GEOTECHNICAL DATA REPORT
BRIDGE STRUCTURES H3033, H3034 & H3036 & RETAINING WALLS
US95-CC215 INTERCHANGE, PHASE 3D/E
LAS VEGAS, CLARK COUNTY, NEVADA
PROJECT NO. 20184521E1R
March 22, 2019

Prepared for:

HDR Engineering, Inc.

Nevada Department of Transportation
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Prepared by:

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March 22, 2019
Project No. 20184521E1r

Ms. Pamela S. Pierce, PE
Senior Project Manager
HDR Engineering, Inc.
9805 Double R Boulevard, Suite 101
Reno, Nevada 89521-5917

RE: Geotechnical Data Report
Bridge Structures H3033, H3034 & H3036 &
Retaining Walls
US95-CC215 Interchange, Phase 3D/E
Las Vegas, Clark County, Nevada

Dear Ms. Pierce:

Geotechnical & Environmental Services, Inc. (GES) is pleased to present the Geotechnical Data Report (GDR) for the proposed Bridge Structures H3033, H3034 & H3036 & retaining walls as part of the US95-CC215 Interchange, Phase 3D/E project in Las Vegas, Clark County, Nevada.

The GDR includes the findings of the geologic review, the results of the field exploration and laboratory testing for site development.

We appreciate this opportunity to provide our professional services. If you have any questions or comments regarding this information, please feel free to contact our office.

Sincerely,

Geotechnical & Environmental Services, Inc.

David J. Salter, P.E.
Geotechnical Practice Leader

for Gregory P. DeSart, P.E.
President

DJS:GPD:caw

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TABLE OF CONTENTS

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1. INTRODUCTION

This report presents the geotechnical data obtained from a geotechnical exploration program performed by Geotechnical & Environmental Services, Inc. (GES) for the proposed Structures H3033, H3034 & H3036 & retaining walls as part of the US95-CC215 Interchange, Phase 3D/E project in Las Vegas, Nevada. The project is being designed and constructed using the design-bid-build delivery method.

The attached Figure A-1 presents a vicinity map showing the approximate location of the site within the Las Vegas Valley. The following sections present the purpose and scope of our geotechnical exploration, project and site descriptions, field exploration, and laboratory testing.

1.1. PURPOSE AND SCOPE

The purpose of this data report is to provide subsurface soil information to aid in the design and construction for the proposed bridge Structures H3033, H3034 & H3036 & retaining walls as part of the US95-CC215 Interchange, Phase 3D/E project in Las Vegas, Nevada. The scope of this study included a review of referenced geologic literature and maps, review of available geotechnical exploration data, a subsurface exploration program to supplement previous explorations, soil sampling, laboratory testing of selected soil samples and preparation of this data report.

Design level geotechnical reports will be prepared by HDR and GES, under separate cover, for each proposed bridge structure and associated retaining walls. The design level geotechnical reports will provide a summary of design analysis for shallow and deep foundations, conclusions and geotechnical recommendations. The design level reports will refer to and rely on the data presented in this report.

GES reviewed existing geotechnical data obtained and summarized by others. The applicable geotechnical data was collected by others generally for the overall US95-CC215 Interchange project or for projects associated with or located within the interchange project. Figure A-2 shows the exploration locations of applicable previous explorations along with the additional explorations

drilled during this study. The following is a summary of geotechnical reports reviewed by GES for this phase.

- Geotechnical Exploration Report titled Geotechnical Data Report US 95/CC-215 Interchange and Vicinity Clark County with project number: EA 73518 and dated May 2017 including volumes 1 through 6.

- Geotechnical Evaluation report for the proposed pedestrian bridge over the proposed realigned Sky Pointe Drive as part of the CC215 Beltway Connection from Centennial Parkway to Decatur Boulevard – Segment "B". The report was prepared by GES under project no. 20174206E2, dated December 21, 2018.

- Preliminary Geotechnical Data Report, Phase I, Preliminary Design for CC215/US95 System to System Interchange. Kleinfelder project no. 117419.7, dated July 31, 2012.

- Results of Preliminary Shallow Foundation Design Analysis, CC215/US95 System to System Interchange. Kleinfelder project no. 117419.7, dated July 13, 2012.

- Results of Preliminary Deep Foundation Design Analysis, CC215/US95 System to System Interchange. Kleinfelder project no. 117419.7, dated July 31, 2012.

1.2. PROJECT DESCRIPTION

Our understanding of the project is based on our correspondence with HDR and the Nevada Department of Transportation (NDOT), a review of aerial photographs, and our experience with similar projects in the vicinity.

The proposed Phase 3 D/E project is anticipated to include the design and construction of three bridge structures referred to as H3033, H3034 and H3036. Bridge structures H3033 and H3034 are both proposed as a two-span overpass structure along Sky Pointe Drive. Bridge H3033 will span the proposed US95 South to CC215 East ramp and the existing US95 North to CC215 East ramp. Bridge H3034 will span CC215 both east- and west-bound travel lanes. Bridge structure H3036 will be part of the CC215 East- to US95 North-bound ramp and is proposed as a three-span bridge over the proposed Sky Pointe Drive extension. Several retaining walls associated with each of the bridge structures including localized on- and off-ramps are also part of the US95-CC215 Interchange, Phase 3D/E project.

The proposed bridge width, length and loading information was not available at the time of this GDR and will be summarized in each design level geotechnical report.

1.3. SITE DESCRIPTION

The project is located in northwest Las Vegas in an area commonly referred to as the Centennial Bowl. This phase of the project currently traverses undeveloped parcels and existing asphalt paved roadways and ramps associated with the US95 and CC215 Interchange. A high-pressure Kinder Morgan gas transmission line and a storm drain conveyance system generally runs west to east along the northern portion of the project and parallel to the proposed H3036 structure. Portions of the storm drain consist of buried concrete box culverts and other portions consist of open concrete lined channel.

Portions of the site is currently used and was previously used as the lay down area during construction of the other project phases. We anticipate that fill material and debris may be encountered. Site drainage consists of sheet drainage generally to the east to southeast.

2. DISCUSSION

The following sections describe the geology, seismicity, mapped soil conditions, field exploration, laboratory testing, and subsurface materials and conditions for the project site.

2.1. GEOLOGY

The subject site is located in the Las Vegas Valley, a fault-bounded graben structure surrounded by mountain ranges. The Las Vegas Valley is physiographically characteristic of the Basin and Range Province with generally northwest-trending parallel mountain ranges and an intervening basin. Unlike many basins within the Basin and Range Province, which are internally draining, the Las Vegas Valley is unique in that the basin drains through the Las Vegas Wash to Lake Mead and the Colorado River.

Tertiary and Quaternary unconsolidated alluvial deposits, derived from the surrounding mountain ranges, fill the valley. These deposits may be up to 4,000 feet thick at the site near the center of the valley. The surrounding mountain ranges are comprised of sedimentary and igneous rocks. Alluvial fan deposits, consisting of sand and gravel, slope down from the mountain fronts towards the valley floor. Sediments are typically less coarse, grading from fine sand and silt to clay near the valley bottom. Beds of amorphous and crystalline gypsum are common. Zones of calcareous cemented deposits (caliche) are present at various locations and depths throughout the valley.

The subject site is located on the referenced Geologic Map of the Tule Springs Park Quadrangle, Nevada, (Bell, J.W., Et al. 1998) within an area of interfluvial and fan-terrace remnants overlying and inset into spring and paludal deposits (Qsp3b and Qsp4) comprising extensive fine-grained valley-bottom fill (Qtse). The Qsp3b and Qsp4 units are characterized by well-developed, tightly packed desert pavement; dark rock varnish; and moderately to strongly etched surface carbonate clasts. The Qtse unit is comprised of light brown to yellowish brown silt, fine sandy silt, and light gray to gray organic mud; locally light green clay. The other mapped geologic unit includes Qa as shown on the attached geologic map on Figure A-2a. The Qa unit is composed of pink to pale-brown fine sand and pebble to cobble gravel.

2.2. SEISMICITY, FAULTING AND FISSURES

The U.S. National Oceanic and Atmospheric Administration Earthquake Catalog lists about 800 events of magnitude greater than or equal to 4.0 with epicenters within about 120 miles of Las Vegas. Only 19 events greater than or equal to magnitude 4.0 are estimated to have occurred during the 1881 through 1938 period in the southern Nevada region.

After about 1947, nuclear testing began at the Nevada Test Site. Therefore, many of the recorded earthquakes after about 1947 may be due to nuclear blasts occurring more than about 60 miles from the subject site. Several hundred earthquakes occurred from 1936 to 1965 near Hoover Dam, presumably due to filling of the Lake Mead reservoir, with 24 of these events reportedly greater than or equal to magnitude 4.0.

Based on a review of referenced geologic maps and literature, the nearest Quaternary-age (last 1.6 million years) fault is located approximately ½-mile southeast of the interchange (dePolo and Bell, 2000). Other mapped Quaternary-age tectonic faults are the Eglington fault (which geologists have debated may also be potentially active) and the Frenchman Mountain fault; these faults are located approximately 3 miles southeast and approximately 14 miles southeast of the project area, respectively. The nearest mapped Holocene active fault (i.e., a fault that has moved within the last 10,000 years) is the Black Hills fault, located approximately 23 miles southeast of the project. The nearest mapped fissure zone is located about 3 miles southeast of the site near Ann Road and Decatur Boulevard (dePolo and Bell, 2000). Based on the results of our review of available literature, it is our opinion that the potential for fault-related surface rupture at the site is low.

2.3.LIQUEFACTION

Liquefaction is a phenomenon in which loose, saturated soils lose shear strength under short term (dynamic) loading conditions. Ground shaking of sufficient duration results in the loss of grain to grain contact in potentially liquefiable soils due to a rapid increase in pore water pressure, causing the soil to behave as a fluid for a short period of time.

To be potentially liquefiable, a soil is typically cohesionless with a grain-size distribution generally consisting of sand and silt. It is generally loose to medium dense and has a relatively high moisture content, which is typical near or below groundwater. The potential for liquefaction decreases with increasing clay and gravel content but increases as the ground acceleration and duration of shaking increase. Potentially liquefiable soils need to be subjected to sufficient magnitude and duration of ground shaking for liquefaction to occur. Effects of liquefaction can include relatively large total and differential settlements, flotation of subsurface structures, slope failures, lateral ground displacements (lateral spreading), surface subsidence, ground cracking, and sand boils.

An in-depth evaluation of the potential for liquefaction at the site was outside the scope of this geotechnical evaluation. Qualitatively, the subsurface soils composed primarily of stiff to very stiff lean clay with gravel, very dense clayey gravel, strongly cemented caliche, and the depth at which groundwater was encountered at the site indicate a low liquefaction potential at the subject site.

2.4.MAPPED SOIL DATA

Based on review of the Clark County Soil Guidelines Map (CCBD, 2019), the project site is located in a previously mapped standard geotechnical consideration area with mixed alluvial sand and gravel. Based on review of the Clark County Expansive Soil Guidelines Map (CCDDS, 2006), the Phase 3 D/E portion of the interchange project is located in a special geotechnical consideration area having moderate swell potential (4 to 8 percent).

Based on a review of the referenced Subsidence Report (Bell, et. al., 1998), there has been ground surface subsidence in the vicinity of the site due to groundwater withdrawals from nearby pumping wells. Historical pumping of groundwater in the Las Vegas Valley has resulted in regional subsidence of the ground surface with subsidence concentrated within three localized subsidence bowls. The site is located within the central subsidence bowl which has subsided approximately 2-feet during the period from 1963 to 2000.

2.5. FIELD EXPLORATION

In addition to the 44 applicable previous explorations performed by others and shown on Figure A-2, GES evaluated the subsurface conditions at the project site by drilling an additional twenty-four exploratory borings for Phase 3D/E. The borings were advanced to depths of between approximately 20 to 110 feet below the existing ground surface. Two borings were drilled for the proposed H3033 bridge structure (H3033B-1 and H3033B-2); three borings for the H3034 bridge structure (H3034B-1 through H3034B-3); five borings for the H3036 bridge structure (H3036B-1 through H3036B-5); and fourteen borings associated with various retaining walls. All borings associated with proposed bridge structures, except for H3036B-5, were drilled with the Diedrich D120 drill rig and was advanced to a depth of 110 feet using mud rotary techniques. H3036B-5 and each of the retaining wall borings were drilled with either the Diedrich D120 or the Mobile B90 truck mounted drill rig or the Diedrich D50 track rig using either hollow- or solid-stem augers. The borings were drilled between November 28, 2018 and February 1, 2019. A summary of the explorations is presented in the following table. The drilling depths and dates are also shown on the attached boring logs in Appendix A. Figure A-2 shows the approximate location of each exploration. The approximate locations (datum NAD 1983 HARN) were recorded by GES staff using a hand-held GPS unit at the time the borings were performed, elevations were estimated using Clark County Web Infomapper.

Table 2.5. Field Exploration Summary

Exploration ID	Exploration Depth (ft)	Northing	Easting	Ground Elevation (ft)	Rig Type	Drilling Method
H3033B-1	111.5	36.2762	-115.2614	2,378	Diedrich D120	Mud Rotary
H3033B-2	111.5	36.2759	-115.2615	2,390	Diedrich D120	Mud Rotary
H3034B-1	111.5	36.2773	-115.2613	2,394	Diedrich D120	Mud Rotary
H3034B-2	111.5	36.2770	-115.2612	2,398	Diedrich D120	Mud Rotary
H3034B-3	111.5	36.2766	-115.2613	2,389	Diedrich D120	Mud Rotary
H3036B-1	111.5	36.2779	-115.2613	2,394.5	Diedrich D120	Mud Rotary
H3036B-2	109	36.2778	-115.2610	2,396	Diedrich D120	Mud Rotary
H3036B-3	111.5	36.2778	-115.2603	2,389	Diedrich D120	Mud Rotary
H3036B-4	111.5	36.2777	-115.2603	2,390	Diedrich D120	Mud Rotary
H3036B-5	51.5	36.2775	-115.2599	2410	Diedrich D120	Solid Stem
RW7B-1	16	36.2775	-115.2634	2,416	Diedrich D120	Solid Stem
RW7B-2	31.5	36.2775	-115.2624	2,407	Diedrich D120	Solid Stem
RW7B-3	69	36.2772	-115.2603	2,389	Diedrich D120	Hollow Stem
RW7B-4	82	36.2771	-115.2596	2,377	Diedrich D50	Hollow Stem
RW7B-5	77	36.2770	-115.2589	2,380	Diedrich D120	Hollow Stem
RW7B-6	60	36.2770	-115.2583	2,369	Diedrich D120	Solid Stem
RW7B-7	41.5	36.2769	-115.2576	2,368	Diedrich D120	Solid Stem
RW7B-8	26	36.2768	-115.2569	2,347	Diedrich D50	Solid Stem
RW8B-1	56.5	36.2768	-115.2627	2,410	Mobile B90	Hollow Stem
RW8B-2	86.5	36.2767	-115.2603	2,385	Diedrich D120	Hollow Stem
RW9B-1	21.5	36.2768	-115.2633	2,398	Mobile B90	Hollow Stem
RW10B-1	26.5	36.2750	-115.2617	2,391	Diedrich D120	Solid Stem
RW10B-2	46.5	36.2743	-115.2615	2,385	Diedrich D120	Solid Stem
RW14B-1	60.5	36.2753	-115.2518	2,355	Mobile B90	Solid Stem

A GES representative directed and supervised the subsurface explorations, while maintaining detailed logs of the subsurface conditions, classifying the soils encountered, and obtaining soil samples. The soils encountered were classified in general accordance with the Unified Soil Classification System (USCS). A Key to Symbols and Terms utilized on the exploration logs is presented on Figure A-3.

Soil samples and penetration blow counts were obtained with a 3-inch outside diameter ring-lined drive sampler and with a 2-inch outside diameter split-spoon sampler in general accordance with ASTM D3550 and ASTM D1586, respectively. The samplers were driven with a 140-pound automatic trip hammer falling about 30 inches. The penetration resistance (hammer blows) measured by driving the sampler was used to evaluate the consistency of the in-place soil. Thin walled Shelby tubes were attempted at selected intervals using a Pitcher barrel sampler. Pocket penetrometer readings were obtained in selected clays samples and recorded on the boring logs in Appendix A.

The auto-hammer used on each drill rig are calibrated annually. The most current hammer efficiency calibration results are provided in Appendix C.

Prior to drilling, select boring locations were potholed to depths between approximately 2 and 5 feet below the existing ground surface. The cuttings for the boreholes were spread across the site. The boreholes were backfilled with bentonite and surface completed with USDOT concrete patch or asphalt cold patch, where applicable.

Drill rates were generally obtained where layers of strongly cemented soils were encountered within the borings. Drill rates were obtained by measuring the time required to drill through a known depth. The measured time elapsed and the distance drilled were converted to drill rates and were recorded on the boring logs in seconds per foot where obtained. The drilling rates are a qualitative indication of the relative hardness of the cemented soils and are greatly influenced by drilling method, bit size, bit wear, drilling pressure and other features. The drill rates, given in seconds per foot, are listed on the exploration logs in Appendix A at the depths where strongly cemented soils were encountered.

No known or published correlation is available between drill rates with the Diedrich D-50, D-120 and Mobile B-90 drill rigs and cementation and hardness classifications. However, the cementation and hardness of the cemented layers were qualified according to descriptions given in Table 2 of the referenced report by Mr. Joseph M. Cibor and the degree of cementation described in Figure No. A-3. The cementation and hardness of layers drilled with the Diedrich D-50, D-120 and Mobile B-90 drill rigs were evaluated based on our experience with drilling through cemented soils.

2.6. LABORATORY TESTING

The laboratory testing program performed during this study included tests to classify the on-site soils and to evaluate engineering and physical properties of the on-site soils. The test results are presented on the exploration logs in Appendix A and on test reports presented in Appendix B. Detailed descriptions of the laboratory tests performed are also presented in Appendix B. A summary of some of the laboratory test results performed for this study is presented in the following table:

Table 2.6. Summary of Laboratory Test Results

Test Type	Range of Test Results
In-Place Moisture Content	0.7 to 54.5 percent
In-Place Dry Density	68.2 to 125.5 pcf
Atterberg Limits Liquid Limit Plastic Index	 NV to 93 NP to 64
Direct Shear Strength Cohesion (Peak) Friction Angle (Peak)	 70 to 1180 psf 27 to 37 degrees
Clay Swell Potential (60 psf surcharge)	0 to 6 percent
Percent Passing No. 200 Sieve	16 to 99
Sulfide Content	ND to 3.2
Chloride Content	ND to 310 mg/Kg
Sodium Sulfate Content	0.005 to 0.053 percent
pH	7.60 to 8.7
Oxidation-Reduction Potential	372 to 484 mV
Resistivity	252 to 3910 Ohm-cm
Sulfate Content	0.01 to 0.20 percent
Sodium Content	ND to 0.01 percent
Solubility	0.01 to .33 percent
Collapse/Swell Potential (1.8 ksf surcharge)	Swell: 0.3 Collapse: 0.3 to 4.4
Consolidation Test Results	Cc: 0.05 to 0.22 Cr: 0.01
Unconfined Compression (2 tests)	4,370 to 5,600 psf

2.7. SUBSURFACE MATERIALS AND CONDITIONS

The following sections generally describe the fill and native soils encountered in each of the additional 24 borings drilled for Phase 3 D/E. Detailed information regarding subsurface materials and conditions are presented on the exploration logs in Appendix A.

2.7.1. ASPHALT CONCRETE PAVEMENT

Three borings, H3036B-5, RW8B-1 and RW14B-1, were drilled in asphalt concrete pavement. The asphalt thickness measured in these borings was 6-, 5-, and 6-inches, respectively.

2.7.2. FILL

Fill soils were encountered in eleven of the borings. The fill thickness ranged from 1 to 22 feet. A summary of the fill thickness is presented below.

Table 2.7.2. Summary of Fill Thickness

Boring No.	Approximate Thickness of Fill (feet)	Soil Type
H3033B-1	1	GC
H3033B-2	--	--
H3034B-1	--	--
H3034B-2	--	--
H3034B-3	--	--
H3036B-1	--	--
H3036B-2	--	--
H3036B-3	2	SC
H3036B-4	2	SC
H3036B-5	22	SM
		SC
		CL
RW7B-1	--	--
RW7B-2	--	--
RW7B-3	2	GW-GC
RW7B-4	5	CL-ML
RW7B-5	--	--
RW7B-6	10	CL-ML
RW7B-7	10	CL
RW7B-8	4	SC
RW8B-1	4½	SM
RW8B-2	--	--
RW9B-1	--	--
RW10B-1	--	--
RW10B-2	--	--
RW14B-1	10	SM
		CL

Fill placed without documentation to indicate that the fill soils were placed under the supervision of a Geotechnical Engineer are considered uncontrolled. The term uncontrolled fill soils refers to artificial fill which was placed without engineering observation, testing, or documentation and is considered unsuitable for the support of the proposed improvements. Our scope did not include an evaluation of the existing fill soils or certification of the existing fill or improvements.

2.7.3. NATIVE SOIL

The native material generally consisted of interlayered soils consisting of silty to clayey sand and gravel, silt, and lean-to fat clays.

Strongly cemented soils were encountered in our explorations. Due to the inconsistent nature of cemented soils, medium hard to very hard and difficult-to-excavate cemented soils will likely be encountered beyond or between the exploration locations at varying depths. Refraction surveys were performed as part of previous preliminary evaluations. A detailed excavatability or rippability evaluation is beyond the scope of this study. The contractor should perform the independent investigations necessary to determine the type of equipment required to perform the work.

Independent investigations may include test excavations, rock probes, and/or seismic refraction surveys.

The approximate depths that strongly cemented soils were encountered in our borings, the approximate layer thicknesses, and hardness of the materials encountered are summarized in the following table.

Table 2.7.3. Strongly Cemented Soils

Boring No.	Approximate Depth to Cemented Layer (feet)	Approximate Elevation of Cemented Layer (feet)	Approximate Thickness of Cemented Layer (feet)	Degree of Hardness
H3033B-1	49	2329	13½	Hard
	85½	2292½	8½	Very hard
H3033B-2	17½	2372½	7	Very hard
	42½	2347½	2	Hard
	65	2325	7	Very hard
	96	2294	5½	Hard to very hard
H3034B-1	43	2351	1½	Moderately hard
	62	2332	12	Very hard
	93	2301	3½	Very hard
	104	2290	4	Very hard
H3034B-2	39	2359	4	Hard
	64	2334	18	Very hard
	83	2315	1	Very hard
H3034B-3	63 ½	2325 ½	8 ½	Very hard
	97	2292	4 ½	Very hard
	110 ½	2178 ½	1*	Very hard
H3036B-1	39	2355 ½	1	Very hard
	51	2343 ½	2	Hard to very hard
	53	2339 ½	22	Hard to very hard
H3036B-2	40	2356	2	Very hard
	52	2344	38	Very hard
	105	2291	4*	Hard
H3036B-3	47	2342	23	Very hard
	93 ½	2296	5 ½	Very hard
H3036B-4	22	2368	2	Hard
	37 ½	2352 ½	2 ½	Hard
	57	2333	13	Very hard
	94	2296	8	Very hard
H3036B-5	46	2364	3	Moderately hard
RW7B-1	Not Encountered	--	--	--
RW7B-2	Not Encountered	--	--	--
RW7B-3	62	2327	7*	Very hard
RW7B-4	58	2319	12	Very hard
RW7B-5	55	2325	12	Hard to very hard
RW7B-6	57	2312	3*	Moderately hard
RW7B-7	Not Encountered	--	--	--
RW7B-8	13	2334	1	hard
RW8B-1	Not Encountered	--	--	--
RW8B-2	58	2327	7	Very hard
RW9B-1	Not Encountered	--	--	--
RW10B-1	Not Encountered	--	--	--
RW10B-2	Not Encountered	--	--	--
RW14B-1	Not Encountered	--	--	--

** Exploration terminated in cemented layer*

In addition, weakly and moderately cemented soil was encountered within the soil layers at varying depths in the explorations advanced at the site. Weak, moderate and strong cementation is identified on the exploration logs at the depths encountered.

Weakly and moderately cemented soil refers to cemented soil that will crumble or break with little or considerable finger pressure, respectively. Strongly cemented soil refers to rock-like soil that will not crumble or break at any finger pressure. In general, weakly to moderately cemented soils can be excavated with a backhoe, although with a corresponding reduction in excavation production as degree of cementation increases. Medium hard cemented soils can be excavated with a ripper tooth or by a backhoe with extreme difficulty. However, excavation of medium hard to hard, and/or hard cemented rock-like materials may require a heavy-duty excavator or trencher, hoe-ram, rock-saw, or a dozer with the equivalent excavating characteristics of a Caterpillar D-10 equivalent or larger equipment with ripper, or similar rock excavation techniques. Excavation of hard to very hard and/or very hard cemented materials may require blasting or possibly a dozer with the equivalent excavating/ripping characteristics of a Caterpillar D-11 equivalent or larger equipment. Due to the proximity of the site to existing structures, where hard to very hard and/or very hard cemented soils cannot be excavated with a Caterpillar D-11 or equivalent heavy-duty dozer and blasting may be needed, the contractor should carefully prepare a blasting plan, that includes ground vibration monitoring, that prevents damage to nearby structures. Blasting should only be considered as a last resort.

Excavation/ripping of cemented soils is dependent on several factors in addition to equipment type, including but not limited to age and mechanical condition of the equipment, maintenance and care, condition of cutting surfaces and ripper shanks, and the skill of the equipment operators. The earthwork and underground contractors should consider these factors in preparing their respective bids and schedules. It is the express responsibility of the contractor to perform independent evaluations of the rippability of cemented soils prior to preparing their bid. GES is not an earthwork or underground contractor.

2.7.4. GROUNDWATER

Groundwater was encountered in some of our explorations. Observations and depth to groundwater was difficult to identify and measure during mud rotary drilling. Depth to groundwater was generally measured approximately 24 hours after completion of a mud rotary boring. The

measured depth to groundwater after drilling and the approximate groundwater elevation for each boring is summarized in the following table:

Table 2.7.4. Groundwater Depths

Boring No.	Approximate Ground Surface Elevation (feet)	Groundwater Depth During Drilling (feet)	Groundwater Depth After Drilling (feet)	Approximate Elapsed Time Measured After Drilling (days)	Approximate Elevation of Groundwater Measurement (feet)
H3033B-1	2,378	Not Measured	Not Measured	--	N/A
H3033B-2	2,390	Not Measured	57	1	2,333
H3034B-1	2,394	Not Measured	Hole Caved	--	N/A
H3034B-2	2,398	Not Measured	38	1	2,360
H3034B-3	2,389	Not Measured	50	3	2,339
H3036B-1	2,394.5	Not Measured	47	3	2347½
H3036B-2	2,396	Not Measured	60	7	2336
H3036B-3	2,389	Not Measured	49	3	2340
H3036B-4	2,390	Not Measured	Not Measured	--	N/A
H3036B-5	2410	Not Encountered	N/A	--	N/A
RW7B-1	2,416	Not Encountered	N/A	--	N/A
RW7B-2	2,407	Not Encountered	N/A	--	N/A
RW7B-3	2,389	Not Encountered	N/A	--	N/A
RW7B-4	2,377	75	Not Measured	N/A	2302
RW7B-5	2,380	Not Measured	60	1	2320
RW7B-6	2,369	Not Encountered	N/A	--	N/A
RW7B-7	2,368	Not Encountered	N/A	--	N/A
RW7B-8	2347	Not Encountered	N/A	--	N/A
RW8B-1	2,396	Not Encountered	N/A	--	N/A
RW8B-2	2,385	70	Not Measured	N/A	2315
RW9B-1	2,398	Not Encountered	N/A	--	N/A
RW10B-1	2,391	Not Encountered	N/A	--	N/A
RW10B-2	2,385	Not Encountered	N/A	--	N/A
RW14B-1	2355	Not Encountered	N/A	--	N/A

The shallowest groundwater was observed at an elevation of 2365 in a previously drilled boring where groundwater was measured after 24 hours. Groundwater levels should be anticipated to fluctuate due to seasonal precipitation, groundwater withdrawal and recharge, irrigation practices, and potential future dewatering efforts within and/or near the subject site. A detailed evaluation of possible groundwater fluctuations is beyond the scope of this study.

3. LIMITATIONS

The data contained in this report is based on field exploration, laboratory testing, research of pertinent maps and literature, and our understanding of the proposed construction. The soil data used in the preparation of this report were obtained from 24 additional borings performed at the subject site and available geotechnical information. It is possible that variation in the soil conditions will exist between

the locations explored. This data report presents geotechnical data only and does not present geotechnical conclusions or recommendations for design or construction of the proposed project.

This Geotechnical Data Report is provided for inspection and review only. The NDOT cannot and does not warrant the accuracy or reliability of the information included in the Geotechnical Data Report. Such borings and data are subject to sampling errors. The Geotechnical Data Report was prepared for design purposes and may not provide sufficient data for bid preparation by some contractors. Bidders and the Contractor are solely responsible for assumptions, deductions, interpretations and conclusions they may make or obtain from any such information. The information contained in the Geotechnical Data Report is not to be used by the Contractor for any design work including the design of temporary construction facilities. The Geotechnical Data Report may be provided in the Contract Documents with the express understanding of the preceding.

Our services were performed using that degree of care and skill ordinarily exercised under similar circumstances by reputable engineering firms in this or similar localities. No other warranties, either express or implied, are included or intended in this report.

4. REFERENCES

American Association of State Highway and Transportation Officials (AASHTO), 2014, LRFD Bridge Design Specifications, 7th Edition

American Association of State Highway and Transportation Officials (AASHTO), 2012, Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Part 2A: Tests, 27th Edition

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Clark County Department of Development Services-Building Division (CCDDS) and the Nevada Bureau of Mines and Geology, 2006, Clark County Expansive Soil Guidelines Map: dated September 5.

Clark County Geographic Information Systems Management Office (GISMO), 2008, Open Web Info Mapper, http://gisgate.co.clark.nv.us/openweb/asp/openweb.asp.

dePolo, C.M. and Bell, J.W., 2000, Map of Faults and Earth Fissures in the Las Vegas Area, Nevada Bureau of Mines and Geology prepared in cooperation with Las Vegas Valley Water District: Plate 1.

Geotechnical & Environmental Services, Inc., proprietary in-house data.

Nevada Department of Transportation, 2014, Standard Specifications for Road and Bridge Construction.

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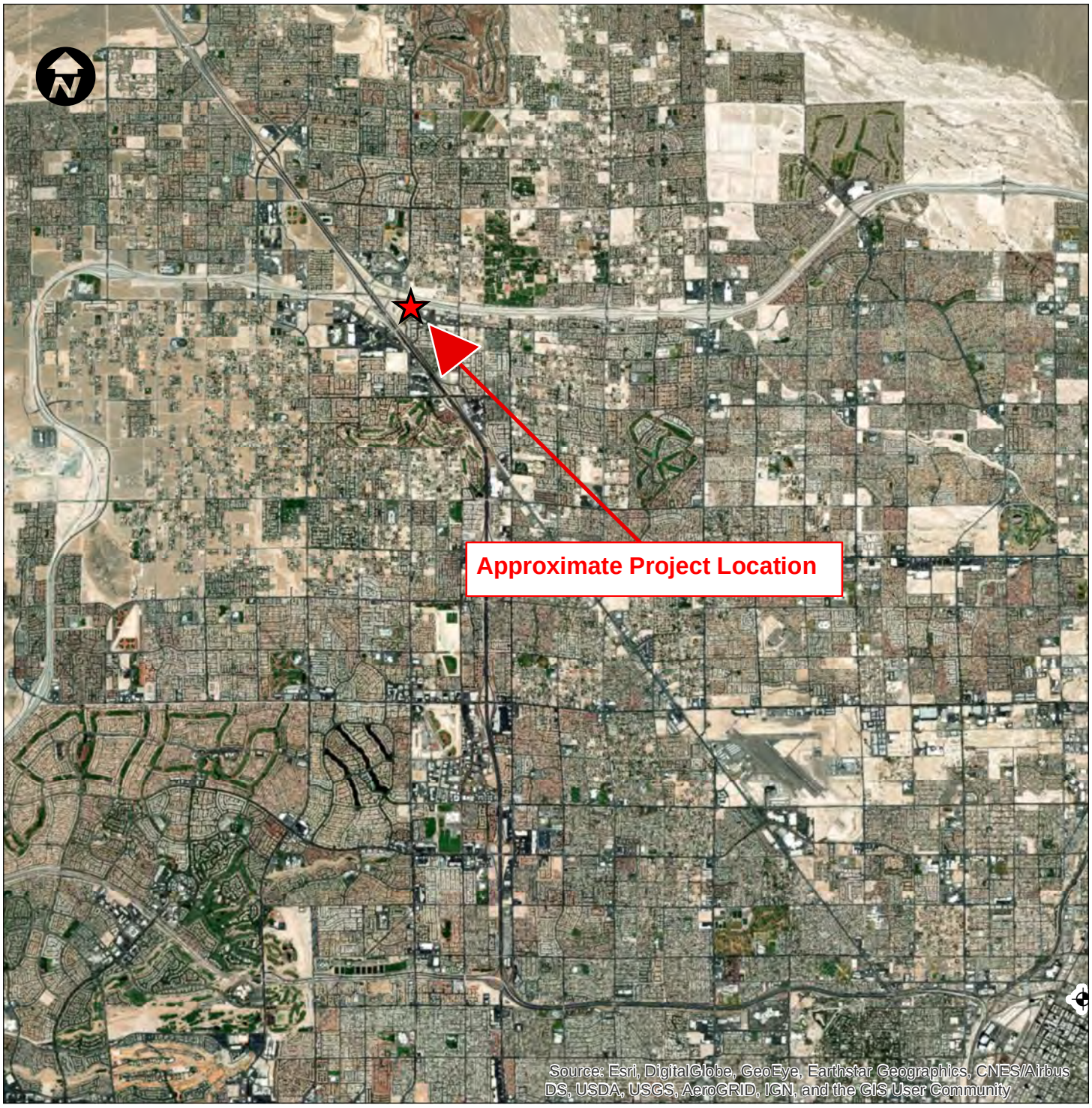
Occupational Safety and Health Administration (OSHA), 2002, OSHA Standards for the Construction Industry, 29 CFR Part 1926

United States Geological Survey (USGS), Quaternary Faults and Folds Database of the United States: http://earthquake.usgs.gov/qfaults/.

