Kumar & Associates, Inc.®
Geotechnical and Materials Engineers
and Environmental Scientists

6735 Kumar Heights
Colorado Springs, CO 80918
phone: (719) 632-7009
fax: (719) 632-1049
email: kacolospgs@kumarusa.com
www.kumarusa.com

An Employee Owned Company

Office Locations: Denver (HQ), Parker, Colorado Springs, Fort Collins, Glenwood Springs, and Summit County, Colorado

Kumar & Associates, Inc. 30 Years of Service www.kumarusa.com 1989-2019

GEOTECHNICAL ENGINEERING STUDY
PROPOSED OFFICE/WAREHOUSE
HCD DRILLING
6201 E. PLATTE AVENUE
COLORADO SPRINGS, COLORADO

Prepared By:
Duane P. Craft, P.E.

COLORADO REGISTERED PROFESSIONAL ENGINEER DUANE P. CRAFT 37553 8/21/19

Reviewed By:

Arben F. Kalaveshi, P.E.

Prepared for:

T-Bone Construction
1310 Ford Street
Colorado Springs, Colorado 80915

Attn: Mr. Darin Weiss

Project No. 19-2-192

August 21, 2019

TABLE OF CONTENTS

SUMMARY

1. Below a layer of topsoil, native granular soils consisting of silty sand (SM) and poorly graded sand with silt (SP-SM) extended to the maximum 5 to 25-foot depths explored in each of the borings.

2. Groundwater was not encountered at the time of drilling. Fluctuations in the water level may occur with time, however, given the site conditions and the results of our field exploration, groundwater is not anticipated to be a design or construction consideration.

3. We recommend the proposed building be founded on spread footings bearing on the undisturbed native soils and/or properly compacted structural fill. Footings should be designed for an allowable bearing pressure of 2,000 psf, and with the other design and construction considerations presented in this report.

4. Based on the subgrade conditions encountered and the traffic information provided, we recommend the pavement section in areas of combined trucks and auto traffic consist of a minimum 6 inches of asphalt over 6 inches of Class 6 aggregate base course. For areas restricted to auto traffic, we recommend a minimum 4 inches of asphalt over 6 inches of Class 6 aggregate base course. Thickness recommendations for alternate concrete and aggregate surfaced sections are presented in the report. Trash pickup, truck loading areas, and other areas where truck turning movements are concentrated should be paved with a minimum 7 inches of portland cement concrete over 4 inches of base course. The use of a flexible pavement in these areas could result in pavement fatigue cracking and/or rutting/shoving of the pavement due to the concentrated wheel loads.

PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical engineering study for the proposed HCD Drilling Office and Warehouse, to be located at 6201 E. Platte Avenue, in Colorado Springs, Colorado. The project site is shown on Fig. 1. This study was conducted in accordance with the scope of work in our Proposal No. C19-228, dated July 19, 2019, to develop recommendations for foundations, floor slabs, and pavements.

This report has been prepared to summarize the data obtained during this 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 the proposed construction are included in the report.

PROPOSED CONSTRUCTION

We understand the proposed construction will consist of a one to two-story office/warehouse building that will have a combined footprint area of approximately 20,000 SF. The building will consist of steel-frame and metal skin type construction, with a concrete slab-on-grade floor. No basement or below grade space is anticipated. Foundation loads are anticipated to be light to moderate, typical of the proposed construction type. As part of the project, a concrete paved apron will be constructed along the west, east and south sides of the building, and an asphalt parking lot and drive lanes will be constructed on the north side. The yard area surrounding the warehouse will be surfaced with aggregate. Site grading is anticipated to be relatively minor, with construction occurring at the approximate existing grades. If the proposed construction varies significantly from that described above or depicted in this report, we should be notified to reevaluate the recommendations contained herein.

SITE CONDITIONS

At the time of our study, the property consisted of vacant land, bordered by Motel Road to the north (followed by East Platte Avenue), an RV storage yard to the east and a landscape/materials company to the west. Additional vacant land was located to the south. The lot was being used for vehicle and equipment storage, and was surrounded with chain link fencing. The property had a gentle to moderate slope down to the north in the northern end of the property, and sloped down to the south in the southern portion of the property. The site was vegetated with natural grass, weeds and occasional trees.

FIELD EXPLORATION

The field exploration of the subsurface conditions consisted of drilling four borings at the approximate locations shown on Fig. 1. The borings were drilled on August 9, 2019. The boring logs and the corresponding legend and notes are included on Figs. 2 and 3, respectively.

The borings were drilled with 4-inch diameter continuous flight augers and were logged by a representative of Kumar & Associates, Inc. Samples of the overburden soils were taken with a 2-inch I.D. California sampler. The sampler was driven into the various strata with blows from a 140-pound hammer falling 30 inches. Penetration resistance values, when properly evaluated, provide an approximation of the relative density or consistency of the soils. Depths at which the samples were taken and the penetration resistance values are shown on the boring logs.

LABORATORY TESTING

Samples obtained from the exploratory borings were visually classified in the laboratory by the project engineer and samples were selected for laboratory testing. Laboratory testing included index property tests such as in-situ moisture content and dry unit weight, grain size analysis, and Atterberg limits. Additional testing performed included concentration of water soluble sulfates. The testing was conducted in general accordance with recognized test procedures, primarily those of the American Society for Testing of Materials (ASTM). Results of the laboratory testing program are shown on Figs. 2, and 4 thru 6, and are summarized on Table I.

SUBSURFACE CONDITIONS

Below a layer of topsoil, native granular soils consisting of silty sand (SM) and poorly graded sand with silt (SP-SM) were encountered, extending to the maximum 5 to 25-foot depths explored in each of the borings. Sampler penetration blow counts indicate the native soils are very loose to medium dense.

Groundwater was not encountered at the time of drilling. The borings were backfilled with auger cuttings upon completion of drilling. Fluctuations in the water level may occur with time, however, given the site conditions and the results of our field exploration, groundwater is not anticipated to be a design or construction consideration.

FOUNDATION RECOMMENDATIONS

Considering the subsurface conditions encountered in the exploratory borings and the nature of the proposed construction, we recommend the proposed building be founded on spread or continuous footings bearing on the undisturbed native soils and/or properly compacted structural fill.

