GEOTECHNICAL INVESTIGATION REPORT

Caliber
Storage Unit Project
1453 Airport Road
Rifle, Colorado

Geo Quest Project No.: 25-134

August 15, 2025

Prepared for:

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1 Purpose and Scope of Study

This report presents the results of our geotechnical investigation for the planned construction of a new storage unit building with office space at 1453 Airport Road in Rifle, Colorado. The project is located in Garfield County on the southern portion of parcel number 217715308002. The purposes of this investigation were to evaluate the subsurface conditions at the site and to develop geotechnical recommendations to guide design and construction of the proposed structure. This report is not a foundation design and cannot be used as such. The type, thickness, reinforcing and other aspects of foundation elements should be designed by a structural engineer. Our scope of services included the following:

- Call the Utility Notification Center of Colorado to request that the utilities on the parcel be marked.
- Drill up to 5 borings to maximum depths of 20 feet or auger refusal, record penetration resistance values and collect soil samples to identify and assess the subsurface conditions at the proposed building site.
- Perform laboratory testing of select soil samples for classification and to evaluate pertinent engineering properties.
- Estimate soil parameters to assist with foundation design, including allowable bearing pressure, lateral earth pressure and approximate depth to bearing stratum.
- Discuss earthwork, including recommendations for fill placement and compaction, suitability of the site soil for reuse as engineered fill, and subgrade preparation.

2 Proposed Construction

Geo Quest (GQ) understands that the project proposes a new storage unit building with office space and a bathroom. Based on the plan set provided by the Client the building will be a single level above ground, with a footprint of approximately 70 feet by 194 feet with new water, sewer and electrical utilities. Twenty-one new parking spaces are also planned with either pavement or gravel surface.

The plan set shows a shallow foundation using concrete stem walls on footings or columns on individual footings with a concrete slab on grade for the floor. The location of the project site is presented in Figure 1, *Project Location Map*. If the proposed construction details change from those above, GQ should be contacted for review and re-evaluation of the recommendations in this report.

3 Site Conditions

The property is approximately 1.1 miles southeast of downtown Rifle and 0.4-mile south of the main Colorado River channel. Interstate I-70 is about 1,000 feet north of the site. The site is bordered by commercial/industrial development on the north and east sides. Private and mostly undeveloped land lies to the south and west. The Last Chance ditch, situated approximately 300 feet to the south, carries water during part of the year.

The ground surface at the project site slopes down to the north with elevations ranging from about 5,365 feet at the southern site boundary to 5,357 feet at the proposed construction site. At the time of the investigation, it was covered with several inches of roadbase gravel and used as a storage area for RV's, boats and other vehicles. The project site is shown in Figure 1 and on the Approximate Boring Location Map in Appendix A.

Figure 1 – Project Location Map

4 Site Geology

The project site is in the Colorado River valley, southwest of the Grand Hogback Monocline and on the south limb of the shallow dipping Rifle Syncline approximately 1,700 feet south of the Colorado River. The following geologic descriptions are based on the Revised preliminary Geologic Map of the Rifle quadrangle, Garfield County, Colorado (Shroba and Scott, 1997). The site is located on surficial deposits mapped as Quaternary-age alluvium and debris flow deposits of silt, sand, pebbly to cobbly gravel with boulders, overlying claystone, mudstone, siltstone and sandstone of the Tertiary-age Shire Member of the Wasatch Formation. The Wasatch Formation is nearly horizontal at in the area of the project and is exposed in surrounding areas within one-half mile south of the proposed building site. Additional surficial deposits may include Quaternary-age flood-plain and stream-channel deposits of silt, clay, sand, pebbles, and cobbles and artificial fill from previous grading of the site.

The site is located within the 100-year flood plain based on the City of Rifle Risk Assessment Map (2011). Geohazards may include, but are not limited to periodic flooding, piping and gullying within the potentially loosely placed alluvium and debris flow deposits.

5 Field Investigation

On July 30, 2025, GQ was at the property and five borings were drilled to maximum depths of 20.5 feet below the ground surface using 4-inch diameter solid stem auger powered by a truck mounted, model #25 Giddings drill rig. The site and approximate boring locations are presented in Figure 1.

Samples of the subsurface materials were obtained from the borings at select depths by driving either a 1-3/8-inch I.D. standard split-spoon sampler or a 2-inch I.D. modified california sampler with liners. Bulk samples of the soil were also recovered from auger cuttings as the borings were advanced for material identification. The samples were transported to our laboratory where they were examined by the geotechnical engineer and laboratory testing was assigned to select samples.