APPENDIX A

SUBSURFACE STUDY



Legend

0 0.5 1 2 3 4 Miles

★ Approximate Project Location

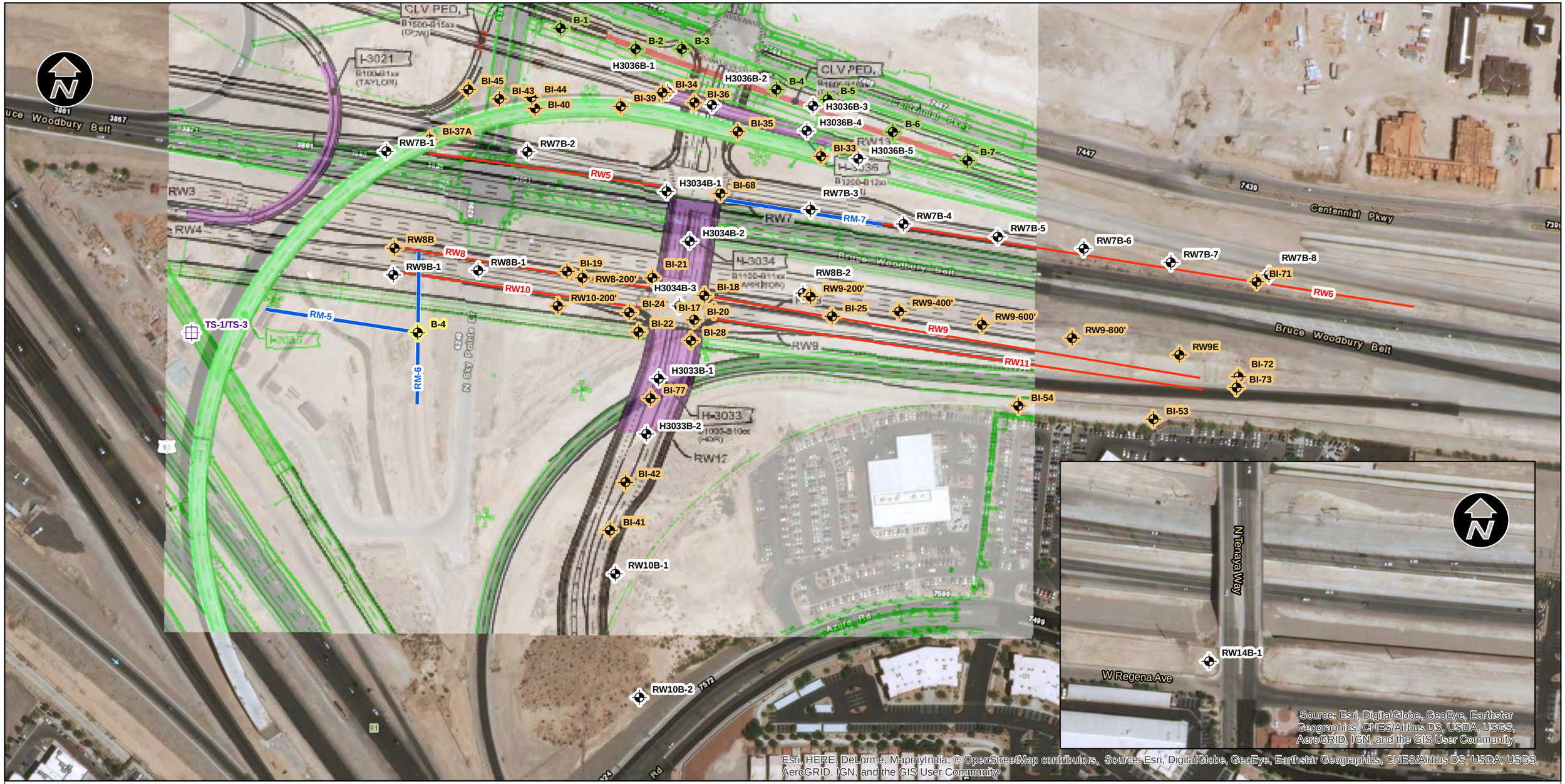
GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.
7150 Placid St.
Las Vegas, NV 89119
702-365-1001
www.gesnevada.com

NOTE: Data presented on this map is a compilation of GIS Metadata extracted from a variety of sources. Major Streets, Airports, and Railroads is data obtained from the Southern Nevada GIS Management Office. This data is downloaded by GES for incorporation into drawings generated by GES. Data contained within this page is to be used for informational purposes only. GES has not modified the data contained herein and uses it as it is acquired from the respective agency.

APPROXIMATE PROJECT LOCATION MAP
US95 - CC215 INTERCHANGE, PHASE 3D/E
CLARK COUNTY, NEVADA

Drawn By:	Date Drawn:
CAB	1/14/2019
Project No.	Figure No.
20184521E1	A-1

J:\GES\Clients\Las Vegas Office\Projects\2018_Projects\20184521\E1\ArcGIS



Legend

- Preliminary Geotechnical Data Report, Phase I, July 2012, Kleinfelder #1174197
- US95-CC215 Interchange, May 2017, NDOT EA 73518
- Sky Pointe Bridge, Dec. 2018, GES #20174206E2
- Approximate Boring Locations, GES 2019
- Test Shaft, TS-1/TS-3, NDOT 2017
- ReMi Survey, Kleinfelder 2012

0 125 250 500 750 1,000 Feet

NOTE: Data presented on this map is a compilation of GIS Metadata extracted from a variety of sources. Major Streets, Airports, and Railroads is data obtained from the Southern Nevada GIS Management Office. This data is downloaded by GES for incorporation into drawings generated by GES. Data contained within this page is to be used for informational purposes only. GES has not modified the data contained herein and uses it as it is acquired from the respective agency.

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Las Vegas, NV 89119
702-365-1001
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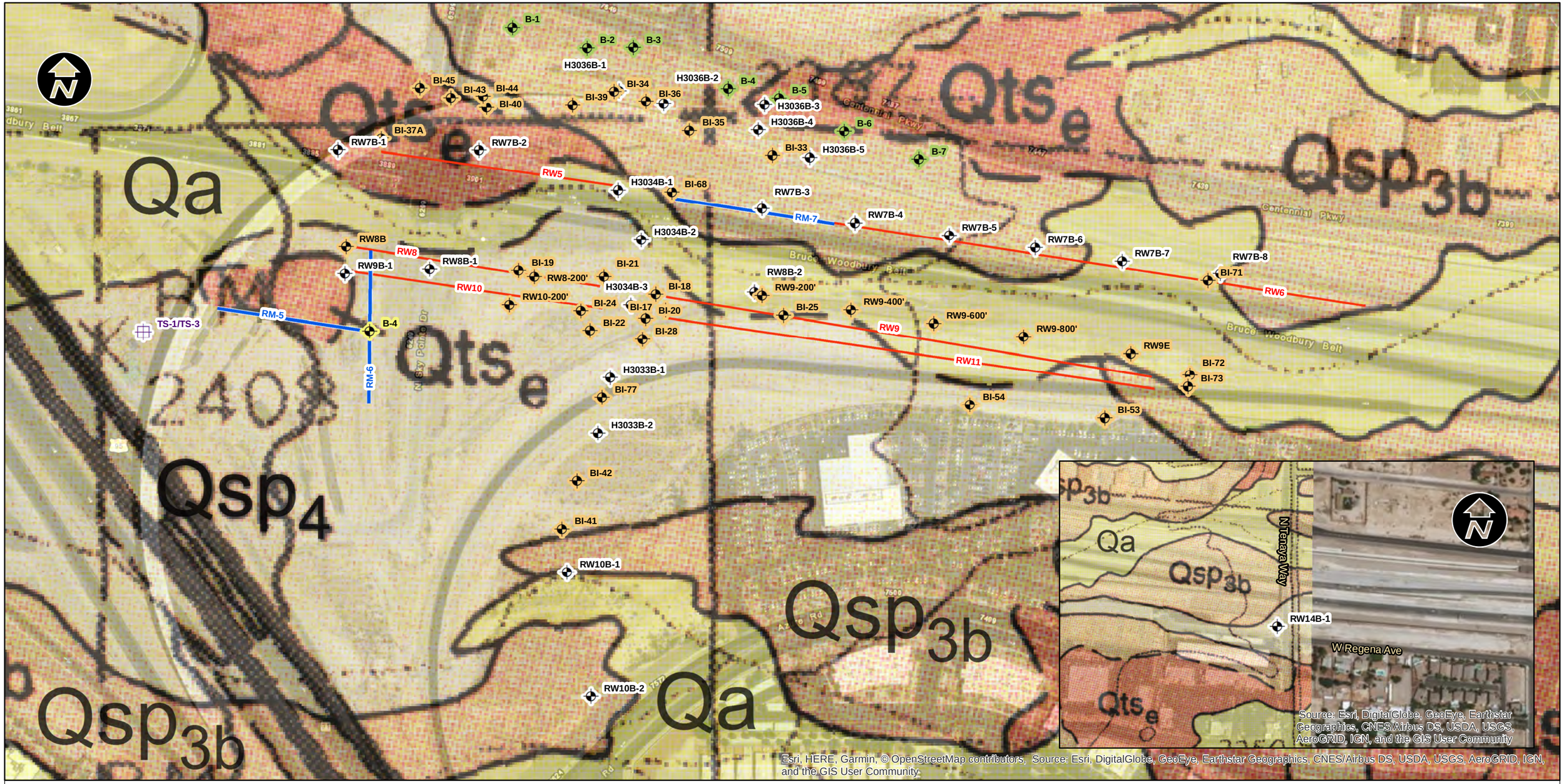
APPROXIMATE BORING LOCATION MAP
US95 - CC215 INTERCHANGE, PHASE 3D/E
CLARK COUNTY, NEVADA

Drawn By: CAB	Date Drawn: 2/6/2019
Proposal No. 20184521E1	Figure No. A-2



Legend

- Preliminary Geotechnical Data Report, Phase I, July 2012, Kleinfelder #1174197
- US95-CC215 Interchange, May 2017, NDOT EA 73518
- Sky Pointe Bridge, Dec. 2018, GES #20174206E2
- Approximate Boring Locations, GES 2019
- Test Shaft, TS-1/TS-3, NDOT 2017
- ReMi Survey, Kleinfelder 2012

0 125 250 500 750 1,000 Feet

NOTE: Data presented on this map is a compilation of GIS Metadata extracted from a variety of sources. Major Streets, Airports, and Railroads is data obtained from the Southern Nevada GIS Management Office. This data is downloaded by GES for incorporation into drawings generated by GES. Data contained within this page is to be used for informational purposes only. GES has not modified the data contained herein and uses it as it is acquired from the respective agency.

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APPROXIMATE BORING LOCATION MAP
US95 - CC215 INTERCHANGE, PHASE 3D/E
CLARK COUNTY, NEVADA

Drawn By: CAB	Date Drawn: 3/13/2019
Proposal No. 20184521E1	Figure No. A-2a

KEY TO SYMBOLS AND TERMS

Terms used according to the Unified Soil Classification System

Consistency or Condition of Soils

Fine-Grained Soils (Silt and Clay): Major portion passing #200 sieve

California Sampler* (blows/foot)	SPT** (blows/foot)	Relative Consistency	Unconfined Compressive Strength (tsf)	Manual Manipulation
< 2	< 2	Very Soft	< 0.25	Thumb will penetrate soil more than 1 in.
2-5	2-4	Soft	0.25-0.50	Thumb will penetrate soil about 1 in.
5-10	4-8	Firm	0.50-1.00	Thumb will penetrate soil about $\frac{1}{4}$ in.
10-20	8-15	Stiff	1.00-2.00	Thumb will not indent soil but readily indented with thumbnail.
>20	>15	Very Stiff	>2.00	Thumbnail will not indent soil.

*ASTM D3550 using a 140-pound hammer falling 30 inches.
**ASTM D1586

Coarse-Grained Soils (Sand and Gravel): Major portion retained on #200 sieve

California Sampler* (blows/foot)	SPT** (blows/foot)	Relative Density	Behavior of $\frac{1}{2}$-inch Diameter Probe Rod
0-5	0-4	Very Loose	Easily penetrated when pushed by hand.
5-15	4-10	Loose	Firmly penetrated when pushed by hand.
15-40	10-30	Medium Dense	Easily penetrated when driven by 1 lb. hammer.
40-70	30-50	Dense	Penetrated less than 1 inch when driven with a 1 lb. hammer.
>70	>50	Very Dense	Penetrated less than $\frac{1}{4}$ inch when driven with a 1 lb. hammer.

*ASTM D3550 using a 140-pound hammer falling 30 inches.
**ASTM D1586

Cementation	Characteristic
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

Hardness	Characteristic
Moderately Hard	Can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and scratch is readily visible after the powder has been blown away.
Hard	Can be scratched with difficulty; scratch produces little powder and is often faintly visible; traces of the knife steel may be visible.
Very Hard	Cannot be scratched with pocket knife. Leave knife steel marks on surface.

Misc. Symbols

- Exploration continues
- Initial groundwater depth
- Measured groundwater depth (after 24 hours or more)

Constituent Percentages

- Trace - < 5%
- Few - 5 to 10%
- Little - 15-25%
- Some - 30-45%
- Mostly - 50-100%

Moisture Condition

- Dry - Absence of moisture, dusty, dry to the touch
- Moist - Damp but no visible water
- Wet - Visible free water, usually soil is below water table

Notes

1. Subsurface explorations were performed using the equipment listed on the exploration logs.
2. Subsurface explorations were performed on the date(s) shown on the exploration logs.
3. Soil sampler(s) were driven with a 140 pound hammer falling 30 inches (unless otherwise noted in the text of this report).
4. The transitions between soil types shown on the exploration logs as occuring abruptly at particular depths may in actuality be a gradual progression from one soil type to the next.
5. Exploration logs are subject to the limitations, conclusions, and recomendations presented in this report.

Strata Group Symbols

- AC - Asphalt Concrete
  PCC - Portland Cement Concrete
- CL- Low plasticity clay
- CH - High plasticity clay
- CL-ML - Silty low plasticity clay
- ML - Silt
- MH - Elastic silt
- SC - Clayey sand
- SM - Silty sand
- SP - Poorly graded sand
- SW - Well - graded sand
- GC - Clayey Gravel
- GM - Silty gravel
- GP - Poorly graded gravel
- GW - Well - graded gravel
- CG - Cemented sand and gravel
- CALI - Caliche

Soil Sampler Symbols

- Air Knife
- Bulk Sample
- California Sampler
- Standard Penetration Test
- Core Barrel
- Shelby Tube

GES

Disclaimer

This Key to Symbols and Terms is part of a report prepared by Geotechnical & Environmental Services, Inc. and should be used with the report. The descriptions on the exploration logs apply only at the specific exploration locations and at the time the explorations were made. They are not warranted to be representative of subsurface conditions at other locations or times.

Figure A-3

BORING LOG
H3033B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2762, W: 115.2614
EXPLORATION DATE: 1/21/19
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,378-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	0					GC	FILL:							PP = Pocket Penetometer (tsf)
						SC	Brown clayey GRAVEL with sand, dry and dense.							DR = Drill Rate (sec/ft.)
2376	2						NATIVE: Brown clayey SAND, moist and dense.							MDD = Max. Dry Density (pcf)
	4													
					27 36 50/5		...strongly cemented and very dense.							PP=>4.5
2372	6													
	8													
2368	10				11 14 12	SP-SM	Brown poorly-graded SAND with clay and gravel, moist and medium dense.							PP=3.25
	12													
2364	14													
					14 22 33	CL	Brown lean CLAY with sand, strongly cemented, moist and very stiff.	12.7	103.2	75	46	25		PP=>4.5
2360	18													
	20				14 14 14		...weakly cemented.							PP=4.0
2356	22													
	24													
					18 18 27		...White silty, strongly cemented.	13.9	108.1	79	45	22		PP=>4.5
2352	26													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-4

BORING LOG
H3033B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2762, W: 115.2614
EXPLORATION DATE: 1/21/19
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,378-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	28													
2348	30				11 11 20		...Light brown.							PP=>4.5
	32													
2344	34				19 23 35	GC	Brown clayey GRAVEL with sand, moderately cemented and dense.	13.8	120.7	47	39	19		PP=>4.5
	36													
2340	38					CL	Brown lean CLAY with sand, strongly cemented, moist and very stiff.							
	40				9 11 12									PP=2.0
2336	42													
	44													
2332	46				14 12 14	CH	Brown sandy fat CLAY, strongly cemented, moist and very stiff.							
	48													
2328	50				50/2	CALI	Brown CALICHE, strongly cemented, moist and very hard.							DR=150
	52													DR=110
														DR=130
2324	54													DR=190
														DR=180

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-4

BORING LOG
H3033B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2762, W: 115.2614
EXPLORATION DATE: 1/21/19
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,378-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	56													DR=130
														DR=40
2320	58													DR=40
														DR=110
	60													DR=135
														DR=90
2316	62													DR=40
						CL	Brown lean CLAY, moist and very stiff.							
	64													
					9 11 15									PP=4.0
2312	66													
	68													
2308	70				9 10 14		...Dark brown.	25.0	99.6	99	44	23		PP=3.75
	72													
2304	74													
														PP=>4.5
	76				7 7 11									
	78													
2300														
	80													
					20 19 23		...increased gravel and caliche nodules.	19.1	115.2	63	32	15		PP=3.75
2296	82													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-4

BORING LOG
H3033B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2762, W: 115.2614
EXPLORATION DATE: 1/21/19
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,378-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	84													
2292	86					CALI	Brown CALICHE, strongly cemented, moist and very hard.							DR=190 DR=350
	88													DR=1405
														DR=420
2288	90													DR=250
	92													DR=110 DR=90
														DR=65
2284	94					CL	Dark brown lean CLAY, moist and very stiff.							
					9 15 23									PP=4.0
	96													
2280	98													
	100				31 37 50/5		...strongly cemented.	25.6	99.9	92	34	15		PP=4.0
2276	102													
	104													
					13 14 24									PP=2.5
2272	106													
	108													
2268	110				13 14			25.1	102.2	93	29	11		

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-4

BORING LOG
H3033B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2762, W: 115.2614
EXPLORATION DATE: 1/21/19
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,378-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
					23		**END OF BORING AT 111.5 FEET**							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	112													
2264	114													
	116													
2260	118													
	120													
2256	122													
	124													
2252	126													
	128													
2248	130													
	132													
2244	134													
	136													
2240	138													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
H3033B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2759, W: 115.2615
EXPLORATION DATE: 11/28/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,390-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 57-feet
DATE ENCOUNTERED: 11/30/18
DATE MEASURED: 12/3/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	0					GM	NATIVE: Brown silty GRAVEL with sand, dry and dense.							PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf)
2388	2													
	4				11 15 17	ML	Brown SILT, slightly moist and very stiff.	6.1	93.9	95	NV	NP		
2384	6													
	8													
2380	10				28 27 29	SC	Brown clayey SAND, weakly cemented, moist to wet and dense.	8.9	102.5	49	27	12		
	12													
2376	14													
	16				12 17 27									
2372	18					CALI	Brown CALICHE, moderately cemented, moist and hard to very hard.							DR=168
	20				50/5									DR=270
2368	22													
	24													
2364	26				32 12 19	SM	Brown silty SAND, moist and dense.	8.5		44	NV	NP		

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
H3033B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2759, W: 115.2615
EXPLORATION DATE: 11/28/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,390-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 57-feet
DATE ENCOUNTERED: 11/30/18
DATE MEASURED: 12/3/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	28					GC	Brown clayey GRAVEL with sand, wet and very dense.							
2360	30				50/5									
	32													
2356	34													
	36				50/5	CL	Light brown lean CLAY with sand, weakly to moderately cemented, moist and very stiff.							PP=2.0 DR=105
2352	38													
	40				14 14 25	CH	White to brown to orange sandy fat CLAY, weakly cemented, wet and very stiff.	28.0	87.5	68	73	42		PP=4.0
2348	42					CALI	Brown CALICHE, moderately cemented, moist and very hard.							DR=180
	44													
					14 16 22	CH	Light brown sandy fat CLAY, wet and very stiff.	25.0	91.7	59	62	39		PP=4.0
2344	46													
	48													
2340	50				12 17 22		...with white spots.							PP=3.5
	52													
2336	54													
					9		...Brown to black to white, with gravel and							PP=3.75

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
H3033B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2759, W: 115.2615
EXPLORATION DATE: 11/28/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,390-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 57-feet
DATE ENCOUNTERED: 11/30/18
DATE MEASURED: 12/3/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	56				12 18		weakly cemented.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2332	58													
	60				28 36 36	GC	Brown clayey GRAVEL with sand, wet and very dense.	20.2	110.3	30	46	22		
2328	62													
	64													
					50/4	CALI	Light brown CALICHE, strongly cemented, moist and very hard.							
2324	66													
	68													
2320	70				50/1									DR=170 DR=168
	72					CL	Light brown lean CLAY with sand and caliche nodules, wet and very stiff.							
2316	74													
					50/5		...weakly to moderately cemented.							DR=36 DR=111
	76													
2312	78													
	80				7 9 10			22.7	103.6	73	31	15		PP=2.0
2308	82													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
H3033B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2759, W: 115.2615
EXPLORATION DATE: 11/28/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,390-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 57-feet
DATE ENCOUNTERED: 11/30/18
DATE MEASURED: 12/3/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	84													
2304	86				13 13 21									
	88													
2300	90				8 10 10		...trace gravel.							
	92						...silty.							PP=2.0
2296	94													
	96				14 27		...gravelly caliche nodules.							PP=2.0
					50/5	CALI	Light brown CALICHE, strongly cemented, moist and hard to very hard.							DR=80
2292	98													DR=75
														DR=90
	100				50/0									DR=210
2288	102					CL	Gray lean CLAY with sand, moderately cemented, wet and very stiff.							
	104													
					8 19 22			26.1	95.6	76	35	17		PP=4.5
2284	106						...Brown, no cementation.							PP=2.5
	108													
2280	110				15 23		...gravelly, moderately cemented.							PP=>4.5

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-5

BORING LOG
H3033B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2759, W: 115.2615
EXPLORATION DATE: 11/28/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,390-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 57-feet
DATE ENCOUNTERED: 11/30/18
DATE MEASURED: 12/3/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
					24		**END OF BORING AT 111.5 FEET**							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	112													
2276	114													
	116													
2272	118													
	120													
2268	122													
	124													
2264	126													
	128													
2260	130													
	132													
2256	134													
	136													
2252	138													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-5

BORING LOG
H3034B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2773, W: 115.2613
EXPLORATION DATE: 12/3/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,394-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: Hole Caved
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	0					ML	NATIVE: Brown SILT with gravel and sand, dry and firm.							
2392	2													
	4													
					5 4 4									PP=4.5
2388	6													
	8													
2384	10				9 10 14	CL	Brown lean CLAY, moist and very stiff.	16.2	100.0	89	27	9		PP=4.5
	12													
2380	14													
					8 6 4		...stiff.							PP=3.0
	16													
2376	18													
	20				10 9									PP=4.0
					16	ML	Brown SILT, moist and very stiff.	14.7	102.1	93	NV	NP		
2372	22													
	24													
					14 10 16	GM	Brown silty GRAVEL with sand and gypsum, moist and medium dense.							
2368	26													

NOTES
PP = Pocket Penetometer (tsf)
DR = Drill Rate (sec/ft.)
MDD = Max. Dry Density (pcf)

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BORING LOG
H3034B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2773, W: 115.2613
EXPLORATION DATE: 12/3/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,394-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: Hole Caved
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	28													
2364	30				12 14 12	CL	Light brown gravelly lean CLAY, moderately cemented, moist and very stiff.							PP=2.0
	32													
2360	34				22 19 33	GC	Brown clayey GRAVEL with sand, wet and dense.	18.4	101.3	25	51	30		
2356	36													
	38													
	40				6 7 5	CL	Brown lean CLAY with sand and caliche nodules, moist and stiff.							PP=3.0
2352	42													
	44					CALI	Brown CALICHE, moderately cemented, moist and moderately hard.							
	46				20 14 11	GC	Brown clayey GRAVEL with sand, wet and medium dense.	17.0	116.2	42	33	15		
2348	48													
	50				5 7 7	CH	Brown to light brown sandy fat CLAY with gravel, weakly cemented, wet and stiff.							PP=2.5
2344	52													
	54				12		...weakly to moderately cemented.	27.4	92.2	61	53	25		PP=4.5
2340														

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BORING LOG
H3034B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2773, W: 115.2613
EXPLORATION DATE: 12/3/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,394-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: Hole Caved
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	56				22 24									
2336	58													
	60				12 11 10									PP=4.5
2332	62					CALI	Brown CALICHE, strongly cemented, wet and very hard.							DR=220 DR=180
	64													DR=160
2328	66				50/2									DR=150
	68													DR=140 DR=210
2324	70													DR=790 DR=500
	72													DR=450 DR=400
2320	74					CL	Brown lean CLAY with sand, wet and stiff.	16.1	79.1	73	27	11		
	76													
2316	78													
	80				4 6 8									PP=3.25
2312	82													

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BORING LOG
H3034B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2773, W: 115.2613
EXPLORATION DATE: 12/3/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,394-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: Hole Caved
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	84													
2308	86				9 9 28			23.3	104.2	75	39	22		PP=3.0
	88													
2304	90				8 14 11		...orange brown.							PP=2.5
	92													
2300	94					CALI	Brown CALICHE, strongly cemented, wet and very hard.							DR=185
	96													
2296	98					CL	Brown gravelly lean CLAY with sand, wet and very stiff.							
	100				27 38 22			19.3	110.1	54	33	16		PP=2.5
2292	102													
	104					CALI	Brown CALICHE, moderately to strongly cemented, wet and hard to very hard.							
2288	106				50/4									DR=100 DR=60 DR=60
	108					CL	Brown sandy lean CLAY, moderately cemented, wet and very stiff.							
2284	110				14 24			22.0	107.0	62	33	14		PP=4.5

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-6

BORING LOG
H3034B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2773, W: 115.2613
EXPLORATION DATE: 12/3/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,394-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: Hole Caved
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
					40		**END OF BORING AT 111.5 FEET**							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	112													
2280	114													
	116													
2276	118													
	120													
2272	122													
	124													
2268	126													
	128													
2264	130													
	132													
2260	134													
	136													
2256	138													

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-6

BORING LOG
H3034B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2770, W: 115.2612
EXPLORATION DATE: 1/23/19 & 1/24/19
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,398-feet
LOGGER/DRILLER: Badrzadeh / Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 38-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 1/25/19

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
2396	2					GC	NATIVE: Tan clayey GRAVEL with sand, strongly cemented, slightly moist and hard.							DR=180
														DR=210
	4													DR=190
														DR=230
2392	6													DR=190
														DR=210
	8													DR=60
2388	10				45 27 41	GP-GC	Dark brown poorly-graded GRAVEL with clay and sand, moderately to strongly cemented, moist and very dense.							
	12													DR=120
2384	14													DR=195
														DR=110
	16													DR=50
														DR=175
2380	18													DR=40
	20				9 8 10	CL	Brown sandy lean CLAY with gravel, moist and very stiff.	15.0		65	33	18		
2376	22													
	24													
					50/5	SM	Brown silty SAND with gravel, wet and very dense.							
2372	26													
	28						...moderately cemented.							DR=90

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-7

BORING LOG
H3034B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2770, W: 115.2612
EXPLORATION DATE: 1/23/19 & 1/24/19
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,398-feet
LOGGER/DRILLER: Badrzadeh / Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 38-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 1/25/19

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
2368	30				9 6 7	CH	Light brown to brown sandy fat CLAY with caliche nodules, moist and very stiff.	23.7		55	60	36		PP=3.5
	32													
2364	34				50/4		...with cobbles, not cemented.							
	36													
2360	38													
	40					CALI	Brown CALICHE, moderately cemented, slightly moist and hard.							DR=93 DR=70
2356	42													
	44					CH	Light brown fat CLAY with caliche nodules, wet and very stiff.							
2352	46				9 11 19									PP=2.0
	48					GC	Light brown to brown clayey GRAVEL with sand, wet and medium dense.							
2348	50				12 17 16			16.0	112.6	32	38	20		
	52					CH	Light brown fat CLAY with caliche nodules, wet and very stiff.							
2344	54						...Brown, less sand and gravel.							PP=3.5
	56				8 6 11									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-7

BORING LOG
H3034B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2770, W: 115.2612
EXPLORATION DATE: 1/23/19 & 1/24/19
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,398-feet
LOGGER/DRILLER: Badrzadeh / Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 38-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 1/25/19

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2340	58													
	60				10 32 39		...increased sand and gravel.	21.0	99.6	53	63	39		PP=>4.5
2336	62													
	64					CALI	Light brown CALICHE, strongly cemented, moist and very hard.							DR=135
														DR=120
2332	66													DR=100
														DR=100
	68													DR=225
														DR=305
2328	70													DR=800
														DR=740
	72													DR=350
														DR=200
2324	74													DR=210
					50/0									DR=336
	76													DR=340
														DR=720
2320	78													DR=790
														DR=500
	80													DR=370
														DR=240
2316	82					CL	Brown lean CLAY with sand, moist and very stiff.							
						CALI	Light brown CALICHE, strongly cemented,							
	84													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
H3034B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2770, W: 115.2612
EXPLORATION DATE: 1/23/19 & 1/24/19
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,398-feet
LOGGER/DRILLER: Badrzadeh / Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 38-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 1/25/19

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
						CL	moist and very hard.							
2312	86				7 9 12		Brown to light brown lean CLAY, wet and very stiff.	23.5	102.9	87	38	20		PP=3.0
	88													
2308	90				6 7 9									PP=3.0
	92													
2304	94						...Brown.	20.7	107.6	94	33	16		PP=3.5
	96				18 23 31									
2300	98													
	100				7 6 10		...Brown to yellowish brown.							PP=4.5
2296	102													
	104													
2292	106				9 11 16		...Brown with sand.	24.1	103.0	81	44	26		PP=4.0
	108													
2288	110				7 11 14		...Light brown to reddish brown, weakly to slightly cemented.							PP=3.0
	112						**END OF BORING AT 111.5 FEET**							

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-7

BORING LOG
H3034B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2766, W: 115.2613
EXPLORATION DATE: 11/26/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,389-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 50-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 11/29/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2388	0					GC	NATIVE: Brown clayey GRAVEL with sand, dry and dense.							
	2													
	4					SM	Brown silty SAND, wet and loose.							
2384					6 7			16.8	96.7	47	32	8		
	6				12	CL	Dark brown lean CLAY with sand, moist to wet and very stiff.							PP=4.0
	8													
2380														
	10				19 23 25									PP=3.5
	12													
2376														
	14													
	16				8 11 23	SC	Brown to gray clayey SAND with gravel, wet and medium dense to very dense.	20.5		28	44	28		
2372														
	18													
	20				40 50/3									
2368														
	22													
	24													
2364					16 14 27	CL	White mottled orange lean CLAY with sand and caliche nodules, weakly cemented, moist to wet and very stiff.	22.6		85	35	13		PP=4.0
	26													

