AGEC
Applied GeoTech

GEOTECHNICAL INVESTIGATION

PARCEL I-SB-57-A (R-1-7.5)

IVINS, UTAH

PREPARED FOR:

SILVERADO GROUP, LLC
118 EAST LOMOND VIEW DRIVE
NORTH OGDEN, UTAH

ATTENTION: ALLEN CLEMONS

PROJECT NO. 2220960

JUNE 9, 2022

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SUMMARY

1. The subsurface profile observed in the borings drilled generally consists of 1 to 2 feet of cultivated soil overlying poorly graded sand with silt to silty sand to the maximum depth investigated, approximately 25½ feet. Interlayered silty to clayey sand was encountered beneath the poorly graded sand with silt in some of the borings. The interlayered silty to clayey sand contained cemented zones.

2. Subsurface water was not encountered in the borings drilled to the maximum depth investigated, approximately 25½ feet below the existing grade. Fluctuations in the groundwater level may occur over time. An evaluation of such fluctuations is beyond the scope of this report.

3. The on-site soils in their existing condition are not suitable to support the proposed construction. The site is suitable for the proposed construction provided recommendations within this report are followed.

4. The on-site sand, free of organics, debris and material greater than 4 inches in size, are suitable for use as structural fill, site grading fill, wall backfill and utility trench backfill. The cultivated soil should be removed and disposed of or placed in non-structural areas.

5. The proposed residences may be supported on conventional spread footings bearing on one foot of properly compacted structural fill underlain by a properly prepared subgrade as recommended in the Subgrade Preparation section of this report.

   Specifically, subsequent to grubbing, we recommend the exposed subgrade be overexcavated to remove the full depth of the cultivated soil and near surface loose, dry, sand. Based on the conditions observed in borings, the overexcavation will extend on the of order of 2 feet below the existing grade.

   Basement footings and slabs will extend through the collapsible soils may be supported on 1 foot of properly compacted, structural fill. Footings may be designed for a net allowable bearing capacity of 2,000 psf.

6. If basements are constructed, a subdrain system should be placed around the perimeters of the basements due to the possible presence of future groundwater which could exist in the area. If the groundwater becomes present, the drain would be in-place to remove potential future groundwater.

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

8. 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 Parcel I-SB-57-A (R-1-7.5) residential subdivision to be located in Ivins, Utah, as shown in Figure 1. This report presents the subsurface conditions encountered, laboratory test results, and recommendations for the project. This report was prepared in general accordance with the Proposal for Professional Geotechnical Services under Project No. 2220960, dated April 19, 2022.

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 development.

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.

SITE CONDITIONS

The project site consists of an undeveloped parcel north of Old Highway 91 as shown on Figure 1. The site slopes gently down from the northwest to the southeast with approximately 9 to 10 feet of grade change. It is currently covered with cultivated soil and alfalfa. There is an undeveloped parcel to the north, a residential development to the west and Red Mountain Vistas development is to the east.

FIELD STUDY

An engineer from AGEC visited the site on April 26 and 27, 2022 and observed the drilling of 11 borings at the approximate locations shown on Figure 2. The borings were drilled using a truck mounted drill rig equipped with 8-inch hollow stem augers. Samples of the subsurface soils were obtained at the time of excavation to facilitate laboratory testing.

SUBSURFACE CONDITIONS

The subsurface profile observed in the borings drilled generally consists of 1 to 2 feet of cultivated soil overlying poorly graded sand with silt to silty sand to the maximum depth investigated, approximately 25½ feet. Interlayered silty to clayey sand was encountered beneath the poorly graded sand with silt in some of the borings. The interlayered silty to clayey sand contained cemented zones. Descriptions of each soil and bedrock type encountered follow.

Cultivated Soil - The cultivated soil consists of poorly graded sand with silt to silty sand. It is loose, dry, contains roots and is red-brown in color.

Laboratory tests conducted on a sample of the cultivated soil indicate an in-place moisture content of 2 percent and an in-place dry density of 103 pounds per cubic foot (pcf).

Interlayered Silty and Clayey Sand - The interlayered silty and clayey sand is dense to very dense, contains cemented zones, and is red-brown to light brown with white spots.

Laboratory tests conducted on samples of the interlayered silty and clayey sand indicates in-place moisture contents ranging 4 to 12 percent, in-place dry densities ranging from 91 to 111 pcf and a fines content (percent passing the No. 200 Sieve) of 50 percent. A water soluble sulfate concentration test indicates a water soluble sulfate concentration of 110 parts per million (ppm).

Silty Sand - The silty sand is dense to very dense, slightly moist to moist, and red-brown in color. The silt sand contains occasional layers of sandy silt.

Laboratory tests conducted on samples of the silty sand indicate in-place moisture contents ranging from 2 to 10 percent, in-place dry densities ranging from 101 to 117 pcf, gravel contents (percent retained on the No. 4 sieve) ranging from 0 to 3 percent and fines contents ranging from 12 to 51 percent.

One-dimensional consolidation/collapse tests were completed on samples of the sand. The tests indicate the soil is slightly to highly collapsible when wetted under a constant pressure of 1,000 pounds per square feet (psf) and slightly to moderately compressible under additional loading. The collapse potential was measured to decrease with depth.

Poorly Graded Sand with Silt - The poorly graded sand with silt is loose to medium dense, dry, and red to red-brown in color.

Laboratory tests conducted on samples of the poorly graded sand with silt indicate moisture contents ranging 1 to 2 percent, in-place dry densities ranging from 103 to 106 pcf, a gravel content of 0 percent, and fines contents ranging from 8 to 11 percent. A water soluble sulfate concentration test indicates a water soluble sulfate concentration of 1 ppm.

The Logs, Legend and Notes of Exploratory Borings are shown on Figures 3-5. The laboratory test results are shown on Figures 3-5 and are summarized in the Summary of Laboratory Test Results, Table 1. Consolidation/collapse tests are shown on Figures 6-9.

SUBSURFACE WATER

Subsurface water was not encountered in the borings drilled to the maximum depth investigated, approximately 25½ feet below the existing grade. Fluctuations in the groundwater level may occur over time. An evaluation of such fluctuations is beyond the scope of this report.

PROPOSED CONSTRUCTION

The site is proposed to be developed into a residential subdivision. A preliminary drawing indicates there will be on the order of 21 building pads. Based upon the existing topography, we anticipate cuts and fills on the order of 2 to 3 feet deep to construct building pads.

Single-family residences have been proposed for construction within the development which will typically consist of single and multi-story slab-on-grade type construction. A portion of the residences may include full depth basements. We anticipate the residences will be constructed using conventional spread footings with slab-on-grade floors. The residences will likely be constructed with wood framing, stucco or rock veneer, and tile roofs.