Penetration resistance measurements were recorded by driving the samplers into the subsurface materials with a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler 12 inches, after an initial penetration of 6 inches for the standard sampler, constitutes the penetration resistance value. The penetration value may be correlated to the relative density of granular soil and the consistency of cohesive soil. The borings were backfilled with the auger cuttings when drilling was complete.

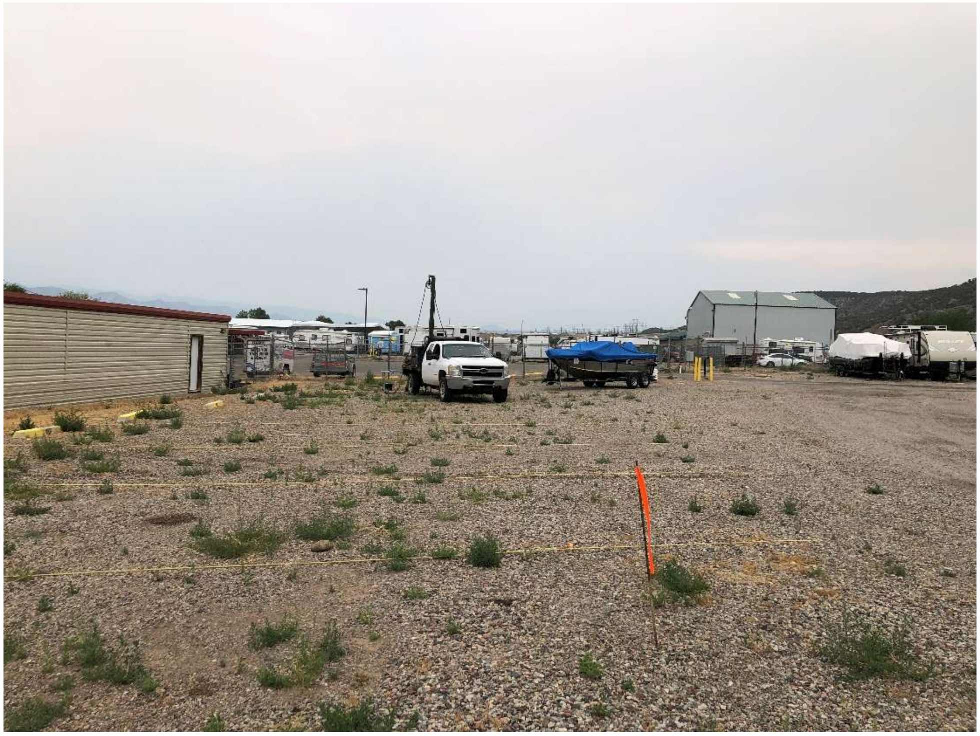

Figure 2 –Drilling Boring B-4, Looking East

6 Subsurface Conditions

The borings generally encountered approximately 6 inches of gravel on the surface over loose clayey sand and medium stiff clay to the bottom of borings. The clayey sand graded into thin lenses of fine sand, roughly 12 to 18 inches thick, in many of the holes at multiple elevations. Light grinding on cobbles and gravel was encountered in Boring B-2 between 7 and 8 feet.

Boring B-5 encountered 2 feet of clay over 2 feet of cobbles with heavy grinding and auger refusal at 4 feet. Due to shallow auger refusal a new Boring B-5 was started 10 feet to the west and encountered the same conditions in the top 4 feet over 2 feet of silty, clayey sand over 1 foot of cobbles above sand and silty sand to the bottom of boring. Sampling was attempted at 9 and 14 feet, but the hole collapsed to a depth of 3.5 feet.

The subsurface was moist to very moist although groundwater was not encountered in the borings during our investigation. Variations in the groundwater level may occur seasonally. The magnitude of the variation will be largely dependent upon the amount of spring snowmelt, duration and intensity of precipitation, irrigation practices, site grading changes, and the surface and subsurface drainage characteristics of the surrounding area.

6.1 Lab Testing

Collected soil samples were classified by the geotechnical engineer in accordance with the Unified Soil Classification System (USCS) as described in ASTM D-2487. Laboratory testing was performed on select samples to evaluate the pertinent engineering properties of the soil layers encountered. The laboratory testing was conducted in general accordance with the American Society for Testing and Materials (ASTM) test procedures. The following laboratory tests were performed for this evaluation:

- In-Place Dry Density ASTM D2937
- Moisture Content ASTM D2216
- Atterberg Limit Testing ASTM D4318
- Percent Finer than Sand ASTM D1140
- Swell/Collapse Potential ASTM D4546

Testing performed on two samples from depths of 3 and 4 feet below the ground surface resulted in collapse up to 2.5 percent. Laboratory test results are presented in Appendix B.