NOTES
PP = Pocket Penetometer (tsf)
DR = Drill Rate (sec/ft.)
MDD = Max. Dry Density (pcf)

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made.
It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
H3034B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2766, W: 115.2613
EXPLORATION DATE: 11/26/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,389-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 50-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 11/29/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	28													
2360														
	30				50/5									PP=4.5
	32													
2356														
	34													
					8 9 12									PP=4.0
	36													
2352														
	38													
	40				11 16 17		...increased sand.	17.8	105.8	65	33	15	6	PP=4.5
2348														
	42													
	44													
2344														
					7 7 11									PP=3.5
	46													
	48													
2340														
	50				8 9 14	CH	Brown fat CLAY with sand and caliche nodules, weakly cemented, wet and very stiff.	33.3	84.7	74	58	43		PP=4.0
	52													
2336														
	54													
					12	GC	Brown clayey GRAVEL with sand, wet and	24.8	99.7	43	44	24		

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-8

BORING LOG
H3034B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2766, W: 115.2613
EXPLORATION DATE: 11/26/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,389-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 50-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 11/29/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	56				17 21		medium dense.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2332														
	58					CL	Brown gravelly lean CLAY with sand, wet and stiff.							
	60				6 5 7		...less gravel, wet and stiff.							PP=1.5
2328														
	62													
	64					CALI	Light brown CALICHE, strongly cemented, wet and very hard.							
2324					50/3									
	66													DR=360
	68													DR=300
2320														
	70													DR=150
	72					CL	Brown to dark grey lean CLAY, wet and very stiff.							
2316														
	74													
	76				16 17 20									
2312														
	78													
	80				18 19 24			23.1	102.6	89	30	12		PP=2.0
2308														
	82							25.5	100.0	98	42	25		

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-8

BORING LOG
H3034B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2766, W: 115.2613
EXPLORATION DATE: 11/26/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,389-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 50-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 11/29/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	84													
2304	86				7 9 12	CH	Orange to brown sandy fat CLAY, wet and very stiff.							PP=4.0
	88													
2300	90				9 11 20		...Brown, with sand and trace caliche gravel and very stiff.	29.1	94.9	80	58	39		PP=4.0
	92													
2296	94													
	96				19 34 50/4		...weakly to moderately cemented.							PP=4.0
2292	98					CALI	Light brown CALICHE, strongly cemented, wet and very hard.							DR=127 DR=180 DR=120
	100				50/4									DR=70
2288	102					CL	Brown to light brown lean CLAY, weakly to moderately cemented, wet and very stiff.							
	104													
2284	106				17 19 16			27.5	95.9	86	35	15		PP=3.0
	108													
2280	110				21 25	CALI	Light brown CALICHE, strongly cemented, wet							PP=4.0

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-8

BORING LOG
H3034B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2766, W: 115.2613
EXPLORATION DATE: 11/26/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,389-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 50-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 11/29/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
					50/5		and very hard.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
							END OF BORING AT 111.5 FEET							
	112													
2276														
	114													
	116													
2272														
	118													
	120													
2268														
	122													
	124													
2264														
	126													
	128													
2260														
	130													
	132													
2256														
	134													
	136													
2252														
	138													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-8

BORING LOG
H3036B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2779, W: 115.2613
EXPLORATION DATE: 12/4/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,394.5-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 47-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/7/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
														PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2392	0					GC	NATIVE: Brown clayey GRAVEL with sand, slightly moist and dense.							
	2													
	4				14 24 28			7.8	117.6	48	25	10		
2388	6													
	8					CL	Brown to dark brown gravelly lean CLAY with sand, dry and very stiff.							
2384	10				19 29 30		...weakly cemented.							PP=4.5
	12													
2380	14				5 9 12		...increased gravel percentage.							
	16													
2376	18													
	20				14 16 19	SC	White to brown clayey SAND, dry to moist and medium dense.	15.5	93.9	45	48	27		
2372	22													
	24													
	26				13 13 14	CL	Light brown to white lean CLAY weakly cemented, moist and very stiff.							PP=4.0
2368	28													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
H3036B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2779, W: 115.2613
EXPLORATION DATE: 12/4/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,394.5-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 47-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/7/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	30				18 22 28		...light brown, with gravel.							PP=4.5
2364														
	32													
	34													
2360					12 21 31		...increased sand and caliche nodules and moderately cemented.	22.8	87.8	60	48	26		PP=4.0
	36													
	38													
2356						CALI	Brown CALICHE, strongly cemented, moist and very hard.							DR=600
	40				41 42 33	GC	Light brown clayey GRAVEL with sand, moderately cemented, moist to wet and very dense.							
	42													
2352														
	44													
	46				30 23 28		...dense.	15.6	118.6	35	56	35		
2348														
	48													
	50				15 34	CL	Light brown gravelly lean CLAY moderately cemented, moist to wet and very stiff.							
2344														
	52				50/2	CALI	Brown CALICHE, moderately to strongly cemented, moist and hard to very hard.							DR=160
	54					CL	Light brown gravelly lean CLAY moderately cemented, moist to wet and very stiff.							
2340														
					50/2	CALI	Brown CALICHE, moderately to strongly							DR=200

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BORING LOG
H3036B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2779, W: 115.2613
EXPLORATION DATE: 12/4/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,394.5-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 47-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/7/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	56						cemented, moist and hard to very hard.							
2336	58													DR=160
	60													
2332	62													
	64													
	66													DR=720
2328														DR=640
	68													DR=360
														DR=520
	70													
2324														DR=520
	72													DR=120
														DR=85
	74													DR=60
2320					18 24 50/4	CL	Light brown lean CLAY with gravel and caliche nodules, moderate cementation, moist and very stiff	17.3	111.4	72	26	10		PP=2.5
	76													
	78													
2316														
	80				9 13 17									
	82													
2312														

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BORING LOG
H3036B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2779, W: 115.2613
EXPLORATION DATE: 12/4/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,394.5-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 47-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/7/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	84													PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
					15 27 17									
2308	86													
	88													
	90				12 14 21		...increased sand.	25.1	98.2	59	33	16		
2304	92													
	94													
2300	96				7 19 25	CH	Brown fat CLAY with gravel, moderately cemented, moist and very stiff.							PP=2.5
	98													
2296	100				50/2	CL	Brown lean CLAY with gravel and caliche nodules, strongly cemented, moist and very stiff.							PP=4.5
	102													
2292	104													
	106				15 18 41	CH	Dark brown fat CLAY with sand, strongly cemented, moist and very stiff.	31.7	91.1	76	58	39		PP=3.75
2288							**END OF BORING AT 107.0 FEET**							
	108													
	110													
2284														

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-9

BORING LOG
H3036B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2778, W: 115.2610
EXPLORATION DATE: 12/6/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,396-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 60-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/13/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
														PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	0					CL	NATIVE: Tan gravelly lean CLAY with sand and cobbles, dry and very stiff.							
2392	4				5 12 17									PP=2.75
2388	8													
	10				14 15 19	CL-ML	Brown silty CLAY, slightly moist and very stiff.	8.7	97.2	86	25	7		PP=3.5
2384	12													
	14													
2380	16				25 24 23		...strongly cemented.							PP=4.0
	18					SM	Brown silty SAND with gravel, slightly moist and dense.							
2376	20				25 32 29			10.1	116.8	28	NV	NP		
	22													
2372	24													
	26				7 10 14		...medium dense.							

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-10

BORING LOG
H3036B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2778, W: 115.2610
EXPLORATION DATE: 12/6/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,396-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 60-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/13/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
2368	28													
	30				19 28 29	SC	White to tan clayey SAND, weakly cemented, moist and dense.	14.0	100.9	47	30	9		
2364	32													
	34				11 11 13	CH	Grey sandy fat CLAY with gravel, moist and very stiff.	21.4	92.3	50	58	36		
2360	36													
	38													
2356	40					CALI	Brown CALICHE, strongly cemented, moist and very hard.							DR=460 DR=192
	42					CL	Grey sandy lean CLAY with gravel, moist and very stiff.							
2352	44				26 32 25									
	46													
2348	48													
	50				8 15 24			25.0	99.8	57	43	24		
2344	52					CALI	Brown CALICHE, strongly cemented, moist and very hard.							DR=280
	54				25									

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BORING LOG
H3036B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2778, W: 115.2610
EXPLORATION DATE: 12/6/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,396-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 60-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/13/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2340	56				50/4									DR=60
	58													DR=110 DR=200
2336	60													DR=480 DR=420
	62													DR=230 DR=300
2332	64													DR=360
	66													DR=480
2328	68													
	70													DR=580
2324	72													DR=210 DR=330
	74													DR=755 DR=545
2320	76													DR=545 DR=320
	78													DR=350 DR=185
2316	80				50/5									DR=210
	82													DR=110 DR=123 DR=90

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-10

BORING LOG
H3036B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2778, W: 115.2610
EXPLORATION DATE: 12/6/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2,396-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 60-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/13/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2312	84													DR=105
	86													DR=80
														DR=50
2308	88													
	90				11 13 17	CL	Dark brown sandy lean CLAY, moist and very stiff.							PP=4.0
2304	92													
	94													
					11 16 21			26.3	99.2	66	40	19		PP=2.25
2300	96													
	98													
2296	100				6 6 11		...increased gravel and strongly cemented.							PP=2.25
	102													
2292	104													
	106				50/6	CALI	Brown CALICHE, moderately to strongly cemented, moist and hard.			35	29	13		DR=375
2288	108													
							END OF BORING AT 109.0 FEET							
	110													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-10

BORING LOG
H3036B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2778, W: 115.2603
EXPLORATION DATE: 12/10/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2389-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 49-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/13/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2388	0					SC	FILL: Light brown clayey SAND with gravel, slightly moist and medium dense.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	2					SC	NATIVE: Light brown clayey SAND with gravel, moist and medium dense.							
2384	4				19 19 16									
	6													
2380	8													
	10				9 9 11	CL	Greyish brown sandy lean CLAY with caliche nodules, moist and very stiff.	17.6		74	27	9		
2376	12													
	14													
	16				16 20 33			16.9	110.6	62	37	16		
2372	18													
	20				13 13 13	GC	Greyish brown clayey GRAVEL with sand and caliche nodules, moist and medium dense.	21.4		28	58	30		
2368	22													
	24													
2364	26				50/6	CH	Light brown sandy fat CLAY, moist and very stiff.	35.2	95.7	63	70	40		

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-11

BORING LOG
H3036B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2778, W: 115.2603
EXPLORATION DATE: 12/10/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2389-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 49-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/13/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	28													PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2360														
	30				11 9 13		...with caliche nodules.							
	32													
2356														
	34					GC	Brown clayey GRAVEL with sand, moist and very dense.							
	36				10 50/3									
2352														
	38													
	40				16 19 19	CL	Light brown sandy lean CLAY, wet and very stiff.	18.4		55	32	15		
2348														
	42													
	44													
2344					50/3									
	46													
	48					CALI	Brown CALICHE strongly cemented, moist and very hard.							DR=244 DR=222
2340														DR=145
	50													DR=119
	52				50/3									DR=137
2336														
	54													DR=125
					50/2									

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-11

BORING LOG
H3036B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2778, W: 115.2603
EXPLORATION DATE: 12/10/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2389-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 49-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/13/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2332	56													DR=218
	58													DR=161
														DR=114
	60				50/2									DR=227
2328														DR=953
	62													DR=746
														DR=379
	64													DR=320
2324					50/0									
	66													DR=286
														DR=925
	68													DR=99
2320														DR=115
	70				10 8 8	CL	Light brown lean CLAY with gravel, wet and very stiff.	26.0		71	34	15		
	72						...with sand.	21.3	85.2	85	27	8		
2316														
	74													
					8 9 9									
	76													
2312														
	78													
	80				8 13 16		...Reddish brown, less sand and gravel and very stiff.	25.9	102.6	96	36	16		
2308														
	82													

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-11

BORING LOG
H3036B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2778, W: 115.2603
EXPLORATION DATE: 12/10/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2389-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 49-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/13/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE / BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
2304	84												
	86			6 9 12									
	88												
2300	90			8 8 13		...Orange brown with sand and very stiff.	38.1	83.5	74	42	23		
2296	92												
	94			50/3	CALI	Brown CALICHE strongly cemented, moist and very hard.							DR=230 DR=128 DR=125 DR=118 DR=120
2292	96												
	98												
	100			7 8 9	SM	Light brown silty SAND, wet and loose to medium dense.							
2288	102												
	104												
2284	106			6 26 23	CH	Light brown fat CLAY, wet and very stiff.							
	108												
2280	110			15 24	SC	Light brown clayey SAND, wet and very							

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-11

BORING LOG
H3036B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2778, W: 115.2603
EXPLORATION DATE: 12/10/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2389-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 49-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 12/13/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
					50/3		dense.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	112						**END OF BORING AT 111.5 FEET**							
2276	114													
	116													
2272	118													
	120													
2268	122													
	124													
2264	126													
	128													
2260	130													
	132													
2256	134													
	136													
2252	138													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-11

BORING LOG
H3036B-4

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2777, W: 115.2603
EXPLORATION DATE: 12/12/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2390-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	0					SC	FILL: Light brown clayey SAND with gravel, moist and dense.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2388	2					SC	NATIVE: Light brown clayey SAND with gravel, moist and dense.							
	4				12 11 39			9.8	116.7	45	28	13		
2384	6													
	8					CL	Brown sandy lean CLAY with gravel, moist and very stiff.							
2380	10				12 11 13									
	12													
2376	14													
	16				25 41 41		...White to brown with sand and caliche nodules.	10.6	105.6	82	27	9		PP=4.5
2372	18													
	20				16 21 28		...decreased sand and gravel.	14.2		90	28	9		
2368	22					CALI	Brown CALICHE moderately cemented, moist and hard.							DR=109 DR=116
	24					CH	Whitish brown sandy fat CLAY with caliche nodules, moist and very stiff.							DR=50
2364	26				10 21 28		..weakly cemented caliche.							DR=85

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BORING LOG
H3036B-4

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2777, W: 115.2603
EXPLORATION DATE: 12/12/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2390-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	28													
2360	30				6 10 10									
	32													
2356	34					GC	Brown clayey GRAVEL with sand, wet and medium dense.	23.1	99.5	31	34	14		
	36				9 12 18									
2352	38					CALI	Brown CALICHE moderately cemented, moist and hard.							DR=86 DR=207 DR=73
	40				7 8 10	CL	Light brown sandy lean CLAY with trace gravel, wet and very stiff.							
2348	42													
	44													
2344	46				24 35 35	GC	Light brown clayey GRAVEL with sand and caliche nodules, wet and very dense.	14.0	122.0	31	31	13		
	48													
2340	50				36 50/1		...Whitish brown.							
	52													
2336	54				11		...Orange brown and medium dense.	27.2	95.9	40	93	56		

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-12

BORING LOG
H3036B-4

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2777, W: 115.2603
EXPLORATION DATE: 12/12/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2390-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	56				9 26									
2332	58					CALI	Brown CALICHE strongly cemented, moist, very hard.							DR=228 DR=392 DR=671
	60				50/0									DR=618 DR=924
2328	62													DR=587 DR=489
	64													DR=508 DR=774
2324	66				50/0									DR=749 DR=663
	68													DR=530 DR=220
2320	70				27 50/3	CL	Light brown sandy lean CLAY with caliche nodules, wet and very stiff.	17.3		49	27	12		
	72													
2316	74													
	76				6 7 14	SC	Light brown clayey SAND, wet and medium dense.							
2312	78					CL	Light brown sandy lean CLAY, wet and very stiff.							
	80				8 12									
2308	82				13	GC	Brown clayey GRAVEL with sand, wet and loose to medium dense.	20.0	68.2	33	27	8		

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-12

BORING LOG
H3036B-4

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2777, W: 115.2603
EXPLORATION DATE: 12/12/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2390-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	84													
2304	86				14 20 26	CL	Brown sandy lean CLAY, wet and very stiff.							PP=3.5
	88													
2300	90				6 9 14		...with trace gravel.							
	92													
2296	94				50/4	CALI	Brown CALICHE strongly cemented, moist and very hard.							
	96													DR=230
														DR=289
2292	98													DR=355
														DR=453
	100				50/0									DR=225
														DR=238
2288	102					CL	Light brown sandy lean CLAY, wet and very stiff.							
	104													
2284	106				7 29 50/2		...with sand.	26.9		72	34	16		
	108													
2280	110				33 45									

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-12

BORING LOG
H3036B-4

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2777, W: 115.2603
EXPLORATION DATE: 12/12/18
EXPLORATION SIZE (dia.): 6-inches
EQUIPMENT: Diedrich D-120 Mud Rotary
ELEVATION: 2390-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
					48		**END OF BORING AT 111.5 FEET**							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	112													
2276	114													
	116													
2272	118													
	120													
2268	122													
	124													
2264	126													
	128													
2260	130													
	132													
2256	134													
	136													
2252	138													

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-12

BORING LOG
H3036B-5

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2775, W: 115.2599
EXPLORATION DATE: 1/8/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,410-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	0						ASPHALT: Approximately 6-inches thick.							
2408	2					SM	TYPE II AGGREGATE: Approximately 6-inches thick. FILL: Brown silty SAND with gravel, slightly moist and very dense.							
	4				39 50/4			3.1	134.7	19	NV	NP		
2404	6													
	8													
2400	10				9 26 32	SC	Brown clayey SAND with gravel, slightly moist and very dense.	6.3		36	24	9		
	12													
2396	14													
	16				50/4	CL	Brown sandy lean CLAY, slightly moist and very stiff.	5.1		54.5				PP=2.5
2392	18													
	20				9 14 23		...trace gravel.							
2388	22					CL	NATIVE: Brown sandy lean CLAY, slightly moist and very stiff.							
	24													
2384	26				10 31 47		...sandy with gravel.	5.2	113.5	51	25	13		PP=4.5

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
H3036B-5

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2775, W: 115.2599
EXPLORATION DATE: 1/8/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,410-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	28													PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2380	30				11 20 23		...weakly cemented.							
	32													
2376	34				15 27 39		...with sand.	7.7	114.3	72	32	17		PP=4.5
	36													
2372	38													
	40				9 12 17		...Light brown, trace gravel.							
2368	42													
	44													
					19 49		...Mottled brown and white, sandy.	4.6	123.7	56	27	13		PP=4.5
2364	46				50/5	CALI	Light brown to white CALICHE, moderately cemented, slightly moist and moderately hard.							
	48													
2360	50				19 24 22	CL	White to brown lean CLAY with gravel and sand, slightly moist and very stiff.							
	52						**END OF BORING AT 51.5 FEET**							
2356	54													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW7B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2775, W: 115.2634
EXPLORATION DATE: 1/7/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,416-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2416	0					SC	NATIVE: Brown gravelly clayey SAND, moist and very dense.	4.1		48	24	10		PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf)
	2													
2412	4													
					37 50/5		...with cobbles.							
	6													
2408	8													
	10				37 41 50/3			6.4	118.1	48	26	10		
2404	12													
	14													
					17 50/5	CL	Brown sandy lean CLAY, moist and very stiff.							PP=4.5
2400	16						**END OF BORING AT 16.0 FEET**							
	18													
2396	20													
	22													
2392	24													
	26													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW7B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2775, W: 115.2624
EXPLORATION DATE: 1/7/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,407-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	0					SC	NATIVE: Brown clayey SAND with gravel, slightly moist and medium dense.							PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf)
	2							5.7		39	27	11		
2404														
	4													
					9 8 8									
	6													
2400														
	8													
	10				15 28 45		...very dense, reduced gravel.	10.5	114.2	17	40	23		
2396														
	12													
	14													
2392					9 19 21	CL	Brown sandy lean CLAY, moist and very stiff.							
	16													
	18													
2388														
	20				12 32 29			12.4	106.5	68	26	9		PP=3.0
	22													
2384														
	24													
	26				5 7 8									
2380														

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW7B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2775, W: 115.2624
EXPLORATION DATE: 1/7/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,407-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	28													
	30				10 15 15		...Brown to white.	13.5	99.1	61	44	22		PP=>4.5
2376							**END OF BORING AT 31.5 FEET**							
	32													
	34													
2372														
	36													
	38													
2368														
	40													
	42													
2364														
	44													
	46													
2360														
	48													
	50													
2356														
	52													
	54													
2352														

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-15

BORING LOG
RW7B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2772, W: 115.2603
EXPLORATION DATE: 1/7/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Hollow Stem
ELEVATION: 2,389-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2388	0					GW-GC	FILL: Brown well-graded GRAVEL with clay, moist and medium dense.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	2					ML	NATIVE: Brown gravelly SILT with sand, slightly moist and stiff.							
2384	4				3 4 6		...less gravel.	7.2	74.9	75	31	3		
2380	8													
	10				12 19 15		...very stiff.							
2376	12													
	14					GC	White clayey GRAVEL with sand, slightly moist and dense.	4.2		37	30	11		
	16				13 22 25									
2372	18													
	20				19 40 42		...with caliche nodules and very dense.							
2368	22													
	24													
2364	26				33 39 50/5		...Brown to white.	7.1	102.4	29	55	29		

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW7B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2772, W: 115.2603
EXPLORATION DATE: 1/7/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Hollow Stem
ELEVATION: 2,389-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	28													
2360														
	30				17 31 36		...White.							
	32													
2356														
	34													
					23 50/4	ML	Grey gravelly SILT with sand, dry and very stiff.							PP=4.5
	36													
2352														
	38													
	40				16 29 25	SC	Brown clayey SAND with gravel, dry and very dense.	5.6		38	30	12		
2348														
	42													
	44													
2344					8 16 21	CL	Brown lean CLAY with sand, moist and very stiff.	16.8	97.9	71	45	24		
	46													
	48													
2340														
	50				2 5 2		...with sand and firm.							
	52													
2336														
	54													
					8	GC	Orange to brown fat clayey GRAVEL with	20.3	88.1	39	76	46		

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-16

BORING LOG
RW7B-3

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2772, W: 115.2603
EXPLORATION DATE: 1/7/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Hollow Stem
ELEVATION: 2,389-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	56				16 21		sand, moist and medium dense.							
2332														
	58													
	60				43 10 5		...Brown.							
2328														
	62					CALI	Brown CALICHE, strongly cemented, moist and very hard.							DR=617 DR=480
	64													DR=2950
2324														DR=3150
	66													
	68						...Practical Auger refusal.							
2320							**END OF BORING AT 69.0 FEET**							
	70													
	72													
2316														
	74													
	76													
2312														
	78													
	80													
2308														
	82													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-16

BORING LOG
RW7B-4

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2771, W: 115.2596
EXPLORATION DATE: 11/26/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: D-50 Hollow Stem
ELEVATION: 2,377-feet
LOGGER/DRILLER: Alajmi / Luis-Sanchez

INITIAL DEPTH TO WATER: 75-feet
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: 11/26/18
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2376	0					CL-ML	FILL: Dark brown silty CLAY with gravel. dry and firm.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	2						...with debris.							
	4													
2372	5				4 6 11	CL	NATIVE: Dark brown lean CLAY with sand, dry and stiff.							PP=4.2
	8													
2368	10				15 13 17		...very stiff, reduced sand.	7.2	98.8	95	36	15		PP=>4.5
	12						...Light brown.							
2364	14													
	15				10 14 14	CH	White to brown fat CLAY, moderately cemented, dry and very stiff.							
2360	18													
	20				33 41 35		...with sand and gravel and moist.							
2356	22						...tan.							
	24													
2352	25				14 14 19			11.9	95.8	82	59	33		PP=4.5
	26													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-17

BORING LOG
RW7B-4

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2771, W: 115.2596
EXPLORATION DATE: 11/26/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: D-50 Hollow Stem
ELEVATION: 2,377-feet
LOGGER/DRILLER: Alajmi / Luis-Sanchez

INITIAL DEPTH TO WATER: 75-feet
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: 11/26/18
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	28													
2348														
	30				3 11 25		...with sand.							PP=4.5
	32													
2344														
	34													
	36				33 48 40	GC	Light brown clayey GRAVEL with sand, weakly cemented, moist and very dense.	9.1	107.8	33	37	17		
2340														
	38													
	40				22 39 47	CL	White to brown sandy lean CLAY with gravel, strongly cemented, moist and very stiff.							PP=4.5
2336														
	42													
	44													
2332					50/6		...Brown and moderately cemented.	14.0	103.7	58	40	16		PP=4.5
	46													
	48													
2328														
	50				50/6									
	52													
2324														
	54													
					27									

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW7B-4

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2771, W: 115.2596
EXPLORATION DATE: 11/26/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: D-50 Hollow Stem
ELEVATION: 2,377-feet
LOGGER/DRILLER: Alajmi / Luis-Sanchez

INITIAL DEPTH TO WATER: 75-feet
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: 11/26/18
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	56				27 12									
2320	58					CALI	Brown CALICHE, strongly cemented, moist and very hard.							DR=426
	60													DR=2520
2316	62													DR=1200
	64													DR=1420
2312	66													DR=885
	68													DR=540
2308	70				15 28 40	CL	Brown gravelly lean CLAY with sand and caliche nodules, weakly to moderately cemented, moist and very stiff.	13.8	120.1	51	25	8		DR=312 DR=60 DR=60 PP=4.0
	72													
2304	74													
	76				8 15 20	CL-ML	Brown silty CLAY, wet and very stiff.							PP=3.0
2300	78													
	80				6 8 10	CH	Orange brown fat CLAY, moist and very stiff.	22.6		94	53	27		PP=4.0
2296	82						**END OF BORING AT 82.0 FEET**							

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-17

BORING LOG
RW7B-5

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2770, W: 115.2589
EXPLORATION DATE: 11/20/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: Diedrich D-120 Hollow Stem
ELEVATION: 2,380-feet
LOGGER/DRILLER: Solares / Luis-Sanchez

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 60-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 11/21/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2380	0					SC	Native: Brown clayey SAND with gravel, slightly moist and medium dense.	3.5		49	23	10		
	2													
2376	4				7 8 18	ML	Dark grey to brown SILT, moist and very stiff.	11.7	73.3	98	40	12	0	PP=2.5
	6													
2372	8													
	10				25 31 35		...trace gravel.							
2368	12													
	14				10 15 24	CL	Brown sandy lean CLAY, slightly moist and stiff. ...increased sand and gravel.	8.9	105.6	59	33	16		
2364	16													
	18													
2360	20				25 31 49	GC-GM	Light brown silty clayey GRAVEL with sand, slightly moist and very dense.	2.4	119.4	16	24	5		
	22													
2356	24													
	26				15 38 42	CH	Greyish brown sandy fat CLAY, moist and very stiff.							

NOTES
PP = Pocket Penetometer (tsf)
DR = Drill Rate (sec/ft.)
MDD = Max. Dry Density (pcf)

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made.
It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW7B-5

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2770, W: 115.2589
EXPLORATION DATE: 11/20/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: Diedrich D-120 Hollow Stem
ELEVATION: 2,380-feet
LOGGER/DRILLER: Solares / Luis-Sanchez

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 60-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 11/21/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
2352	28													
	30				10 13 15		...with sand.	18.8	96.1	82	51	33		PP=4.5
2348	32													
	34													
					15 20 25									PP=4.0
2344	36													
	38													
2340	40				8 25 20		...Brown with gravel.							PP=>4.5
	42													
2336	44													
	46				18 21 31	SC	Brown clayey SAND with gravel, moist and dense.	12.6	106.5	44	31	13		
2332	48													
	50				22 31 50	CL	Reddish brown mottled white and grey lean CLAY with gravel, moist and very stiff.							PP=4.0
2328	52						...moderately to strongly cemented.							
	54													
					45	CALI	Brown CALICHE, moderately to strongly	14.7	88.8	40	43	19		

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BORING LOG
RW7B-5

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2770, W: 115.2589
EXPLORATION DATE: 11/20/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: Diedrich D-120 Hollow Stem
ELEVATION: 2,380-feet
LOGGER/DRILLER: Solares / Luis-Sanchez

INITIAL DEPTH TO WATER: Not Measured
MEASURED DEPTH TO WATER: 60-feet
DATE ENCOUNTERED: N/A
DATE MEASURED: 11/21/18

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
2324	56				50/4		cemented, moist and hard to very hard.							DR=180
														DR=180
	58													DR=120
														DR=180
2320	60						▼							
														DR=540
	62													DR=300
														DR=240
2316	64													DR=240
					50/3									DR=180
	66													DR=300
						CL	Yellow brown sandy lean CLAY with gravel, moist and stiff.							
2312	68													
	70													
2308	72													
	74													
		X					...Light brown, increased silt.			67	21	7		
2304	76													
							END OF BORING AT 77.0 FEET							
	78													
2300	80													
	82													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-18

BORING LOG
RW7B-6

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2770, W: 115.2583
EXPLORATION DATE: 1/2/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,369-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2368	0					CL-ML	FILL: Tan sandy silty CLAY with gravel, dry and very stiff.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	2													
	4													
2364					22 25 33			4.6	99.9		24	5		
	6													
	8													
2360														
	10				20 19 20	CL	NATIVE: Light brown lean CLAY with sand and gravel, dry and very stiff.							
	12													
2356														
	14													
	16				16 23 38		...Brown with caliche nodules, weakly cemented.							
2352														
	18													
	20				17 36 50/5		...increased sand.	6.6	106.0	68	38	20		PP=2.0
2348														
	22													
	24													
2344					11 14 13									
	26													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-19

BORING LOG
RW7B-6

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2770, W: 115.2583
EXPLORATION DATE: 1/2/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,369-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	28													
2340														
	30				16 45 50/4		...with sand.	11.4	103.3	80	41	21		PP=>4.5
	32													
2336														
	34													
	36				5 7 7		...Brown, moist and stiff.							
2332														
	38													
	40				24 24 36			13.2	89.9	80	32	11		PP=2.0
2328														
	42													
	44													
2324					13 24 29	GC	Brown clayey GRAVEL with sand, wet and dense.	16.4	94.3	47	71	40		
	46													
	48													
2320														
	50				12 16 19									
	52													
2316														
	54													
					29	MH	Brown sandy elastic SILT with gravel and	15.8	91.3	67	71	35		PP=>4.5

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-19

BORING LOG
RW7B-6

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2770, W: 115.2583
EXPLORATION DATE: 1/2/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,369-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	56				37 40		caliche nodules, dry and very stiff.							
2312						CALI	Brown CALICHE, moderately cemented, moist and moderately hard.							DR=60 DR=85 DR=50
	58													
	60				50/1		**END OF BORING AT 60.1 FEET**							
2308	62													
	64													
2304	66													
	68													
2300	70													
	72													
2296	74													
	76													
2292	78													
	80													
2288	82													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW7B-7

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2769, W: 115.2576
EXPLORATION DATE: 1/3/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,368-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
2368	0					CL	FILL: Tan lean CLAY with sand and gravel, dry and very stiff.							
	2													
2364	4													
					16 16 17									
	6													
2360	8													
	10				23 22 23	CL	NATIVE: Dark brown sandy lean CLAY, dry and very stiff.	6.3	104.5	64	30	12		PP=3.5
2356	12													
	14													
					5 7 10		...White with gypsum.							
2352	16													
	18													
2348	20				26 23 34			8.5	101.0	70	43	25		
	22													
2344	24													
	26				22 21 20	SP-SC	Grey poorly-graded SAND with clay and gravel, dry and dense.							

