Applied GeoTech

GEOTECHNICAL INVESTIGATION

PROPOSED HEBER CITY HIGH SCHOOL

300 NORTH 1000 WEST

HEBER CITY, UTAH

PREPARED FOR:

WASATCH SCHOOL DISTRICT
101 EAST 200 NORTH
HEBER CITY, UT 84032

ATTENTION: FRANCIS HARRISON

PROJECT NO. 1190318

JUNE 11, 2019
REVISED JUNE 13, 2019

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EXECUTIVE SUMMARY

1. Four borings (B-1 through B-4) were drilled and one test pit (TP-1) excavated in the area of the proposed school to depths of approximately 15½ to 20½ feet. Approximately 1 to 2 feet of topsoil was encountered overlying lean clay, which extends to depths ranging from approximately 5½ to 11½ feet below the ground surface except in Boring B-3 where the clay extends the full depth of the boring, approximately 15½ feet. Gravel with some sand layers was encountered below the clay and extends to the maximum depth of Borings B-1 and B-2 and Test Pit TP-1. Clay was encountered below the gravel in Boring B-4 at a depth of approximately 12 feet and extends to the maximum depth of this boring, approximately 15½ feet.

   One boring (B-5) was drilled in the area of the proposed football bleachers to a depth of approximately 15½ feet. This boring encountered approximately 1½ feet of topsoil overlying clay, which extends to a depth of approximately 8 feet. Gravel was encountered below the clay to the maximum depth of the boring.

   Additional test pits (TP-2 through TP-23) were excavated to a depth of approximately 5 feet in areas of proposed parking lots, access roads, courts and play fields. These test pits encountered approximately ½ to 2½ feet of topsoil overlying clay except in Test Pits TP-14 and TP-17 where gravel was encountered below the topsoil. Sand and gravel were encountered below the clay in some of the test pits and clay was encountered below the gravel in Test Pits TP-14 and TP-17.

2. Subsurface water was measured on May 28, 2019 at depths ranging from approximately 1½ to 8 feet below the ground surface. The shallowest depth to water is generally near the creeks along the north end and through the middle of the site.

3. The upper approximately 3 to 5 feet of clay should be removed from below proposed foundations and replaced with structural fill. Net allowable bearing pressures of 1,500 and 2,500 pounds per square foot may be used in design of footings where at least 3 and 5 feet of the clay is removed from below footings, respectively, and replaced with an equal or greater amount of structural fill.

   The northern portion of the building area (Boring B-1 and Test Pits TP-6 and TP-7) encountered softer soils and higher organic content. With the meandering streams that extend through the site, there is potential for areas of organic soil and very soft material that should be removed. It will be important for an engineer from AGEC to observed footing excavations to identify areas where soil should be removed to greater depths. Additional

EXECUTIVE SUMMARY (continued)

exploration may be considered to better define the extent of the very soft soil containing organics.

Consideration may be given to using aggregate piers below footings instead of over-excavation and replacement of the clay. This would allow for use of higher bearing pressures in footing design. The depth of piers may vary across the building area depending on soil conditions and should generally extend through the clay down to the gravel.

4. Construction equipment access difficulties should be expected for rubber-tired construction equipment in most areas of the site due to the shallow depth to water and soft clay. Placement of approximately 2 to 2½ feet of granular fill will provide limited support for construction equipment in areas of very moist to wet clay.

5. With the relatively shallow depth to water, we anticipate that the site grade may be raised to improve conditions for construction at the site. Where areas of the site are raised more than approximately 3 feet above the existing ground surface, the site grading fill should be placed well in advance of building construction so that most of the settlement induced by the load of the site grading fill occurs prior to building construction. We anticipate that the majority of the settlement will occur in the first 3 to 6 months after fill placement. The settlement should be monitored to determine when building construction can begin. The wait time may be reduced by temporarily placing surcharge fill over the proposed building area.

6. Geotechnical information relating to foundations, subgrade preparation, materials and pavement is included in the report.

SCOPE

This report presents the results of a geotechnical investigation for a proposed high school at 300 North 1000 West in Heber City, Utah. The report presents the subsurface conditions encountered, laboratory test results and recommendations for foundations and pavement. The study was conducted in general accordance with our proposal dated May 6, 2019.

Field exploration was conducted to obtain information on the subsurface conditions at the site. Samples obtained from the field investigation were tested in the laboratory to determine physical and engineering characteristics of the on-site soil. Information obtained from the field and laboratory investigations was used to define conditions at the site and to develop recommendations for the proposed foundations and pavement.

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 relating to construction are included in the report.

SITE CONDITIONS

At the time of our field study, the site consisted of cultivated fields and pasture. There were no permanent structures or pavement on the property except for a farm structure in the southwest corner of the site and a garage in the northeast corner.

The ground surface at the site is relatively flat and generally slopes gently down to the west.

Spring Creek extends along the north side of the property and another creek extends through the central portion of the site in an east/west direction. There was water in the creeks at the time of our field study.

The Sagebrush and Spring Creek canal, which had water flowing in it, extends through the southeast corner of the northern portion of the site.

Vegetation at the site consists of grass and areas of alfalfa. There are some trees along the creeks and canal.

The site is generally surrounded by cultivated fields and pastures. There is a residential development to the east and a church to the south of the east end of the site. There is a house to the north of the east end of the site.

FIELD STUDY

The field study was conducted on May 16 through 21, 2019. Five borings were drilled and 23 test pits excavated at the approximate locations indicated on Figure 1. The borings were drilled using 8-inch diameter, hollow-stem auger powered by a truck-mounted drill rig. The test pits were excavated with a rubber-tired backhoe. The borings and test pits were logged and soil samples obtained by representatives of AGEC. Logs of the subsurface conditions encountered in the borings and test pits are graphically shown on Figures 2 through 4 with legend and notes on Figure 5.

We had access difficulties for our rubber-tired backhoe in the northwestern portion of the site. The backhoe became stuck in an area between Test Pits TP 19 and TP-22.

The test pits were backfilled without significant compaction. The backfill in the test pits should be replaced with properly compacted backfill where it will support buildings, slabs or other improvements sensitive to settlement.

SUBSURFACE CONDITIONS

Four borings (B-1 through B-4) were drilled and one test pit (TP-1) excavated in the area of the proposed school to depths of approximately 15½ to 20½ feet. Approximately 1 to 2 feet of topsoil was encountered overlying lean clay, which extends to depths ranging from approximately 5½ to 11½ feet below the ground surface except in Boring B-3 where the clay extends the full depth of the boring, approximately 15½ feet. Gravel with some sand layers was encountered below the clay and extends to the maximum depth of Borings B-1 and B-2 and Test Pit TP-1. Clay was encountered below the gravel in Boring B-4 at a depth of approximately 12 feet and extends to the maximum depth of this boring, approximately 15½ feet.

One boring (B-5) was drilled in the area of the proposed football bleachers to a depth of approximately 15½ feet. This boring encountered approximately 1½ feet of topsoil overlying clay, which extends to a depth of approximately 8 feet. Gravel was encountered below the clay to the maximum depth of the boring.

Additional test pits (TP-2 through TP-23) were excavated to a depth of approximately 5 feet in areas of proposed parking lots, access roads, courts and play fields. These test pits encountered approximately ½ to 2½ feet of topsoil overlying clay except in Test Pits TP-14 and TP-17 where gravel was encountered below the topsoil. Sand and gravel were encountered below the clay in some of the test pits and clay was encountered below the gravel in Test Pits TP-14 and TP-17.

A description of the soil encountered in the borings and test pits follows:

> Topsoil - The topsoil consists of sandy lean clay. It is very moist to wet, dark brown and contains roots and organics.

> Lean Clay - The clay contains silty and clayey sand layers. It is very soft to medium stiff, very moist to wet and brown to dark brown. Soft to very soft soil was

encountered in Boring B-1 and in Test Pits TP-6, TP-7, TP-11, TP-12, TP-15, TP-17, TP-20, TP-21, TP-22 and TP-23.

