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

ENT 5421:2019 PG 1 of 52
JEFFERY SMITH
UTAH COUNTY RECORDER
2019 Jan 22 2:38 pm FEE 115.00 BY MG
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 JAN. 19, 2018 along with the site grading plan to the property generally located at 700 W. 400 S (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 6 day of December, 2018.

OWNER(S):

(Signature) (Signature)

Grant Lefgren — Michael B. Horan
(Printed Name) (Printed Name)

Member — Member
(Title) (Title)

STATE OF UTAH)
§
COUNTY OF Utah)

On the 6th day of December, 2018, personally appeared before me Grant Lefgren and Michael B. Horan, Owner(s) of said Property, as (individuals and/or authorized representatives of a company), and acknowledged to me that such individuals or company executed the within instrument freely of their own volition and pursuant to the articles of organization where applicable.

NOTARY PUBLIC
TIFFANIE S. MACE
681595
COMMISSION EXPIRES
JANUARY 13, 2019
STATE OF UTAH

Notary Public
My Commission Expires: January 13, 2019

Approved as to form: American Fork City Attorney

Rev. 12/4/18

ROAD DEDICATION PARCEL TO AMERICAN FORK CITY

A parcel of land situate in the Southeast Quarter of Section 22, Township 5 South, Range 1 East, Salt Lake Base and Meridian, being more particularly described as follows:

Beginning at a point South 00°03'33" West 109.04 feet along the section line and West 1,799.46 feet from the East Quarter Corner of Section 22, Township 5 South, Range 1 East, Salt Lake Base and Meridian, and running;

thence South 1°10'11" West 43.24 feet;
thence South 1°29'23" West 787.89 fee;
thence North 89°05'07" West 42.00 feet;
thence North 1°29'23" East 788.20 feet;
thence North 1°10'11" East 42.66 feet;
thence South 89°27'26" East 42.00 feet to the point of beginning.

Contains 34,902 square feet or 0.801 acres.

HOLINDRAKE BIRD DESCRIPTION

A parcel of land situate in the South Half of Section 22, Township 5 South, Range 1 East, Salt Lake Base and Meridian, said parcel being more particularly described as follows:

Beginning at a point on the West line of Fenn Property Annexation, said point being South 00°03'33" West 109.04 feet along the Section line and West 1,799.46 feet from the East Quarter Corner of Section 22, Township 5 South, Range 1 East, Salt Lake Base and Meridian, and running; thence South 01°10'11" West 43.24 feet and South 01°29'23" West 787.89 feet along said West line; thence North 89°05'07" West 854.46 feet; thence North 01°30'57" East 369.82 feet; thence North 01°00'42" East 454.65 feet; thence South 89°32'52" East 144.39 feet to a point on the Southwest Corner of the Brad Reynolds Annexation; thence along said line for the following five(5) courses 1)North 89°45'50" East 56.70 feet 2)South 88°56'13" East 103.76 feet 3)South 89°21'35" East 261.62 feet 4)North 89°45'37" East 107.56 feet 5)South 89°27'26" East 183.93 feet to the point of beginning.

GeoStrata

14425 South Center Point Way Bluffdale, Utah 84065
Phone (801) 501-0583 | Fax (801) 501-0584

Geotechnical Investigation
Holindrake Development
350 South 7000 West
American Fork, UT

GeoStrata Job No. 1012-015

January 19, 2018

Prepared for:

Keystone Construction
520 South 850 East, STE A3
Lehi, UT 84043

Attn: Mr. Grant Lefgren

Learn More

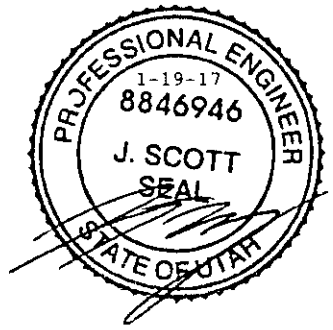
GeoStrata 14425 South Center Point Way Bluffdale, Utah 84065
T: (801) 501-0583 ~ F: (801) 501-0584

Prepared for:

Mr. Grant Lefgren
Keystone Construction
520 South 850 East, STE A3
Lehi, UT 84043

Geotechnical Investigation
Holindrake Development
Approximately 350 South 700 West
American Fork, UT

GeoStrata Job No. 1012-015



J. Scott Seal, P.E.
Geotechnical Manager

Ashley Peay
Staff Geologist

GeoStrata
14425 South Center Point Way
Bluffdale, UT 84065
(801) 501-0583

January 19, 2018

TABLE OF CONTENTS

APPENDICES

1.0 EXECUTIVE SUMMARY

This report presents the results of a geotechnical investigation conducted for the proposed Holindrake Subdivision to be located at approximately 350 South 7000 West in American Fork, Utah. The purposes of this investigation were to assess the nature and engineering properties of the subsurface soils at the site and to provide recommendations for general site grading and the design and construction of foundations, slab-on-grades, exterior concrete flatwork, and pavements.

Based on the results of our analysis, it is our opinion that the site is suitable for the proposed development provided that the recommendations contained in this report are incorporated into the design and construction of the project.

Subsurface conditions were investigated through the excavation of nine test pits to depths ranging from 8 to 10 feet below the existing site grade. Based on our observations and geologic literature review, the subject area is overlain by 1 foot of organic rich topsoil comprised of sand and silt. Underlying the topsoil, we encountered deposits that are mapped as consisting of Pleistocene-aged lacustrine fine-grained deposits. The fine-grained soils consisted of soft to stiff, moist to wet, brown to grey-brown, SILT (ML), and Lean CAY (CL), each with various amounts of fine- to medium-grained sand. These deposits occasionally contained fine pinholes throughout, as well as occasional seams of organic-rich material. The Sandy Lean CLAY (CL) soils typically contained frequent lenses of Silty SAND (SM). The coarse-grained soils consisted of medium dense to dense, moist to wet, brown, Poorly Graded GRAVEL (GP) with sand and Silty GRAVEL (GM) with sand. These deposits occasionally contained light iron staining, and rounded gravels up to 4-inches in diameter. These deposits persisted to the full depth of our explorations. Groundwater was encountered in each of our explorations, and was measured in our piezometers as existing at a depth of 5 to 6 feet below the site grade as it existed at the time of our explorations.

The proposed structures may be supported on foundation systems consisting of conventional strip and/or spread footings founded on a minimum of 18 inches of structural fill. Conventional strip footings founded entirely on undisturbed native soils or on properly placed and compacted structural fill may be proportioned for a maximum net allowable bearing capacity of 1,600 psf. Due to the presence of relatively shallow groundwater, it is recommended that all final top of slab elevations be maintained a minimum of 36 inches above the groundwater elevation unless foundation drain systems are installed.

A laboratory obtained CBR of 5.8 for near-surface soils was utilized in the pavement design. Based on assumed traffic loads, a pavement section of 3 inches of asphalt over 6 inches of untreated base course over 10 inches of granular borrow. Alternatively, a pavement section of 3 inches of asphalt over 14 inches of untreated base course may be utilized. Recommendations for general site grading, design of foundations, slabs-on-grade, moisture protection as well as other aspects of construction are included in this report.

NOTE: The scope of services provided within this report are limited to the assessment of the subsurface conditions at the subject site. The executive summary is provided solely for purposes of overview and is not intended to replace the report of which it is part and should not be used separately from the report.

2.0 INTRODUCTION

2.1 PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical investigation conducted for the proposed Holindrake Subdivision to be located at approximately 350 South 7000 West in American Fork City, Utah. The purposes of this investigation were to assess the nature and engineering properties of the subsurface soils at the site and to provide recommendations for general site grading and the design and construction of foundations, slab-on-grades, exterior concrete flatwork, and pavements.

The scope of work completed for this study included a site reconnaissance, subsurface exploration, soil sampling, laboratory testing, engineering analyses, and preparation of this report. Our services were performed in accordance with our proposal, dated September 29, 2017 and your signed authorization.

The recommendations contained in this report are subject to the limitations presented in the "Limitations" section of this report (Section 7.1).

2.2 PROJECT DESCRIPTION

The subject property is located at approximately 350 South and 7000 West in American Fork City, Utah (see Plate A-1, *Site Vicinity Map*). Our understanding of the proposed development is based on information provided by the client as well as on a drawing titled "Holindrake Property Alta/NSPS Land Title & Topography Survey" prepared by Ensign Engineering and dated 11/18/2017. We understand that the development will consist of single family residential lots constructed on approximately 16.25 acres of property. Construction plans were not available for our review at the time this report was prepared; however, we anticipate that the improvements are to consist of wood-framed, single family residential structures with basements founded on conventional strip and spread footings. We understand that the project will also incorporate associated driveways and landscaping areas. For the purposes of this report we have assumed structural loads on the order of 2 to 3 kips per lineal foot.

3.0 METHODS OF STUDY

3.1 FIELD INVESTIGATION

As part of this investigation, subsurface soil conditions were explored by advancing nine exploratory test pits at the site to depths of 8 to 10 feet below the site grade as it existed at the time of our investigation. The approximate locations of the explorations are shown on the *Exploration Location Map*, Plate A-2 in Appendix A. Exploration points were selected to provide a representative cross section of the subsurface soil conditions in the anticipated vicinity of the proposed structures. Subsurface soil conditions as encountered in the explorations were logged at the time of our investigation by a qualified geotechnical engineer and are presented on the enclosed Test Pit Logs, Plates B-1 through B-9 in Appendix B. A *Key to USCS Soil Symbols and Terminology* is presented on Plate B-10.

The test pits were excavated using a tracked mini-excavator. Disturbed and undisturbed samples were obtained from the test pits. Disturbed soil samples were obtained with use of bags and buckets. Undisturbed samples were collected from blocks of soil taken from the test pit walls. All samples were transported to our laboratory for testing to evaluate engineering properties of the various earth materials observed. The soils were classified according to the *Unified Soil Classification System* (USCS) by the Geotechnical Engineer. Classifications for the individual soil units are shown on the attached Test Pit Logs.

3.2 LABORATORY INVESTIGATION

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 conducted during this investigation include:

- Grain Size Distribution Analysis (ASTM D422)
- Atterberg Limits Test (ASTM D4318)
- Collapse Potential Test (ASTM D 5333)
- 1-D Consolidation Test (ASTM D2435)
- California Bearing Ratio (CBR) Test (ASTM D1883)

The results of laboratory tests are presented on the test pit logs in Appendix B (Plates B-1 to B-9), the Lab Summary Report (Plate C-1), and on the test result plates presented in Appendix C (Plates C-2 through C-9).

3.3 ENGINEERING ANALYSIS

Engineering analyses were performed using soil data obtained from the laboratory test results and empirical correlations from material density, depositional characteristics and classification. Appropriate factors of safety were applied to the results consistent with industry standards and the accepted standard of care.

4.0 GENERALIZED SITE CONDITIONS

4.1 SURFACE CONDITIONS

At the time of our subsurface investigation, the property consisted of an undeveloped parcel that was being utilized for agricultural purposes. Specifically, the site was used for growing alfalfa. The only man-made improvements observed at the subject site included occasional unlined irrigation ditches oriented in all directions. The site slopes gently to the southwest (towards Utah Lake), and has a maximum topographic relief of approximately 16 feet.

4.2 SUBSURFACE CONDITIONS

As discussed previously, the subsurface soil conditions were explored at the site by excavating nine test pits at representative locations within the subject property. The test pits extended to depths of 8 to 10 feet below existing site grade. Subsurface soil conditions were logged during our field investigation and are included on the test pit logs in Appendix B (Plates B-1 to B-9). The soil and moisture conditions encountered during our investigation are discussed below.

4.2.1 Soils

Based on our observations and geologic literature review, the subject area is overlain by 1 foot of organic rich topsoil comprised of sand and silt. Underlying the topsoil, we encountered deposits that are mapped by Machette (1992) as consisting of Pleistocene-aged fine-grained lacustrine deposits associated with the transgressive phase of the Bonneville lake cycle. Descriptions of the soil units encountered are described below:

Topsoil: Where observed, the topsoil consisted of a moist, dark brown to black Silty CLAY (CL-ML). This unit was observed to have an organic appearance and texture, with roots and pinholes throughout. Approximately 12-inches of topsoil were encountered in each of the test pits and are expected to overlie the majority of the site.

Pleistocene-aged Fine-Grained Lacustrine Deposits: These deposits were encountered in each of the test pits underlying the topsoil and were observed to consist of alternating seams of fine-grained and coarse-grained soils. The fine-grained soils consisted of soft to stiff, moist to wet, brown to grey-brown, SILT (ML), and Lean CAY (CL), each with various amounts of fine- to medium-grained sand. These deposits occasionally contained fine pinholes throughout, as well as

occasional seams of organic-rich material. The Sandy Lean CLAY (CL) soils typically contained frequent lenses of Silty SAND (SM). The coarse-grained soils consisted of medium dense to dense, moist to wet, brown, Poorly Graded GRAVEL (GP) with sand and Silty GRAVEL (GM) with sand. These deposits occasionally contained light iron staining, and rounded gravels up to 4-inches in diameter. These deposits persisted to the full depth of our explorations.

