

ADS:jlh

Encl. Figure 1, Bearing Capacity Calcs
Figures 2A and 2B, Settlement Calcs
Figure 3, Geologic Certificate
Figures 4A and 4B, Site-Specific Ground Motion Study Calcs
Figure 5, Site-Specific Ground Motion Study Results
Addressee (email)

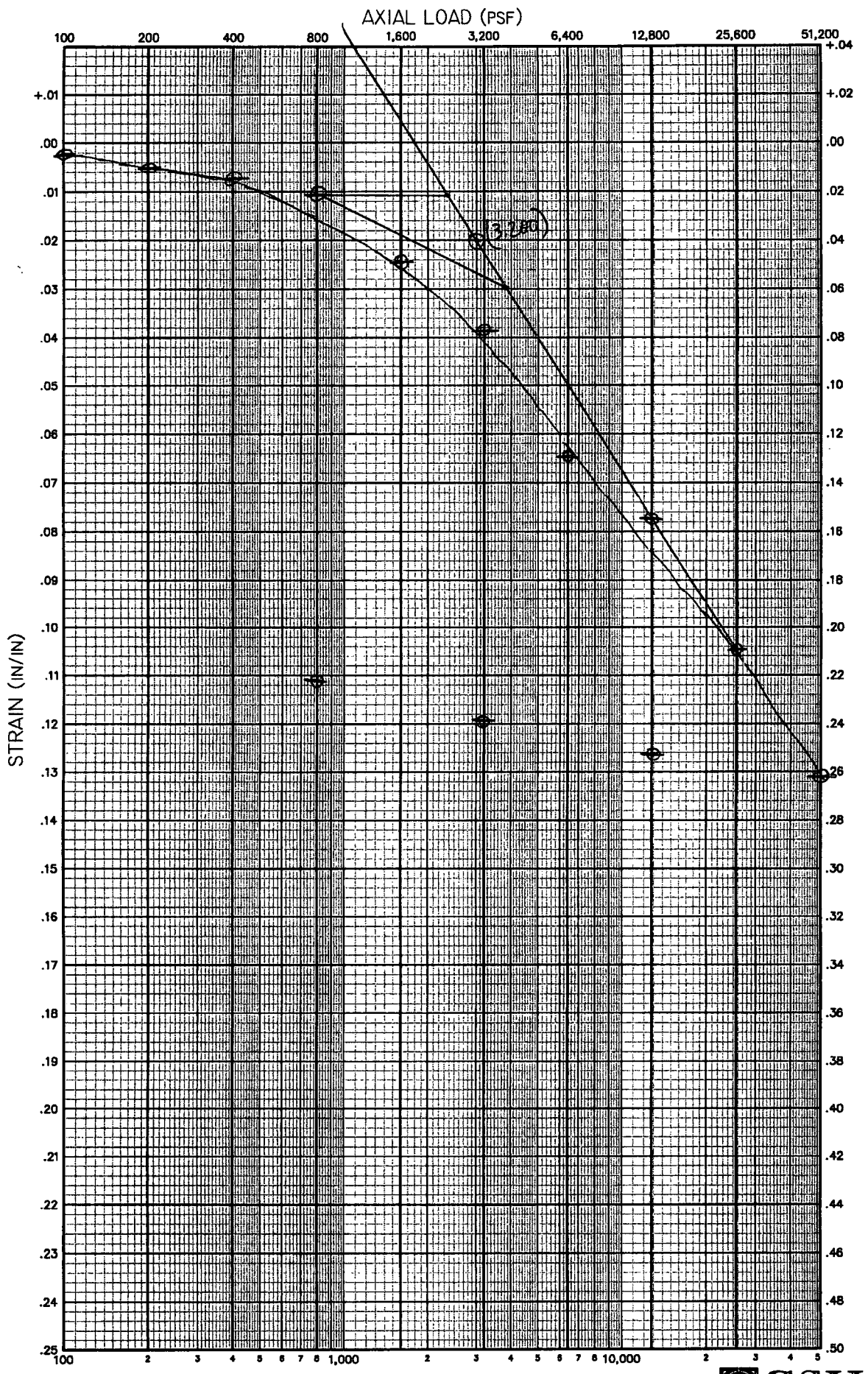


CONSOLIDATION TEST RESULTS

GSH

JOB NO. 2093-004-19 JOB NAME Vest Property Apartments

BORING NO. B8 DEPTH 2.5' TESTED BY BT DATE 10/7/2019

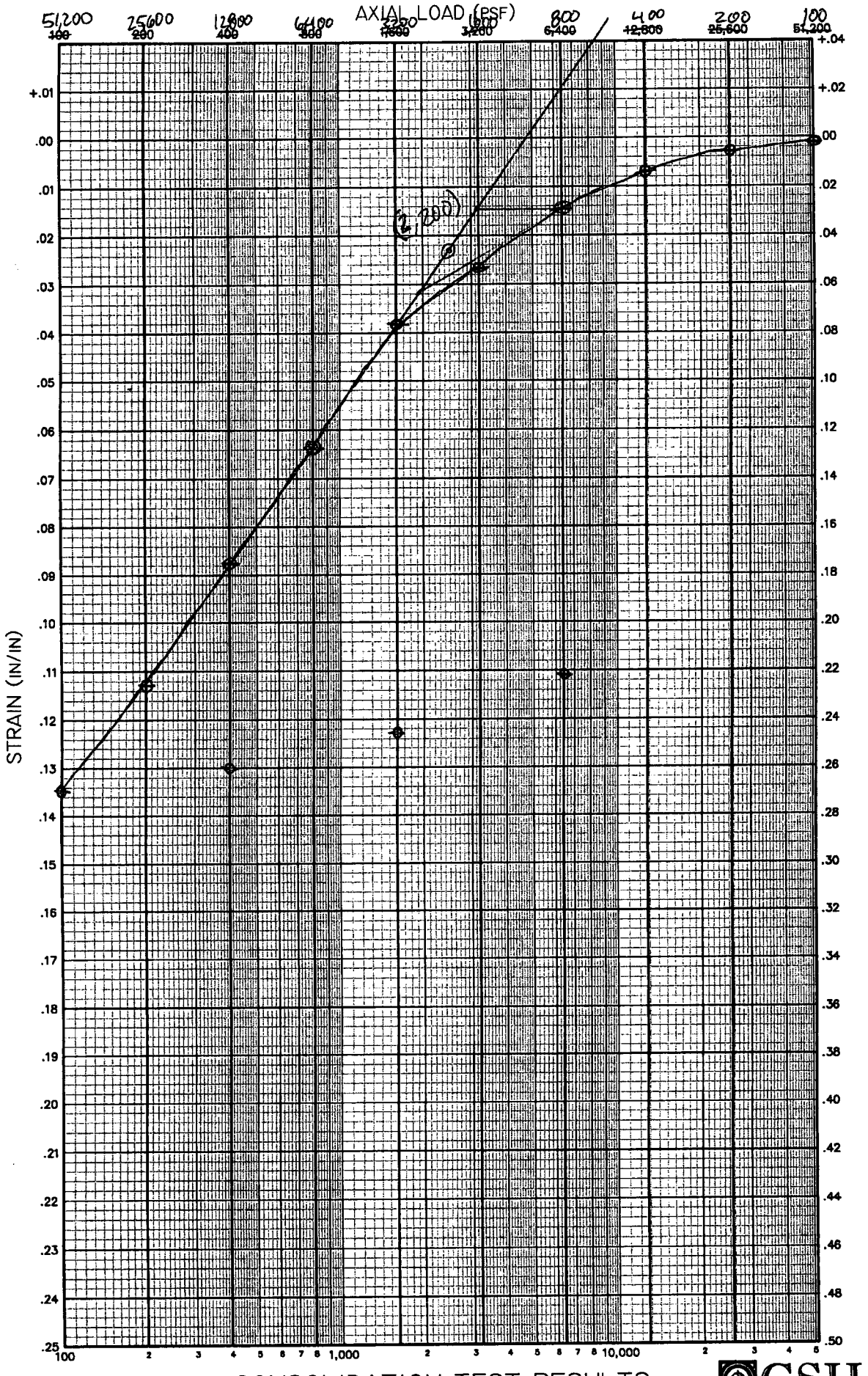


CONSOLIDATION TEST RESULTS

GSH

JOB NO. 2093-004-19 JOB NAME Vest Property Apartments

BORING NO. B4 DEPTH 5' TESTED BY BT DATE 10/7/2019

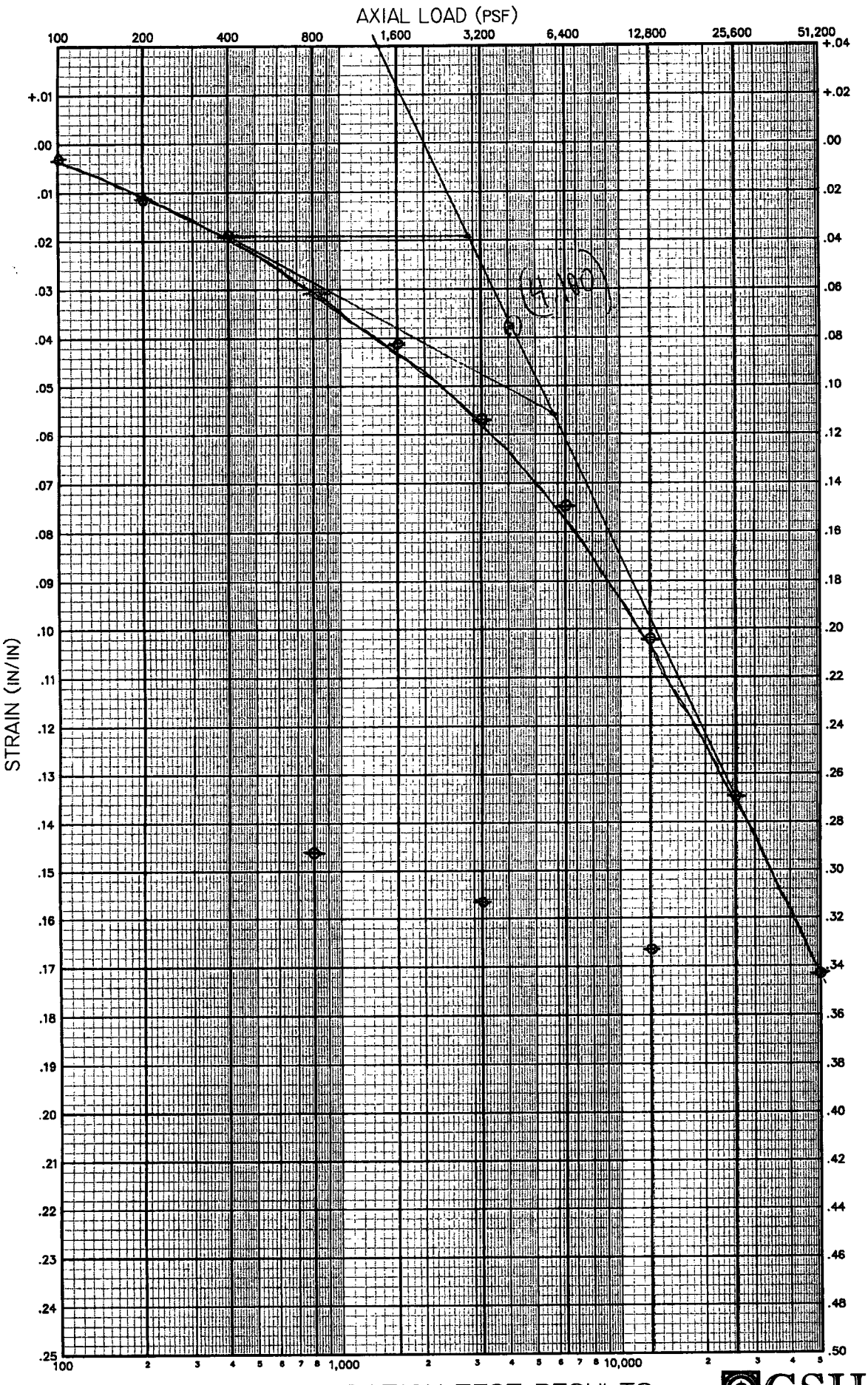


CONSOLIDATION TEST RESULTS

GSH

JOB NO. 2093-004-19 JOB NAME Vest Property Apartments

BORING NO. B15 DEPTH 7.5' TESTED BY BT DATE 10/7/2019



CONSOLIDATION TEST RESULTS

GSH

JOB NO. 2093-004-19 JOB NAME Vest Property Apartments

BORING NO. B9 DEPTH 10 TESTED BY BT DATE 10/7/2019

Square Foundation

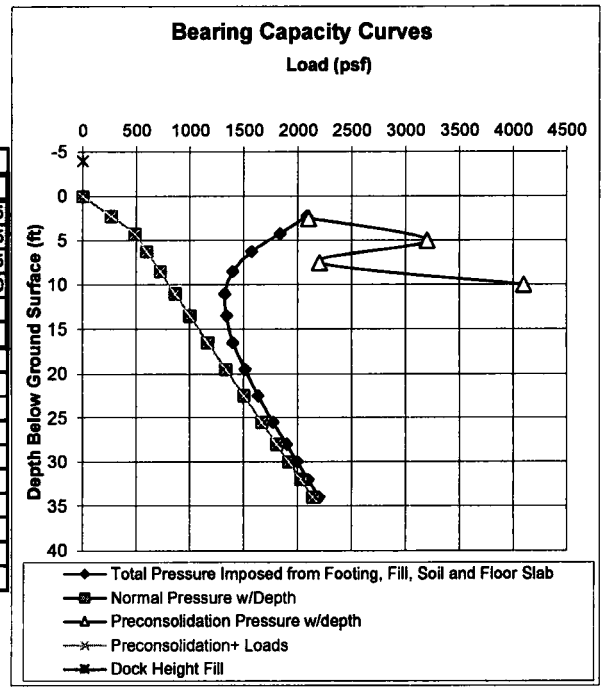
Depth of Footing (ft)= 1.5
Depth of Water (ft) = 4
Note if water table was not encountered this number has to be greater than the maximum depth you are calculating pressures for.