Laboratory tests performed on samples of the clay indicate that it has natural moisture contents ranging from 18 to 49 percent and natural dry densities ranging from 70 to 105 pounds per cubic foot (pcf). Samples of the clay tested in the laboratory were found to have unconfined compressive strengths of 890 to 2,290 pounds per square foot (psf). Results of consolidation tests indicate that the clay will generally compress a small to moderate to amount with the addition of light to moderate loads. The very soft clay from Boring B-1 was found to compress a moderate to large amount with the addition of light to moderate loads. Results of the consolidation tests are presented on Figures 6 through 9.

Silty Sand - The silty sand is medium dense, very moist to wet and brown.

Clayey Gravel with Sand - The gravel is medium dense, moist to wet and brown.

Poorly-graded Gravel with Silt and Sand - The gravel contains sand layers and occasional cobbles. It is medium dense to dense, moist to wet and gray to grayish brown.

Laboratory tests conducted on a sample of the gravel indicate it has a natural moisture content of 9 percent and a natural dry density of 122 pcf. The results of a gradation test on the gravel are presented on Figure 10.

Results of the laboratory tests are summarized on Table I and are included on the logs of the borings and test pits.

SUBSURFACE WATER

Subsurface water was measured on May 28, 2019 at depths ranging from approximately 1½ to 8 feet below the ground surface. The shallowest depth to water is generally near the creeks along the north end and through the middle of the site. Slotted PVC pipe was installed in the borings and test pits except for Test Pit TP-18. Fluctuations in the water level will occur over time. An evaluation of such fluctuations is beyond the scope of this report.

PROPOSED CONSTRUCTION

We understand that the site consists of 63 acres planned to be developed for a high school. We anticipate the school building will consist of a one- to two-story, steel-frame and masonry structure with a slab-on-grade floor. We understand that football bleachers and storage/concessions buildings are planned for the northern portion of the site. We have assumed building column and wall loads of up to 250 kips and 14 kips per lineal foot, respectively.

We understand that parking and vehicle access areas will be constructed for the project. We have assumed traffic consisting predominantly of car traffic in the parking areas and various amounts of bus traffic for access and drive areas.

If the proposed construction, building loads or traffic is significantly different from what is described above, we should be notified so that we can reevaluate the recommendations given.

RECOMMENDATIONS

Based on the subsurface conditions encountered, laboratory test results and our understanding of the proposed construction, the following recommendations are given:

A. Site Grading

With the relatively shallow depth to water, we anticipate that the site grade may be raised to improve conditions for construction at the site. Where areas of the site are raised more than approximately 3 feet above the existing ground surface, the site grading fill should be placed well in advance of building construction so that most of the settlement induced by the load of the site grading fill occurs prior to building construction. We anticipate that the majority of the settlement will occur in the first 3 to 6 months after fill placement. The settlement should be monitored to determine when building construction can begin. The wait time may be reduced by temporarily placing surcharge fill over the proposed building area.

1. Subgrade Preparation

Prior to placing site grading fill or base course, the unsuitable fill, topsoil, organics, debris and other deleterious material should be removed.

The upper soil consists predominantly of clay and subsurface water is relatively close to the existing ground surface in areas of the site. A soft area was observed in the northwestern portion of the site where the rubber-tired backhoe used to excavate the test pits became stuck. Construction equipment access difficulties should be expected for rubber-tired construction equipment in most areas of the site due to the shallow depth to water and soft clay. Placement of approximately 2 to 2½ feet of granular fill will provide limited support for construction equipment in areas of very moist to wet clay.

Care should be taken to not disturb the natural soil to remain below areas of proposed buildings and pavement.

2. Excavation

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

Excavations extending near or below the subsurface water level will require low ground pressure equipment or equipment supported from outside and above the excavation areas. A smooth cutting edge should be used for excavation equipment when excavating for building foundations in the clay to minimize disturbance of the natural soil.

Excavations that extend below the water level should be dewatered. The water level should be maintained below the base of the excavation during initial fill and concrete placement. Free-draining gravel with less than 5 percent passing the No. 200 sieve should be used for fill or backfill below the original water level. A filter fabric should be placed between the natural soil and free-draining gravel.

3. Materials

Listed below are recommendations for imported structural fill.

Fill to Support	Recommendations
Footings	Non-expansive granular soil Passing No. 200 Sieve < 35% Liquid Limit < 30% Maximum size 4 inches
Floor Slab (Upper 4 inches)	Sand and/or Gravel Passing No. 200 Sieve < 5% Maximum size 2 inches
Slab Support	Non-expansive granular soil Passing No. 200 Sieve < 50% Liquid Limit < 30% Maximum size 6 inches

Materials placed as fill to support structures should be non-expansive granular soil. The upper natural soil consists predominantly of clay. The clay is not recommended for use as structural fill in proposed building areas. The on-site soil may be considered for use as fill below pavement areas or as utility trench backfill, if the topsoil, organics and other deleterious materials are removed or it may be used in landscaping areas.

The natural soil is generally very moist to wet and it is anticipated that significant drying would be needed prior to using the on-site soil as fill. Drying of the soil may not be practical during cold or wet periods of the year.

Free-draining gravel with less than 5 percent passing the No. 200 sieve should be used as fill below the original free water level.

4. Compaction

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

Fill To Support	Compaction Criteria
Foundations	≥ 95%
Concrete Slabs	≥ 90%
Pavement	
Base Course	≥ 95%
Fill placed below Base Course	≥ 90%
Landscaping	≥ 85%
Retaining Wall Backfill	85 - 90%

To facilitate the compaction process, fill should be compacted at a moisture content within 2 percent of the optimum moisture content.

The fill should be placed and compacted in thin enough lifts to allow for proper compaction. Fill placed for the project should be frequently tested for compaction.

5. Drainage

The ground surface surrounding the proposed buildings should be sloped away from the buildings in all directions. Roof downspouts and drains should discharge beyond the limits of backfill.

The collection and diversion of drainage away from the pavement surface is important to the satisfactory performance of the pavement section. Proper drainage should be provided.

B. Foundations

1. Bearing Material

The upper approximately 3 to 5 feet of clay should be removed from below proposed foundations and replaced with structural fill. Structural fill placed below footings should extend down to suitable undisturbed natural soil and out away from the edge of footings at least a distance equal to the depth of fill placed below footings.

The northern portion of the building area (Boring B-1 and Test Pits TP-6 and TP-7) encountered softer soils and higher organic content. With the meandering streams that extend through the site, there is potential for areas of organic soil and very soft material that should be removed. It will be important for an engineer from AGEC to observed footing excavations to identify areas where soil should be removed to greater depths. Additional exploration may be considered to better define the extent of the very soft soil containing organics.

Consideration may be given to using aggregate piers below footings instead of over-excavation and replacement of the clay. This would allow for use of higher bearing pressures in footing design. The depth of piers may vary across the building area depending on soil conditions and should generally extend through the clay down to the gravel.

The topsoil, organics, unsuitable fill, unsuitable natural soil, debris and other deleterious materials should be removed from below proposed foundation areas.

2. Bearing Pressure

Net allowable bearing pressures of 1,500 and 2,500 pounds per square foot may be used in design of footings where at least 3 and 5 feet of the clay is removed from below footings, respectively, and replaced with an equal or greater amount of structural fill.

Spread footings should have a width of at least 2 feet and a depth of embedment of at least 1 foot.

3. Settlement

We estimate that total and differential settlement for footings designed as indicated above will be on the order of 1 inch and ¾ of an inch, respectively.

4. Temporary Loading Conditions

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

5. Frost Depth

Exterior footings and footings beneath unheated areas should be placed at least 30 inches below grade for frost protection.

6. Foundation Base

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

7. Construction Observation

A representative of the geotechnical engineer should observe footing excavations prior to structural fill or concrete placement.

C. Concrete Slab-on-Grade

1. Slab Support

Concrete slabs may be supported on undisturbed natural soil or on compacted structural fill extending down to the undisturbed natural soil.

Topsoil, debris and other deleterious materials should be removed from below proposed slab areas.

2. Underslab Sand and/or Gravel

A 4-inch layer of free-draining sand and/or gravel (less than 5 percent passing the No. 200 sieve) should be placed below floor slabs for ease of construction and to promote even curing of the slab concrete.