The stratification lines shown on the enclosed test pit logs represent the approximate boundary between soil types (Plates B-1 to B-9). The actual in-situ transition may be gradual. Due to the nature and depositional characteristics of the native soils, care should be taken in interpolating subsurface conditions between and beyond the exploration locations.

4.2.2 Groundwater

Groundwater was encountered in each of the explorations completed as part of our investigation. The depth to groundwater was measured at the time of our field investigation and ranged from 4½ to 6 feet below the site grade as it existed at the time of our measurements. GeoStrata installed piezometers in four of our test pit locations in order to measure the depth of groundwater at a later time in order to get a more accurate measurement. GeoStrata returned to the site on December 4th, 2017 in order to take additional readings. The results of our readings are summarized in the following table;

Piezometer Location	Depth to Groundwater (ft.)
TP-1	5.0
TP-5	5.9
TP-6	5.2
TP-9	6.1

Seasonal fluctuations in precipitation, surface runoff from adjacent properties, or other on or offsite sources may increase moisture conditions; groundwater conditions can be expected to rise several feet seasonally depending on the time of year. Due to the potential presence of elevated groundwater as well as the fine-grained nature of the exposed soils, it is recommended that foundation drains be incorporated into the design of the project. Recommendations concerning the foundation drains may be found in Section 6.7 of this report.

4.2.3 Hydro-Collapse Potential

Collapse (often referred to as "hydro-collapse") is a phenomena whereby undisturbed soils exhibit volumetric strain and consolidation upon wetting under increased loading conditions. Collapsible soils can cause differential settling of structures and roadways. Collapsible soils do not necessarily preclude development and can be mitigated by over-excavating porous, potentially collapsible soils and replacing with engineered fill and by controlling surface drainage and runoff. For some structures that are particularly sensitive to differential settlement, or in areas where collapsible soils are identified at great depth, a deep foundation system should be considered.

Soils that have a potential to collapse under increased loading and moisture conditions are typically characterized by a pinhole structure and relatively low unit weights. In general, potentially collapsible soils are observed in fine-grained soils that include clay and silt, although collapsible soils may include sandy soils. Results of our laboratory testing indicated that the subsurface soils have a low collapse potential, with the collapse potential ranging from 0.00 to 0.01 percent. As such, it is anticipated that collapsible soils will not present a risk to the foundation elements within the proposed development if the recommendations presented in this report are incorporated into the design and construction of the structures.

4.2.4 Compressible Soils

A soil's compressibility is a function of several properties of the soil, as well as on the depositional history and previously loading of the material. Soils with relatively low OCR (Over Consolidation Ratio) are more likely to experience excessive settlement when a load from a footing or other source is applied. GeoStrata completed a total of three consolidation tests on samples obtained during our field investigation. Results of our testing indicate that the near-surface fine-grained soils have OCR values ranging from 1.0 (normally consolidated) to 5.0 (over consolidated). As such, it is likely that highly compressible soils are present at the site. Remediation of these soils includes over-excavation and replacement with properly placed and compacted structural fill.

5.0 GEOLOGIC CONDITIONS

5.1 GEOLOGIC SETTING

The site is located in American Fork, Utah at an elevation of approximately 4,513 to 4,529 feet above sea level in the Utah Valley. The Utah Valley represents a deep, sediment-filled structural basin of Cenozoic age flanked by uplifted blocks, the Wasatch Range on the east, and the Lake and East Tintic Mountains on the west. The Wasatch Range is the easternmost expression of pronounced Basin and Range extension in north-central Utah.

The near-surface geology of the Utah Valley is dominated by sediments, which were deposited within the last 30,000 years by Lake Bonneville (Hintze, 1993). The lacustrine sediments near the mountain front consist mostly of gravel and sand. As the lake receded, streams began to incise large deltas formed at the mouths of major canyons along the Wasatch Range, and the eroded material was deposited in shallow lakes and marshes in the basin and in a series of recessional deltas and alluvial fans. Sediments toward the center of the valley are predominately deep-water deposits of clay, silt and fine sand. However, these deep-water deposits are in places covered by a thin post-Bonneville alluvial cover. Most surficial deposits along the Wasatch fault zone were deposited during the Bonneville Lake Cycle that was the last cycle of Lake Bonneville between approximately 32 to 10 ka (thousands of years ago) and in the Holocene (< 10 ka). As mentioned previously, the surficial sediments at the site are mapped as consisting of Pleistocene- to Holocene-aged fine-grained lacustrine deposits associated with the transgressive phase of the Bonneville lake cycle.

5.2 FAULTING AND SEISMICITY

The site lies within the north-south trending belt of seismicity known as the Intermountain Seismic Belt (ISB) (Hecker, 1993). The ISB extends from northwestern Montana through southwestern Utah. There are no known active faults that pass under or immediately adjacent to the subject property (Black and others, 2003). An active fault is defined as a fault that has had activity within the Holocene (<11ka). No active faults are mapped through or immediately adjacent to the site (Black and others, 2003, and Machette, 1992). The site is located approximately 4½ miles southwest of the Provo section of the Wasatch Fault Zone. The Provo segment is one of the longest sections of the Wasatch Fault Zone (Hecker, 1993) and is estimated to be approximately 43 miles long with a reported rupture length of 37 miles and a maximum potential to produce earthquakes up to magnitude (M_S) 7.5 to 7.7 (Black et al, 2003). During the

Quaternary Period there is evidence that as many as 10 to 15 earthquakes have occurred along this segment in the last 15,000 years (Hecker, 1993). The site is also located approximately 2½ miles northeast of the mapped Utah Lake Faults and Folds (ULFF). The ULFF consists of several northeast- to northwest-trending faults and folds located beneath Utah Lake and are reported to have been active in the past 15 ka (Black et al, 2003). However, since the ULFF is at the bottom of a large lake these faults are poorly understood – as such, the USGS does not include ULFF in their fault database for seismic hazard analysis. Analysis of the ground shaking hazard along the Wasatch Front suggests that the Wasatch Fault Zone is the single greatest contributor to the seismic hazard in the Salt Lake City region. Each of the faults listed above show evidence of Holocene-aged movement, and is therefore considered active.

Seismic hazard maps depicting probabilistic ground motions and spectral response have been developed for the United States by the U.S. Geological Survey as part of NEHRP/NSHMP (Frankel et al, 1996). These maps have been incorporated into both *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures* (FEMA, 1997) and the *International Building Code* (IBC) (International Code Council, 2015). Spectral responses for the Maximum Considered Earthquake (MCE_R) are shown in the table below. These values generally correspond to a two percent probability of exceedance in 50 years (2PE50) for a "Stiff Soil" site. To account for site effects, site coefficients which vary with the magnitude of spectral acceleration are used. Based on our field exploration, it is our opinion that this location is best described as a Site Class D. The spectral accelerations are shown in the table below. The spectral accelerations are calculated based on the site's approximate latitude and longitude of 40.3684° N and -111.8196° W respectively and the USGS Seismic Design Maps web based application. Based on IBC, the site coefficients are F_a=1.04 and F_v=1.62. From this procedure, the peak ground acceleration (PGA) is estimated to be 0.48g.

MCE_R Seismic Response Spectrum Spectral Acceleration Values for IBC Site Class D[a]

Site Location: **Latitude = 40.3684° N** **Longitude = -111.8196° W**	**Site Class D Site Coefficients:** **Fa = 1.04** **Fv = 1.62**
Spectral Period (sec)	**Response Spectrum Spectral Acceleration (g)**
0.2	$S_{MS}=(F_a*S_S=1.04*1.15) = 1.19$
1.0	$S_{M1}=(F_v*S_1=1.62*0.39) = 0.63$
[a] IBC 1613.3.4 recommends scaling the MCE values by 2/3 to obtain the design spectral response acceleration values; values reported in the table above have not been reduced.	

6.0 ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

6.1 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 physical properties of the earth materials encountered and tested as part of our subsurface exploration and the anticipated design data discussed in the **PROJECT DESCRIPTION** section. If subsurface conditions other than those described herein are encountered in conjunction with construction, and/or if design and layout changes are initiated, GeoStrata must be informed so that our recommendations can be reviewed and revised as changes or conditions may require.

Based on the subsurface conditions encountered at the site, it is our opinion that the subject site is suitable for the proposed development provided that the recommendations contained in this report are incorporated into the design and construction of the project.

Based on our field observations, the site is overlain by approximately 12 inches of silty topsoil. It is recommended that this topsoil unit be removed in all areas underlying proposed structures, fill sections, concrete flatwork, or pavement sections. It is likewise recommended that this material not be used as structural fill in these areas, but may be utilized in landscaped areas.

Based on the results of our laboratory testing, the near-surface fine-grained soils have a relatively high collapsibility potential under increased loading. As a result, it is recommended that all foundation elements be established on a minimum of 18-inches of properly placed and compacted structural fill.

As mentioned previously, groundwater was measured in our piezometers as being located at a depth ranging from 5 to 6 feet below the existing site grade. As such, GeoStrata recommends that all top of slab elevations be maintained a minimum of 36-inches above the groundwater elevation unless foundation drains be incorporated into the design of the project. In addition, the contractor should anticipate using a dewatering system and additional shoring in all excavations extending deeper than 5 feet.

The following sub-sections present our recommendations for general site grading, design of foundations, slabs-on-grade, and lateral earth pressures.

6.2 EARTHWORK

Prior to the placement of foundations, general site grading is recommended to provide proper support for foundations, exterior concrete flatwork, and concrete slab-on-grade. Site grading is also recommended to provide proper drainage and moisture control on the subject property and to aid in preventing differential settlement of foundations as a result of variations in subgrade moisture conditions.

6.2.1 General Site Preparation and Grading

Within areas to be graded (below proposed structures, fill sections, concrete flatwork, or pavement sections), any existing vegetation, debris, topsoil, undocumented fill, or otherwise unsuitable soils should be removed. Any soft, loose, or disturbed soils should also be removed. Following the removal of vegetation, unsuitable soils, and loose or disturbed soils, as described above, site grading may be conducted to bring the site to design elevations.

Based on our observations made during our field investigation, the site is overlain by approximately 1 foot of silty topsoil. In areas beneath proposed structures, fill sections, concrete flatwork, or pavements, removal of these undocumented fill, topsoil, and disturbed soils should be anticipated. If over-excavation is required, the excavation should extend a minimum of one foot laterally for every foot of depth of over-excavation. Excavations should extend laterally at least two feet beyond flatwork, pavements, and slabs-on-grade. If materials are encountered that are not represented in the test pit logs or may present a concern, GeoStrata should be notified so observations and further recommendations as required can be made.

A GeoStrata representative should observe the site preparation and grading operations to assess that the recommendations presented in this report are complied with.

6.2.2 Excavation Stability

Based on Occupational Safety and Health Administration (OSHA) guidelines for excavation safety, trenches with vertical walls up to 5 feet in depth may be occupied, however, the presence of fill soils, loose soils, or wet soils may require that the walls be flattened to maintain safe working conditions. When the trench is deeper than 5 feet, we recommend a trench-shield or shoring be used as a protective system to workers in the trench. Based on our soil observations, laboratory testing, and OSHA guidelines, native soils at the site classify as Type C soils. Deeper excavations, if required, should be constructed with side slopes no steeper than one and one and

one half horizontal to one vertical (1.5H:1V). If wet conditions are encountered, side slopes should be further flattened to maintain slope stability. Alternatively, shoring or trench boxes may be used to improve safe work conditions in trenches. The contractor is ultimately responsible for trench and site safety. Pertinent OSHA requirements should be met to provide a safe work environment. If site specific conditions arise that require engineering analysis in accordance with OSHA regulations, GeoStrata can respond and provide recommendations as needed.

As mentioned previously, potentially saturated soils were encountered at the site at a depth as shallow as 5 feet below the existing site grade. This may impact deeper utility trenches planned for the development. Trenches or excavations planned for depths greater than 5 feet may require the use of a dewatering system to complete.

We recommend that a GeoStrata representative be on-site during all excavations to assess the exposed foundation soils. We also recommend that the Geotechnical Engineer be allowed to review the grading plans when they are prepared in order to evaluate their compatibility with these recommendations.

6.2.3 Soft Soil Stabilization

Soft or pumping soils may be exposed in excavations at the site. Once exposed, all subgrade surfaces beneath proposed structure, pavements, and flat work concrete should be proof rolled with heavy wheeled-construction equipment. If soft or pumping soils are encountered, these soils should be stabilized prior to construction of footings. Stabilization of the subgrade soils can be accomplished using a clean, coarse angular material worked into the soft subgrade. We recommend the material be greater than 2 inches diameter, but less than 6 inches. A locally available pit-run gravel may be suitable but should contain a high percentage of particles larger than 2 inches and have less than 7 percent fines (material passing the No. 200 sieve). A pit-run gravel may not be as effective as a coarse, angular material in stabilizing the soft soils and may require more material and greater effort. The stabilization material should be worked (pushed) into the soft subgrade soils until a firm relatively unyielding surface is established. Once a firm, relatively unyielding surface is achieved, the area may be brought to final design grade using structural fill.

