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

ENT 70176:2024 PG 1 of 44
ANDREA ALLEN
UTAH COUNTY RECORDER
2024 Oct 10 01:24 PM FEE 40.00 BY LM
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 10-21-21 along with the site grading plan to the property generally located at 162 West 400 South (address), American Fork, UT 84003 and therefore mandating that all construction be in compliance with said Geotechnical Study and site grading plan per the requirements of American Fork City ordinances and standards and specification including specifically Ordinance 07-10-47, Section 6-5, Restrictive Covenant Required and 6-2-4, Liquefiable Soils. Said Sections require establishment of a restrictive covenant and notice to property owners of liquefiable soils or other unique soil conditions and construction methods associated with the property.

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

Dated this 29 day of May, 2024.

OWNER(S):

(Signature) | (Signature)

Dan Stewart
(Printed Name) | (Printed Name)

Owner
(Title) | (Title)

STATE OF UTAH)
§
COUNTY OF Salt Lake)

On the 29 day of May, 2024, personally appeared before me Dan Stewart 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.

JEFF CORNELIUS
Notary Public State of Utah
My Commission Expires on:
May 27, 2025
Comm. Number: 718531

Notary Public
My Commission Expires: 5/27/25

Exhibit A - Legal Description of Property

Exhibit A

PROPERTY DESCRIPTION:

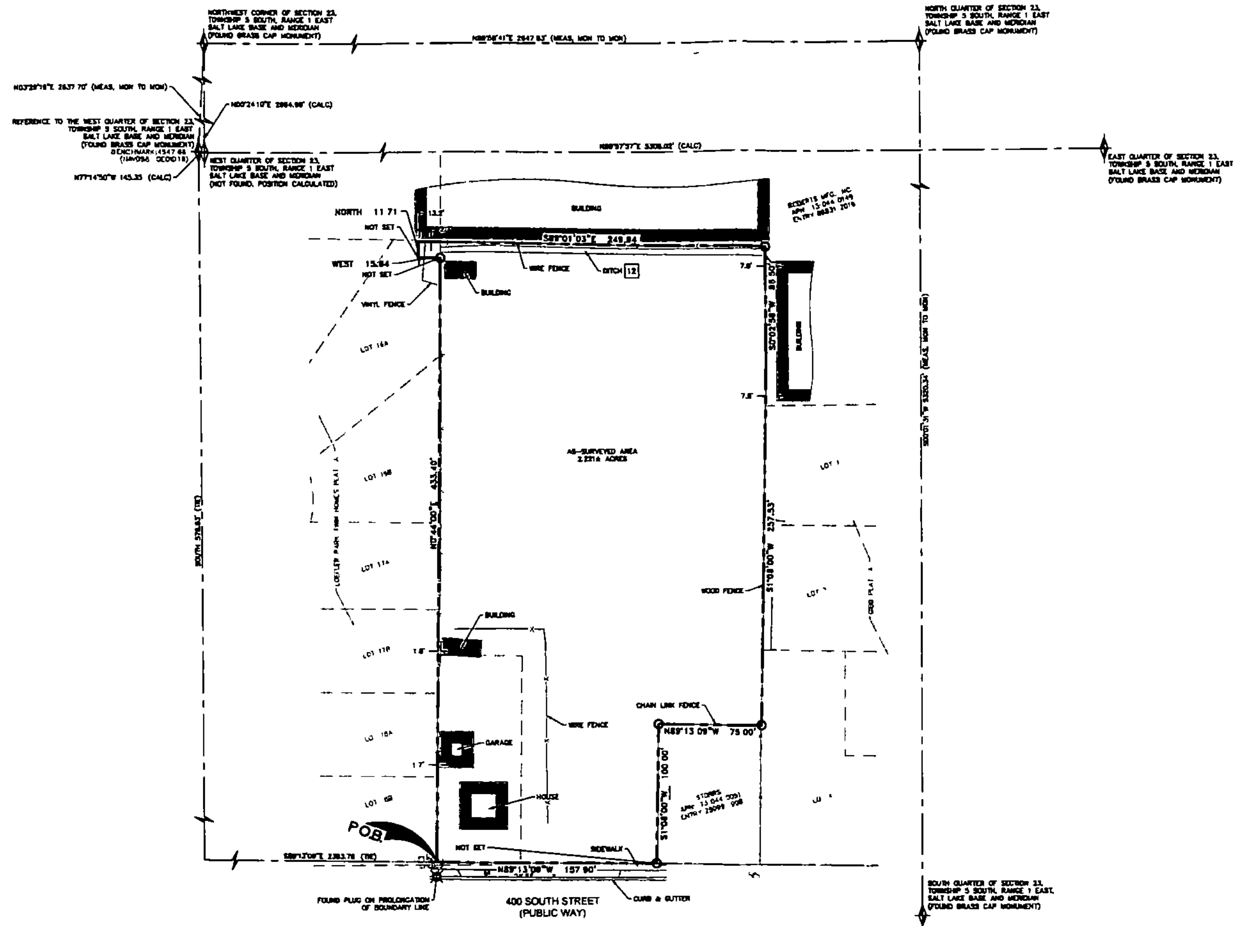
A TRACT OF LAND BEING SITUATE IN THE SOUTHWEST QUARTER OF SECTION 23, TOWNSHIP 5 SOUTH, RANGE 1 EAST, SALT LAKE BASE AND MERIDIAN, HAVING A BASIS OF BEARINGS OF NORTH 03°29'19" EAST BETWEEN THE REFERENCE TO THE WEST QUARTER AND THE NORTHWEST CORNER OF SECTION 23, TOWNSHIP 5 SOUTH, RANGE 1 EAST, SALT LAKE BASE AND MERIDIAN, SAID TRACT OF LAND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT WHICH IS SOUTH 578.93 FEET AND SOUTH 89°13'09" EAST 2383.76 FEET FROM THE REFERENCE TO THE WEST QUARTER OF SAID SECTION 23, SAID POINT ALSO BEING THE SOUTHEAST CORNER OF LOEFLER PARK TWIN HOMES SUBDIVISION, PLAT "A", ON FILE WITH THE OFFICE OF THE UTAH COUNTY RECORDER AS MAP NO. 15224, AND RUNNING THENCE ALONG SAID SUBDIVISION THE FOLLOWING THREE (3) COURSES, 1) NORTH 00°44'00" EAST 433.40 FEET, 2) WEST 15.64 FEET, 3) NORTH 11.71 FEET TO THE PROLONGATION OF A FENCE LINE, SAID POINT BEING AT THE POINT OF BEGINNING OF THAT CERTAIN PROPERTY BOUNDARY LINE AGREEMENT ON FILE WITH THE OFFICE OF THE UTAH COUNTY RECORDER AS ENTRY NO. 74491:2023; THENCE SOUTH 89°01'03" EAST ALONG SAID PROPERTY BOUNDARY LINE AGREEMENT A DISTANCE OF 249.94 FEET TO A POINT ON A PROLONGATION OF THE WEST FACE OF A RETAINING WALL; THENCE SOUTH 00°02'56" WEST ALONG SAID PROPERTY BOUNDARY LINE AGREEMENT A DISTANCE OF 86.50 FEET TO THE PROLONGATION OF A FENCE LINE, SAID POINT ALSO BEING ON THE PROLONGATION OF THE WEST LINE OF PLAT "A", GIBB SUBDIVISION, ON FILE WITH THE OFFICE OF THE UTAH COUNTY RECORDER AS MAP FILING NO. 1860; THENCE SOUTH 01°06'00" WEST ALONG SAID FENCE AND PROLONGATION THEREOF, PROPERTY BOUNDARY LINE AGREEMENT AND A PROLONGATION THEREOF, SUBDIVISION AND PROLONGATION THEREOF A DISTANCE OF 257.53 FEET TO THAT CERTAIN PROPERTY BOUNDARY LINE AGREEMENT ON FILE WITH THE OFFICE OF THE UTAH COUNTY RECORDER AS ENTRY NO. 70891:2023; THENCE ALONG SAID PROPERTY BOUNDARY LINE AGREEMENT THE FOLLOWING TWO (2) COURSES, 1) NORTH 89°13'09" WEST 75.00 FEE, 2) SOUTH 01°06'00" WEST 100.00 FEET TO THE NORTH RIGHT-OF-WAY LINE OF 400 SOUTH STREET; THENCE NORTH 89°13'09" WEST ALONG SAID RIGHT-OF-WAY LINE A DISTANCE OF 157.90 FEET TO THE POINT OF BEGINNING.

CONTAINING 96,752 SQUARE FEET OR 2.221 ACRES, MORE OR LESS.
9 LOTS

KASKADE HOMES PROPERTY

LOCATED IN THE SOUTHWEST QUARTER OF SECTION 23,
TOWNSHIP 5 SOUTH, RANGE 1 EAST,
SALT LAKE BASE AND MERIDIAN
ALTA/NSPS LAND TITLE SURVEY



SURVEYOR'S CERTIFICATE

TO: KASKADE HOMES LLC
STEWART TITLE GUARANTY COMPANY

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2021 MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/NSPS LAND TITLE SURVEYS, JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 2, 4, 8, 11 AND 13 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON DECEMBER 6, 2021

TITLE DESCRIPTION

BEGINNING 6.47 CHAINS WEST AND 8.85 CHAINS SOUTH OF THE CENTER OF SECTION 23, IN TOWNSHIP 5 SOUTH, RANGE 1 EAST OF THE SALT LAKE BASE AND MERIDIAN, THENCE EAST 80 FEET; THENCE NORTH 148.50 FEET; THENCE WEST 80 FEET; THENCE SOUTH 148.50 FEET TO THE PLACE OF BEGINNING.

ALSO:
COMMENCING AT A POINT ON THE NORTH FENCE LINE OF 400 SOUTH STREET WHICH IS 397 FEET WEST AND 591 FEET SOUTH OF THE CENTER OF SECTION 23, TOWNSHIP 5 SOUTH, RANGE 1 EAST SALT LAKE BASE AND MERIDIAN, THENCE NORTH 148.5 FEET. THENCE WEST 80 FEET. THENCE NORTH 291.34 FEET ALONG THE FENCE TO A POINT ON THE NORTH FENCE LINE, THENCE EAST 330.67 FEET ALONG THE FENCE TO A POINT ON THE EAST FENCE LINE, THENCE SOUTH 0°44 WEST ALONG THE FENCE TO A POINT ON THE NORTH FENCE LINE OF 400 SOUTH STREET. THENCE WEST 173 FEET ALONG THE NORTH FENCE LINE OF 400 SOUTH STREET TO THE POINT OF BEGINNING.

LESS AND EXCEPTING THAT PORTION CONVEYED IN BOUNDARY LINE AGREEMENT RECORDED MAY 29, 2015 AS ENTRY NO. 45732:2015.

BOUNDARY DESCRIPTION

A TRACT OF LAND BEING SITUATE IN THE SOUTHWEST QUARTER OF SECTION 23, TOWNSHIP 5 SOUTH, RANGE 1 EAST, SALT LAKE BASE AND MERIDIAN, HAVING A BASIS OF BEARINGS OF NORTH 03°29'19" EAST BETWEEN THE REFERENCE TO THE WEST QUARTER AND THE NORTHWEST CORNER OF SECTION 23, TOWNSHIP 5 SOUTH, RANGE 1 EAST, SALT LAKE BASE AND MERIDIAN. SAID TRACT OF LAND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT WHICH IS SOUTH 578.83 FEET AND SOUTH 89°13'09" EAST 2383.76 FEET FROM THE REFERENCE TO THE WEST QUARTER OF SAID SECTION 23, SAID POINT ALSO BEING THE SOUTHEAST CORNER OF LOEFLER PARK TWIN HOMES SUBDIVISION, PLAT "A", ON FILE WITH THE OFFICE OF THE UTAH COUNTY RECORDER AS MAP NO. 15224, AND RUNNING THENCE ALONG SAID SUBDIVISION THE FOLLOWING THREE (3) COURSES, 1) NORTH 00°44'00" EAST 433.40 FEET, 2) WEST 15.84 FEET 3) NORTH 11.71 FEET TO THE PROLONGATION OF A FENCE LINE; THENCE SOUTH 89°01'03" EAST ALONG SAID FENCE LINE AND PROLONGATION THEREOF A DISTANCE OF 249.84 FEET TO A POINT ON A PROLONGATION OF THE WEST FACE OF A RETAINING WALL, THENCE SOUTH 00°02'58 WEST ALONG SAID WEST FACE A DISTANCE OF 88.50 FEET TO THE PROLONGATION OF A FENCE LINE; THENCE SOUTH 01°08'00" WEST ALONG SAID FENCE AND PROLONGATION THEREOF A DISTANCE OF 257.53 FEET. THENCE NORTH 89°13'09" WEST 75.00 FEET; THENCE SOUTH 01°08'00" WEST 100.00 FEET TO THE NORTH RIGHT-OF-WAY LINE OF 400 SOUTH STREET; THENCE NORTH 89°13'09" WEST ALONG SAID RIGHT-OF-WAY LINE A DISTANCE OF 157.90 FEET TO THE POINT OF BEGINNING.

