Applied GeoTech

GEOTECHNICAL INVESTIGATION

PROPOSED SINCLAIR REDEVELOPMENT

WASHINGTON, UTAH

PREPARED FOR:

GREENS
9289 RESEARCH DRIVE
IRVINE, CALIFORNIA 92618

ATTENTION: ADAM CORRAL, P.E.

PROJECT NO. 2160930 **July 8, 2016**

1420 South 270 East • St. George, Utah 84790 • (435) 673-6850 • FAX (435) 673-1044

TABLE OF CONTENTS

SUMMARY

1. The subsurface profile observed within the borings drilled at the site generally consists of approximately 2½ to 4 inches of asphalt cement overlying 3 to 5 inches of base course underlain by site grading fill ranging in thickness from approximately 1 to 5 feet. The fill was underlain, generally, by silty to clayey sand and lean clay to the maximum depth investigated, approximately 20½ feet below the existing grade. Poorly graded sand with silt was encountered in borings B-4 and B-5 at approximately 7 and 17 feet, respectively. No asphalt or base course was encountered in boring B-2. Auger refusal was encountered in B-4 at a depth of approximately 14½ feet below the existing grade on cemented soil.

2. Subsurface water was encountered in borings B-1, B-2, B-3 and B-5 at depths ranging from approximately 9½ to 19½ feet below the existing grade. Groundwater was not encountered in boring B-4. Fluctuation in groundwater level may occur over time. An evaluation of such fluctuations is beyond the scope of this report.

3. The on-site soils are suitable to support the proposed construction provided the recommendations within this report are followed.

4. The subgrade beneath the existing fill should be overexcavated and prepared as recommended in the Subgrade Preparation section of this report to remove the unsuitable soils which are currently present beneath the proposed building area.

5. The proposed buildings may be supported on conventional spread footings with slab-on-grade floors. Footings and slabs should be supported on properly compacted, structural fill. The recommended structural fill depths and allowable bearing pressures are included in the Foundations section of this report.

6. The on-site fill and granular soils (sand) free of roots, organics, and debris are suitable for use as structural fill, site grading fill, wall backfill and utility trench backfill. The on-site fine grained soils (lean clay) is suitable for use as site grading fill, wall backfill and utility trench backfill.

8. Detailed recommendations for subgrade preparation, pavements, materials, foundations, and drainage are included in the report.

9. The information provided in this summary should not be used independent of that provided within the body of this report

SCOPE

This report presents the results of a geotechnical investigation for the proposed Sinclair Redevelopment to be located in Washington, Utah, as shown in Figure 1. This report presents the subsurface conditions encountered, laboratory test results, and recommendations for geotechnical aspects of the project.

Field exploration was conducted to obtain information on the subsurface conditions and to obtain samples for laboratory testing. Information obtained from the field and laboratory was used to define conditions at the site and to develop recommendations for the proposed construction.

This report has been prepared to summarize the data obtained during the study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction are included in the report. The report was prepared in general accordance with the engineering services agreement dated June 7, 2016

SITE CONDITIONS

The subject site consists of an existing Sinclair gas station, an existing hotel and a vacant parcel in Washington, Utah at the location shown on Figure 1. The site slopes gently down, generally, from the north to the south and is covered in asphalt cement. The vacant parcel to the west is graded level and is partially used for the hotel overflow parking. The site is bounded on the north by Interstate 15, on the south by Red Cliffs Drive, on the east by Green Springs Drive, and on the west by an existing hotel.

FIELD STUDY

An engineer from AGEC visited the site on June 10, 2016, to observe the drilling of 5 borings at the approximate locations shown on Figure 2. The borings were drilled utilizing a truck mounted drill rig equipped with 8-inch hollow-stem augers. The subsurface soil profile was logged and soil samples were obtained at this time for laboratory testing.

SUBSURFACE SOIL CONDITIONS

The subsurface profile observed within the borings drilled at the site generally consists of approximately 2½ to 4 inches of asphalt cement overlying 3 to 5 inches of base course underlain by site grading fill ranging in thickness from approximately 1 to 5 feet. The fill was underlain, generally, by silty to clayey sand and lean clay to the maximum depth investigated, approximately 20½ feet below the existing grade. Poorly graded sand with silt was encountered in borings B-4 and B-5 at approximately 7 and 17 feet, respectively. No asphalt or base course was encountered in boring B-2. Auger refusal was encountered in B-4 at a depth of approximately 14½ feet below the existing grade on cemented soil.

Descriptions of the soil types encountered follow.

Asphalt Cement - The asphalt cement appears to range in condition from poor to good. It contains several patched areas and cracking throughout, and is black in color.

Base Course - The base course consists of silty gravel with sand. It appears to be well compacted, slightly moist to moist, and light brown in color.

Fill - The fill consists of silty sand with gravel to silty sand. It appears to be poorly to moderately compacted, dry to moist, contains varied amounts of silt, and ranges in color from reddish brown to light brown to light grey in color.

Laboratory tests conducted on samples of the fill indicate in-place moisture contents ranging from 7 to 15 percent, in-place dry densities ranging from 106 to 120 pounds per cubic foot (pcf), and fines contents (percent passing the No. 200 sieve) ranging from 23 to 53 percent.

One dimensional consolidation tests conducted on samples of the fill indicate the fill is non- to slightly collapsible when wetted under a constant pressure of 1,000 psf and slightly to moderately compressible under additional loading.

Lean Clay - The lean clay is stiff to very stiff, moist to wet, and reddish brown to light brown in color.

Laboratory tests conducted on a sample of the lean clay indicate an in-place moisture content of 8 percent, an in-place dry density of 123 pcf, and a fines content of 63 percent.