In large areas of soft subgrade soils, stabilization of the subgrade may not be practical using the method outlined above. In these areas, it may be more economical to place a woven geotextile fabric against the soft soils covered by 18 inches of coarse, sub-rounded to rounded material over

the woven geotextile. An inexpensive non-woven geotextile "filter" fabric should also be placed over the top of the coarse, sub-rounded to rounded fill prior to placing structural fill or pavement section soils to reduce infiltration of fines from above. The woven geotextile should be Mirafi RS280i or prior approved equivalent. The filter fabric should consist of a Mirafi 140N, or equivalent as approved by the Geotechnical Engineer.

6.2.4 Structural Fill and Compaction

All fill placed for the support of structures, concrete flatwork or pavements should consist of structural fill. Structural fill may consist of native gravel soils with particles larger than 4 inches in diameter removed. The native clayey soils may also be utilized as structural fill; however, the contractor should be aware that the native silt and clay soils may be difficult to moisture condition and compact. 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 inert materials larger than 4 inches nominal size. Alternatively, an imported structural fill meeting the specifications below may be used. If soil is imported for use as structural fill, we recommend that it be a relatively well graded granular soil with a maximum of 50 percent passing the No. 4 mesh sieve and a maximum fines content (minus No.200 mesh sieve) of 25 percent. All structural fill soils should be approved by the Geotechnical Engineer prior to placement. Clay and silt particles in imported structural fill should have a liquid limit less than 35 and a plasticity index less than 15 based on the Atterberg Limit's test (ASTM D-4318). The contractor should anticipate testing all soils used as structural fill frequently to assess the maximum dry density, fines content, and moisture content, etc.

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 10-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 the geotechnical engineer. Structural fill should be compacted to at least 95% of the maximum dry density, as determined by ASTM D-1557. The moisture content should be at or slightly above the optimum moisture content at the time of placement and compaction. Also, prior to placing any fill, the excavations should be observed by the geotechnical engineer to observe that any unsuitable materials or loose soils have been removed. In addition, proper grading should precede placement of fill, as described in the **General Site Preparation and Grading** subsection of this report (Section 6.2.1).

Fill soils placed for subgrade below exterior flat work and pavements, should be within 3% of the optimum moisture content when placed and compacted to at least 95% of the maximum dry density as determined by ASTM D-1557. All utility trenches backfilled below the proposed structure, pavements, and flatwork concrete, should be backfilled with structural fill that is within 3% of the optimum moisture content when placed and compacted to at least 95% of the maximum dry density as determined by ASTM D-1557. All other trenches, in landscape areas, should be backfilled and compacted to at least 90% of the maximum dry density (ASTM D-1557).

The gradation, placement, moisture, and compaction recommendations contained in this section meet our minimum requirements, but may not meet the requirements of other governing agencies such as city, county, or state entities. If their requirements exceed our recommendations, their specifications should override those presented in this report.

6.3 FOUNDATIONS

The foundations for the proposed structures may consist of conventional strip and/or spread footings founded on a minimum of 18-inches of properly placed and compacted structural fill soils extending to suitable native soils. The structural fill zone may consist of scarified, moisture conditioned and appropriately compacted in-place soils. Strip and spread 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 footings not subject to frost should be embedded at least 18 inches below final grade to provide confinement.

Due to the presence of relatively shallow groundwater at the site, it is recommended that all final top of slab elevations be maintained a minimum of 36-inches above the groundwater table elevation unless foundation drains are incorporated into the design of the project. Additional information concerning foundation drains may be found in Section 6.7 of this report.

Conventional strip and spread footings founded on a minimum of 1½ feet of structural fill may be proportioned for a maximum net allowable bearing capacity of **1,500 psf**. The net allowable bearing capacity may be increased (typically by one-third) for temporary loading conditions such as transient wind and seismic loads. All footing excavations should be observed by the Geotechnical Engineer prior to footing placement.

6.4 SETTLEMENT

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 over 30 feet.

6.5 CONCRETE SLAB-ON-GRADE CONSTRUCTION

Concrete slabs-on-grade should be constructed over at least 4 inches of compacted gravel overlying non-collapsible native soils or a zone of structural fill that is at least 18-inches thick. Structural fill should be compacted to at least 95% of the maximum dry density as determined by ASTM D-1557 (modified proctor) prior to placement of gravel. The gravel should consist of road base or clean drain rock with a ¾-inch maximum particle size and no more than 12 percent fines passing the No. 200 mesh sieve. The gravel layer should be compacted to at least 95 percent of the maximum dry density of modified proctor or until tight and relatively unyielding if the material is non-proctorable. All concrete slabs should be designed to minimize cracking as a result of shrinkage. Consideration should be given to reinforcing the slab with welded wire, re-bar, or fiber mesh.

6.6 EARTH PRESSURES AND LATERAL RESISTANCE

Lateral forces imposed upon conventional foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footing and the supporting soils. In determining the frictional resistance against concrete, a coefficient of friction of 0.35 should be used for fine-grained soils against concrete. Where footings are underlain by granular soils or structural fill, a coefficient of friction of 0.43 should be used.

Ultimate lateral earth pressures from native material acting against buried walls and structures for long term condition may be computed from the lateral pressure coefficients or equivalent fluid densities presented in the following table:

Condition	Lateral Pressure Coefficient	Equivalent Fluid Density (pounds per cubic foot)
Active*	0.33	40
At-rest**	0.50	60
Passive*	3.00	360
Seismic Active***	0.53	64
Seismic Passive***	-0.88	-106

* Based on Coulomb's equation

** Based on Jaky

*** Based on Mononobe-Okabe Equation

These coefficients and densities assume level, granular backfill with no buildup of hydrostatic pressures. The force of the water should be added to the presented values if hydrostatic pressures are anticipated. If sloping backfill is present, we recommend the geotechnical engineer 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. A value of 1.5 is typically used. Additionally, if passive resistance is calculated in conjunction with frictional resistance, the passive resistance should be reduced by ½.

For seismic analyses, the *active* and *passive* earth pressure coefficient provided in the table is based on the Mononobe-Okabe pseudo-static approach and only accounts for the dynamic horizontal thrust produced by ground motion. Hence, the resulting dynamic thrust pressure *should be added* to the static pressure to determine the total pressure on the wall. The pressure distribution of the dynamic horizontal thrust may be closely approximated as an inverted triangle with stress decreasing with depth and the resultant acting at a distance approximately 0.6 times the loaded height of the structure, measured upward from the bottom of the structure.

The coefficients shown assume a vertical wall face. Hydrostatic and surcharge loadings, if any, should be added. Over-compaction behind walls should be avoided. Resisting passive earth pressure from soils subject to frost or heave, or otherwise above prescribed minimum depths of embedment, should usually be neglected in design.

6.7 FOUNDATION DRAINAGE

Potentially saturated soils were encountered at a depth of 5 feet below the existing site grade. The IBC Section 1805 Dampproofing and Waterproofing recommends the construction of a foundation drain around any walls or portions thereof that retain earth and enclose spaces and floors below grade.

The foundation drain should consist of a 4 inch perforated pipe placed at or below the footing elevation. The pipe should be covered with at least 12 inches of free draining gravel (containing less than 5 percent passing the No 4 sieve) and be graded to a free gravity outfall or to a pumped sump. A separator fabric, such as Mirafi 140N, should separate the free draining gravel and native soil (i.e. the separator fabric should be placed between the gravel and the native soils at the bottom of the gravel, the side of the gravel where the gravel does not lie against the concrete footing or foundation and at the top of the gravel). We recommend that the gravel extend up the foundation wall to within 2 feet of the final ground surface. As an alternative, the gravel extending up the foundation wall may be replaced with a prefabricated drain panel, such as Ecodrain-E.

6.8 MOISTURE PROTECTION AND SURFACE DRAINAGE

Moisture should not be allowed to infiltrate the soils in the vicinity of the foundations. We recommend the following mitigation measures be implemented at the building location.

- The ground surface within 10 feet of the entire perimeter of the building should slope a minimum of five percent away from the structure.
- Roof runoff devices (rain gutters) should be installed to direct all runoff a minimum of 10 feet away from the structure and preferably day-lighted to the curb where it can be transferred to the storm drain system. Rain gutters discharging roof runoff adjacent to or within the near vicinity of the structure may result in excessive differential settlement.
- We do not recommend storm drain collection sumps be used as part of this development. However, if necessary, sumps should not be located adjacent to foundations or within roadway pavements.
- We recommend irrigation around foundations be minimized by selective landscaping and that irrigation valves be constructed at least 5 feet away from foundations.
- Jetting (injecting water beneath the surface) to compact backfill against foundation soils may result in excessive settlement beneath the building and is not allowed.

- Backfill against foundations walls should consist of on-site native fine-grained soils and should be placed in lifts and compacted to 90% modified proctor to create a moisture barrier.

Failure to comply with these recommendations could result in excessive total and differential settlements causing structural damage or below grade flooding.

6.9 PAVEMENT SECTION

A laboratory-obtained CBR value for the near surface subgrade soils of 5.8 was used in our analysis, indicating that the near-surface soils will provide relatively fair pavement support. No traffic information was available at the time this report was prepared, therefore, GeoStrata has assumed traffic counts for access roads and parking areas. We assumed that vehicle traffic in and out of paved area would consist of approximately 350 passenger car trips per day, 2 small trucks/busses per day, and 1 large truck per day with a 20 year design life. Based on these assumptions our analysis used 53,000 ESAL's for traffic over the life of the pavement. We have further assumed that the traffic will be relatively consistent over the design life of the pavement sections. Therefore, no growth factor was applied in calculation of loading for each pavement sections' design life. Based on the information obtained and the above mentioned assumptions, we recommend that one of the following pavement sections be constructed.

Flexible (Asphalt) Pavement Section – Holindrake Development

Asphalt Concrete (in.)	Untreated Road Base (in.)	Granular Borrow (in.)
3	6	10
3	14	0

Asphalt has been assumed to be a high stability plant mix; base course material should be composed of crushed stone with a minimum CBR of 70. Asphalt should be compacted to a minimum density of 96% of the Marshall value and base course should be compacted to at least 95% of the maximum dry density of the modified proctor. Untreated base should meet UDOT or Vineyard City specifications.

If traffic conditions vary significantly from our stated assumptions, GeoStrata 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 as necessary. The pavement section thickness above assumes that the majority of the 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, the owner should anticipate maintenance or a decrease in the design life of the pavement area.

Consideration should be given to thickening the pavement section in truck turn around areas, especially if the pavement section consists of asphalt. It has been our experience that truck turnaround areas show early pavement distress based on the turning of heavily loaded truck wheels. We recommend that in these areas the pavement section by increased from 3.5 inches of asphalt to 4 inches.

7.0 CLOSURE

7.1 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 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 the points explored. The nature and extent of variations may not be evident until construction occurs. 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, GeoStrata should be notified.

This report was prepared in accordance with the generally accepted standard of practice at the time the report was written. No other warranty, expressed or implied, is made.

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.

7.2 ADDITIONAL SERVICES

The recommendations made in this report are based on the assumption that an adequate program of tests and observations will be made during construction. GeoStrata staff should be on site to verify compliance with these recommendations. These tests and observations should include, but not necessarily be limited to, the following.

- Observations and testing during site preparation, earthwork and structural fill placement.
- Observation of foundation soils to assess their suitability for footing placement.
- Observation of soft/loose soils over-excavation.
- Observation of temporary excavations and shoring.
- Consultation as may be required during construction.
- Quality control and observation of concrete placement.

We also recommend that project plans and specifications be reviewed by us to verify compatibility with our conclusions and recommendations. Additional information concerning the scope and cost of these services can be obtained from our office.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding the report or wish to discuss additional services, please do not hesitate to contact us at your convenience at (801) 501-0583.

8.0 REFERENCES CITED

Black, B.D., Hecker, S., Hylland, M.D., Christenson, G.E., and McDonald G.N., 2003, Quaternary Fault and Fold Database and Map of Utah: Utah geological Survey Map 193DM.

Federal Emergency Management Agency [FEMA], 1997, *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures,* FEMA 302, Washington, D.C.

Frankel, A., Mueller, C., Barnard, T., Perkins, D., Leyendecker, E.V., Dickman, N., Hanson, S., and Hopper, M., 1996, *National Seismic-hazard Maps: Documentation*, U.S. Geological Survey Open-File Report 96-532, June.

Hecker, S., 1993, Quaternary Tectonics of Utah with Emphasis on Earthquake-Hazard Characterization: Utah Geological Survey Bulletin 127, 157p.

Hintze, L. F., 1980, Geologic Map of Utah: Utah Geological and Mineral Survey Map-A-1, scale 1:500,000.

Hintze, L.F., Willis, G.C., Laes, D.Y.M., 2000, Digital Geologic Map of Utah, Utah Geological Survey.

International Building Code [IBC], 2015, International Code Council, Inc.

Machette, M.N., 1992, Surficial Geologic Map of the Wasatch Fault Zone, Eastern Part of Utah Valley, Utah County and Parts of Salt Lake and Juab Counties, Utah, U.S. Geological Survey, Miscellaneous Investigations Series, Map I-2095

Stokes, W.L., 1986, Geology of Utah, Utah Museum of Natural History, University of Utah and Utah Geological and Mineral Survey, Department of Natural Resources: Occasional paper number 6.