Assumed Bearing Capacity BC= 2000 psf
Column Load L= 200 kips
Width of Footing b= 10.00 feet
Unit Weight γ= 118 pcf

Depth Below Ground Surface	Average Depth Below Ground Surface	Average Depth Below Found * D	D/ width of Found	Influence of found load (from table)	P'o	ΔP+P'o	(ΔP+P'o) / P'o	Log ( )	Cc	Thickness of Depth Increment	Unit Settlement	Total Settlement
Feet	Feet	Feet		%	PSF	PSF				Inches	Inches	Inches
0.0	0.0	0.0	0.00	0.00	0	0	0.00	0.000	0.012	18.0	0.00	0.00
1.5	2.3	0.8	0.08	0.91	266	2086	7.85	0.895	0.003	18.0	0.05	0.05
3.0	4.3	2.8	0.28	0.68	486	1836	3.78	0.577	0.012	30.0	0.21	0.26
5.5	6.3	4.8	0.48	0.49	597	1573	2.63	0.421	0.012	18.0	0.09	0.35
7.0	8.5	7.0	0.70	0.34	722	1398	1.94	0.287	0.014	36.0	0.14	0.49
10.0	11.0	9.5	0.95	0.23	861	1324	1.54	0.187	0.014	24.0	0.06	0.55
12.0	13.5	12.0	1.20	0.17	1000	1340	1.34	0.127	0.014	36.0	0.06	0.62
15.0	16.5	15.0	1.50	0.12	1167	1397	1.20	0.078	0.014	36.0	0.04	0.66
18.0	19.5	18.0	1.80	0.09	1334	1514	1.13	0.055	0.016	36.0	0.03	0.69
21.0	22.5	21.0	2.10	0.07	1501	1636	1.09	0.037	0.016	36.0	0.02	0.71
24.0	25.5	24.0	2.40	0.05	1667	1773	1.06	0.027	0.016	36.0	0.02	0.73
27.0	28.0	26.5	2.65	0.05	1806	1899	1.05	0.022	0.014	24.0	0.01	0.73
29.0	30.0	28.5	2.85	0.04	1918	1998	1.04	0.018	0.014	24.0	0.01	0.74
31.0	32.0	30.5	3.05	0.04	2029	2099	1.03	0.015	0.012	24.0	0.00	0.74
33.0	34.0	32.5	3.25	0.03	2140	2201	1.03	0.012	0.012	24.0	0.00	0.75
35.0										Total Settlement	0.75	Inches

Preload 0 psf
Floorslab 0 psf

δP+P'o+Loads	Average Depth Below Ground Surface	P'o	P'o + Loads	Average Depth Below Ground Surface	Preconsolidation Pressures	Depth
PSF	Feet	PSF	PSF	Feet	PSF	Feet
0	-4					
0	0	0	0	0	2100	2.5
2086	2.25	266	265.5	2.25	3,200	5
1836	4.25	486	485.9	4.25	2200	7.5
1573	6.25	597	597.1	6.25	4100	10
1398	8.5	722	722.2	8.5		
1324	11	861	861.2	11		
1340	13.5	1000	1000.2	13.5		
1397	16.5	1167	1167	16.5		
1514	19.5	1334	1333.8	19.5		
1636	22.5	1501	1500.6	22.5		
1773	25.5	1667	1667.4	25.5		
1899	28	1806	1806.4	28		
1998	30	1918	1917.6	30		
2099	32	2029	2028.8	32		
2201	34	2140	2140	34		
0	0	0	0	0		
0	0	0	0	0		



Strip Foundation

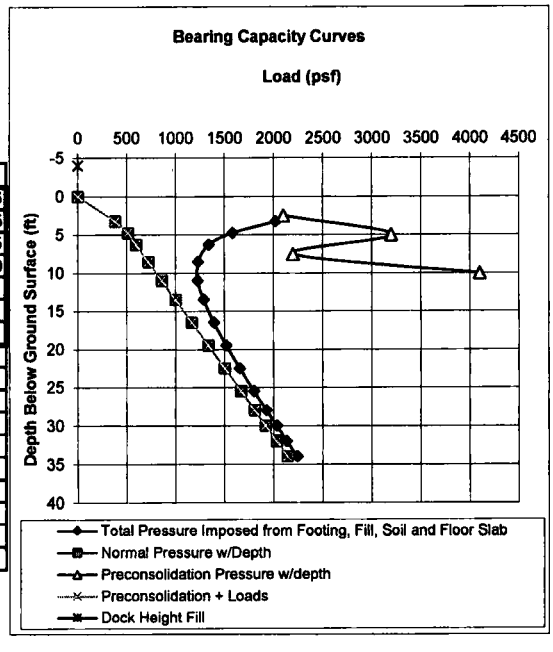
Depth of Footing (ft)= 2.5
Depth of Water (ft) = 4
Note if water table was not encountered this number has to be greater than the maximum depth you are calculating pressures for.

Assumed Bearing Capacity BC= 2000 psf
Wall Load L= 7 kips/ft
Width of Footing b= 3.50 feet
Unit Weight γ= 118 pcf

Depth Below Ground Surface	Average Depth Below Ground Surface	Average Depth Below Found * D	D/ width of Found	Influence of found load (from table)	P'o	ΔP+P'o	(ΔP+P'o) / P'o	Log ( )	Cc	Thickness of Depth Increment	Unit Settlement	Total Settlement
Feet	Feet	Feet		%	PSF	PSF				Inches	Inches	Inches
0.0	0.0	0.0	0.00	0.00	0	0	0.00	0.000	0.012	30.0	0.00	0.00
2.5	3.3	0.8	0.21	0.82	384	2023	5.28	0.722	0.012	18.0	0.16	0.16
4.0	4.8	2.3	0.64	0.53	514	1583	3.08	0.489	0.003	18.0	0.03	0.18
5.5	6.3	3.8	1.07	0.37	597	1340	2.24	0.351	0.012	18.0	0.08	0.26
7.0	8.5	6.0	1.71	0.25	722	1230	1.70	0.231	0.014	36.0	0.12	0.37
10.0	11.0	8.5	2.43	0.18	861	1226	1.42	0.153	0.014	24.0	0.05	0.43
12.0	13.5	11.0	3.14	0.14	1000	1288	1.29	0.110	0.014	36.0	0.06	0.48
15.0	16.5	14.0	4.00	0.11	1167	1391	1.19	0.076	0.014	36.0	0.04	0.52
18.0	19.5	17.0	4.86	0.09	1334	1519	1.14	0.056	0.016	36.0	0.03	0.55
21.0	22.5	20.0	5.71	0.08	1501	1655	1.10	0.042	0.016	36.0	0.02	0.58
24.0	25.5	23.0	6.57	0.07	1667	1799	1.08	0.033	0.016	36.0	0.02	0.60
27.0	28.0	25.5	7.29	0.06	1806	1927	1.07	0.028	0.014	24.0	0.01	0.61
29.0	30.0	27.5	7.86	0.06	1918	2029	1.06	0.025	0.014	24.0	0.01	0.61
31.0	32.0	29.5	8.43	0.05	2029	2134	1.05	0.022	0.012	24.0	0.01	0.62
33.0	34.0	31.5	9.00	0.05	2140	2240	1.05	0.020	0.012	24.0	0.01	0.63
35										Total settlement	0.63	Inches

Preload 0 psf
Floorslab 0 psf

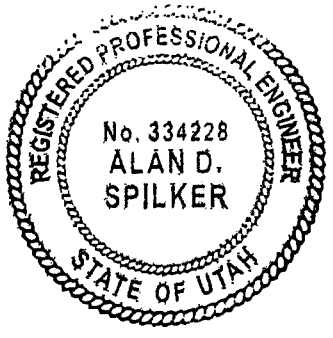
δP+P'o+Loads	Average Depth Below Ground Surface	P'o	P'o + Loads	Average Depth Below Ground Surface	Preconsolidation Pressures	Depth
PSF	Feet	PSF	PSF	Feet	PSF	Feet
0	-4					
0	0	0	0	0	2100	2.5
2023	3.25	384	383.5	3.25	3,200	5
1583	4.75	514	513.7	4.75	2200	7.5
1340	6.25	597	597.1	6.25	4100	10
1230	8.5	722	722.2	8.5		
1226	11	861	861.2	11		
1288	13.5	1000	1000.2	13.5		
1391	16.5	1167	1167	16.5		
1519	19.5	1334	1333.8	19.5		
1655	22.5	1501	1500.6	22.5		
1799	25.5	1667	1667.4	25.5		
1927	28	1806	1806.4	28		
2029	30	1918	1917.6	30		
2134	32	2029	2028.8	32		
2240	34	2140	2140	34		
0	0	0	0	0		
0	0	0	0	0		



CERTIFICATE

I hereby certify that I am a licensed professional engineer or an engineering geologist, as those terms are defined in the "Sensitive Lands Ordinance" Section of the American Fork City Ordinances. I have examined the letter report/geologic 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. All procedures and tests used in said letter report/geologic report meet minimum applicable professional standards.

Alan D. Spilker, PE.



SeisOpt ReMi© Dispersion Curve and Slowness Spectrum

2903-005 Vest Property Apartments
ReMi Line 1

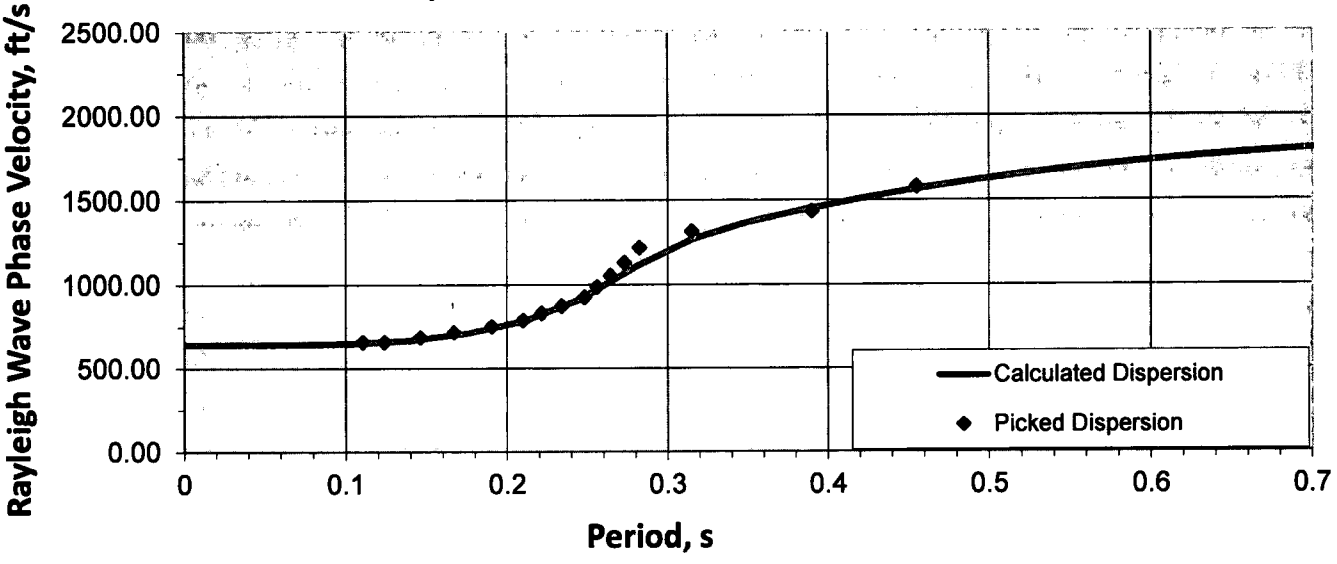
Data Processed by:
Morgan Stipe
Geologist, Data Analyst
morgan.stipe@optimsoftware.com

Prepared for:
Kylie Bailey
GSH Geotechnical, Inc.