For design purposes, we have assumed wall loads of less than 4 kips per linear foot and column loads of less than 50 kips. As part of the development, we understand that roadways, utilities and city improvements will also be included. Roadway widths are currently not designed.

If the proposed construction, or building loads 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 given:

A. **Site Grading**

1. Subgrade Preparation

a. *General Subgrade Preparation*

Prior to placing fill to support building areas, pavement/flatwork or improvements, the site should be grubbed to remove the existing vegetation and cultivated soil containing significant roots and organics. The thickness may vary across the site, but we anticipate this will generally require the removal of approximately 1 to 2 feet of soil across the site.

b. *Building Pad*s

Subsequent to grubbing (removal of cultivated soil), the building pads should be overexcavated to remove the full depth of the near surface loose, dry, soil. Based on the boring information and laboratory testing, we anticipate the overexcavation will extend on the of order of 1 to 2 feet below the existing grade. If dense or cemented soil are encountered, the overexcavation may be terminated. The removed material may then be replaced in properly moisture conditioned and compacted lifts.

Consideration should also be given to full depth overexcavation in areas which will support hard surfaces and CMU fences. A reduced overexcavation depth may be considered below, but if the remaining loose soils beneath the overexcavation zone are wetted, additional settlement may occur.

The limits of overexcavation should extend at least 5 feet beyond the perimeter of the proposed construction. The lateral extent of the overexcavation should be determined by survey and is the responsibility of the owner/contractor.

c. *Pavement, Flatwork and Improvements*

Subsequent to grubbing and cultivated soil removal and prior to placing site grading fill or road base in pavement areas, a portion of the underlying loose, dry sandy soil should be removed. As a minimum, we recommend the exposed subgrade beneath pavement, flatwork and improvement areas be prepared by overexcavating a minimum of 1 foot below existing grade or 1 foot below the proposed subgrade (whichever is greater) prior to placing fill or road base. The removed soil may then be replaced in properly moisture conditioned and compacted lifts.

Subsequent to overexcavation, and prior to placing fill, the exposed subgrade should be scarified to a depth of approximately 8 inches, properly moisture conditioned and compacted to meet the recommendations provided in the compaction section of this report. The removed material may then be replaced in properly moisture conditioned and compacted lifts.

2. <u>Excavation</u>

We anticipate that excavation of the soils at the site can be accomplished with typical excavation equipment.

The following table summarizes recommendations for excavation of temporary and permanent cut slope excavations, trench excavations and permanent fill slope construction. Slopes should include benches in accordance with the 2018 IBC.

Slope Condition	Maximum Slope (Horizontal:Vertical)
Permanent Cut Slopes in Overburden Soils	2:1
Permanent Fill Slopes - Compacted fill	2½:1
Utility Trenches in On-site Soils (OSHA Soil Class C)	1½:1*

*Steeper trenches will require the use of shoring or a trench box to provide a safe work environment. Safe trench excavation is the responsibility of the contractor.

Fill slopes should be graded by overbuilding and then cutting back to the desired grade to provide a compacted slope face. Fill placed on existing slopes steeper than 3:1 should be placed using a benching procedure to "key" the fill into the existing slope. Benches should be of sufficient width to allow adequate area for the compaction equipment.

The cut and fill slopes will be highly susceptible to erosion, particularly resulting from run off from the adjacent slopes. Water should be directed around slopes using drainage swales to reduce potential erosion. A lot specific drainage study should be conducted by the civil engineer to control localized runoff.

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%
Underslab (upper 4 inches)	Base course	**-200** <12% Maximum size: 1 inch Solubility < 1%

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

The on-site sand, free of organics, debris and material greater than 4 inches in size, are suitable for use as structural fill, site grading fill, wall backfill and utility trench backfill. The cultivated soil should be removed and disposed of or placed in non structural areas.

4. <u>Compaction</u>

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	90
Footings/building pad	95
Site grading	95
Utility trenches	95
Pipe zone (utility trenches)	90
Wall backfill	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. <u>Surface Drainage</u>

Positive site drainage should be maintained during the course of construction. After construction has been completed, positive drainage of the surface water away from the buildings in each direction must be maintained. To reduce infiltration adjacent to foundations we recommend the following:

a. A minimum slope of 6 inches in the first 10 feet from the perimeters of the structures should be provided.

b. Roof gutter systems should be installed around the perimeters of the structures. Roof downspouts should discharge away from the buildings so as to prevent ponding adjacent to foundations. We recommend piping roof drains to the curb and gutter downslope from the structures.

c. Placement of 3 to 4 foot wide concrete aprons around the perimeters of the structures.

d. Landscaping requiring water should be minimized and not used within 10 feet of foundations.

e. 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 on concrete/masonry.

6. Subsurface Drainage

We recommend construction of a perimeter subdrain around basement walls due to possible presence of future groundwater accumulation. The drain should consist of a 4 inch perforated PVC pipe placed around the perimeter of the footings. It should be placed such that the bottom of the pipe is at least 12 inches below the finished floor elevation. It should slope at a 2% minimum grade to drain to a sump. A sump pump should be placed to remove water which may be installed in the future. The perforated pipe should be backfilled with 1 inch minus crushed gravel to an elevation at least 1 foot above the highest anticipated groundwater level. Prior to backfilling the basement walls with properly compacted fill, Mirafi 140N filter fabric should be placed over the gravel to prevent sand from migrating into the gravel.

B. Foundations

The proposed residences may be supported on conventional spread footings bearing on compacted structural fill underlain by a properly prepared subgrade as recommended in the Subgrade Preparation section of this report. Recommendations for design of conventional spread and spot footing are provided below.

1. Bearing Material

The proposed residences may be supported on conventional spread footings bearing on 1 foot of properly compacted structural fill underlain by a properly prepared subgrade. The subgrade should be prepared during site grading by overexcavating and compacting the entire building pad as recommended in the Subgrade Preparation section of this report.

Basement footings and slabs, that will likely extend through the loose or collapsible soils may be supported on 1 foot of properly compacted, structural fill.

2. Bearing Pressure

   Footings bearing on properly compacted structural fill may be designed for a net allowable bearing pressures of 2,000 psf.

3. Footing Width and Embedment

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

4. Temporary Loading Conditions

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

5. Settlement

   We estimate that settlement will be approximately 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. Pool Support

Based on the encountered subsurface conditions, the following recommendations are provided:

1. The pool may be supported on a conventional matt foundation.

2. The pool shell and pool decking should be supported directly on the underlying dense sand or on properly compacted fill extending through the near surface loose soils.

3. Loose or disturbed soil should be removed from the bottom of the pool excavation. In no case should any loose or disturbed soil remain beneath the pool prior to construction.

4. Alternatively, if the pool is supported on fill, the exposed subgrade should be properly compacted prior to construction.

5. We recommend the pool be excavated with a large track mounted excavator equipped with a bladed bucket to minimize disturbance.