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW7B-7

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2769, W: 115.2576
EXPLORATION DATE: 1/3/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,368-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2340	28													PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	30				9 9 15	CH	Grey sandy fat CLAY, moist and very stiff.	20.6	90.8	63	61	38		
2336	32													
	34						...Brown with gravel.							
2332	36				11 22 39									
	38					CL	Brown lean CLAY with sand, moist and very stiff.							
2328	40				17 19 22			10.8		72	32	14		
	42						**END OF BORING AT 41.5 FEET**							
2324	44													
	46													
2320	48													
	50													
2316	52													
	54													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW7B-8

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2768, W: 115.2569
EXPLORATION DATE: 2/1/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-50 Solid Stem
ELEVATION: 2,347-feet (Approximately)
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
	0					SC	FILL: Light brown clayey SAND with gravel, moist and medium dense.							
2344	2													
	4				9 8 10	CL	NATIVE: Whitish-brown sandy lean CLAY with gravel, moist and stiff.							PP=4.5
2340	6													
	8													
2336	10				19 26 20			8.3		57	29	14		
	12					CALI	White CALICHE, moderately cemented, moist and hard.							DR=65
	14					SC	White-grey clayey SAND with gravel, moist and dense.	8.2	106.9	43	43	25		
2332	16				6 19 32									
	18													
2328	20				4 14 31	CL	Brown sandy lean CLAY, moist and very stiff. ...Whitish-brown to brown.							
2324	22													
	24				12 50/3		...Light brown with sand.	13.6	93.5	71	34	19		PP=4.5
2320	26						**END OF BORING AT 26.0 FEET**							

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-21

BORING LOG
RW8B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2768, W: 115.2627
EXPLORATION DATE: 11/21/18
EXPLORATION SIZE (dia.): 4-inches
EQUIPMENT: B-90 Hollow Stem
ELEVATION: 2,396-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2396	0													PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
						SM	ASPHALT: Unit is approximately 5-inches thick. FILL: Brown silty SAND with gravel, dry and dense.	2.7		19	NV	NP		
	2													
2392	4													
					18 50/4	CL	Brown sandy lean CLAY with gravel, dry and very stiff.							
	6													
2388	8													
	10				27 50/5									
2384	12					SC	Brown clayey SAND with gravel, moist and dense.							
	14													
					14 12 22									
2380	16													
	18													
2376	20				2 23 50/3		...moderately cemented and very dense.	8.4	113.6	41	22	9	1	
	22					CL	NATIVE: Brown sandy lean CLAY, moist and very stiff.							
2372	24													
					7 19 18									PP=4.5
	26													

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BORING LOG
RW8B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2768, W: 115.2627
EXPLORATION DATE: 11/21/18
EXPLORATION SIZE (dia.): 4-inches
EQUIPMENT: B-90 Hollow Stem
ELEVATION: 2,396-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
2368	28													
	30				14 18 36	GC	Orange to black, white and brown clayey GRAVEL, dry and dense.							
2364	32													
	34						...very dense.							
					22 44 18									
2360	36													
	38													
2356	40				9 15 25	SC	Brown clayey SAND, dry and dense.	9.7	106.1	46	30	16		PP=4.5
	42													
2352	44													
					6 14 16	CH	White to grey fat CLAY, weakly cemented, moist and very stiff.							PP=4.5
	46													
2348	48													
	50				16 25 36	SC	Brown to light brown to grey clayey SAND, weakly cemented, moist and dense.	14.2	96.5	32	49	32		
2344	52													
	54													
					18	CL	Brown to light brown sandy lean CLAY with							

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BORING LOG
RW8B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2768, W: 115.2627
EXPLORATION DATE: 11/21/18
EXPLORATION SIZE (dia.): 4-inches
EQUIPMENT: B-90 Hollow Stem
ELEVATION: 2,396-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2340	56				23 35		caliche nodules, wet to dry and very stiff.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
							END OF BORING AT 56.5 FEET							
	58													
2336	60													
	62													
2332	64													
	66													
2328	68													
	70													
2324	72													
	74													
2320	76													
	78													
2316	80													
	82													

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-22

BORING LOG
RW8B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2767, W: 115.2603
EXPLORATION DATE: 11/20/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: Diedrich D-120 Hollow Stem
ELEVATION: 2,385-feet
LOGGER/DRILLER: Solares / Luis-Sanchez

INITIAL DEPTH TO WATER: 70-feet
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: 11/20/18
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2384	0					GC	NATIVE: Brown clayey GRAVEL with sand, dry to moist and medium dense.	2.7		20	23	9	0	PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	2													
	4													
2380					22 23 14			4.3	118.1					
	6													
	8													
2376														
	10				6 11 16	CL	Dark brown lean CLAY trace gravel, moist and very stiff.							PP=2.5
	12													
2372														
	14													
	16				16 22 30	SM	Brown silty SAND with gravel, moist and dense.							
2368														
	18													
	20				21 24 25	SC	Brown clayey SAND with orange clay nodules and gravel, moist, and dense.	7.6	125.5	22	35	16		
2364														
	22													
	24													
2360														
	26				11 15 17	CL	White lean CLAY with orange nodules, moist and very stiff.							PP=>4.5
	28						...Orange brown.							

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BORING LOG
RW8B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2767, W: 115.2603
EXPLORATION DATE: 11/20/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: Diedrich D-120 Hollow Stem
ELEVATION: 2,385-feet
LOGGER/DRILLER: Solares / Luis-Sanchez

INITIAL DEPTH TO WATER: 70-feet
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: 11/20/18
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2356														PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	30				17 18 31		...Greyish brown, with sand.	14.3	106.3	69	46	26		
	32													
2352														
	34													
	36				16 16 21		...Dark brown mottled white.							PP=4.5
2348														
	38													
	40				7 11 18		...Greyish brown.							
2344														
	42													
	44													
2340					18 25 30	CH	Reddish brown fat CLAY with gravel, moist and very stiff.	35.7	85.0	80	91	64		PP=4.5
	46													
	48													
2336														
	50				10 34 49	CL	Light brown mottled dark reddish brown gravelly lean CLAY, moist and very stiff.							PP=3.75
	52													
2332														
	54													
	56				18 32 38	GC	Light brown to white clayey GRAVEL with sand and caliche nodules, moist and very	17.3	107.3	37	32	14		

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BORING LOG
RW8B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2767, W: 115.2603
EXPLORATION DATE: 11/20/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: Diedrich D-120 Hollow Stem
ELEVATION: 2,385-feet
LOGGER/DRILLER: Solares / Luis-Sanchez

INITIAL DEPTH TO WATER: 70-feet
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: 11/20/18
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
2328							dense.							
	58					CALI	Brown CALICHE, strongly cemented, moist and very hard.							DR=240
														DR=180
	60													
2324														DR=510
	62													DR=323
														DR=686
	64													DR=120
2320					20 25 24	CL	Dark brown lean CLAY with sand and caliche nodules, wet and very stiff.							PP=4.5
	66													
	68													
2316														
	70				9 13 19		...less caliche nodules observed.	23.1	103.2	85	32	15		PP=2.75
	72													
2312														
	74													
					7 14 20									PP=3.75
	76													
2308														
	78													
	80				17 23 30									PP=3.5
2304														
	82													
	84					GC	Brown clayey GRAVEL, wet and dense.							

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-23

BORING LOG
RW8B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2767, W: 115.2603
EXPLORATION DATE: 11/20/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: Diedrich D-120 Hollow Stem
ELEVATION: 2,385-feet
LOGGER/DRILLER: Solares / Luis-Sanchez

INITIAL DEPTH TO WATER: 70-feet
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: 11/20/18
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2300	86				21 28 30		...increased caliche nodules.	19.1	110.5	47	32	14		PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
							END OF BORING AT 86.5 FEET							
	88													
2296	90													
	92													
2292	94													
	96													
2288	98													
	100													
2284	102													
	104													
2280	106													
	108													
2276	110													
	112													

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-23

BORING LOG
RW9B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2768, W: 115.2633
EXPLORATION DATE: 11/29/18
EXPLORATION SIZE (dia.): 8-inches
EQUIPMENT: B-90 Hollow Stem
ELEVATION: 2,398-feet
LOGGER/DRILLER: Badrzadeh / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES (PP = Pocket Penetometer (tsf); DR = Drill Rate (sec/ft.); MDD = Max. Dry Density (pcf))
2396	0					SC-SM	NATIVE: Dark brown silty clayey SAND with gravel, dry and dense.	3.2		27	21	5	3	
	2													
	4													
2392	6				3 5 8	CL	Brown sandy lean CLAY, weakly cemented, moist and stiff.							PP=4.5
	8													
2388	10				4 5 8	CL-ML	Brown silty CLAY with gravel, moist and stiff. ...Orange brown and weakly cemented.							PP=4.0
	12													
2384	14													
	16				8 14 17	GC	White brown clayey GRAVEL with gypsum and weakly cemented, moist and medium dense.							
2380	18													
	20				9 10 15	CL	Brown gravelly lean CLAY, moist and very stiff.							PP=4.0
2376	22						**END OF BORING AT 21.5 FEET**							
	24													
2372	26													

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GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-24

BORING LOG
RW10B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2750, W: 115.2617
EXPLORATION DATE: 1/2/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,391-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	0					CL-ML	NATIVE: Tan silty lean CLAY with gravel, dry and stiff.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2388	2													
	4				12 37 40	GM	Brown silty GRAVEL with sand, dry and very dense.	0.7		16	NV	NP		
2384	6													
	8													
	10				28 50/6	CL	Tan lean CLAY, dry and very stiff.	4.6		89	28	9		
2380	12													
	14													
2376					24 50/3		...Brown with sand.							
	16													
	18													
2372														
	20				50/3		...Dark brown.							
	22													
2368														
	24													
	26				15 19 23	CL-ML	White lean CLAY with silt and trace gravel, dry and very stiff.							
2364							**END OF BORING AT 26.5 FEET**							

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW10B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2743, W: 115.2615
EXPLORATION DATE: 1/2/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,385-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
2384	0					CL-ML	NATIVE: Tan silty CLAY with sand, dry and stiff.							PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	2													
	4													
2380					8 7 11		...Dark brown, very stiff.	5.8		83	30	7		
	6													
	8													
2376														
	10				26 37 32	ML	Brown SILT, dry and very stiff.	3.8	105.1	93	NV	NP		
	12													
2372														
	14													
	16				7 8 8									
2368														
	18													
	20				20 50/6	SM	Greyish silty SAND with gravel and clay, slightly moist and very dense.							
2364														
	22													
	24													
2360														
	26				8 9 11	MH	White mottled orangeish-brown sandy elastic SILT, moist and very stiff.	21.9		69	71	36		

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-26

BORING LOG
RW10B-2

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2743, W: 115.2615
EXPLORATION DATE: 1/2/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Diedrich D-120 Solid Stem
ELEVATION: 2,385-feet
LOGGER/DRILLER: Alajmi / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	28													PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
2356	30				29 33 30	CL	Grey sandy lean CLAY, moist and very stiff.	12.9	116.1	64	30	13		
2352	32													
	34													
	36				8 11 8	CH	Grey fat CLAY with sand, moist and very stiff.							
2348	38													
	40				9 13 13	CL	Brown lean CLAY with sand and caliche nodules, wet and very stiff.	21.2	100.0	75	40	21		
2344	42													
	44													
2340	46				7 9 12		...Dark brown with sand.							
							END OF BORING AT 46.5 FEET							
	48													
2336	50													
	52													
2332	54													

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-26

BORING LOG
RW14B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2753, W: 115.2518
EXPLORATION DATE: 1/29/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Mobile B-90 Solid Stem
ELEVATION: 2,355-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	0						ASPHALT:							PP = Pocket Penetometer (tsf)
						SM	RAP approximately 6-inches thick.							DR = Drill Rate (sec/ft.)
2352	2						FILL: Whitish-brown silty SAND with gravel,moist and loose.							MDD = Max. Dry Density (pcf)
	4				7 5 6	CL	Brown lean CLAY, slightly moist and firm.	8.6	81.2	90	39	18		
2348	6													
	8						...Greyish-brown with cobbles.							
	10				6 6 7	SP-SM	NATIVE: White to light brown poorly-graded SAND with silt and gravel, moist and medium dense.							
2344	12													
	14				23 50/4	CL	Greyish-white sandy lean CLAY with sand, slightly moist and very stiff.	8.7	108.3	73	27	15		
2340	16													
	18													
2336	20				10 14 18									
	22													
2332	24													
	26				19 50/4		...Light brown.	6.4	98.2	71	32	18		
2328														

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW14B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2753, W: 115.2518
EXPLORATION DATE: 1/29/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Mobile B-90 Solid Stem
ELEVATION: 2,355-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	28													PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	30				4 12 19									
2324	32													
	34													
2320	36				7 15 27		...Light brown, reduced sand.	9.6	100.0	93	36	20		PP=4.5
	38													
2316	40				17 23		...Brown.							
	42				50/5	GP-GM	Greyish-brown poorly-graded GRAVEL with silt and sand, moist and dense.							
2312	44					CL	Grey lean CLAY with sand, moist and very stiff.							
	46				6 9 12			15.3		81	36	19		
2308	48													
	50				14 30 50/4		...Whitish-brown.							
2304	52													
	54													
2300					33 50/2		...Light brown with gravel.	13.2	99.3	72	32	15		

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

BORING LOG
RW14B-1

PROJECT: US95-CC215 Interchange, Phase 3D/E
PROJECT NO.: 20184521E1
BORING LOCATION: N: 36.2753, W: 115.2518
EXPLORATION DATE: 1/29/19
EXPLORATION SIZE (dia.): 4.5-inches
EQUIPMENT: Mobile B-90 Solid Stem
ELEVATION: 2,355-feet
LOGGER/DRILLER: Wang / Snell

INITIAL DEPTH TO WATER: Not Encountered
MEASURED DEPTH TO WATER: N/A
DATE ENCOUNTERED: N/A
DATE MEASURED: N/A

ELEVATION	DEPTH	BULK SAMPLE	STRATA GROUP SYMBOL	SAMPLER TYPE	BLOWS	STRATA GROUP	DESCRIPTION	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	% PASSING # 200 SIEVE	LL	PI	SWELL (%)	NOTES
	56													PP = Pocket Penetometer (tsf) DR = Drill Rate (sec/ft.) MDD = Max. Dry Density (pcf)
	58													
2296					7 11 9		...Reddish-brown with sand.							
	60						**END OF BORING AT 60.5 FEET**							
	62													
2292														
	64													
	66													
2288														
	68													
	70													
2284														
	72													
	74													
2280														
	76													
	78													
2276														
	80													
	82													
2272														

The descriptions contained within this exploration log apply only at the specific exploration location and at the time the exploration was made. It is not intended to be representative of subsurface conditions at other locations or times.

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure No. A-27

APPENDIX B

LABORATORY TEST RESULTS

APPENDIX B
LABORATORY TEST RESULTS

Laboratory tests were conducted on representative soil samples for the purpose of classification and to evaluate their engineering and physical properties. The amount and selection of the types of testing for a given study are based on the geotechnical conditions of the project. A summary of the various laboratory tests conducted for this project are presented below.

1. IN-PLACE MOISTURE CONTENT AND DENSITY

   The in-place moisture contents and the in-place dry densities of selected soil samples obtained from the thick-walled ring-lined sampler were evaluated. For each sample, the volume and wet weight of the sample were evaluated. The samples were then oven-dried. After drying, the dry weight of each sample was measured, and the moisture contents and the subsequent dry densities were calculated. The in-place moisture content and dry density is a qualitative measure of consistency and compressibility. The moisture contents and dry densities of the sampled soils are presented at the respective sampling depth on the exploration logs in Appendix A.

2. GRAIN SIZE DISTRIBUTION

   One hundred and forty-one grain size distribution tests were performed by sieve analysis in general accordance with ASTM D6913. Soil samples are oven dried to a constant weight and sorted by a number of different sized sieves. The amount of material retained on each sieve is measured and the percent of material passing each sieve is computed. The test results are presented as particle size distribution curves in Appendix B.

3. ATTERBERG LIMITS

   One hundred and thirty-four samples were tested to evaluate Atterberg limits in general accordance with ASTM D4318. The liquid limit (LL) and plastic limit (PL) of tested samples were evaluated. The difference between the liquid limit and the plastic limit is the plasticity index (PI) and represents the range of water content over which the soil behaves in a plastic state. The term NP refers to non-plastic and the term NV refers to no value. Test results are presented on the boring logs in Appendix A and in Appendix B.

4. CONSOLIDATION

Five selected soil samples were tested to evaluate one-dimensional consolidation in general accordance with ASTM D2435. Soil was obtained from a thick-walled ring-lined sampler, or from a thin-walled Shelby tube sampler and trimmed to a height of 1 inch. After preparing each sample, the sample was placed in a consolidometer, saturated, and then loaded incrementally. The sample was unloaded at an appropriate load increment to evaluate rebound characteristics. Sample deformation was measured during each load increment. Consolidation test results are presented in Appendix B.

5. HYDRO COLLAPSE/ SWELL POTENTIAL

Thirteen swell/collapse potential test were performed on a sample of the native soils in general accordance ASTM D 4546. To perform the tests ring samples were placed in consolidation racks and was incrementally loaded to a pressure of 1,800 pounds per square foot (psf), after which, the sample was inundated with water. The deformation of the samples were recorded for 24 hours. The results of the tests are presented in Appendix B.

6. DIRECT SHEAR STRENGTH

Seven direct shear strength tests were performed on soil samples obtained from a thick-walled ring-lined sampler using a constant strain rate direct shear machine in general accordance with AASHTO T236 (ASTM D3080). In the shear machine, the samples were inundated with water, loaded to successive normal pressures, and then sheared beyond the peak shear strength until the residual shear strength was obtained. The results of the tests are presented graphically as Mohr-Coulomb failure surfaces and stress-strain diagrams in Appendix B.

7. 60 PSF SWELL POTENTIAL

Five swell tests were performed on relatively undisturbed samples of the native soils in general accordance with Section 1802.3.3 of the Southern Nevada Amendments to the 2006 International Building Code. A vertical confining pressure of approximately 60 pounds per square foot was applied to the oven-dried sample and then the sample was inundated with water. The deformation of the sample was recorded for 24 hours. The results of the swell test is presented in Appendix B.

8. UNCONFINED COMPRESSIVE STRENGTH

Two unconfined compressive strength tests were performed on soil samples in accordance with ASTM D2166. The samples were obtained from a ring-lined California driven sampler and trimmed to a height to width ratio of at least 2:1 (H:W). The samples were loaded at a steady rate until a reduction in strength was observed. Results are presented in Appendix B.

9. TRIAXIAL

One triaxial test was performed in general accordance with ASTM D4767. Soil was obtained from a thin-walled Shelby tube sampler and two samples from the same Shelby tube were trimmed to a height of approximately 6 inches each. After preparing each sample, the samples were subjected to consolidated undrained (CU) triaxial shear testing using target confining stresses of 20 psi and 80 psi. Triaxial test results are presented in Appendix B.

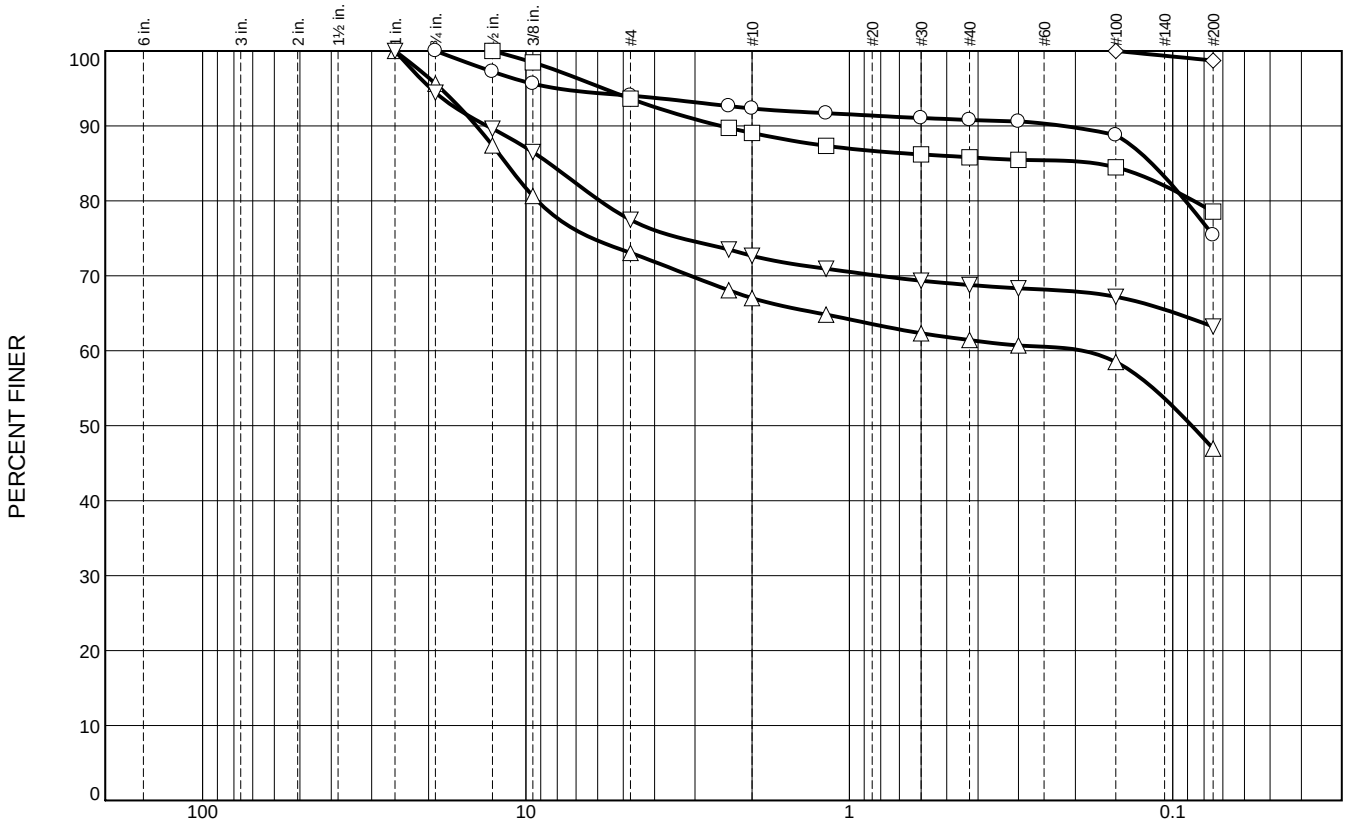
10. WATER SOLUBLE SALT AND SOLUBILITY

Tests were performed on selected soil samples to evaluate the contents of soluble sodium, soluble sulfate, total available sodium sulfate, and total soluble solids (i.e. solubility), and chloride content. The tests were performed by Silver State Analytical Laboratories. The results of the tests are shown in Appendix B.

11. CORROSIVITY TESTS

A suite of chemical corrosivity tests were performed on selected soil samples to aid in evaluating the corrosiveness of the on-site soils to buried metal. The suite of chemical corrosivity tests included the pH, reduction-oxidation (red-ox) potential, and the contents of sulfate, sulfide, total salts and chloride. The chemical tests were performed by Silver State Analytical Laboratories. The test results are presented in Appendix B.

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	6	2	1	16	75
□	0	0	6	5	3	7	79
△	0	4	23	6	6	14	47
◇	0	0	0	0	0	1	99
▽	0	6	17	4	4	6	63

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-060	H3033B-1	15.0'-16.5'	Lean clay with sand	CL
□	LAB #19-060	H3033B-1	25.0'-26.5'	Lean clay with sand	CL
△	LAB #19-060	H3033B-1	35.0'-36.5'	Clayey gravel with sand	GC
◇	LAB #19-060	H3033B-1	70.0'-71.5'	Lean clay	CL
▽	LAB #19-060	H3033B-1	80.0'-81.5'	Gravelly lean clay	CL

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

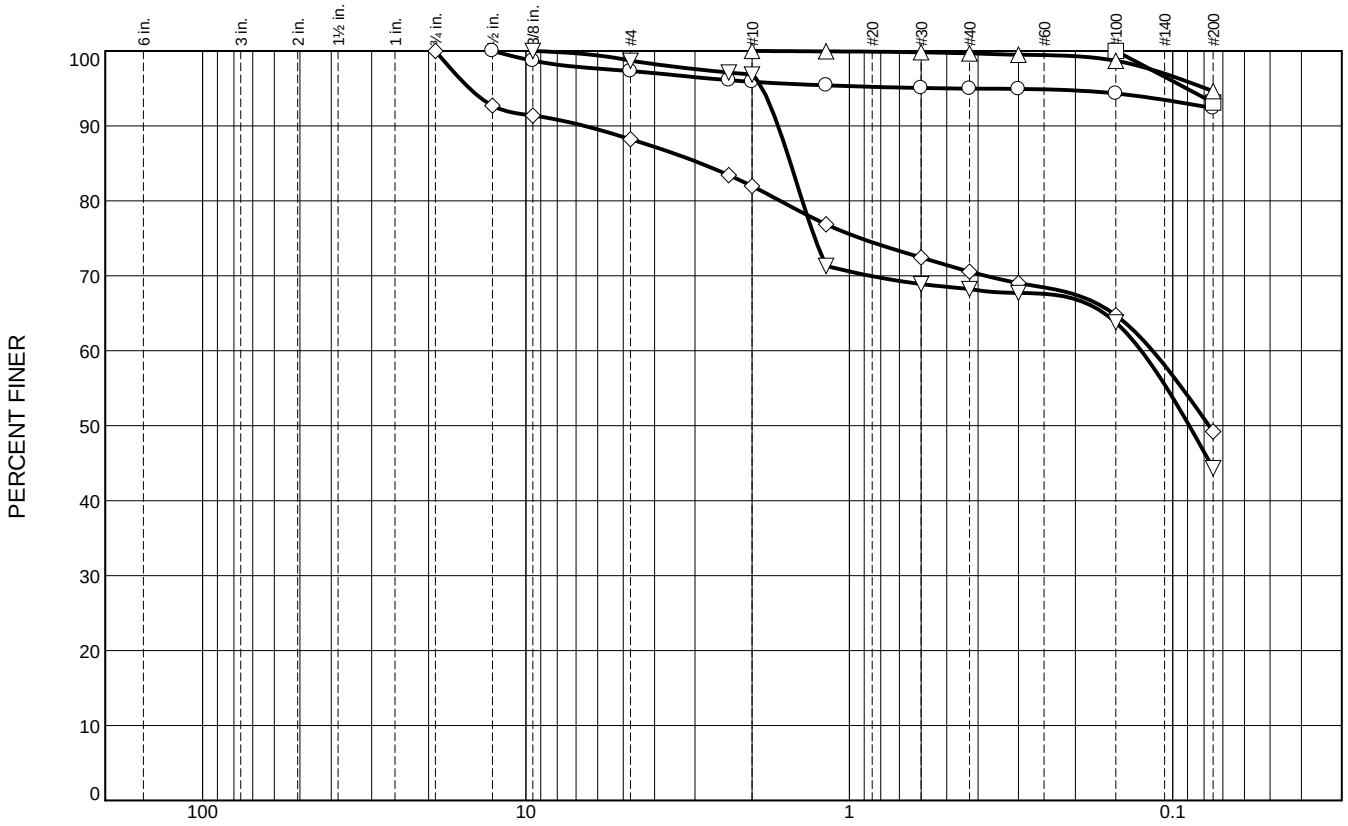
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-1

Tested By: K. MARIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	3	1	1	3	92
□	0	0	0	0	0	7	93
△	0	0	0	0	0	5	95
◇	0	0	12	6	11	22	49
▽	0	0	1	2	29	24	44

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-060	H3033B-1	100.0'-101.5'	Lean clay	CL
□	LAB #19-060	H3033B-1	110.0'-111.5'	Lean clay	CL
△	LAB #18-524	H3033B-2	5.0'-6.5'	Silt	ML
◇	LAB #18-524	H3033B-2	10.0'-11.6'	Clayey sand	SC
▽	LAB #18-524	H3033B-2	25.0'-26.5'	Silty sand	SM

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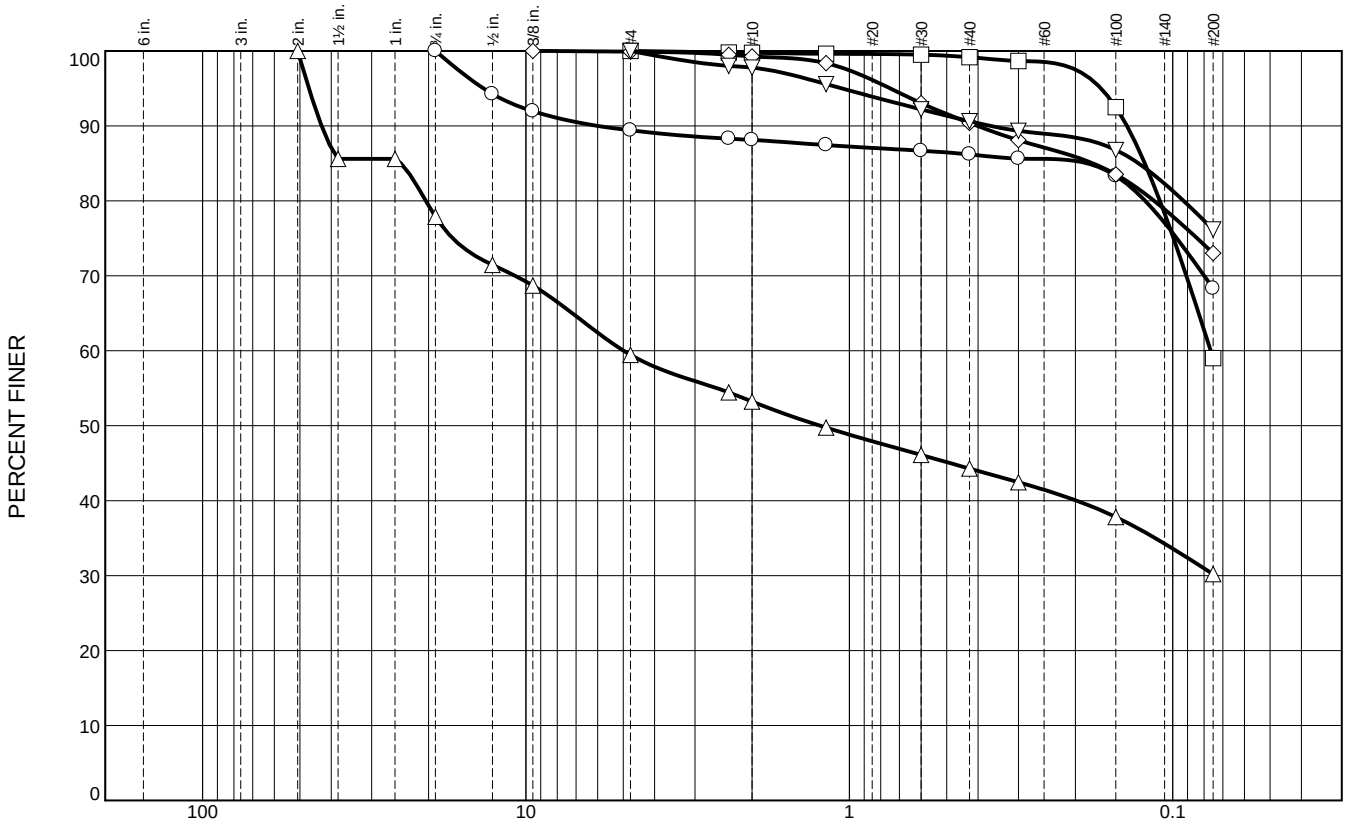
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-2

Tested By: K. MARIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	11	1	2	18	68
□	0	0	0	0	1	40	59
△	0	22	19	6	9	14	30
◇	0	0	0	1	9	17	73
▽	0	0	0	2	7	15	76

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-524	H3033B-2	40.0'-41.5'	Sandy fat clay	CH
□	LAB #18-524	H3033B-2	45.0'-46.5'	Sandy fat clay	CH
△	LAB #18-524	H3033B-2	60.0'-61.5'	Clayey gravel with sand	GC
◇	LAB #18-524	H3033B-2	80.0'-81.5'	Lean clay with sand	CL
▽	LAB #18-524	H3033B-2	105.0'-106.5'	Lean clay with sand	CL