A one dimensional consolidation test conducted on a sample of the lean clay indicates the lean clay is slightly collapsible when wetted under a constant pressure of 1,000 psf and moderately compressible under additional loading.

Clayey Sand - The clayey sand is medium dense to dense, slightly moist to wet, and light brown to reddish brown in color.

Laboratory tests conducted on samples of the clayey sand indicate in-place moisture contents ranging from 15 to 16 percent, and in-place dry densities ranging from 113 to 114 pcf.

Silty Sand - The silty sand is medium dense to dense, dry to wet, and reddish brown in color.

Laboratory tests conducted on a sample of the silty sand indicate an in-place moisture content of 8 percent, and an in-place dry density of 111 pcf. A water soluble sulfate test conducted on a sample of the silty sand indicates a water soluble sulfate concentration of 879 parts per million (ppm).

Poorly Graded Sand with Silt - The poorly graded sand with silt is dense, wet, and light grey in color.

The Logs, Legend, and Notes of Exploratory Borings are shown on Figure 3. The laboratory test results are also shown on Figure 4 and are summarized in the Summary of Laboratory Test Results, Table 1. The One-dimensional Consolidation/Collapse Test Results are shown graphically on Figures 5 and 6.

SUBSURFACE WATER

Subsurface water was encountered in borings B-1, B-2, B-3 and B-5 at depths ranging from approximately 9½ to 19½ feet below the existing grade. Groundwater was not encountered in boring B-4. Fluctuation in groundwater level may occur over time. An evaluation of such fluctuations is beyond the scope of this report.

PROPOSED CONSTRUCTION

We understand it is proposed to demolish the existing Sinclair gas station and construct a new structure consisting of a gas station along with two other tenants with associated improvements on the subject site. Based upon the proposed construction, we anticipate wall loads will be less than 5 kips per linear foot (klf) and column loads will be less than 75 kips. We also anticipate that the structure will be built at, or near the existing grade. For the purpose of this study, we have assumed that the driveway and parking areas will be paved with asphaltic concrete pavement that will generally support light duty traffic. We also anticipate occasional delivery trucks, fuel trucks, and garbage trucks may enter the site.

If the proposed construction, building loads or anticipated traffic conditions are significantly different from those listed, we should be notified so that we can reevaluate our recommendations.

RECOMMENDATIONS

Based on our experience in the area, the subsurface conditions encountered, laboratory test results, and the proposed construction, the following recommendations are provided:

A. Site Grading

1. <u>Subgrade Preparation</u>

   General: Prior to placing structural fill, any existing asphalt cement, debris, bushes, or weeds should be removed.

   Building Pad/Interior Slab: Subsequent to debris and organics removal, and prior to placing fill or concrete, building areas should be overexcavated to remove the full depth of the underlying, poorly compacted fill. Based on the borings drilled on the subject site, we anticipate that this will require the removal of approximately 1 to 5 of fill. The removed fill soil and sand may be stockpiled on site and replaced in properly compacted lifts. The overexcavation should extend at least 5 feet beyond the perimeter of the of the proposed building envelopes. The building envelope should be located by survey and is beyond the scope of our services. The approximate existing fill depths are shown on Figure 2 and the boring logs, Figure 3.

Subsequent to overexcavation and prior to placing site fill or concrete, the exposed subgrade should be scarified to a depth of 8 inches, properly moisture conditioned, and compacted to at least 90 percent of the maximum dry density as determined by ASTM D-1557. The removed soil may be replaced in properly moisture conditioned and compacted lifts.

If the subgrade in other areas becomes soft or unstable during grubbing, proof rolling, or fill placement, stabilization of the subgrade may be necessary as described below.

Pavement and Flatwork Areas: Subsequent to grubbing and prior to placing fill or concrete, pavement and flatwork areas, the exposed subgrade should be scarified to a depth of 8 inches, properly moisture conditioned and compacted to at least 90 percent of the maximum dry density as determined by ASTM D-1557.

2. Excavation

We anticipate that excavation of the soils at the site may be accomplished with typical heavy duty excavation equipment.

Utility trenches excavated in the on-site soils should be excavated in accordance with OSHA requirements using a OSHA Soil Class C (1½:1 Horizontal:Vertical) for overburden soils. Steeper trenches may require the use of shoring or a trench box to provide as safe work environment. The method of trenching or shoring is the responsibility of, and should be chosen by the contractor.

3. Materials

Import materials should be non-expansive, non-gypsiferous, granular soil. Listed below are the materials recommended for imported fill.

Area	Fill Type	Recommendations
Foundations/slabs	Site grading/ structural fill	**-200** <35%, **LL** <30% Maximum size: 4 inches Solubility < 1%
Parking	Base course	CBR>60%, **200** <12% Maximum size: 1 inch
Underslab	Base course	**-200** <12% Maximum size: 1 inch

-200 = Percent Passing the No. 200 Sieve
LL = Liquid Limit

The on-site fill and granular soils (sand) free of roots, organics, debris and particles greater than 6 inches are suitable for use as structural fill, site grading fill, wall backfill and utility trench backfill. The on-site fine grained soils (lean clay) is suitable for use as site grading fill, wall backfill and utility trench backfill.

4. Compaction

Compaction of materials placed at the site should equal or exceed the following minimum densities when compared to the maximum dry density as determined by ASTM D-1557:

Area	Percent Compaction
Subgrade (on-site)	90
Footings/building pad	95
Site grading	95
Utility trenches	95
Wall Backfill	95
Pipe zone	90
Base course	95

To facilitate the compaction process, the fill should be moisture conditioned to within 2 percentage points of the optimum moisture content as determined by ASTM D-1557 prior to placement. Fill should be placed in loose lift thicknesses which do not exceed the capacity of the equipment being utilized. Generally, 6 to 8-inch loose lifts are adequate. Lift thicknesses should be reduced to 4-inches for hand compaction equipment.