The design and construction criteria presented below should be observed for a shallow footing foundation system. The construction details should be considered when preparing project documents.

1. Footings placed on the undisturbed native soils and/or properly compacted structural fill should be designed for an allowable bearing pressure of 2,000 psf.

2. Although not encountered in our borings, any existing fill encountered below the proposed foundation elevation should be removed and replaced with properly compacted nonexpansive structural fill. Additionally, areas of loose or soft material at the base of the excavation removed and replaced with a nonexpansive structural fill. New fill should extend down from the edges of the footings at a minimum 1 horizontal to 1 vertical projection.

3. Based on the conditions encountered in our borings, we anticipate some amount of overexcavation of loose or soft subgrade soils will be required. Once the foundation excavations have been cut to grade, we should be consulted to assist the contractor in identifying these areas.

4. The on-site soils, minus any deleterious materials, are suitable for reuse as structural fill. Import soils, if required, should consist of a minus 2-inch granular soil that contains a maximum 35 percent passing the No. 200 sieve, and a maximum plasticity index of 10.

5. Fill placed for support of foundations should be compacted to a minimum 98% of the standard Proctor maximum dry density (ASTM D 698), near the optimum moisture content.

6. We estimate total settlement for footings designed and constructed as discussed in this section will be approximately 1 inch or less.

7. Foundations should have a minimum width of 16 inches for continuous footings and 24 inches for isolated pads.

8. Exterior footings should be provided with adequate soil cover above their bearing elevation for frost protection. Placement of foundations at least 30 inches below the exterior grade is typically used in this area.

9. The lateral resistance of a spread footing placed on undisturbed native soils and/or properly compacted structural fill material will be a combination of the sliding resistance of the footing on the foundation materials and passive earth pressure against the side of the footing. Resistance to sliding at the bottoms of the footings may be calculated based on an allowable coefficient of friction of 0.35. Passive pressure against the sides of the footings may be calculated using an allowable equivalent fluid unit weight of 180 pcf.

10. Continuous foundation walls should be reinforced top and bottom to span an unsupported length of at least 10 feet.

11. Granular foundation soils should be densified with a smooth vibratory compactor prior to placement of concrete.

12. A representative of the geotechnical engineer should observe all footing excavations prior to fill or concrete placement to verify bearing conditions.

SEISMIC DESIGN CRITERIA

The generalized subsurface profile was assumed to consist of generally granular overburden soils, underlain by relatively deep sedimentary bedrock. The weighted average of the estimated shear wave velocities for this subsurface profile to a depth of 100 feet indicates an IBC design Site Class D. Based on the subsurface profile and site seismicity, liquefaction is not a design consideration.

FLOOR SLABS

The native on-site soils, exclusive of topsoil, are suitable to support lightly to moderately loaded slab-on-grade construction. Any existing fill or otherwise unsuitable material encountered below the proposed floor slab elevation should be removed and placed back, properly compacted. Structural fill placed for support of floor slabs should be a nonexpansive soil compacted to at least 95% of the standard Proctor maximum dry density (ASTM D 698), at moisture content near optimum. The specifications for structural fill and a discussion regarding the suitability for reuse of the on-site soils is presented under the “Foundation Recommendations” section of this report.

To reduce the effects of some differential movement, floor slabs should be separated from all bearing walls and columns with expansion joints which allow unrestrained vertical movement. Floor slab control joints should be used to reduce damage due to shrinkage cracking. The appropriate joint spacing is dependent on slab thickness, concrete aggregate size and slump, and should be consistent with recognized guidelines such as those of the Portland Cement Association (PCA) or American Concrete Institute (ACI). The joint spacing and any requirements for slab reinforcement should be established by the designer based on experience and the intended slab use.

If moisture-sensitive floor coverings will be used, mitigation of moisture penetration into the slabs, such as by use of a vapor barrier, may be required. If an impervious vapor barrier membrane is used, special precautions will be required to reduce potential differential curing problems which could cause the slabs to warp. Section 302.1R of the ACI Manual of Concrete Practice addresses this topic.

WATER SOLUBLE SULFATES

The concentration of water soluble sulfates measured in a sample obtained from the exploratory borings was approximately 0.03%. This concentration of water soluble sulfates represent a Class 0 severity of exposure to sulfate attack on concrete exposed to these materials. The degree of attack is based on a range of Class 0 to Class 3 severity of exposure as presented in ACI 201. Based on this information and our experience with the soil types encountered, we believe special sulfate resistant cement will not be required for concrete exposed to the on-site soils.

SURFACE DRAINAGE

Providing proper surface drainage, both during construction and after the construction has been completed, is very important for acceptable performance of the building. The following recommendations should be used as guidelines and changes should be made only after consultation with the geotechnical engineer.

1. Excessive wetting or drying of the foundation excavation and underslab areas should be avoided during construction.

2. Exterior backfill should be adjusted to a moisture content near optimum and compacted to at least 95% of the maximum standard Proctor density (ASTM D 698).

3. Care should be taken when compacting around the foundation walls to avoid damage to the structure.

4. The ground surface surrounding the exterior of the building should be sloped to drain away from the foundation in all directions. We recommend a minimum slope of 6 inches in the first 10 feet in unpaved areas. Site drainage beyond the 10-foot zone should be designed to promote runoff and reduce water infiltration. A minimum slope of 3 inches in the first 10 feet is recommended in the paved areas. These slopes may be changed as required for handicap access points in accordance with the Americans with Disabilities Act.

5. Ponding of water should not be allowed on backfill material or in within 10 feet of the foundation walls, whichever is greater.

6. Roof downspouts and drains should discharge well beyond the limits of all backfill.

7. Excessive landscape irrigation should be avoided within 10 feet of the foundation walls.

PAVEMENT DESIGN

Subgrade Materials: The upper subgrade soils encountered during our study classified as A-2-4 with a group index of 0 in accordance with the American Association of State Highway Transportation Officials (AASHTO) classification. Based on the soil classifications, an R-value of 20 was assumed for design of flexible pavements and a subgrade modulus of 100 pci was assumed for rigid pavements.