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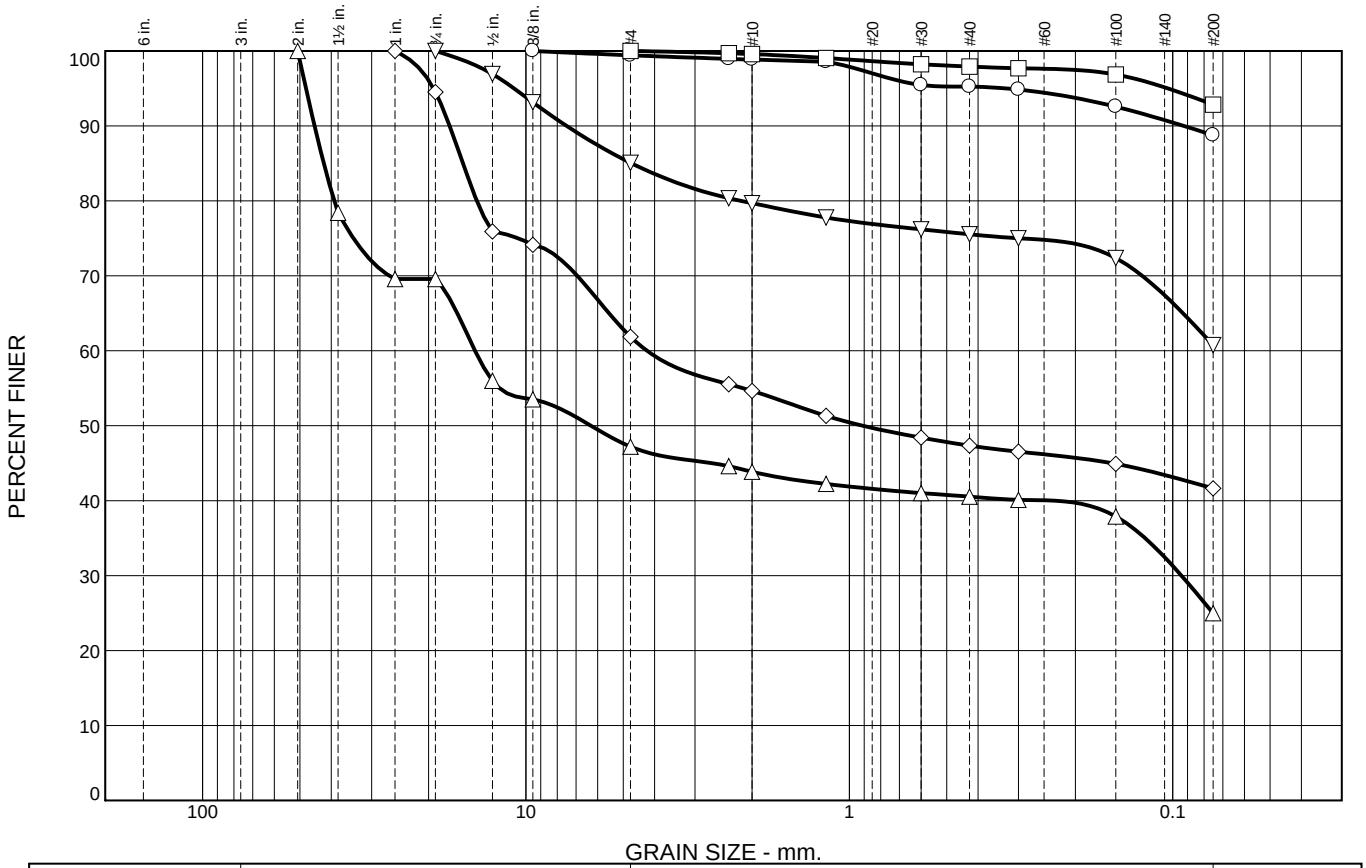
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-3

Tested By: K. MARIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	1	0	4	6	89
□	0	0	0	0	2	5	93
△	0	30	23	3	3	16	25
◇	0	5	33	7	8	5	42
▽	0	0	15	5	4	15	61

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-524	H3034B-1	10.0'-11.5'	Lean clay	CL
□	LAB #18-524	H3034B-1	20.0'-21.5'	Silt	ML
△	LAB #18-524	H3034B-1	35.0'-36.5'	Clayey gravel with sand	GC
◇	LAB #18-524	H3034B-1	45.0'-46.5'	Clayey gravel with sand	GC
▽	LAB #18-524	H3034B-1	55.0'-56.5'	Sandy fat clay with gravel	CH

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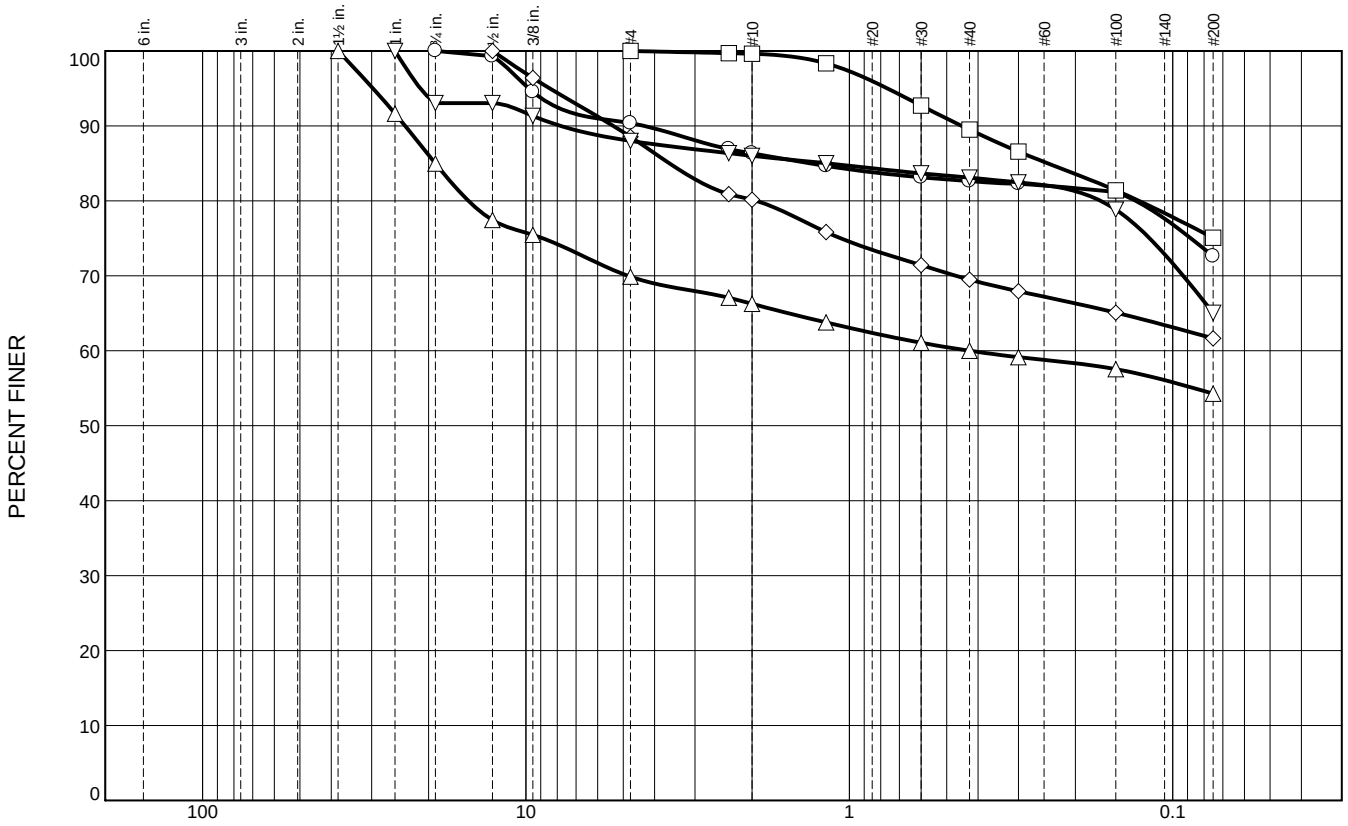
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-4

Tested By: K. MARIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	10	4	3	10	73
□	0	0	0	0	10	15	75
△	0	15	15	4	6	6	54
◇	0	0	11	9	11	7	62
▽	0	7	5	2	3	18	65

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-524	H3034B-1	74.0'-76.0'	Lean clay with sand	CL
□	LAB #18-524	H3034B-1	85.0'-86.5'	Lean clay with sand	CL
△	LAB #18-524	H3034B-1	100.0'-101.5'	Gravelly lean clay with sand	CL
◇	LAB #18-524	H3034B-1	110.0'-111.5'	Sandy lean clay	CL
▽	LAB #19-060	H3034B-2	20.0'-21.5'	Sandy lean clay	CL

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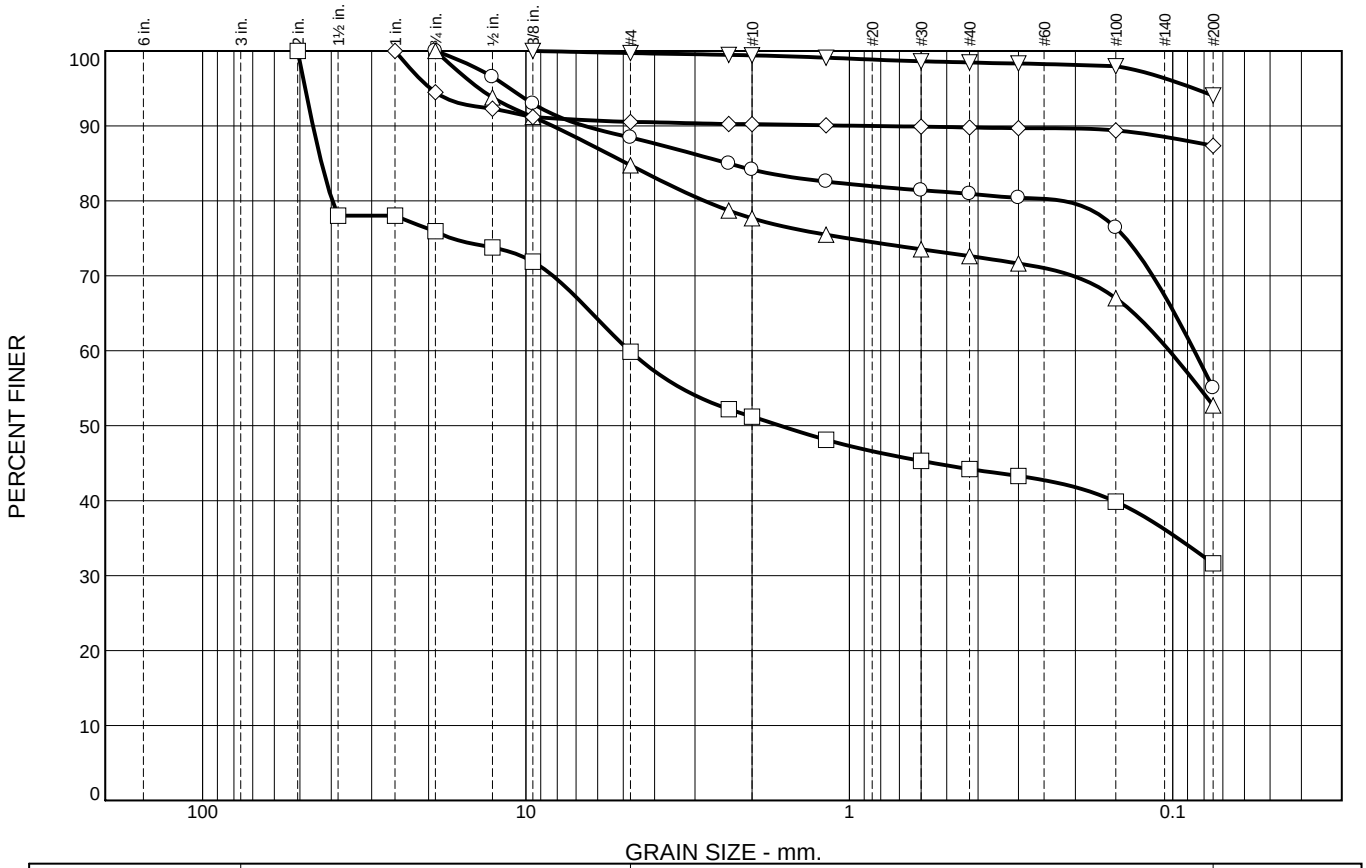
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-5

Tested By: K. MARIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	12	4	3	26	55
□	0	24	16	9	7	12	32
△	0	0	15	7	5	20	53
◇	0	6	3	1	0	3	87
▽	0	0	0	1	1	4	94

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-060	H3034B-2	30.0'-31.5'	Sandy fat clay	CH
□	LAB #19-060	H3034B-2	50.0'-51.5'	Clayey gravel with sand	GC
△	LAB #19-060	H3034B-2	60.0'-61.5'	Sandy fat clay with gravel	CH
◇	LAB #19-060	H3034B-2	85.0'-86.5'	Lean clay	CL
▽	LAB #19-060	H3034B-2	95.0'-96.5'	Lean clay	CL

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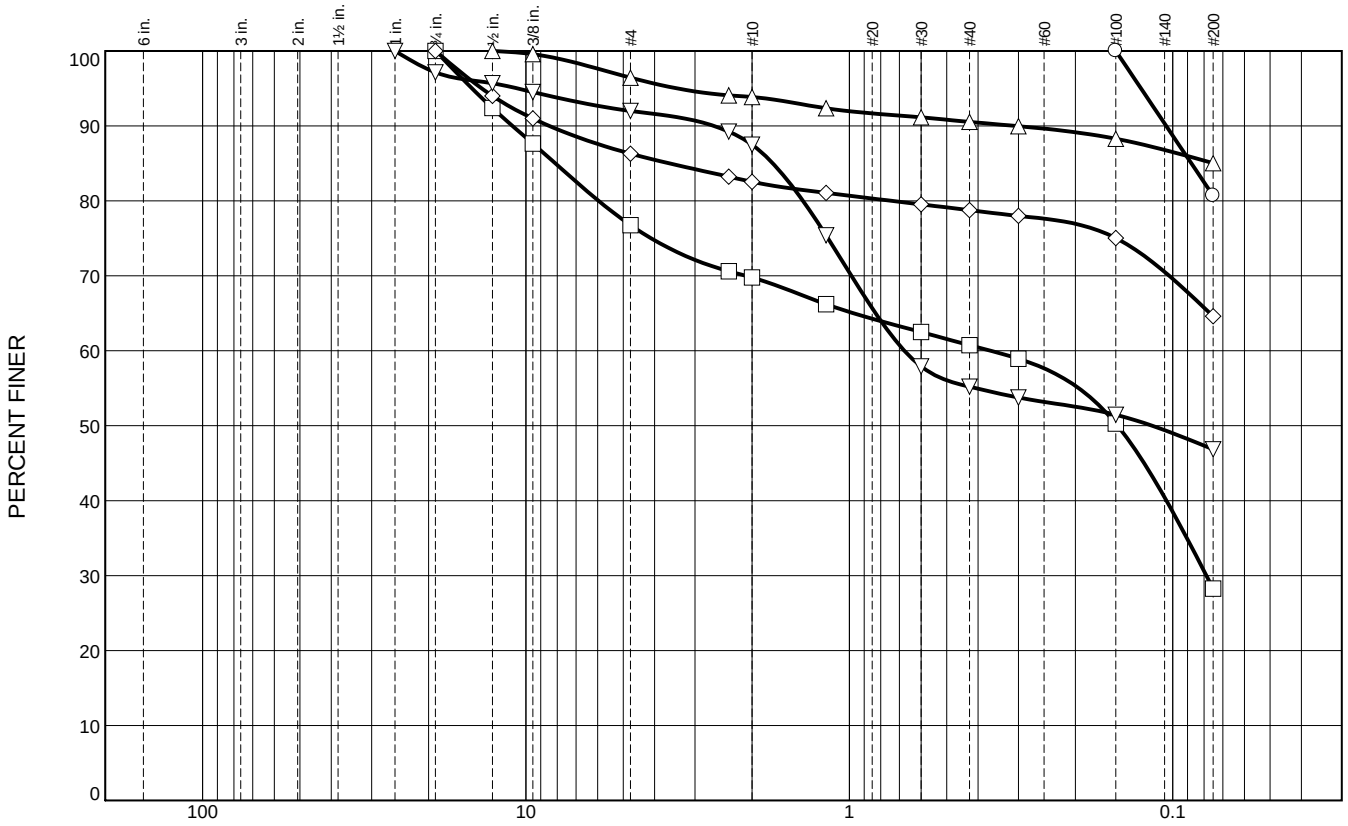
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-6

Tested By: K. MARIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	0	0	0	19	81
□	0	0	23	7	9	33	28
△	0	0	4	2	3	6	85
◇	0	0	14	3	4	14	65
▽	0	3	5	5	32	8	47

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-060	H3034B-2	105.0'-106.5'	Lean clay with sand	CL
□	LAB #18-508	H3034B-3	15.0'-16.5'	Clayey sand with gravel	SC
△	LAB #18-508	H3034B-3	25.0'-26.5'	Lean clay with sand	CL
◇	LAB #18-508	H3034B-3	40.0'-41.5'	Sandy lean clay	CL
▽	LAB #18-508	H3034B-3	5.0'-6.5'	Silty sand	SM

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

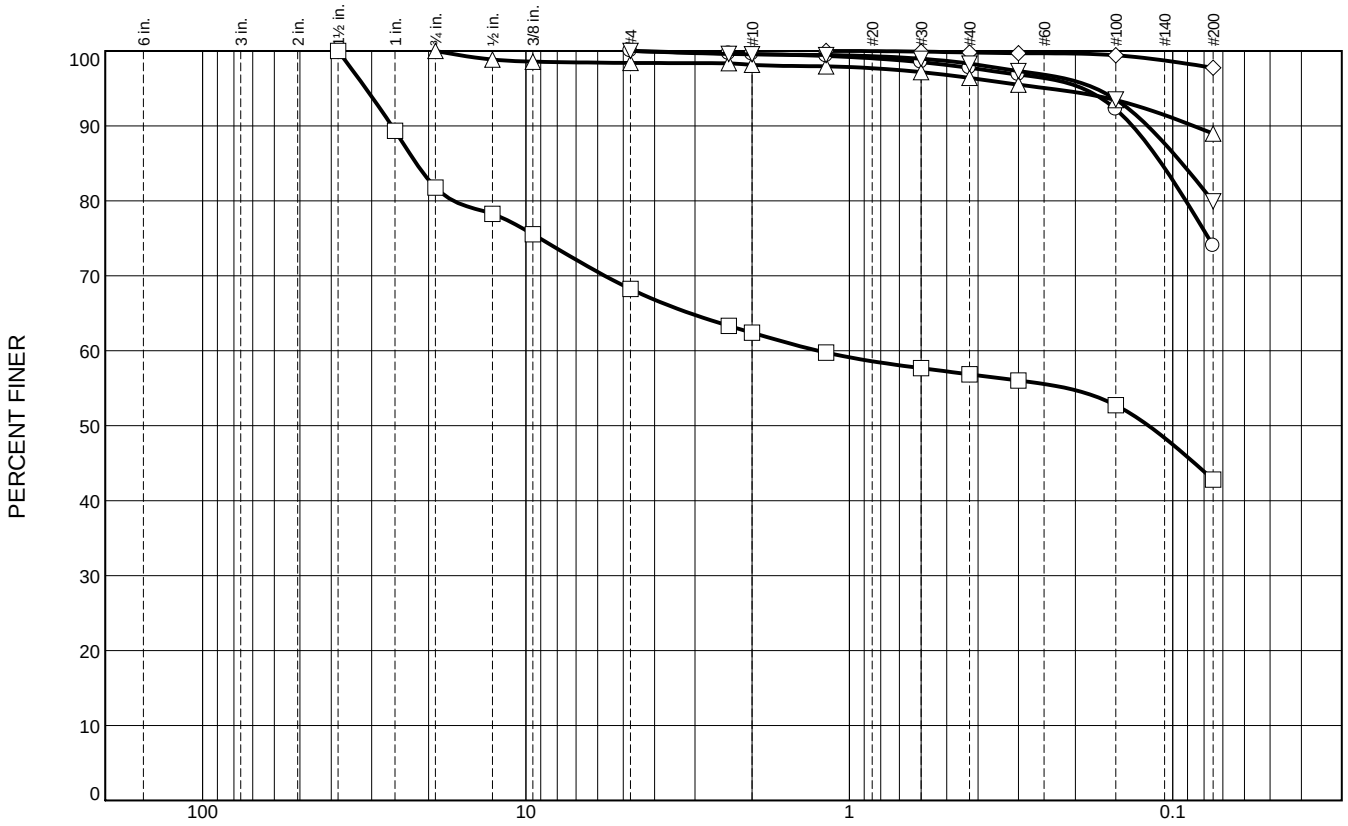
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-7

Tested By: ○ K. MARIN □ A. SANDERS △ A. SANDERS ◇ A. SANDERS ▽ A. SANDERS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	0	0	2	24	74
□	0	18	14	6	5	14	43
△	0	0	2	0	2	7	89
◇	0	0	0	0	0	2	98
▽	0	0	0	0	2	18	80

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-508	H3034B-3	50.0'-51.5'	Fat clay with sand	CH
□	LAB #18-508	H3034B-3	55.0'-56.5'	Clayey gravel with sand	GC
△	LAB #18-508	H3034B-3	80.0'-81.5'	Lean clay	CL
◇	LAB #18-508	H3034B-3	82.0'-84.5'	Lean clay	CL
▽	LAB #18-508	H3034B-3	90.0'-91.5'	Fat clay with sand	CH

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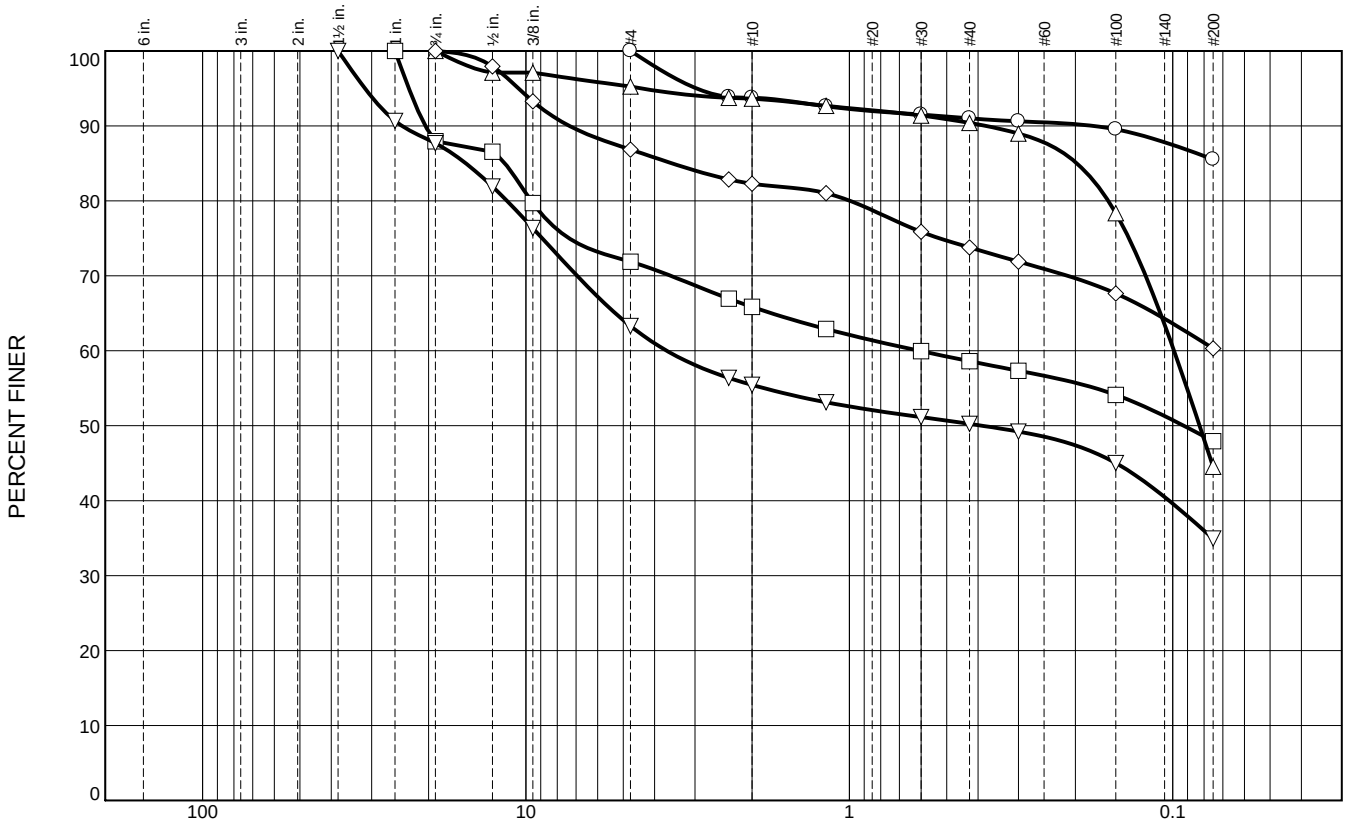
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-8

Tested By: ○ A. SANDERS □ A. SANDERS △ A. SANDERS ◇ R. BRATTON ▽ A. SANDERS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	0	6	3	5	86
□	0	12	16	6	7	11	48
△	0	0	5	1	4	45	45
◇	0	0	13	5	8	14	60
▽	0	12	25	8	5	15	35

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-508	H3034B-3	105.0'-106.5'	Lean clay	CL
□	LAB #18-526	H3036B-1	5.0'	Clayey gravel with sand	GC
△	LAB #18-526	H3036B-1	20.0'	Clayey sand	SC
◇	LAB #18-526	H3036B-1	35.0'	Sandy lean clay	CL
▽	LAB #18-526	H3036B-1	45.0'	Clayey gravel with sand	GC

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

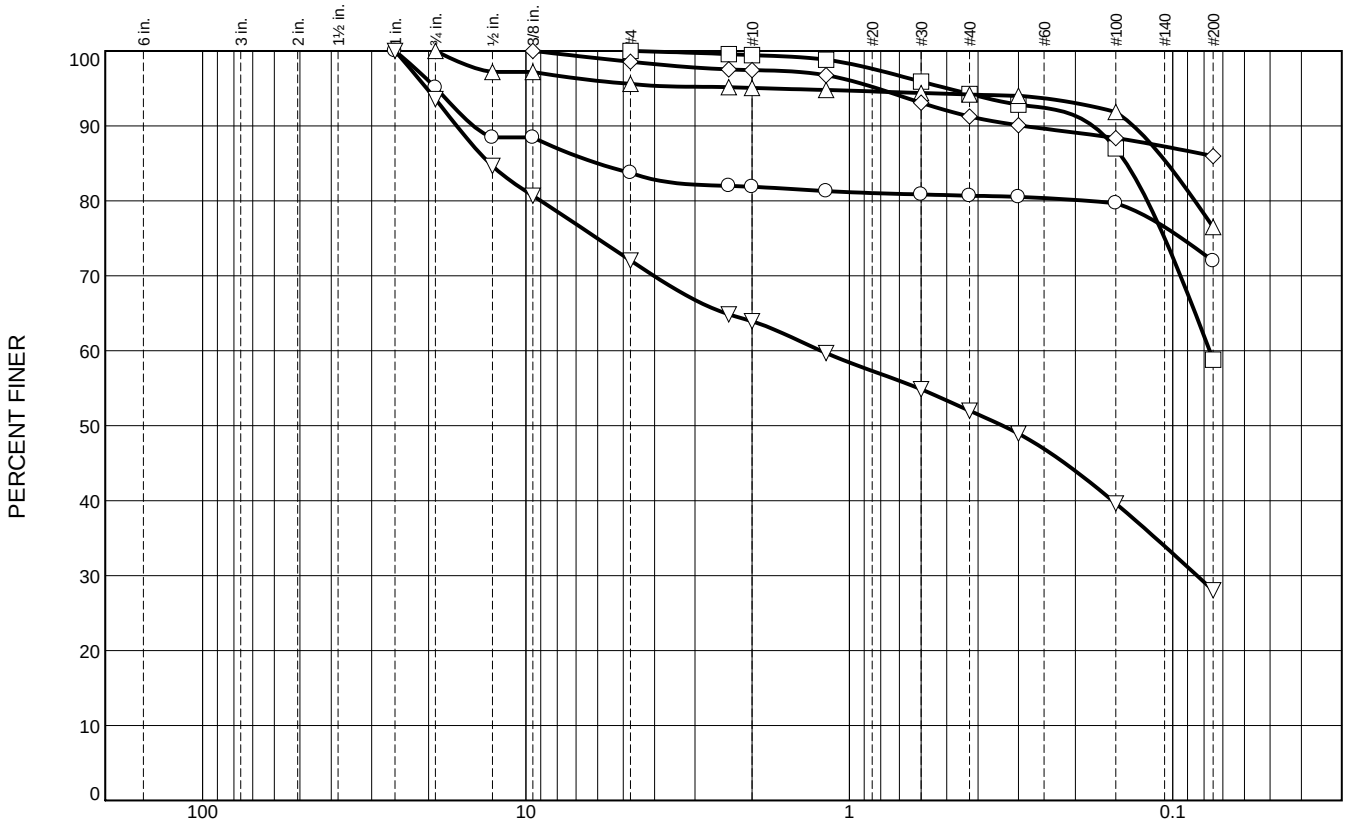
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-9

Tested By: R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	5	11	2	1	9	72
□	0	0	0	1	5	35	59
△	0	0	4	1	1	18	76
◇	0	0	1	2	6	5	86
▽	0	6	22	8	12	24	28

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-526	H3036B-1	75.0'	Lean clay with gravel	CL
□	LAB #18-526	H3036B-1	90.0'	Sandy lean clay	CL
△	LAB #18-526	H3036B-1	105.0'	Fat clay with sand	CH
◇	LAB #18-526	H3036B-2	10.0'	Silty clay	CL-ML
▽	LAB #18-526	H3036B-2	20.0'	Silty sand with gravel	SM

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Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-10

Tested By: R. BRATTON

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	6	4	4	39	47
□	0	0	17	5	7	21	50
△	0	7	12	2	5	17	57
◇	0	0	0	0	16	18	66
▽	0	13	29	9	9	5	35

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-526	H3036B-2	30.0'	Clayey sand	SC
□	LAB #18-526	H3036B-2	35.0'	Sandy fat clay with gravel	CH
△	LAB #18-526	H3036B-2	50.0'	Sandy lean clay with gravel	CL
◇	LAB #18-526	H3036B-2	95.0'	Sandy lean clay	CL
▽	LAB #18-526	H3036B-2	105.0'	Clayey gravel with sand	GC

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

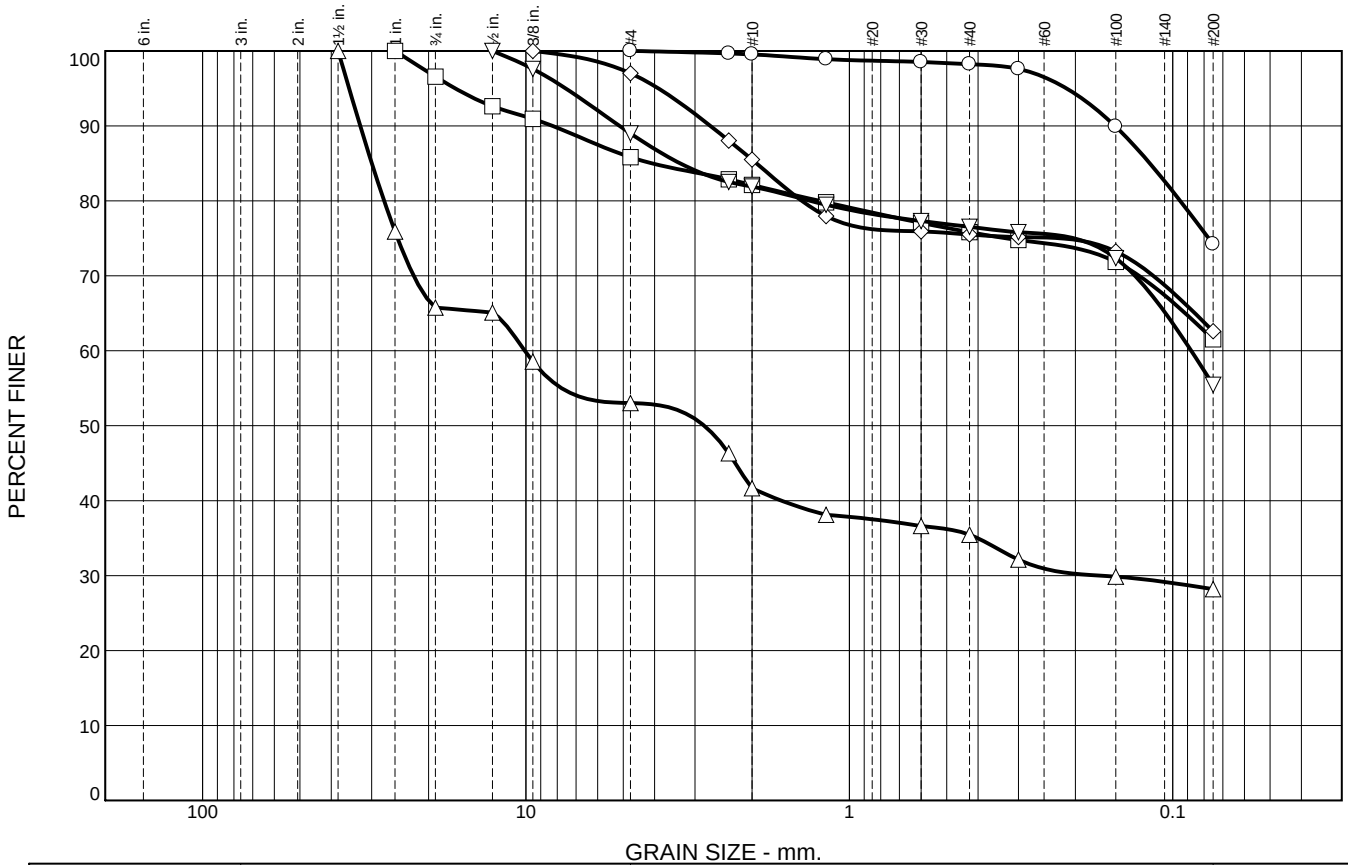
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-11