6. An engineer from AGEC should observe the pool excavation prior to construction to observe subsurface conditions and to verify unsuitable soils have been removed and the pool support subgrade has been properly prepared and exposed conditions are consistent with those encountered during this investigation.

D. **Concrete Slab-on-Grade**

1. Slab Support

   Concrete slabs should be supported on a zone of properly prepared (overexcavated) and compacted fill as stated in the Subgrade Preparation section of this report. Fill placed in slab areas should be tested frequently 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.

E. 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 properly compacted on-site 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
Imported or on-site granular backfill (sand or gravel)	35 pcf	55 pcf	325 pcf
Imported or on-site 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 weight 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)
Active	7 pcf increase
At-rest	0 pcf increase
Passive	18 pcf decrease

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.

F. Seismicity, Liquefaction and Faulting

1. Listed below is a summary of the site parameters as required by the 2018 International Building Code and ASCE 7-16:

Description	Seismic Event - 2% PE in 50 Yrs
	Value
Site Class	C
S_s (0.2 second period)	0.49g
S_1 (1 second period)	0.15g
PGA	0.21g
F_a	1.3
F_v	1.5
F_{PGA}	1.2

The values provided above were generated using the ASCE 7-16 Seismic Hazard Tool. Based on the subsurface conditions anticipated and the seismic parameters mapped for the site as per ASCE 7-16, a ground motion hazard analysis as per ASCE 7-16 is not required by the 2018 International Building Code.

2. Liquefaction

Based on subsurface conditions encountered in the borings, the subsurface soils observed are non-liquefiable to the depths investigated during a seismic event.

3. Faulting

Based on a review of available geologic literature, there are no mapped faults extending near or through the site.

G. Low Impact Development (LID)

"Green Infrastructure and Low-impact Development Application Guidance for Washington County, Utah", Updated: June 20, 2020, Dixie Storm Water Coalition (DSWC).

The following criteria should be considered when implementing BMP's for LID design:

a. Using the referenced website, the following soil types and characteristics were determined:

Soil Type	Location	Area	Hydrologic Soil Group	Infiltration Rate (inches/hr)
Ib - Ivins Loamy Sand	North	4 acres	C	0.2 to 0.6
Ic - Ivins loamy fine sand, hummocky	South	5.7 acres	C	0.2 to 0.6

(https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm).

b. Depth to groundwater - was not encountered. It is greater than 25½ feet deep.

c. Depth to bedrock - Bedrock was not encountered. It is greater than 25½ feet deep.

d. LID design constraints:

- Collapsible soil risk: Low
- Expansive soil risk: Low
- Gypsiferous soil risk: Low
- Liquefaction risk: Low

Using DSWC Table 3 (Matrix), appropriate Best Management Practices (BMP) should be selected by the civil engineer of record based upon the provided risks, infiltration rates, depth to groundwater and depth to bedrock.

H. Soil Corrosion

Based upon our experience in the area and laboratory testing, the on-site soils and many 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) 318-14. Tables 19.3.1.1 and 19.3.2.1 of ACI 318-14 should be referenced for design of concrete elements utilizing a Sulfate Exposure Class of S2.

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

I. Pavement

1. <u>Subgrade Support</u>

We anticipate that the subgrade materials beneath the pavement areas will consist of silty sand. Prior to placement of road base, the subgrade should be prepared as recommended in the subgrade preparation section of this report. A California Bearing Ratio (CBR) of 7 percent was assumed for a properly compacted silty sand subgrade for purposes of design.

2. Pavement Thickness

Based on the assumed traffic loadings and listed traffic indexes, a 20-year design life, and AASHTO design methods, the following pavement sections are recommended.

Roadway	TI	Asphalt (in.)	Base Course (in.)
45 - 50 foot ROW	5	2½	6
80 foot ROW	7	3½	8

3. Pavement Materials

The pavement materials should meet City of Ivins specifications for gradation and quality. The pavement thicknesses indicated above assume that the base course is a high quality material with a CBR of at least 50 percent and the asphaltic concrete has a minimum Marshall stability of 1,800 pounds. Other materials may be considered for use in the pavement section. The use of other materials may result in other pavement material thicknesses.

4. 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.

J. Construction Testing and Observations

We recommend the following testing and observations be done as a minimum as required by the City of Ivins.

a. Observe grubbing and verify removal of soil containing roots and organics.

b. Verify that recommended overexcavation depths are achieved in the building pads and beneath roadways. The lateral extent of the building pad should be located by survey (not included in AGEC's Scope of Services) and include the area which extends at least 5 feet beyond the buildable area as per city set-back requirements.

c. Verify that recommended structural fill depths are provided below foundations and slabs.

d. Conduct compaction testing on fill placed below foundations and in building pads. We recommend testing each foot of fill placed.

e. Conduct construction materials testing on city improvements at a frequency which meets or exceeds Ivins City requirements.

K. **Geotechnical Recommendation Review**

The client should familiarize themselves with the information contained in this letter. 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 drilled borings, the data obtained from laboratory testing, 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.

If you have any questions or if we can be of further service please call.

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Arnold DeCastro, P.E.

Reviewed by: Jon Russell Hanson, P.E.

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PARCEL I-SB-57-A (R-1-7.5)
IVINS, UTAH