CONTAINING 96,753 SQUARE FEET OR 2.221 ACRES, MORE OR LESS.

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS NORTH 03°29'19" EAST BETWEEN THE REFERENCE TO THE WEST QUARTER AND THE NORTHWEST CORNER OF SECTION 23, TOWNSHIP 5 SOUTH, RANGE 1 EAST SALT LAKE BASE AND MERIDIAN.

NARRATIVE OF BOUNDARY

THE PURPOSE OF THIS SURVEY WAS TO LOCATE AND MONUMENT ON THE GROUND THE SURVEYED PROPERTY FOR FUTURE REDEVELOPMENT OF THE LAND.

THE WEST LINE WAS ESTABLISHED BY USING THE WESTERLY ADJOINING SUBDIVISION AND FENCE LINES. THIS LINE IS ALSO COINCIDENT WITH A BOUNDARY LINE AGREEMENT ON FILE WITH THE OFFICE OF THE UTAH COUNTY RECORDER AS ENTRY NO. 45733:2015.

THE NORTH AND EAST LINES WERE REVISED FROM MY PREVIOUSLY FILED SURVEY (UTAH COUNTY SURVEYOR FILING NUMBER 21-434) TO ADJUST THE LINE TO MATCH EXISTING OCCUPATION. THIS IS BASED UPON AN AGREED UPON LINE BETWEEN PROPERTY OWNERS, AND THIS SURVEY SERVES AS AN EXHIBIT TO THAT AGREED UPON LINE.

GENERAL NOTES

(1) OTHER DOCUMENTS USED IN THE PREPARATION OF THIS SURVEY:
1. ALTA OWNER'S POLICY OF TITLE INSURANCE ISSUED BY STEWART TITLE GUARANTY COMPANY ORDER NO. 289083, DATED NOVEMBER 30, 2021
2. OTHER DOCUMENTS AS SHOWN ON THIS MAP

(2) WILDING ENGINEERING SURVEYED ABOVE GROUND VISIBLE EVIDENCE OF STRUCTURES THAT WOULD INDICATE THE POSSIBILITY OF AN EXISTING EASEMENT OR ENCUMBRANCE ON THE PROPERTY. HOWEVER WE RELIED UPON THE TITLE COMPANY TO RESEARCH THE COUNTY RECORDS FOR RECORDED EASEMENTS AND OTHER RECORDED ENCUMBRANCES THAT WOULD AFFECT THE PROPERTY AND THAT MAY OR MAY NOT BE READILY VISIBLE ON THE SITE TO BE SURVEYED AND SHOWN ON THIS MAP. WE REFERRED TO SCHEDULE B OF THE TITLE REPORT TO OBTAIN THIS INFORMATION.

(3) EXCEPTIONS AS SHOWN IN SCHEDULE B OF THE ABOVE REFERENCED ALTA OWNER'S POLICY OF TITLE INSURANCE HAVE BEEN ADDRESSED AS FOLLOWS:

1-11 NOT ADDRESSED BY THIS SURVEY

12 PUBLIC UTILITY EASEMENTS INCLUDING BUT NOT LIMITED TO UTILITY LINES, CABLE LINES, STREET LIGHTS, OVERHEAD POWER LINES AND THEIR SUPPORTING STRUCTURES LOCATED OVER AND ACROSS THE PROPERTY AS DISCLOSED BY A VISUAL INSPECTION OF THE SUBJECT PROPERTY
SURVEY NOTES: THERE IS AN IRRIGATION DITCH WHICH RUNS ALONG THE NORTH LINE OF THE SURVEYED PROPERTY. IT IS UNKNOWN IF THIS DITCH IS USED BY ADJOINING PROPERTIES AND MAY CARRY WITH IT PRESCRIPTIVE RIGHTS.

13 MOUNTAIN STATES TELEPHONE AND TELEGRAPH COMPANY RIGHT OF WAY EASEMENT
DATED: MARCH 12, 1942
RECORDED: NOVEMBER 5, 1942
ENTRY NO.: 8023
BOOK/PAGE: 370/408
GRANTOR: WM ROY STORRS
GRANTEE: MOUNTAIN STATES TELEPHONE AND TELEGRAPH COMPANY
PURPOSE: THE RIGHT TO CONSTRUCT, OPERATE, MAINTAIN AND REMOVE SUCH COMMUNICATION AND OTHER FACILITIES, FROM TIME TO TIME, UPON, OVER, UNDER AND ACROSS THE SUBJECT PROPERTY TOGETHER WITH INCIDENTAL RIGHTS THERETO.
SURVEY NOTES: THIS EASEMENT IS BLANKET IN NATURE AND APPEARS TO AFFECT THE NORTHERLY ADJOINING PROPERTY. THUS, IT HAS NOT BEEN ADDRESSED BY THIS SURVEY

LEGEND

FOUND SECTION CORNER — SECTION LINE
SET 5/8 REBAR AND CAP (WILDING ENGINEERING) — (BOUNDARY LINE)
ADJACENT PROPERTY / ROW LINE
FOUND PLUG

WILDING ENGINEERING
14721 SOUTH HERITAGE CREST WAY
BLUFFDALE, UTAH 84065
801.553.8112
WWW.WILDINGENGINEERING.COM

G:\DATA\21308 Storrs Boundary Survey\dwg\21308 ALTA.dwg
PLOT DATE: Oct 10, 2023

NO.	REVISION	DATE
1	UPDATE BOUNDARY FOR BLA	10/10/23

DRAWING TITLE: ALTA/NSPS LAND TITLE SURVEY	PROJECT NAME: KASKADE HOMES		DATE: 5/9/2022
			SCALE: 1" = 40'
LOCATION: 162 W 400 S	DRAWN: KMD	CHECKED: KMD	SHEET: 1 OF 1
AMERICAN FORK, UTAH	COUNTY: UTAH		

Exhibit B - Geotechnical Study

GEOTECHNICAL INVESTIGATION
STORRS PROPERTY RESIDENTIAL SUBDIVISION

PROPERTY LOCATION
162 WEST 400 SOUTH
AMERICAN FORK, UTAH

Project No.: 21306

Prepared For:
KASKADE HOMES
ATTN: DAN STEWART
13775 SOUTH 78 WEST STE 1
DRAPER, UT 84040

OCTOBER 21, 2021

WILDING
ENGINEERING

14721 SOUTH HERITAGE CREST WAY
BLUFFDALE, UTAH 84065
801.553.8112

APPENDICES

1 INTRODUCTION

This report presents the geotechnical investigation for the proposed residential development at 162 West 400 South, American Fork, Utah, as shown on the Site Vicinity Map in Appendix A (Figure A-1).

The field investigation consisted of three test pits. The test pits were excavated to depths of 10 to 10½ feet below the existing ground surface. Detailed test pit logs can be found in Appendix B (Figures B-2 to B-4). Recommendations in this report are based upon information gathered from the field investigation, site observation, published geologic maps, laboratory testing, and engineering analysis.

2 PURPOSE AND SCOPE

The purpose of this investigation was to assess the suitability of on-site soils for the residential development with the associated utilities, landscaping, and driveway and provide geotechnical recommendations. The scope of work completed for this study included site reconnaissance, subsurface exploration, soil sampling, laboratory testing, engineering analyses, and preparation of this report.

3 SITE AND PROJECT INFORMATION

3.1 PROJECT DESCRIPTION

Based on our understanding of the project, the proposed development will consist of a 9-lot subdivision comprised of single-family homes with associated utilities, landscaping, and roadways. No specific structural loading information is provided at the time of this report. However, we understand the proposed structures will be one- to two-story with typical wood framed walls and a basement, constructed on traditional continuous or spread footings.

3.2 EXISTING SITE CONDITIONS

At the time of our field investigation, the proposed development has an existing residential home with a detached garage and storage shed located on the southwest corner. There is an old structure on the northwest corner of the property. The remaining portion of the site is vacant land that was used for farming. The vegetation consists of native grasses and weeds. Large mature trees are located on the northwest and southwest corner of the proposed development. The site is bound by commercial property to North and northwest, residential subdivisions to the east and west, and 400 South to the South. The site can be accessed directly from 400 South.

4 GEOLOGY RESEARCH AND REVIEW

4.1 SURFICIAL GEOLOGY

Based on the available geologic map[1], the project site is mapped within the Qafp unit, which is described as: *Alluvial-fan deposits, regressive (Provo) phase of Lake Bonneville (upper Pleistocene) – Poorly to moderately sorted, pebble to cobble gravel, locally bouldery, with a matrix of sand, silt, and minor clay; clasts typically angular, but well rounded where derived from Lake Bonneville gravel; medium to very thick bedded; deposited by debris flows, debris floods, and stream flow from American Fork as the river lost confinement beyond the American Fork delta front in the adjacent Lehi quadrangle (Biek, 2005b). The B soil horizon of paleosols developed on regressive-phase alluvial-fan deposits commonly shows an intensification of brown colors due to oxidation of iron-bearing minerals or a slight accumulation of clay, and may include a pedogenic accumulation of calcium carbonate as thin, discontinuous coatings on gravel; Machette (1992), using the terminology of Birkeland (1984), designated the soil profile of this unit and others of similar age as A/Bw/Bk(or Cox) to A/Bt(weak)/Bk(or Cox). Exposed thickness less than 30 feet (10 m).*

The geologic conditions presented in this section were obtained by locating the subject site on available large-scale geologic maps. Due to the scales involved, precise location of the site can be difficult to determine. The large-scale geologic maps describe only general trends. Local variations are possible and site-specific geology may differ from those described herein. A site-specific detailed geologic description is beyond our scope of work.

4.2 LIQUEFACTION

Certain areas within the intermountain region possess a potential for liquefaction during seismic events. Liquefaction is a phenomenon whereby loose, saturated, non-cohesive soil deposits lose a significant portion of their shear strength due to excess pore water pressure buildup resulting from dynamic loading, such as that caused by an earthquake. Liquefaction can result in densification of such deposits, resulting in settlement of overlying layers. Three conditions must be present for liquefaction to occur in soils:

- The soil must be susceptible to liquefaction, i.e., granular layers with less than fifteen percent fines, existing below the groundwater table.
- The soil must be in a loose state.
- Ground shaking must be strong enough to cause liquefaction.

Based on the liquefaction hazard map, [redacted]. A "high" liquefaction potential indicates that there is a >50% probability of

1 Solomon B.J., Biek, R.F., Ritter, S.M., 2009, Utah Geologic Map of the Pelican Point Quadrangle Utah County, Utah, Utah Geologic Survey Map M244, Scale 1:24,000

2 Christenson, G.E., Shaw, L.M., 2008, Liquefaction special study areas, Wasatch Front and nearby areas, Utah: Utah Geological Survey, Supplement map to Circular 106, scale 1:250,000

having a seismic event exceeding critical acceleration in 100 years[1]. A site-specific liquefaction study has not been performed and is beyond our proposed scope of work.

5 FIELD EXPLORATIONS

5.1 SUBSURFACE INVESTIGATION

Subsurface soil conditions at the project site were explored at the site by excavating six test pits at representative locations within the subject property. The test pits were excavated using a rubber-track mini-excavator to depths of 10 to 10½ feet below the existing site grade. Stratigraphy and classification of the soils were logged under the direction of our Geotechnical Engineer.

Disturbed and relatively undisturbed samples were obtained at various depths. The samples were transported to our laboratory for testing. The test pits were backfilled to the ground surface with on-site soils. Sample types with depths are shown in detail in the Test Pit Logs found in Appendix B (Figure B-2 to B-4). A Key to Soil Symbols is presented on Figure B-1.

5.2 SUBSURFACE CONDITIONS

5.2.1 Soils

The soils encountered in the test pits consisted of 1 foot of topsoil at the ground surface. Below the topsoil is native fine-grained soils (clay and silt) with pinholes and a low to moderate collapse potential. A 2- to 3-feet thick layer of granular soil (sand and gravel) is encountered approximately 4½ below exist site grades in Test Pit 1 (TP-1) and TP-2. Granular soils are observed again at approximately 10 feet in TP-2. More detailed description is presented in Test Pit Logs (Appendix B Figure B-2 to B-4). The stratification lines shown on the enclosed Test Pit Logs represent the approximate boundary between soil types. The actual in-situ transition may be gradual. Due to the nature and depositional characteristics of native soils, care should be taken in interpolating subsurface conditions between and beyond the exploration location.