Tested By: R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	0	0	2	24	74
□	0	3	11	4	6	14	62
△	0	34	13	11	7	7	28
◇	0	0	3	11	10	13	63
▽	0	0	11	7	5	22	55

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-536	H3036B-3	10.0'	Lean clay with sand	CL
□	LAB #18-536	H3036B-3	15.0'	Sandy lean clay	CL
△	LAB #18-536	H3036B-3	20.0'	Clayey gravel with sand	GC
◇	LAB #18-536	H3036B-3	25.0'	Sandy fat clay	CH
▽	LAB #18-536	H3036B-3	40.0'	Sandy lean clay	CL

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

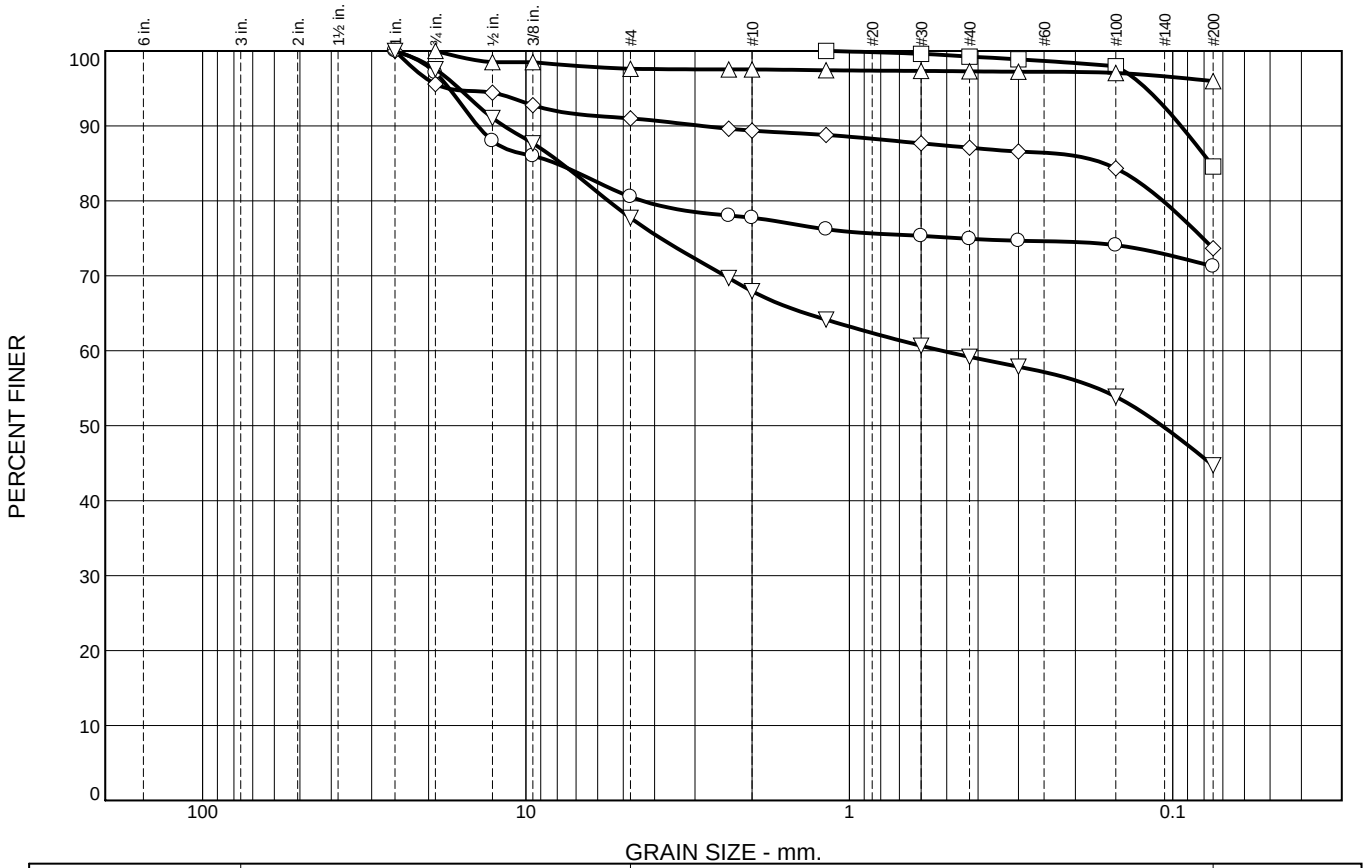
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-12

Tested By: K. MARIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	3	16	3	3	4	71
□	0	0	0	0	1	14	85
△	0	0	2	0	1	1	96
◇	0	4	5	2	2	13	74
▽	0	2	20	10	9	14	45

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-536	H3036B-3	70.0'	Lean clay with gravel	CL
□	LAB #18-536	H3036B-3	72.0'-74.0'	Lean clay with sand	CL
△	LAB #18-536	H3036B-3	80.0'	Lean clay	CL
◇	LAB #18-536	H3036B-3	90.0'	Lean clay with sand	CL
▽	LAB #18-539	H3036B-4	5.0'	Clayey sand with gravel	SC

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

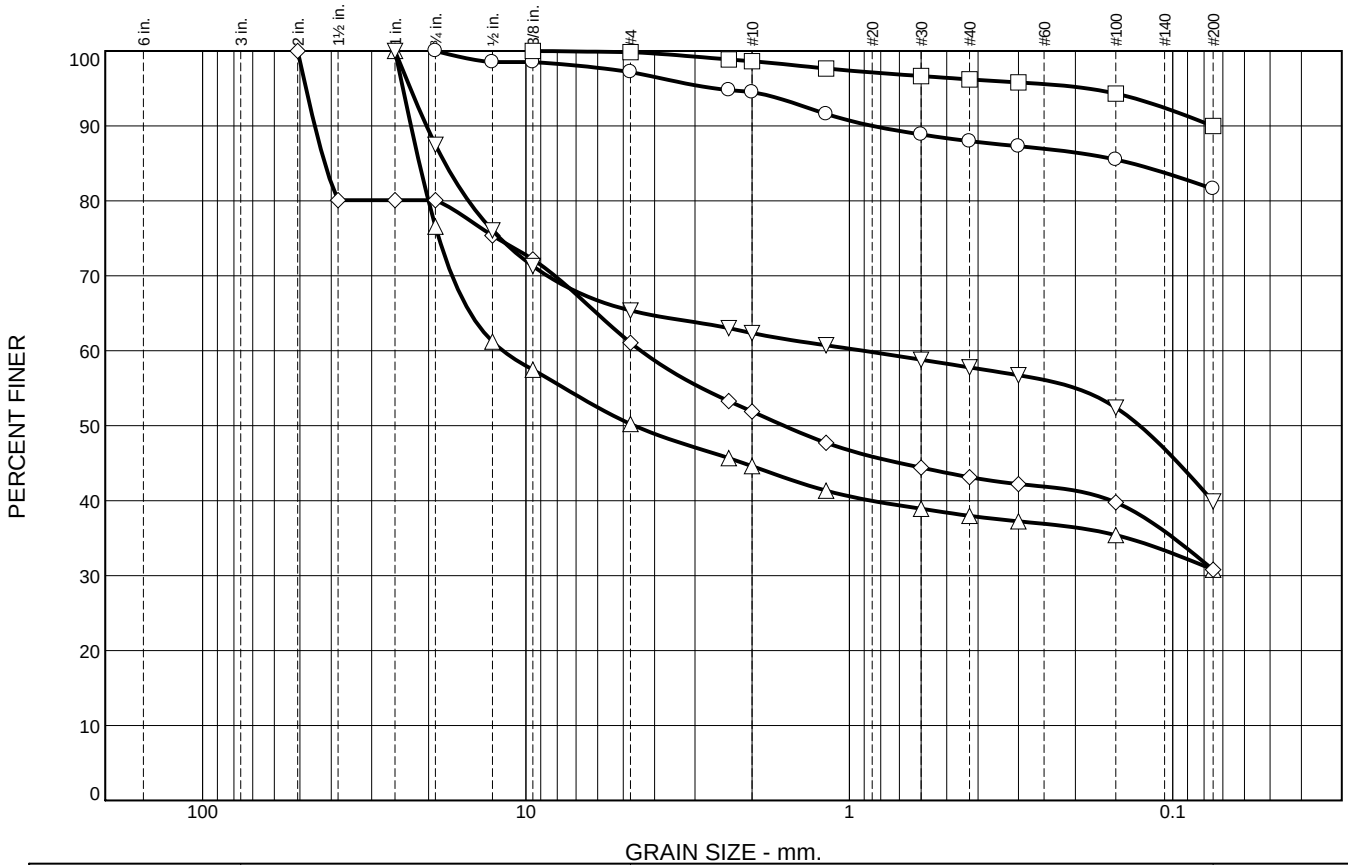
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-13

Tested By: ○ K. MARIN □ K. MARIN △ K. MARIN ◇ K. MARIN ▽ R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	3	3	6	6	82
□	0	0	0	1	3	6	90
△	0	23	27	5	7	7	31
◇	0	20	19	9	9	12	31
▽	0	13	22	3	4	18	40

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-539	H3036B-4	15.0'	Lean clay with sand	CL
□	LAB #18-539	H3036B-4	20.0'	Lean clay	CL
△	LAB #18-539	H3036B-4	35.0'	Clayey gravel with sand	GC
◇	LAB #18-539	H3036B-4	45.0'	Clayey gravel with sand	GC
▽	LAB #18-539	H3036B-4	55.0'	Clayey gravel with sand	GC

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

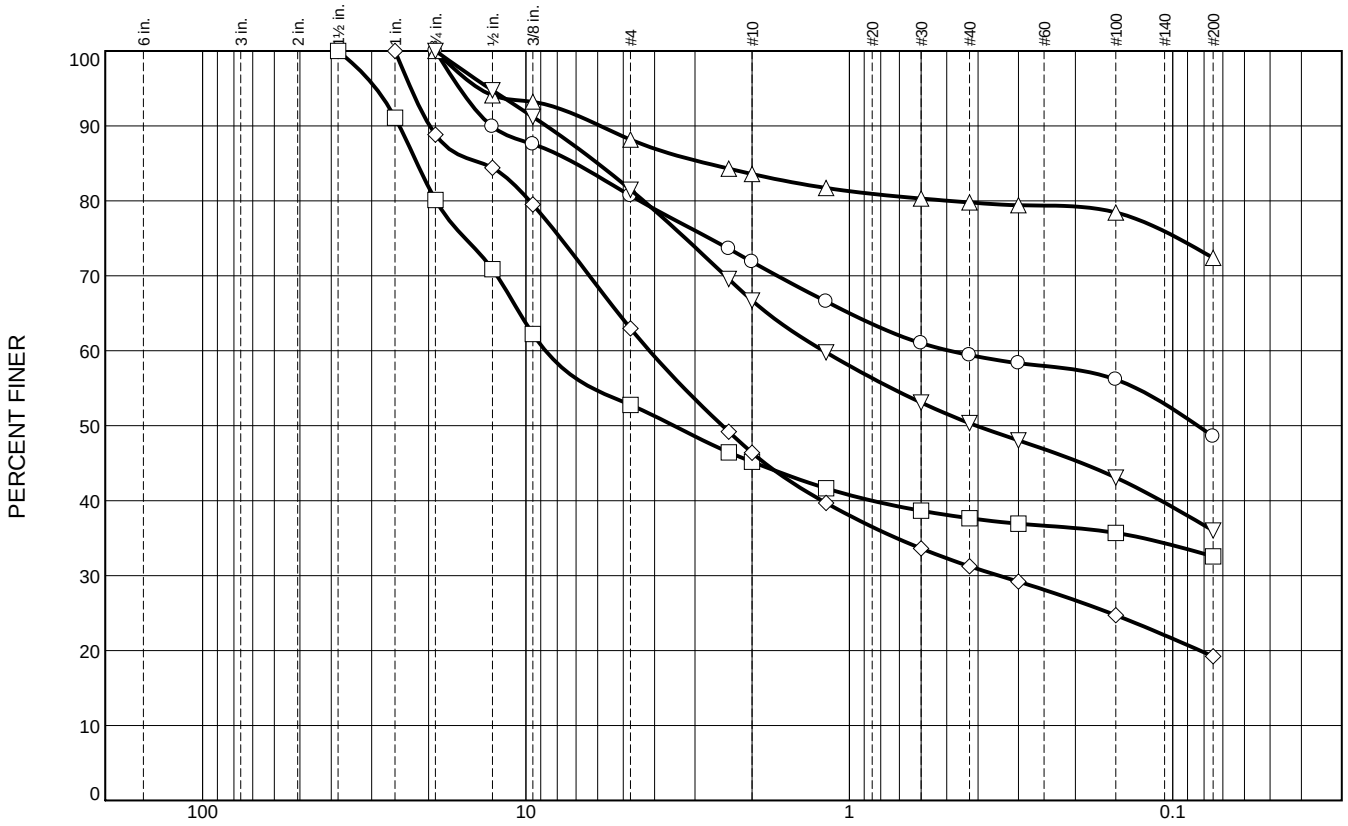
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-14

Tested By: R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	19	9	13	10	49
□	0	20	27	8	7	5	33
△	0	0	12	4	4	8	72
◇	0	11	26	17	15	12	19
▽	0	0	19	14	17	14	36

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-539	H3036B-4	70.0'	Clayey sand with gravel	SC
□	LAB #18-539	H3036B-4	80.0'	Clayey gravel with sand	GC
△	LAB #18-539	H3036B-4	105.0'	Lean clay with sand	CL
◇	LAB #19-024	H3036B-5	5.0'	Silty sand with gravel	SM
▽	LAB #19-024	H3036B-5	10.0'	Clayey sand with gravel	SC

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

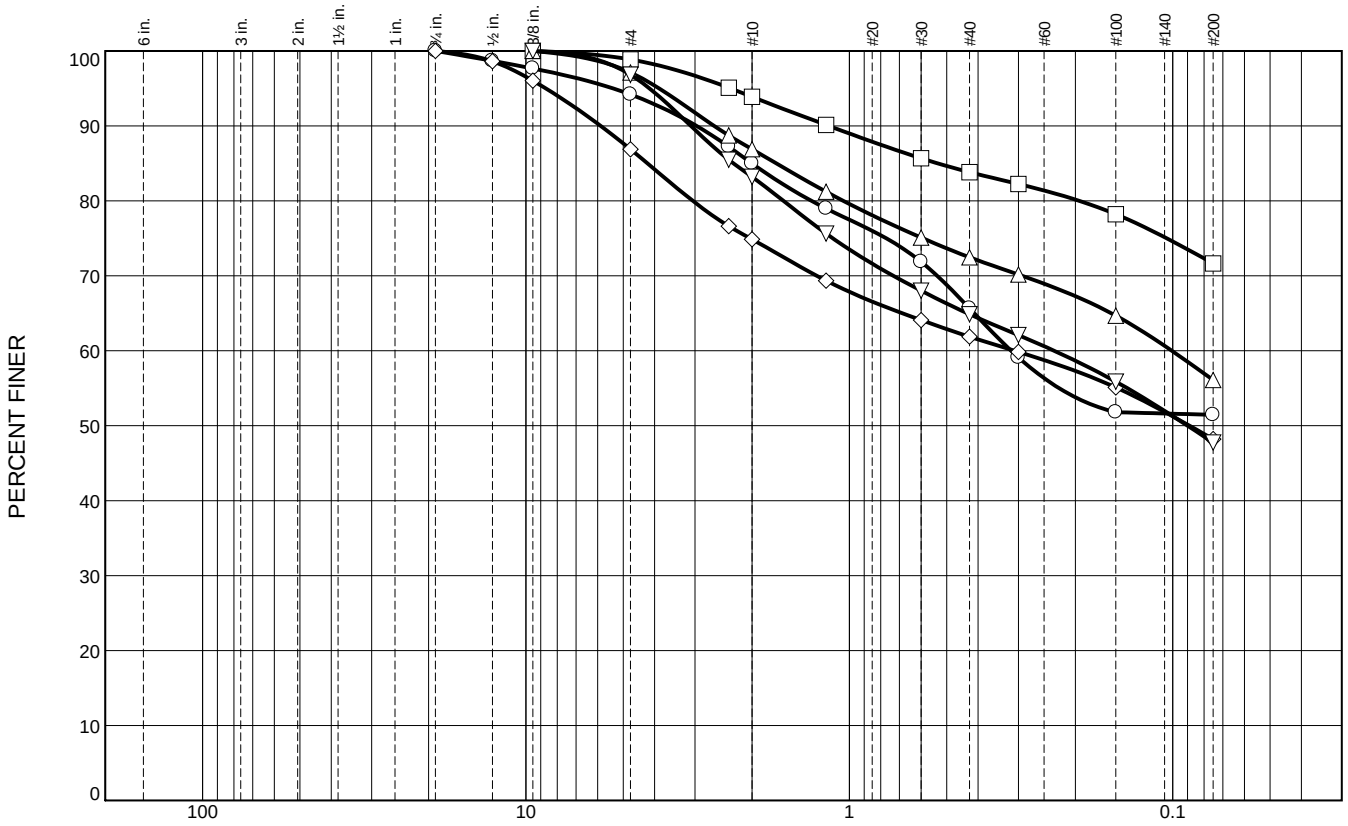
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-15

Tested By: R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	6	9	19	15	51
□	0	0	1	5	10	12	72
△	0	0	3	10	15	16	56
◇	0	0	13	12	13	14	48
▽	0	0	3	14	18	17	48

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-024	H3036B-5	25.0'	Sandy lean clay	CL
□	LAB #19-024	H3036B-5	35.0'	Lean clay with sand	CL
△	LAB #19-024	H3036B-5	45.0'	Sandy lean clay	CL
◇	LAB #19-024	RW7B-1	1.0'-4.0'	Clayey sand	SC
▽	LAB #19-024	RW7B-1	10.0'	Clayey sand	SC

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

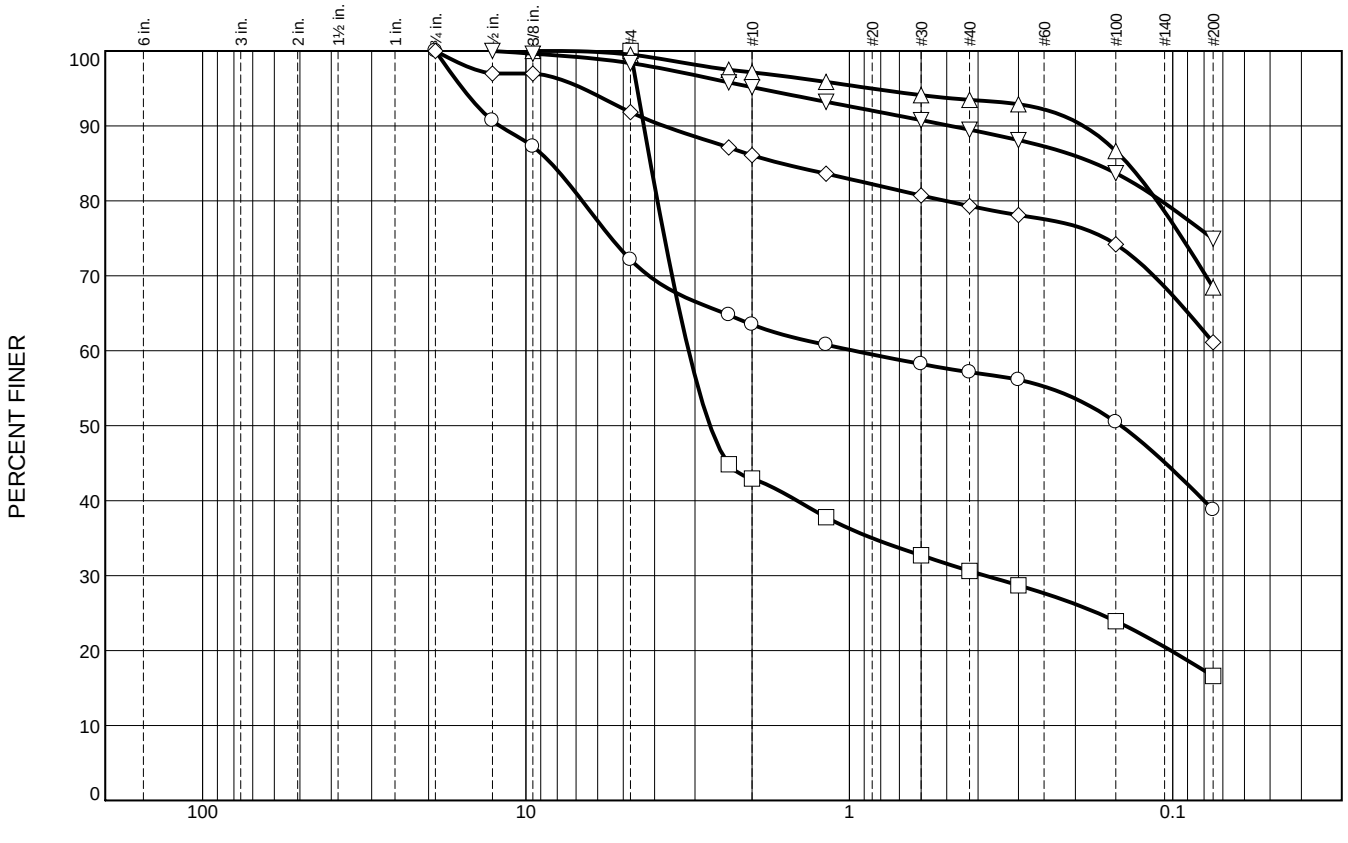
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-16

Tested By: R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	28	9	6	18	39
□	0	0	0	57	12	14	17
△	0	0	0	3	4	25	68
◇	0	0	8	6	7	18	61
▽	0	0	2	3	6	14	75

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-024	RW7B-2	1.0'-4.0'	Clayey sand with gravel	SC
□	LAB #19-024	RW7B-2	10.0'	Clayey sand	SC
△	LAB #19-024	RW7B-2	20.0'	Sandy lean clay	CL
◇	LAB #19-024	RW7B-2	30.0'	Sandy lean clay	CL
▽	LAB #19-024	RW7B-3	5.0'	Silt with sand	ML

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

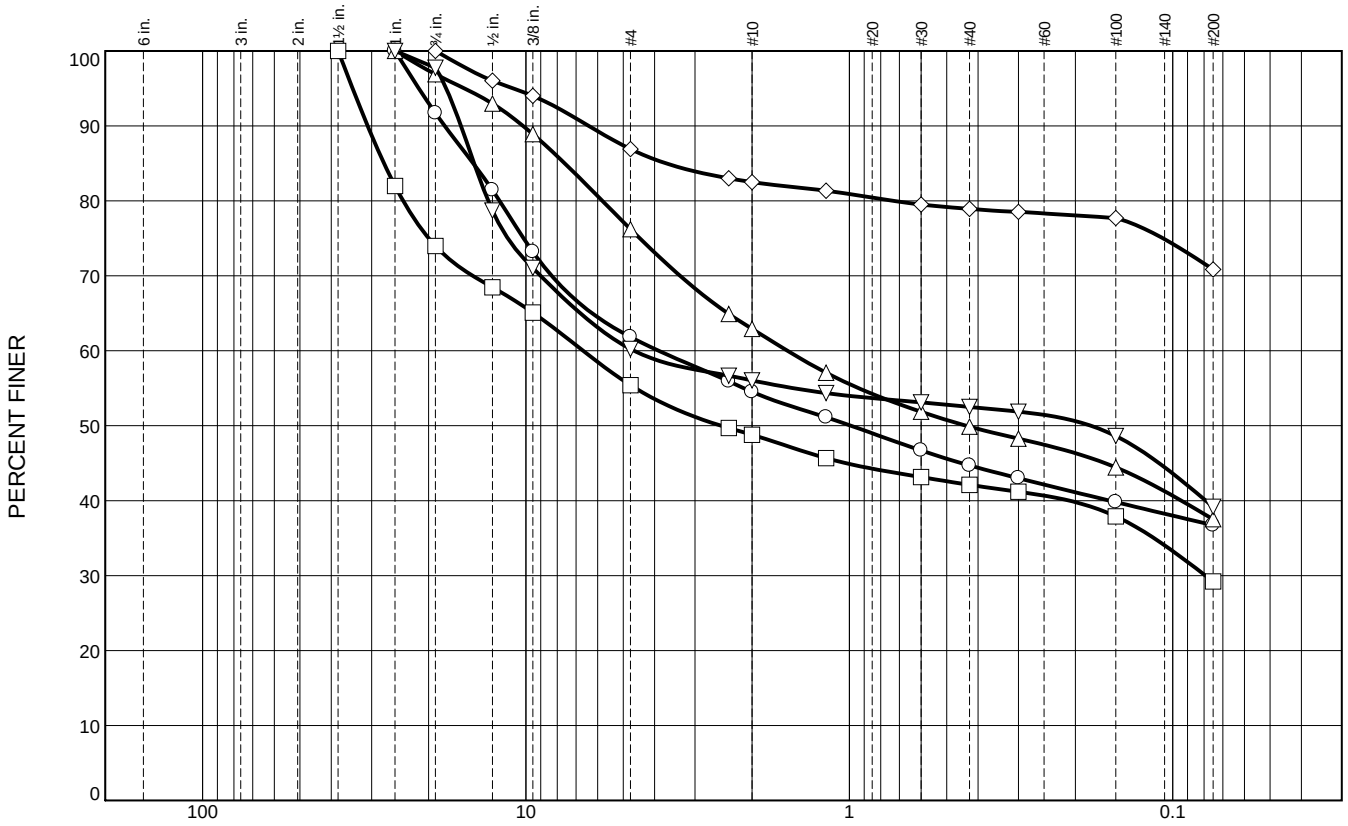
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-17

Tested By: ○ R. BRATTON □ K. FERNANDO △ R. BRATTON ◇ R. BRATTON ▽ R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	8	30	7	10	8	37
□	0	26	19	6	7	13	29
△	0	3	21	13	13	12	38
◇	0	0	13	4	4	8	71
▽	0	2	38	4	3	14	39

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-024	RW7B-3	15.0'	Clayey gravel with sand	GC
□	LAB #19-024	RW7B-3	25.0'	Clayey gravel with sand	GC
△	LAB #19-024	RW7B-3	40.0'	Clayey sand with gravel	SC
◇	LAB #19-024	RW7B-3	45.0'	Lean clay with sand	CL
▽	LAB #19-024	RW7B-3	55.0'	Clayey gravel with sand	GC

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

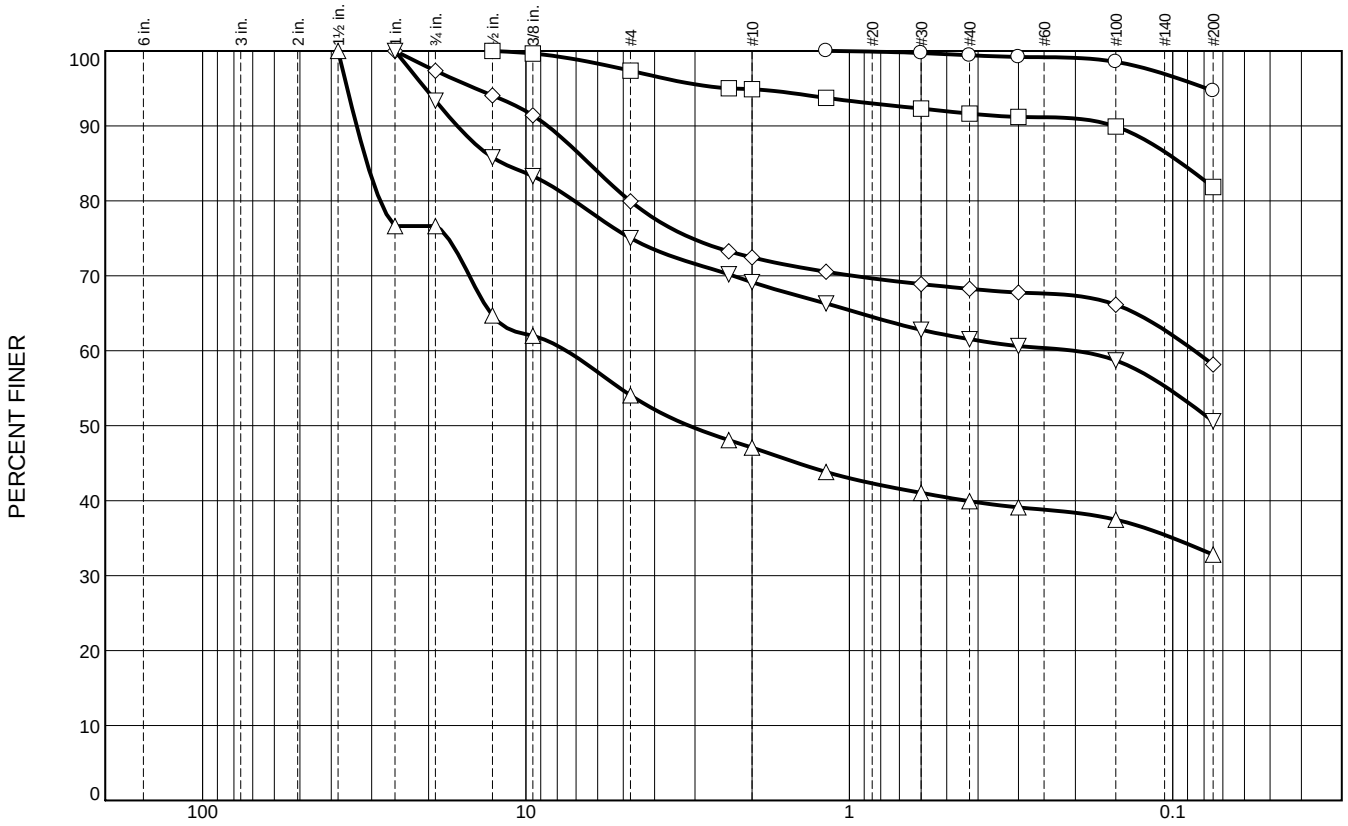
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-18

Tested By: R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	0	0	1	4	95
□	0	0	3	2	3	10	82
△	0	23	23	7	7	7	33
◇	0	3	17	8	4	10	58
▽	0	7	18	6	7	11	51

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-528	RW7B-4	10.0'	Lean clay	CL
□	LAB #18-528	RW7B-4	25.0'	Fat clay with sand	CH
△	LAB #18-528	RW7B-4	35.0'	Clayey gravel with sand	GC
◇	LAB #18-528	RW7B-4	45.0'	Sandy lean clay with gravel	CL
▽	LAB #18-528	RW7B-4	70.0'	Gravelly lean clay with sand	CL