3. Vapor Barrier

A vapor barrier should be placed under the concrete floor if the floor will receive an impermeable floor covering. The barrier will reduce the amount of water vapor passing from below the slab to the floor covering.

D. Lateral Earth Pressure

1. Lateral Resistance for Footings

   Lateral resistance for footings placed on the natural soil or on compacted structural fill is controlled by sliding resistance between the footing and the foundation soils. A friction value of 0.45 may be used in design for ultimate lateral resistance.

2. Subgrade Walls and Retaining Structures

   The following equivalent fluid weights are given for the 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. The values listed below assume a horizontal surface adjacent the wall.

Soil Type	Active	At-Rest	Passive
Clay & Silt	50 pcf	65 pcf	250 pcf
Sand & Gravel	40 pcf	55 pcf	300 pcf

3. Seismic Conditions

   Under seismic conditions, the equivalent fluid weight should be increased by 20 pcf for the active condition and 5 pcf for the at-rest condition. A decrease of 20 pcf is recommended for the passive condition. This assumes a peak ground acceleration of 0.34g which represents a 2 percent probability of exceedance in a 50-year period (IBC, 2018).

4. Safety Factors

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

E. Subsurface Drains

Floors that extend below the original ground surface should be provided with a subsurface drain around the perimeter of the below-grade floor areas. The underdrain should consist of at least the following items:

1. The underdrain system should consist of a perforated pipe installed in a gravel filled trench around the perimeter of the subgrade floor portion of the building.

2. The flow line of the pipe should be placed at least 18 inches below the finished floor level and should slope to a sump or outlet where water can be removed by pumping or by gravity flow.

3. If placing the gravel and drain pipe requires excavation below the bearing level of the footing, the excavation for the drain pipe and gravel should have a slope no steeper than 1 horizontal to 1 vertical so as not to disturb the soil below the footing.

4. A filter fabric should be placed between the natural soil and the drain gravel. This will help reduce the potential for fine-grained material filling in the void spaces of the gravel.

5. The subgrade floor slab should have at least 6 inches of free-draining gravel placed below it and the underslab gravel should connect to the perimeter drain.

6. Consideration should be given to installing cleanouts to allow access into the perimeter drain should cleaning of the pipe be required in the future.

F. Pavement

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

1. Subgrade Support
   The upper soil consists predominantly of clay. We have assumed a California Bearing Ratio (CBR) value of 2½ percent which assumes a clay subgrade.

2. Pavement Thickness
   Based on the subsurface conditions encountered, the assumed traffic conditions, a design life of 20 years for flexible pavement and 30 years for rigid pavement, and methods presented by the AASHTO, the following pavement sections are calculated:

	Rigid Pavement	Flexible Pavement		
Traffic Condition	Portland Cement Concrete Thickness	Asphaltic Concrete Thickness	Base Course Thickness	Granular Borrow Thickness
No significant heavy trucks or buses	5" —	— 3"	— 6"	— —
10 buses per day	5" —	— 3½"	— 6"	— 12"
20 buses per day	5½" —	— 4"	— 6"	— 12"

Note that some granular fill may be needed to construct pavements due to the shallow depth to water and the soft clay subgrade.

For garbage dumpster approach slabs, we recommend a Portland cement concrete thickness of 6½ inches over 4 inches of base course.

3. Pavement Materials and Construction

a. Flexible Pavement (Asphaltic Concrete)

The pavement materials should meet the specifications for the applicable jurisdiction. The use of other materials may result in the need for different pavement material thicknesses.

b. Rigid Pavement (Portland Cement Concrete)

The rigid pavement thickness assumes that the pavement will have aggregate interlock joints and that a concrete shoulder or curb will be provided.

The pavement materials should meet the specifications for the applicable jurisdiction. The pavement thickness indicated above assumes that the concrete will have a 28-day compressive strength of 5,000 pounds per square inch. Concrete should be air entrained with approximately 6 percent air. Maximum allowable slump will depend on the method of placement but should not exceed 4 inches.

4. Jointing

Joints for concrete pavement should be laid out in a square or rectangular pattern. Joint spacings should not exceed 30 times the thickness of the slab. The joint spacings indicated should accommodate the contraction of the concrete and under these conditions steel reinforcing will not be required. The joints should be approximately one-fourth of the slab thickness.

G. Corrosion

The following parameters relative to corrosion potential of the soil were measured for a sample of clayey sand from Test Pit TP-1.

Parameter	Value
pH	7.66
Resistivity (ohm - cm)	1,200
Redox Potential (mV)	511
Sulfide Content	negative

Based on the values indicated above and published literature, the natural soil is aggressive toward buried metals. The information presented above should be provided to a corrosion engineer to design suitable corrosion protection for the project.

H. Preconstruction Meeting

Prior to beginning construction at the site, a preconstruction meeting should be held with representatives of the owner, project architect, geotechnical engineer, general contractor, earthwork contractor and other members of the design team to review construction plans, specifications, methods and schedule.

GEOLOGIC HAZARD EVALUATION

Heber City is situated in a valley filled with alluvium from the several rivers that feed into the valley. The sediments are likely underlain by Paleozoic rock at a significant depth.

The site is located in the Intermountain Seismic Belt, which is a seismically active zone extending from Montana to Arizona.

The geologic hazards reviewed for this study consist of debris flow, landslide, rockfall, earthquake ground shaking, surface fault rupture, liquefaction and tectonic subsidence.

1. Debris Flow

The site is located near the center of the valley, well away from sources of debris flow. Debris flow is not considered a hazard at the site.

2. Landslide

The site and vicinity slopes gently down toward the west. Landslide is not considered a hazard at the site.

3. Rockfall

There is no source of rock on or near the property that would represent a rockfall hazard at the site.

4. Seismic Ground Shaking

Seismic ground shaking is a hazard at the site. Listed below is a summary of the site parameters for the 2018 International Building Code:

a.	Site Class	D
b.	Short Period Spectral Response Acceleration, S_S	0.56g
c.	One Second Period Spectral Response Acceleration, S_1	0.20g

5. Surface Fault Rupture

There are no mapped active faults extending through the project site. The closest surface trace of a potentially active fault is that of the Wasatch Fault located approximately 16½ miles west of the site (Utah Geological Survey, 2019).

6. Liquefaction

The site is mapped to have a "very low" liquefaction potential (Anderson and others, 1994). The soil type most susceptible to liquefaction during a large magnitude earthquake is loose, clean sand. The liquefaction potential tends to decrease with an increase in fines content and density. Based on the subsurface conditions encountered at the site, liquefaction is not considered to be a hazard at this site.

7. Tectonic Subsidence

Seismically-induced subsidence would be insignificant at the site since there are no faults close to the site.

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 in the report are based on the information obtained from the borings drilled and test pits excavated at the approximate locations indicated on Figure 1 and the results of laboratory tests. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the subsurface conditions, proposed construction or groundwater level is found to be significantly different from what is described above, we should be notified to reevaluate the recommendations given.