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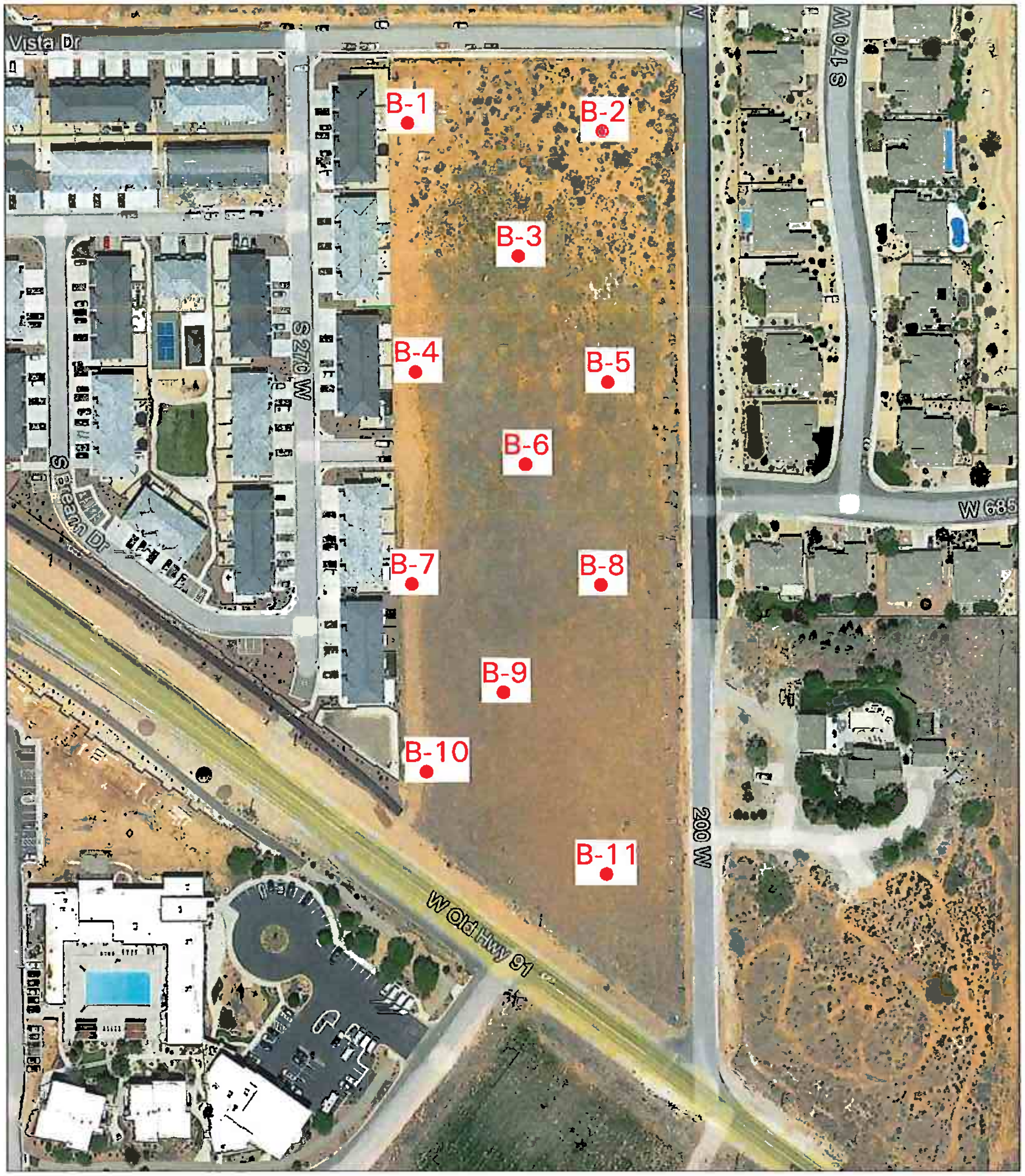
Not to Scale

2220960	AGEC	Vicinity Map	Figure 1



PARCEL I-SB-57-A (R-1-7.5)
IVINS, UTAH

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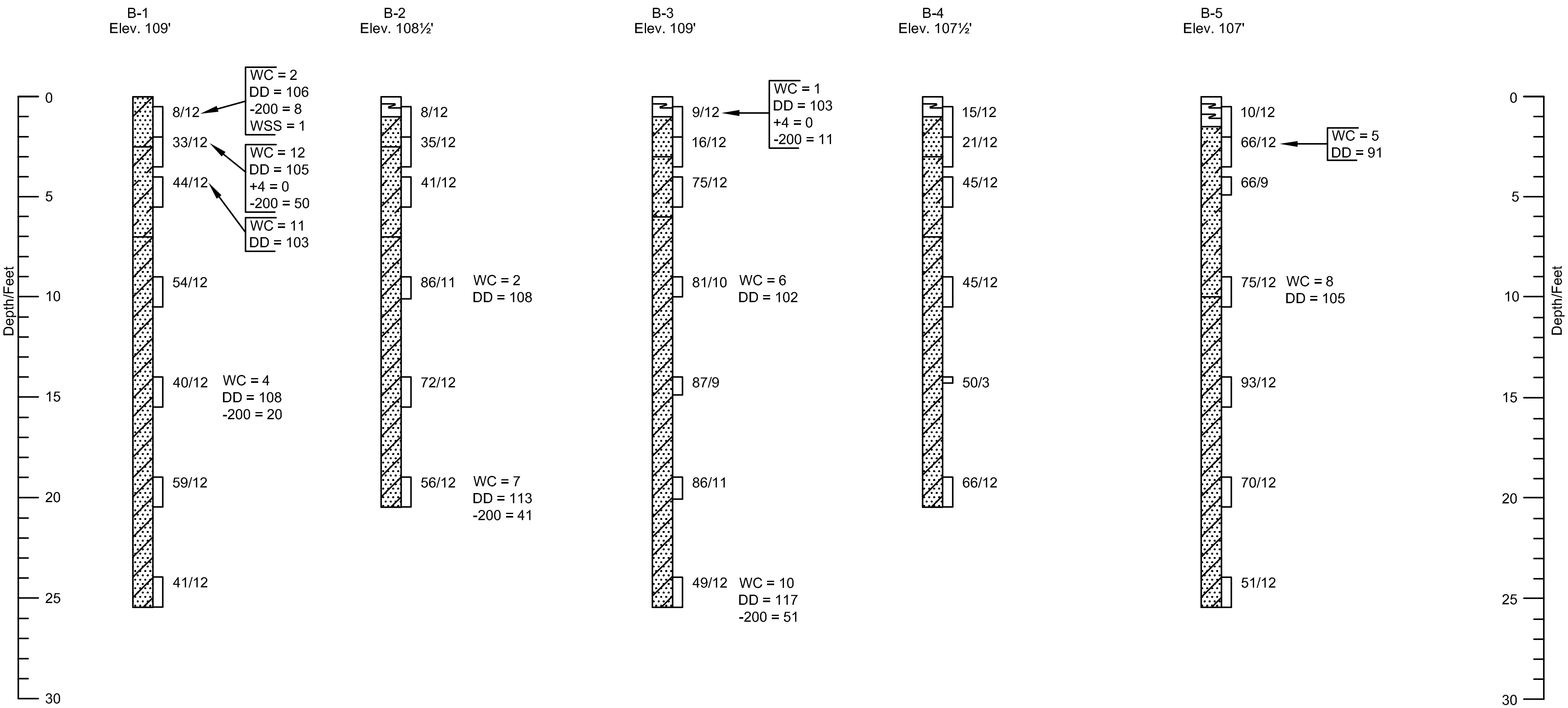
0 200 400 feet