5. Drainage

The following drainage recommendations should be implemented:

- Positive site drainage should be maintained during the course of construction. In no case should water be allowed to pond adjacent to buildings/foundations.

- After construction has been completed, positive drainage of surface water away from the structures should be maintained throughout the life of the structures. We recommend a minimum slope of 6 inches in the first 10 feet from the perimeter of the structures. Hard or impermeable surfaces may be used to direct water away rom the building.

- Roof gutters should also be utilized with downspouts which extend out away and down slope from the building. Preferably, downspouts should discharge off-site.

- Landscaping required water should be limited to reduce the potential for wetting and subsequent weakening of foundation support soils. Landscaping requiring water should be placed at least 10 feet away from the building foundations.

- We also recommend that desert landscaping, which requires no water, be used adjacent to concrete or masonry walls or other cement containing elements to reduce salt migration of soluble salts and the subsequent salt weathering on cement containing elements. Further, the below grade portions of walls/fences which are backfilled with soil should be protected with an impermeable membrane and a subsurface drain. A gravel covered, perforated PVC pipe should also be placed at the base of the wall to carry water to a discharge point. This is intended to reduce the potential for salt weathering and sulfate attack on concrete/masonry.

B. Foundations

Recommendations for design of conventional foundations are provided below.

1. Bearing Material and Foundation Type

The proposed structure may be supported on conventional spread footings bearing on a zone of properly compacted structural fill as listed below.

2. Bearing Pressure

Spread footings bearing on properly compacted structural fill may be designed for the following net allowable bearing pressures with the recommended thicknesses of structural fill.

Load Type	Maximum Load	Footing Width "B"	Net Allowable Bearing Pressures (psf)	Minimum Structural Fill Thickness (ft)*
Wall/Continuous	<5 klf	$1½ < B \leq 2$ ft	2,500	1
Column/Spot	<50 kips	$1½ < B \leq 4$ ft	2,500	1
Column/Spot	75 kips	$4 < B \leq 5$ ft	3,000	1

* The structural fill should consist of granular soil and should be underlain by a properly overexcavated and compacted subgrade as recommended in the Subgrade Preparation Section of this report.

3. Footing Width and Embedment

Footings should have a minimum width of 18 inches and footings should be embedded at least 12 inches below the lowest adjacent grade.

4. Temporary Loading Conditions

The allowable bearing pressure may be increased by one-third for temporary loading conditions such as wind or seismic loads.

5. Settlement

We estimate that settlement will be less than 1 inch for footings designed as indicated above due to the load of the structure. Differential settlement is estimated to be approximately ½ inch.

6. Foundation Base

The base of excavations should be cleared of loose or deleterious material prior to placement of fill or concrete.

C. Concrete Slab-on-Grade

1. Slab Support

Concrete slabs may be supported on a properly compacted subgrade as recommended in the subgrade preparation section of this report. Fill placed in slab areas should be tested to verify compaction meets the recommendations provided within this report.

2. Underslab Base Course

A 4-inch layer of properly compacted base course should be placed below slabs to provide a firm and consistent subgrade and promote even curing of the concrete.

3. Vapor Barrier

A vapor barrier should be placed below slabs in areas which will receive floor coverings sensitive to moisture or coverings which are impermeable. In addition, a vapor barrier should also be considered beneath the building slab to provide protection from sulfate attack (on the concrete slab) due to the potentially high water soluble sulfates which may exist in the underlying soil.

D. Lateral Earth Pressures

1. Lateral Resistance for Footings

Lateral resistance for spread footings is controlled by sliding resistance developed between the footing and the subgrade soil. An ultimate friction value of 0.45 may be used in design for ultimate lateral resistance of footings bearing on onsite granular soils.

2. Retaining Structures

The following equivalent fluid weights are given for design of subgrade walls and retaining structures. The active condition is where the wall moves away from the soil. The passive condition is where the wall moves into the soil and the at-rest condition is where the wall does not move. We recommend the basement walls be designed in an at-rest condition.

The values listed below assume a horizontal surface adjacent the top and bottom of the wall.

Description	Active	At-Rest	Passive
Granular backfill (sand or gravel)	35 pcf	55 pcf	350 pcf
Granular backfill - Earth pressure coefficient	0.28	0.44	-

The above values account for the lateral earth pressures due to the soil and level backfill conditions and do not account for hydrostatic pressures or surcharge loads.

Lateral loading should be increased to account for surcharge loading (using the appropriate earth pressure coefficient) and a rectangular distribution if structures are placed above the wall and are within a horizontal distance equal to the height of the wall. If the ground surface slopes up away from the wall, the equivalent fluid weights should also be increased.

Care should be taken to prevent percolation of surface water into the backfill material adjacent to the retaining walls. The risk of hydrostatic buildup can be reduced by placing a subdrain behind the walls consisting of free-draining gravel wrapped in a filter fabric.

3. Seismic Conditions

Under seismic conditions, the equivalent fluid weights should be modified as follows according to the Mononobe-Okabe method assuming a level backfill condition:

Lateral Earth Pressure Condition	Seismic Modification (2% PE in 50 yrs)
	Granular Backfill
Active	15 pcf increase
At-rest	0 pcf increase
Passive	36 pcf decrease

The seismic increases and decrease assume a peak ground acceleration of 0.22g using the Mononobe-Okabe pressure distribution. The resultant of the seismic increase should be placed up ⅓ from the base of the wall.