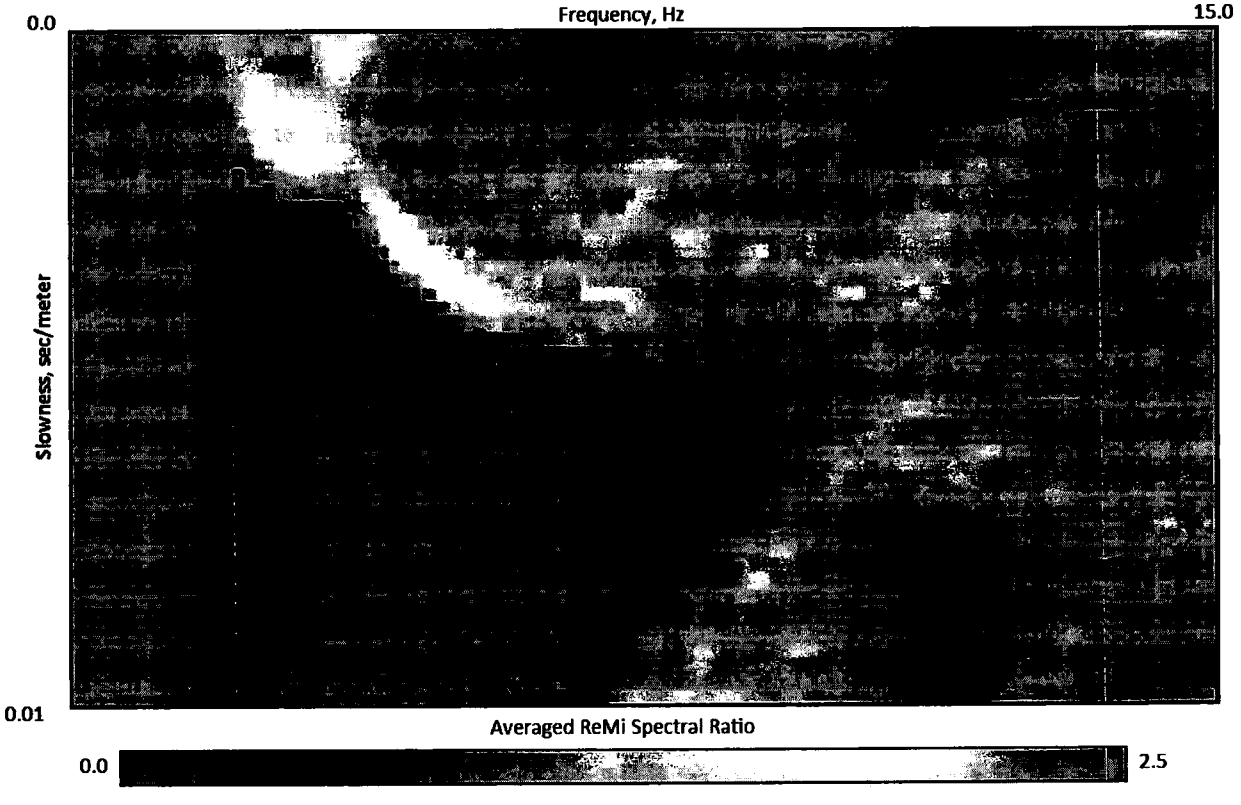
Date:
9/30/19

200 S. Virginia St. #560
Reno, NV 89501
support@optimsoftware.com
www.optimsoftware.com

Dispersion Curve Showing Picks and Fit



p-f Image with Dispersion Modeling Picks



SeisOpt ReMi© Shear Wave Velocity Profile

2903-005 Vest Property Apartments
ReMi Line 1

Data Processed by:
Morgan Stipe
Geologist, Data Analyst
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Prepared for:
Kylie Bailey
GSH Geotechnical, Inc.

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9/30/19

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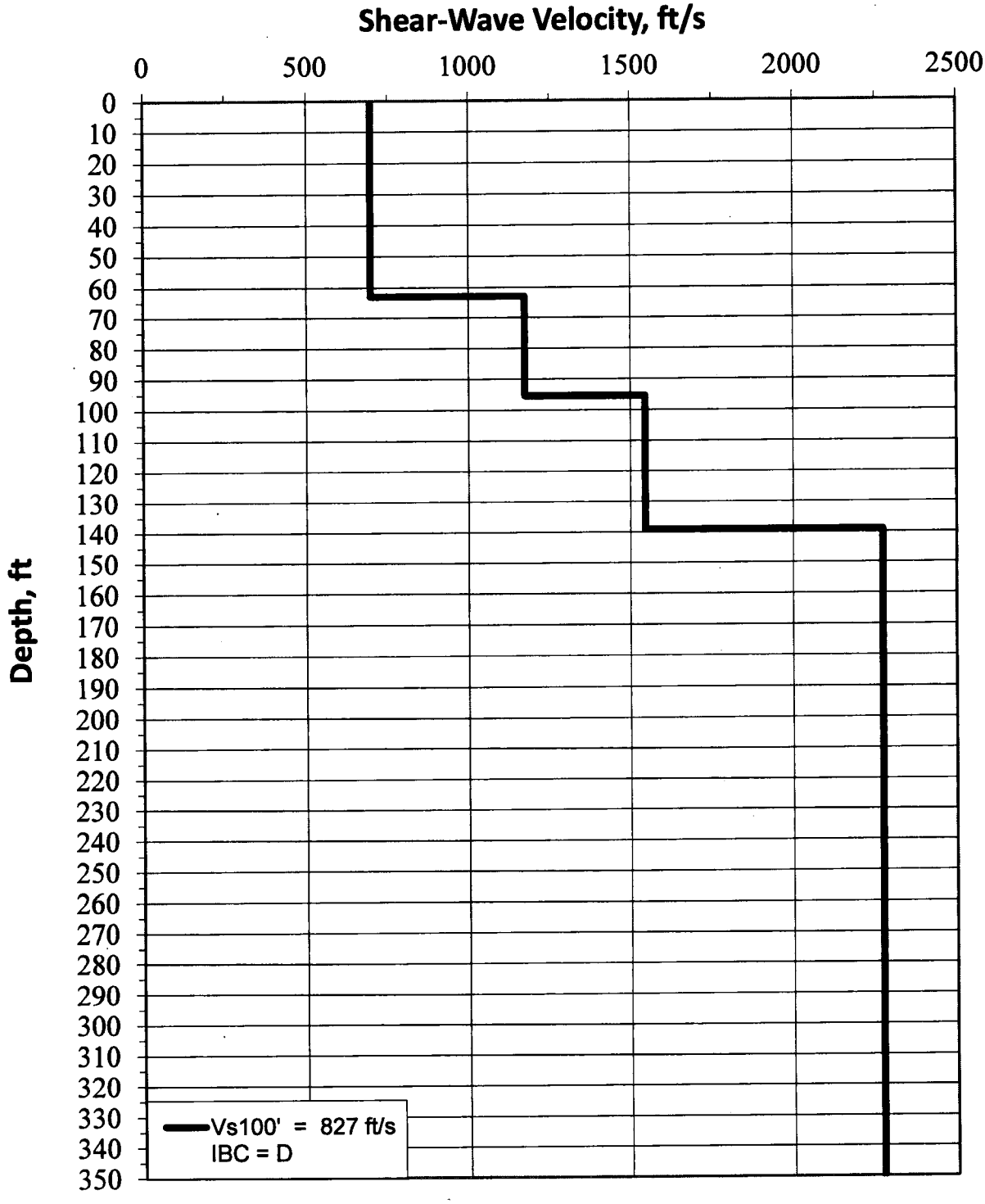

SeisOpt ReMi© Dispersion Curve and Slowness Spectrum

2903-005 Vest Property Apartments
ReMi Line 2

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GSH Geotechnical, Inc.

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9/30/19

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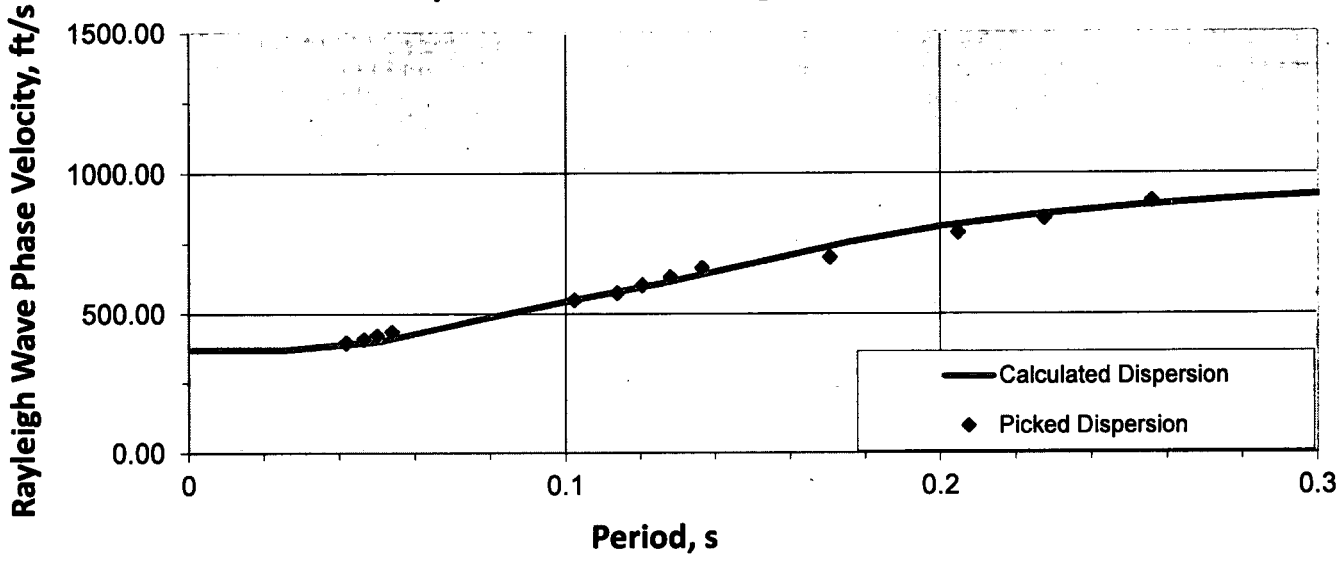
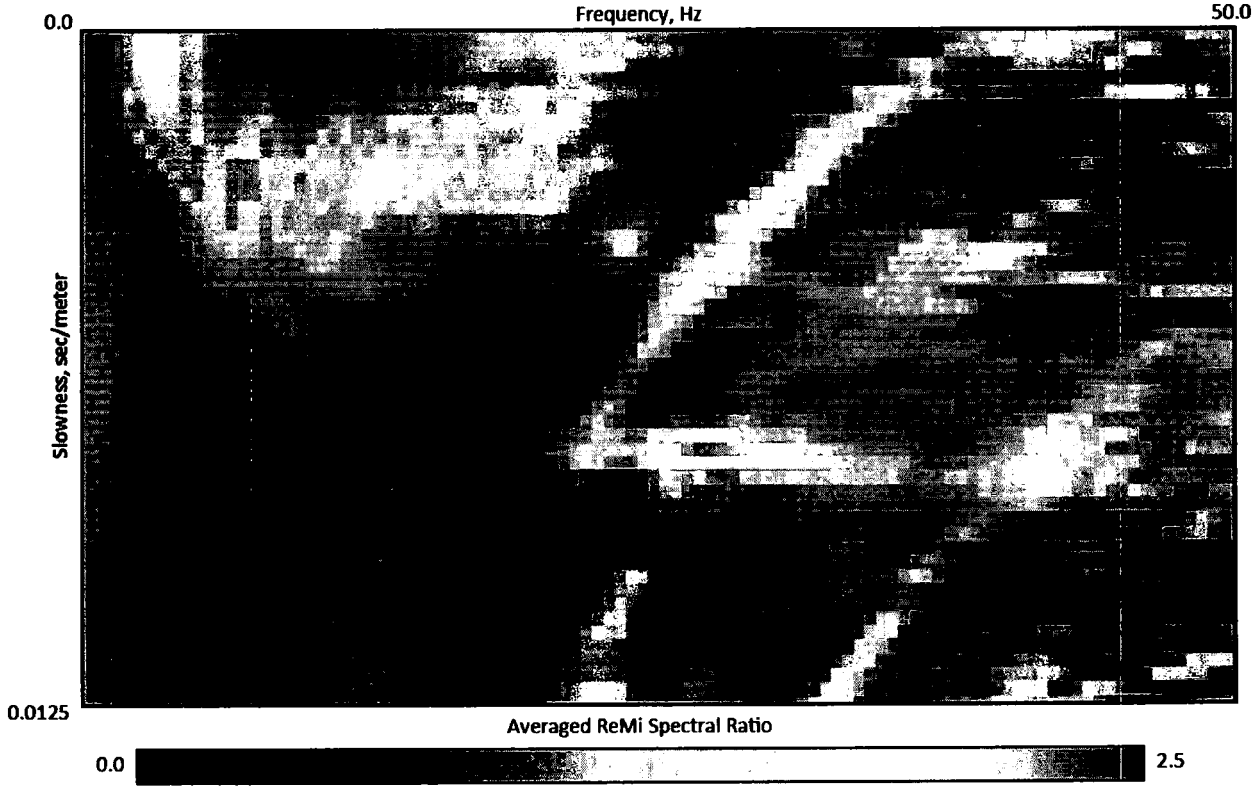
Dispersion Curve Showing Picks and Fit