Design Traffic: Detailed traffic loading information for the planned pavement areas was not available to us at the time of our study. From our conversations, we have assumed the parking lot traffic will primarily consist of automobiles. The access driveways will include approximately 40 vehicle trips per day, to include 10 combination-unit 6-axle trucks with a maximum weight load 70 kips, 4 vac trucks, and the balance consisting of single-unit support trucks and pickups. For our pavement thickness design calculations, we assumed an equivalent 18-kip daily load application (EDLA) of 5 for areas restricted to automobile traffic (such as auto parking stalls), and 40 for areas of combined truck traffic and auto (such as drive lanes). If it is determined that actual traffic is significantly different from that described, we should be contacted to reevaluate the pavement thickness design.

Pavement Sections: The recommended sections were determined using the DARWin 3.01 pavement design software based on the 1993 AASHTO pavement design procedures. Based on the subgrade conditions encountered and the traffic information provided, we recommend the following pavement sections:

Traffic	Pavement Section Thickness (in.)		
	Asphalt over Base Course	Portland Cement Concrete over Base Course	Aggregate Surfacing Only
Light Duty (Areas restricted to automobile traffic)	4 over 6	6 over 4	6
Heavy Duty (Areas w/truck traffic)	6 over 6	7 over 4	10

Trash pickup, truck loading areas, and other areas where truck turning movements are concentrated should be paved with a minimum 7 inches of portland cement concrete over 4 inches of base course. The use of a flexible pavement in these areas could result in pavement fatigue cracking and/or rutting/shoving of the pavement due to the concentrated wheel loads.

With the aggregate base course surfaced section provided, it should be anticipated that periodic grading will be required if surface erosion and/or rutting develops. It is common for surface rutting to develop, especially where heavy truck turning movements are concentrated. Aggregate surfaced pavements should consist of a CDOT Class 5 or 6 aggregate base course. A recycled concrete or asphalt material that meets the Class 5 or 6 gradation requirements would also be acceptable.

A full-depth asphalt section alternative was not included because it has been our experience it can be difficult to construct given the presence of occasionally clean sands. The clean sands will have a tendency to rut from pavement vehicles even if properly compacted, potentially contaminating the bottom lift of asphalt. The usage of an aggregate base course layer will reduce the magnitude of this potential issue.

Pavement Materials: The asphalt pavement should consist of a bituminous material which meets the requirements of the Pikes Peak Region Asphalt Paving Specifications. The mix should meet Grading S or SX requirements and a SuperPave gyratory design revolution (NDES) of 75 should be used in the design process. Based on the assumed traffic loading, we recommend that a PG 58-28 or PG 64-22 asphalt binder is used in the mix. Aggregate base course should meet the requirements of a CDOT Class 6.

Concrete pavement should meet the requirements of a Class P Mix, per Section 601 of the CDOT Standard Specifications, and should be based on a mix design established by a qualified engineer. The concrete should contain transverse joints not greater than 12 to 15 feet on centers and longitudinal joints no greater than 14 feet. Joint spacings and layout should be determined by a qualified engineer. The joints should be hand formed, sawed or formed by premolded filler, and should be at least 1/4 of the slab thickness. Expansion joints should be provided at the end of each construction sequence and between the concrete slab and adjacent structures. Expansion joints where required, should be filled with a ½ inch-thick asphalt impregnated fiber. Concrete should be cured by protecting against loss of moisture, rapid temperature changes and mechanical injury for at least three days after placement. The concrete sections presented above are assumed to be unreinforced. Providing dowels at construction joints would help reduce the risk of differential movements between panel sections. Providing a grid mat of deformed rebar or welded wire mesh within the concrete pavement section would assist in mitigating corner breaks and differential panel movements. If a rebar mat is installed, we recommend that the bars be placed in the lower half of the pavement section. Also, if reinforcing is used, we have commonly seen No. 4 rebar placed at 24-inch center in each direction, however, we recommend that a structural engineer evaluate the placement and spacing of rebar if needed.

Subgrade Preparation: To provide a uniform bearing surface, prior to paving, we recommend the pavement subgrade be thoroughly scarified and well-mixed to a minimum depth of 12 inches, adjusted to a moisture content near optimum, and compacted to a minimum 95% of the standard Proctor maximum dry density (ASTM D698).

The pavement subgrade should be proofrolled with a heavily loaded pneumatic-tired vehicle. Pavement design procedures assume a stable subgrade. Areas that deform excessively under heavy wheel loads are not stable and should be removed and replaced to achieve a stable subgrade prior to paving.

Subgrade Stabilization: Unstable subgrade may be encountered during subgrade preparations for new pavements. Unstable soils may be stabilized by scarifying/ripping the subgrade and allowing it to dry, or by overexcavation and replacement of the subgrade with suitable, imported, angular, well-graded materials. Other alternatives include the use of Type 2 biaxial geogrid reinforcement in combination with a layer of Class 6 aggregate base course. It has been our experience that the use of a crushed concrete product meeting a Class 6 gradation can perform well when trying to achieve stabilization. Specific stabilization requirements should be evaluated at the time of construction.

Drainage: The collection and diversion of surface drainage away from paved areas is extremely important to the satisfactory performance of the pavement. Drainage design should provide for the removal of water from paved areas and prevent the wetting of the subgrade soils.

EXCAVATION CONSIDERATIONS

In our opinion, the overburden soils encountered in the exploratory borings drilled for this study can be excavated with conventional heavy-duty construction equipment.

All excavations should be in accordance with OSHA, state and local requirements. The contractor should follow appropriate safety precautions. In accordance with OSHA guidelines, the overburden soils should be considered a Type C material. Per OSHA criteria, unless excavations are shored, temporary unretained excavations in Type C materials should have slopes no steeper than 1½:1 (H:V). Flatter slopes will be required where ground-water seepage is encountered. OSHA regulations require that excavations greater than 20 feet in depth be designed by a professional engineer. The contractor's on-site "competent person" should make decisions regarding necessary slope and shoring.

Based on our boring logs, groundwater is not anticipated to be encountered in excavations during construction. However, if encountered, we expect the groundwater can be controlled by pumping from sumps installed below the base of excavation. The bottom and sides of the excavation may become unstable, especially in the granular soils, if the ground-water level is not lowered in advance of excavation and maintained at a sufficient depth below the bottom of the excavation. Dewatering must be maintained through the time period the excavation is open. The dewatering system should be properly designed, installed and maintained by an experienced dewatering contractor.