4. Safety Factors

The values recommended assume mobilization of the soil to achieve the assumed soil strength. Conventional safety factors used for structural analysis for such items as overturning and sliding resistance should be used in design.

E. Seismicity, Liquefaction and Faults

1. Seismicity

Listed below is a summary of the site parameters as required by the 2012 International Building Code and ASCE 7, Chapters 7 and 20:

Description	Seismic Event - 2% PE in 50 Yrs
	Value
2012 IBC Site Class	D
Site Longitude	-113.5243°
Site Latitude	37.1272°
PGA - Site Class D	0.22g
S_s (0.2 second period) - Site Class D	0.53g
S_1 (1 second period) - Site Class D	0.16g
F_a - Site Class Factor	1.378
F_v - Site Class Factor	2.158
F_{PGA} - Site Class Factor	1.365

2. Liquefaction

Liquefaction is a condition where a soil loses strength due to an increase in soil pore water pressures during a dynamic event such as an earthquake. Research indicates that the soil type most susceptible to liquefaction during a severe seismic event is loose, clean sand.

For the sand to liquefy, it must be located beneath the groundwater level and exist in a relatively loose condition. The liquefaction potential for soil tends to decrease with an increase in fines content and density (Standard Penetration Resistance Values).

Based on our field investigation and engineering analysis, the following subsurface conditions exist at the subject site.

- Groundwater was encountered at depths ranging from approximately 9½ to 19½ feet below the existing grade.

- Medium dense to dense silty to clayey was encountered beneath the groundwater level to the maximum depth investigated, approximately 20½ feet.

- The condition of the soil below 20½ feet is not known, but we anticipate it will consist of similar soil underlain by bedrock. Based on the subsurface conditions encountered and assumptions regarding the condition of the underlying soils, we anticipate there is a low to moderate risk of liquefaction of the subsurface soils during a severe seismic event.

3. Faults

Based on a review of the Surface Fault Rupture Map for the area by Lund, 2008, no faults extend through the project site. The concealed location of the Washington Fault is located approximately 1 mile east of the subject site.

F. Soil Corrosion

Our laboratory testing and experience in the area has shown the on-site soils and potential imported sources may contain sulfates in sufficient concentration to be corrosive to concrete. Therefore, we recommend concrete elements that will be exposed to the on-site soils be designed in accordance with provisions provided in the American Concrete Institute Manual of Concrete Practice (ACI) 318-11 and Section 1904.3 of the 2012 International Building Code. Tables 4.2.1 and 4.3.1 of ACI 318-11 should be referenced for design of concrete elements utilizing a Sulfate Exposure Class of S1, and a sulfate exposure severity of “moderate”.

Consideration should also be given to cathodic protection of buried metal pipes. We recommend utilizing PVC pipes where local building codes allow.

G. Pavement

Based on the subsoil conditions encountered and the laboratory test results, the following recommendations are given:

1. Analysis

a. Asphaltic Concrete: The flexible pavement analysis is based on UDOT and AASHTO design methods and a 20 year design life. The following parameters were considered for our analysis:

- Base course that meets specifications which would correspond to a Structural Coefficient (a_2) of at least 0.12. Asphalt that provides a Structural Coefficient (a_1) of at least 0.40.

- Drainage Coefficient = 1.0.

- The subgrade support soils consist of fill soil consisting of silty sand with gravel. A M_R value of 10,500 psi was used for the subgrade based upon an estimated CBR value of 7 percent and the relationship between CBR and Resilient Modulus (M_R).

- Serviceability Index: $P_o = 4.2$, $P_t = 2.5$.

- Reliability of 90 percent.

- Standard Deviation (S_o) = 0.45.

b. Portland Cement Concrete: The rigid pavement analysis is based on UDOT and AASHTO design methods and a 20 year design life. The following parameters were considered for our analysis:

- Concrete with a minimum compressive strength of 4,500 psi supported on high quality base course that meets specifications provided in the Materials section of this report.

- Drainage Coefficient = 1.10.

- The subgrade support soils consist of silty sand with gravel with a subgrade modulus of 250 pci.

- A joint transfer coefficient of 3.0 for joints without load transfer devises.

- Serviceability Index: $P_o = 4.2$, $P_t = 2.0$.

- Reliability of 90 percent.

- Standard Deviation (S_o) = 0.35.

2. Subgrade Support

We anticipate the subgrade materials will consist of compacted on-site fill soil. Our design assumes a properly compacted subgrade. Prior to placing granular sub-base, base course or pavement area grading fill, the subgrade should be prepared as recommended in the Subgrade Preparation section of this report.

3. Pavement Thickness

Based on the anticipated traffic, a 20 year design life, PCC and AASHTO design methods, the following pavement sections are recommended.

Area	Unreinforced Rigid Pavement		Flexible Pavement	
	Portland Cement Concrete (inches)	Base Course (inches)	Asphaltic concrete (inches)	Base Course (inches)
Light Duty Parking	NA	NA	2½	6
Entrance	NA	NA	3	6
Heavy Duty/Unloading/ Dumpster	5	5	3	6

4. Pavement Materials

a. *Flexible Pavement (Asphaltic Concrete)*

The pavement materials should meet AASHTO and Washington City specifications for gradation and quality. The pavement thicknesses indicated above assume that the base course is high quality material with a CBR of at least 60 percent. Asphalt material should have a Marshal stability of at least 1,800 pounds.

b. *Rigid Pavement (Portland Cement Concrete)*

The pavement thicknesses indicated assumes that the concrete will have a 28-day compressive strength of 4,500 psi.

5. Jointing

Joints for concrete (rigid) pavement should be laid out in a square or rectangular pattern. Joint spacings should not exceed 30 times the thickness of the slab. The depth of joints should be at least one-quarter of the slab thickness. Load transfer dowels may be incorporated in longitudinal joints to transfer load between slabs.