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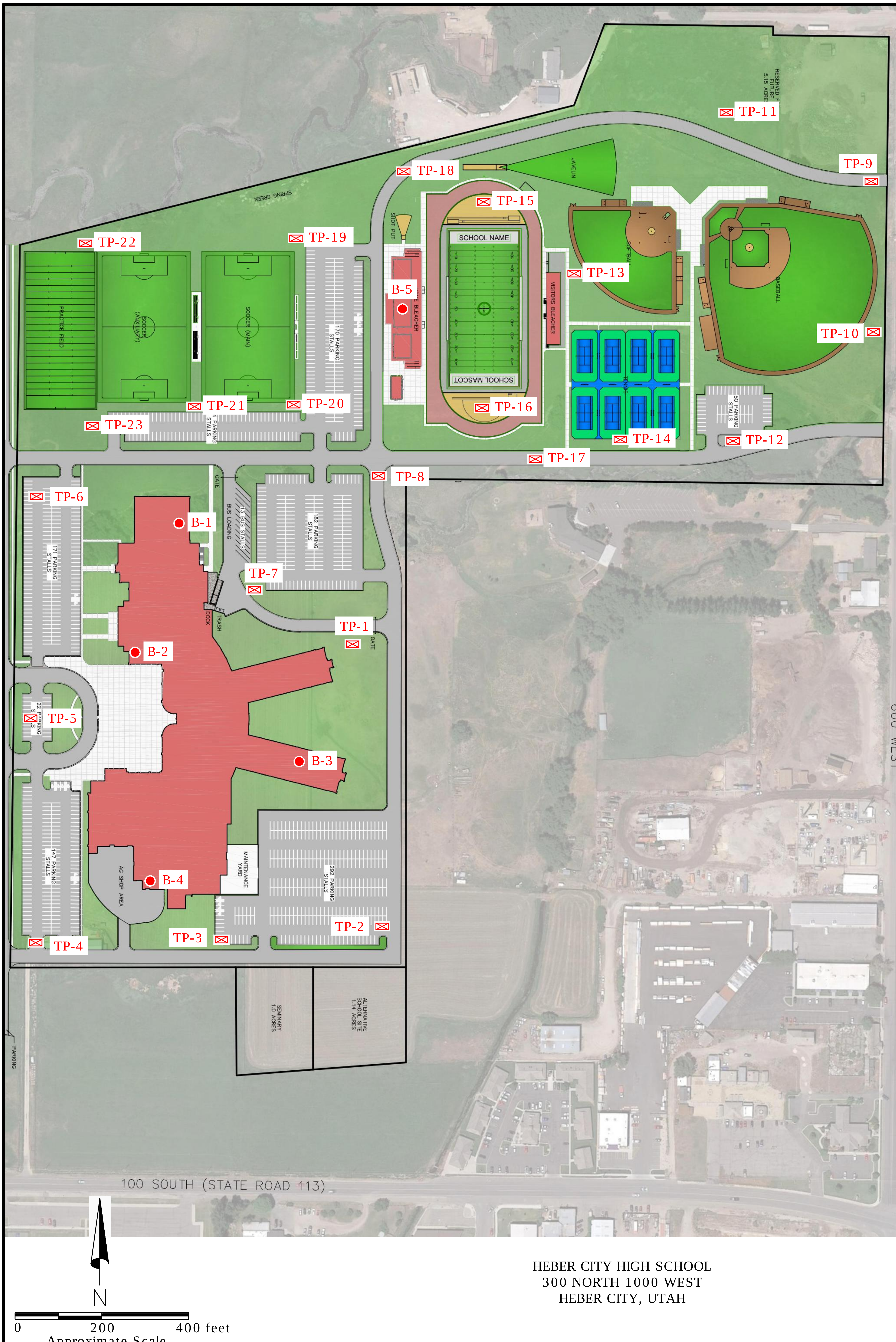
REFERENCES

Anderson, L., Keaton, J., Rice, J., 1994; Liquefaction Potential Map for Central Utah, Plate No. 1 (Park City - Heber), U.S. Geological Survey, Contract Report 94-10.

International Building Code, 2018; International Code Council, Inc. Falls Church, Virginia.

Utah Geological Survey, 2019; Utah Quaternary Fault and Fold Database, http://geology.utah.gov/resources/data-databases/qfaults/ Accessed June 7, 2019.



HEBER CITY HIGH SCHOOL
300 NORTH 1000 WEST
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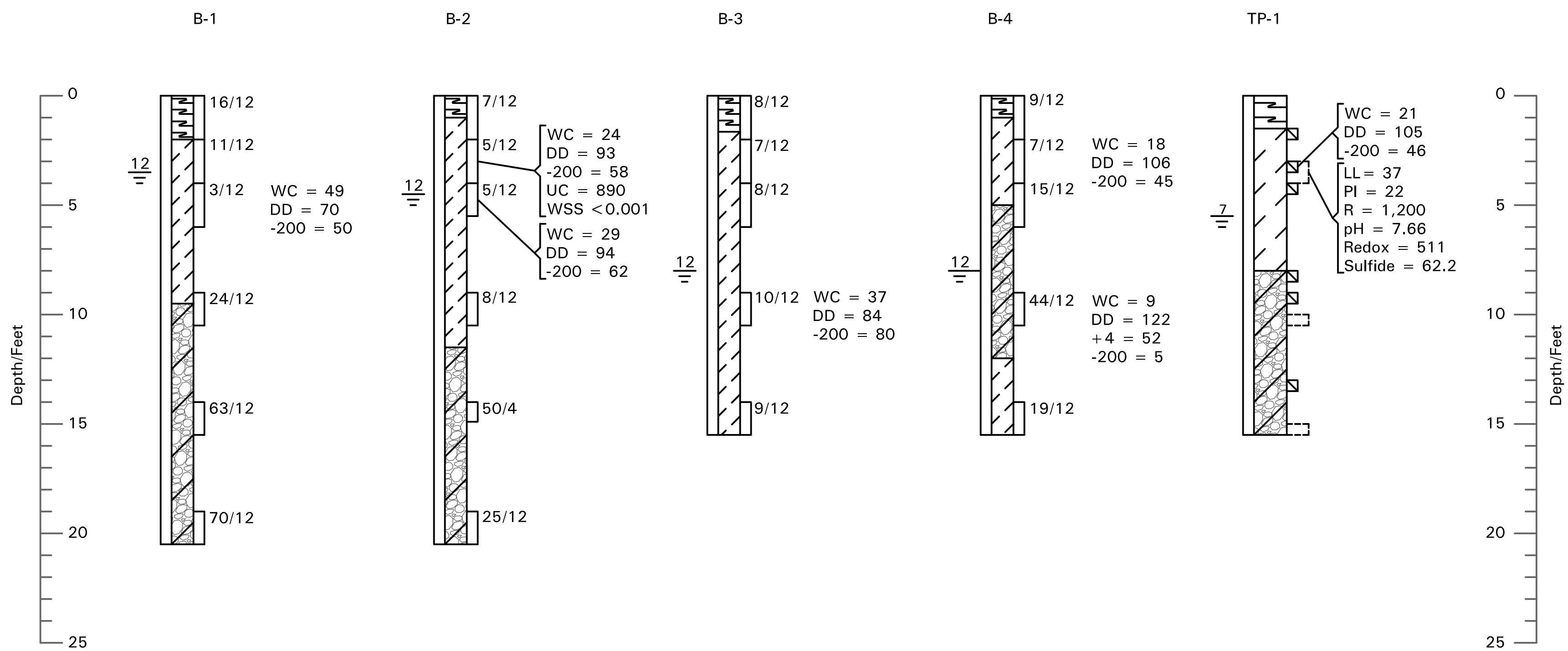
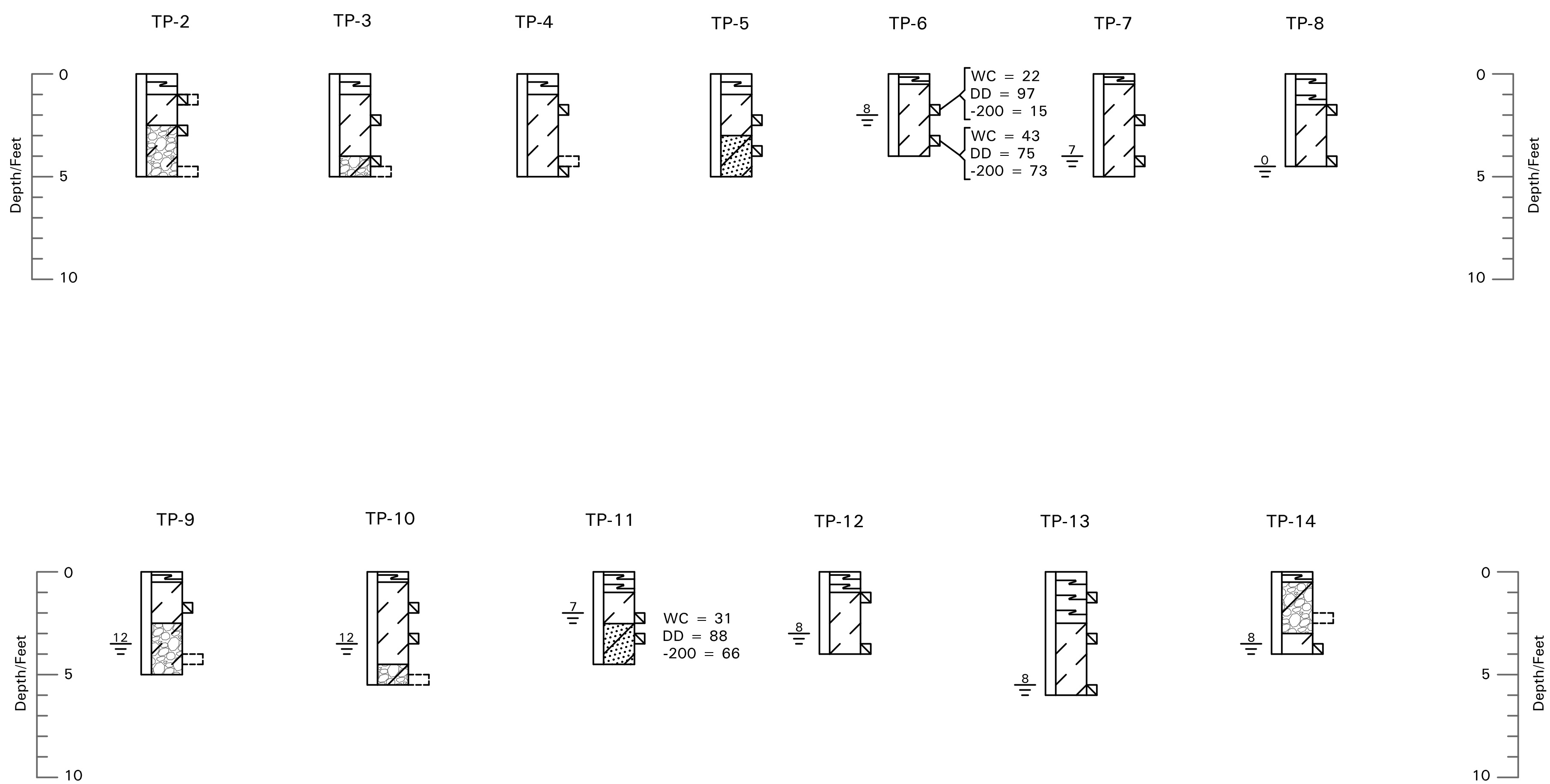
1190318	AGEC	Exploratory Test Pit and Boring Locations	Figure 1