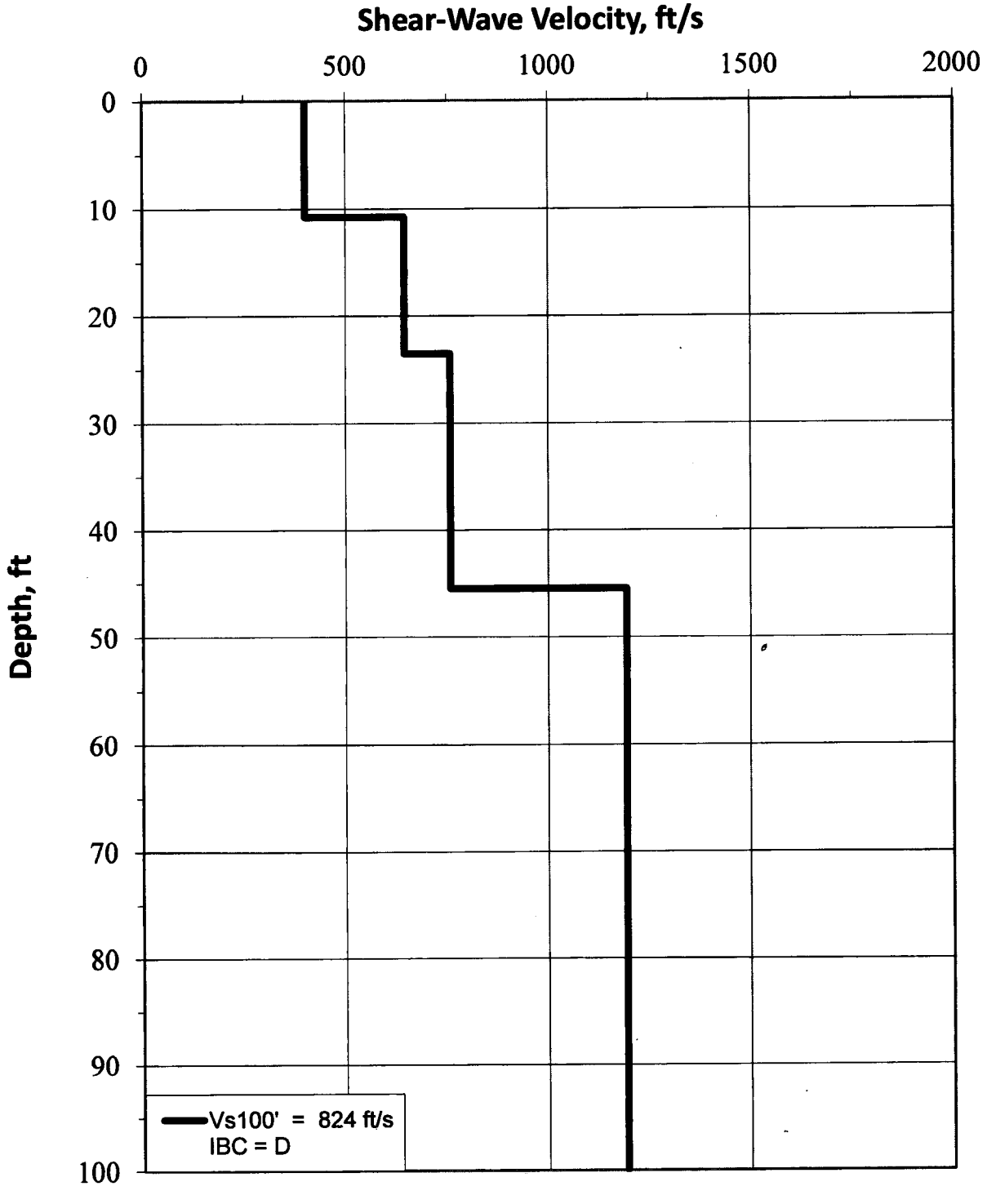
p-f Image with Dispersion Modeling Picks



SeisOpt ReMi© Shear Wave Velocity Profile

2903-005 Vest Property Apartments
ReMi Line 2

Data Processed by:	Prepared for:	Date:	
Morgan Stipe Geologist, Data Analyst morgan.stipe@optimsoftware.com	Kylie Bailey GSH Geotechnical, Inc.	9/30/19	200 S. Virginia St. #560 Reno, NV 89501 support@optimsoftware.com www.optimsoftware.com



ProShake 2.0 Report

ProShake 2.0 Input Data

Project Data			
Project Date:	11/8/2019 1:50:34 PM	**Unit:**	US
Project Identifier:	Vest Apartments		
Project Description:			
Number of Profiles:	1	**Number of Motions:**	9
Motion Group Description:			
Max. Number of Iterations:	200	**Strain Ratio:**	0.65
Error Tolerance:	1.00%	**Analysis Completed:**	Yes
Analyst Name:	Mike Huber	**Analysis Date:**	2/10/2020 1:25:41 PM
Data File Name:	C:\Users\Mike\Documents\ProShake Data Folder\Vest Apts 02-10-20.xlsx		

Profile Data				
Profile Number	**Profile Description**	**Water Table Depth**	**Number of Layers**	**Object Motion Layer**
1	Profile 1	5.00	35	35

Motion Data				
Motion Number	**File Name**	**Number of Values**	**Time Step**	**Peak Acceleration**
1	C:\Users\Mike\Documents\ProShake Data Folder\EQS\DIAM.EQ	2000	0.0000	0.000
2	C:\Users\Mike\Documents\ProShake Data Folder\EQS\ELCENTRO.EQ	4187	0.0000	0.000
3	C:\Users\Mike\Documents\ProShake Data Folder\EQS\TAFT.EQ	4220	0.0000	0.000
4	C:\Users\Mike\Documents\ProShake Data Folder\EQS\TOPANGA.eq	5872	0.0000	0.000
5	C:\Users\Mike\Documents\ProShake Data Folder\EQS\RSN143_TABAS_TAB-L1.AT2	1650	0.0000	0.000
6	C:\Users\Mike\Documents\ProShake Data Folder\EQS\RSN1044_NORTHR_NWH090.AT2	2000	0.0000	0.000
7	C:\Users\Mike\Documents\ProShake Data Folder\EQS\RSN1549_CHICHI_TCU129-E.AT2	18000	0.0000	0.000
8	C:\Users\Mike\Documents\ProShake Data Folder\EQS\RSN5657_IWATE_IWTH25NS.AT2	30000	0.0000	0.000
9	C:\Users\Mike\Documents\ProShake Data Folder\EQS\RSN8164_DUZCE_487-NS.AT2	13751	0.0000	0.000

ProShake 2.0 Report

Profile 1 - Layer Data

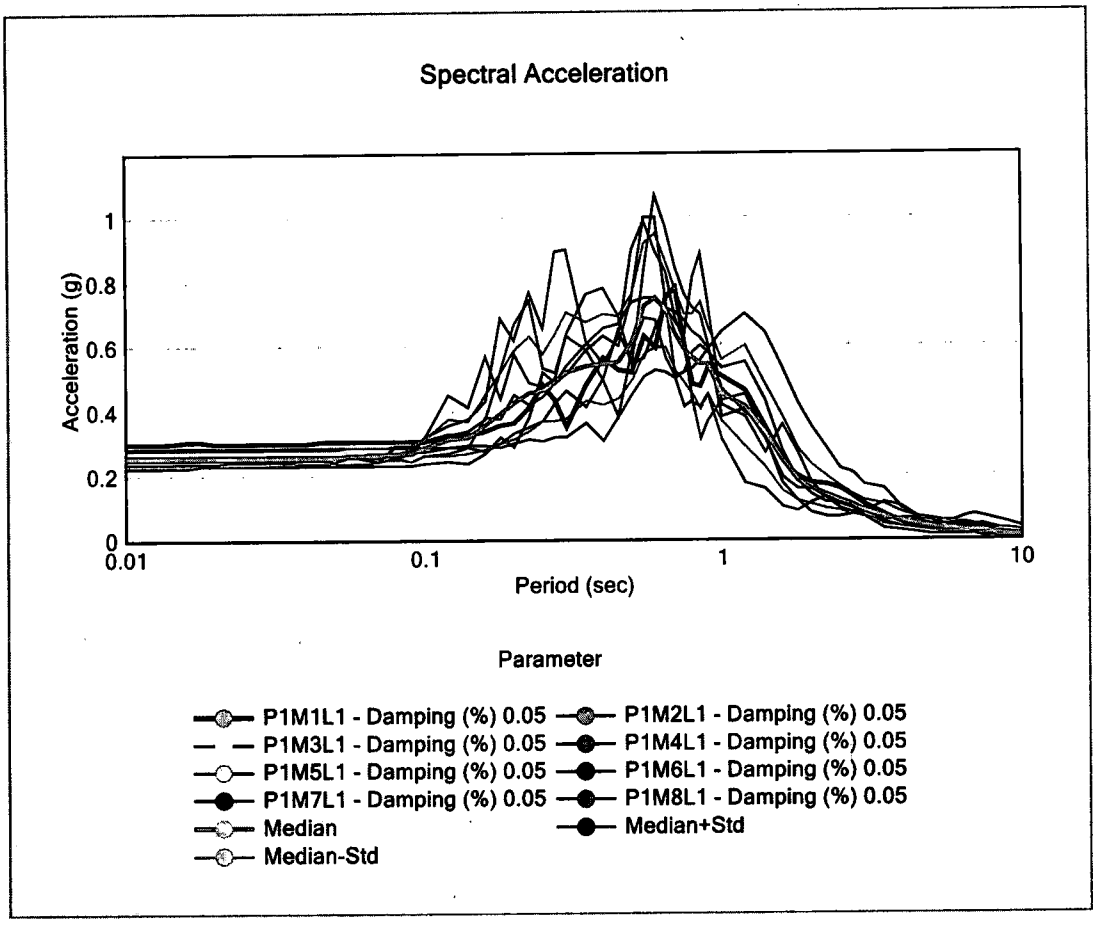
Layer Data

Layer Number	Material Name	Thickness	Unit Weight	Vss	G Max	Soil Model	PI (%)	K0	OCR	No. of Cycles	Freq (Hz) or D50 (mm)	Cu
1	Surface Clays	f	f	f	f	Darendeli (2001)	20.00	0.50	2.00	1.00	1.00	-
2	Surface Clays	f	f	f	f	Darendeli (2001)	20.00	0.50	2.00	1.00	1.00	-
3	Lower Clays	f	f	f	f	Darendeli (2001)	20.00	0.50	2.00	1.00	1.00	-
4	Lower Clays	f	f	f	f	Darendeli (2001)	20.00	0.50	2.00	1.00	1.00	-
5	Sands	f	f	f	f	Sand (Seed & Idriss)	-	-	-	-	-	-
6	Sands	f	f	f	f	Sand (Seed & Idriss)	-	-	-	-	-	-
7	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
8	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
9	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
10	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
11	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
12	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
13	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
14	Upper Gravels	f	f	f	f	Gravel	-	-	-	-	-	-

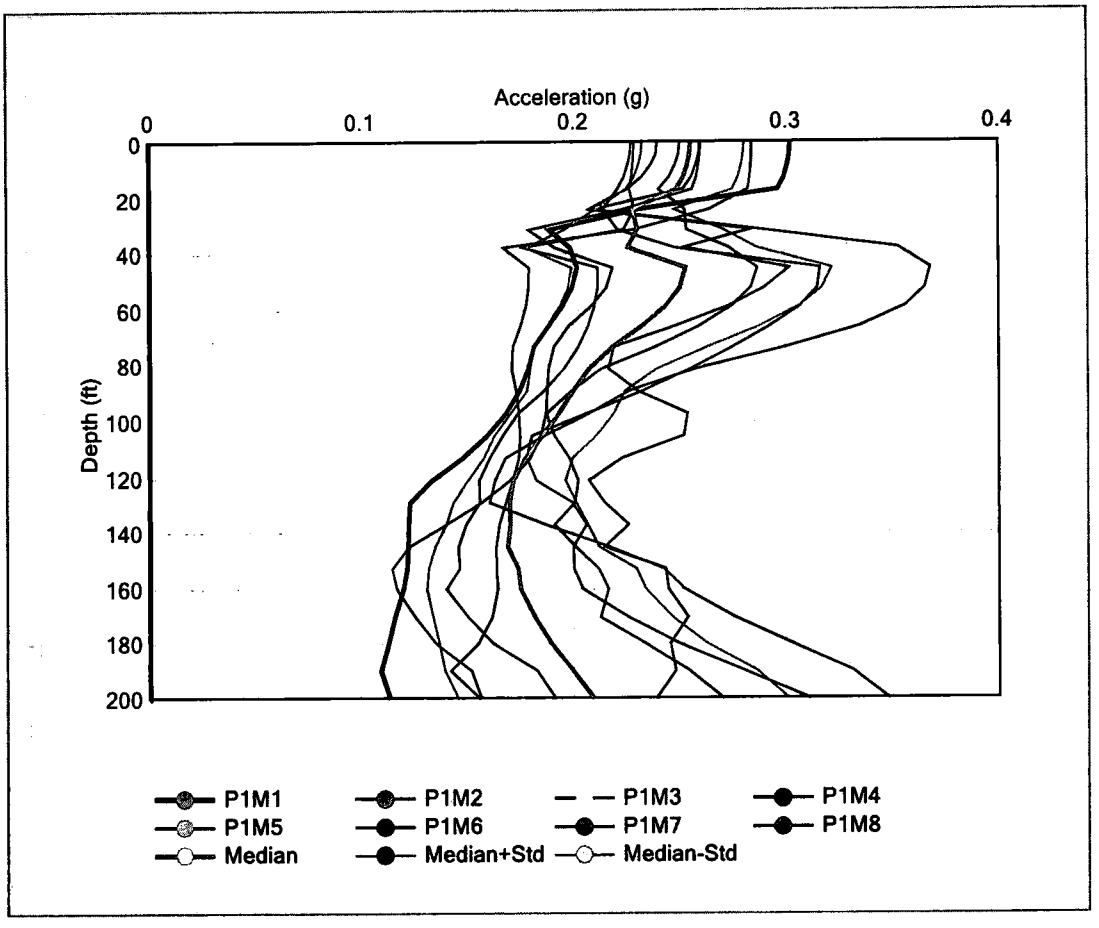
						(Seed et al.)						
15	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
16	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
17	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
18	Upper Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
19	Middle Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
20	Middle Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
21	Middle Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
22	Middle Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
23	Middle Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
24	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
25	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
26	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
27	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-

28	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
29	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
30	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
31	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
32	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
33	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
34	Lower Gravels	f	f	f	f	Gravel (Seed et al.)	-	-	-	-	-	-
35	Bedrock	f	f	f	f	Rock (Idriss)	-	-	-	-	-	-