1000 0 1000 2000 3000 4000 ft

GeoStrata
Copyright, 2018

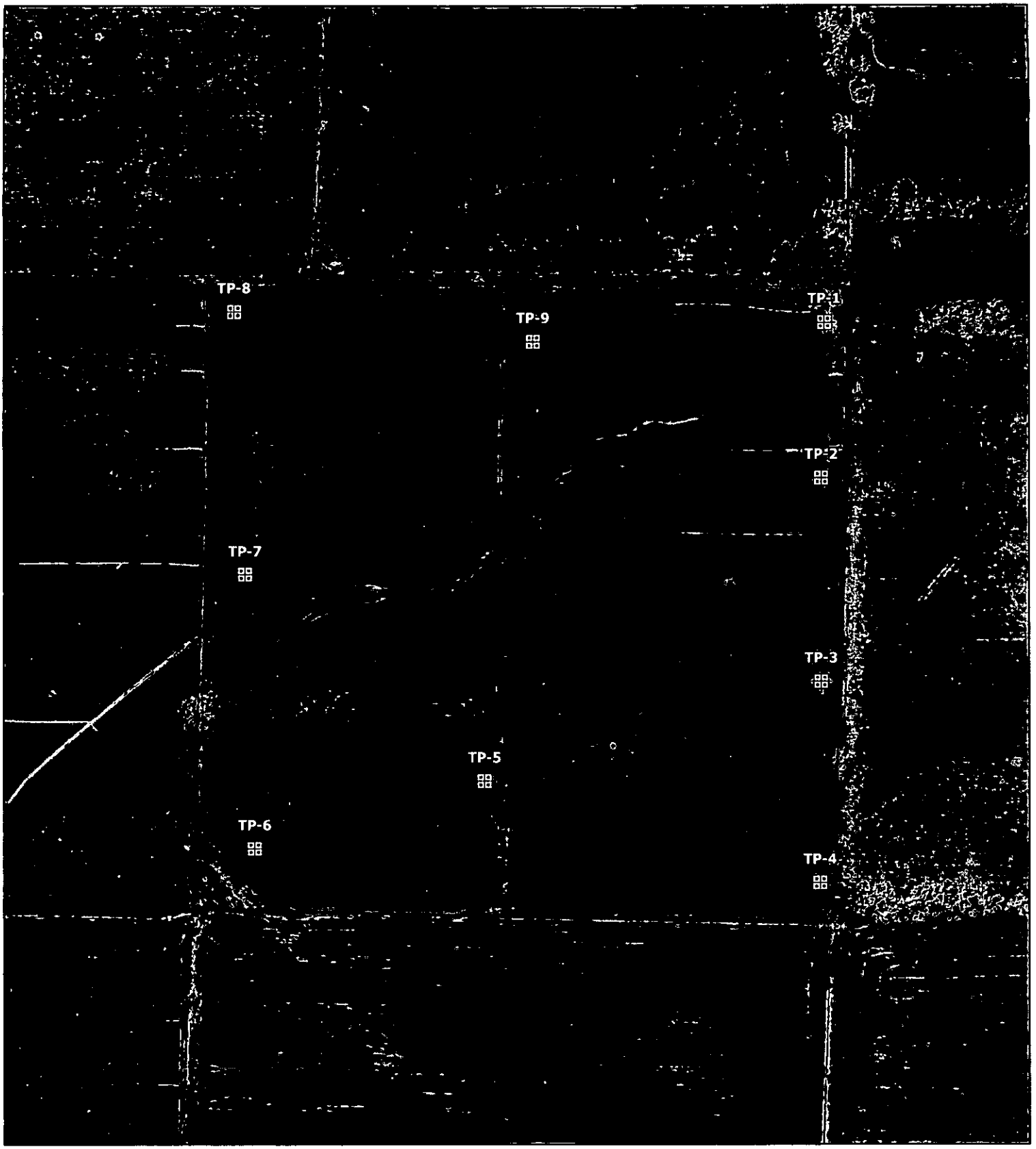
Legend

Approximate Site Boundary

Keystone Construction
Holindrake Subdivision
American Fork, UT
Project Number: 1012-015

Site Vicinity Map

Plate A-1



100 0 100 200 300 400 ft

1:2,000

Legend

Approximate Site Boundary

Approximate Test Pit Location

Keystone Construction
Holindrake Subdivision
American Fork, UT
Project Number: 1012-015

Exploration Location Map

Plate A-2

DATE
STARTED: 11/27/17
COMPLETED: 11/27/17
BACKFILLED: 11/27/17

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number 1012-015

GeoStrata Rep: J.P.
Rig Type: Mini-ex

TEST PIT NO:
TP-1
Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0					TOPSOIL: Clayey SILT - dark brown, moist						
					CL	Lean CLAY - stiff, brown, moist to wet						
1			▼									
	5											
2												
					CL	Sandy Lean CLAY with gravel - stiff, black, wet, subrounded gravels up to 2.5 inches in diameter			63.6	36	12	⊢●
3	10					Bottom of Test Pit @ 12 Feet						

LOG OF TEST PITS (B) TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18

GeoStrata

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
▼ - MEASURED
▽ - ESTIMATED

NOTES:

Plate
B-1

DATE: STARTED: 11/27/17; COMPLETED: 11/27/17; BACKFILLED: 11/27/17

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number 1012-015

GeoStrata Rep: J.P.
Rig Type: Mini-ex

TEST PIT NO: TP-2
Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index
0	0					TOPSOIL: SILT - greyish brown, moist					
					ML	SILT - medium stiff, grey-brown, moist, pinhole structures throughout					
1											
	5		▽		GW	Well-Graded GRAVEL - medium dense, moist to wet, sub-rounded gravels up to 4 inches in diameter					
2						- Refusal		1.9	3.9		
						Bottom of Test Pit @ 7.5 Feet					
3	10										

Moisture Content and Atterberg Limits

Plastic Limit — Moisture Content — Liquid Limit

10 20 30 40 50 60 70 80 90

LOG OF TEST PITS (B) TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18

GeoStrata

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate B-2

DATE: STARTED: 11/27/17 | COMPLETED: 11/27/17 | BACKFILLED: 11/27/17

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number 1012-015

GeoStrata Rep: J.P.
Rig Type: Mini-ex

TEST PIT NO: TP-3
Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index
0	0					TOPSOIL; SILT - greyish brown, moist					
					GP	Poorly Graded GRAVEL with sand - medium dense, moist to wet, sub-rounded gravels up to 4 inches in diameter					
1											
	5		▽			- Gravels moderately cemented					
2											
					ML	SILT with sand - medium stiff, grey-brown, wet		28.1	85.0	NP	NP
3	10					Bottom of Test Pit @ 10 Feet					

Moisture Content and Atterberg Limits

Plastic Limit — Moisture Content — Liquid Limit

10 20 30 40 50 60 70 80 90

LOG OF TEST PITS (B) TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18

GeoStrata

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate
B-3

DATE
STARTED: 11/27/17
COMPLETED: 11/27/17
BACKFILLED: 11/27/17

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number 1012-015

GeoStrata Rep: J.P.
Rig Type: Mini-ex

TEST PIT NO:
TP-4
Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0					TOPSOIL; SILT - greyish brown, moist						
					ML	SILT - medium stiff, grey-brown, moist, pinhole structures throughout						
1												
					GP	Poorly Graded GRAVEL with sand - medium dense, moist to wet, sub-rounded gravels up to 4 inches in diameter						
2	5		▽									
					SM	Silty SAND - medium dense, grey-brown, wet, iron staining throughout		24.5	48.4	NP	NP	●
3	10					Bottom of Test Pit @ 10 Feet						

LOG OF TEST PITS (B) TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18

GeoStrata

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
▼ - MEASURED
▽ - ESTIMATED

NOTES:

Plate
B-4

DATE
STARTED: 11/27/17
COMPLETED: 11/27/17
BACKFILLED: 11/27/17

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number 1012-015

GeoStrata Rep: J.P.
Rig Type: Mini-ex

TEST PIT NO:
TP-5
Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index
0	0					TOPSOIL: SILT - greyish brown, moist					
					ML	SILT - medium stiff, grey brown, moist, pinhole structures throughout - Pocket Penetometer 3.0-4.5 tons/sq.ft.					
1					CL	Lean CLAY with sand - stiff, medium brown, moist to very moist, minor iron staining throughout - Pocket Penetometer 0.1-0.5 tons/sq.ft.	93.7	26.3	74.3	33	14
	5		▼			Silty SAND - dense, medium brown with tan mottling, wet, minor iron staining throughout					
2					GP	Poorly Graded GRAVEL with sand - medium dense, moist to wet, sub-rounded gravels up to 3 inches in diameter					
						Bottom of Test Pit @ 8.5 Feet					
3	10										

Moisture Content and Atterberg Limits

Plastic Limit — Moisture Content — Liquid Limit

10 20 30 40 50 60 70 80 90

LOG OF TEST PITS (B) TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18

GeoStrata

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
▼ - MEASURED
▽ - ESTIMATED

NOTES:

Plate B-5

DATE: STARTED: 11/27/17 | COMPLETED: 11/27/17 | BACKFILLED: 11/27/17

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number 1012-015

GeoStrata Rep: J.P.
Rig Type: Mini-ex

TEST PIT NO: TP-6
Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index
0	0					TOPSOIL: SILT - greyish brown, moist					
					ML	SILT - medium stiff, grey brown, moist, pinhole structures throughout					
					GM	Silty GRAVEL - dense, brown, moist, sub-rounded gravels up to 4 inches in diameter - Pocket Penetometer 4.75 tons/sq.ft.					
1					CL	Lean CLAY - medium stiff, brown, moist, innerbedded lenses of fine to medium grained sand - Pocket Penetometer 0.1-0.5 tons/sq.ft.					
	5		▼								
2						- Pocket Penetometer 0.25 tons/sq.ft.					
							94.4	29.6			
3	10					Bottom of Test Pit @ 10 Feet					

Moisture Content and Atterberg Limits

Plastic Limit — Moisture Content — Liquid Limit

10 20 30 40 50 60 70 80 90

LOG OF TEST PITS (B) TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18

GeoStrata

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate
B-6

DATE
STARTED: 11/27/17
COMPLETED: 11/27/17
BACKFILLED: 11/27/17

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number 1012-015

GeoStrata Rep: J.P.
Rig Type: Mini-ex

TEST PIT NO: TP-7
Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index
0	0					TOPSOIL: SILT - greyish brown, moist					
					CL	Sandy Lean CLAY - medium stiff, grey-brown, moist					
						- Pocket Penetometer 1.75-2.0 tons/sq.ft.					
1											
	5					- Pocket Penetometer 0.75-1.0 tons/sq.ft.	101.4	23.2	67.7	32	11
			▽		ML	Sandy SILT - stiff, grey, very moist to wet, roots throughout					
2						- Pocket Penetometer 0.25-1.0 tons/sq.ft.					
3						- Pocket Penetometer 0.25-1.0 tons/sq.ft.					
	10					Bottom of Test Pit @ 10 Feet					

Moisture Content and Atterberg Limits

Plastic Limit — Moisture Content — Liquid Limit

10 20 30 40 50 60 70 80 90

LOG OF TEST PITS (B) TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18

GeoStrata

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
▼ - MEASURED
▽ - ESTIMATED

NOTES:

Plate
B-7

DATE
STARTED: 11/27/17
COMPLETED: 11/27/17
BACKFILLED: 11/27/17

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number 1012-015

GeoStrata Rep: J.P.
Rig Type: Mini-ex

TEST PIT NO: TP-8
Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density (pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index
0	0					TOPSOIL; SILT - greyish brown, moist					
					CL	Lean CLAY with sand - stiff, brown, moist to wet					
1						- Pocket Penetometer 4.5 tons/sq.ft.	91.8	20.9	79.5	38	17
	5		▽			- Pocket Penetometer .25 tons/sq.ft.		26.1	68.3	28	4
2					ML	Sandy SILT - soft, grey, wet, minor roots thoughout					
3	10					Bottom of Test Pit @ 10.5 Feet					

Moisture Content and Atterberg Limits

Plastic Limit | Moisture Content | Liquid Limit

10 20 30 40 50 60 70 80 90

LOG OF TEST PITS (B) TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18

GeoStrata

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
▼ - MEASURED
▽ - ESTIMATED

NOTES:

Plate
B-8

DATE
STARTED: 11/27/17
COMPLETED: 11/27/17
BACKFILLED: 11/27/17

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number 1012-015

GeoStrata Rep: J.P.
Rig Type: Mini-ex

TEST PIT NO:
TP-9
Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index
0	0					TOPSOIL; SILT - greyish brown, moist					
					CL	Lean CLAY with sand - stiff, brown, moist					
1							83.9	18.7			
	5										
2					ML	Sandy SILT - stiff, grey, wet					
						Bottom of Test Pit @ 9 Feet					
3	10										