7 Earthwork

Excavation cuts of 3 to 5 feet below grade are anticipated for site development. Fill placement should be relatively minor. Areas to receive fill should be stripped of vegetation, organic soils and debris. The on-site soils free of organic matter, debris and rocks larger than 3 inches may be used as fill material.

Fill should be placed in loose lifts of 8 inches thick or less, moisture conditioned and compacted to at least 95 percent of the maximum proctor dry density as shown in Table 1. Placement and compaction should be observed and tested by the geotechnical engineer. GQ recommends proof rolling of the engineered fill section be observed by the geotechnical engineer below the concrete slab area to check for soft, week areas.

If weak or saturated soils are encountered at the subgrade elevation, within the building footprint, the material should be removed, dried and recompacted or imported, granular material such as road base may be used in its place. Imported road base will likely be much faster to place and compact than waiting for wet on-site soil to dry and compact.

Care should be used when compacting soil next to foundation walls, utilities or other sensitive areas to prevent damage. If utility trenches are backfilled with granular soil, a clay plug of adequate thickness should be placed in the trench adjacent to the building to reduce the potential for water flowing through the trench back under the structure. Placement and compaction of fill should be observed and tested by a representative of the geotechnical engineer.

Table 1 – Compaction Criteria

Percent Compaction	Moisture Content
95% minimum Standard (ASTM D698)	$\pm$ 2 % of optimum

8 Drainage Considerations

The soils at the site are moisture sensitive and proper drainage should be maintained during construction and throughout the life of the structure. If these soils become overly wetted during construction additional measures may need to be taken to complete foundation preparation and other earthwork. Providing drainage that directs water away from excavations is critical.

It is not uncommon for surface water to flow through permeable wall backfill and collect at the backfill and natural soil interface resulting in saturated foundation soils and/or wet crawlspace conditions. We recommend the ground surface surrounding the building be <u>sloped to drain away from the structure with a minimum slope of 8 percent or 10 inches in the first 10 feet for landscape areas</u>. We recommend a slope of 2 percent away from the structure beyond this.

It should be noted that ponding water from roof run off, gutter downspouts, waterline leaks, irrigation, outdoor washing and other sources of water near the structure foundation may result in movements including foundation distress and/or observed cracking. We recommend that roof drain downspouts discharge a minimum of 10 feet away from the structure and beyond all structure backfill zones.

9 Recommendations

9.1 Foundations

Based on the results of our subsurface investigation, we believe shallow foundations are an acceptable option and will generally bear in the clay and clayey sand soils. Boring B-5 located near the middle of the proposed structure is the exception and encountered significant shallow cobbles and gravel. This material was very dense and quite different than the surrounding clay and clayey sand found in the other 4 borings.

We believe there will be a low to moderate risk of soil volume change and differential movement due to collapse in the relatively loose debris fan soils versus the dense gravel and cobbles. Due to a potential variation in soil consistencies, we recommend a minimum of 24 inches of the soil at the foundation bearing depth be removed, moisture conditioned and placed back with proper compaction control as described in Section 7 Earthwork. The foundation should bear on a single type of material and not clay/clayey sand below one port of the structure and gravel below a different portion of the structure. If onsite gravel is used in the fill it should be mixed with the clay/clayey sand and distributed throughout the footprint.

Alternatively, coarse granular imported material is also desirable to construct this bearing platform. The removed and recompacted soil will create an engineered fill section with more uniform strength characteristics. The following design and construction details should be observed for footings placed on the engineered fill section.

1. Weak, disturbed or unsuitable material encountered at the subgrade elevation at the base of foundation excavations should be removed and replaced with properly compacted fill or the subgrade should be extended to undisturbed soils.

2. Footing foundations can be designed for a maximum allowable soil pressure of 1,500 pounds per square foot (psf) when placed on the engineered fill section of clay/clayey sand at least 24 inches thick.

3. If the upper 12 inches (or more) of the engineered fill section is composed of high-quality granular fill such as CDOT Class 6 or Class 1 material a maximum allowable soil pressure of 2,500 psf may be used.

4. The engineered fill section should extend laterally a minimum of 12 inches beyond all footing edges.

5. Continuous wall footings should have a minimum width of at least 15 inches. Foundation pads for isolated columns should have a minimum dimension of 24 inches.