ProShake 2.0 Report



ProShake 2.0 Report



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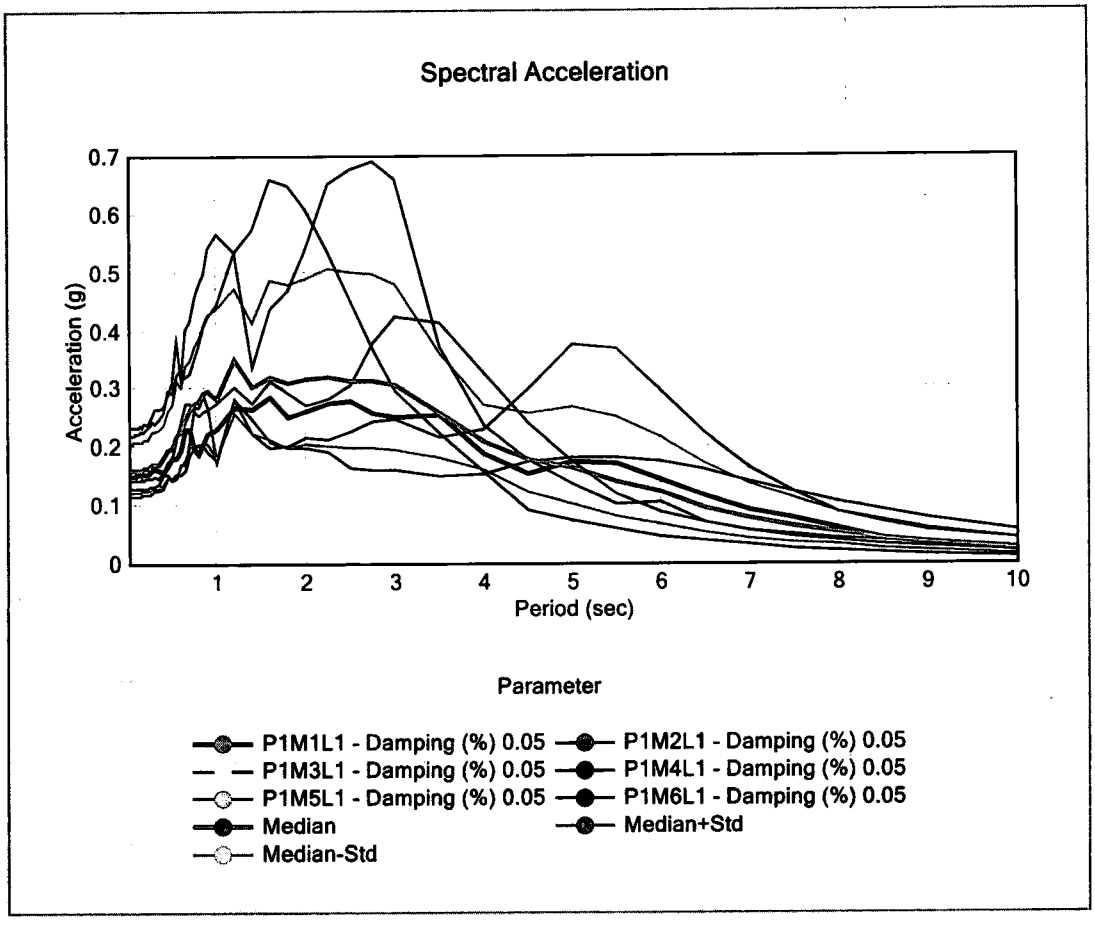

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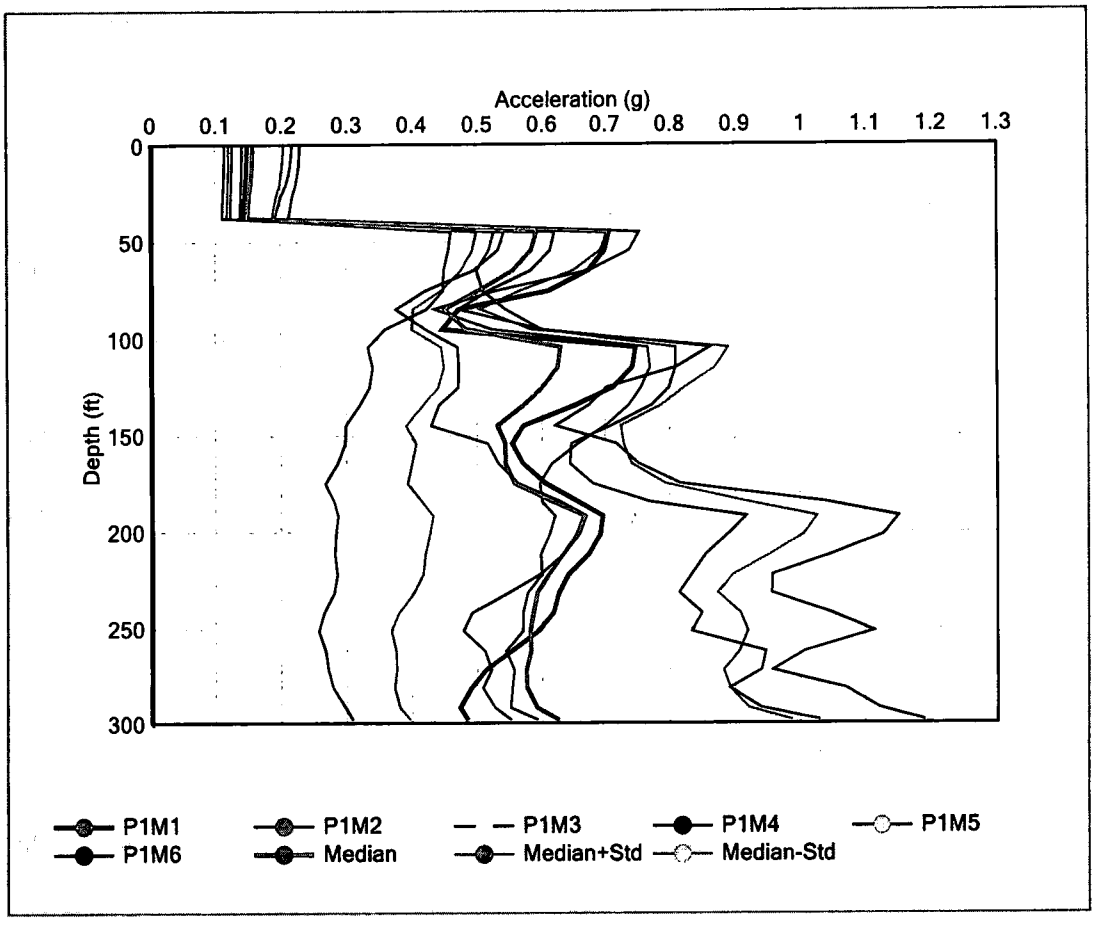
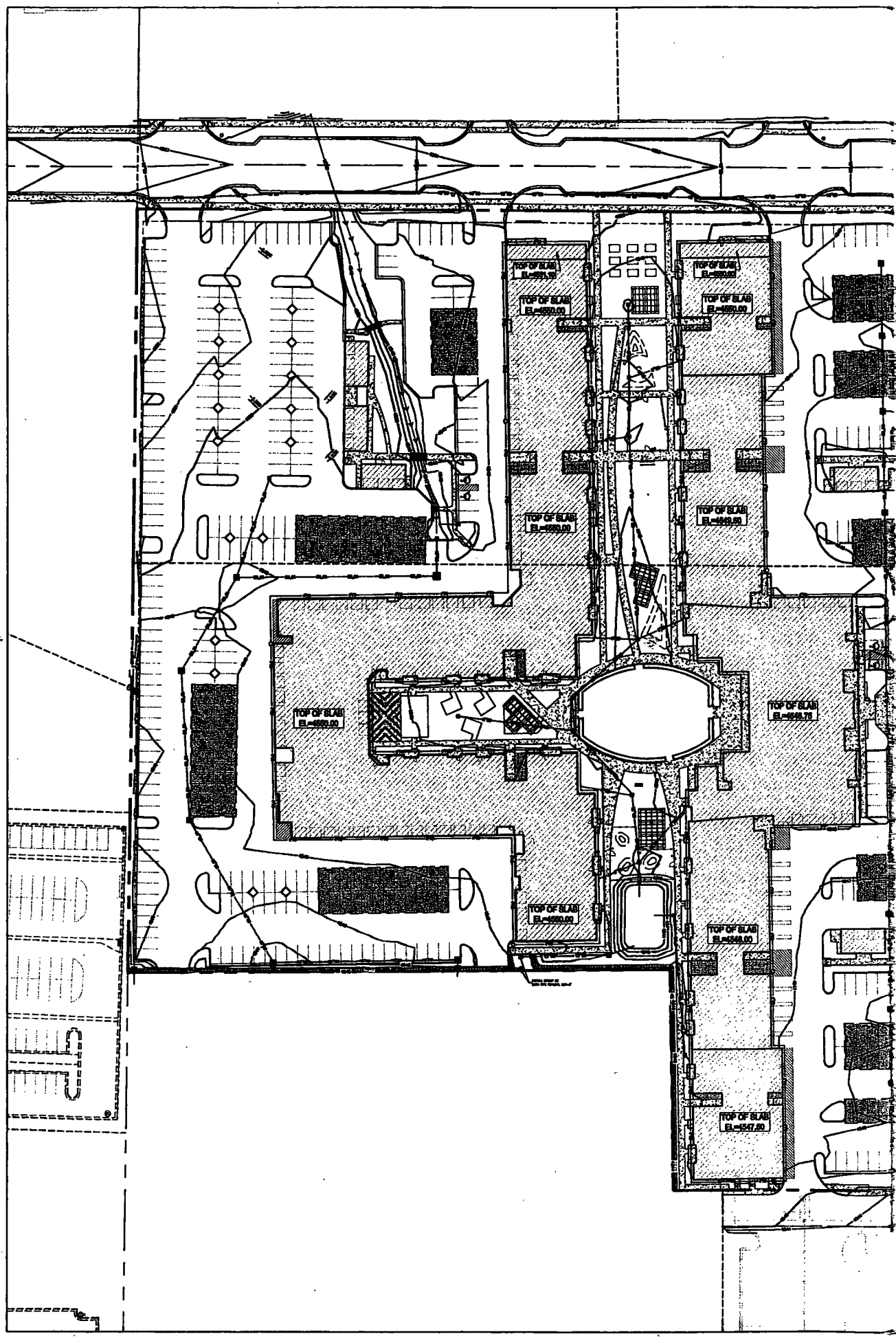


Period (sec)	CODE 80% MINIMUM Spectral Acceleration (g)	SRA Spectral Acceleration (g)	Site-Specific Spectral Acceleration (g)	Design Spectral Acceleration (2/3 of Site-Specific Acceleration) (g)
0.05	0.591	0.522	0.591	0.394
0.1	0.763	0.538	0.763	0.609
0.2	1.046	0.723	1.046	0.697
0.3	1.046	1.029	1.046	0.697
0.34	**1.046**	**1.068**	**1.068**	**0.712**
0.36	**1.046**	**1.065**	**1.065**	**0.710**
0.38	**1.046**	**1.039**	**1.046**	**0.697**
0.40	**1.046**	**1.049**	**1.049**	**0.699**
0.42	**1.046**	**1.052**	**1.052**	**0.701**
0.44	**1.046**	**1.058**	**1.058**	**0.705**
0.46	**1.046**	**1.060**	**1.060**	**0.707**
0.48	**1.046**	**1.073**	**1.073**	**0.715**
0.5	**1.046**	**1.115**	**1.115**	**0.743**
0.6	1.046	1.116	1.116	0.744
0.8	1.046	1.117	1.117	0.745
1.0	0.954	1.039	1.039	0.693
1.2	0.795	1.037	1.037	0.691
1.4	0.682	0.794	0.794	0.529
1.6	0.597	0.603	0.603	0.402
1.8	0.530	0.465	0.530	0.353
2.0	0.477	0.384	0.477	0.318
3.0	0.318	0.190	0.318	0.212
4.0	0.239	0.103	0.239	0.159

EXHIBIT C

Site Grading Plan


1
2
3
E
D
C
B
A
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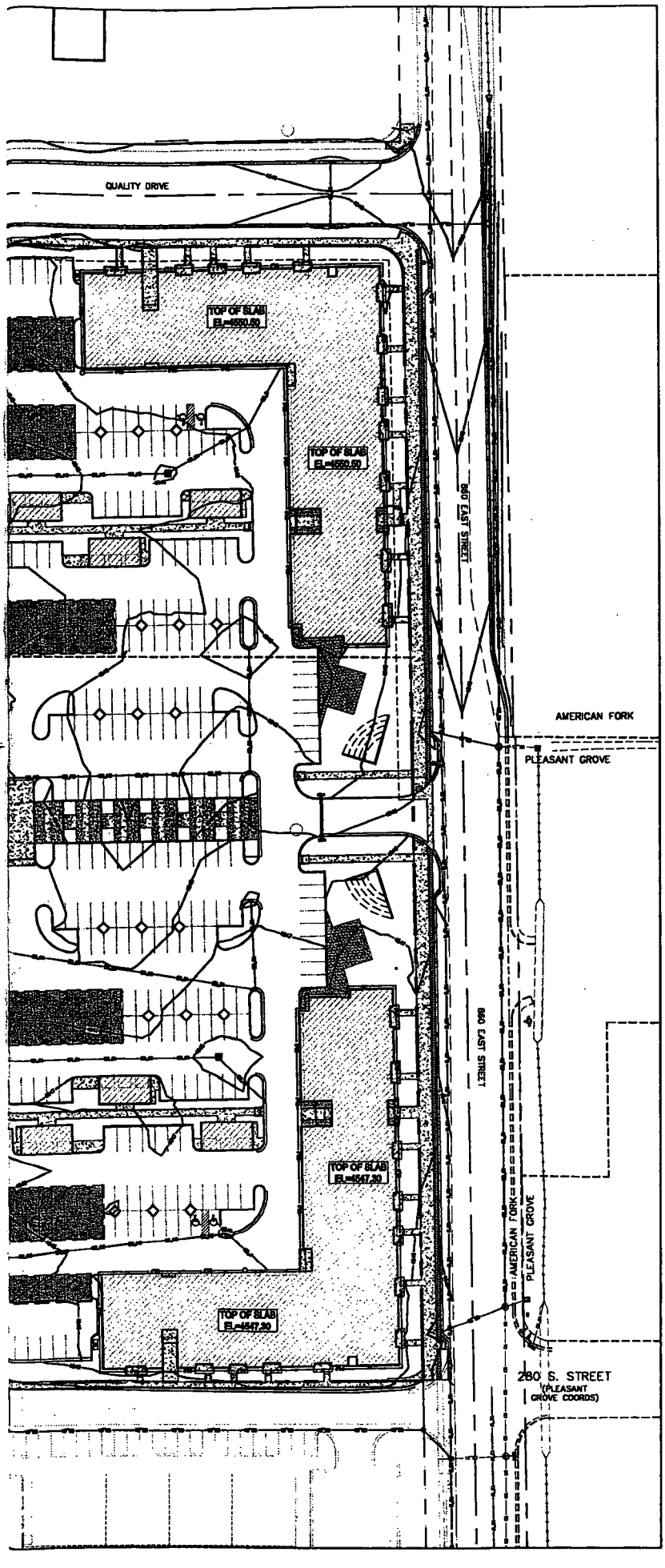


LEGEND

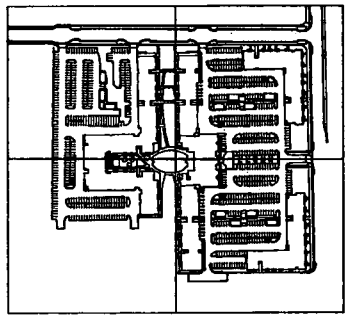
- BOUNDARY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- SD — EXISTING STORM DRAIN
- EXISTING STORM DRAIN STRUCTURES
- SD — PROPOSED STORM DRAIN
- PROPOSED STORM DRAIN STRUCTURES
- PROPOSED DITCH

NOTES:

1. FINISHED GRADE CONTOURS IN THE PARKING LOT AREAS REPRESENT APPROXIMATE FINISHED ASPHALT ELEVATION. PLANTER ISLANDS ELEVATIONS ARE REPRESENTED BY SPOT ELEVATIONS AND ARE INTENDED TO BE 9" TO 6" HIGHER THAN ASPHALT.
2. SEE ARCHITECTURAL "AS SERIES" DRAWINGS FOR EXTERIOR STEPS, HANDRAILS, RAMPS AND ASSOCIATED DETAILS.