Moisture Content and Atterberg Limits

Plastic Limit | Moisture Content | Liquid Limit

10 20 30 40 50 60 70 80 90

LOG OF TEST PITS (B) TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18

GeoStrata

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate
B-9

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			USCS SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	GRAVELS (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS (More than half of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
			SC	CLAYEY SANDS SAND-GRAVEL-CLAY MIXTURES
FINE GRAINED SOILS (More than half of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid limit less than 50)		ML	INORGANIC SILTS & VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid limit greater than 50)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

LOG KEY SYMBOLS

- BORING SAMPLE LOCATION
- TEST-PIT SAMPLE LOCATION
- WATER LEVEL (level after completion)
- WATER LEVEL (level where first encountered)

CEMENTATION

DESCRIPTION	DESCRIPTION
WEAKELY	CRUMBLES OR BREAKS WITH HANDLING OR SLIGHT FINGER PRESSURE
MODERATELY	CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE
STRONGLY	WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE

OTHER TESTS KEY

C	CONSOLIDATION	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	DS	DIRECT SHEAR
UC	UNCONFINED COMPRESSION	T	TRIAXIAL
S	SOLUBILITY	R	RESISTIVITY
O	ORGANIC CONTENT	RV	R-VALUE
CBR	CALIFORNIA BEARING RATIO	SU	SOLUBLE SULFATES
COMP	MOISTURE/DENSITY RELATIONSHIP	PM	PERMEABILITY
CI	CALIFORNIA IMPACT	-200	% FINER THAN #200
COL	COLLAPSE POTENTIAL	Gs	SPECIFIC GRAVITY
SS	SHRINK SWELL	SL	SWELL LOAD

MODIFIERS

DESCRIPTION	%
TRACE	<5
SOME	5 - 12
WITH	>12

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
DRY	ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH
MOIST	DAMP BUT NO VISIBLE WATER
WET	VISIBLE FREE WATER, USUALLY SOIL BELOW WATER TABLE

STRATIFICATION

DESCRIPTION	THICKNESS	DESCRIPTION	THICKNESS
SEAM	1/16 - 1/2"	OCCASIONAL	ONE OR LESS PER FOOT OF THICKNESS
LAYER	1/2 - 12"	FREQUENT	MORE THAN ONE PER FOOT OF THICKNESS

GENERAL NOTES

1. Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual.
2. No warranty is provided as to the continuity of soil conditions between individual sample locations.
3. Logs represent general soil conditions observed at the point of exploration on the date indicated.
4. In general, Unified Soil Classification designations presented on the logs were evaluated by visual methods only. Therefore, actual designations (based on laboratory tests) may vary.

APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPT (blows/ft)	MODIFIED CA. SAMPLER (blows/ft)	CALIFORNIA SAMPLER (blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
VERY LOOSE	<4	<4	<5	0 - 15	EASILY PENETRATED WITH 1/2-INCH REINFORCING ROD PUSHED BY HAND
LOOSE	4 - 10	5 - 12	5 - 15	15 - 35	DIFFICULT TO PENETRATE WITH 1/2-INCH REINFORCING ROD PUSHED BY HAND
MEDIUM DENSE	10 - 30	12 - 35	15 - 40	35 - 65	EASILY PENETRATED A FOOT WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER
DENSE	30 - 50	35 - 60	40 - 70	65 - 85	DIFFICULT TO PENETRATED A FOOT WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER
VERY DENSE	>50	>60	>70	85 - 100	PENETRATED ONLY A FEW INCHES WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER

CONSISTENCY - FINE-GRAINED SOIL

CONSISTENCY	SPT (blows/ft)	TORVANE UNTRAINED SHEAR STRENGTH (tsf)	POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf)	FIELD TEST
VERY SOFT	<2	<0.125	<0.25	EASILY PENETRATED SEVERAL INCHES BY THUMB. EXUDES BETWEEN THUMB AND FINGERS WHEN SQUEEZED BY HAND.
SOFT	2 - 4	0.125 - 0.25	0.25 - 0.5	EASILY PENETRATED ONE INCH BY THUMB. MOLDED BY LIGHT FINGER PRESSURE.
MEDIUM STIFF	4 - 8	0.25 - 0.5	0.5 - 1.0	PENETRATED OVER 1/2 INCH BY THUMB WITH MODERATE EFFORT. MOLDED BY STRONG FINGER PRESSURE.
STIFF	8 - 15	0.5 - 1.0	1.0 - 2.0	INDENTED ABOUT 1/2 INCH BY THUMB BUT PENETRATED ONLY WITH GREAT EFFORT.
VERY STIFF	15 - 30	1.0 - 2.0	2.0 - 4.0	READILY INDENTED BY THUMBNAIL.
HARD	>30	>2.0	>4.0	INDENTED WITH DIFFICULTY BY THUMBNAIL.

GeoStrata

Soil Symbols Description Key

Keystone Construction
Holindrake Subdivision
American Fork, UT
Project Number: 1012-015

Plate B-10

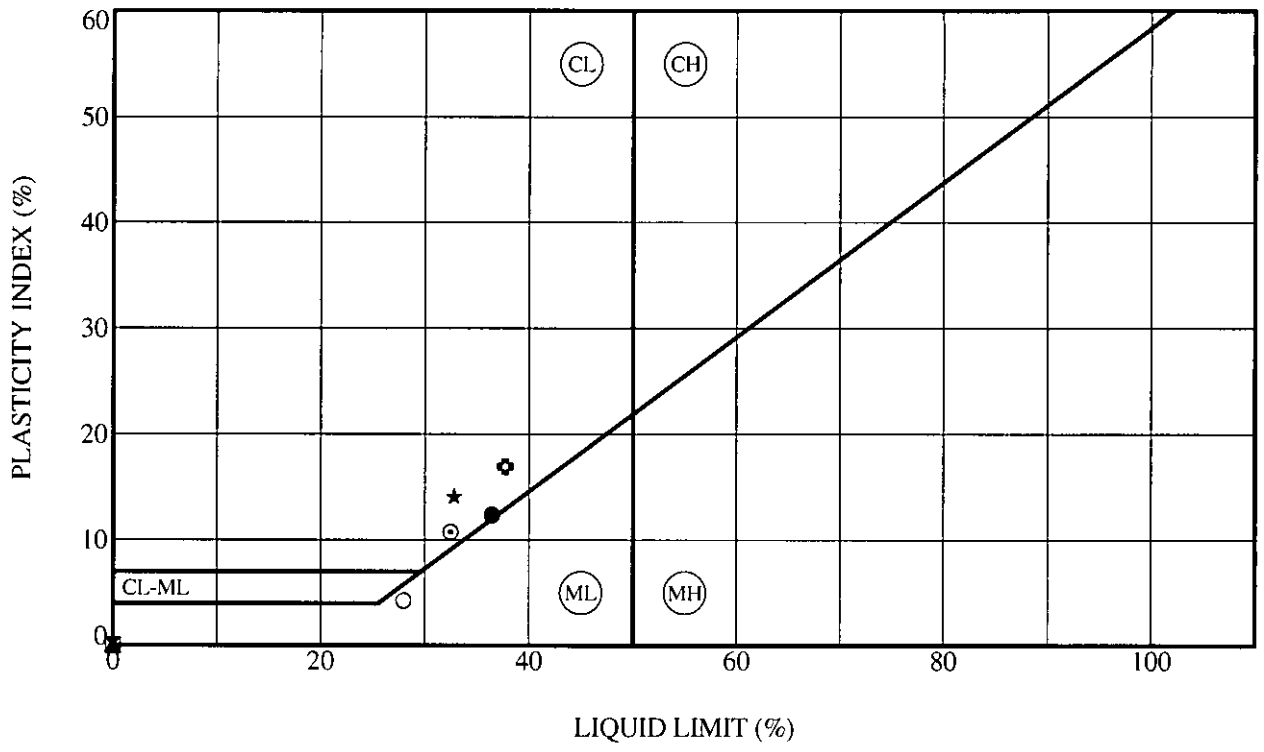
Test Pit No.	Sample Depth (feet)	USCS Soil Classification	Natural Moisture Content (%)	Natural Dry Density (pcf)	Optimum Moisture Content (%)	Maximum Dry Density (pcf)	Gradation			Atterberg		Consolidation			Collapse (%)	CBR (%)	Sulfate Content (ppm)	Resistivity (Ω-cm)	pH
							Gravel (%)	Sand (%)	Fines (%)	LL	PI	Cc	Cr	OCR					
TP-1	7.5	CL	41.4	80.1	17.2	108	16.1	20.3	63.6	36	12	0.145	0.028	2.3		5.8			
TP-2	6.5	GW	1.9				88.7	7.4	3.9										
TP-3	9	ML	28.1				0.0	0.0	85.0	NP	NP								
TP-4	9	SM	24.5				0.0	0.0	48.4	NP	NP								
TP-5	4.5	CL	26.3	93.7			0.0	0.0	74.3	33	14				0.00				
TP-6	9	CL	29.6	94.4								0.092	0.012	1.0					
TP-7	5	CL	23.2	101.4			0.0	0.0	67.7	32	10								
TP-8	3	CL	20.9	91.8			0.0	0.0	79.5	38	17				0.01				
TP-8	5	ML	26.1				0.0	0.0	68.3	28	4								
TP-8	10	ML																1400	8.31
TP-9	3.5	ML	18.7	83.9								0.159	0.026	5.0					

GeoStrata

Lab Summary Report

Keystone Construction
Holindrake Subdivision
American Fork, UT
Project Number: 1012-015

Plate C - 1



Sample Location		Depth (ft)	LL (%)	PL (%)	PI (%)	Fines (%)	Classification
●	**TP-1**	**7.5**	**36**	**24**	**12**	**63.6**	**Sandy Lean CLAY with gravel**
⊠	**TP-3**	**9.0**	**NP**	**NP**	**NP**	**85.0**	**SILT with sand**
▲	**TP-4**	**9.0**	**NP**	**NP**	**NP**	**48.4**	**Silty SAND**
★	**TP-5**	**4.5**	**33**	**19**	**14**	**74.3**	**Lean CLAY with sand**
⊙	**TP-7**	**5.0**	**32**	**22**	**10**	**67.7**	**Sandy Lean CLAY**
✿	**TP-8**	**3.0**	**38**	**21**	**17**	**79.5**	**Lean CLAY with sand**
○	**TP-8**	**5.0**	**28**	**24**	**4**	**68.3**	**Sandy SILT**

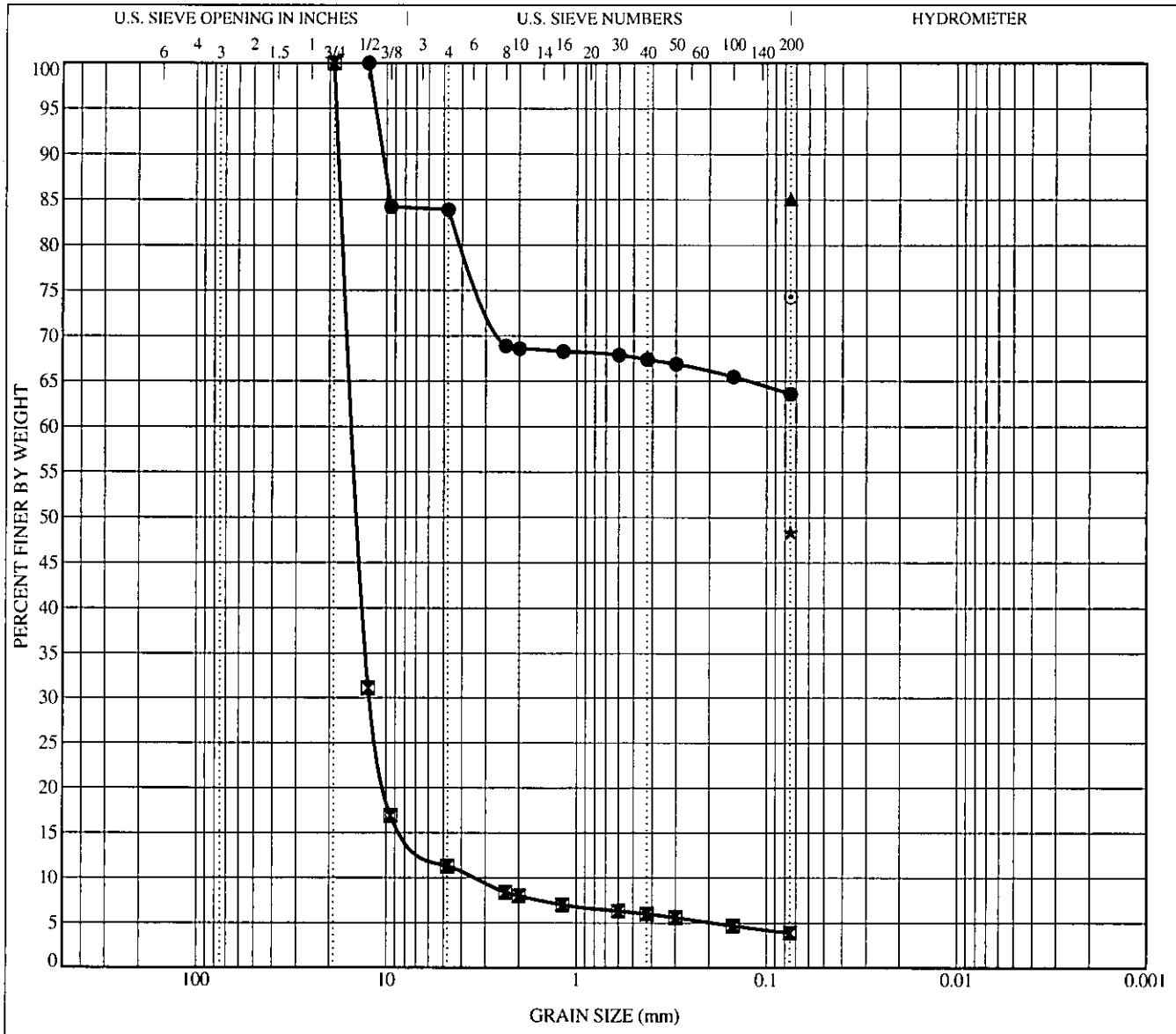
ATTERBERG LIMITS' RESULTS - ASTM D 4318

GeoStrata

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number: 1012-015

Plate
C - 2

C_ATTERBERG TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Location	Depth	Classification	LL	PL	PI	Cc	Cu
●	TP-1	7.5	Sandy Lean CLAY with gravel	36	24	12		
⊠	TP-2	6.5	Well-Graded GRAVEL				2.90	4.29
▲	TP-3	9.0	SILT with sand	NP	NP	NP		
★	TP-4	9.0	Silty SAND	NP	NP	NP		
⊙	TP-5	4.5	Lean CLAY with sand	33	19	14		