6. Drainage

   The collection and diversion of drainage away from the pavement surface is extremely important to the satisfactory performance of the pavement section. Proper drainage should be provided. We further recommend a yearly maintenance program including crack sealing and a surface treatment such as a "slurry seal" to extend the pavement life and reduce water infiltration into the subsurface soils.

H. Construction Testing and Observations

We recommend testing fill, concrete, and asphalt materials at a frequency which meets or exceeds Washington City minimum testing frequency requirements for city improvements. We also recommend the following testing and observations be done as a minimum.

1. Verify the subgrade is properly prepared/compacted in accordance with the recommendations provided in the Subgrade Preparation section of this report.

2. Verify that foundation subgrade is properly compacted prior to placement of concrete. Verify the recommended thicknesses of structural fill are placed. The structural fill thicknesses depend upon building loads. The building loads should be provided by the structural engineer for each footing.

3. Conduct compaction testing on fill placed below foundations, in building pads, and paved areas. We recommend testing each foot of fill placed.

4. Conduct construction materials testing of soils, concrete and asphalt materials and special inspections as required for the proposed construction by St. George City and the structural engineer.

5. Conduct special inspections on the proposed building as required by the 2012 International Building Code and the structural engineer.

I. Geotechnical Recommendation Review

The client should familiarize themselves with the information contained in this report. If specific questions arise or if the client does not fully understand the conclusions/recommendations provided, AGEC should be contacted to provide clarification.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on the information obtained from the borings drilled, laboratory test results and our experience in the area. Variations in the subsurface conditions may not become evident until excavation is conducted. If the subsurface conditions or groundwater level are found to be significantly different from those described above, we should be notified to reevaluate our recommendations.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

LICENSED PROFESSIONAL ENGINEER
No. 7038303
JON RUSSELL
HANSON
7/06/16
STATE OF UTAH

Jon Russell Hanson, P.E.

Reviewed by: G. Wayne Rogers, P.E.

JRH/sd P:\2016 Project Files\2160900\2160930 - Washington-Sinclair Redevelopment\2160930 report.wpd

GEOLOGIC LITERATURE REFERENCE

"Geologic hazards and adverse construction conditions, St. George-Hurricane Metropolitan Area, Washington County, Utah", prepared by Lund, W.R., Knudsen, T.R., Vice, G.S., and Shaw, L.M., 2008, Utah Geological Survey Special Study 127, variously paginated, 14 plates, scale 1:24,000, DVD-ROM.

N

Not to Scale

SINCLAIR REDEVELOPMENT
WASHINGTON, UTAH

2160930	AGEC	Vicinity Map	Figure 1

SINCLAIR REDEVELOPMENT
WASHINGTON, UTAH

● Approximate test pit location

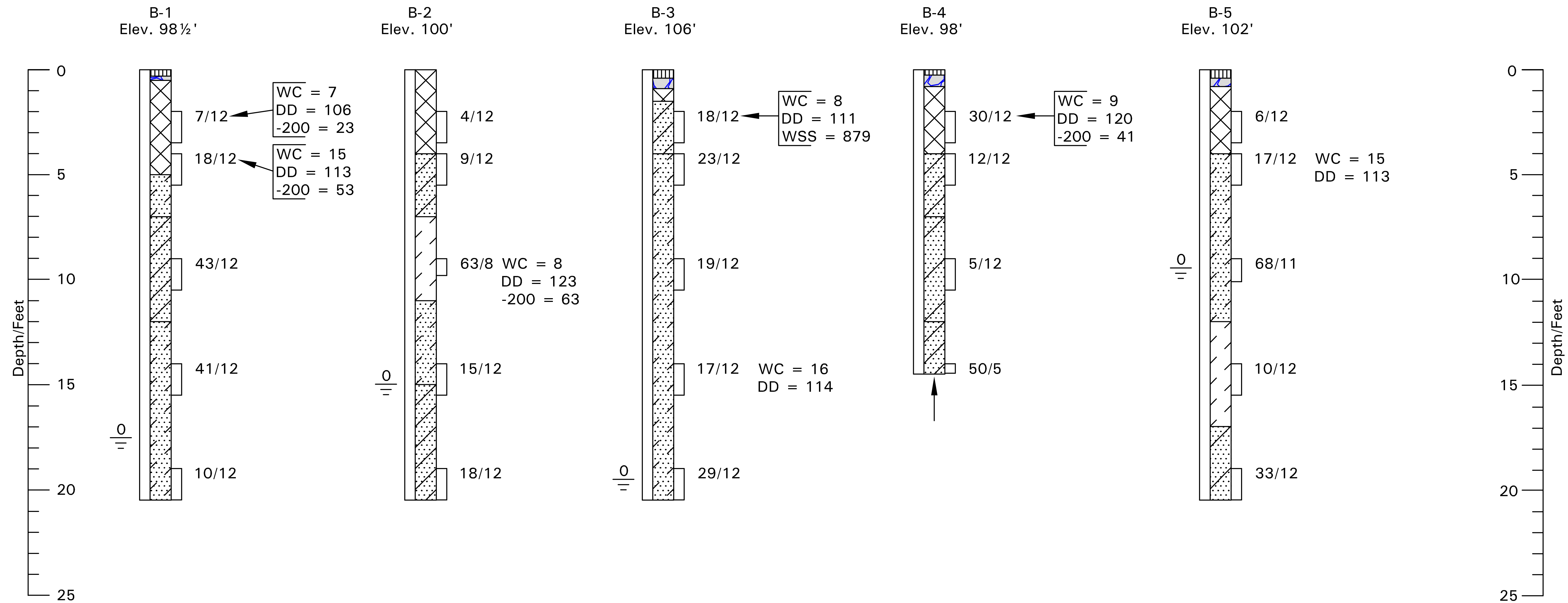
(#) Approximate thickness of existing fill (feet)

N

0 100 200 feet

Approximate Scale

2160930	AGEC	Site Plan	Figure 2



See Figure 4 for Legend and Notes

2160930	AGEC	Logs of Exploratory Borings	Figure 3

LEGEND:

Asphalt cement; appears to range in condition from poor to good. Contains several patched areas and cracking throughout, and is black in color.