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

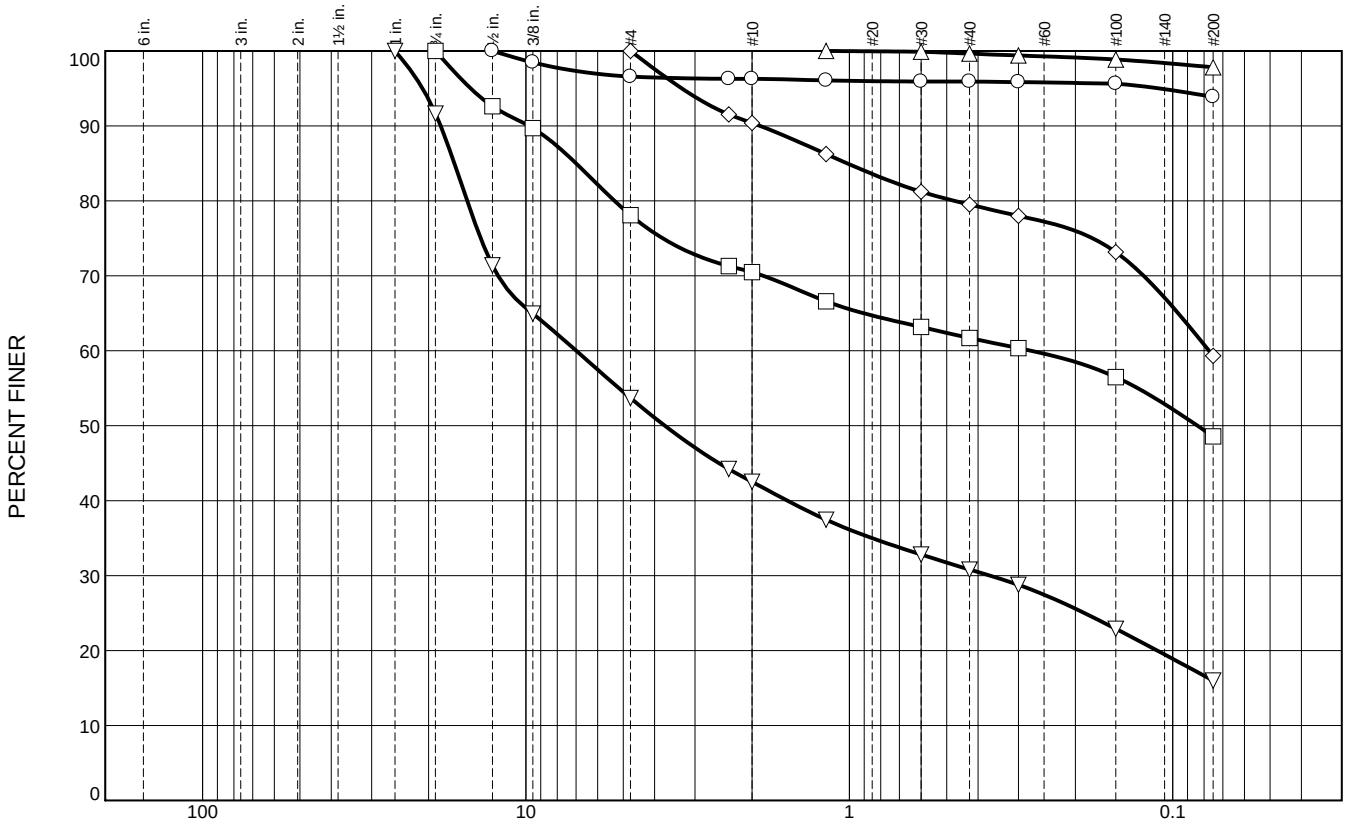
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-19

Tested By: R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	3	1	0	2	94
□	0	0	22	8	8	13	49
△	0	0	0	0	0	2	98
◇	0	0	0	10	10	21	59
▽	0	8	38	11	12	15	16

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-528	RW7B-4	80.0'	Fat clay	CH
□	LAB #18-501	RW7B-5	1.0'-4.0'	Clayey sand with gravel	SC
△	LAB #18-501	RW7B-5	5.0'-6.5'	Silt	ML
◇	LAB #18-501	RW7B-5	15.0'-16.5'	Sandy lean clay	CL
▽	LAB #18-501	RW7B-5	20.0'-21.5'	Silty clayey gravel with sand	GC-GM

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

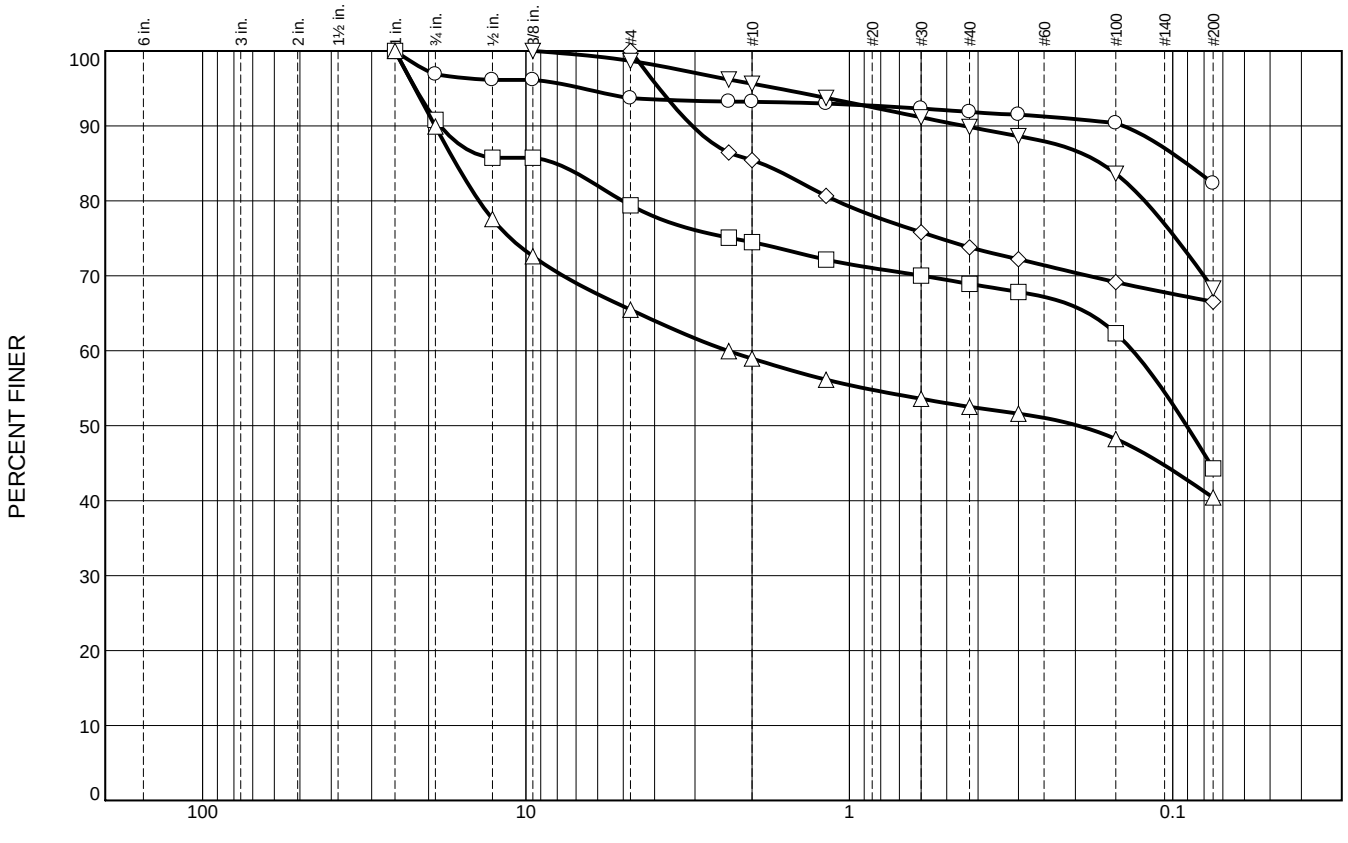
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-20

Tested By: ○ R. BRATTON □ A. SANDERS △ A. SANDERS ◇ K. MARIN ▽ A. SANDERS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	3	3	1	1	10	82
□	0	9	12	5	5	25	44
△	0	10	25	6	6	13	40
◇	0	0	0	15	11	7	67
▽	0	0	1	3	6	22	68

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-501	RW7B-5	30.0'-31.5'	Fat clay with sand	CH
□	LAB #18-501	RW7B-5	45.0'-46.5'	Clayey sand with gravel	SC
△	LAB #18-501	RW7B-5	55.0'-56.4'	Clayey gravel with sand	GC
◇	LAB #18-501	RW7B-5	75.0'-76.0'	Sandy silty clay	CL-ML
▽	LAB #19-008	RW7B-6	20.0'	Sandy lean clay	CL

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

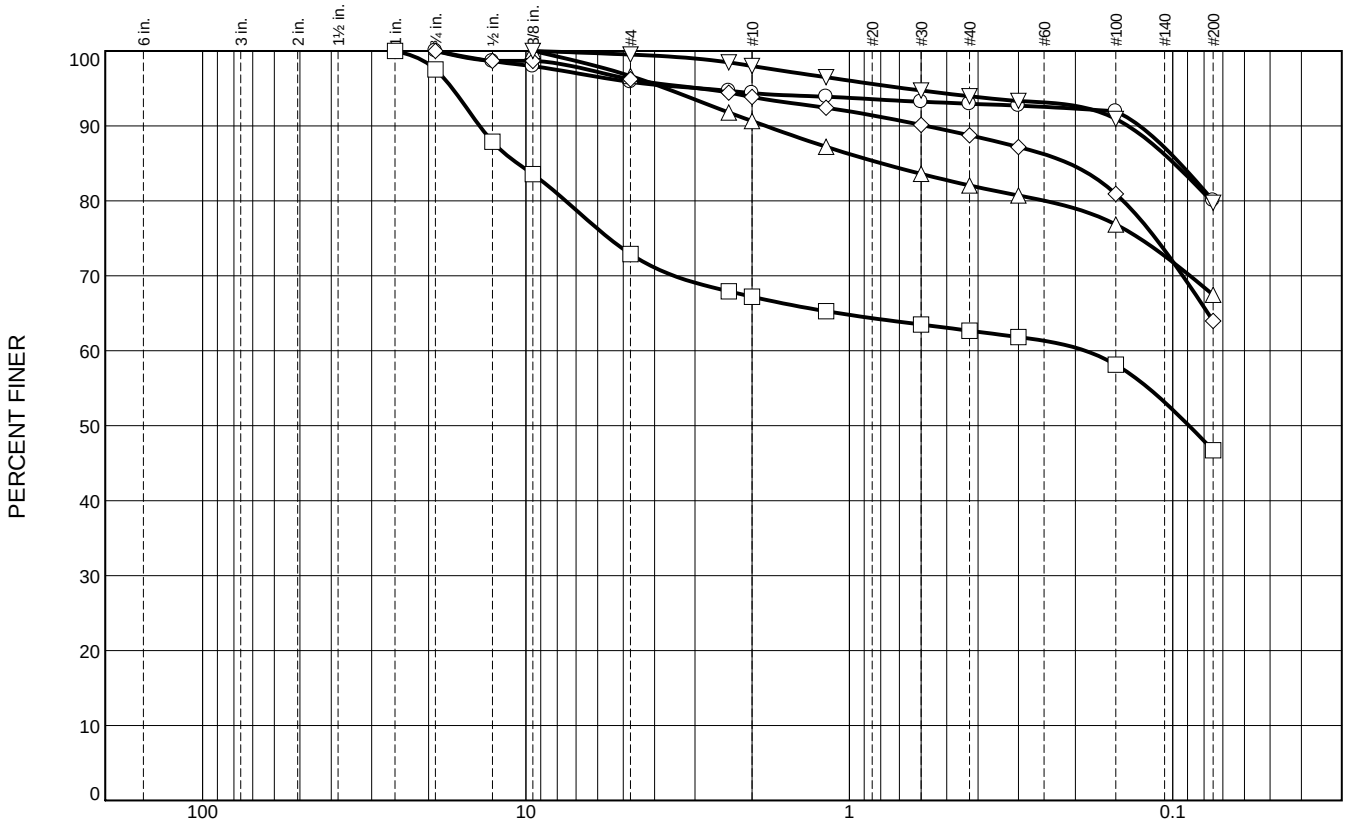
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-21

Tested By: ○ A. SANDERS □ K. MARIN △ K. MARIN ◇ K. MARIN ▽ R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	4	2	1	13	80
□	0	2	25	6	4	16	47
△	0	0	3	6	9	15	67
◇	0	0	4	2	5	25	64
▽	0	0	0	2	4	14	80

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-008	RW7B-6	40.0'	Lean clay with sand	CL
□	LAB #19-008	RW7B-6	45.0'	Clayey gravel with sand	GC
△	LAB #19-008	RW7B-6	55.0'	Sandy elastic silt	MH
◇	LAB #19-008	RW7B-7	10.0'	Sandy lean clay	CL
▽	LAB #19-008	RW7B-6	30.0'	Lean clay with sand	CL

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

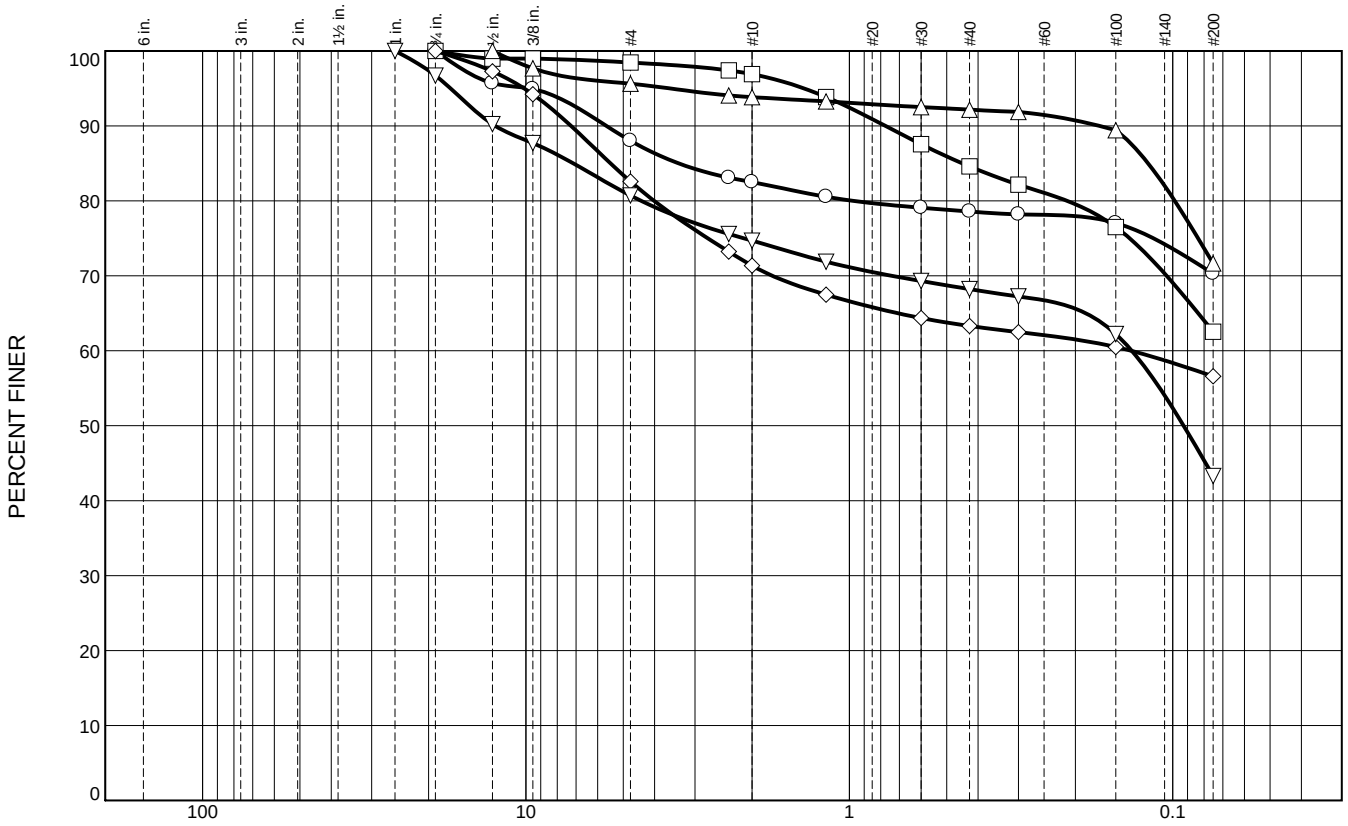
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-22

Tested By: R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	12	6	3	9	70
□	0	0	2	1	12	22	63
△	0	0	4	2	2	20	72
◇	0	0	17	12	8	6	57
▽	0	3	16	6	7	25	43

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-008	RW7B-7	20.0'	Sandy lean clay	CL
□	LAB #19-008	RW7B-7	30.0'	Sandy fat clay	CH
△	LAB #19-008	RW7B-7	40.0'	Lean clay with sand	CL
◇	LAB #19-075	RW7B-8	10.0'-11.5'	Sandy lean clay with gravel	CL
▽	LAB #19-075	RW7B-8	15.0'-16.5'	Clayey sand with gravel	SC

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-23

Tested By: ○ R. BRATTON □ R. BRATTON △ R. BRATTON ◇ K. MARIN ▽ K. MARIN

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	2	5	7	15	71
□	0	0	27	20	23	11	19
△	0	4	16	9	15	15	41
◇	0	0	10	5	5	34	46
▽	0	0	14	17	22	15	32

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-075	RW7B-8	25.0'-25.75'	Lean clay with sand	CL
□	LAB #18-500	RW8B-1	0.5'-5.0'	Silty sand with gravel	SM
△	LAB #18-500	RW8B-1	20.0'-21.3'	Clayey sand with gravel	SC
◇	LAB #18-500	RW8B-1	40.0'-41.5'	Clayey sand	SC
▽	LAB #18-500	RW8B-1	50.0'-51.5'	Clayey sand	SC

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

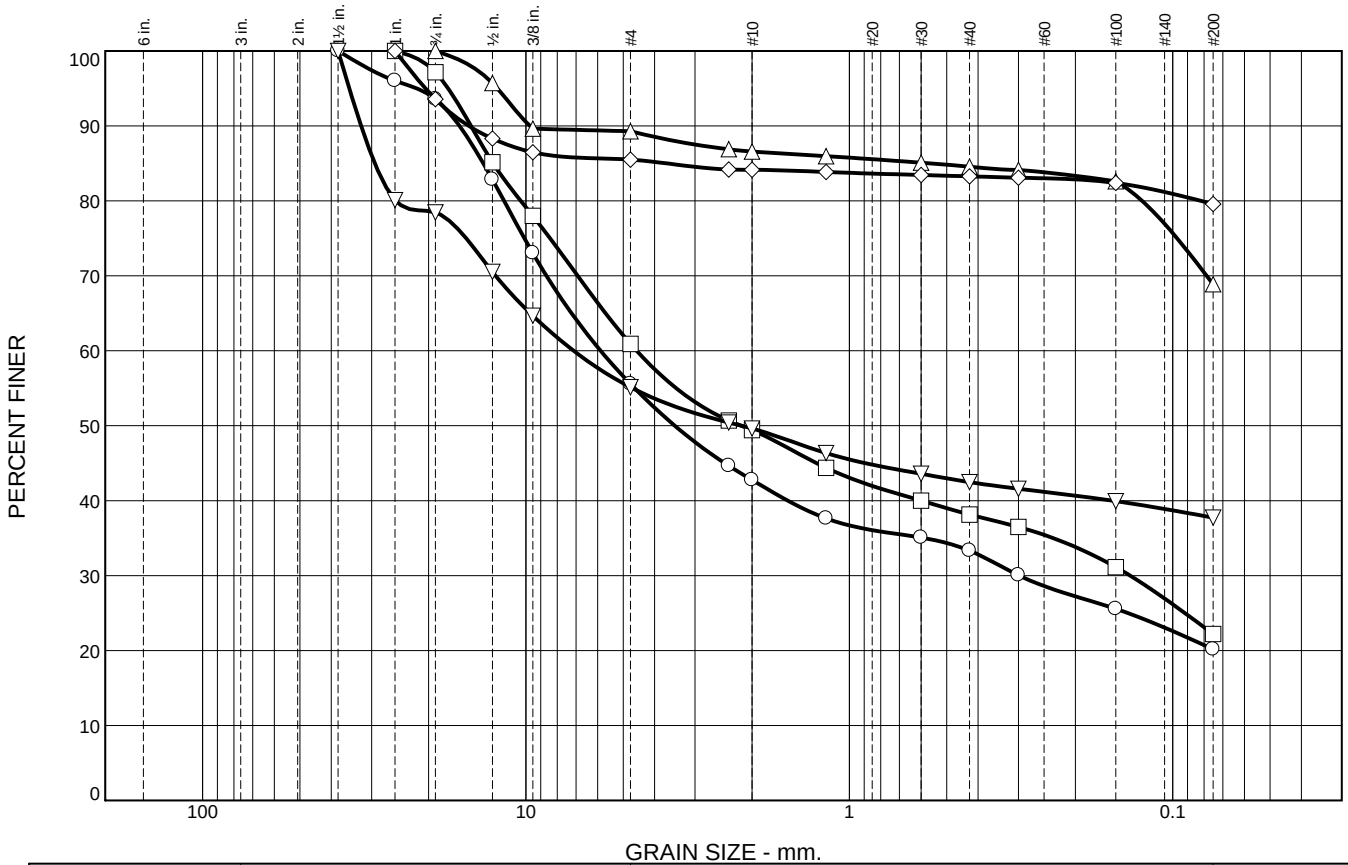
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-24

Tested By: ○ K. MARIN □ K. MARIN △ C. BYER ◇ C. BYER ▽ C. BYER

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	6	38	13	10	13	20
□	0	3	36	12	11	16	22
△	0	0	11	2	2	16	69
◇	0	6	9	1	1	3	80
▽	0	22	23	5	8	4	38

SOIL DATA

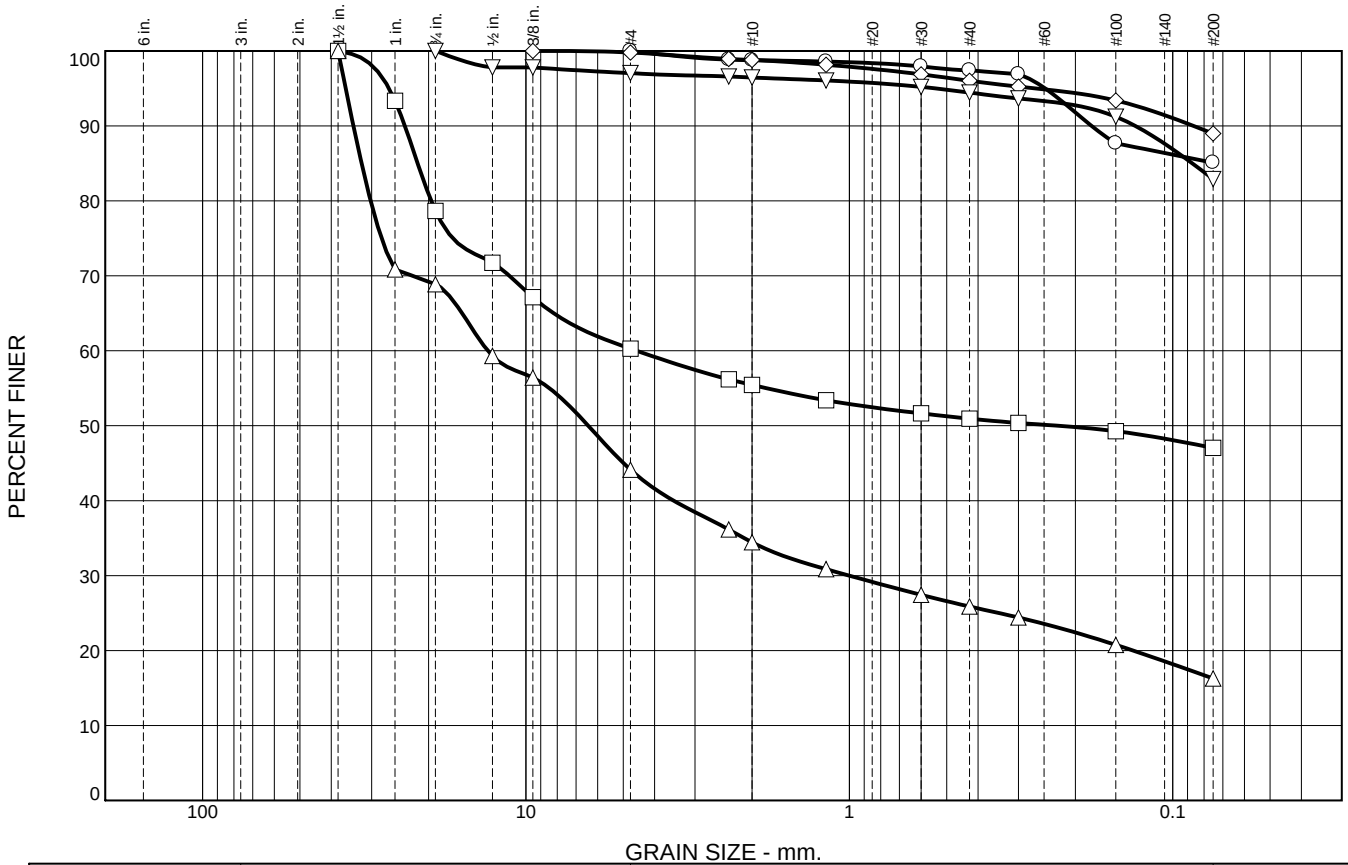
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-501	RW8B-2	1.0'-5.0'	Clayey gravel with sand	GC
□	LAB #18-501	RW8B-2	20.0'-21.5'	Clayey sand with gravel	SC
△	LAB #18-501	RW8B-2	30.0'-31.5'	Sandy lean clay	CL
◇	LAB #18-501	RW8B-2	45.0'-46.5'	Fat clay with gravel	CH
▽	LAB #18-501	RW8B-2	55.0'-56.5'	Clayey gravel with sand	GC

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.
GES

Client: HDR
Project: US95-CC215 INTERCHANGE, PHASE 3D/E
Project No.: 20184521E1 **Figure** B-25

Tested By: ○ K. MARIN □ K. MARIN △ K. MARIN ◇ A. SANDERS ▽ K. MARIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	0	1	2	12	85
□	0	21	19	5	4	4	47
△	0	31	25	10	8	10	16
◇	0	0	0	1	3	7	89
▽	0	0	3	1	2	11	83

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #18-501	RW8B-2	70.0'-71.5'	Lean clay with sand	CL
□	LAB #18-501	RW8B-2	85.0'-86.5'	Clayey gravel	GC
△	LAB #19-008	RW10B-1	5.0'	Silty gravel with sand	GM
◇	LAB #19-008	RW10B-1	10.0'	Lean clay	CL
▽	LAB #19-008	RW10B-2	5.0'	Silty clay with sand	CL-ML

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

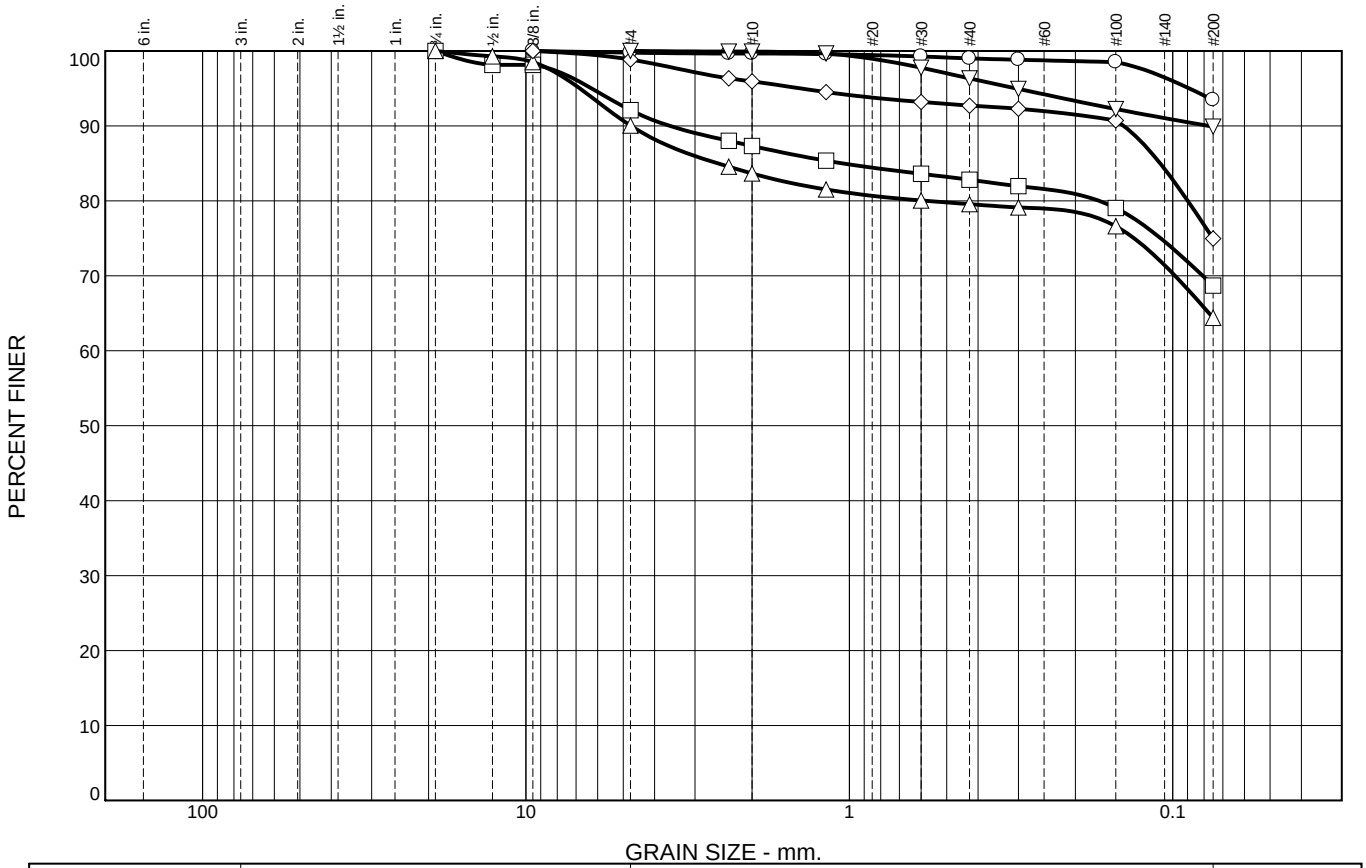
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-26

Tested By: ○ A. SANDERS □ A. SANDERS △ R. BRATTON ◇ R. BRATTON ▽ R. BRATTON

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	0	0	1	6	93
□	0	0	8	5	4	14	69
△	0	0	10	6	4	16	64
◇	0	0	1	3	3	18	75
▽	0	0	0	0	4	6	90

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-008	RW10B-2	10.0'	Silt	ML
□	LAB #19-008	RW10B-2	25.0'	Sandy elastic silt	MH
△	LAB #19-008	RW10B-2	30.0'	Sandy lean clay	CL
◇	LAB #19-008	RW10B-2	40.0'	Lean clay with sand	CL
▽	LAB #19-073	RW14B-1	5.0'-6.5'	Lean clay	CL

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

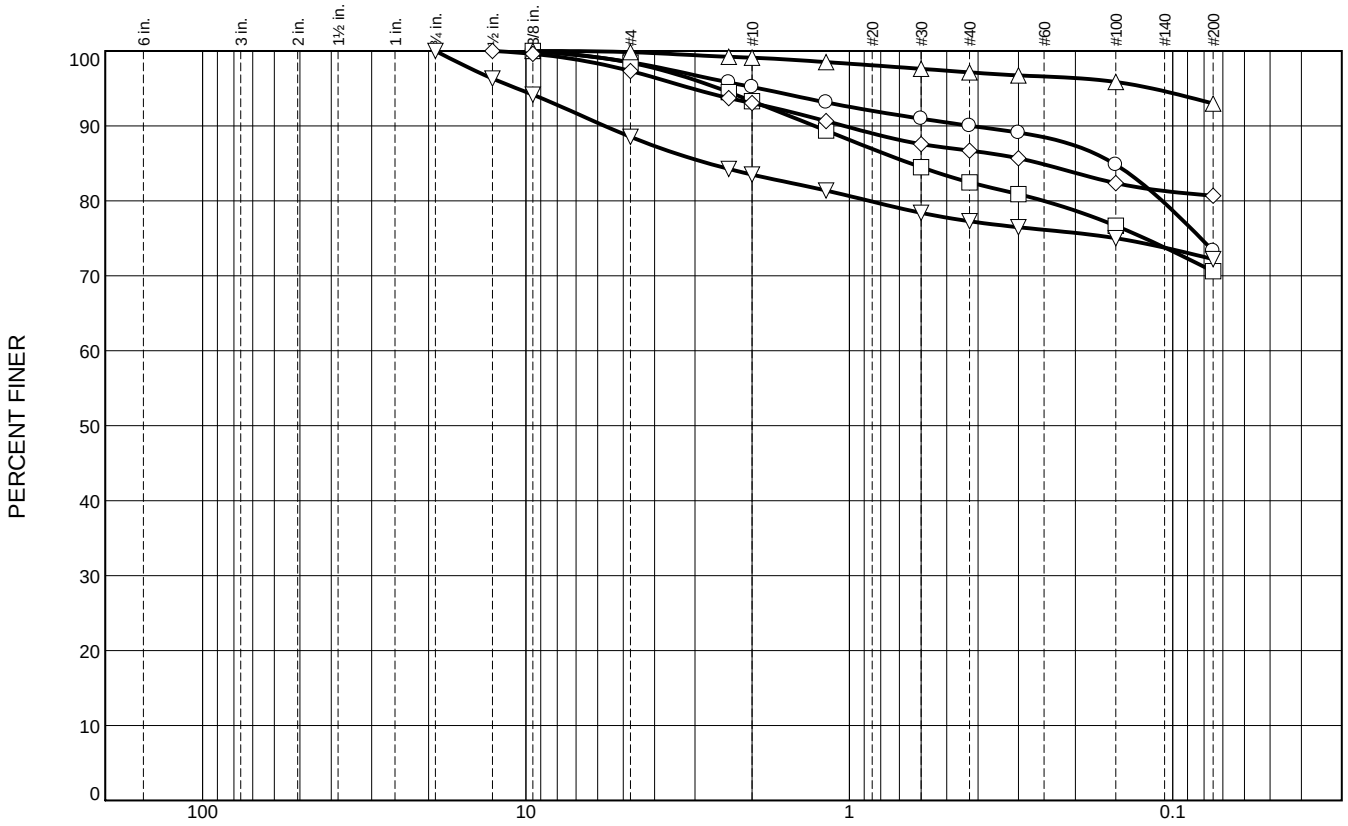
Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-27

Tested By: ○ R. BRATTON □ R. BRATTON △ R. BRATTON ◇ R. BRATTON ▽ K. MARIN

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	Silt
○	0	0	2	3	5	17	73
□	0	0	2	5	11	11	71
△	0	0	0	1	2	4	93
◇	0	0	3	4	6	6	81
▽	0	0	11	5	7	5	72

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	LAB #19-073	RW14B-1	15.0'-16.5'	Lean clay with sand	CL
□	LAB #19-073	RW14B-1	25.0'-26.5'	Lean clay with sand	CL
△	LAB #19-073	RW14B-1	35.0'-36.5'	Lean clay	CL
◇	LAB #19-073	RW14B-1	45.0'-46.5'	Lean clay with sand	CL
▽	LAB #19-073	RW14B-1	55.0'-55.7'	Lean clay with sand	CL

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Client: HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Project No.: 20184521E1 **Figure** B-28

Tested By: K. MARIN

GEOTECHNICAL &
ENVIRONMENTAL
SERVICES, INC.