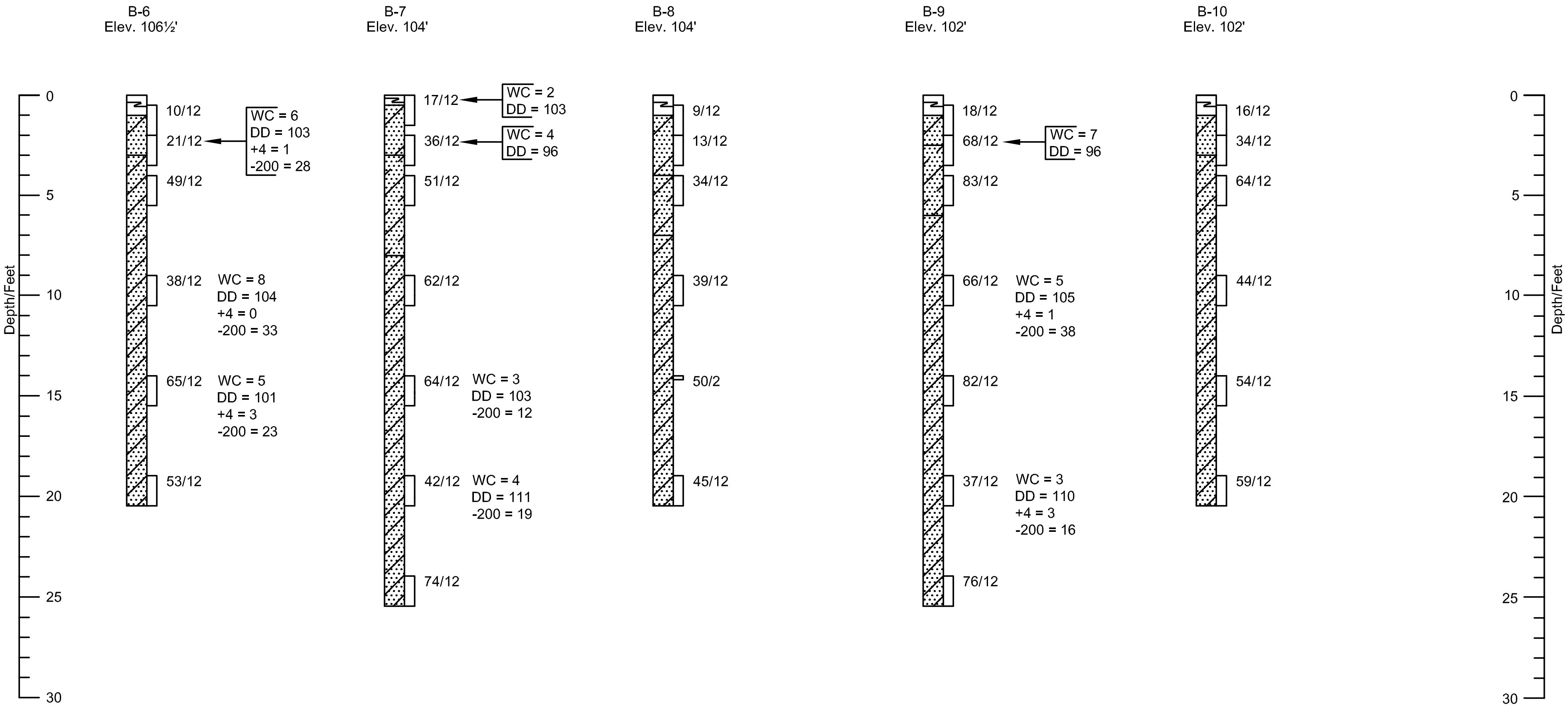
● Approximate boring location

Benchmark; top of sewer manhole, assumed elevation = 100 feet.

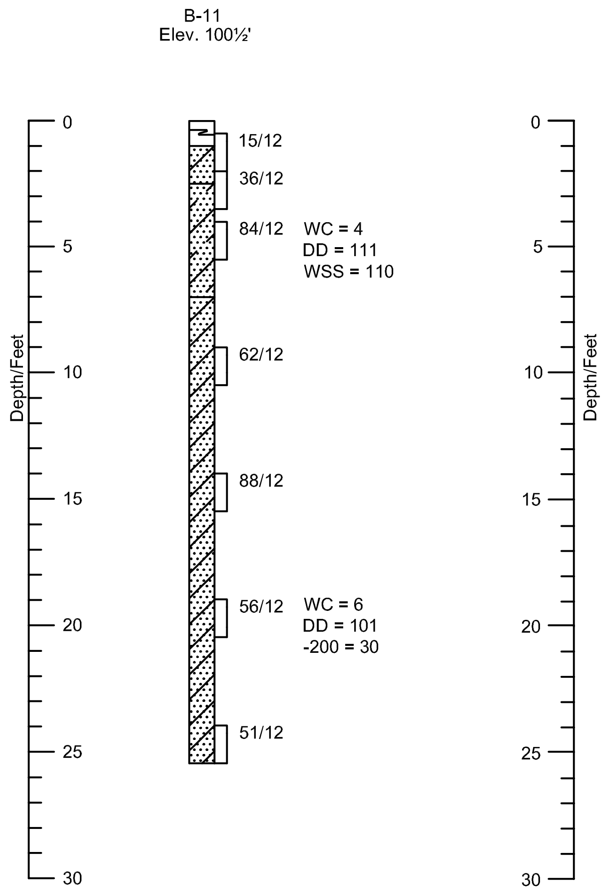
2220960	AGEC	Site Plan	Figure 2



2220960 | AGEC | Logs of Exploratory Borings | Figure 3



2220960 | AGEC | Logs of Exploratory Borings | Figure 4



LEGEND:

Cultivated Soil; Poorly Graded Sand with Silt to Silty Sand (SP-SM to SM); loose, dry, contains roots, red-brown.

Interlayered Silty and Clayey Sand (SM and SC); dense to very dense, cemented zones, red-brown to light brown with white spots.

Silty Sand (SM); dense to very dense, slightly moist to moist, red-brown.

Poorly Graded Sand with Silt (SP-SM); loose to medium dense, dry, red to red-brown.

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.

NOTES:

1. The borings were drilled on April 26 and 27, 2022 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 Figure 2.
3. The elevations of the borings were measured by hand level and refer to 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. Free water was not encountered in the borings at the time of drilling.
7. WC = water content (%);
   DD = dry density (pcf);
   +4 = percent retained on the No. 4 sieve;
   -200 = percent passing No. 200 sieve;
   WSS = water soluble sulfates (ppm).