Base Course; consists of silty gravel with sand. It appears to be well compacted, slightly moist to moist, and light brown in color.

Fill; consists of silty sand with gravel with silty sand. It appears to be poorly to moderately compacted, dry to moist, contains varied amounts of silt and ranges in color from reddish brown to light brown to light grey.

Lean clay (CL); stiff to very stiff, moist to wet, reddish brown to light brown in color.

Clayey sand (SC); medium dense to dense, slightly moist to wet, light brown to reddish brown in color.

Silty sand (SM); medium dense to dense, dry to wet, reddish brown in color.

Poorly Graded Sand with Silt (SP-SM); dense, wet, light grey in color.

10/12 California drive sample taken. The symbol 10/12 indicates that 10 blows from a 140 pound hammer falling 30 inches were required to drive the sampler 12 inches.

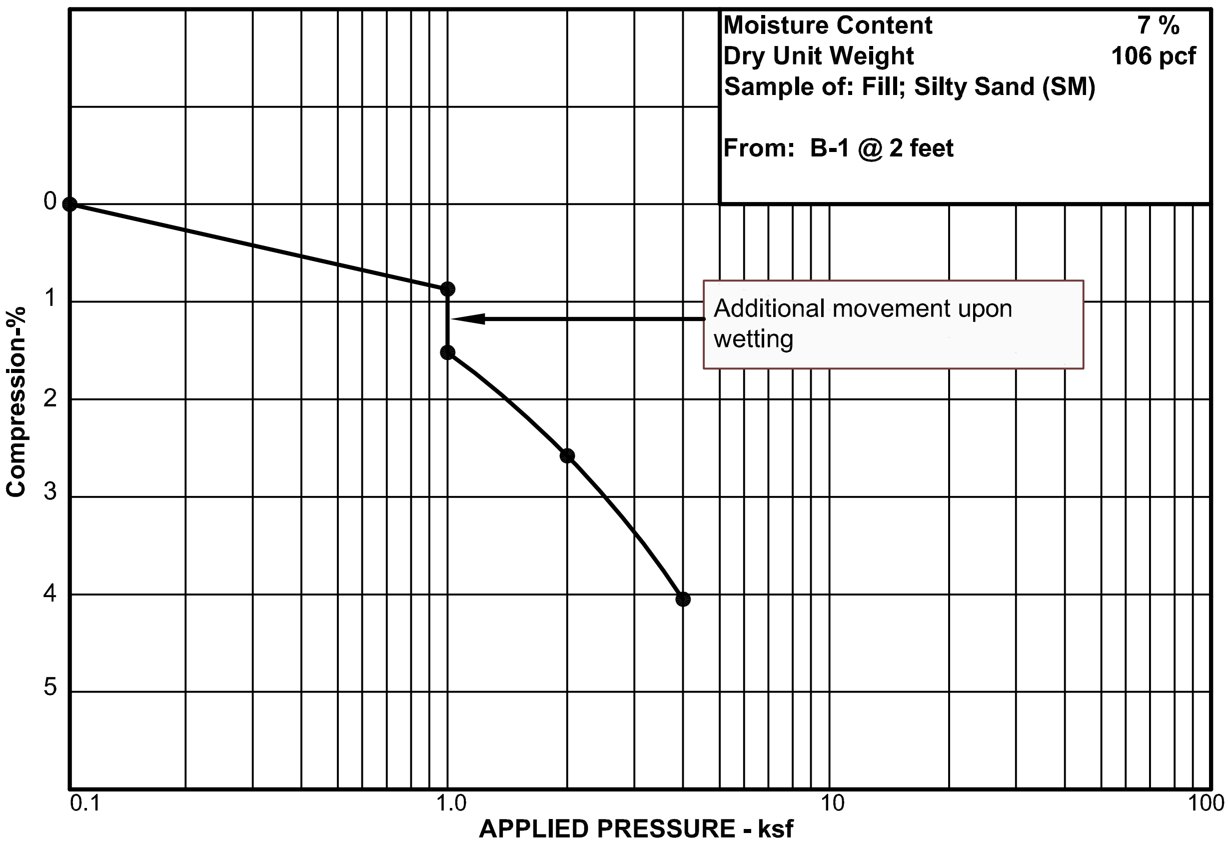
Indicates slotted 1 inch PVC pipe installed in the boring to the depth shown.