5.2.2 Groundwater

[redacted] It should be noted that it is possible for the groundwater levels to fluctuate during the year depending on the season and climate. Additionally, discontinuous zones of perched water may exist at various locations and depths beneath the ground surface. Therefore, groundwater conditions encountered during and/or after construction may differ from those encountered during our field investigation.

1 Anderson, L R., Keaton, J.R., Bischoff, J.E., 1994, Liquefaction potential map for Utah County, Utah complete technical report: Utah Geological Survey, Contract Report 94-8, p. 22.

5.2.3 Soil Collapse Potential

Collapsible soil can be broadly classified as soil that is susceptible to a large and sudden reduction in volume upon wetting. These soils exhibit a physical characteristic that gives them the potential for collapsing upon the introduction of water. Collapsible soil usually has a low dry density, low moisture content and a pinhole structure. Such soils can often withstand a large applied vertical stress with a small compression, but then experience much larger settlements after wetting, with no increase in vertical pressure. Three collapse tests were performed on samples obtained at 8 feet, 7 feet, and 3½ feet below the existing site grade. The collapse potential was evaluated when water was introduced to the samples at 2,000, 1,500, and 1,000 psf vertical stress. The test results indicate the native fine-grained soils have a low to moderate collapse potential. Test results are summarized below:

Table 5.1 Summary of Collapse Testing

Test Pit	Depth (ft)	Vertical Stress (psf)	Collapse Potential (%)
TP-1	8	2,000	0.68
TP-2	3.5	1,000	1.08
TP-3	7	1,500	3.57

We recommend that our geotechnical engineer observes the presence of potentially collapsible soils within the foundation excavation at the time of construction. Care should be taken to limit the introduction of water into these soils during and after the construction of the proposed residences. See more details in *Section 7.2.6 Moisture Protection and Surface Drainage*.

5.2.4 Infiltration Test

An infiltration test was performed at I-1 as shown on Figure A-2 in Appendix A. The test was performed at 18 inches below the existing ground surface. The soil found at the infiltration test depth consisted of Lean CLAY with Sand (CL) that was dry with a pinhole structure. A test pit was excavated about 18 inches below existing site grades. Then a hole was hand shoveled about 12 inches in depth and 8 inches in diameter. A perforated plastic cylinder was placed into the hand shoveled hole and backfilled with gravel around cylinder. Water was introduced to the cylinder. The water was then allowed to infiltrate into the bottom and sides of the boring prior to taking readings. Following initial saturation of 1 hour, water was introduced again into the cylinder and then readings were taken until the infiltration rate stabilized. The soil infiltration rate was estimated as shown in Table 5.2.

Table 5.2. Summary of Infiltration Testing

Boring ID	Material Encountered	Estimated Infiltration Rate
I-1	Lean Clay with Sand (CL)	11.6 inches/hour

6 LABORATORY TESTING

Geotechnical laboratory tests were conducted on selected soil samples obtained during our field investigation. The laboratory testing program was designed to evaluate the engineering characteristics of onsite earth materials. Laboratory tests for this investigation include: Atterberg Limits Test, Moisture Content of Soil by Mass, One-Dimensional Consolidation of Soils, One-Dimensional Swell or Collapse of Soils.

The results of laboratory tests are presented on the test pit log in Appendix B (Figure B-2 through B-4), the Summary of Laboratory Test Results table (Figure C-1), and on the test result figures presented in Appendix C (Figures C-2 through C-6).

7 RECOMMENDATIONS AND CONCLUSIONS

7.1 GENERAL CONCLUSIONS

Supporting data upon which the following recommendations are based have been presented in the previous sections of this report. The recommendations presented herein are governed by the engineering properties of the earth materials encountered and tested as part of our subsurface exploration and the anticipated design data discussed in *Section 3.1, Project Description*. If subsurface conditions other than those described herein are encountered during construction, and/or if design changes are initiated, Wilding Engineering must be informed in writing so that our recommendations can be reviewed and revised as changes or conditions may require.

7.2 EARTHWORK

7.2.1 Site Preparation and Grading

It is the contractor's responsibility to locate and protect all existing utility lines, whether shown on the drawings or not.

In general, 1 foot of topsoil was encountered during our investigation at the ground surface. All topsoil, undocumented fill, or any soil containing organic or deleterious materials shall be removed where structures, pavements, or concrete flatwork are to be placed. Topsoil may be stockpiled on site for subsequent use in landscape areas.

Upon completion of site grubbing and prior to placement of any fill, the exposed subgrade should be evaluated by Wilding Engineering. Proof rolling with loaded construction equipment may be a part of this evaluation. Soils that are observed to rut or deflect excessively (typically greater than 1-inch) under the moving load of a loaded rubber-tired truck or other suitable construction vehicle should be over-excavated down to firm undisturbed native soils and backfilled with properly placed and compacted structural fill *Sections 7.2.3 and 7.2.4*.

Excavations should be made using an excavator equipped with a smooth edge. If the subgrade is disturbed during construction, disturbed soils should be over-excavated to firm, undisturbed soil and backfilled with compacted structural fill.

For ease of construction and to increase the likelihood of favorable soil conditions, we recommend that site preparation, earthwork, and pavement subgrade preparation be accomplished during warmer, drier months.

7.2.2 Excavation Stability

All utility excavations shall be carefully supported, maintained, and protected during construction in accordance with OSHA Regulations. It is the responsibility of the contractor to maintain safe working conditions. Temporary construction excavations shall be properly sloped or shored, in compliance with current federal, state, and local requirements. Excavations are to be made to minimize subsequent filling. A trench box or shoring may be used. Coarse-grained material, soil with low fines content (material passing the No. 200 sieve) and wet soils can easily become unstable and in some areas where there could be toppling, cave-ins or sliding.

Wilding Engineering does not assume responsibility for construction site safety or the contractor's or other parties' compliance with local, state, and federal safety or other regulations. As stated in the OSHA regulations, "a competent person shall evaluate the soil exposed in the excavations as part of his/her safety procedures". In no case should slope height, slope inclination, or excavation depth, including utility trench excavations depth, exceed those specified in local, state, and federal safety regulations.

7.2.3 Structural Fill Material

All fill placed for support of structures, concrete flatwork, or pavements shall consist of structural fill or properly prepared native subgrade soils. The contractor should have confidence that the anticipated method of compaction will be suitable for the type of structural fill used. All structural fill should be free of vegetation, debris or frozen material, and should contain no materials larger than 4 inches nominal size.

Structural fill shall consist of well-graded granular material, with a maximum aggregate size of 4 inches, and a maximum of 30% passing the #200 sieve. The fill material finer than the #40 sieve shall have a liquid limit (LL) less than 25 and a Plastic Index (PI) less than 10. Specifications for gradation of structural fill are provided in Table 7.1. This material shall be free from organics, garbage, frost, and other loose, compressible, or deleterious materials.

Table 7.1 Material Specification for Structural Fill

Grain Size	Percent Passing
4-inch	100
¾-inch	70 to 100
No. 4	50 to 80
No. 200	15 to 30
Plastic Index (PI)	< 10
Liquid Limit (LL)	< 25

Variations to the structural fill gradation described above must be approved by our Geotechnical Engineer. Fine-grained materials (clays) are not generally suitable for use as fill due to their inherent resistance to uniform moisture conditioning and workability to achieve desired compaction, as well as their proclivity to change volume when the soil becomes either drier or wetter. Imported structural fill is preferred and it is usually easier for compaction. Onsite soils mainly consisted of fine-grained soils that do not meet the above specifications and may not be re-used as structural fill. If onsite granular soils are to be used as structural fill, index testing should be performed on such soils to evaluate compliance with above specifications.

The contractor should anticipate testing all soils used as structural fill frequently to assess the maximum dry density, fines content, and moisture content, etc. Specifications from governing authorities such as cities and special service districts having their own precedence should be followed where applicable.

7.2.4 Structural Fill Placement and Compaction

All structural fill should be placed in maximum 6-inch loose lifts if compacted by small hand-operated compaction equipment, maximum 8-inch loose lifts if compacted by light-duty rollers, and maximum 12-inch loose lifts if compacted by heavy duty compaction equipment that is capable of efficiently compacting the entire thickness of the lift. We recommend that all structural fill be compacted on a horizontal plane, unless otherwise approved by our Geotechnical Engineer.

Structural fill placed for subgrade below load bearing areas including footings, concrete slabs and pavements should be compacted to at least 95% of the maximum dry density as determined by ASTM D1557. Structural fill placed in non-load bearing areas including landscape areas should be compacted to at least 90% of the maximum dry density (ASTM D1557). The moisture content should be within 2% of the optimum moisture content at the time of placement and compaction. Wilding Engineering should be notified if structural fill thickness exceeds 5 feet so the compaction percentage requirement can be adjusted accordingly. Also, prior to placing any fill, the contractor should request Wilding Engineering to observe the excavations and evaluate if any unsuitable materials or loose soils have been removed. Proper grading should precede placement of fill, as described in *Section 7.2.1, Site Preparation and Grading*.

Specifications from governing authorities such as cities and special service districts having their own precedence should be followed where applicable.

7.2.5 Utility Trenches

Construction of the pipe bedding shall consist of preparing an acceptable pipe foundation, excavating the pipe groove in the prepared foundation, and backfilling from the foundation to 12 inches above the top of the pipe. All piping shall be protected from lateral displacement and possible damage resulting from impact or unbalanced loading during backfilling operations by being adequately bedded.

The soils in the utility pipe trenches are to meet the specified structural fill requirements in *Sections 7.2.3 and 7.2.4*.

> **Pipe foundation:** shall consist of imported granular soils. Wherever the trench subgrade material does not afford a sufficiently solid foundation to support the pipe and superimposed load, the trench shall be excavated below the bottom of the pipe to such depth as may be necessary, and this additional excavation shall be filled with compacted well-graded, granular soil per *Sections 7.2.3 and 7.2.4.*
>
> **Pipe groove:** shall be excavated in the pipe foundation to receive the bottom quadrant of the pipe so that the installed pipe will be true to line and grade. Bell holes shall be dug after the trench bottom has been graded. Bell holes shall be excavated so that only the barrel of the pipe bears on the pipe foundation.
>
> **Pipe bedding:** (from pipe foundation to 12 inches above top of pipe) shall be deposited and compacted in layers not to exceed 9 inches in uncompacted depth. Placement and compaction of bedding materials shall be performed simultaneously and uniformly on both sides of the pipe. All bedding materials shall be placed in the trench in such a manner that they will be scattered alongside the pipe and not dropped into the trench in compact masses.

Specifications from governing authorities such as cities and special service districts having their own precedence should be followed where applicable.

7.2.6 Moisture Protection and Surface Drainage

Precautions should be taken during and after construction to eliminate saturation of foundation soils. Over wetting the soils prior to or during construction may result in increased softening and pumping, causing equipment mobility problems and difficulties in achieving compaction.

Moisture should not be allowed to infiltrate the soils in the vicinity of, or upslope from, the structures. It should be noted that there will be an increased risk of settlement if foundation soils become over-wetted. After the footings were constructed, the following recommendations for foundation moisture protection and drainage should be considered:

- Backfill around foundation walls should consist of fine-grained soils with low-permeability. Free-draining sandy and gravelly soils should not be used. The backfill should be placed in

12-inch lifts and compacted to at least 90% of the maximum dry density of the modified Proctor (ASTM D1557).

- The ground surface within 10 feet of the foundation walls should be sloped to drain away from structure with a minimum slope of 5% (2% if hardscaped).
- Roof runoff devices and downspouts should be installed around the entire perimeter of the structure to collect and discharge all roof runoff a minimum of 10 feet from the foundation walls. The runoff should always be allowed to flow away as designed and not back flow against the foundation; pop-ups, direct drainage or other options may be considered. Rain gutters, downspouts, discharge pipes and pop-ups (if used) should be inspected and cleared frequently so they remain unclogged.
- Only hand watering or drip irrigation should be used within 5 feet of the foundation walls, but xeriscaping or desert landscaping is preferred. Irrigation and/or water lines near the foundation walls should be maintained in good working order.

7.2.7 Soft Soil Stabilization

If excavations or earthwork activities expose very soft, unsuitable or unstable native soils, we recommend to over-excavate soft soils until firm native material is encountered. The depth of firm native material shall be determined by our Geotechnical Engineer. If over-excavating to the firm native material is not practical, the contractor may consider using a soft soil stabilization method. Soft soil stabilization methods include but are not limited to:

- Using a clean, coarse angular material that is greater than 3 inches in nominal diameter, but less than 6 inches. The stabilization material shall be pushed into the soft subgrade soils until a firm and unyielding surface is established. Then structural fill may be used to bring the site up to grade if needed.
- Using a woven geotextile and compacted structural fill. The woven geotextile may consist of TenCate RSi series or approved equal equivalent. The geotextile should be placed to cover the entire excavation bottom where structural fill will be placed. Seams should be overlapped a minimum of 12 inches. Following placement of the geotextile, compacted structural fill may be placed.