DESIGN AND SUPPORT SERVICES

Kumar & Associates, Inc. should be retained to review the project plans and specifications for conformance with the recommendations provided in our report. We are also available to assist the design team in preparing specifications for geotechnical aspects of the project, and performing additional studies if necessary to accommodate possible changes in the proposed construction.

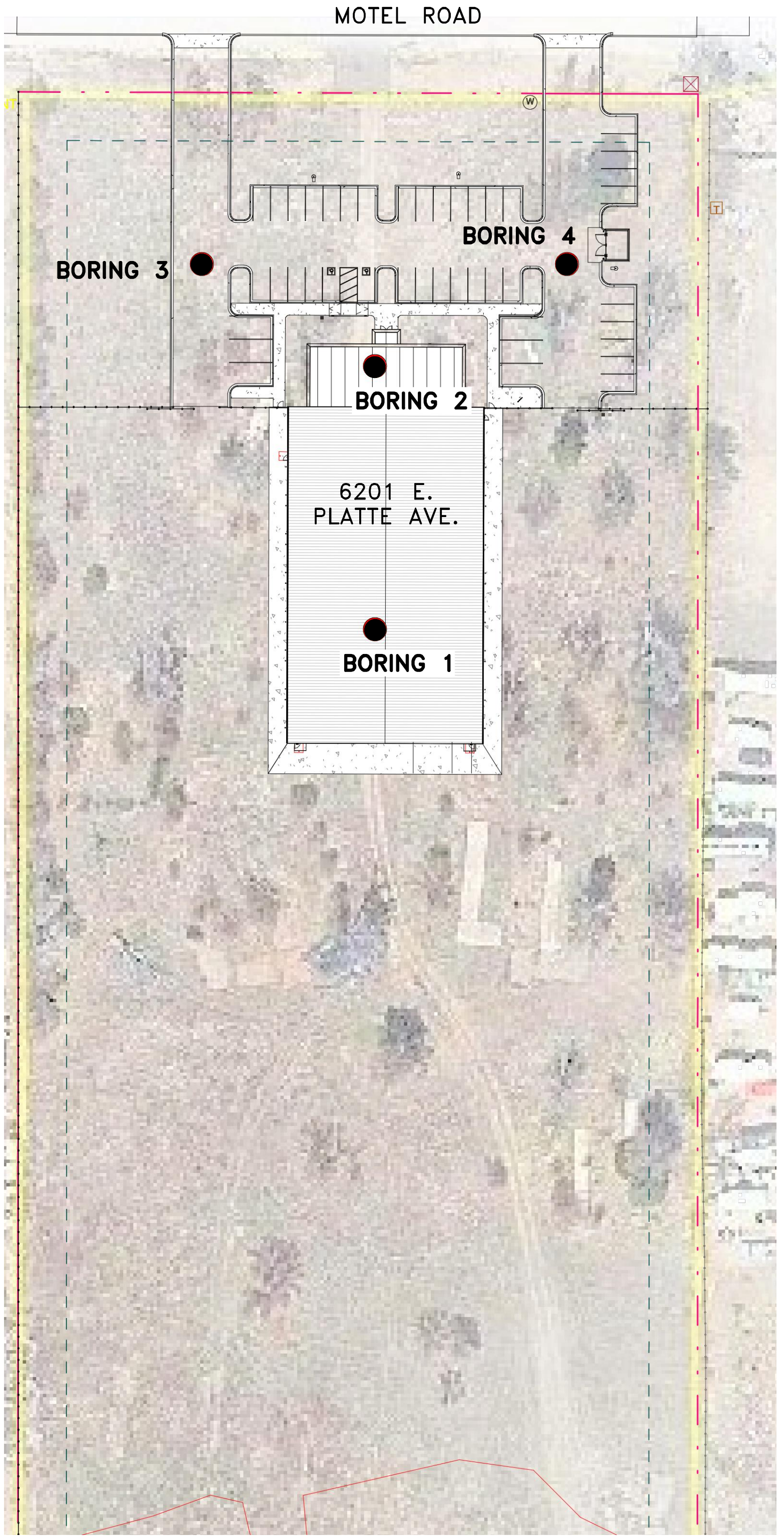
We recommend that Kumar & Associates, Inc. be retained to provide observation and testing services to document that the intent of this report and the requirements of the plans and specifications are being followed during construction, and to identify possible variations in subsurface conditions from those encountered in this study so that we can re-evaluate our recommendations, if needed.

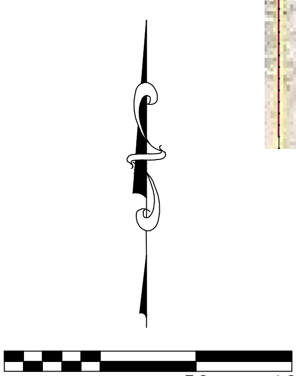
LIMITATIONS

This study has been conducted for exclusive use by the client for geotechnical related design and construction criteria for the project. The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory borings at the locations indicated on Fig. 1 or as described in the report, and the proposed type of construction. This report may not reflect subsurface variations that occur, and the nature and extent of variations across the site may not become evident until site grading and excavations are performed. If during construction, fill, soil, rock or water conditions appear to be different from those described herein, Kumar & Associates, Inc. should be advised at once so that a re-evaluation of the recommendations presented in this report can be made. Kumar & Associates, Inc. is not responsible for liability associated with interpretation of subsurface data by others.

The scope of services for this project does not include any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken.