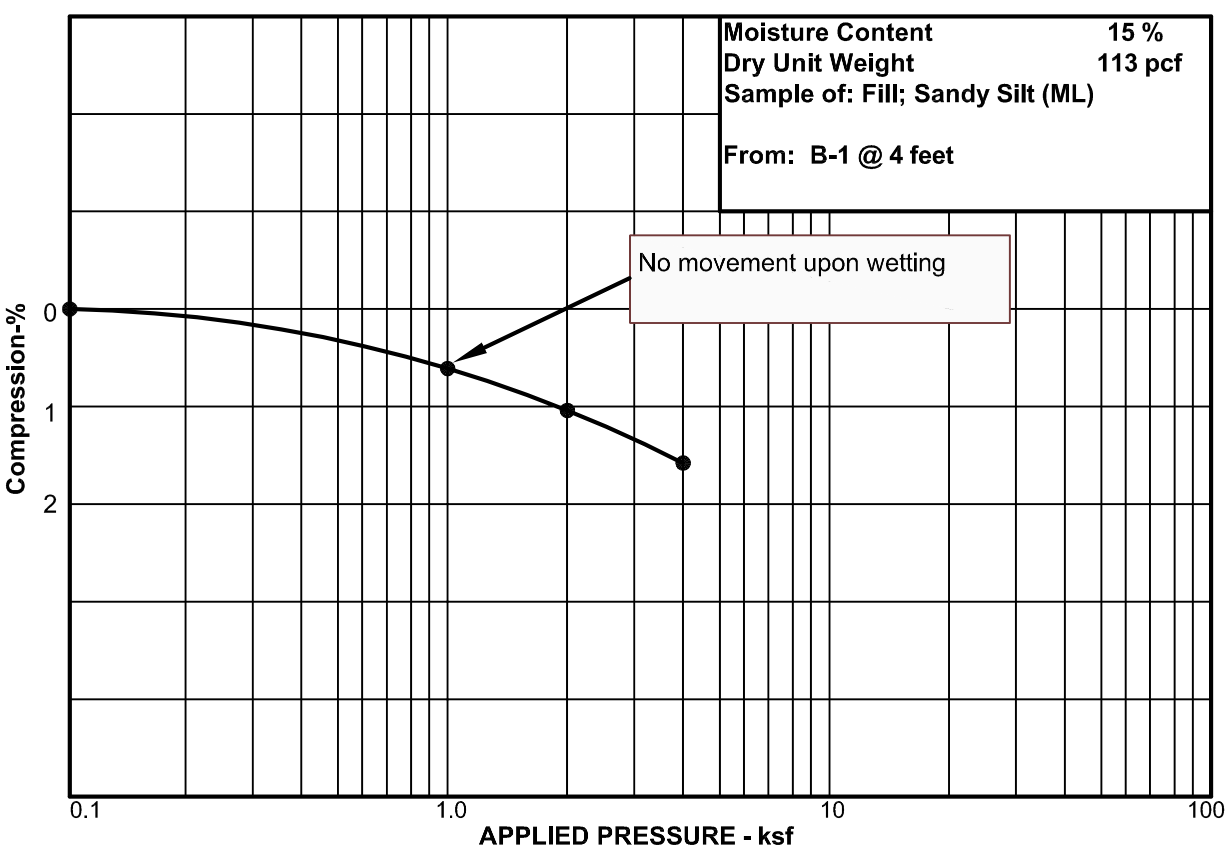
0 Indicates the depth to free water and the number days after excavation the measurement was taken.

NOTES:

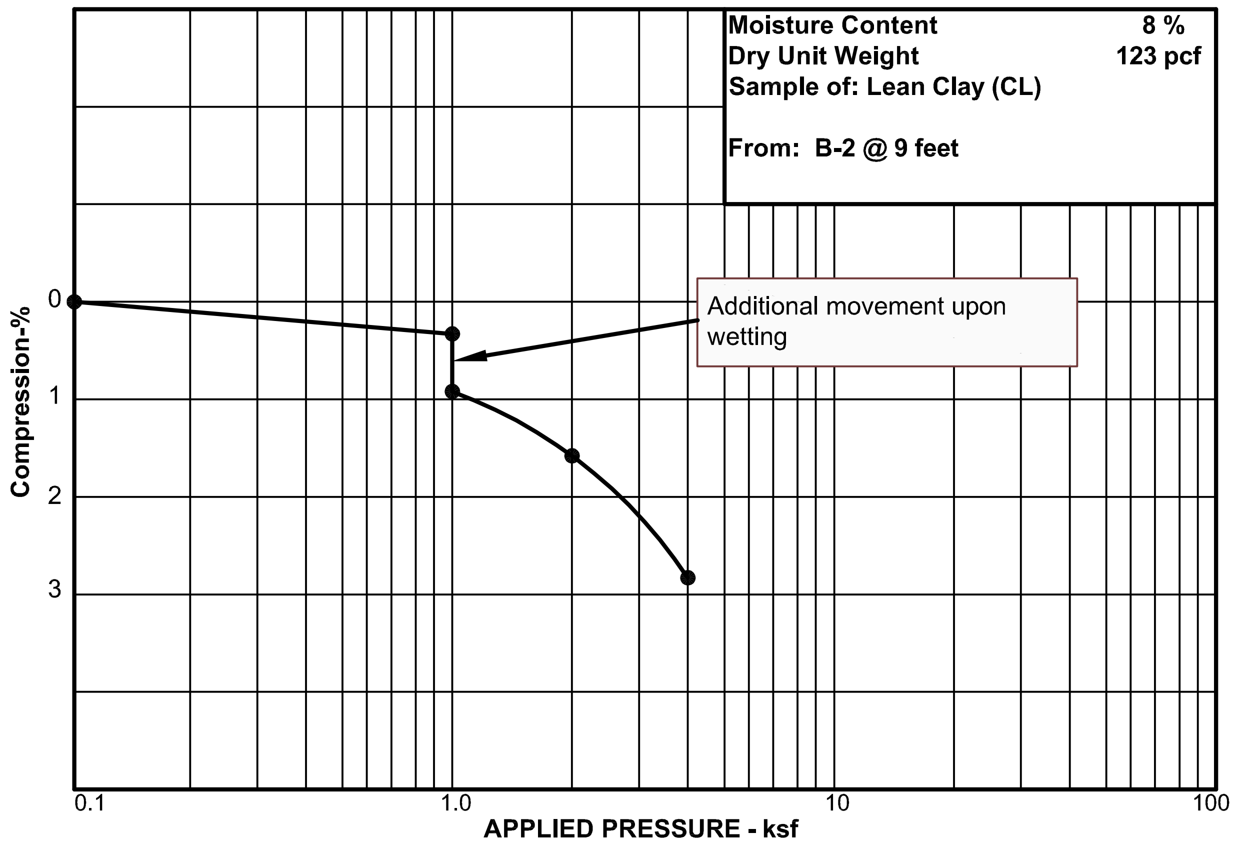
1. The borings were drilled on June 10, 2016 with a truck mounted drill rig equipped with 8-inch hollow-stem augers.
2. The locations of the borings were measured by pacing from features shown on the site plan provided.
3. The elevations of the borings were estimated using a hand level and the benchmark shown on Figure 2.
4. The boring locations and elevations should be considered accurate only to the degree implied by the method used.
5. The lines between the materials shown on the boring logs represent the approximate boundaries between material types and the transitions may be gradual.
6. Water level readings shown on the logs were made at the time and under the conditions indicated. Fluctuations in the water level may occur with time.
7. WC = water content (%);
   DD = dry density (pcf);
   -200 = percent passing No. 200 sieve;
   WSS = water soluble sulfates (ppm).