The effectiveness of the soft soil stabilization shall be assessed by proof-rolling with construction equipment. Stabilized soils shall not rut or deflect excessively (typically greater than 1-inch) under the moving load of a loaded rubber-tired dump truck (typically, 9 ton/axle) or other suitable construction vehicle

7.3 FOUNDATION RECOMMENDATIONS

The foundations for the proposed structures may consist of conventional strip and/or spread footings. Strip and spread footing footings should be a minimum of 20 and 36 inches wide, respectively, and exterior shallow footings should be embedded at least 30 inches below final grade for frost protection and confinement. Interior shallow footings not susceptible to frost conditions should be embedded at least 12 inches for confinement.

7.3.1 Installation and Bearing Material

Footings may be placed on a minimum of 2 feet of undisturbed native granular soils. As previously mentioned in *Section 5.2.3 Soil Collapse Potential*, test results indicate native fine-grained soils have a low to moderate collapse potential. If such soils are encountered at the footing bearing elevation, they should be over-excavated a minimum of 2 feet and replaced with a minimum of 2 feet of structural fill. Wilding Engineering should be contacted at the time of basement excavation to evaluate the foundation soils on a lot-specific basis. Less over-excavation and structural fill may be possible if better soil conditions are encountered on individual lot(s).

Footings should not be placed partially on native soils and partially on structural fill unless approval from Wilding Engineering is obtained. Structural fill should meet material recommendations and be placed and compacted as recommended in *Sections 7.2.3 and 7.2.4*.

If encountered, all topsoil, undocumented fill, soft areas, frozen material or other inappropriate material shall be removed from the footing zone to a depth recommended by Wilding Engineering. Footings placed on slopes shall be benched so that all footing bases are horizontal.

If structural fill is used, it should extend from the outside edge of the footing for a distance equal to the depth of structural fill placed.

Footing excavations shall be observed by us prior to placement of structural fill, concrete, or reinforcement steel to assess their suitability for placement of footings.

7.3.2 Bearing Pressure

Conventional strip and spread footings constructed as described above may be proportioned for a maximum net allowable bearing pressure of **1,800 pounds per square foot (psf)**. The recommend net allowable bearing pressure refers to the total dead load and can be increased by 20% to include the sum of all loads including wind and seismic.

7.3.3 Static Settlement

Assuming no additional surcharge beside footing loads is applied, static settlements of properly designed and constructed conventional footings, founded as described above, are anticipated to be less than 1 inch. Differential settlements should be on the order of half the total settlement or ½ inch over 30 feet.

7.3.4 Frost Protection

All exterior footings are to be constructed at least 30 inches below the ground surface for frost protection and confinement. This includes walk-out areas and may require fill to be placed around building. Interior footings not susceptible to frost conditions should be embedded at least 12 inches for confinement. If foundations are constructed through the winter months, all soils on which footings will bear shall be protected from freezing.

7.3.5 *Construction Observation*

Wilding Engineering shall periodically monitor excavations prior to installation of footings. Observation of soil before placement of structural fill or concrete is required to evaluate any field conditions not encountered in the investigation which would alter the recommendations or this report. **All structural fill material shall be tested under the direction of our Geotechnical Engineer for material and compaction requirements.**

7.3.6 *Foundation Drainage*

Soils encountered in the subsurface explorations at elevations of proposed foundations consisted of both Group I soils (silty sand or silty gravel) and Group II soils (lean clay or silty clay) according to 2018 International Residential Code (IRC) Section R405. A drainage system is not required where the foundation is installed on Group I soils per IRC 2018. However, a drainage system is required where the foundation is installed on Group II soils per IRC 2018 if the foundations retain earth and enclose habitable or usable spaces located below grade. Due to the soil type variation at the subject site, the Geotechnical Engineer should be on site for the foundation excavation for each individual lot to evaluate if a drainage system is required. If required, the drainage system should be designed according to IRC 2018 Section R405, which can be accessed at https://codes.iccsafe.org/public/document/IRC2018/chapter-4-foundations.

7.4 LATERAL FORCES

7.4.1 *Resistance for Footings*

Lateral forces imposed upon conventional foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and frictional resistance between the base of the footing and the supporting subgrade. In evaluating the frictional resistance, a coefficient of friction of 0.45 may be used for native granular soils or imported structural fill soils against concrete. A coefficient of friction of 0.34 may be used for native fine-grained soils against concrete.

7.4.2 *Lateral Earth Pressures on Foundation Walls*

Ultimate lateral earth pressures from native granular soils, imported structural fill soils or native fine-grained soils acting against buried walls and structures may be computed from the lateral pressure coefficients or equivalent fluid densities presented in the following tables:

Table 7.2 Lateral Earth Pressures – Native Granular Soils or Structural Fill Soils

Condition	Lateral Pressure Coefficient	Equivalent Fluid Density (pounds per cubic foot)
Active	0.26	32
At-rest	0.41	52
Passive	3.85	481

Table 7.3 Lateral Earth Pressures – Fine-Grained Soils

Condition	Lateral Pressure Coefficient	Equivalent Fluid Density (pounds per cubic foot)
Active	0.36	40
At-rest	0.53	58
Passive	2.77	305

For seismic analyses, recent research presented by Lew, Sitar, Al Atik and others in their publication dated 2010[1] provided provisional recommendations for the design of building basement walls are. Based on this publication, if the retained earth materials are cohesive soils (including cemented soils and clayey soils), the horizontal ground acceleration, k_h, may be taken as one-half of the PGA (g). If the retained earth materials are cohesionless (including sandy silt, sand, and gravel), the horizontal ground acceleration, k_h, may be estimated from Table 7.4 below.

Table 7.4 Horizontal Ground Acceleration* for Cohesionless Retained Earth Material

Peak Ground Acceleration (g)	Recommended k_h
Less than 0.4	0
0.4	0.25 PGA
0.6	0.5 PGA
1.0	0.67 PGA

* : For other levels of peak ground acceleration, linear interpolation of the tabulated values may be used.

Lew, Sitar, Al Atik and others cited recent research suggesting that the earth pressure distribution under seismic loading is very similar to a fluid distribution (i.e., triangular distribution), like static earth pressure. This is consistent with the dynamic earth pressure distributions directly measured and interpreted from the pressure sensors, strain gage and load cell data measured on walls during shake table modeling[2].

It should be noted that the above static and seismic coefficients and densities assume horizontal backfill and vertical wall face with no buildup of hydrostatic pressures. Hydrostatic and surcharge loadings, if any, should be added to the presented values. Over-compaction behind walls should be avoided. If sloping backfill is present, we should be consulted to provide more accurate lateral pressure parameters once the design geometry is established.

Walls and structures allowed to rotate slightly should use the active condition. If the element is constrained against rotation, the at-rest condition should be used. These values should be used with an appropriate factor of safety against overturning and sliding. Additionally, if passive resistance is calculated in conjunction with frictional resistance, the passive resistance should be

1 Lew, M., Sitar, N., Al Atik, L., Pourzanjani, M., and Hudson, M. B., 2010, "Seismic Earth Pressures on Deep Building Basements", SEAOC 2010 Convention Proceedings, Structural Engineers Association of California
2 Mikola, R.G., Candia, G. and Sitar, N., 2014, "Seismic Earth Pressures on Retaining Structures and Basement Walls", Tenth U.S. National Conference on Earthquake Engineering, Frontiers of Earthquake Engineering, July 21-25, 2014, Anchorage, Alaska.

reduced by ½. Resisting passive earth pressure from soils subject to frost or heave, or otherwise above prescribed minimum depths of embedment, should be neglected in design.

7.5 CONCRETE SLABS-ON-GRADE & MODULUS OF SUBGRADE REACTION

Concrete slabs-on-grade for interior floor slabs should be constructed on 4" of free draining gravel, overlying properly prepared native granular soils or a zone of structural fill that is at least 12 inches thick if native fine-grained soils are encountered. The 4 inches of free draining gravel is recommended to provide a capillary break below the finish floor slab and underlying soils. The gravel should consist of a ¾ inch minus clean drain rock. The gravel should be compacted until tight and relatively unyielding.

Concrete slabs–on-grade for exterior flatwork should be constructed on properly prepared native granular soils or zone of structural fill that is at least 12 inches thick if native fine-grained soils are encountered.

For all slab-on-grade construction the structural fill shall be consistent with *Sections 7.2.3 and 7.2.4*. The concrete slabs constructed on subgrade prepared in accordance with the preceding recommendations may be designed using a **modulus of subgrade reaction (k) of 80 psi/in** and should be designed with appropriately spaced, deep control joints to control the location of cracking as a result of shrinkage. Consideration should be given to reinforcing the slabs with welded wire, rebar, or fiber mesh.

7.6 SEISMIC INFORMATION

Based on the USGS Quaternary Fault and Fold Database of the United States, the project site is located approximately 4 miles southwest the Provo Section of the Wasatch fault zone and 2 miles north of the Utah Lake Faults.

Seismic values were obtained for the subject property utilizing the SEAOC & OSHPD Seismic Design Maps[1] as recommended on USGS website per the 2018 International Building Code (IBC) and ASCE 7-16 code. The ground motions values produced by the web tools are presented in Table 7.5 below based on the site coordinates and Site Class D - Default[2]. More detailed seismic parameters are presented in Appendix D.

Table 7.5 Seismic Ground Motion Parameters

Parameters	S_S	S_1	S_{MS}	S_{DS}	PGA_M
Acceleration (g)	1.278	0.464	1.534	1.023	0.691

1 SEAOC & OSHPD Seismic Design Maps, https://seismicmaps.org/, accessed August 19, 2021.
2 It should be noted that our field explorations only extended to 10.5 feet below existing ground surface. According to ASCE 7-16 Section 20.1, the site class shall be based on site-specific data (average soil parameters) to a depth of 100 feet. The soils at deeper depths may have properties that meet criteria of other site classification which, on average, may change the site classification in the upper 100 feet. A geotechnical investigation to 100 feet is beyond our scope of work.

7.7 PAVEMENT DESIGN

Based on our field observation, we assumed a California Bearing Ratio (CBR) of 4 for design of pavements for the project. We have prepared various pavement section options be used to support anticipated traffic loads with equivalent single axle loads (ESALs) not exceeding 50,000 per year[1] and a twenty (20) year design life. The table below presents recommended pavement section thickness based on the above assumptions and the material descriptions provided in the following sections. These pavement section options are equivalent to each other and may be selected based on economic considerations.

Specifications from governing authorities such as cities and special service districts having their own precedence and/or more strict requirements should be followed where applicable.

Table 7.6 Pavement Design Recommended Thickness

Pavement Section Options	Asphalt Concrete (in.)	Untreated Base Course (in.)	Granular Borrow (in.)
Option 1	**3**	**8**	**6**
Option 2	**3.5**	**11**	**-**
Option 3	**4**	**9**	**-**

It is our experience that pavement in areas where vehicles frequently turn around, backup, or load and unload, including exit and entrance areas and round-a-bouts, often experience more distress. If the owner wishes to prolong the life of the pavement in these areas, consideration should be given to using a Portland cement concrete (rigid) pavement in these areas. For these conditions, the following rigid pavement section is recommended:

Table 7.7 Rigid Pavement Section

Concrete (in.)	Untreated Base Course
5	**8**

Concrete should consist of a low slump, low water cement ratio mix with a minimum 28-day compressive strength of 4,000 psi.

7.7.1 Sub-grade Preparation

All topsoil, undocumented fill, construction debris or other unsuitable materials must be removed below pavements. The prepared sub-grade can them be proof rolled with a loaded dump truck

1 If traffic conditions vary significantly from our stated assumptions, we should be contacted so we can modify our pavement design parameters accordingly. Specifically, if the traffic counts are significantly higher or lower, we should be contacted to revise the pavement section design if necessary. The pavement sections presented assume that the majority of construction traffic including cement trucks, cranes, loaded haulers, etc. has ceased. If a significant volume of construction traffic occurs after the pavement section has been constructed, a reduced life and increased maintenance in some areas should be anticipated.

or other compaction equipment. Any unsuitable soils shall be removed and replaced with structural fill according to *Sections 7.2.3 and 7.2.4*. The pavement sections presented in Table 7.6 & Table 7.7 should be constructed on properly prepared native granular soils or zone of structural fill that is at least 12 inches thick if native fine-grained soils are encountered. The untreated base course or granular borrow does not count as structural fill.