6. Resistance to sliding at the bottom of the footing can be calculated based on a coefficient of friction of 0.30 on the clay and clayey sand. Passive pressure against the side of the footing can also be considered for the sliding resistance if it is properly compacted. Passive pressure can be estimated based on an equivalent fluid density of 250 pcf for a level backfill.

7. Grade beams and foundation walls should be reinforced to span undisclosed loose or soft soil areas. We recommend reinforcement designed to span an unsupported distance of at least 12 feet.

8. The soils below exterior footings or exterior edges of slabs should be protected from

freezing. Foundation footings should be constructed at least 3 feet below finished exterior grade or as required by local municipal code.

9. All foundation excavations and placement of engineered fill should be observed by a representative of the geotechnical engineer prior to placement of concrete.

Longterm foundation behavior will be dependent on the drainage practices that are used during construction and maintained throughout the life of the structure.

9.2 Below-Grade Walls

The foundation walls should be designed for lateral earth pressure of the surrounding soil where backfill is not present to the same level on both sides of the wall. For walls that can deflect or rotate about 0.5 to 1 percent of the wall height, the wall can be designed for “active” earth pressure conditions. For a very rigid wall where negligible deflection can occur, an “at-rest” lateral earth pressure condition can be used. Typically, below-grade walls for lightly loaded structures can rotate under normal design loads, and this deflection results in acceptable performance.

If on-site soils are used as backfill we recommend using an equivalent fluid density of 45 pcf for design of below grade walls for “active” conditions. This value assumes that some minor cracking is acceptable. If this is unsuitable, then a higher (“at-rest”) equivalent fluid density should be used for design. For “at rest” conditions, an equivalent fluid density of 60 pcf can be used for design. These equivalent fluid densities do not account for sloping backfill, surcharges or hydrostatic pressure.

9.3 Concrete Slabs

Concrete slab on grade design and construction recommendations are as follows:

- GQ recommends an engineered fill section be created below the entire slab on grade floor with a minimum thickness of 12 inches. This should follow the description given in Section 9.1 Foundations and Section 7 Earthwork with appropriate moisture and compaction control.
- A modulus of subgrade reaction value of 125 psi/in may be used for the clay/clayey sand.
- Positive separations and/or isolation joints should be provided between slabs and all foundations, columns, or utility lines to allow independent movement.
- Control joints should be provided in slabs to control the location and extent of cracking.
- Interior trench backfill placed beneath slabs should be properly compacted in accordance with Table 1.
- Slabs should not be constructed on frozen subgrade.

10 Limitations

The analyses and recommendations presented in this report are based upon our data obtained from the boring locations, field observations, laboratory testing, our understanding of the proposed construction and other information as discussed in this report. It is possible and likely that subsurface conditions may vary between borings and beyond the limits explored. The nature and extent of such variations may not become evident until construction. We should review the report if the scope of the proposed construction, including the proposed loads, finished elevations or structure locations, change from those described in this report, and provide supplemental recommendations as necessary.

It is important to note that the recommendations herein are intended to reduce the risk of structural movement and/or damage associated with volume change of the subsurface materials. However, GQ cannot predict the long-term changes in subsurface moisture conditions and/or the extent of potential damaging effects. Where significant increases in subsurface moisture occur due to grading changes, utility line break, leaks from any source, excess irrigation or other causes, excessive movement is possible.

This report was prepared in substantial accordance with the generally accepted standards of practice for geotechnical engineering as exist in the site area at the time of our investigation. No warranties, express or implied, are intended or made. These recommendations are based on the assumption that GQ will conduct an adequate program of testing and observation to evaluate compliance with our recommendations.