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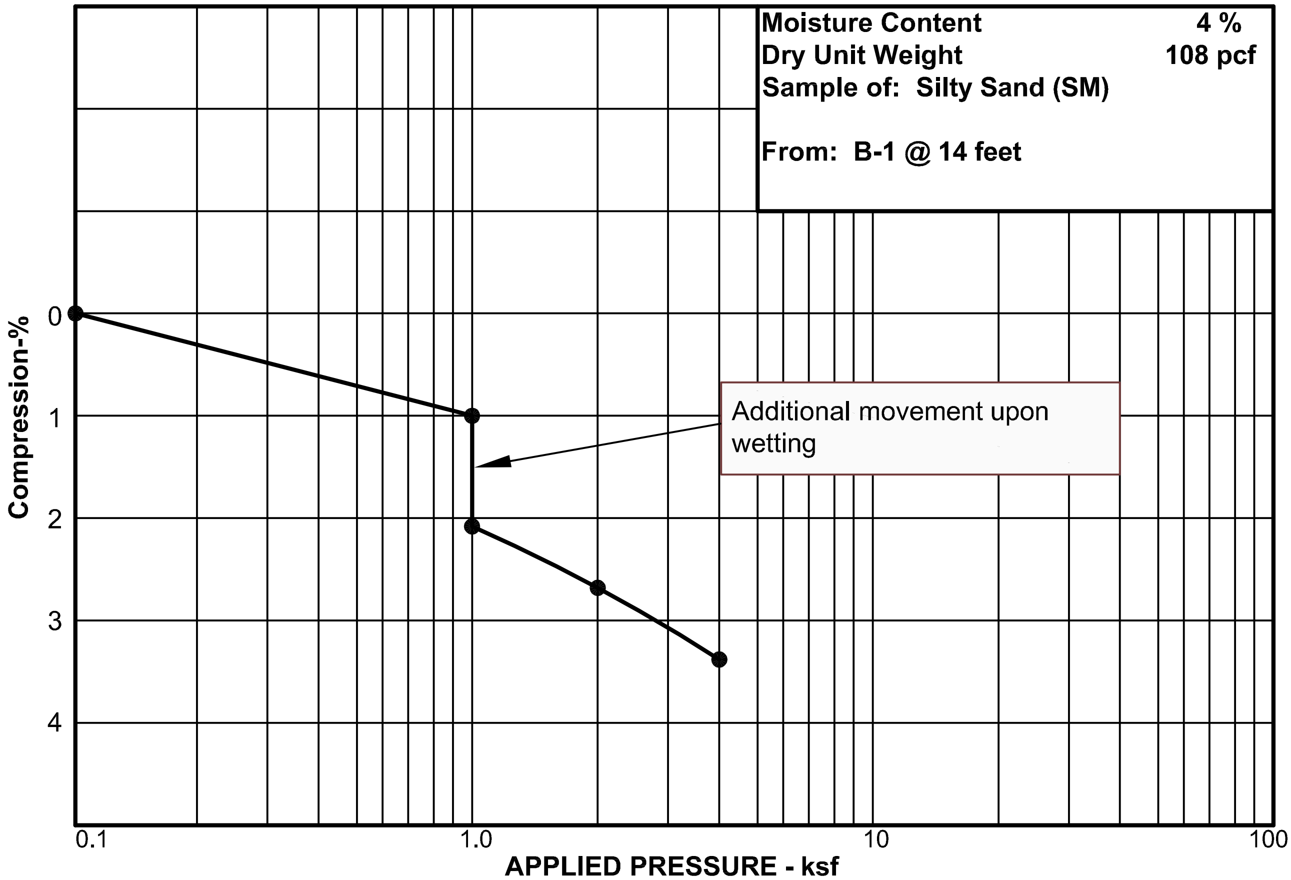