N

40 0 40 80
SCALE OF FEET
FULL SIZE (30X42) 1"=40'



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The RITCHIE GROUP

TWIN PEAKS Engineering & Land Surveying

AMERICAN FORK 860 APARTMENTS

THE RITCHIE GROUP
860 EAST QUALITY DRIVE,
AMERICAN FORK, UTAH 84003

#	Date	Revision

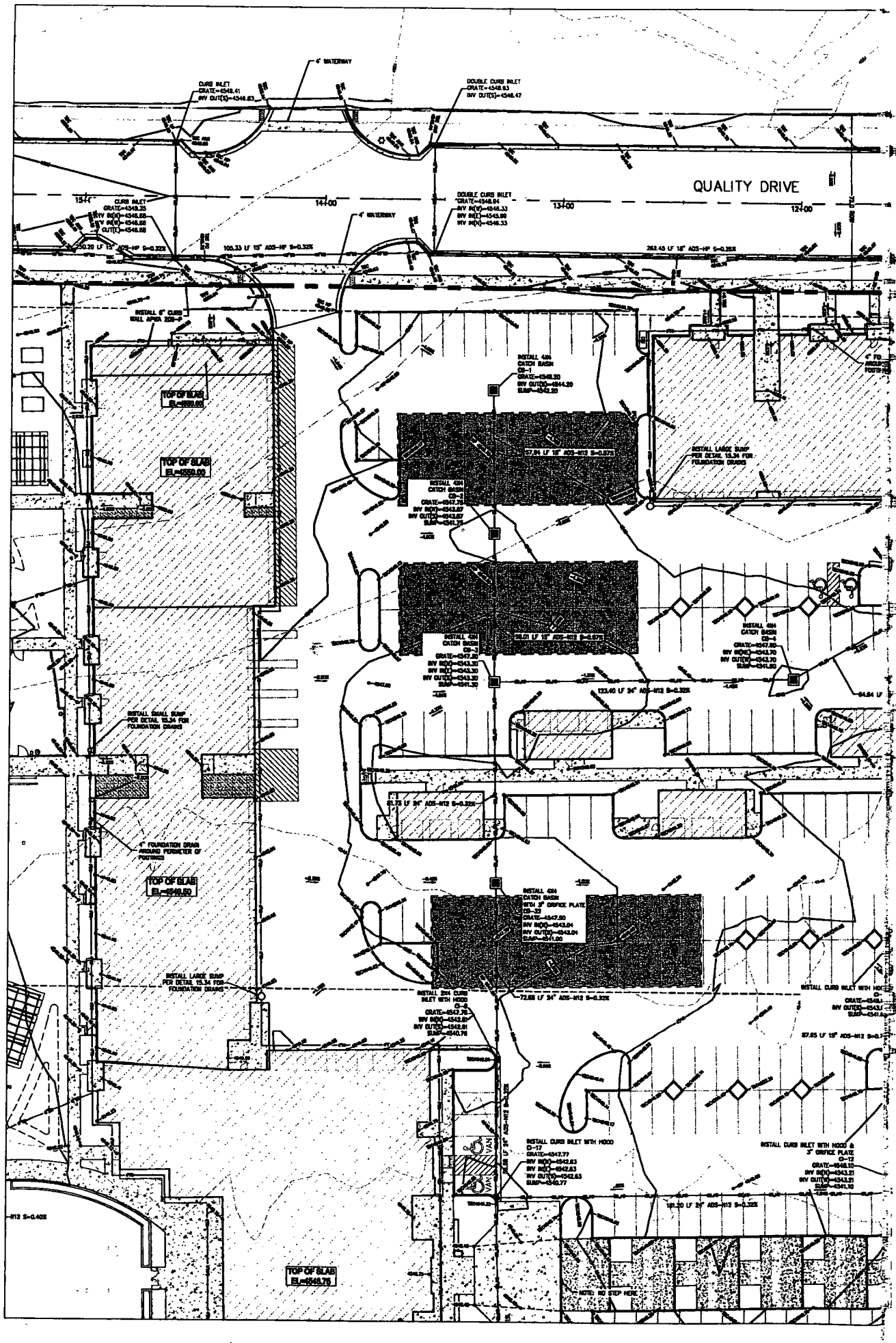
Electronically Signed By: S. Scott Carlson
167727
S. SCOTT CARLSON
STATE OF UTAH

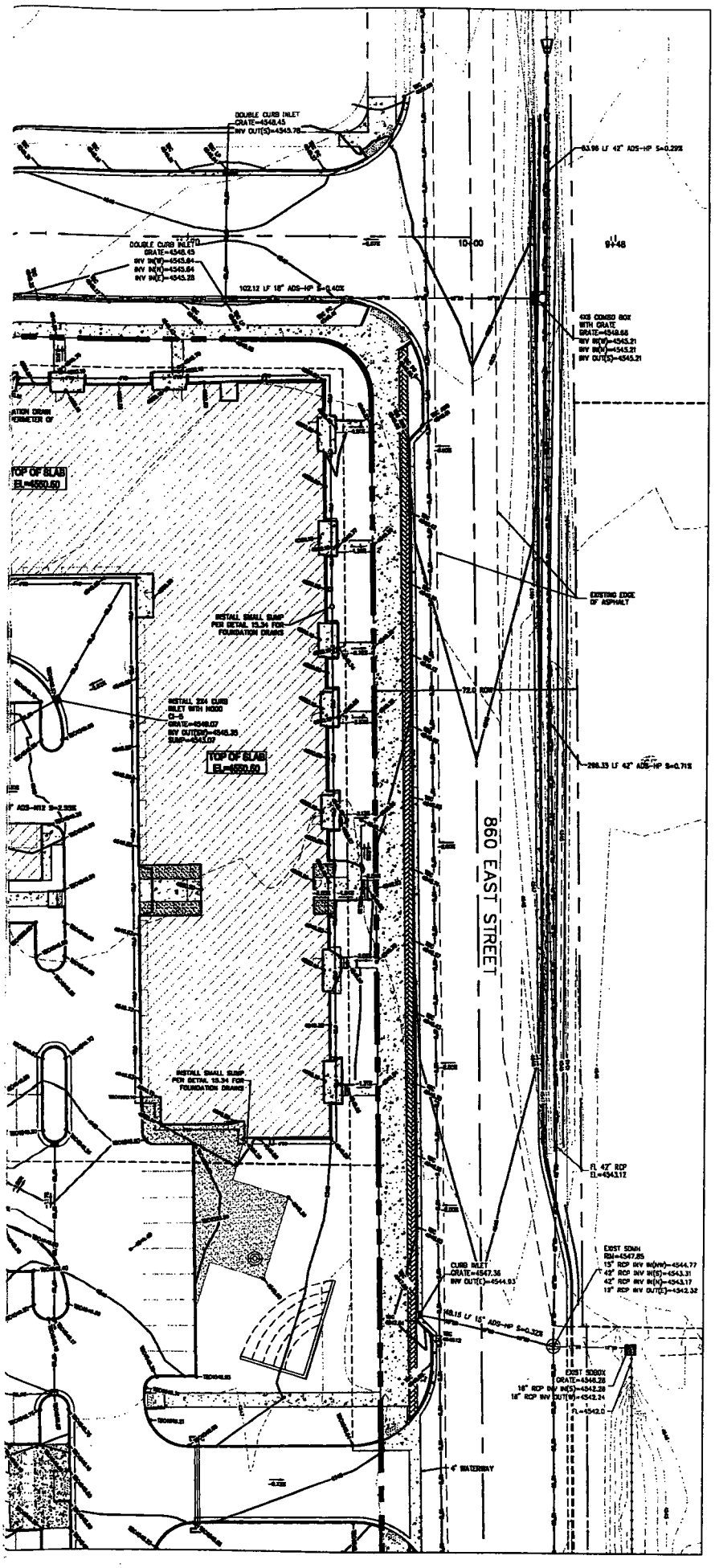
PERMIT SET

NEXUS PROJ. #:
CHECKED BY: SSC
DRAWN BY: ALN
DATE: 11.20.2020

GRADING PLAN

C5


QUALITY DRIVE
TOP OF SLAB
TOP OF SLAB
TOP OF SLAB
TOP OF SLAB
INSTALL LARGE SUMP PER DETAIL 15.34 FOR FOUNDATION DRAINS
INSTALL SMALL SUMP PER DETAIL 15.34 FOR FOUNDATION DRAINS
4" FOUNDATION DRAIN AROUND PERIMETER OF FOOTINGS
INSTALL 6" CURB WALL APER 329-P
4" WATERWAY
4" WATERWAY
CURB INLET
DOUBLE CURB INLET
DOUBLE CURB INLET
INSTALL 48in CATCH BASIN
INSTALL 48in CATCH BASIN
INSTALL 48in CATCH BASIN
INSTALL 48in CATCH BASIN WITH 3" ORIFICE PLATE
INSTALL 30in CURB INLET WITH HOOD
INSTALL CURB INLET WITH HOOD
INSTALL CURB INLET WITH HOOD & 3" ORIFICE PLATE
INSTALL CURB INLET WITH HOOD
NOTE: NO STEP HERE
1
2
3
A
B
C
D
E



LEGEND

- BOUNDARY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- SD — EXISTING STORM DRAIN
- EXISTING STORM DRAIN STRUCTURES
- SD — PROPOSED STORM DRAIN
- PROPOSED STORM DRAIN STRUCTURES
- PROPOSED DITCH

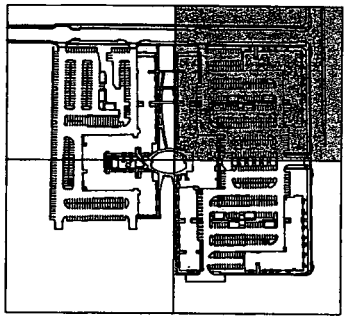
NOTES:

1. FINISHED GRADE CONTOURS IN THE PARKING LOT AREAS REPRESENT APPROXIMATE FINISHED ASPHALT ELEVATION. PLANTER ISLANDS ELEVATIONS ARE REPRESENTED BY SPOT ELEVATIONS AND ARE INTENDED TO BE 0" TO 6" HIGHER THAN ASPHALT.
2. SEE ARCHITECTURAL '10 SERIES' DRAWINGS FOR EXTERIOR STEPS, HANDRAILS, RAMPS AND ASSOCIATED DETAILS.