7.7.2 *Material Recommendations*

All subgrade preparation and pavement section materials (asphalt concrete, untreated base course and granular borrow) should conform to the recommendations presented in this document and all applicable specifications from governing authorities such as cities and counties. Additionally, untreated base course should possess a minimum CBR value of 70, and the granular borrow should have a minimum CBR value of 30. The untreated base course and granular borrow under roads, trails, sidewalks, curb, and gutter should be placed in accordance with *Sections 7.2.3 and 7.2.4* of this report. The asphalt (bituminous concrete) properties should be compliant with APWA 32 12 05 and installed per APWA 32 12 16. The asphalt should be compacted to a minimum of 96% of the Marshall (50 blow) maximum density.

7.7.3 *Drainage and Maintenance*

Grading shall be designed to direct surface water away from proposed buildings and into proper discharge locations. Water shall not be allowed to puddle in low areas of the pavement. Pooling areas could decrease the design life of the asphalt and cause cracking or uplift. Concrete swales are recommended where storm water flows are concentrated. Periodic seasonal maintenance should be anticipated by sealing cracks and joints. IBC 2018 recommends that a minimum of five percent gradient for a ten feet distance away from any structures.

7.8 SOIL CORROSIVITY

Based on our field observation and experience in similar soils, the near-surface site soils are expected to exhibit a low potential for sulfate attack when in contact with concrete elements. We therefore recommend that conventional Type I/II cement be used for construction.

Based on our field observation and experience in similar soils, the onsite soils are considered to be "corrosive"[1] to ferrous materials. A qualified corrosion engineer should be consulted to provide an assessment of any metal that may be associated with construction of ancillary water lines and reinforcing steel, valves and similar improvements. If more accurate results are desired, a comprehensive soil corrosion test should be performed.

8 LIMITATIONS

The recommendations contained in this report are based on our limited field exploration, laboratory testing, and understanding of the proposed construction. The subsurface data used in

1 Roberge, P.R., 2000, Handbook of corrosion engineering: McGraw-Hill, p. 150.

the preparation of this report were obtained from the explorations made for this investigation. It is possible that variations in the soil and groundwater conditions could exist between and beyond the points explored or below the maximum depths of exploration. The nature and extent of variations may not be evident until construction occurs or after. If any conditions are encountered at this site that are different from those described in this report, we should be immediately notified so that we may make any necessary revisions to recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this report, Wilding Engineering should be notified.

This report was prepared in accordance with the generally accepted standard of practice in the project area at the time the report was written. No other warranty, expressed or implied, is made. The concept of risk is a significant consideration of geotechnical analyses. The analytical means and methods used in performing geotechnical analyses and development of resulting recommendations do not constitute an exact science. Analytical tools used by geotechnical engineers are based on limited data, empirical correlations, engineering judgment and experience. As such the solutions and resulting recommendations presented in this report cannot be considered risk-free and constitute our best professional opinions and recommendations based on the available data and other design information available at the time they were developed. Geologic hazards study is beyond our scope of work and may be conducted at additional costs.

This report was prepared for our client's exclusive use on the project. It is the Client's responsibility to see that all parties to the project including the Designer, Contractor, Subcontractors, etc. are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

We appreciate the opportunity of providing this service for you. If you have any questions concerning this report or require additional information or services, please contact us at 801-553-8112.

Report prepared by:

Jeremy G. Wright, E.I.T.
Staff Engineer

Reviewed by:

PROFESSIONAL ENGINEER
10394605-2202
SHUN LI
ELECTRONIC SEAL
STATE OF UTAH

10-21-21

Shun Li, P.E.
Geotechnical Department Manager

WILDING ENGINEERING, INC.

APPENDIX A

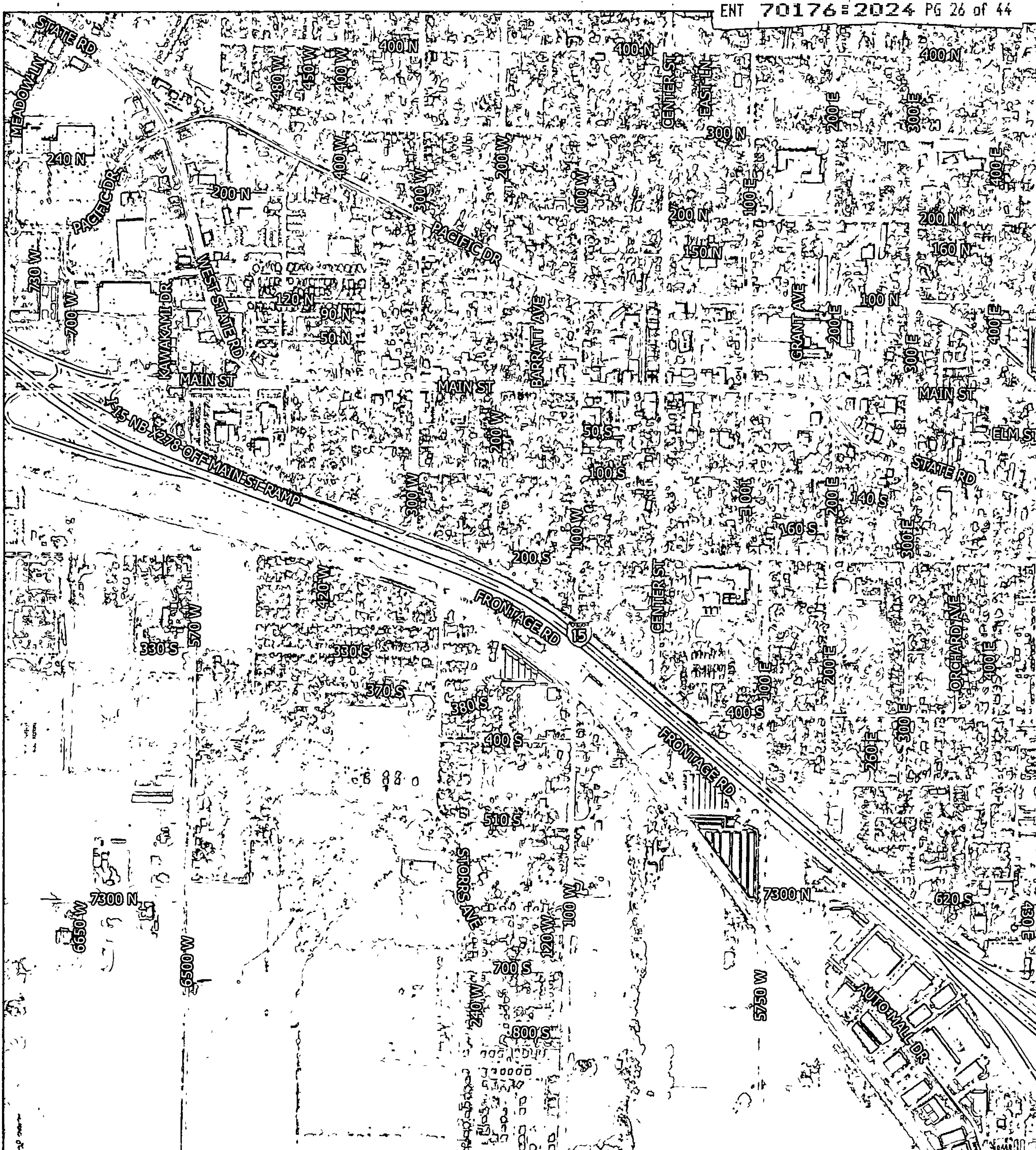


Image Reference: Google Earth October 2019
Wilding Engineering, Storrs Property - Concept, Concept Plan, American Fork, Utah, Scale 1"=50'-0", Date. 10/18/21

800 0 800 1600 2400 3200 ft

1:13675

WILDING ENGINEERING

Legend

Approximate Site Boundary

Kaskade Homes
Storrs Property
162 West 400 South
American Fork, Utah
Project Number: 21306

Site Vicinity Map

Figure A-1

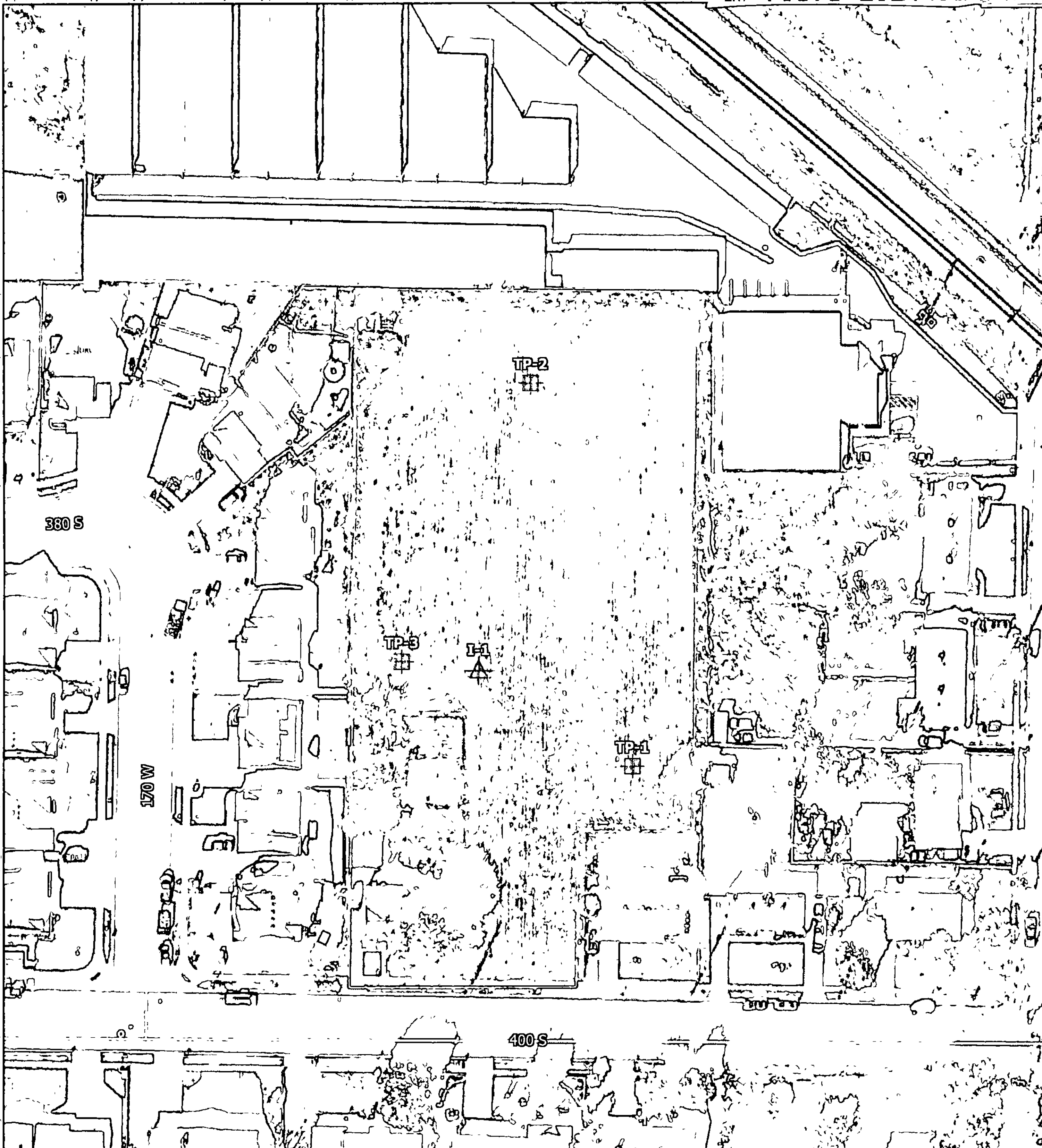


Image Reference: Google Earth October 2019
Wilding Engineering, Storrs Property - Concept, Concept Plan, American Fork, Utah, Scale 1"=50'-0", Date 10/18/21

60 0 60 120 180 240 ft

1:1000

WILDING ENGINEERING

Legend

Approximate Site Boundary

Approximate Test Pit Location

Approximate Infiltration Test Location

Kaskade Homes
Storrs Property
162 West 400 South
American Fork, Utah
Project Number: 21306

Exploration Location Map

Figure A-2

APPENDIX B

KEY TO SYMBOLS

Wilding Engineering Inc

WILDING ENGINEERING

CLIENT Kaskade Homes

PROJECT NUMBER 21306

PROJECT NAME Storrs Property

PROJECT LOCATION American Fork, Utah.