Approximate Vertical Scale 1" = 8'

See Figure 5 for Legend and Notes

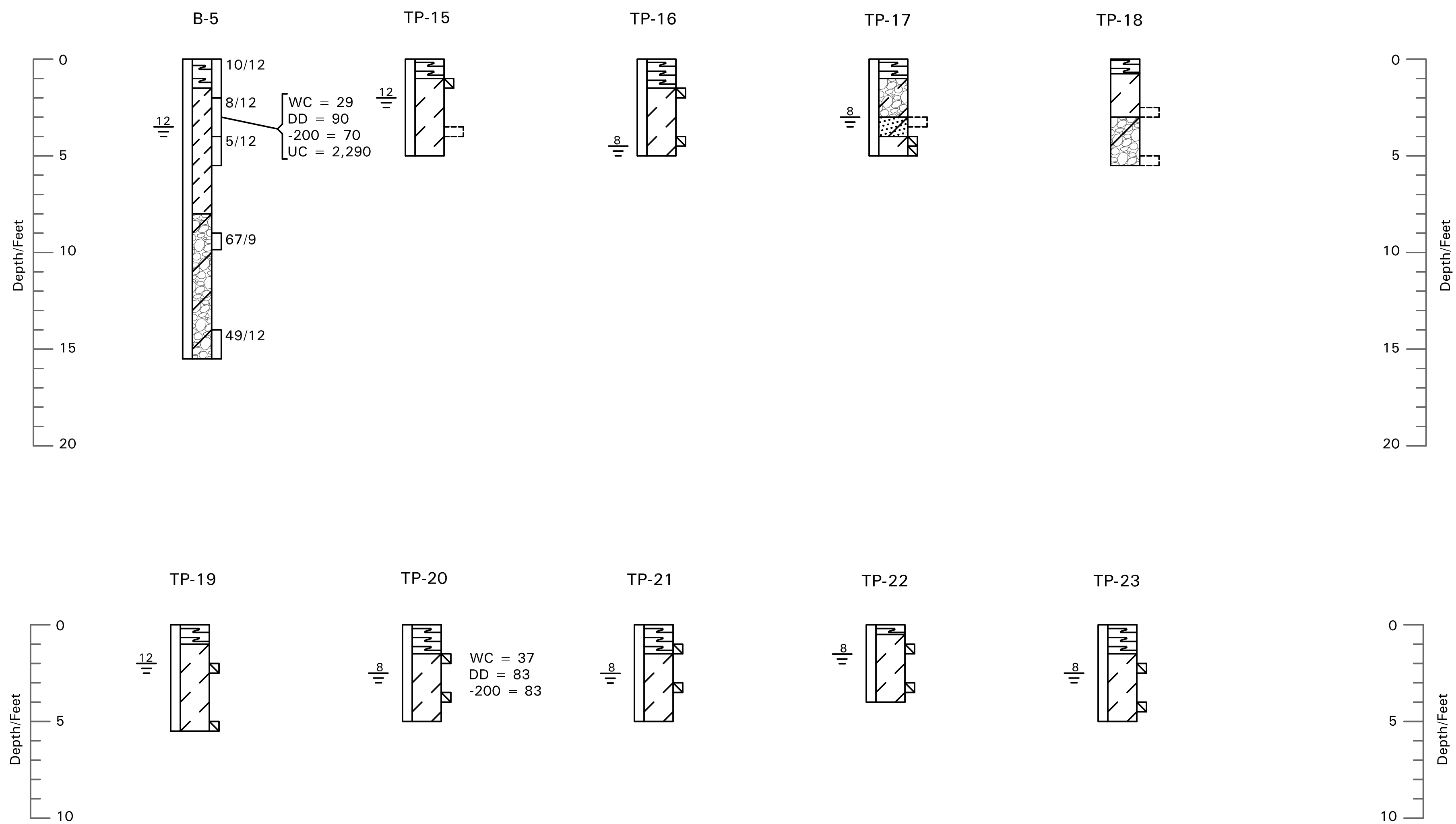
1190318	AGEC	Test Pit and Exploratory Boring Logs	Figure 2



Approximate Vertical Scale 1" = 8'

See Figure 5 for Legend and Notes

1190318	AGEC	Test Pit Logs	Figure 3



Approximate Vertical Scale 1" = 8'

See Figure 5 for Legend and Notes

1190318	AGEC	Exploratory Boring and Test Pit Logs	Figure 4

LEGEND:

Topsoil; sandy lean clay, very moist to wet, dark brown, roots and organics.

Lean Clay (CL); silty and clayey sand layers, very soft to medium stiff, very moist to wet, brown to dark brown. Soft to very soft soil was encountered in B-1, TP-6, TP-7, TP-11, TP-12, TP-15, TP-17, TP-20, TP-21, TP-22 and TP-23.

Silty Sand (SM); medium dense, very moist to wet, brown.

Clayey Gravel with Sand (GC); medium dense, moist to wet, brown.

Poorly-graded Gravel with Silt and Sand (GP-GM); sand layers, occasional cobbles, medium dense to dense, moist to wet, gray to grayish brown.

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

Indicates relatively undisturbed hand drive sample taken.

Indicates disturbed sample taken.

Indicates slotted 1½ inch PVC pipe installed to the depth shown.

12 Indicates the depth to free water and the number of days after drilling/excavating the measurement was taken.

NOTES:

1. The borings were drilled on May 16, 2019 with 8-inch diameter hollow-stem auger. The test pits were excavated on May 16 to 21, 2019 with a rubber-tired backhoe.
2. Locations of the borings and test pits were measured approximately by pacing from features shown on the site plan provided.
3. The boring and test pit locations should be considered accurate only to the degree implied by the method used.
4. The lines between materials shown on the logs represent the approximate boundaries between material types and the transitions may be gradual.
5. Water level readings shown on the logs were made at the time and under the conditions indicated. Fluctuations in the water level will occur with time.
6. WC = Water Content (%);
   DD = Dry Density (pcf);
   +4 = Percent Retained on the No. 4 Sieve;
   -200 = Percent Passing the No. 200 Sieve;
   LL = Liquid Limit (%);
   PI = Plasticity Index (%);
   UC = Unconfined Compressive Strength (psf);
   WSS = Water Soluble Sulfates (%);
   R = Resistivity (ohm-cm);
   pH = pH;
   Sulfides = Sulfide Content (ppm);
   Redox = Redox Potential (mV).