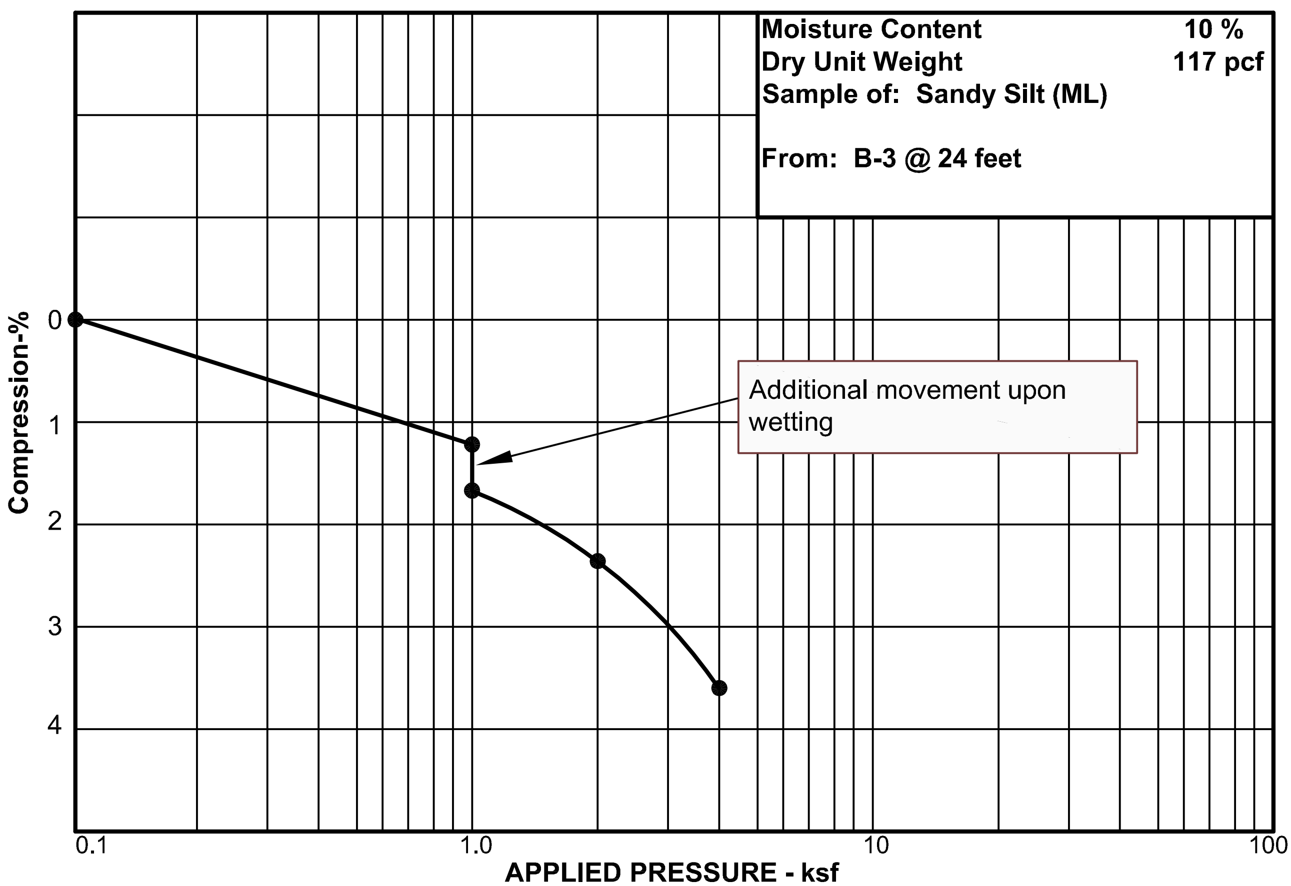

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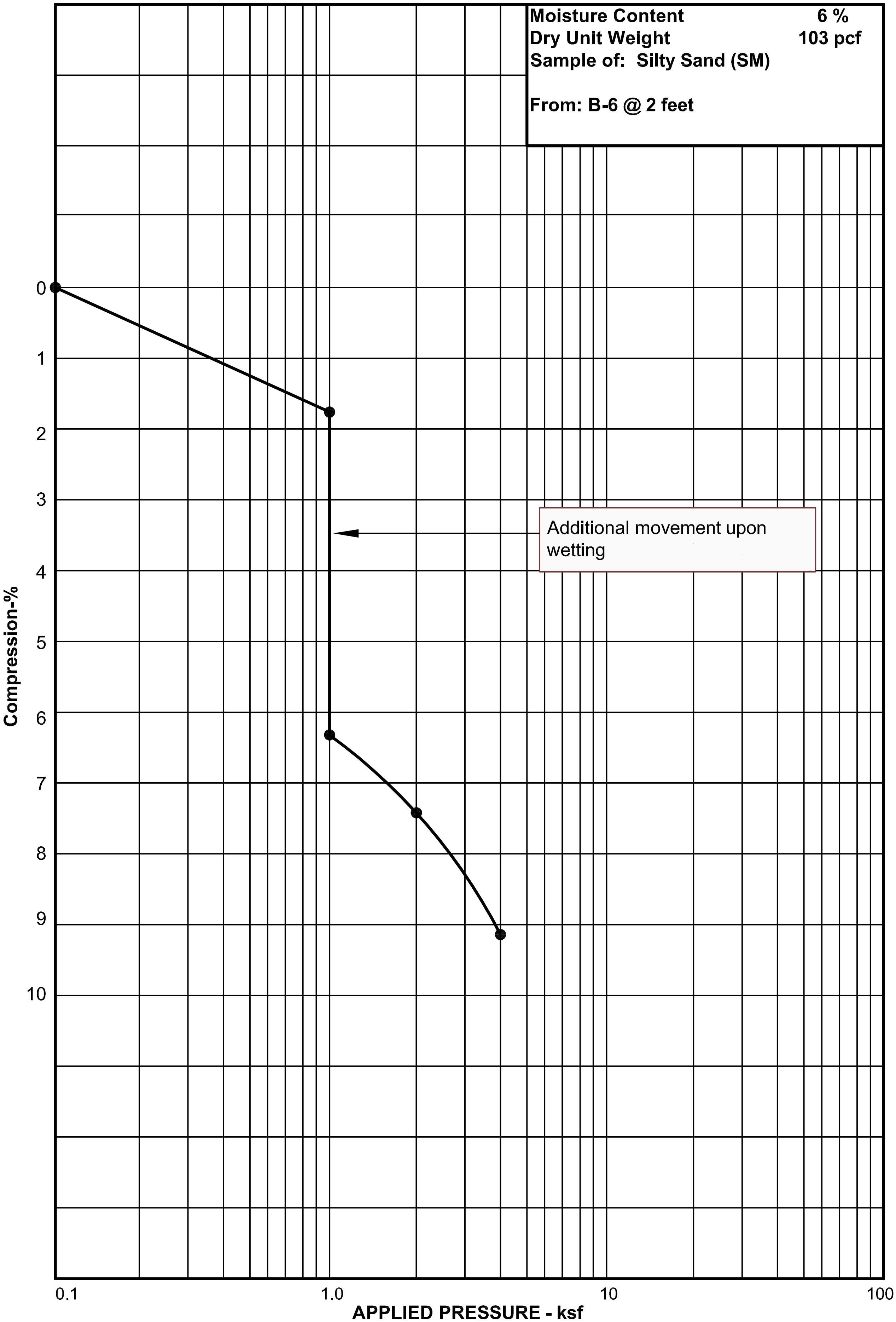
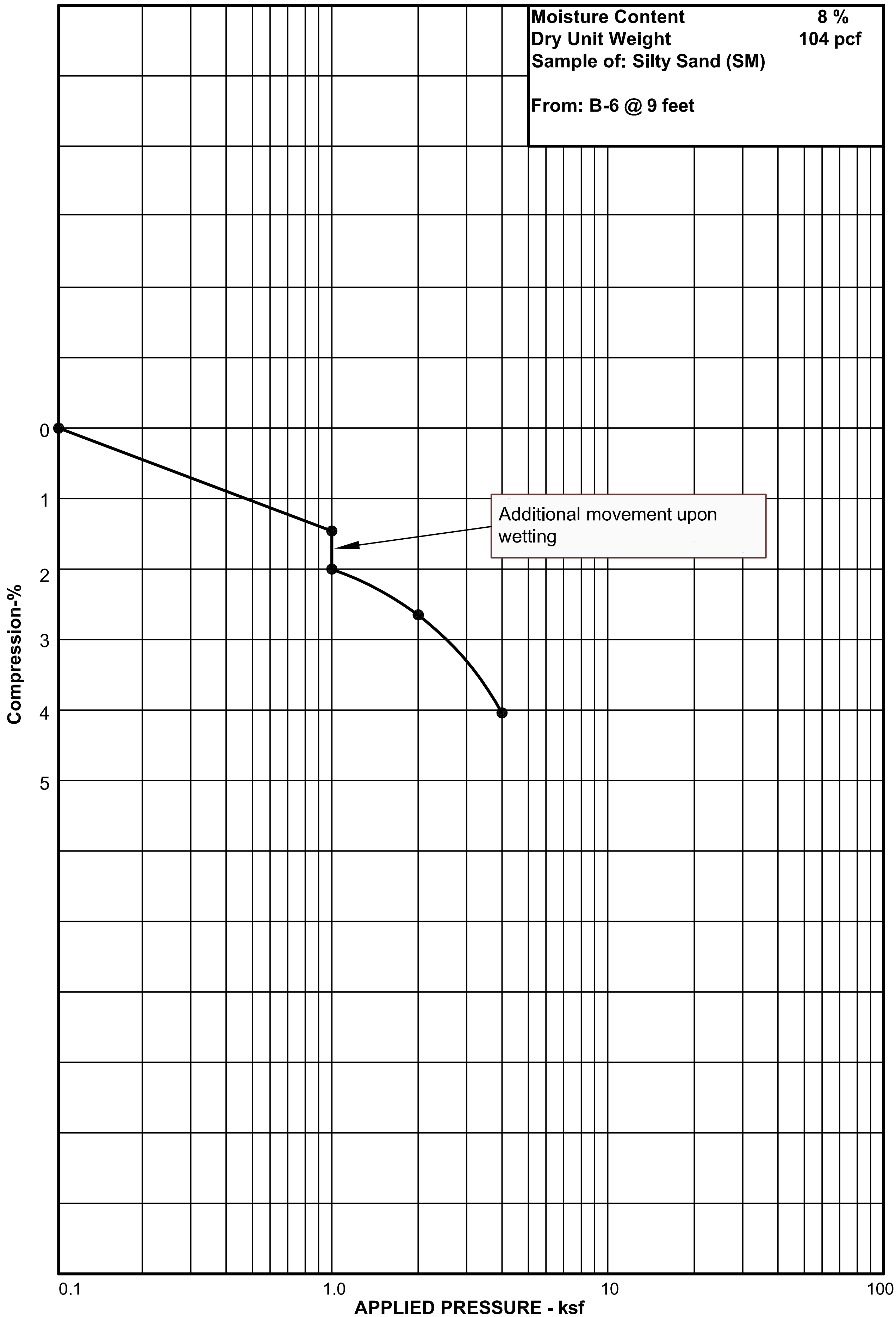