LITHOLOGIC SYMBOLS (Unified Soil Classification System)

CL: USCS Low Plasticity Clay

CL-ML: USCS Low Plasticity Silty Clay

GM: USCS Silty Gravel

SM: USCS Silty Sand

TOPSOIL: Topsoil

SAMPLER SYMBOLS

Hand Sample

3" O.D. Thin Walled Shelby Tube

Undisturbed Sample

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION

Water Level at Time Drilling, or as Shown

Water Level at End of Drilling, or as Shown

Water Level After 24 Hours, or as Shown

KEY TO SYMBOLS - GINT STD US LAB GDT - 10/20/21 15:12 - G:\DATA\21306 STORRS PROPERTY GEOTECH\GINT\BORING LOGS.GPJ

WILDING ENGINEERING
Wilding Engineering
14721 South Heritage Crest Way
Bluffdale, UT 84065
Telephone: 801-553-8112
Fax: 801-553-3317

TEST PIT NUMBER TP-1

PAGE 1 OF 1

CLIENT Kaskade Homes
PROJECT NAME Storrs Property
PROJECT NUMBER 21306
PROJECT LOCATION American Fork, Utah
DATE STARTED 9/9/21 **COMPLETED** 9/9/21
GROUND ELEVATION 4565 ft **TEST PIT SIZE** NA inches
EXCAVATION CONTRACTOR Kaskade Homes
GROUND WATER LEVELS:
EXCAVATION METHOD Test Pit
AT TIME OF EXCAVATION ---
LOGGED BY JGW **CHECKED BY** SL
AT END OF EXCAVATION ---
NOTES
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0			CL		**TOPSOIL - Lean CLAY with Sand:** medium stiff, dry, brown, 1/4" roots to 4 feet, frequent pinholes	
1.0			CL		**Lean CLAY with Sand:** medium stiff, dry, light brown, frequent pinholes	4564.0
2.5						
	H 1					
4.5			SM		**Silty SAND with Gravel:** medium dense, dry, light brown, rounded Gravel	4560.5
5.0						
	H 2	MC = 4%				
7.5			CL		**Lean CLAY with Sand:** medium stiff, dry to moist, light brown, frequent pinholes	4557.5
	S 3	MC = 8% DD = 90 pcf LL = 29 PL = 21 Fines = 84%				
10.0	UD 4	MC = 10%			Bottom of test pit at 10.0 feet.	4555.0

Figure No.: B-2

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Wilding Engineering
14721 South Heritage Crest Way
Bluffdale, UT 84065
Telephone: 801-553-8112
Fax: 801-553-3317

TEST PIT NUMBER TP-2

PAGE 1 OF 1

CLIENT Kaskade Homes
PROJECT NAME Storrs Property
PROJECT NUMBER 21306
PROJECT LOCATION American Fork, Utah
DATE STARTED 9/9/21 **COMPLETED** 9/9/21
GROUND ELEVATION 4565 ft **TEST PIT SIZE** NA inches
EXCAVATION CONTRACTOR Kaskade Homes
GROUND WATER LEVELS:
EXCAVATION METHOD Test Pit
AT TIME OF EXCAVATION ---
LOGGED BY JGW **CHECKED BY** SL
AT END OF EXCAVATION ---
NOTES
AFTER EXCAVATION ---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0			CL		**TOPSOIL - Lean CLAY with Sand:** medium stiff, dry, brown, frequent pinholes	
				1.0		4564.0
2.5			CL		**Lean CLAY with Sand:** medium stiff, dry to moist, light brown, frequent pinholes	
	S 1	MC = 6% DD = 90 pcf LL = 28 PL = 19 Fines = 77%		4.5		4560.5
5.0			GM		**Silty GRAVEL with Sand:** medium dense, dry, light brown, rounded Gravel, max Gravel size 3", gravel layer tapers off on the east side of test pit.	
	H 2	MC = 3%		6.5		4558.5
7.5	S 3		CL		**Lean CLAY with Sand:** medium stiff, dry, light brown, frequent pinholes	
	UD 4					
				9.8		4555.3
10.0	H	MC = 2%	SM		**Silty SAND:** medium dense, dry to moist, brown, no pinholes	
				10.5		4554.5

Bottom of test pit at 10.5 feet.

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Wilding Engineering
14721 South Heritage Crest Way
Bluffdale, UT 84065
Telephone: 801-553-8112
Fax: 801-553-3317

TEST PIT NUMBER TP-3

PAGE 1 OF 1

CLIENT	Kaskade Homes	PROJECT NAME	Storrs Property
PROJECT NUMBER	21306	PROJECT LOCATION	American Fork, Utah
DATE STARTED	9/9/21 COMPLETED 9/9/21	GROUND ELEVATION	4564 ft TEST PIT SIZE NA inches
EXCAVATION CONTRACTOR	Kaskade Homes	GROUND WATER LEVELS:	
EXCAVATION METHOD	Test Pit	AT TIME OF EXCAVATION	---
LOGGED BY	JGW CHECKED BY SL	AT END OF EXCAVATION	---
NOTES		AFTER EXCAVATION	---

DEPTH (ft)	SAMPLE TYPE NUMBER	TESTS	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0.0			CL		**TOPSOIL - Lean CLAY with Sand:** medium stiff, dry, brown, frequent pinholes	
1.0			CL		**Lean CLAY with Sand:** medium stiff, dry, light brown, frequent pinholes	4563.0
2.5						
5.0	S 1	MC = 6%	CL-ML		**Silty CLAY with Sand:** medium stiff, dry to moist, light brown and brown, frequent pinholes	4559.0
7.5	UD 2	MC = 7% DD = 82 pcf LL = 26 PL = 19 Fines = 78%				
10.0	H 3				Bottom of test pit at 10.0 feet.	4554.0

APPENDIX C

SUMMARY OF LABORATORY TEST RESULTS

PAGE 1 OF 1

Wilding Engineering Inc

WILDING ENGINEERING

CLIENT Kaskade Homes

PROJECT NAME Storrs Property

PROJECT NUMBER 21306

PROJECT LOCATION American Fork, Utah

Test Pit	Depth (ft)	Moisture (%)	Dry Density (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Gravel (%)	Sand (%)	Fines (%<#200 Sieve)	Classification
TP-1	6.0	3.9								
TP-1	8.0	8.2	89.8	29	21	8			84	CL
TP-1	9.5	10.2								
TP-2	3.5	6.0	90.1	28	19	9			77	CL
TP-2	6.0	2.8								
TP-2	9.8	2.3								
TP-3	5.0	5.5								
TP-3	7.0	6.6	81.8	26	19	7			78	CL-ML

LAB SUMMARY WILDING - GINT STD US LAB GDT - 10/20/21 14:25 - G:\DATA\21306 STORRS PROPERTY GEOTECH\GINT\BORING LOGS.GPJ

ATTERBERG LIMITS' RESULTS

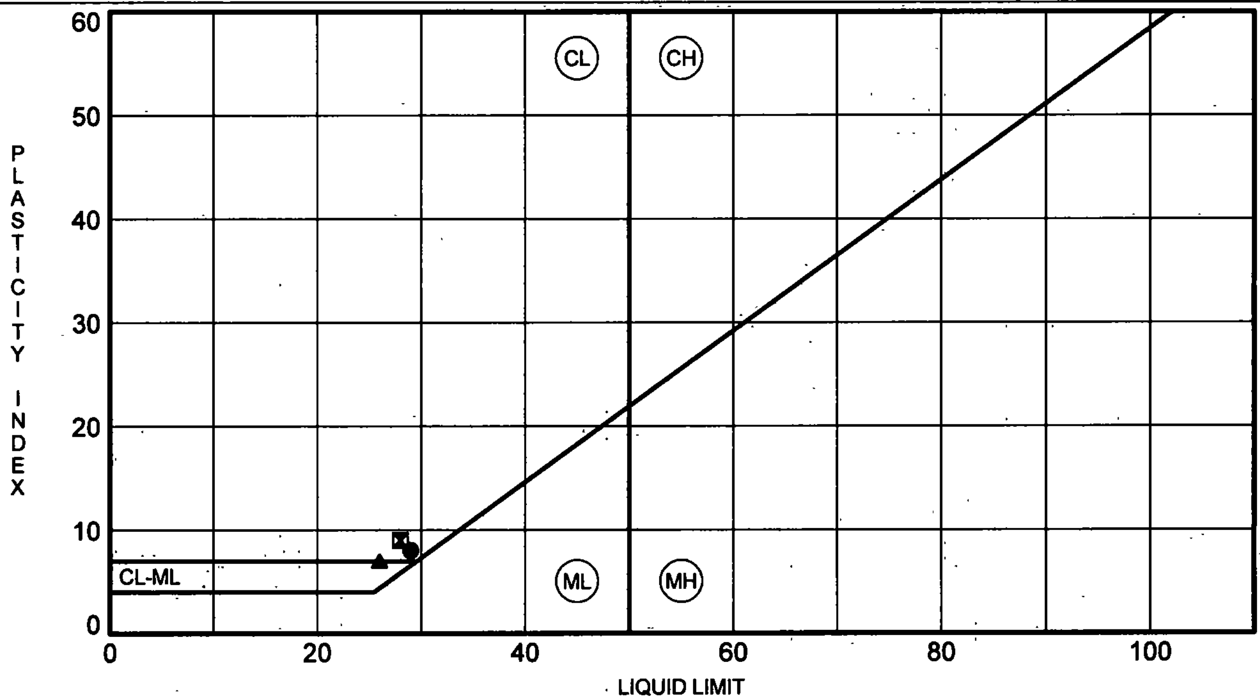
Wilding Engineering Inc

CLIENT Kaskade Homes

PROJECT NAME Storrs Property

PROJECT NUMBER 21306

PROJECT LOCATION American Fork, Utah



	TEST PIT	DEPTH	LL	PL	PI	Fines	Classification
●	TP-1	8.0	29	21	8	84	LEAN CLAY with SAND(CL)
⊠	TP-2	3.5	28	19	9	77	LEAN CLAY with SAND(CL)
▲	TP-3	7.0	26	19	7	78	SILTY CLAY with SAND(CL-ML)

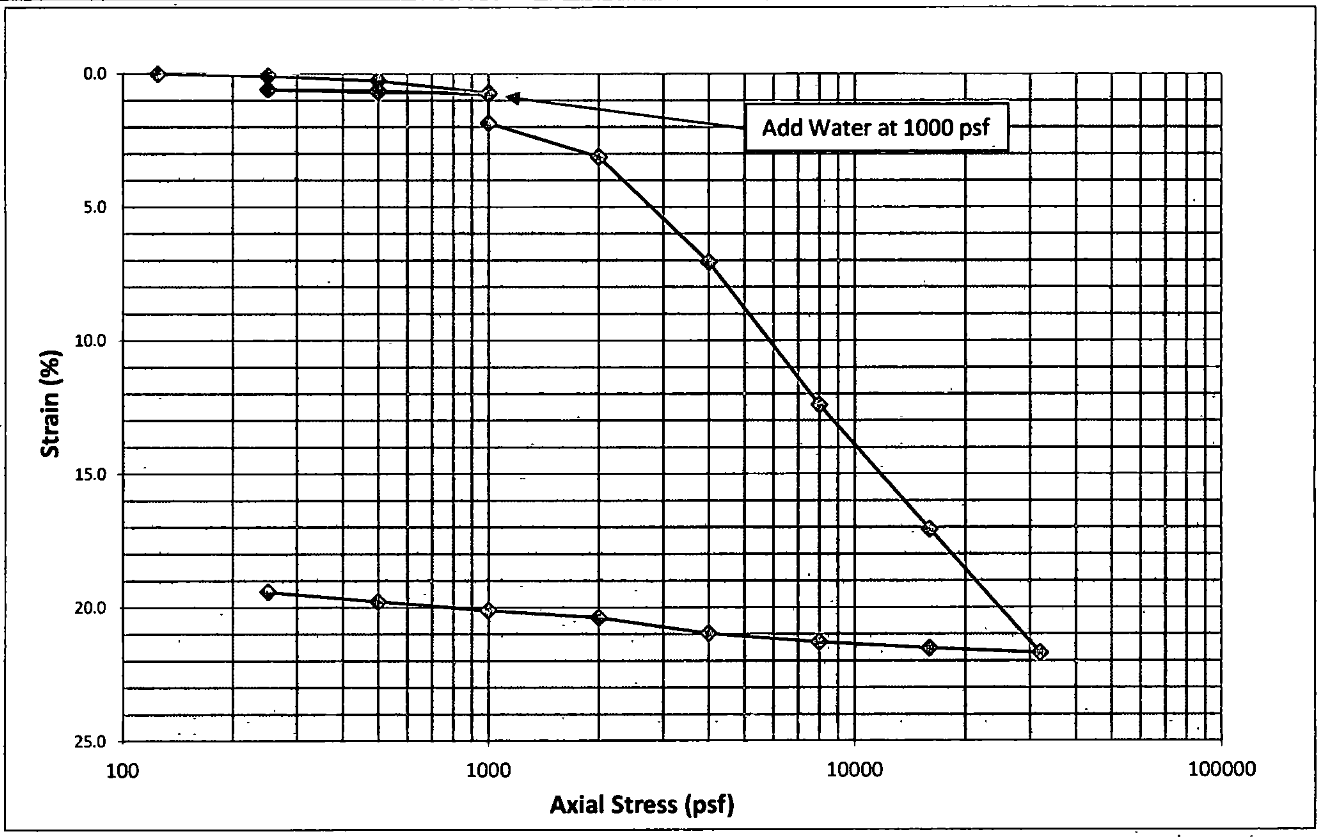
ATTERBERG LIMITS - GINT STD US LAB.GDT - 10/20/21 14:25 - G:\DATA\21306 STORRS PROPERTY GEOTECH\GINT\BORING LOGS.GPJ