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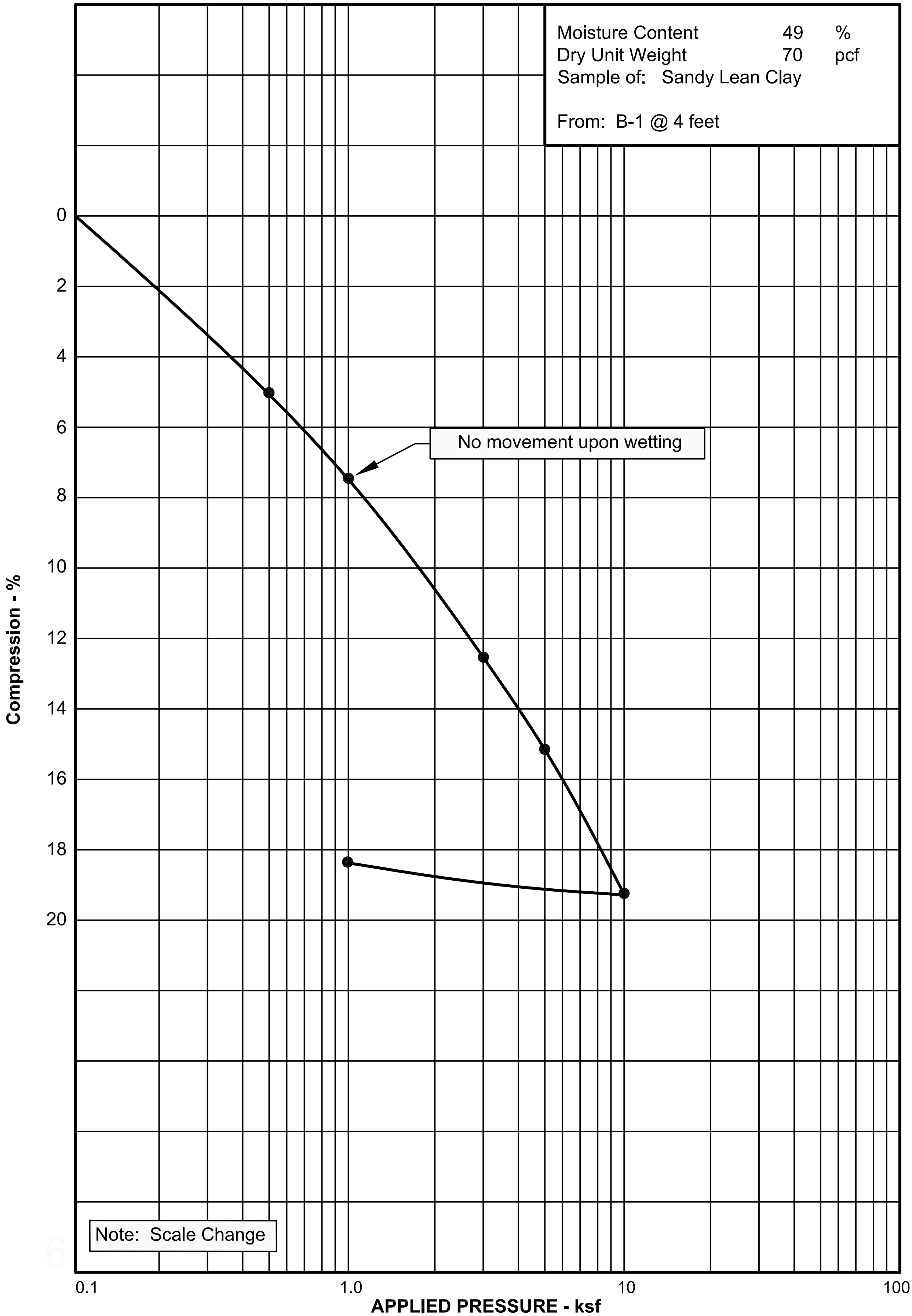