	Sample Loctaion	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-1	7.5	12.5				16.1	20.3	63.6	
⊠	TP-2	6.5	19	14.9	12.237	3.471	88.7	7.4	3.9	
▲	TP-3	9.0	0.075				0.0	0.0	85.0	
★	TP-4	9.0	0.075				0.0	0.0	48.4	
⊙	TP-5	4.5	0.075				0.0	0.0	74.3	

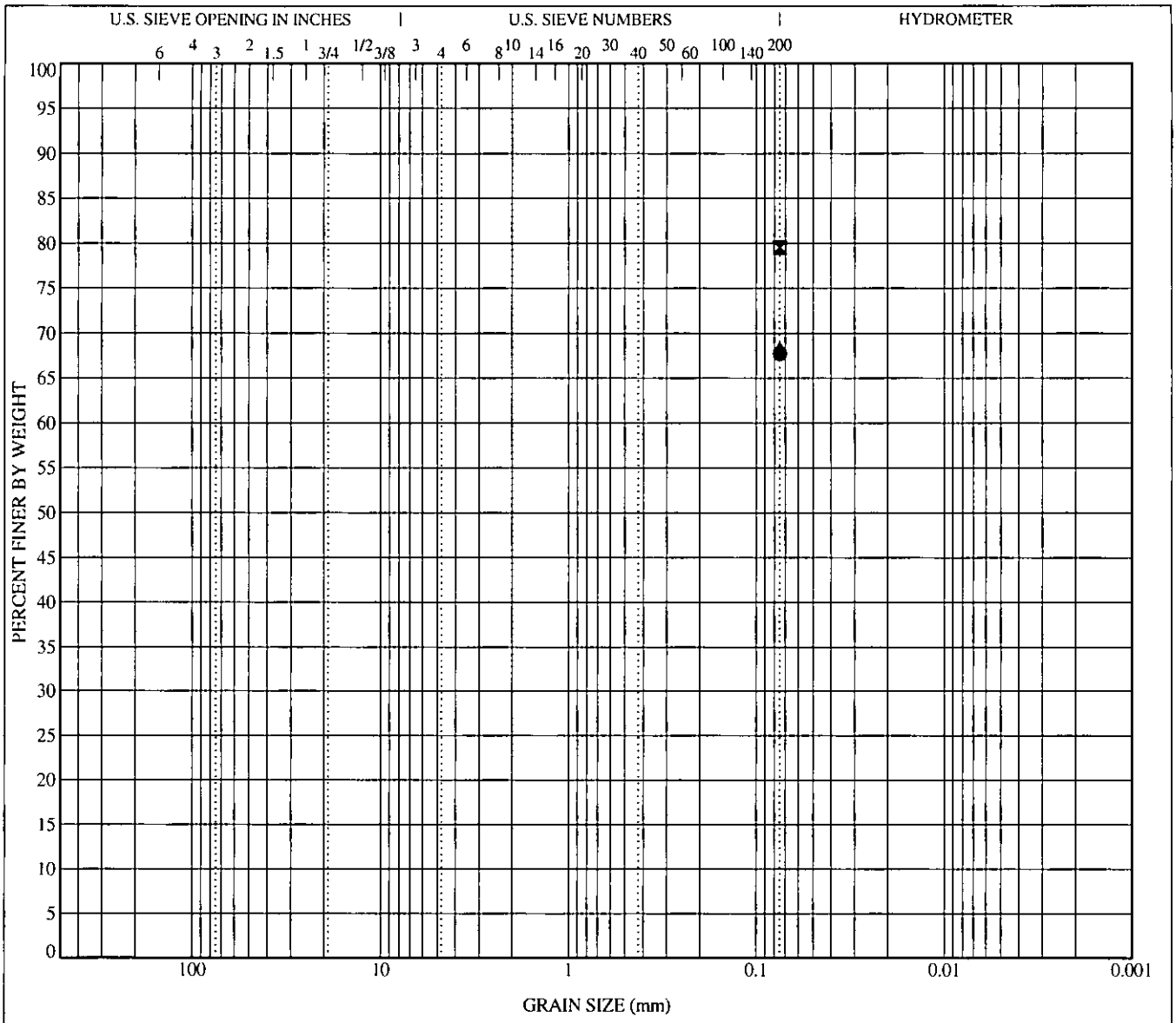
GeoStrata

GRAIN SIZE DISTRIBUTION - ASTM D422

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number: 1012-015

Plate
C - 3

C_GSD TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Sample Location	Depth	Classification	LL	PL	PI	Cc	Cu
●	TP-7	5.0	Sandy Lean CLAY	32	22	10		
⊠	TP-8	3.0	Lean CLAY with sand	38	21	17		
▲	TP-8	5.0	Sandy SILT	28	24	4		

	Sample Loctaion	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-7	5.0	0.075				0.0	0.0	67.7	
⊠	TP-8	3.0	0.075				0.0	0.0	79.5	
▲	TP-8	5.0	0.075				0.0	0.0	68.3	

C_GSD TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/15/18

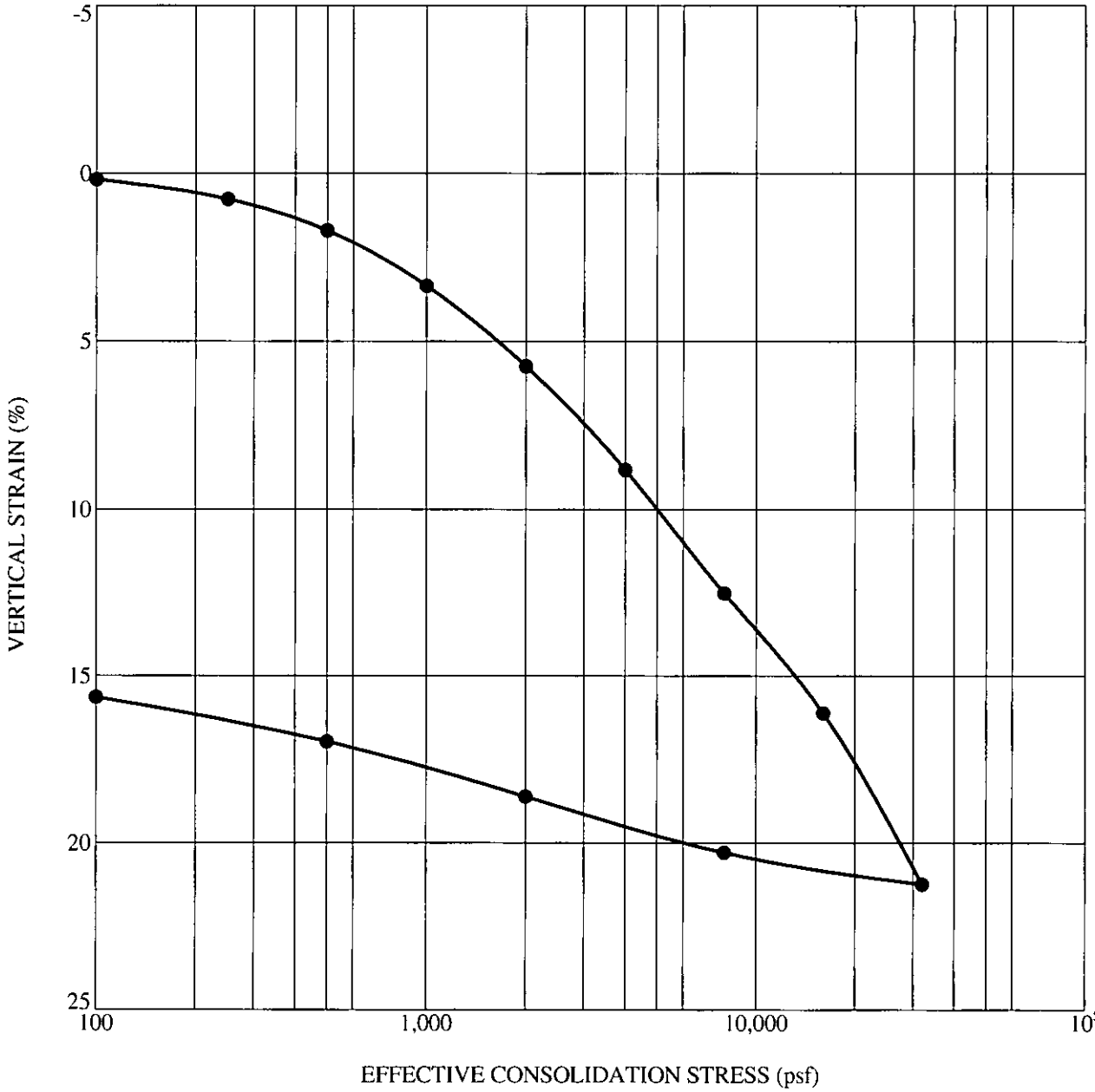
GeoStrata

GRAIN SIZE DISTRIBUTION - ASTM D422

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number: 1012-015

Plate

C - 4



	Sample Location	Depth (ft)	Classification	γ_d (pcf)	MC (%)	C'_c	C'_r	OCR
●	**TP-1**	**7.5**	**Sandy Lean CLAY with gravel**	**80**	**41**	**0.145**	**0.028**	**2.3**

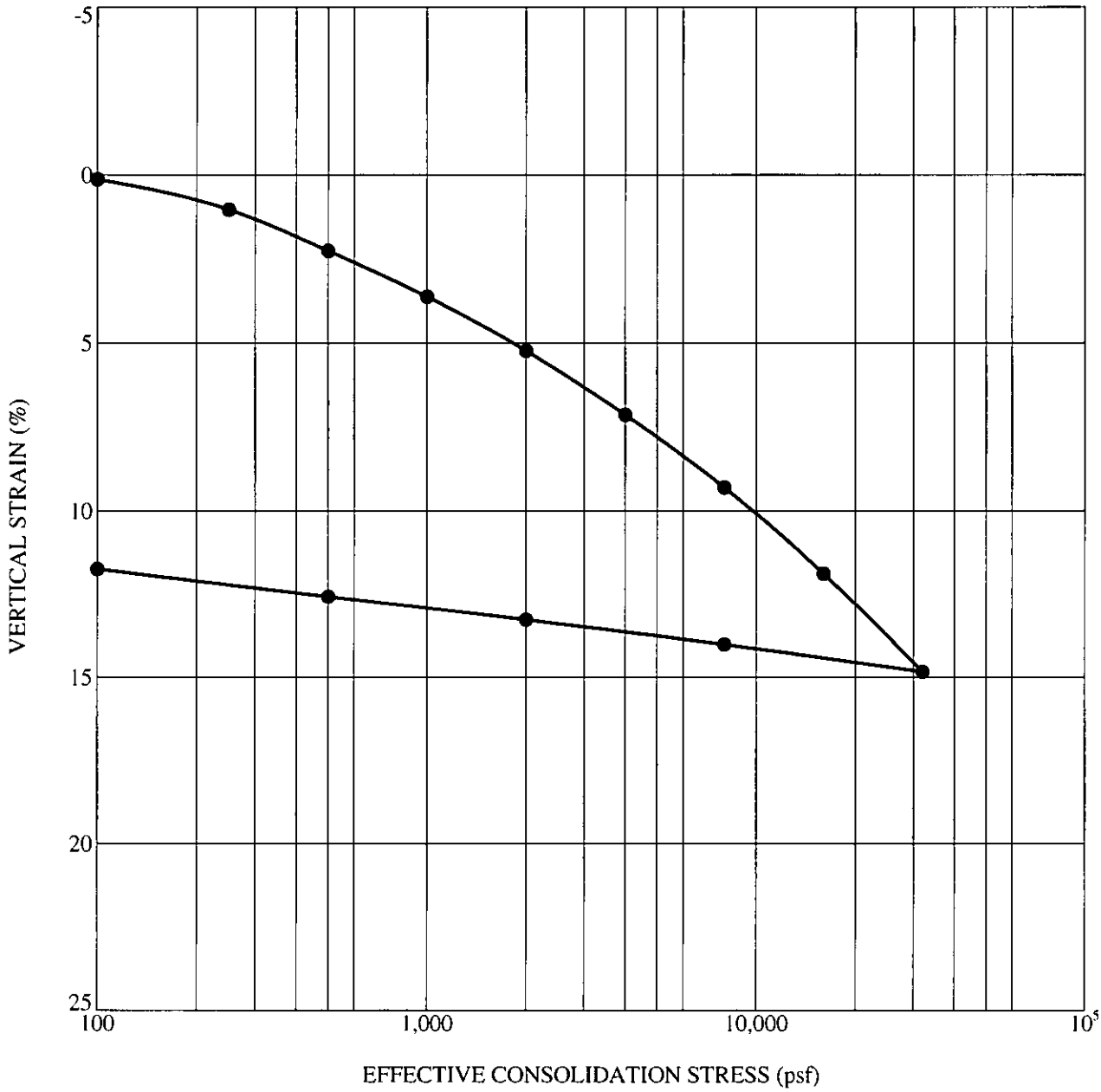
1-D CONSOLIDATION TEST - ASTM D 2435

GeoStrata

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number: 1012-015

Plate
C - 5

C_CONSOL TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/17/18



	Sample Location	Depth (ft)	Classification	γ_d (pcf)	MC (%)	C_c	C_r	OCR
●	**TP-6**	**9.0**	**Lean CLAY**	**88**	**30**	**0.092**	**0.012**	**1.0**