1-D CONSOLIDATION

WILDING ENGINEERING
WWW.WILDINGENGINEERING.COM

Client: Kadkade Homes
Project Number: 21306

Project Name: Storrs Property
Project Location: American Fork, Utah



Sample Number:	2
Sample Location:	TP-2
Sample Depth (ft):	3.5
Sample Type:	Undisturbed
Test Method:	ASTM D2435 Method B
Sample Description:	Lean CLAY with Sand
USCS Classification:	CL
Liquid Limit:	28
Plastic Limit:	19
Fines Content (%):	77
Volumetric Strain (%):	1.08

	Initial	Final
Dry Density (pcf):	90.1	107.8
Water Content (%):	6.0	19.8
Void Ratio:	0.867	0.510
Degree of Saturation (%):	18.6	85.0
Specific Gravity:	2.700	(Assumed)
Remarks:	Added water at 1000 psf	

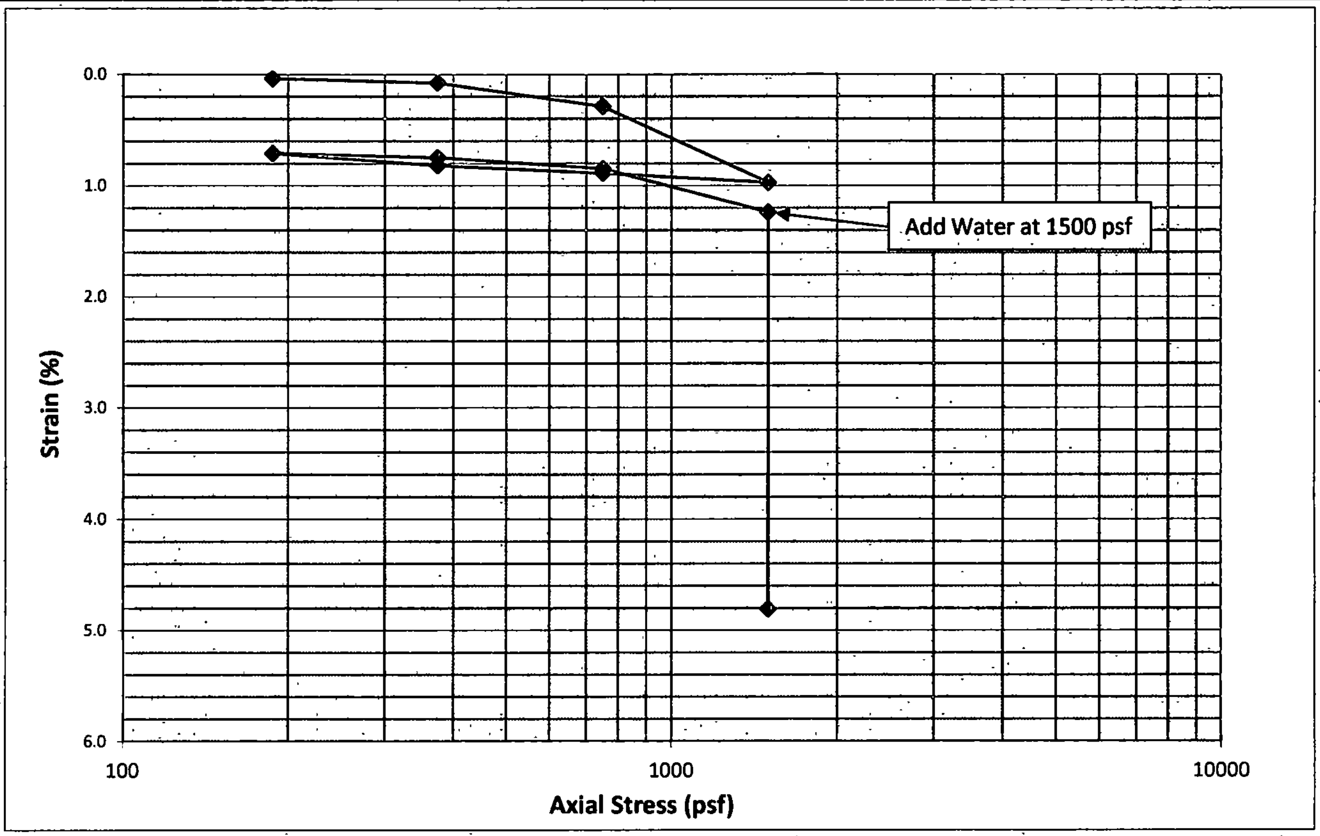
Load Increment	Axial Stress σ_a, (psf)	Axial Strain ϵ_a (%)	Sample Height H, (in)	Void Ratio, e
0	Seating	0.00	1.0000	0.867
1	125	0.01	0.9999	0.867
2	250	0.09	0.9991	0.865
3	500	0.27	0.9973	0.862
4	1000	0.73	0.9927	0.853
5	500	0.70	0.9930	0.854
6	250	0.60	0.9940	0.856
7	500	0.64	0.9936	0.855
8	1000	0.78	0.9922	0.853
9	1000	1.86	0.9814	0.832
10	2000	3.13	0.9687	0.809
11	4000	7.08	0.9292	0.735
12	8000	12.42	0.8758	0.635
13	16000	17.08	0.8292	0.548
14	32000	21.70	0.7830	0.462
15	16000	21.53	0.7847	0.465
16	8000	21.30	0.7870	0.469
17	4000	20.98	0.7902	0.475
18	2000	20.39	0.7961	0.486
19	1000	20.12	0.7988	0.491
20	500	19.78	0.8022	0.498
21	250	19.42	0.8058	0.505

Figure No.: C-3

WILDING ENGINEERING
www.wildingengineering.com

1-D SWELL OR COLLAPSE

Client: Kadkade Homes
Project Number: 21306
Project Name: Storrs Property
Project Location: American Fork, Utah



Sample Number:	3
Sample Location:	TP-3
Sample Depth (ft):	7
Sample Type:	Undisturbed
Test Method:	ASTM D4546
Sample Description:	Silty CLAY with Sand
USCS Classification:	CL
Liquid Limit:	26
Plastic Limit:	19
Fines Content (%):	78
Volumetric Strain (%):	3.57

	Initial	Final
Dry Density (pcf):	81.8	84.2
Water Content (%):	6.6	30.5
Void Ratio:	1.055	0.956
Degree of Saturation (%):	16.9	78.6
Specific Gravity:	2.700	(Assumed)
Remarks:	Added water at 1500 psf	

Load Increment	Axial Stress σ_a, (psf)	Axial Strain ϵ_a (%)	Sample Height H, (in)	Void Ratio, e
0	Seating	0.00	1.0000	1.055
1	188	0.04	0.9996	1.055
2	375	0.08	0.9992	1.054
3	750	0.29	0.9971	1.049
4	1500	0.97	0.9903	1.035
5	750	0.89	0.9911	1.037
6	375	0.82	0.9918	1.039
7	188	0.71	0.9929	1.041
8	375	0.75	0.9925	1.040
9	750	0.85	0.9915	1.038
10	1500	1.24	0.9876	1.030
11	1500	4.81	0.9519	0.956

Figure No.: C-4

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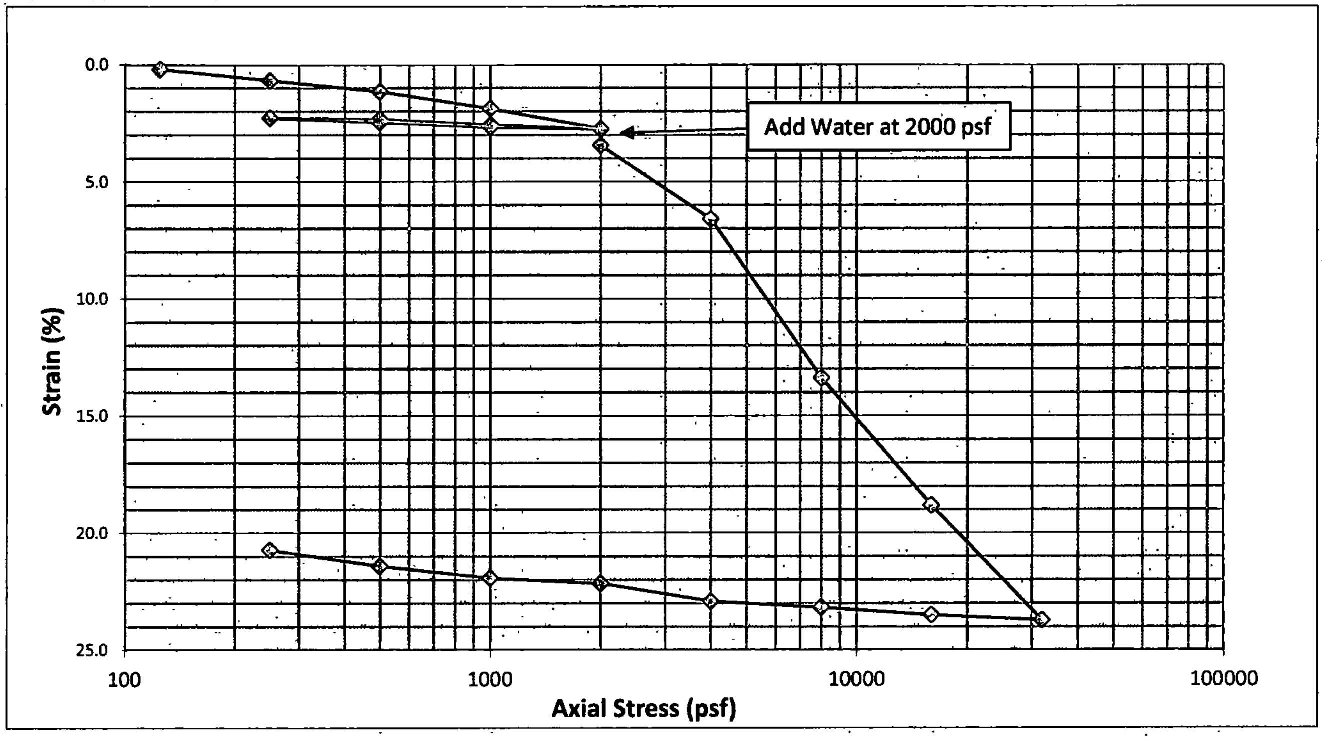
www.wildingengineering.com

1-D CONSOLIDATION

Client: Kadkade Homes
Project Number: 21306
Project Name: Storrs Property
Project Location: American Fork, Utah



Sample Number:	1
Sample Location:	TP-1
Sample Depth (ft):	8
Sample Type:	Undisturbed
Test Method:	ASTM D2435 Method B
Sample Description:	Lean CLAY with Sand
USCS Classification:	CL
Liquid Limit:	29
Plastic Limit:	21
Fines Content (%):	84
Volumetric Strain (%):	0.68

	Initial	Final
Dry Density (pcf):	89.8	107.0
Water Content (%):	8.2	23.3
Void Ratio:	0.874	0.485
Degree of Saturation (%):	25.2	92.1
Specific Gravity:	2.700	(Assumed)
Remarks:	Added water at 2000 psf	