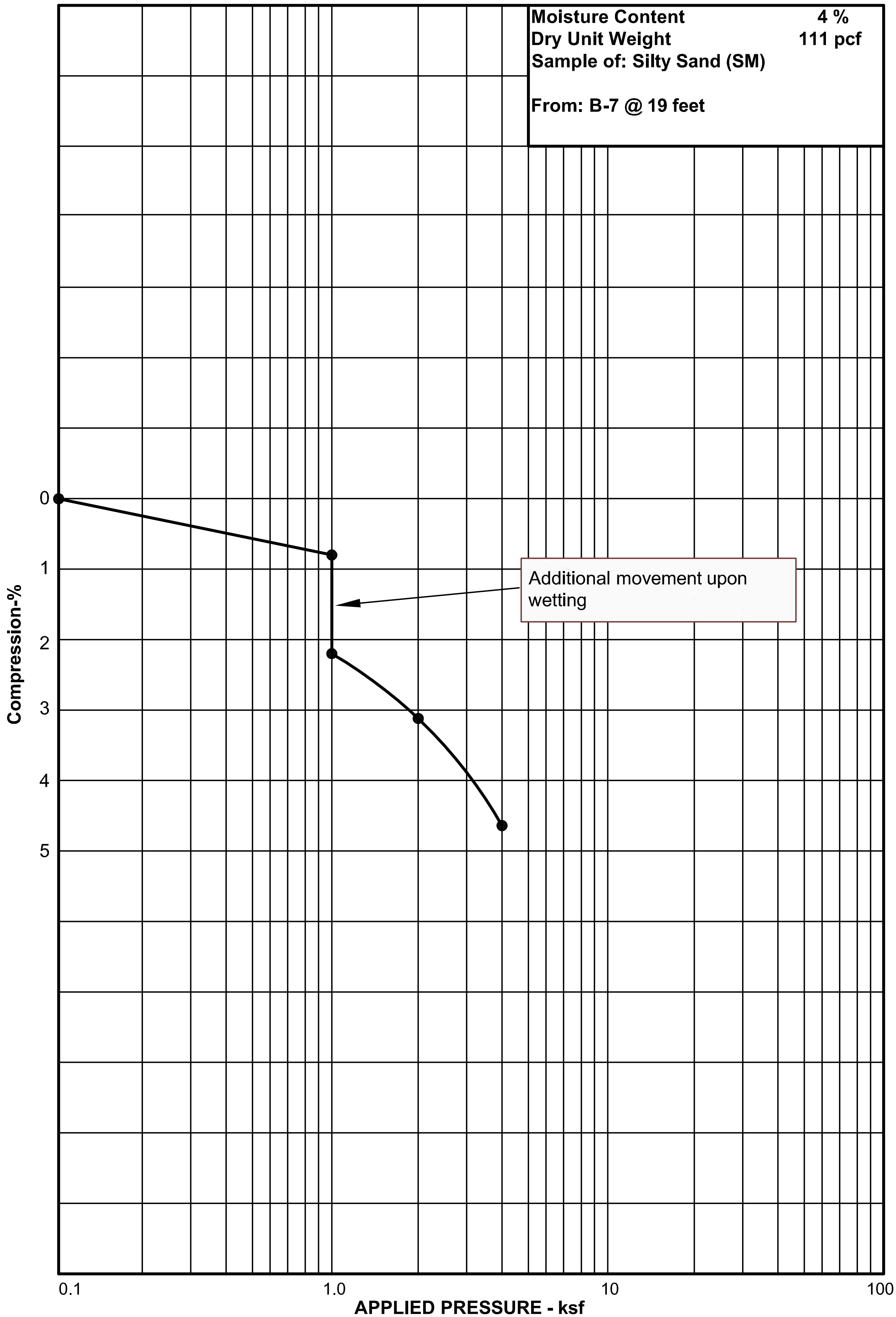
Project No. 2220960 CONSOLIDATION TEST RESULTS Figure 7

Applied Geotechnical Engineering Consultants, Inc.



Project No. 2220960 CONSOLIDATION TEST RESULTS Figure 8

Applied Geotechnical Engineering Consultants, Inc.



APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I
SUMMARY OF LABORATORY TEST RESULTS

Ivins Parcel I-SB-57-A (R-1-7.5) Project Number 2220960

Sample Location		Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation			Water Soluble Sulfate (ppm)	Sample Classification
Boring No.	Depth (feet)			Gravel (%)	Sand (%)	Silt/ clay (%)		
B-1	½	2	106			8	1	Poorly Graded Sand with Silt (SP-SM)
B-1	2	12	105	0	50	50		Interlayered Silty to Clayey Sand (SM to SC)
B-1	4	11	103					Interlayered Silty to Clayey Sand (SM to SC)
B-1	14	4	108			20		Silty Sand (SM)
B-2	9	2	108					Silty Sand (SM)
B-2	19	7	113			41		Silty Sand (SM)
B-3	½	1	103	0	89	11		Poorly Graded Sand with Silt (SP-SM)
B-3	9	6	102					Silty Sand (SM)
B-3	24	10	117			51		Sandy Silt (ML)
B-5	2	5	91					Interlayered Silty to Clayey Sand (SM to SC) Silty Sand (SM)
B-5	9	8	105					Silty Sand (SM)
B-6	2	6	103	1	71	28		Silty Sand (SM)
B-6	9	8	104	0	67	33		Silty Sand (SM)
B-6	14	5	101	3	74	23		Silty Sand (SM)

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Sample Location		Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation			Water Soluble Sulfate (ppm)	Sample Classification
Boring No.	Depth (feet)			Gravel (%)	Sand (%)	Silt/ clay (%)		
B-7	0	2	103					Poorly Graded Sand with Silt (SP-SM)
B-7	2	4	96					Interlayered Silty to Clayey Sand (SM to SC)
B-7	14	3	103			12		Silty Sand (SM)
B-7	19	4	111			19		Silty Sand (SM)
B-9	2	7	96					Interlayered Silty to Clayey Sand (SM to SC)
B-9	9	5	105	1	61	38		Silty Sand (SM)
B-9	19	3	110	3	81	16		Silty Sand (SM)
B-11	4	4	111				110	Interlayered Silty to Clayey Sand (SM to SC)
B-11	19	6	101			30		Silty Sand (SM)