N

20 0 20 40

SCALE OF FEET
FULL SIZE (30X42) 1"=20'



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THE RITCHIE GROUP
860 EAST QUALITY DRIVE,
AMERICAN FORK, UTAH 84003

#	Date	Revision	BY

Electronically Signed by S. Scott Carlson
S. SCOTT CARLSON
STATE OF UTAH

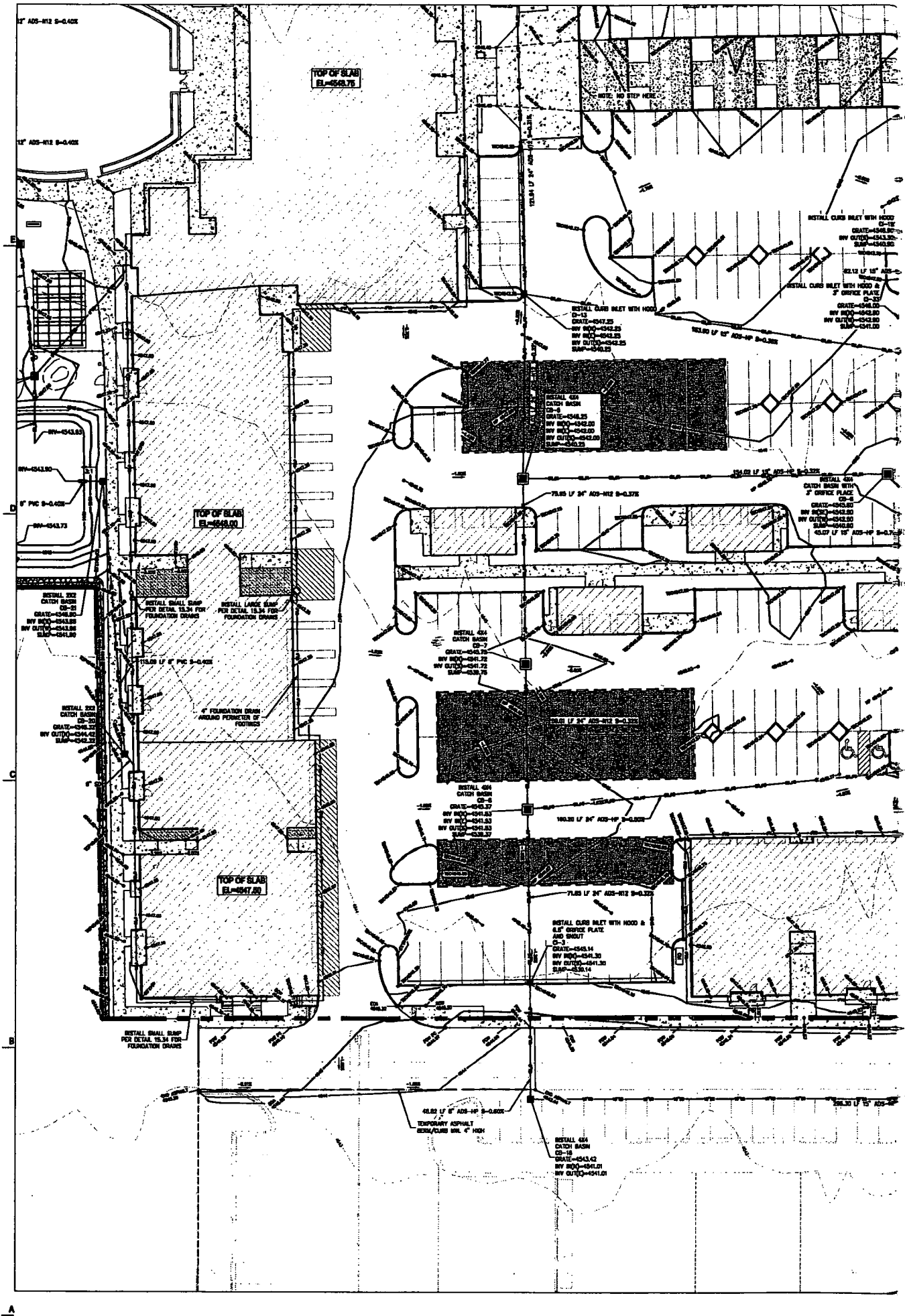
PERMIT SET

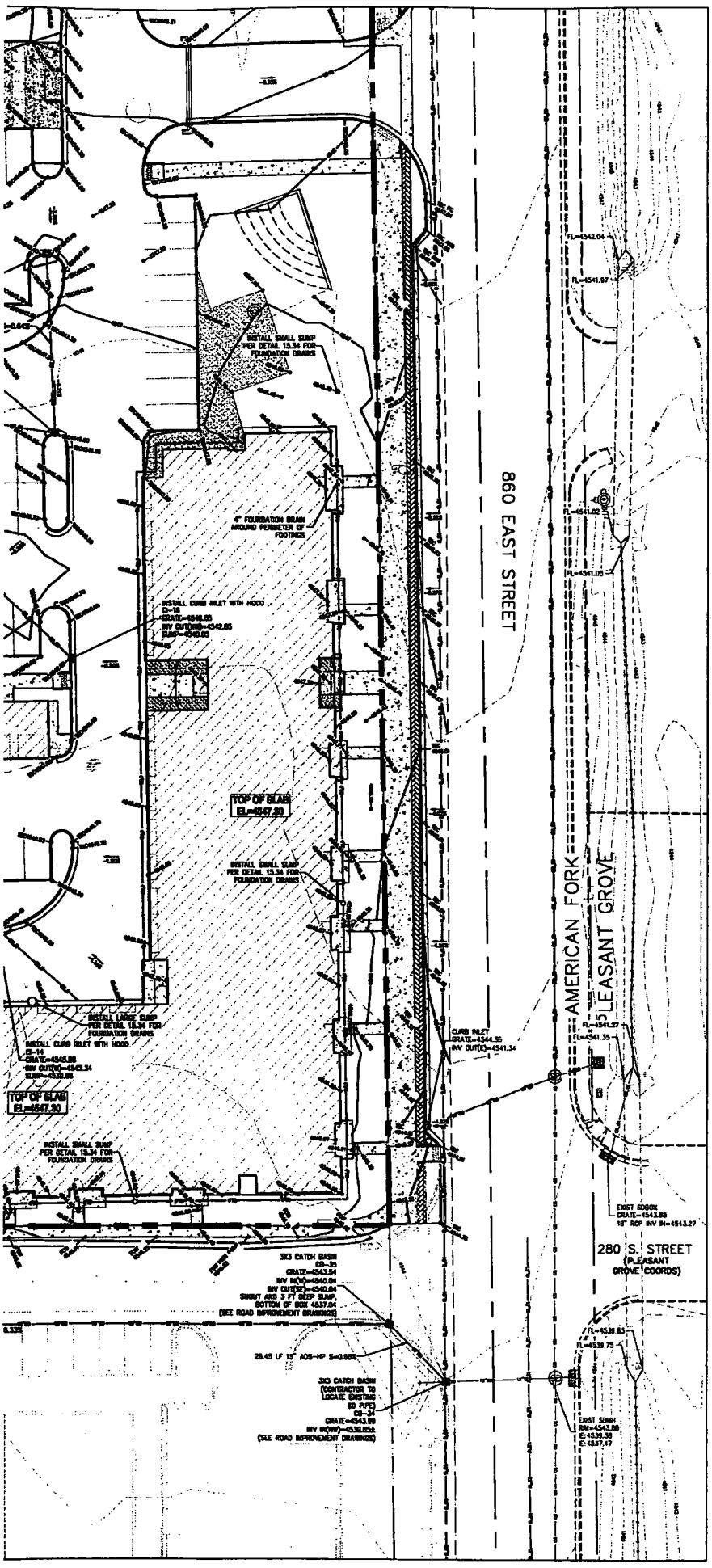
NEXUS PROJ. #: -
CHECKED BY: SSC
DRAWN BY: ALN
DATE: 11.20.2020

GRADING PLAN
QUADRANT 1

C5a

811 Know what's below. Call before you dig.


TOP OF SLAB
EL=4548.75
TOP OF SLAB
EL=4548.00
TOP OF SLAB
EL=4547.00
NOTE: NO STEP HERE
INSTALL CURB INLET WITH HOOD
INSTALL CURB INLET WITH HOOD & 3" ORIFICE PLATE
INSTALL 4X4 CATCH BASIN
INSTALL 4X4 CATCH BASIN WITH 3" ORIFICE PLACE
INSTALL 2X2 CATCH BASIN
INSTALL SMALL SUMP PER DETAIL 15.34 FOR FOUNDATION DRAINS
INSTALL LARGE SUMP PER DETAIL 15.34 FOR FOUNDATION DRAINS
4" FOUNDATION DRAIN AROUND PERIMETER OF FOOTINGS
INSTALL CURB INLET WITH HOOD & 6.5" ORIFICE PLATE AND SNOUT
TEMPORARY ASPHALT BERM/CURB MIN. 4" HIGH



LEGEND

- BOUNDARY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- SD — EXISTING STORM DRAIN
- EXISTING STORM DRAIN STRUCTURES
- SD — PROPOSED STORM DRAIN
- PROPOSED STORM DRAIN STRUCTURES
- PROPOSED DITCH

NOTES:

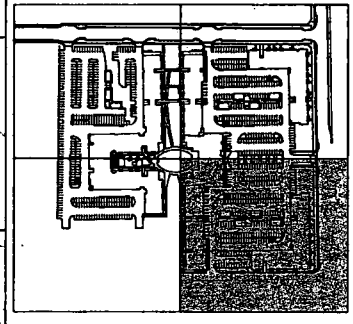
1. FINISHED GRADE CONTOURS IN THE PARKING LOT AREAS REPRESENT APPROXIMATE FINISHED ASPHALT ELEVATION. PLANTER ISLANDS ELEVATIONS ARE REPRESENTED BY SPOT ELEVATIONS AND ARE INTENDED TO BE 6" TO 8" HIGHER THAN ASPHALT.
2. SEE ARCHITECTURAL '18 SERIES' DRAWINGS FOR EXTERIOR STEPS, HANDRAILS, RAMPS AND ASSOCIATED DETAILS.

N

20 0 20 40

SCALE OF FEET

FULL SIZE (30X42) 1"=20'