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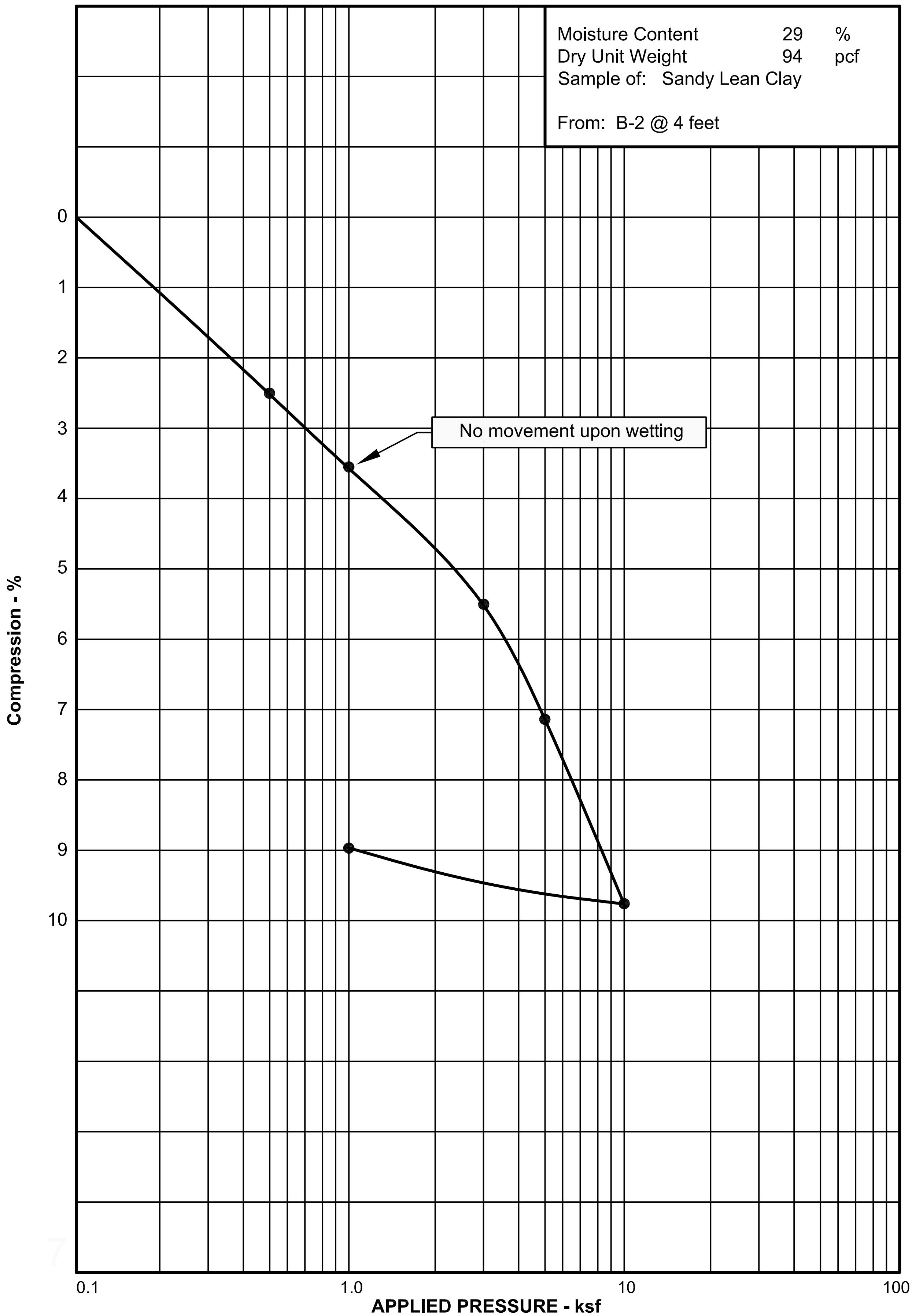
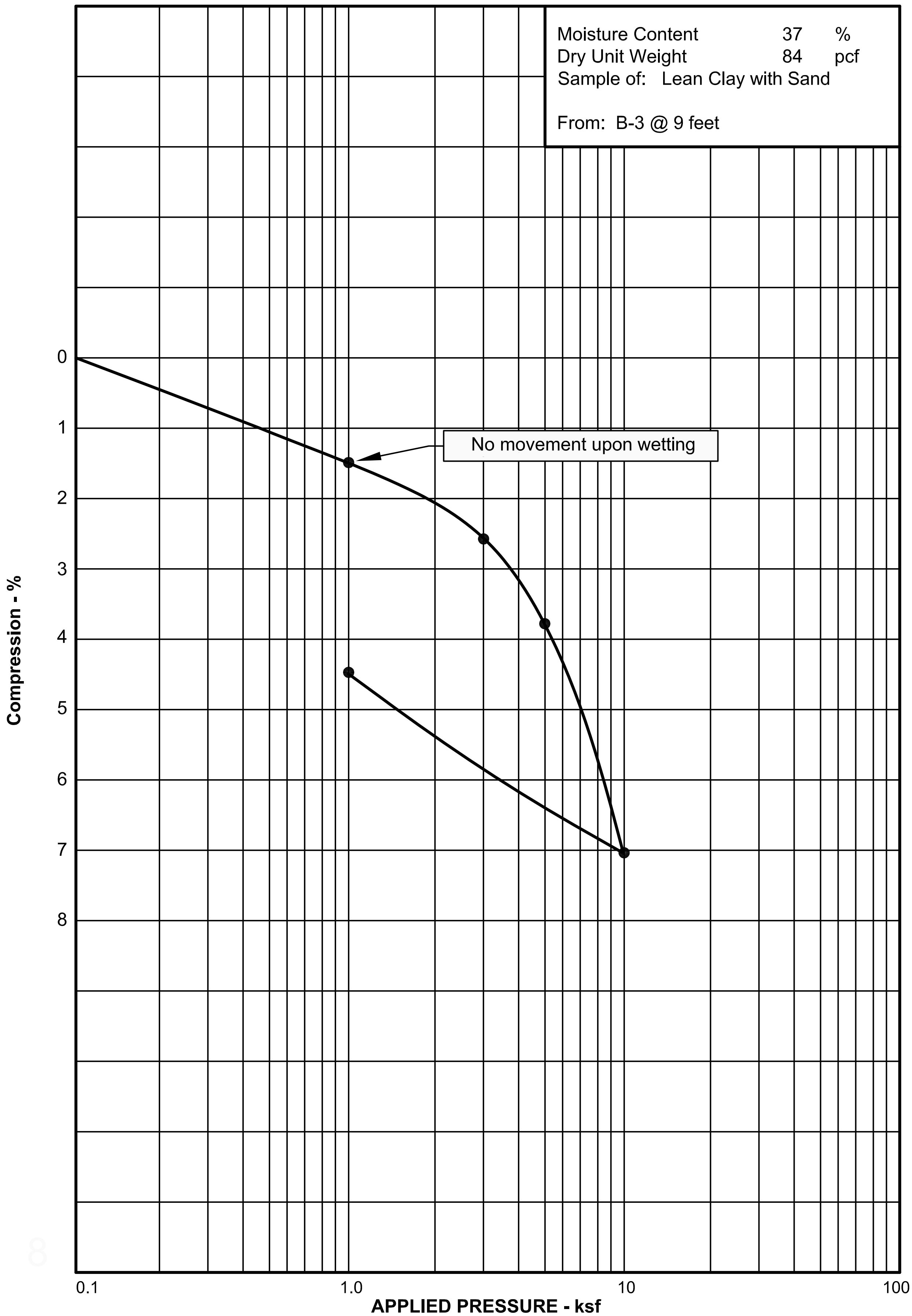


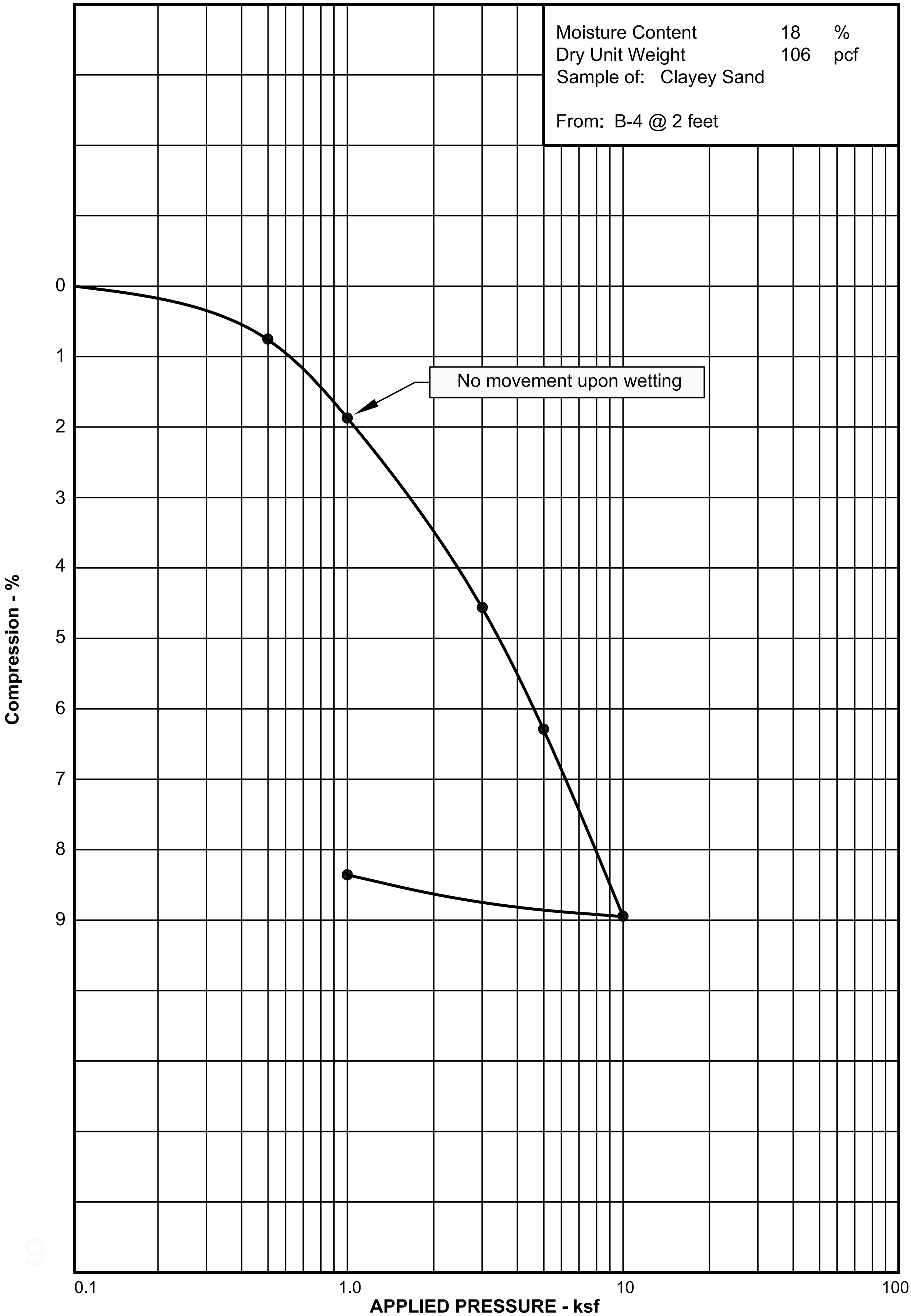
Project No. 1190318 **CONSOLIDATION TEST RESULTS** **Figure 7**

Applied Geotechnical Engineering Consultants, Inc.