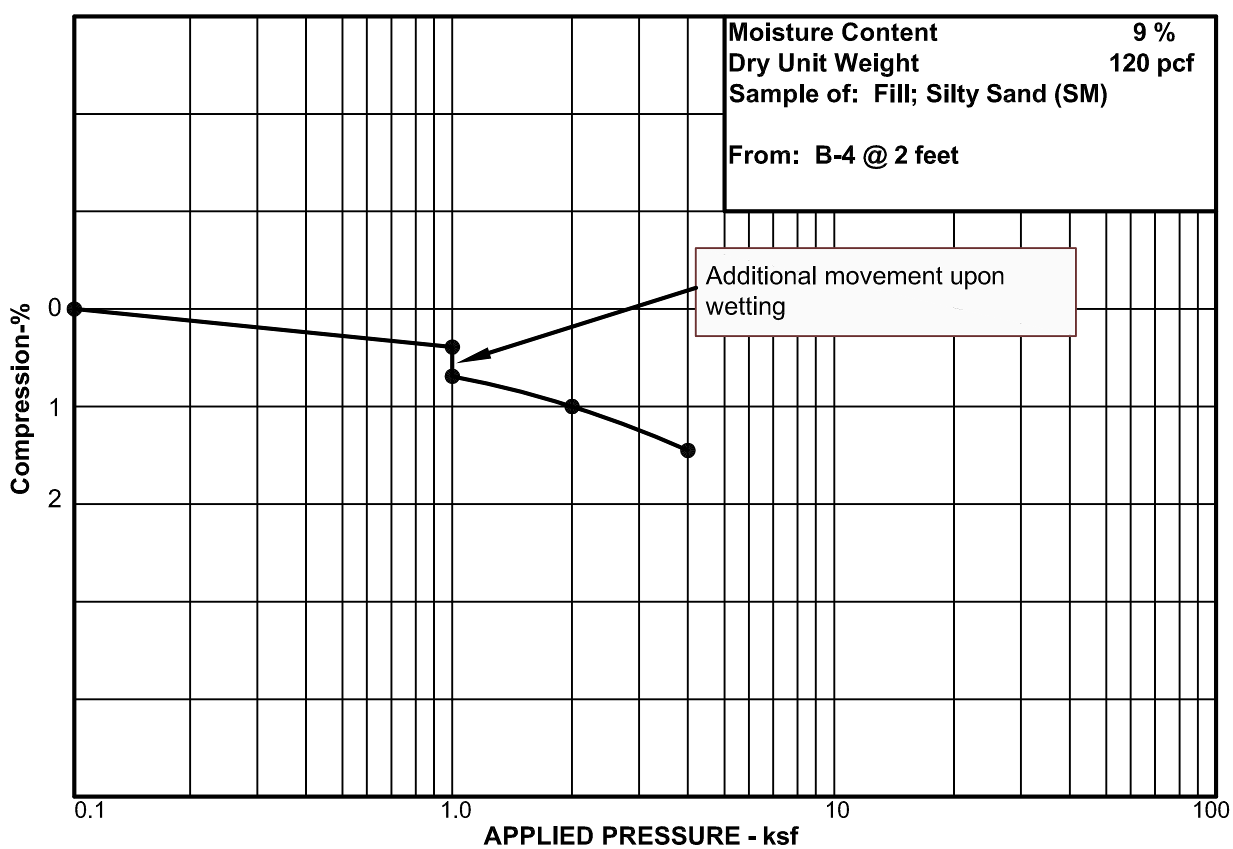
Applied Geotechnical Engineering Consultants, Inc.





Applied Geotechnical Engineering Consultants, Inc.





APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I
SUMMARY OF LABORATORY TEST RESULTS

Sinclair Redevelopment

Project Number 2160930

Sample Location		Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation			Water Soluble Sulfates (ppm)	Sample Classification
Boring No.	Depth (feet)			Gravel (%)	Sand (%)	Silt/ clay (%)		
B-1	2	7	106			23		Fill; Silty Sand (SM)
B-1	4	15	113			53		Fill; Sandy Silt (ML)
B-2	9	8	123			63		Lean Clay (CL)
B-3	2	8	111				879	Silty Sand (SM)
B-3	14	16	114					Clayey Sand (SC)
B-4	2	9	120			41		Fill; Silty Sand (SM)
B-5	4	15	113					Clayey Sand (SM)