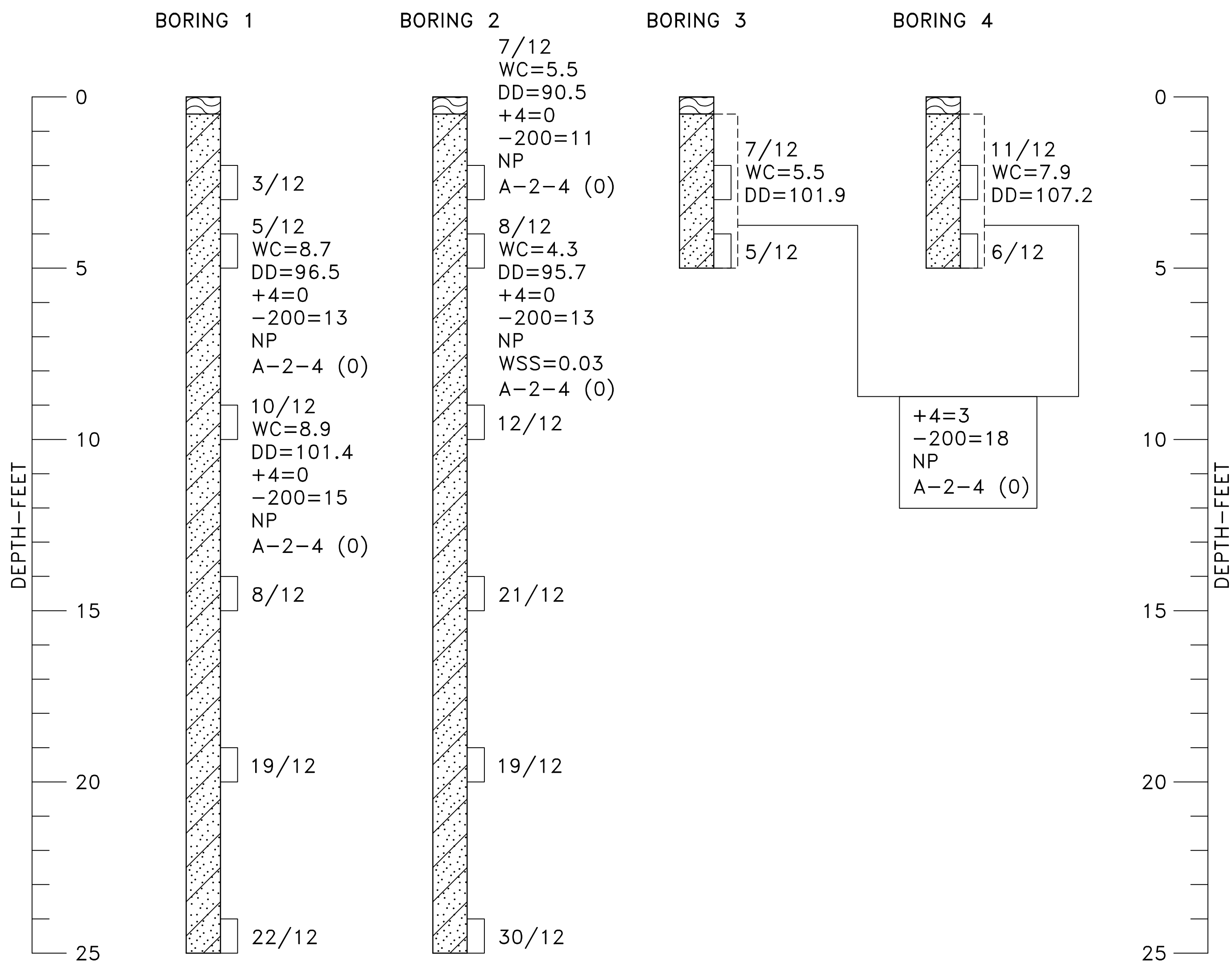
DPC:bj





19-2-192	Kumar & Associates	LOCATION OF EXPLORATORY BORINGS	Fig. 1

August 21, 2019 - 10:13am
V:\Projects\2019\19-2-192 HCD Drilling Office-Warehouse\Drafting\192192-01.dwg



19-2-192	Kumar & Associates	LOGS OF EXPLORATORY BORINGS	Fig. 2

LEGEND

TOPSOIL.

SILTY SAND (SM), AND POORLY-GRADED SAND WITH SILT (SP-SM), FINE TO MEDIUM GRAINED, VERY LOOSE TO MEDIUM DENSE, MOIST, LIGHT BROWN.

DRIVE SAMPLE, 2-INCH I.D. CALIFORNIA LINER SAMPLE.

DISTURBED BULK SAMPLE.

3/12 DRIVE SAMPLE BLOW COUNT. INDICATES THAT 3 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE THE SAMPLER 12 INCHES.

NOTES

1. THE EXPLORATORY BORINGS WERE DRILLED ON AUGUST 9, 2019 WITH A 4-INCH-DIAMETER CONTINUOUS-FLIGHT POWER AUGER.

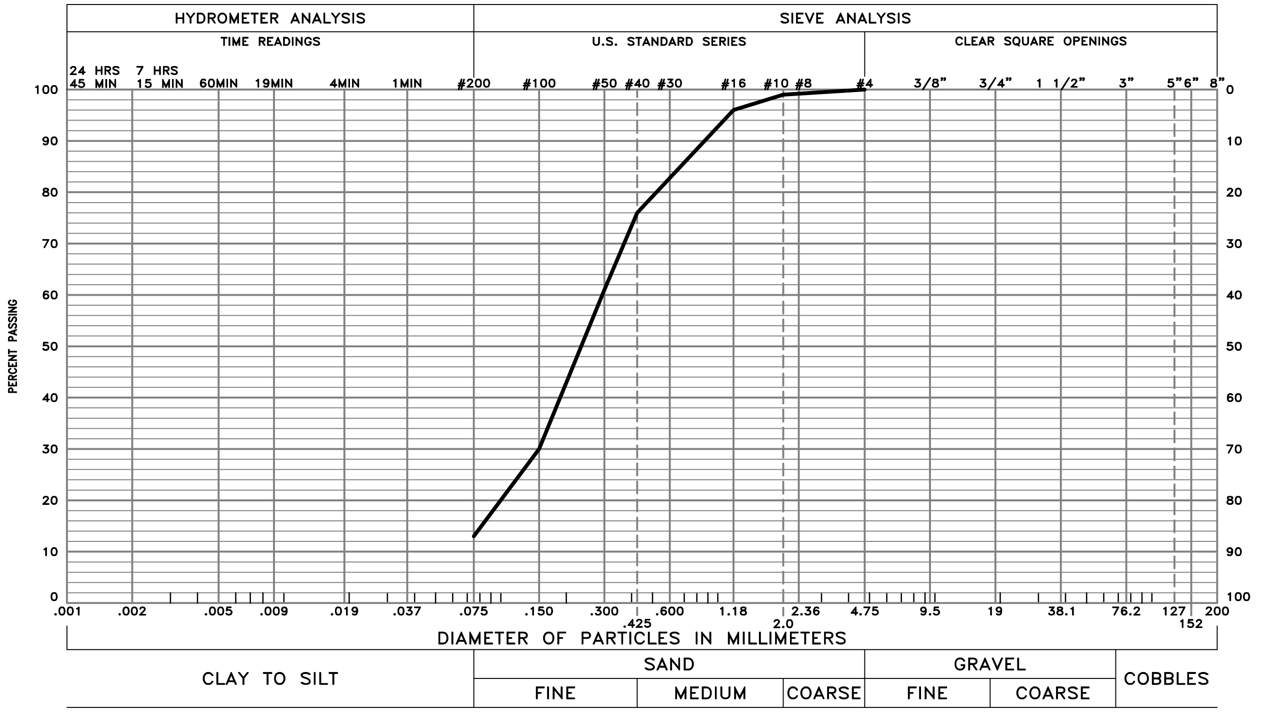
2. THE LOCATIONS OF THE EXPLORATORY BORINGS WERE MEASURED APPROXIMATELY BY TAPING FROM FEATURES SHOWN ON THE SITE PLAN PROVIDED AND SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