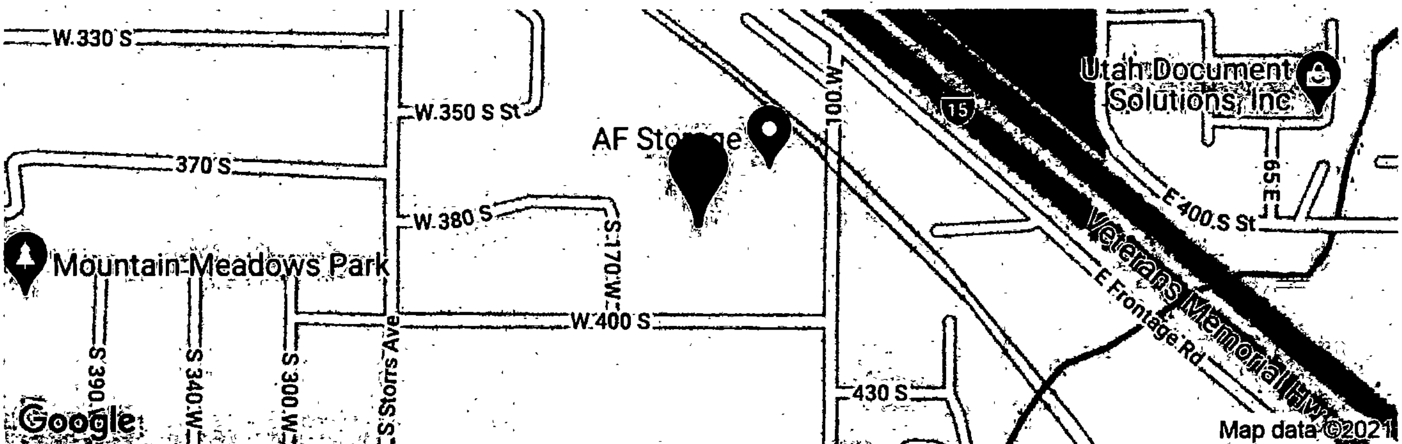
Load Increment	Axial Stress σ_a, (psf)	Axial Strain ϵ_a (%)	Sample Height H, (in)	Void Ratio, e
0	Seating	0.00	1.0000	0.874
1	125	0.20	0.9980	0.870
2	250	0.69	0.9931	0.861
3	500	1.16	0.9884	0.852
4	1000	1.88	0.9812	0.838
5	2000	2.74	0.9726	0.822
6	1000	2.67	0.9733	0.823
7	500	2.47	0.9753	0.827
8	250	2.29	0.9771	0.831
9	500	2.34	0.9766	0.830
10	1000	2.58	0.9742	0.825
11	2000	2.77	0.9723	0.822
12	2000	3.45	0.9655	0.809
13	4000	6.61	0.9339	0.750
14	8000	13.38	0.8662	0.623
15	16000	18.83	0.8117	0.521
16	32000	23.73	0.7627	0.429
17	16000	23.51	0.7649	0.433
18	8000	23.18	0.7682	0.439
19	4000	22.92	0.7708	0.444
20	2000	22.16	0.7784	0.458
21	1000	21.93	0.7807	0.463
22	500	21.42	0.7858	0.472
23	250	20.73	0.7927	0.485

APPENDIX D

OSHPD

Storrs Property

Latitude, Longitude: 40.368882, -111.802678



Date	10/20/2021, 6:37:29 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.278	MCE_R ground motion. (for 0.2 second period)
S_1	0.464	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.534	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.023	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.575	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.691	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.278	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.466	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	3.116	Factored deterministic acceleration value. (0.2 second)
S1RT	0.464	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.523	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.235	Factored deterministic acceleration value. (1.0 second)
PGAd	1.213	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.872	Mapped value of the risk coefficient at short periods
C_{R1}	0.887	Mapped value of the risk coefficient at a period of 1 s

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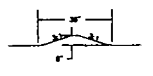
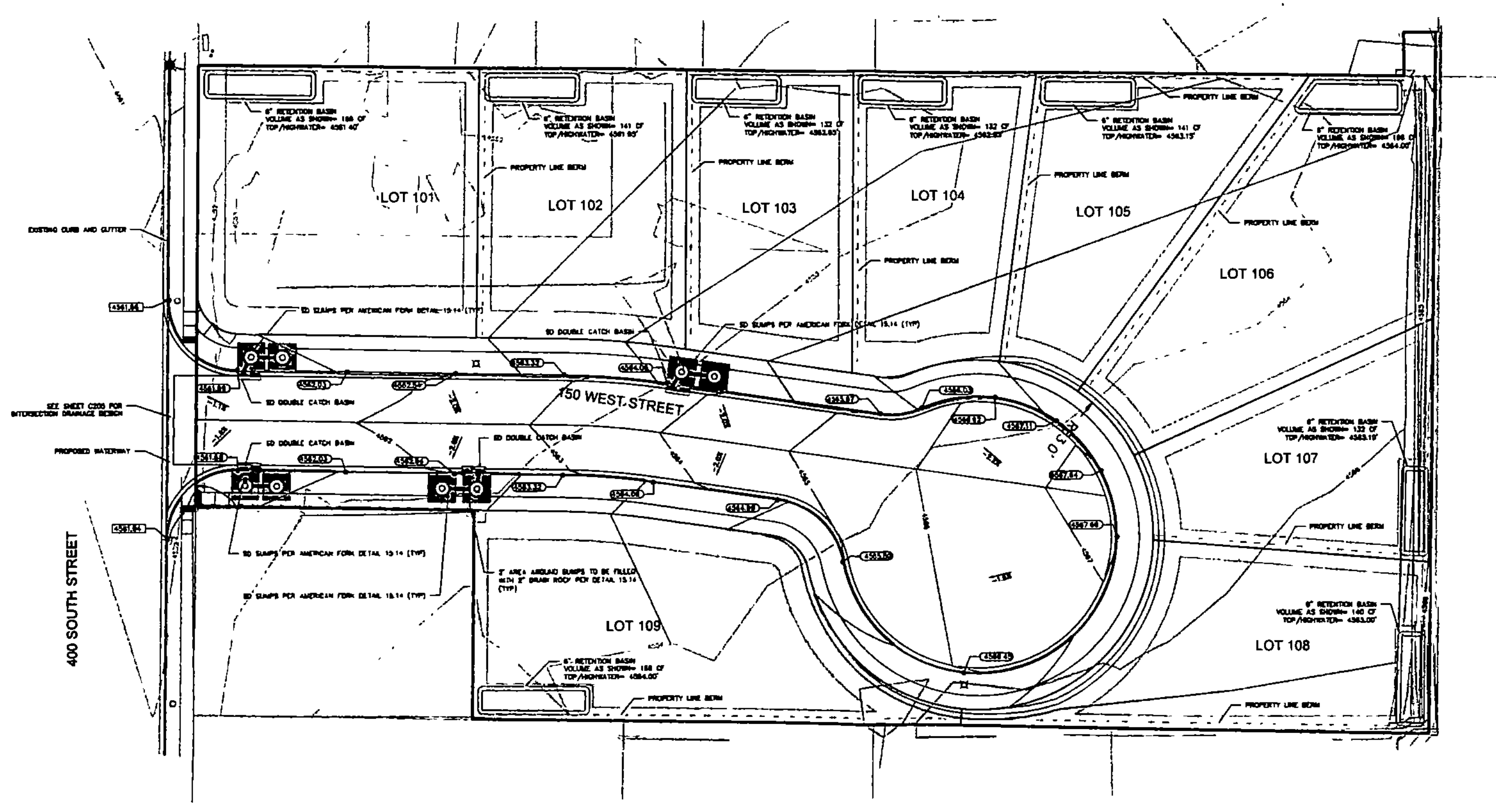
Exhibit C - Site Grading Plan

STORRS COURT SUBDIVISION

GRADING AND DRAINAGE PLAN





WILDING ENGINEERING
14721 South Heritage Crest Way
Bluffdale, Utah 84065
801.553.8112
www.wildingengineering.com

DRAWING NOTES

GENERAL NOTES:
1. 2% MAXIMUM LONGITUDINAL SLOPE ALONG CURB RETURNS IN FRONT OF ADA RAMPS.
2. THE BENCHMARK FOR THIS PROPERTY IS A BRASS CAP MONUMENT AT THE NORTHWEST CORNER OF SECTION 33 TOWNSHIP 5 SOUTH, RANGE 1 EAST, SALT LAKE BASE AND MERIDIAN. THE FOUND MONUMENT HAS AN ELEVATION OF 4363.77
3. TO OUR KNOWLEDGE THERE ARE NO EXISTING LAND DRAINS ON THE PROPERTY
4. THE PROPERTY IS LOCATED IN ZONE X PER FEMA MAP NUMBER 49049C0330F WITH AN EFFECTIVE DATE OF JUNE 19, 2020
5. THIS PLAN IS AN OVERALL VIEW OF THE GRADING AND DRAINAGE FOR THE SITE. FOR DETAILED INFORMATION ON THE ELEVATIONS FOR THE CATCH BASINS PLEASE REFER TO THE PLAN AND PROFILE DRAWINGS INCLUDED IN THIS DRAWING SET
6. CONTRACTOR TO ENSURE THAT FINAL GRADING OF EACH LOT WILL DIRECT STORM WATER RUN-OFF TO THE INDIVIDUAL LOT RETENTION BASIN OR THE ROADWAY RIGHT-OF-WAY

LEGEND
- DRAINAGE DIRECTION
- PROPOSED CONTOUR
- PROPOSED INDEX CONTOUR
- EXISTING CONTOUR
- EXISTING INDEX CONTOUR
- PROPOSED STORM DRAIN
- PROPOSED SPOT ELEVATION
- EXISTING SPOT ELEVATION
- PROPERTY LINE BERM

G:\DATA\21382 Storrs Property Subdivision American Fork\dwg\21382 Base – Before 100 West Topo.dwg
PLOT DATE: May 29, 2024

NO	REVISION	DATE
1	REVISIONS FROM CITY COMMENTS	5-29-24

PROJECT INFORMATION

STORRS COURT SUBDIVISION
GRADING AND DRAINAGE PLAN
AMERICAN FORK, UTAH

DRAWN	CHECKED	PROJECT #
TMS	-	21382

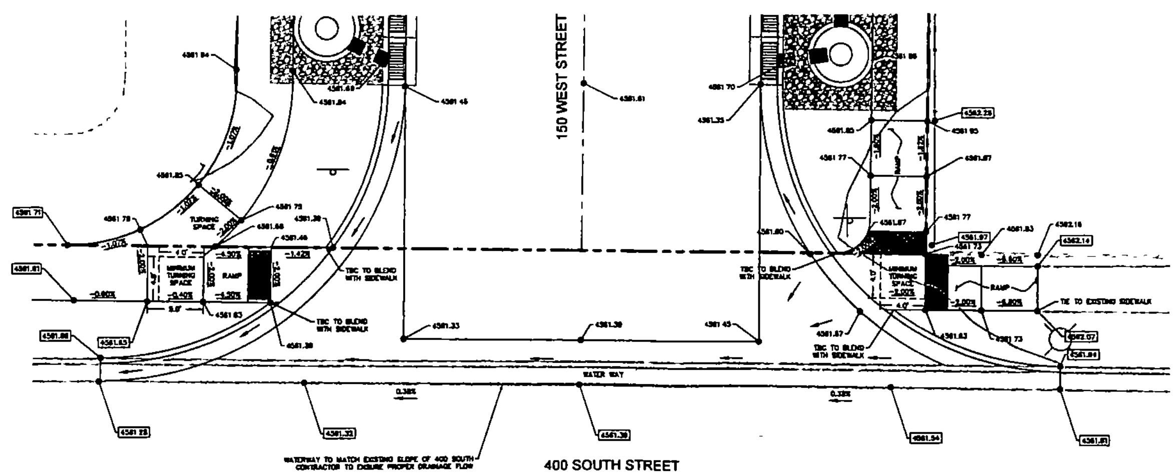
DATE: 4/24/24
SCALE: 1" = 20'
SHEET: C203

LICENSED PROFESSIONAL ENGINEER — MIKE E. CARLTON — STATE OF UTAH
ENGINEER'S STAMP

STORRS COURT SUBDIVISION

ADA GRADING PLAN

Scale 1" = 5 ft



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Bluffdale, Utah 84065
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DRAWING NOTES.

GENERAL NOTES
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2. THE BENCHMARK FOR THIS PROPERTY IS A BRASS CAP MONUMENT AT THE NORTHWEST CORNER OF SECTION 33 TOWNSHIP 5 SOUTH, RANGE 1 EAST SALT LAKE BASE AND MERIDIAN. THE FOUND MONUMENT HAS AN ELEVATION OF [illegible].77
3. TO OUR KNOWLEDGE THERE ARE NO EXISTING LAND DRAINS ON THE PROPERTY
4. THE PROPERTY IS LOCATED IN ZONE X PER FEMA MAP NUMBER [illegible] WITH AN EFFECTIVE DATE OF JUNE 19, 2020

LEGEND
DRAINAGE DIRECTION
PROPOSED CONTOUR
PROPOSED INDEX CONTOUR
EXISTING CONTOUR
EXISTING INDEX CONTOUR
PROPOSED STORM DRAIN
PROPOSED SPOT ELEVATION
EXISTING SPOT ELEVATION
PROPERTY LINE BCRM

G:\DATA\21382 Storrs Property Subdivision American Fork\dwg\21382 Base - Before 100 West Topo.dwg
PLOT DATE: May 24, 2024

NO.	REVISION	DATE

PROJECT INFORMATION

STORRS COURT SUBDIVISION
ADA GRADING PLAN
AMERICAN FORK, UTAH

DRAWN	CHECKED	PROJECT #
SWR	-	21382

DATE: 4/24/24
SCALE: 1" = 5'
SHEET: C205

LICENSED PROFESSIONAL ENGINEER
MIKE E. CARLTON
STATE OF UTAH
ENGINEER'S STAMP

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