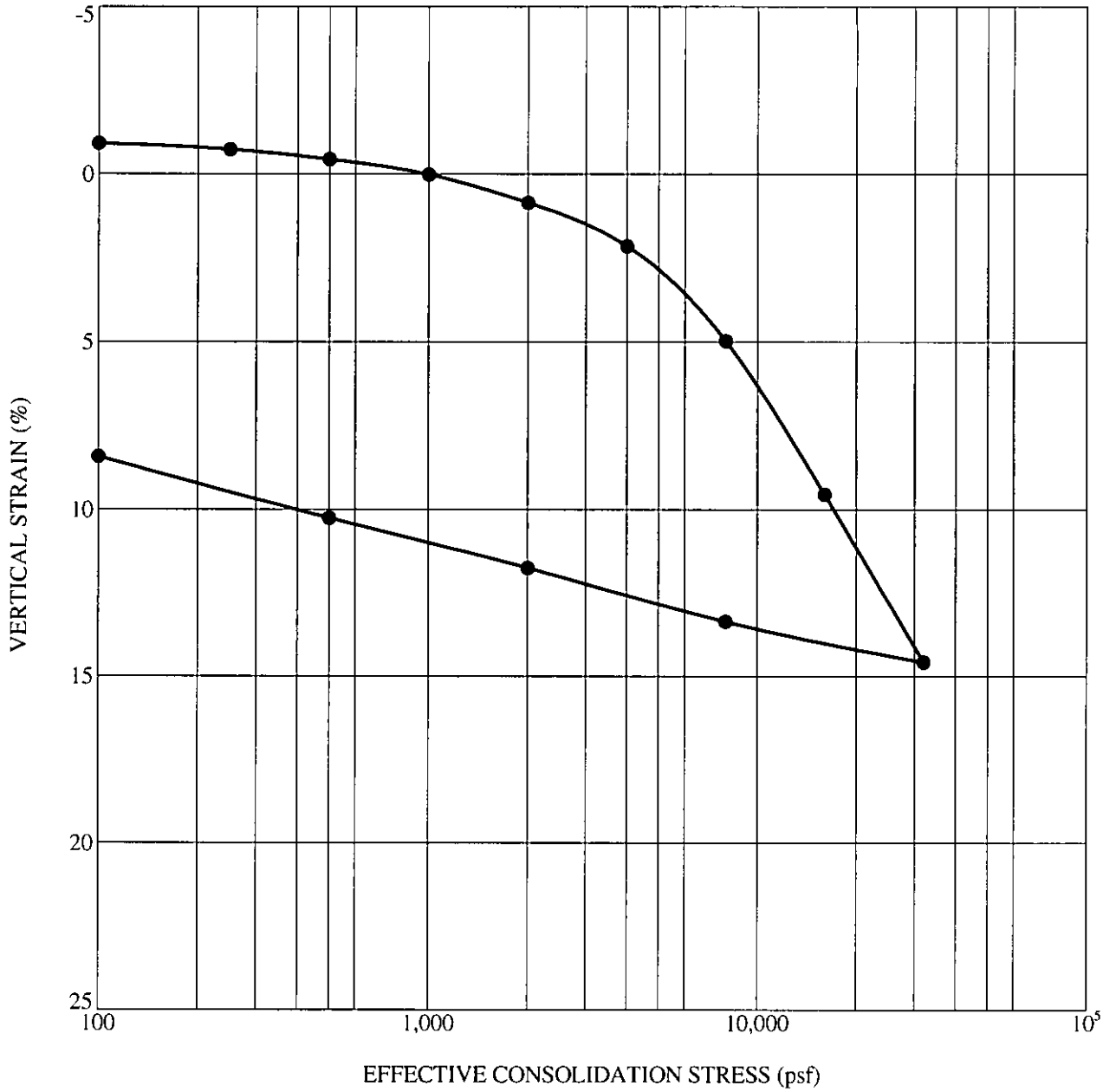
1-D CONSOLIDATION TEST - ASTM D 2435

GeoStrata

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number: 1012-015

Plate
C - 6

C_CONSOL TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/17/18



	Sample Location	Depth (ft)	Classification	γ_d (pcf)	MC (%)	C'_c	C'_r	OCR
●	**TP-9**	**3.5**	**SILT**	**84**	**19**	**0.159**	**0.026**	**5.0**

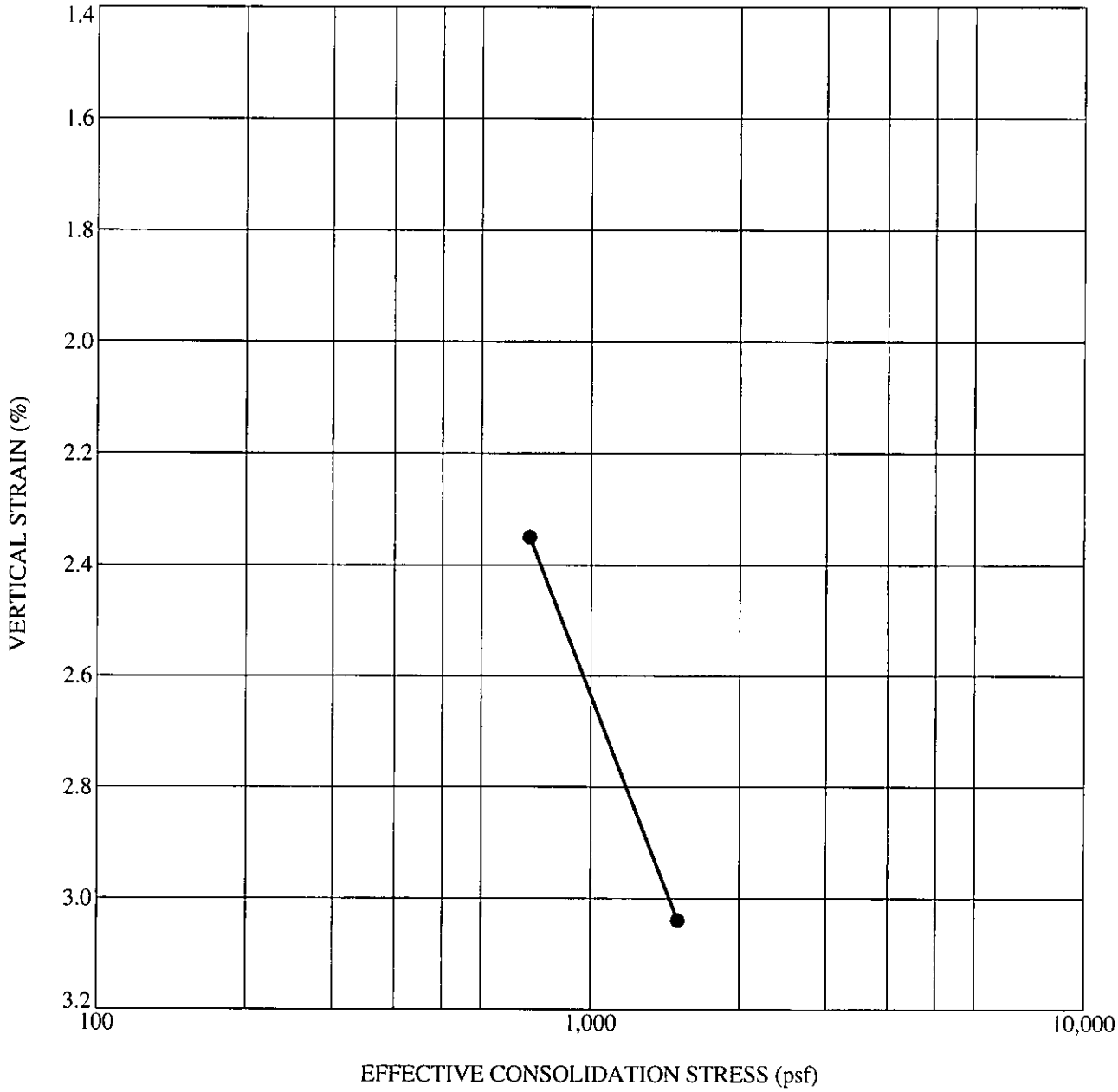
1-D CONSOLIDATION TEST - ASTM D 2435

GeoStrata

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number: 1012-015

Plate
C - 7

C_CONSOL TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/17/18



Sample Location	Depth (ft)	Classification	γ_d (pcf)	MC (%)	Inundation Load (psf)	Swell (%)	Collapse (%)
● TP-5	4.5	Lean CLAY with sand	94	29	1000	---	0.00

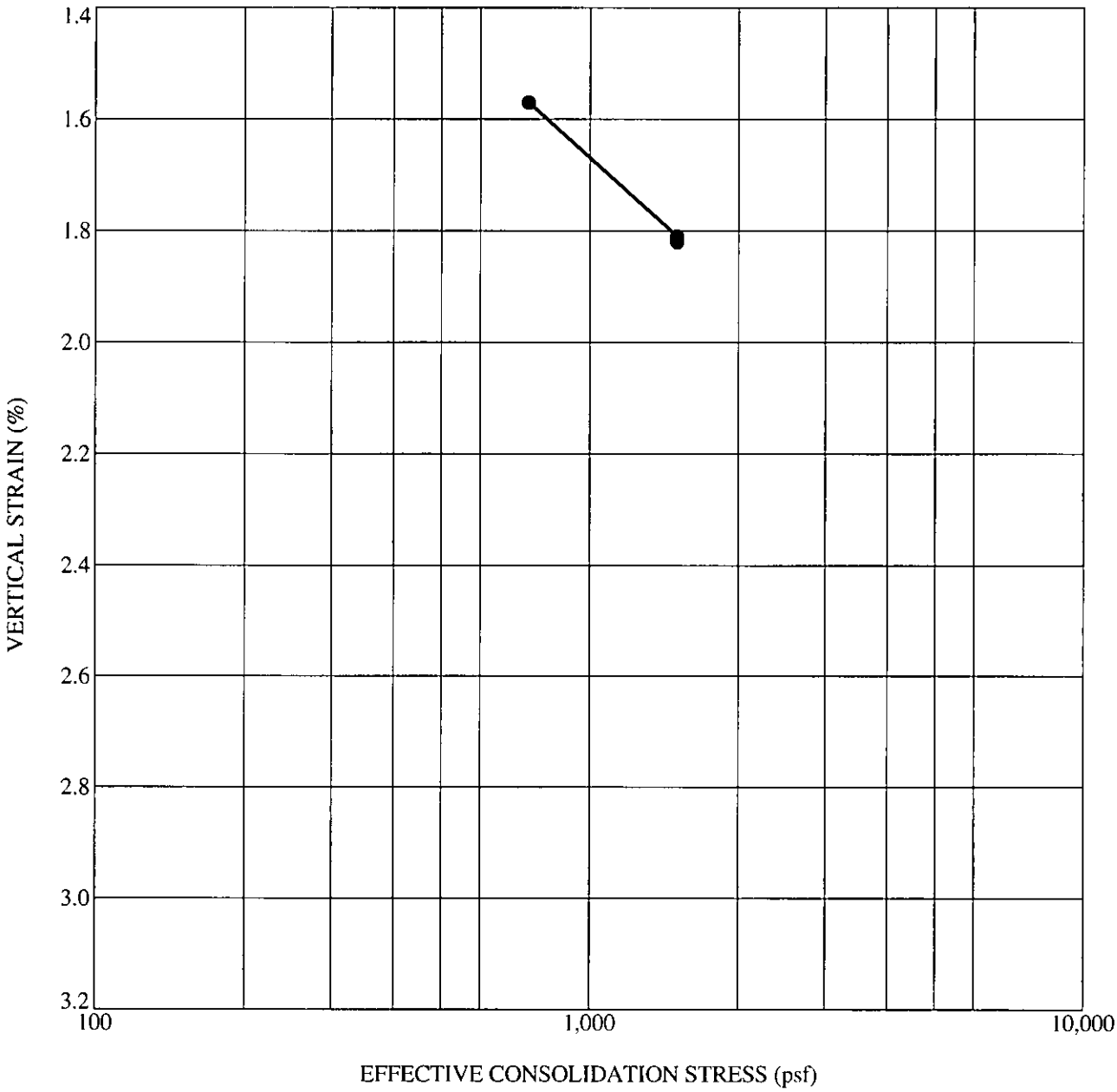
GeoStrata

1-D SWELL/COLLAPSE TEST

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number: 1012-015

Plate
C - 8

C_SWELL/COLLAPSE TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/17/18



Sample Location	Depth (ft)	Classification	γ_d (pcf)	MC (%)	Inundation Load (psf)	Swell (%)	Collapse (%)
● TP-8	3.0	Lean CLAY with sand	92	22	1000	---	0.01