3. THE ELEVATIONS OF THE EXPLORATORY BORINGS WERE NOT MEASURED AND THE LOGS OF THE EXPLORATORY BORINGS ARE PLOTTED TO DEPTH.

4. THE LINES BETWEEN MATERIALS SHOWN ON THE EXPLORATORY BORING LOGS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES AND THE TRANSITIONS MAY BE GRADUAL.

5. GROUNDWATER WAS NOT ENCOUNTERED IN THE BORINGS AT THE TIME OF DRILLING. FLUCTUATIONS IN THE WATER LEVEL MAY OCCUR WITH TIME.

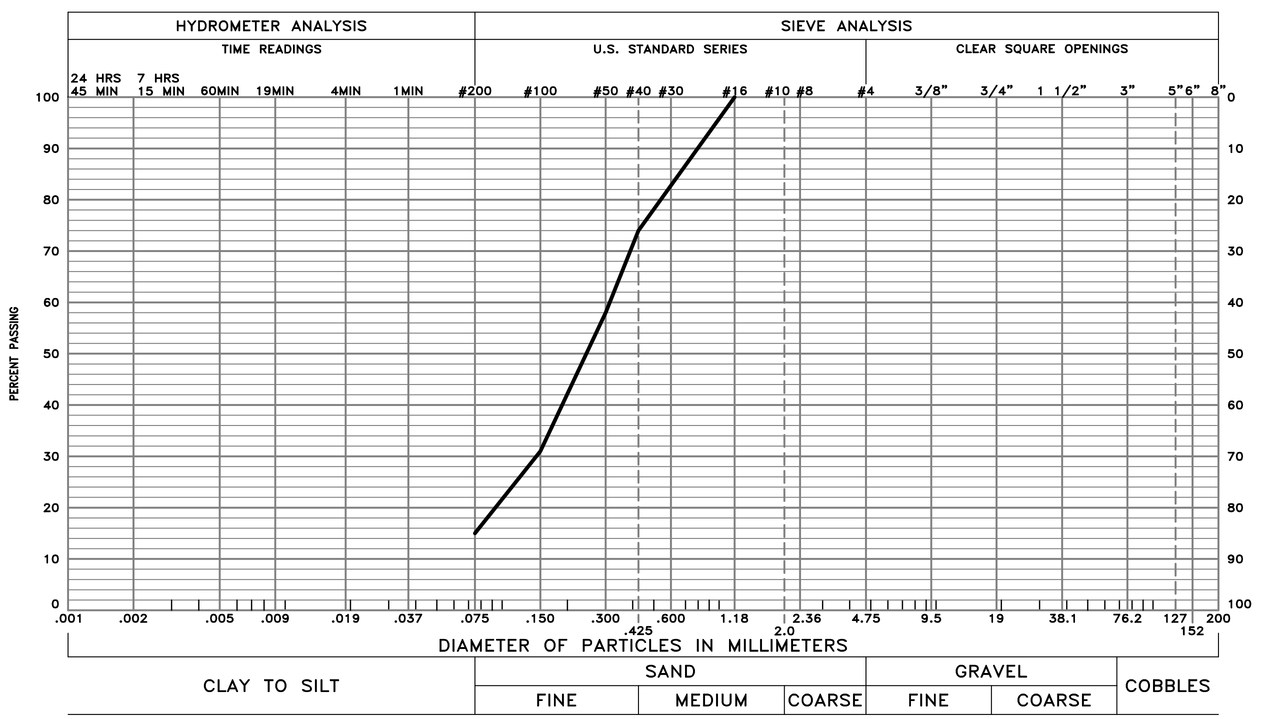
6. LABORATORY TEST RESULTS:
   WC = NATURAL MOISTURE CONTENT (%) (ASTM D2216);
   DD = DRY DENSITY (pcf) (ASTM D2216);
   +4 = PERCENTAGE RETAINED ON NO. 4 SIEVE (ASTM D6913);
   -200= PERCENTAGE PASSING NO. 200 SIEVE (ASTM D1140);
   NP = NON-PLASTIC (ASTM D4318);
   WSS = WATER SOLUBLE SULFATES (%) (CP-L 2103);
   A-2-4 (0) = AASHTO CLASSIFICATION (GROUP INDEX) (AASHTO M 145).