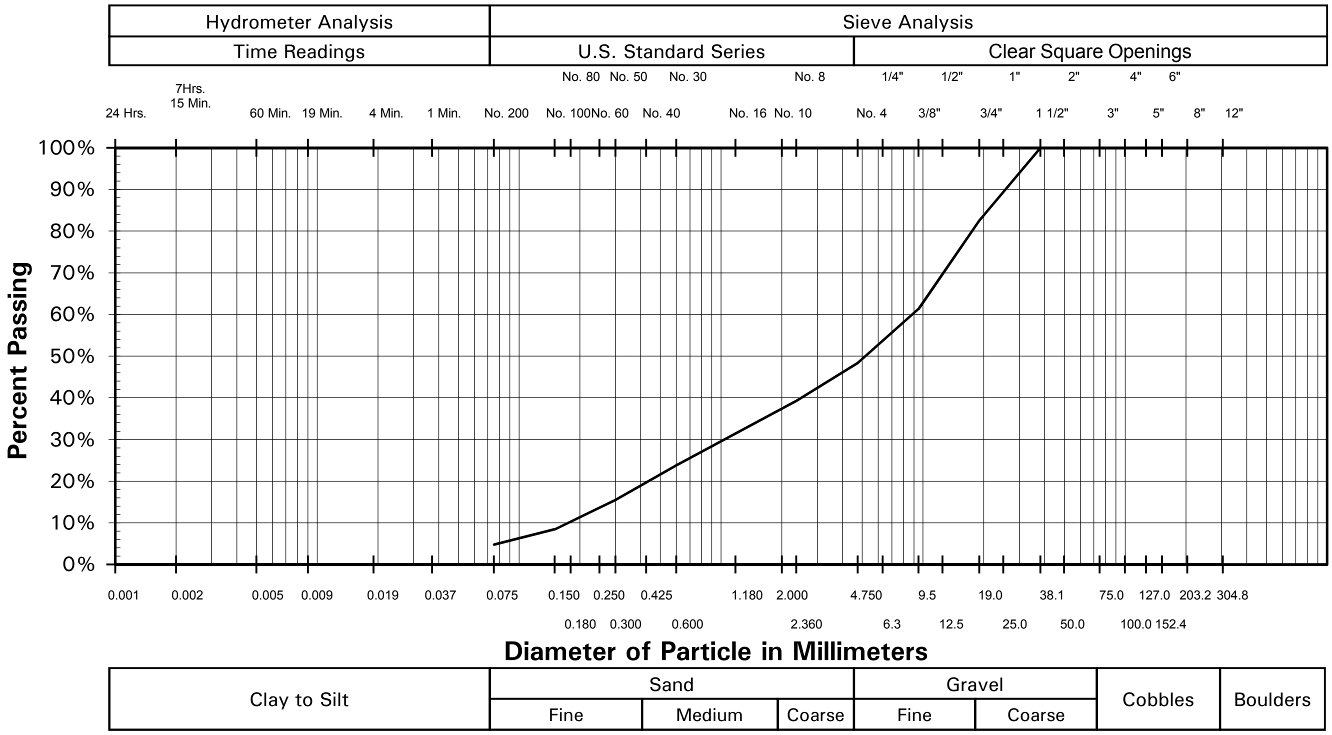


Project No. 1190318 **CONSOLIDATION TEST RESULTS** **Figure 8**

Applied Geotechnical Engineering Consultants, Inc.

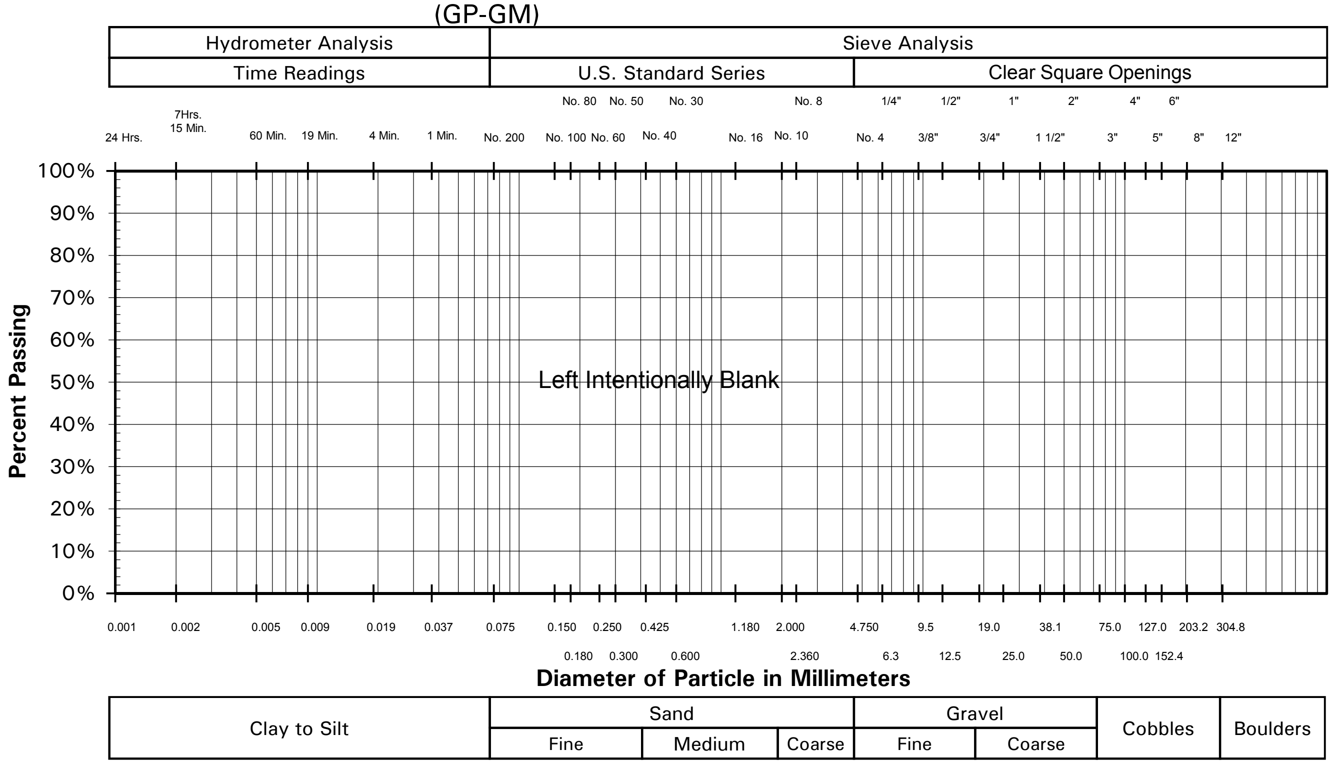


APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.



Gravel	52%	Liquid Limit	-
Sand	43%	Plasticity Index	-
Silt and Clay	5%	Sample Location	B-4 @ 9 feet

Sample Description Poorly-graded Gravel with Silt and Sand (GP-GM)



Gravel	-	Liquid Limit	-
Sand	-	Plasticity Index	-
Silt and Clay	-	Sample Location	

Sample Description

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE I
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER: 1190318

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	WATER SOLUBLE SULFATE (%)	SAMPLE CLASSIFICATION
BORING /TEST PIT	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
B-1	4	49	70			50					Sandy Lean Clay
B-2	2	24	93			58			890	<0.001	Sandy Lean Clay
	4	29	94			62					Sandy Lean Clay
B-3	9	37	84			80					Lean Clay with Sand
B-4	2	18	106			45					Clayey Sand
	9	9	122	52	43	5					Poorly-graded Gravel with Silt and Sand
TP-1	3	21	105			46	37	22			Clayey Sand
TP-6	1½	22	97			15					Clayey Sand
	3	43	75			73					Lean Clay with Sand
TP-11	2	31	88			66					Sandy Lean Clay
B-5	2	29	90			70			2,290		Sandy Lean Clay
TP-20	1½	37	83			83					Lean Clay with Sand

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

TABLE II
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER: 1190318

SAMPLE LOCATION		SOIL RESISTIVITY (OHM-CM)	pH	REDOX (mV)	SULFIDE (mg/kg)	SAMPLE CLASSIFICATION
BORING/ TEST PIT	DEPTH (FEET)					
TP-1	3-4	1,200	7.66	511	62.2	Clayey Sand