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AMERICAN FORK, UTAH 84003

#	Date	Revision

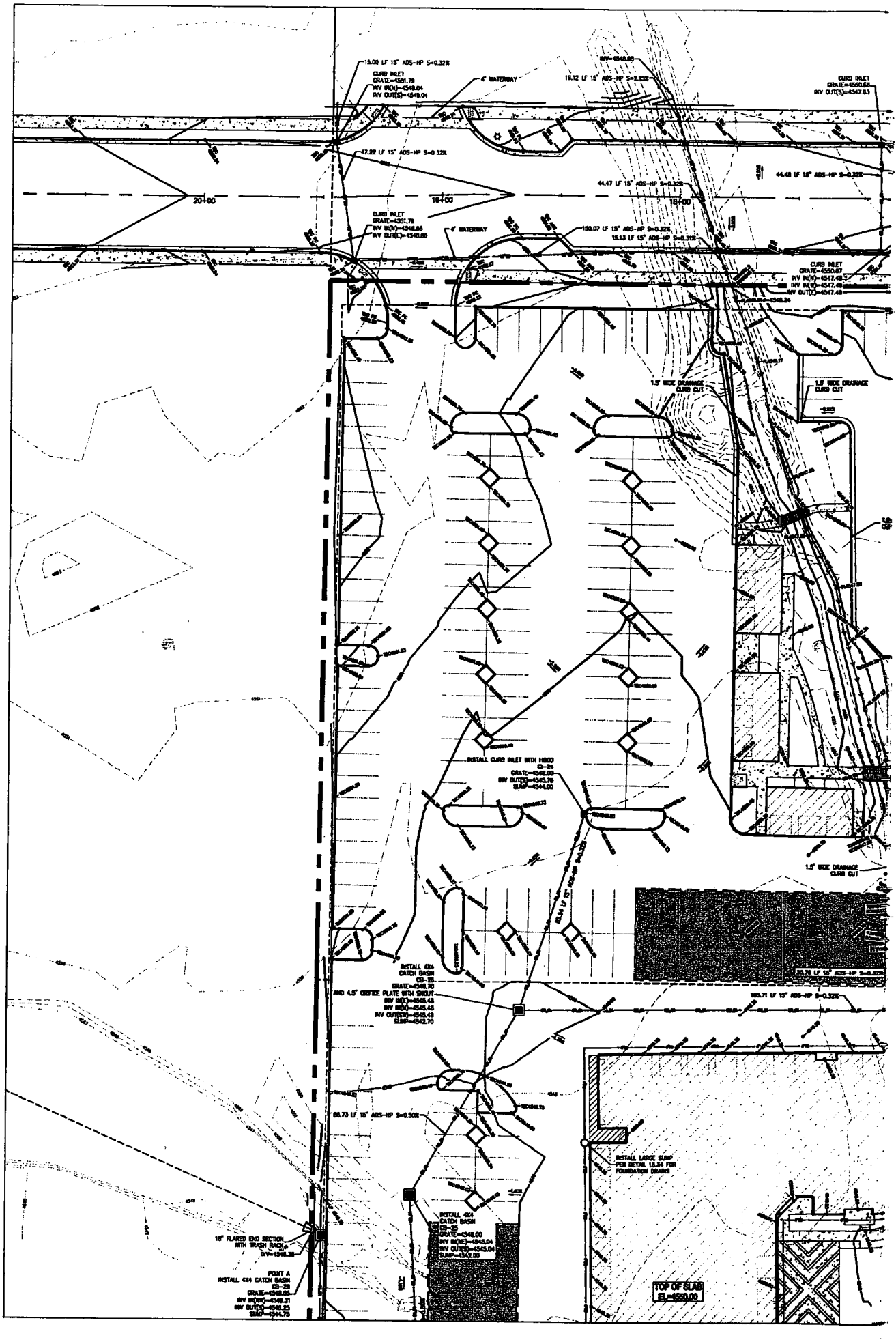
LICENSED PROFESSIONAL ENGINEER S. SCOTT CARLSON 317727 STATE OF UTAH

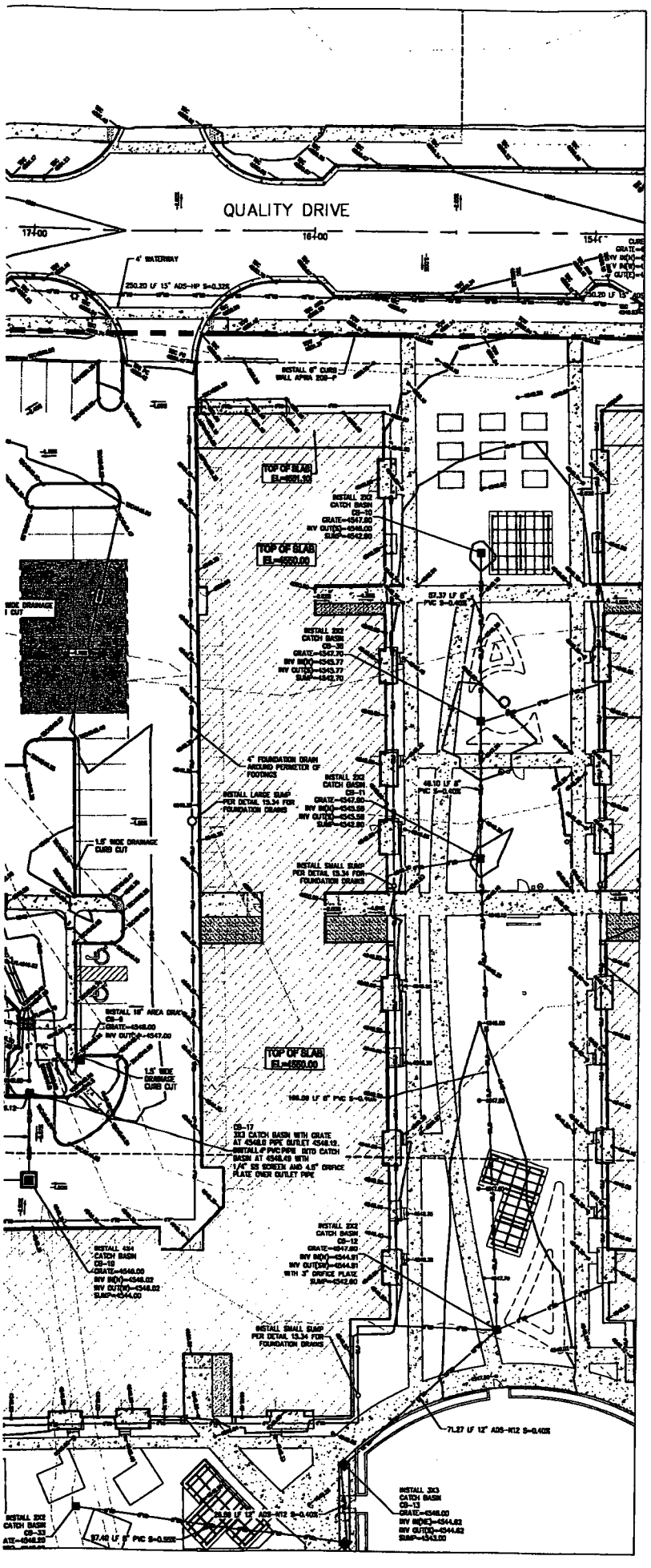
PERMIT SET

NEXUS PROJ. #: -
CHECKED BY: SSC
DRAWN BY: ALN
DATE: 11.20.2020

GRADING PLAN QUADRANT 2

C5b


20+00
19+00
18+00
4" WATERWAY
4" WATERWAY
1.5' WIDE DRAINAGE CURB CUT
1.5' WIDE DRAINAGE CURB CUT
1.5' WIDE DRAINAGE CURB CUT
INSTALL CURB INLET WITH HOOD
INSTALL 4X4 CATCH BASIN
INSTALL LARGE SUMP PER DETAIL 13.34 FOR FOUNDATION DRAINS
16" FLARED END SECTION WITH TRASH RACK
POINT A
INSTALL 4X4 CATCH BASIN
TOP OF SLAB
EL.=4550.00



LEGEND

- BOUNDARY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- SD — EXISTING STORM DRAIN
- EXISTING STORM DRAIN STRUCTURES
- SD — PROPOSED STORM DRAIN
- PROPOSED STORM DRAIN STRUCTURES
- PROPOSED DITCH

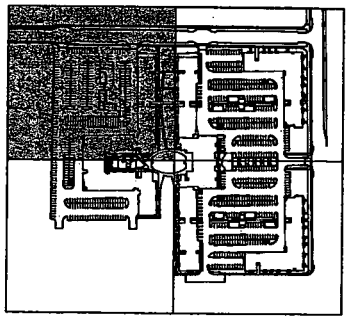
NOTES:

1. FINISHED GRADE CONTOURS IN THE PARKING LOT AREAS REPRESENT APPROXIMATE FINISHED ASPHALT ELEVATION. PLANTER ISLANDS ELEVATIONS ARE REPRESENTED BY SPOT ELEVATIONS AND ARE INTENDED TO BE 6" TO 8" HIGHER THAN ASPHALT.
2. SEE ARCHITECTURAL "A0 SERIES" DRAWINGS FOR EXTERIOR STEPS, HANDRAILS, RAMPS AND ASSOCIATED DETAILS.
3. CLEAR WEEDS AND SMOOTH OUT SIDE SLOPES OF EXISTING NON-JURISDICTIONAL WETLANDS. CONVERT DITCH TO ENGINEERED STREAM BED WITH 2-4 FT WIDE BOTTOM WIDTH (6" COBBLE) AND SIDE SLOPED NO STEEPER THAN 3:1 SEEDED WITH NATIVE GRASS.

N

20 0 20 40

SCALE OF FEET
FULL SIZE (30X42) 1"=20'



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THE RITCHIE GROUP
860 EAST QUALITY DRIVE,
AMERICAN FORK, UTAH 84003

#	Date	Revision

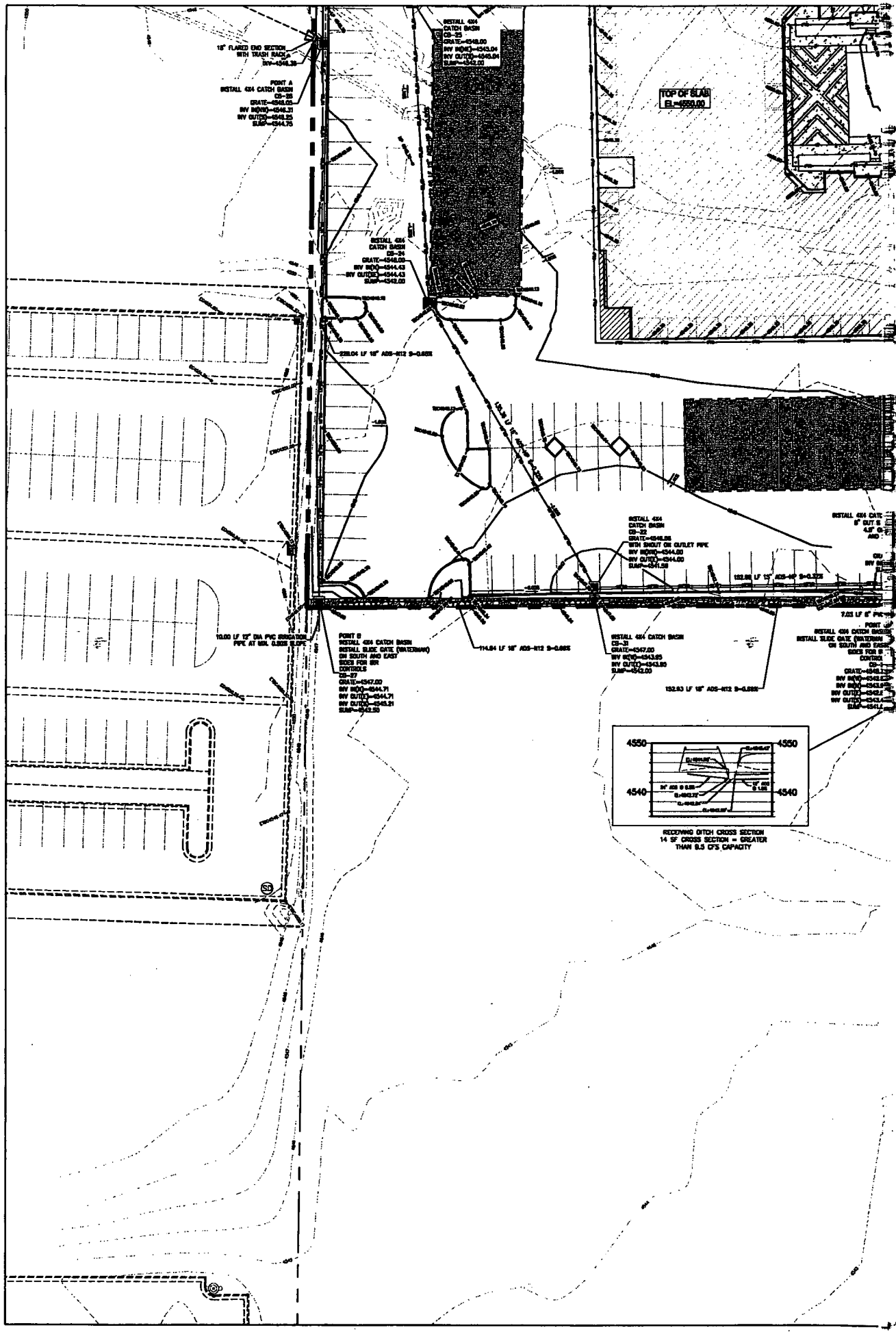
Electronically signed by: S. Scott Carlson, Cert 187727, Utah Licensed Professional Engineer

PERMIT SET

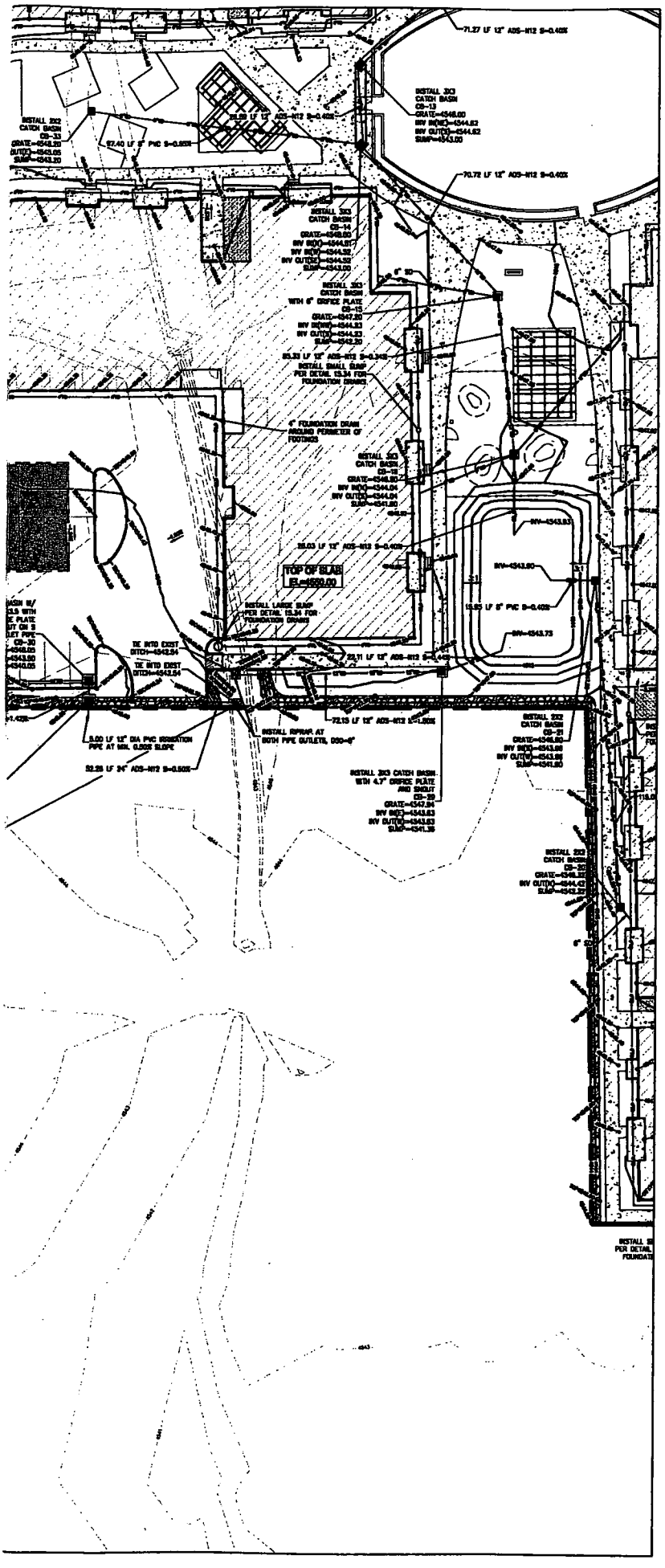
NEXUS PROJ. #: -
CHECKED BY: SSC
DRAWN BY: ALN
DATE: 11.20.2020

GRADING PLAN
QUADRANT 3

C5c


TOP OF SLAB
EL=4550.00
RECEIVING DITCH CROSS SECTION
14 SF CROSS SECTION = GREATER
THAN 8.5 CFS CAPACITY

4 | 5 | 6 |



LEGEND

- BOUNDARY LINE
- EXISTING CONTOURS
- PROPOSED CONTOURS
- SD — EXISTING STORM DRAIN
- EXISTING STORM DRAIN STRUCTURES
- SD — PROPOSED STORM DRAIN
- PROPOSED STORM DRAIN STRUCTURES
- PROPOSED DITCH

NOTES:

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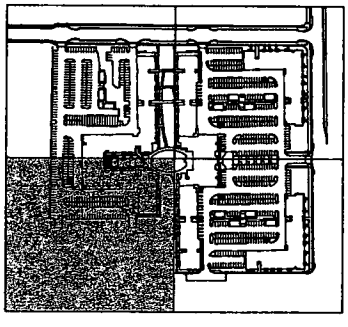
N

20 0 20 40

SCALE OF FEET
FULL SIZE (30X42) 1"=20'



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AMERICAN FORK, UTAH 84003

#	Date	Revision

Electronically Signed By: S. Scott Carlson 7727 S. SCOTT CARLSON LICENSED PROFESSIONAL ENGINEER STATE OF UTAH

PERMIT SET

NEXUS PROJ.#: -
CHECKED BY: SSC
DRAWN BY: ALN
DATE: 11.20.2020

GRADING PLAN QUADRANT 4

C5d