GRAVEL 0 % SAND 87 % SILT AND CLAY 13 %

LIQUID LIMIT PLASTICITY INDEX NP

SAMPLE OF: Silty Sand (SM) FROM: Boring 1 @ 4'



GRAVEL 0 % SAND 85 % SILT AND CLAY 15 %

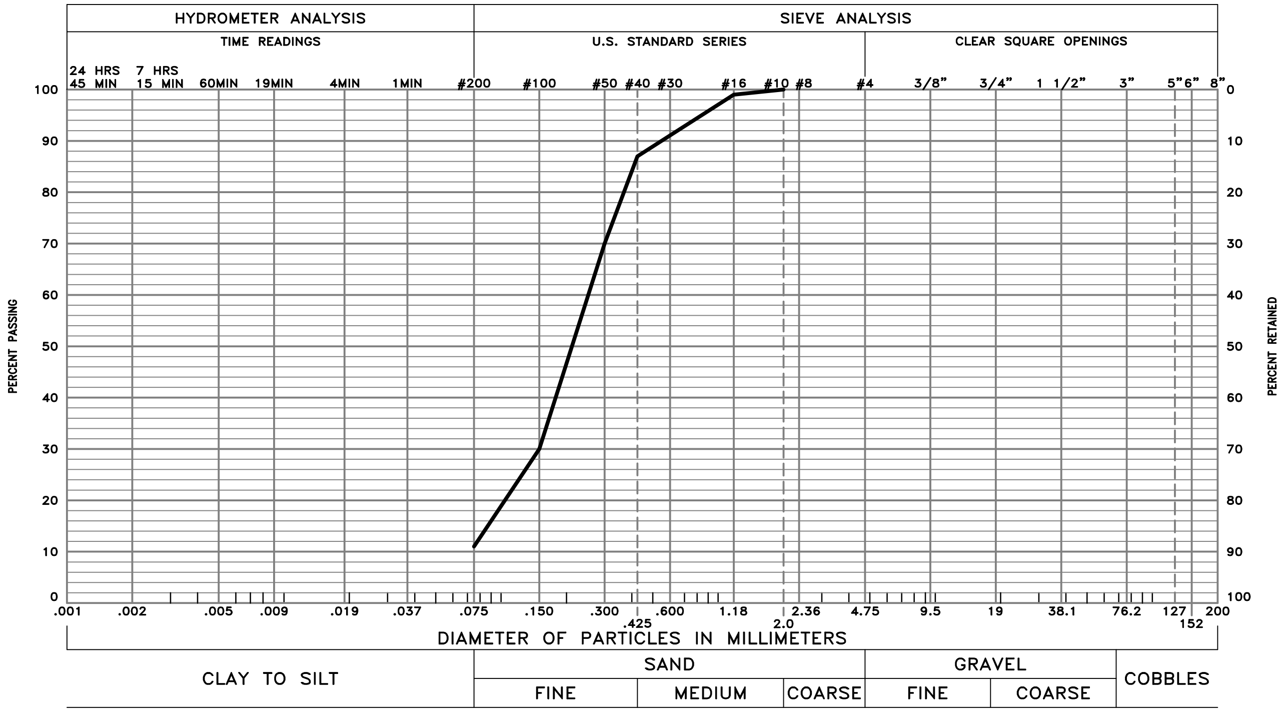
LIQUID LIMIT PLASTICITY INDEX NP

SAMPLE OF: Silty Sand (SM) FROM: Boring 1 @ 9'

These test results apply only to the samples which were tested. The testing report shall not be reproduced, except in full, without the written approval of Kumar & Associates, Inc. Sieve analysis testing is performed in accordance with ASTM D6913, ASTM D7928, ASTM C136 and/or ASTM D1140.

19-2-192	Kumar & Associates	GRADATION TEST RESULTS	Fig. 4

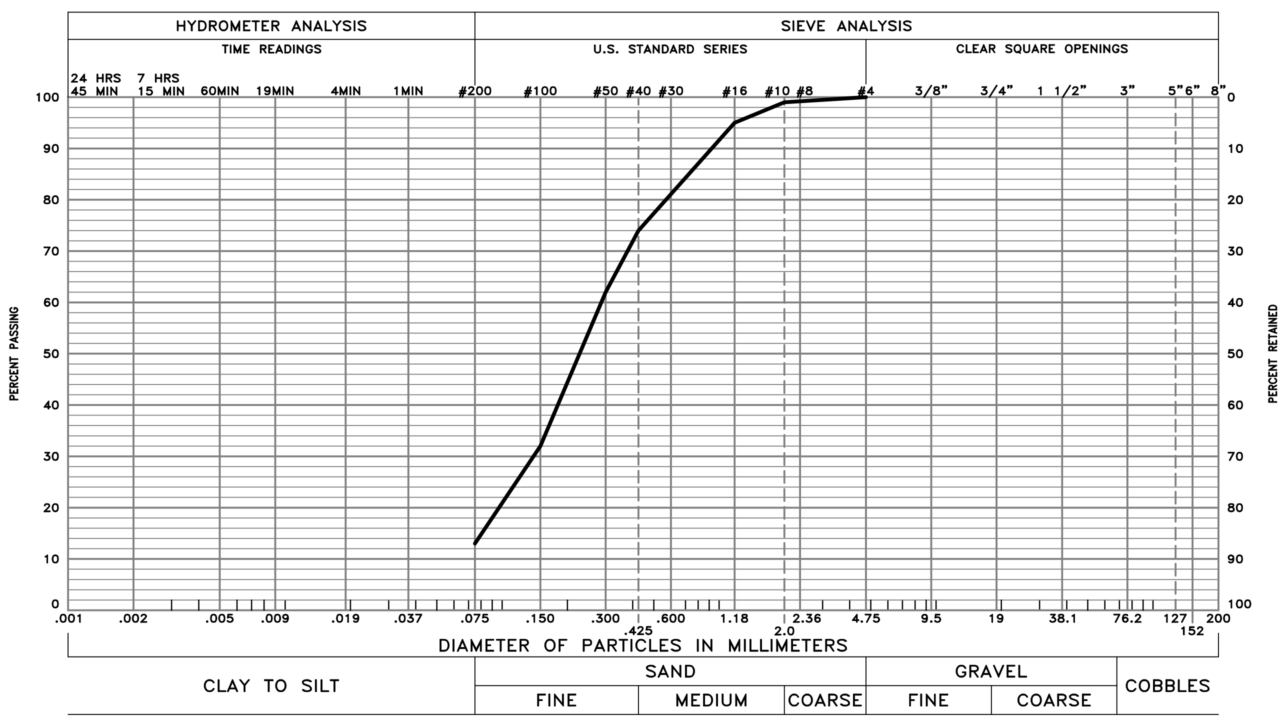
August 21, 2019 - 10:16am
V:\Projects\2019\19-2-192 HCD Drilling Office-Warehouse\Drafting\192192-04 to 06.dwg