GeoStrata

1-D SWELL/COLLAPSE TEST

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number: 1012-015

Plate
C - 9

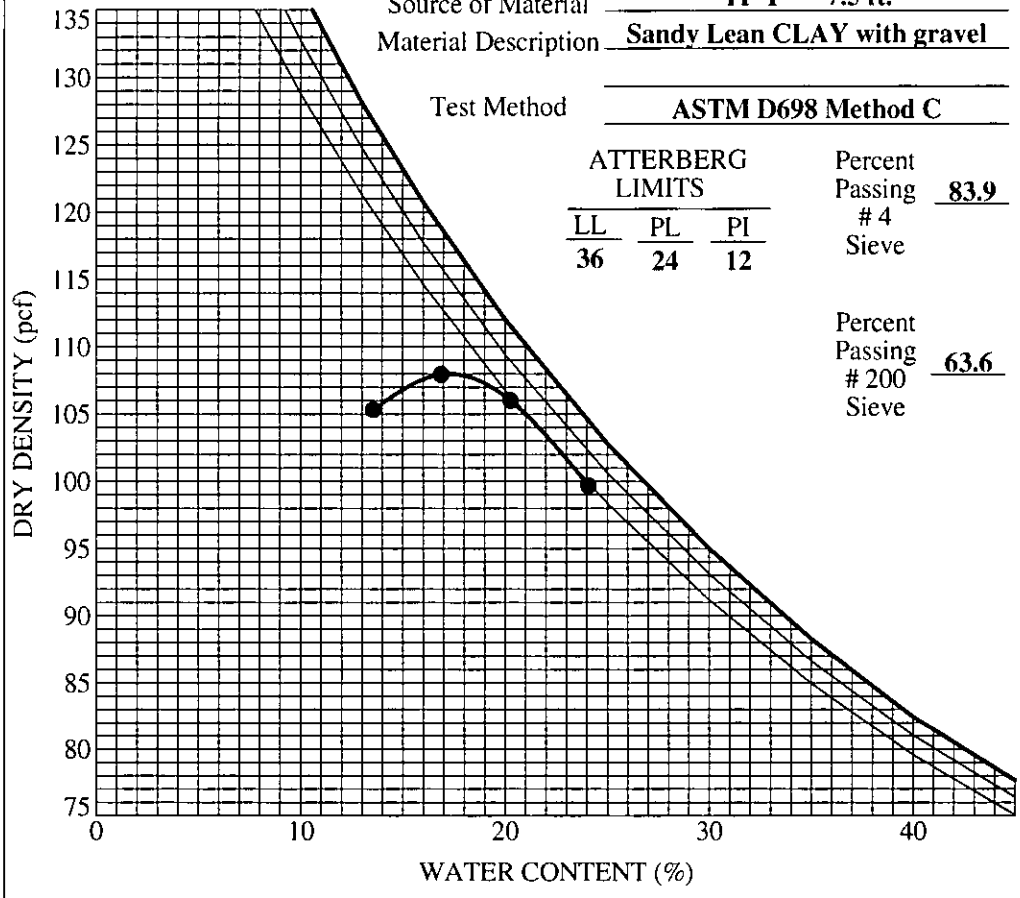
C_SWELL/COLLAPSE TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/17/18

Source of Material: TP-1 7.5 ft.
Material Description: Sandy Lean CLAY with gravel
Test Method: ASTM D698 Method C

ATTERBERG LIMITS

LL	PL	PI
36	24	12

Percent Passing # 4 Sieve: 83.9
Percent Passing # 200 Sieve: 63.6

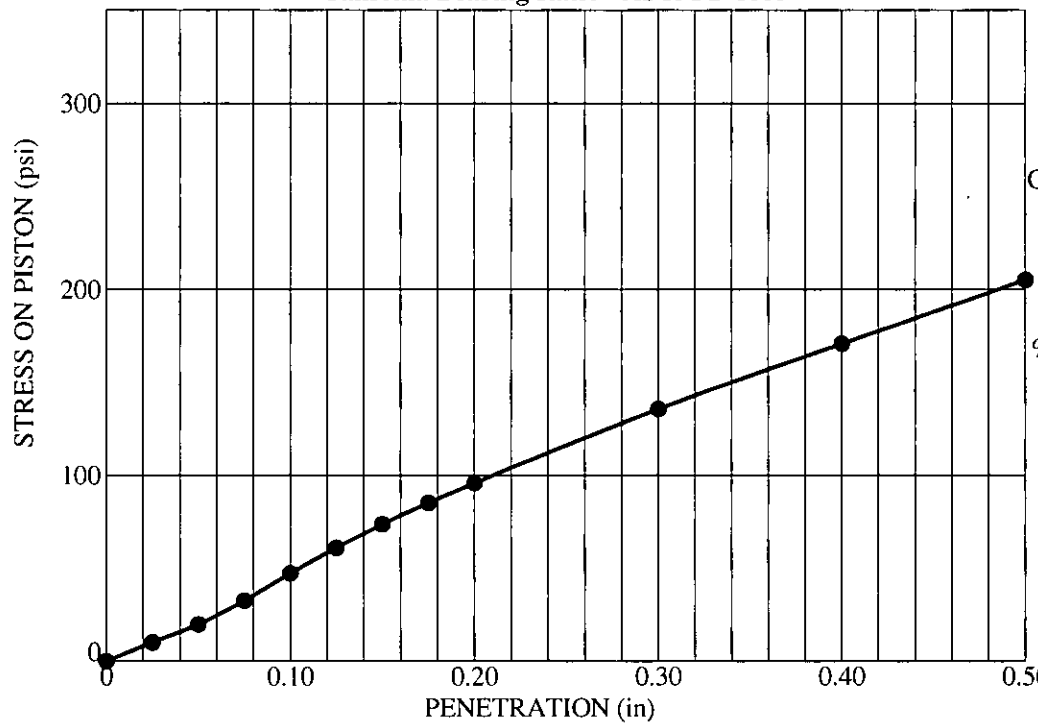


TEST RESULTS

Maximum Dry Density	108.0 (pcf)
Optimum Water Content	17.2 (%)
Percent Rock	(%)
Corrected Maximum Dry Density	(pcf)
Corrected Optimum Water Content	(%)

Curves of 100% Saturation for Specific Gravity Equal to:
2.60, 2.70, 2.80

Califonia Bearing Ratio - ASTM D 1883



Dry Density	108.0 (pcf)
Relative Compaction	98 (%)
Surcharge	50 (psf)
% Standard CBR	5.80
Swell	0.76 (%)

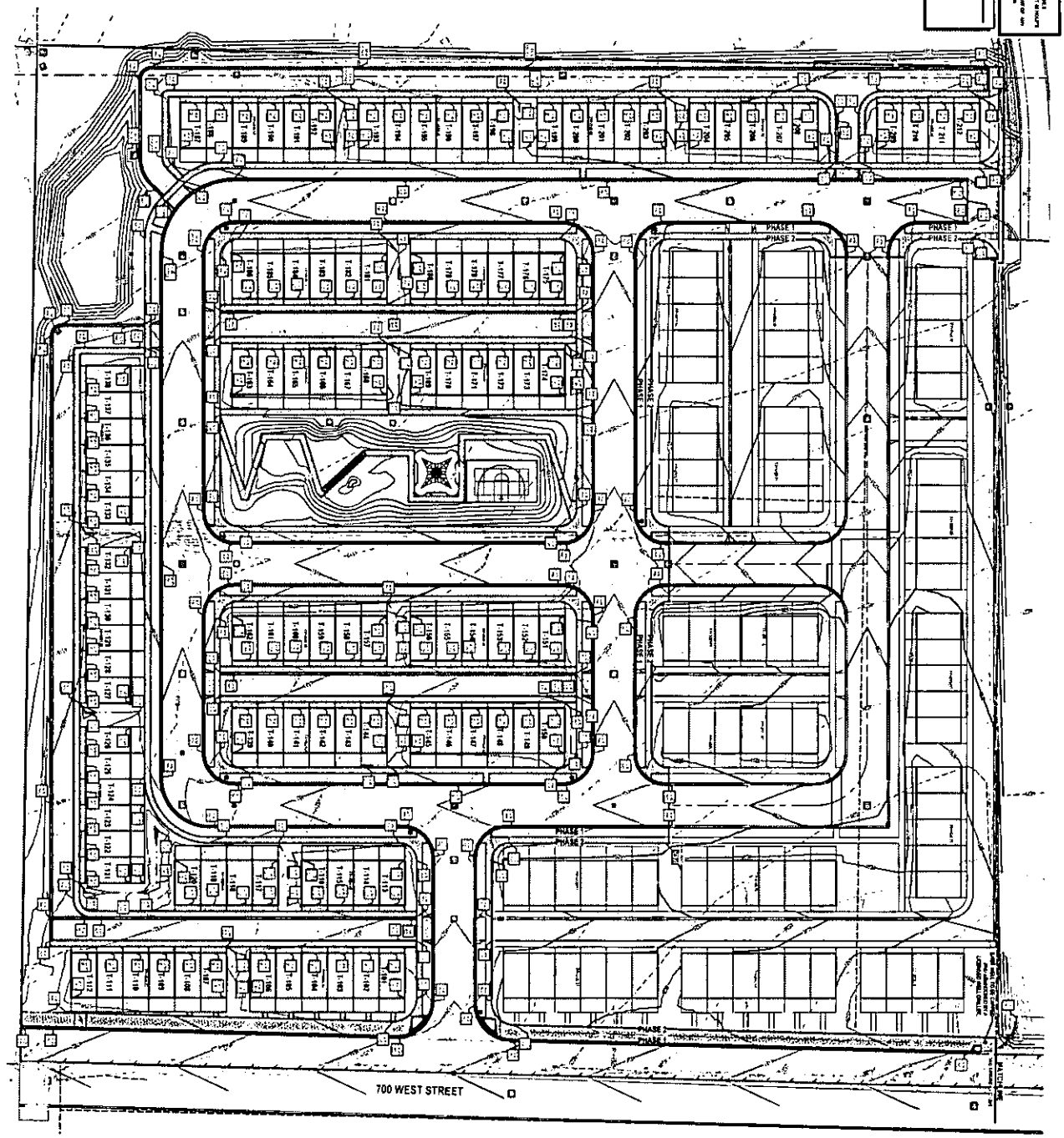
C_COMPACTION SPLIT TEST PIT LOGS.GPJ GEOSTRATA.GDT 1/17/18

GeoStrata

COMPACTION AND CBR TEST

Keystone Construction
Holindrake Subdivision
American Fork, Utah
Project Number: 1012-015

Plate
C - 10



GENERAL NOTES

HORIZONTAL GRAPHIC SCALE

WILLOW GLEN
PHASE 1
400 SOUTH 700 WEST
AMERICAN FORK, UTAH 84003

GRADING PLAN

C-200

ENSIGN
THE STANDARD IN ENGINEERING
SALT LAKE CITY
Phone 801.255.0529
LAYTON
Phone 801.547.1100
TOOELE
Phone 435.843.3590
CEDAR CITY
Phone 435.865.1453
RICHFIELD
Phone 435.896.2983
WWW.ENSIGNENG.COM

GENERAL NOTES

HORIZONTAL GRAPHIC SCALE

ENSIGN
THE STANDARD IN ENGINEERING
SALT LAKE CITY
Phone 801.255.0529
LAYTON
Phone 801.547.1100
TOOELE
Phone 435.843.3590
CEDAR CITY
Phone 435.865.1453
RICHFIELD
Phone 435.896.2983
WWW.ENSIGNENG.COM

WILLOW GLEN
PHASE 1
400 SOUTH 700 WEST
AMERICAN FORK, UTAH 84003

GRADING PLAN

C-201