Respectfully submitted,

Geo Quest, LLC

COLORADO LICENSED
KEVIN E. DYE
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PROFESSIONAL ENGINEER

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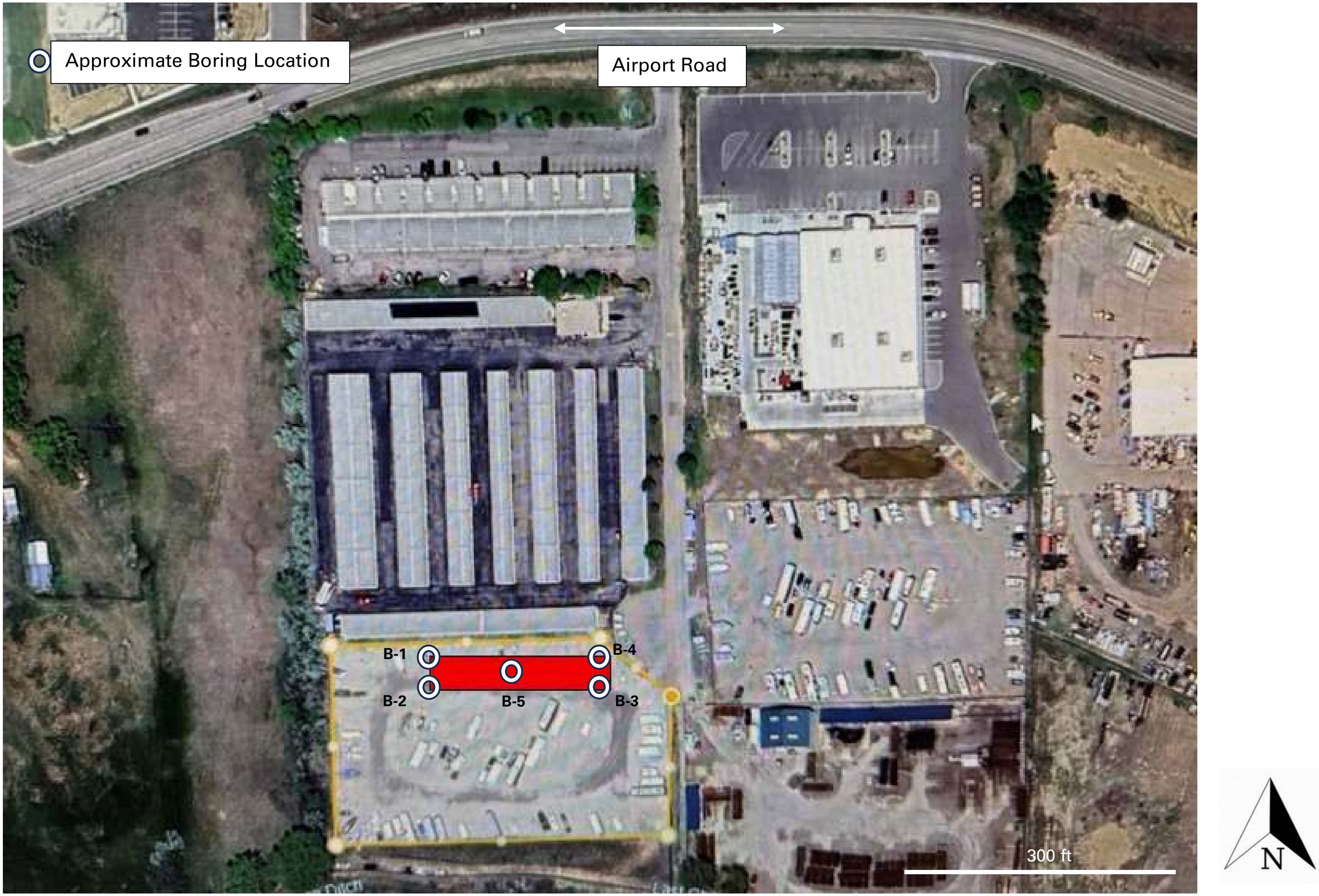
Appendix A

Boring Location Map



Geo Quest
Geotechnical Engineering - Testing

APPROXIMATE BORING LOCATION MAP

CALIBER STORAGE PROJECT

Job No.: 25-134	**Appendix A**

Appendix B

Laboratory Test Results

Summary of Laboratory Test Results

Project No: 25-134 Project Name: Caliber Storage Project

Sample Location			Moisture Content (%)	Dry Density (pcf)	Grain Size Analysis			Atterberg Limits			+Swell / -Consolidation % Applied Load	USCS	Material Description
Test Hole	Depth (ft)	Sample Type			Gravel > #4 (%)	Sand (%)	Fines < #200 (%)	LL	PL	PI	1000 psf		
B-1	3.0	MC	15.2	108			35	35	11	24	-1.0	SC	clayey SAND
	9.0	MC	17.4	105			66	24	15	9		CL	lean CLAY w/ sand
B-2	4.0	MC	9.9	98			49	32	12	20	-2.5	SC	clayey SAND
	9.0	SPT	13.1				66	26	13	13		CL	lean CLAY w/ sand
B-3	3.0	MC	9.2				44	27	14	13		SC	clayey SAND
	7+14	MC	9.0				49	23	14	9		SC	clayey SAND

MC - Modified California Sampler
SPT - Split Spoon Sampler