GRAVEL 0 % SAND 89 % SILT AND CLAY 11 %

LIQUID LIMIT PLASTICITY INDEX NP

SAMPLE OF: Poorly Graded Sand with Silt (SP-SM) FROM: Boring 2 @ 2'



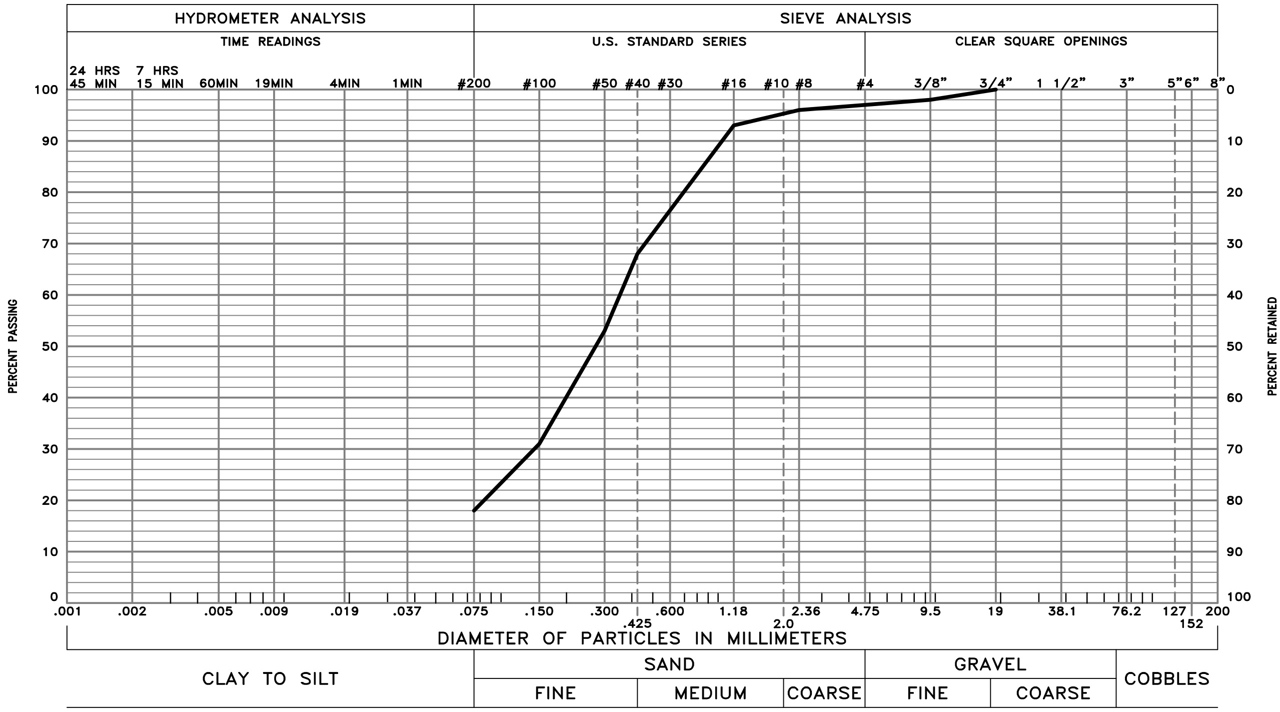
GRAVEL 0 % SAND 87 % SILT AND CLAY 13 %

LIQUID LIMIT PLASTICITY INDEX NP

SAMPLE OF: Silty Sand (SM) FROM: Boring 2 @ 4'

These test results apply only to the samples which were tested. The testing report shall not be reproduced, except in full, without the written approval of Kumar & Associates, Inc. Sieve analysis testing is performed in accordance with ASTM D6913, ASTM D7928, ASTM C136 and/or ASTM D1140.

19-2-192	Kumar & Associates	GRADATION TEST RESULTS	Fig. 5



GRAVEL 3 % SAND 79 % SILT AND CLAY 18 %

LIQUID LIMIT PLASTICITY INDEX NP

SAMPLE OF: Silty Sand (SM) FROM: Borings 3 and 4 @ 6"–5'

These test results apply only to the samples which were tested. The testing report shall not be reproduced, except in full, without the written approval of Kumar & Associates, Inc. Sieve analysis testing is performed in accordance with ASTM D6913, ASTM D7928, ASTM C136 and/or ASTM D1140.

August 21, 2019 – 10:16am
V:\Projects\2019\19-2-192 HCD Drilling Office-Warehouse\Drafting\192192-04 to 06.dwg

19–2–192	Kumar & Associates	GRADATION TEST RESULTS	Fig. 6

Kumar and Associates, Inc.

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

Project No.: 19-2-192
Project Name : HCD Drilling Office/Warehouse
Date Sampled: 8/9/2019
Date Received: 8/9/2019

SAMPLE LOCATION		DATE TESTED	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS		WATER SOLUBLE SULFATES (%)	AASHTO CLASSIFICATION (Group Index)	SOIL OR BEDROCK TYPE (Unified Soil Classification)
BORING	DEPTH (ft)				GRAVEL (%)	SAND (%)		LIQUID LIMIT	PLASTICITY INDEX			
1	4'	8/14/19	8.7	96.5	0	87	13		NP		A-2-4 (0)	Silty Sand (SM)
1	9'	8/14/19	8.9	101.4	0	85	15		NP		A-2-4 (0)	Silty Sand (SM)
2	2'	8/14/19	5.5	90.5	0	89	11		NP		A-2-4 (0)	Poorly Graded Sand with Silt (SP-SM)
2	4'	8/14/19	4.3	95.7	0	87	13		NP	0.03	A-2-4 (0)	Silty Sand (SM)
3	2'	8/14/19	5.5	101.9								Silty Sand (SM)
4	2'	8/14/19	7.9	107.2								Silty Sand (SM)
Composite of 3 and 4	6"-5'	8/14/19			3	79	18		NP		A-2-4 (0)	Silty Sand (SM)