7150 Placid Street
Las Vegas, NV 89119
(702) 365-1001

-200 Wash Log

Project Name: US 95 - CC215, Phase 3D/E **Lab No.:** 19-024

Date Sampled: 20184521E1 **Tested By:** K. Marin **Date:** 1/14/2019

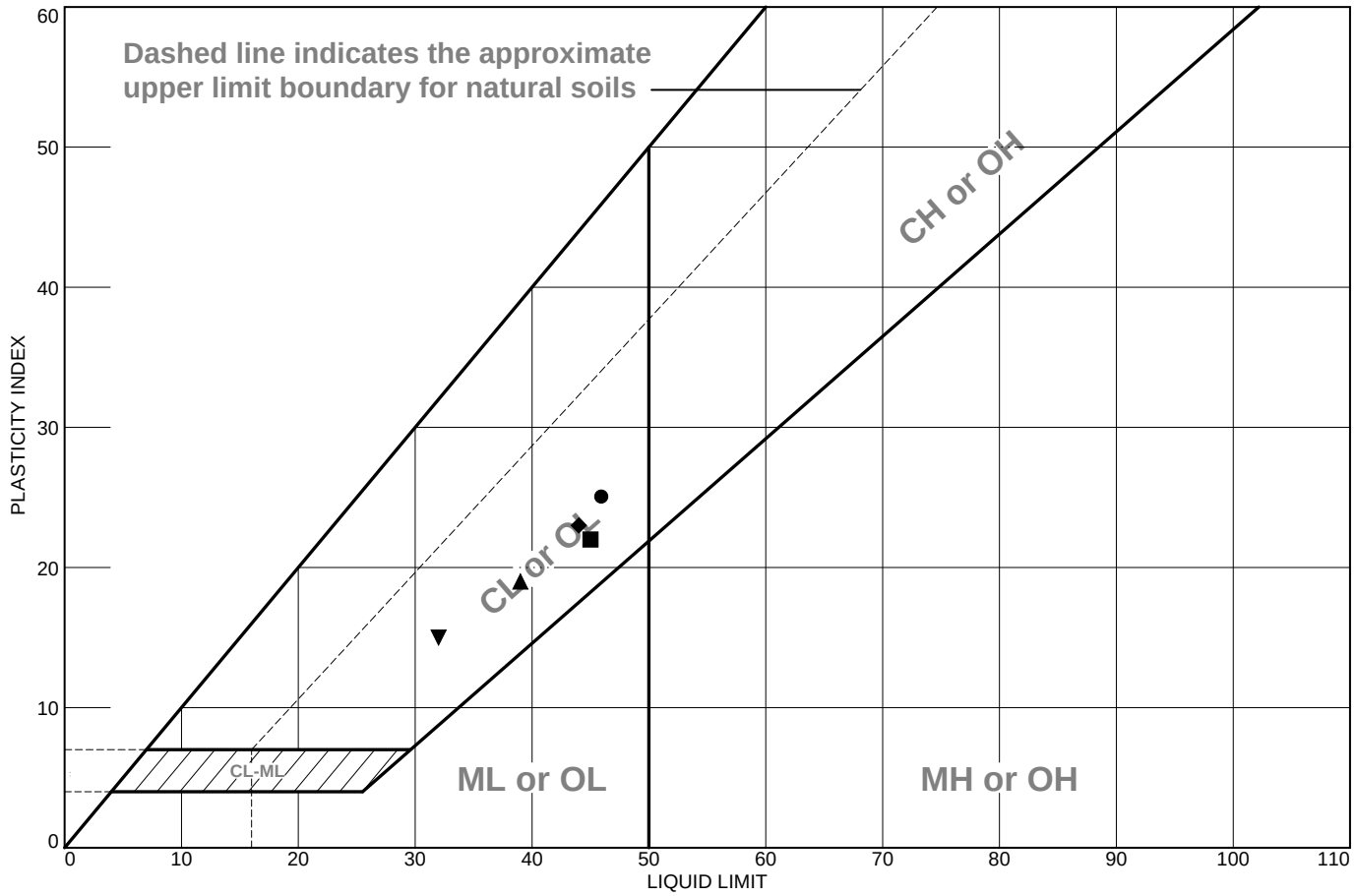
Sample:	H3036B-5					
Depth:	15.0'					
DRY WT. + TARE BEFORE WASH	553.70					
DRY WT. + TARE AFTER WASH	320.90					
TARE WT.	126.70					
DRY WT. BEFORE WASH	427.00					
WEIGHT LOST	232.80					
% PASSING #200	54.5					

Remarks/Condition: _____

_____

Figure B-29

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay with sand	46	21	25	91	75	CL
■	Lean clay with sand	45	23	22	86	79	CL
▲	Clayey gravel with sand	39	20	19	61	47	GC
◆	Lean clay	44	21	23	100	99	CL
▼	Gravelly lean clay	32	17	15	69	63	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3033B-1 @ 15.0'-16.5' **Depth:** 15.0'-16.5' **Sample Number:** H3033B-1

■**Location:** H3033B-1 @ 25.0'-26.5' **Depth:** 25.0'-26.5' **Sample Number:** H3033B-1

▲**Location:** H3033B-1 @ 35.0'-36.5' **Depth:** 35.0'-36.5' **Sample Number:** H3033B-1

◆**Location:** H3033B-1 @ 70.0'-71.5' **Depth:** 70.0'-71.5' **Sample Number:** H3033B-1

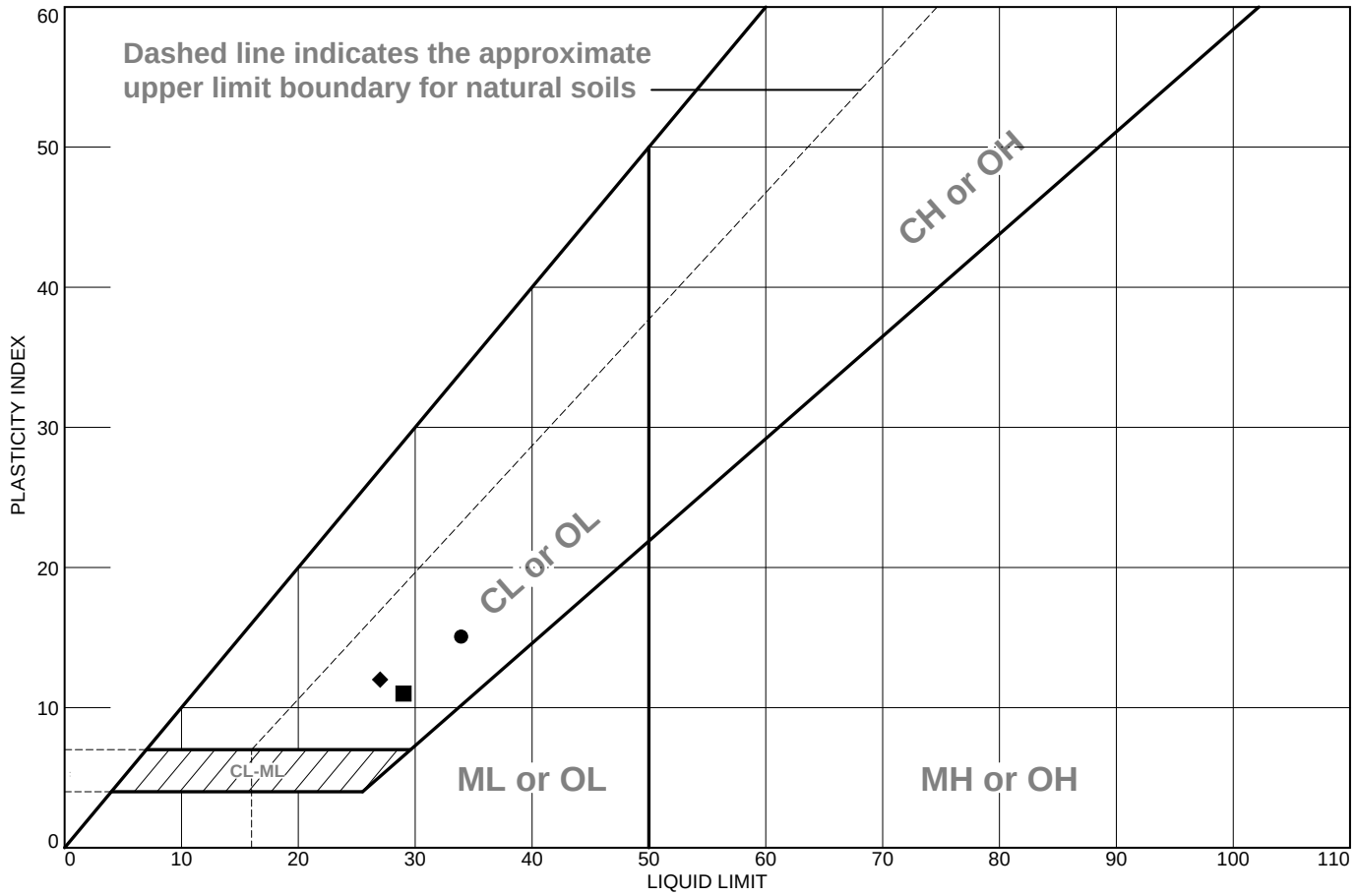
▼**Location:** H3033B-1 @ 80.0'-81.5' **Depth:** 80.0'-81.5' **Sample Number:** H3033B-1

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-30

Tested By: ○ R. BRATTON □ K. MARIN △ R. BRATTON ◇ K. MARIN ▽ R. BRATTON

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	34	19	15	95	92	CL
■	Lean clay	29	18	11	100	93	CL
▲	Silt	NV	NP	NP	100	95	ML
◆	Clayey sand	27	15	12	71	49	SC
▼	Silty sand	NV	NP	NP	68	44	SM

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

●**Location:** H3033B-1 @ 100.0'-101.5' **Depth:** 100.0'-101.5' **Sample Number:** H3033B-1

■**Location:** H3033B-1 @ 110.0'-111.5' **Depth:** 110.0'-111.5' **Sample Number:** H3033B-1

▲**Location:** H3033B-2 @ 5.0'-6.5' **Depth:** 5.0'-6.5' **Sample Number:** H3033B-2

◆**Location:** H3033B-2 @ 10.0'-11.6' **Depth:** 10.0'-11.6' **Sample Number:** H3033B-2

▼**Location:** H3033B-2 @ 25.0'-26.5' **Depth:** 25.0'-26.5' **Sample Number:** H3033B-2

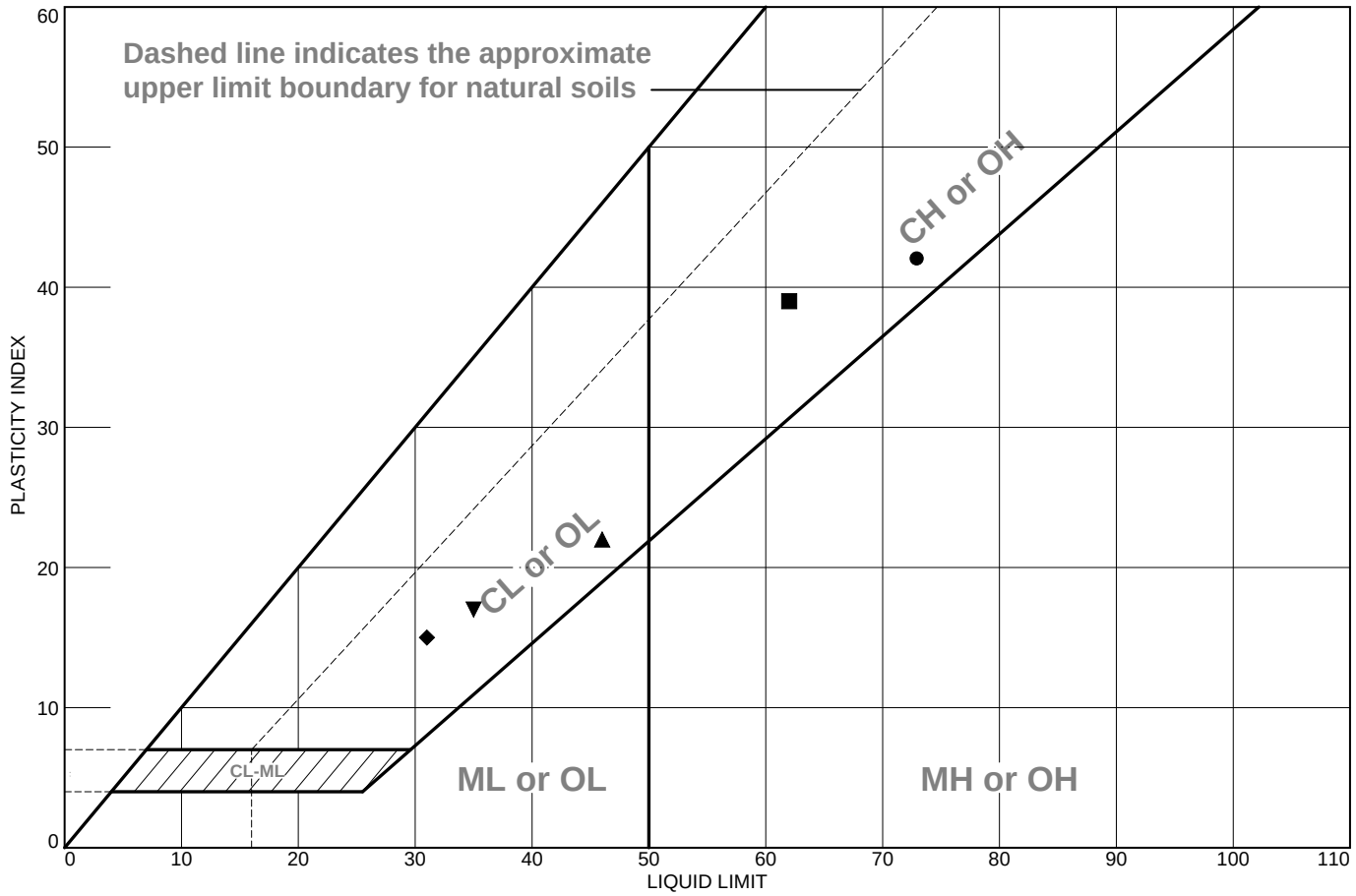
GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.
GES

Remarks:

Figure B-31

Tested By: ○ R. BRATTON □ R. BRATTON △ K. MARIN ◇ K. MARIN ▽ K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy fat clay	73	31	42	86	68	CH
■	Sandy fat clay	62	23	39	99	59	CH
▲	Clayey gravel with sand	46	24	22	44	30	GC
◆	Lean clay with sand	31	16	15	90	73	CL
▼	Lean clay with sand	35	18	17	91	76	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3033B-2 @ 40.0'-41.5' **Depth:** 40.0'-41.5' **Sample Number:** H3033B-2

■**Location:** H3033B-2 @ 45.0'-46.5' **Depth:** 45.0'-46.5' **Sample Number:** H3033B-2

▲**Location:** H3033B-2 @ 60.0'-61.5' **Depth:** 60.0'-61.5' **Sample Number:** H3033B-2

◆**Location:** H3033B-2 @ 80.0'-81.5' **Depth:** 80.0'-81.5' **Sample Number:** H3033B-2

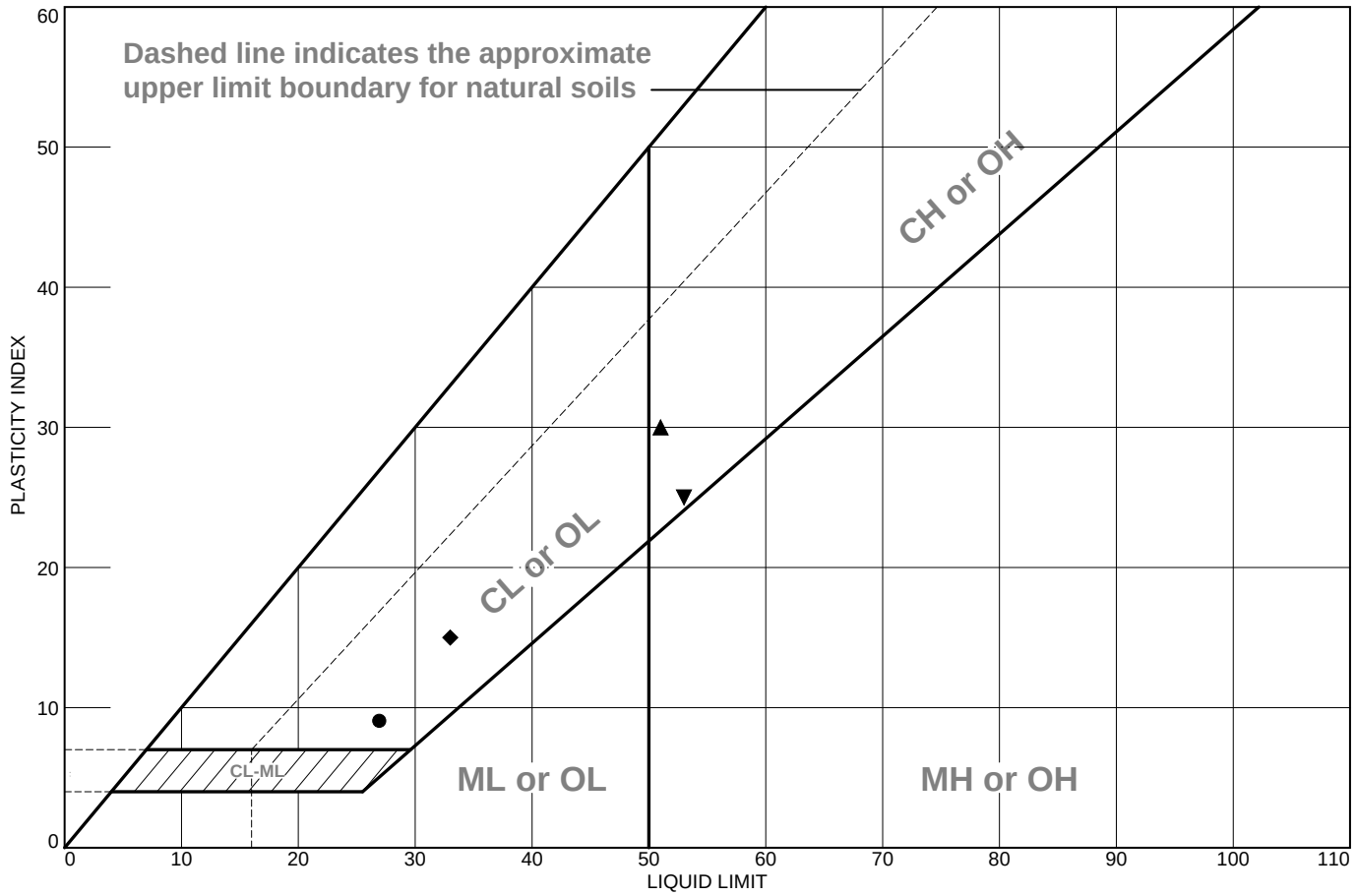
▼**Location:** H3033B-2 @ 105.0'-106.5' **Depth:** 105.0'-106.5' **Sample Number:** H3033B-2

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.
GES

Figure B-32

Tested By: ○ K. MARIN □ K. MARIN △ C. BYER ◇ K. MARIN ▽ K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	27	18	9	95	89	CL
■	Silt	NV	NP	NP	98	93	ML
▲	Clayey gravel with sand	51	21	30	41	25	GC
◆	Clayey gravel with sand	33	18	15	47	42	GC
▼	Sandy fat clay with gravel	53	28	25	76	61	CH

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

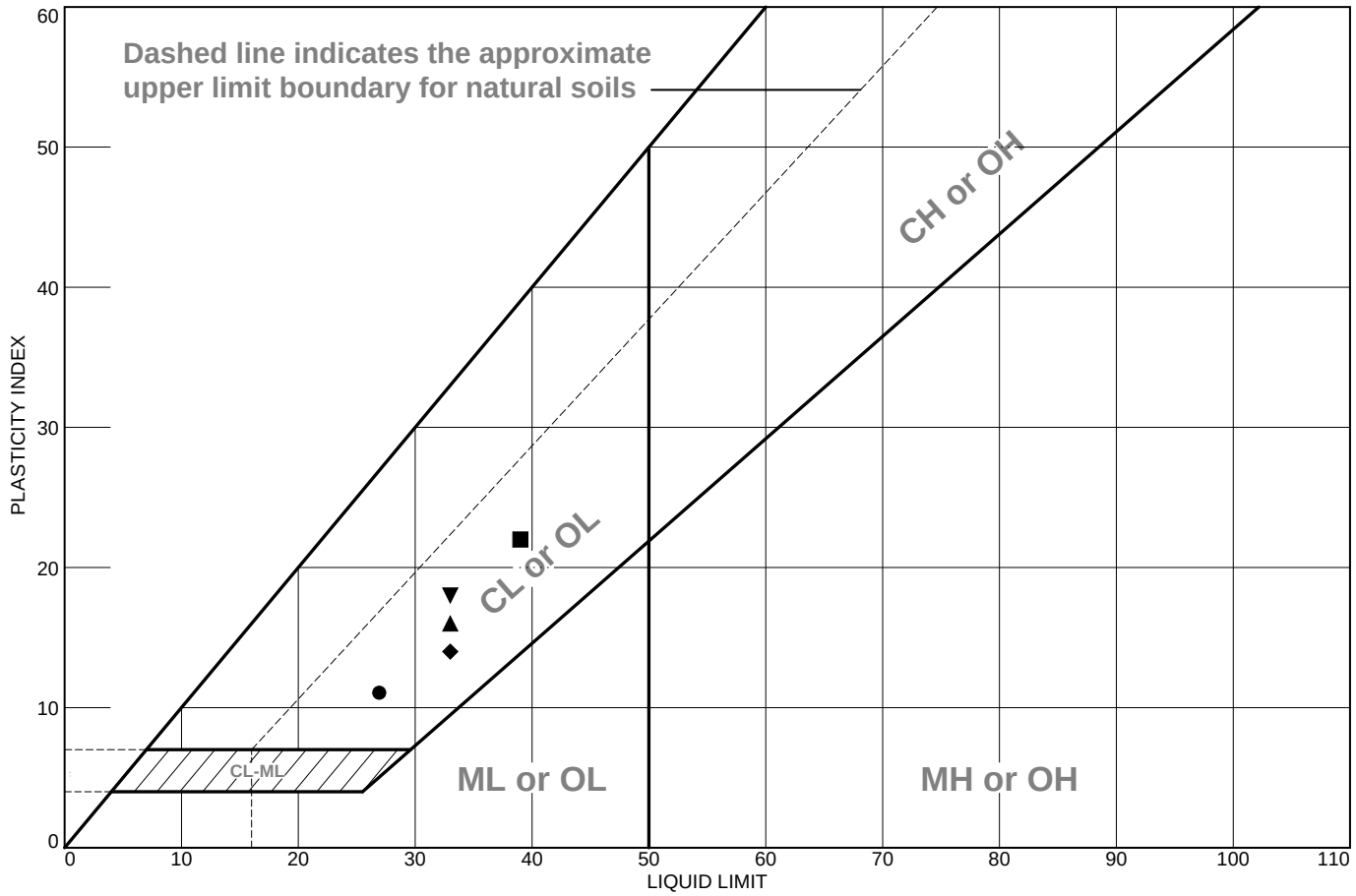
●	**Location:** H3034B-1 @ 10.0'-11.5'	**Depth:** 10.0'-11.5'	**Sample Number:** H3034B-1
■	**Location:** H3034B-1 @ 20.0'-21.5'	**Depth:** 20.0'-21.5'	**Sample Number:** H3034B-1
▲	**Location:** H3034B-1 @ 35.0'-36.5'	**Depth:** 35.0'-36.5'	**Sample Number:** H3034B-1
◆	**Location:** H3034B-1 @ 45.0'-46.5'	**Depth:** 45.0'-46.5'	**Sample Number:** H3034B-1
▼	**Location:** H3034B-1 @ 55.0'-56.5'	**Depth:** 55.0'-56.5'	**Sample Number:** H3034B-1

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-33

Tested By: K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay with sand	27	16	11	83	73	CL
■	Lean clay with sand	39	17	22	90	75	CL
▲	Gravelly lean clay with sand	33	17	16	60	54	CL
◆	Sandy lean clay	33	19	14	69	62	CL
▼	Sandy lean clay	33	15	18	83	65	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3034B-1 @ 74.0'-76.0' **Depth:** 74.0'-76.0' **Sample Number:** H3034B-1

■**Location:** H3034B-1 @ 85.0'-86.5' **Depth:** 85.0'-86.5' **Sample Number:** H3034B-1

▲**Location:** H3034B-1 @ 100.0'-101.5' **Depth:** 100.0'-101.5' **Sample Number:** H3034B-1

◆**Location:** H3034B-1 @ 110.0'-111.5' **Depth:** 110.0'-111.5' **Sample Number:** H3034B-1

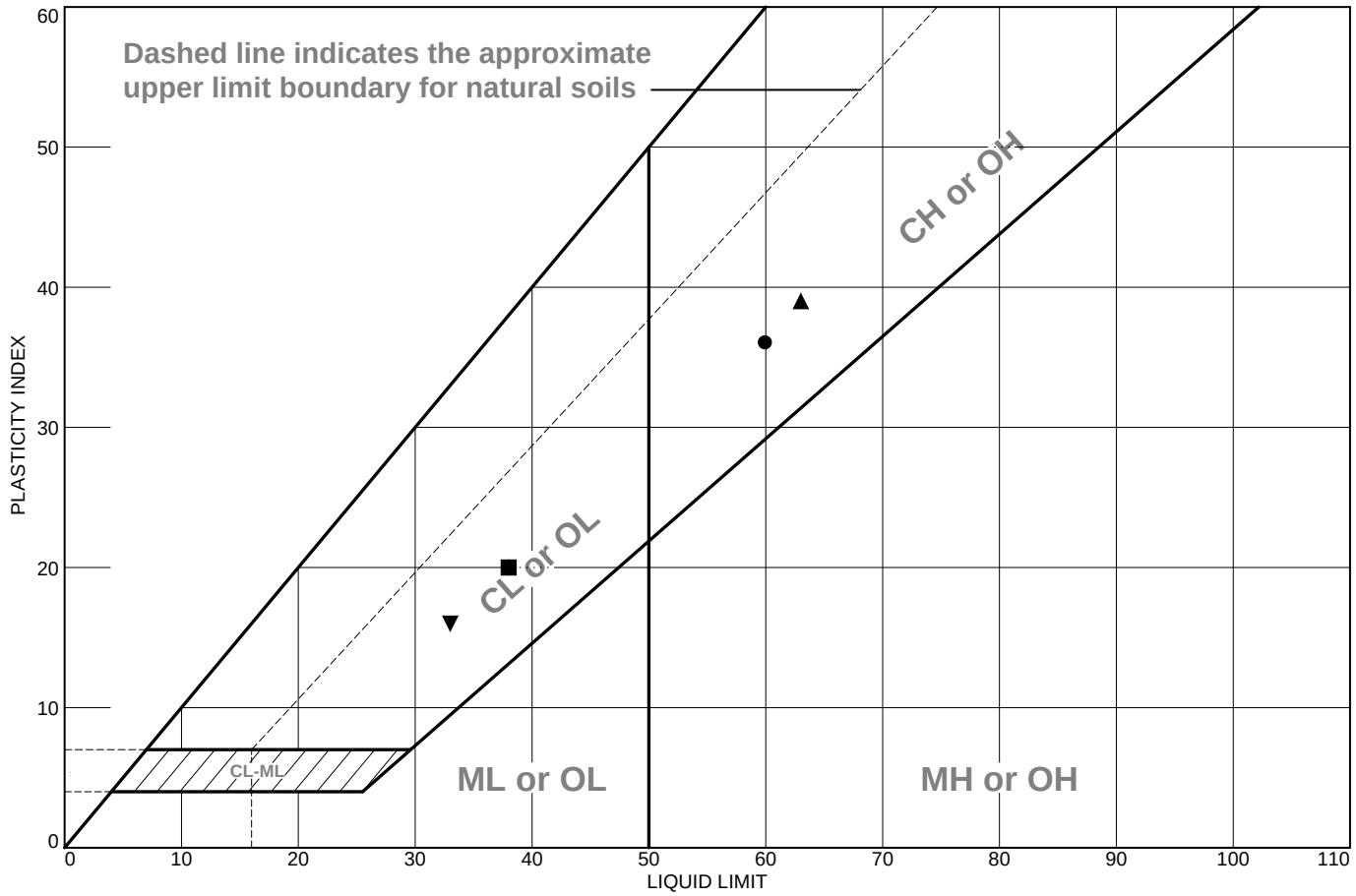
▼**Location:** H3034B-2 @ 20.0'-21.5' **Depth:** 20.0'-21.5' **Sample Number:** H3034B-2

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-34

Tested By: ○ K. MARIN □ K. MARIN △ K. MARIN ◇ K. MARIN ▽ R. BRATTON

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy fat clay	60	24	36	81	55	CH
■	Clayey gravel with sand	38	18	20	44	32	GC
▲	Sandy fat clay with gravel	63	24	39	73	53	CH
◆	Lean clay	38	18	20	90	87	CL
▼	Lean clay	33	17	16	98	94	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3034B-2 @ 30.0'-31.5' **Depth:** 30.0'-31.5' **Sample Number:** H3034B-2

■**Location:** H3034B-2 @ 50.0'-51.5' **Depth:** 50.0'-51.5' **Sample Number:** H3034B-2

▲**Location:** H3034B-2 @ 60.0'-61.5' **Depth:** 60.0'-61.5' **Sample Number:** H3034B-2

◆**Location:** H3034B-2 @ 85.0'-86.5' **Depth:** 85.0'-86.5' **Sample Number:** H3034B-2

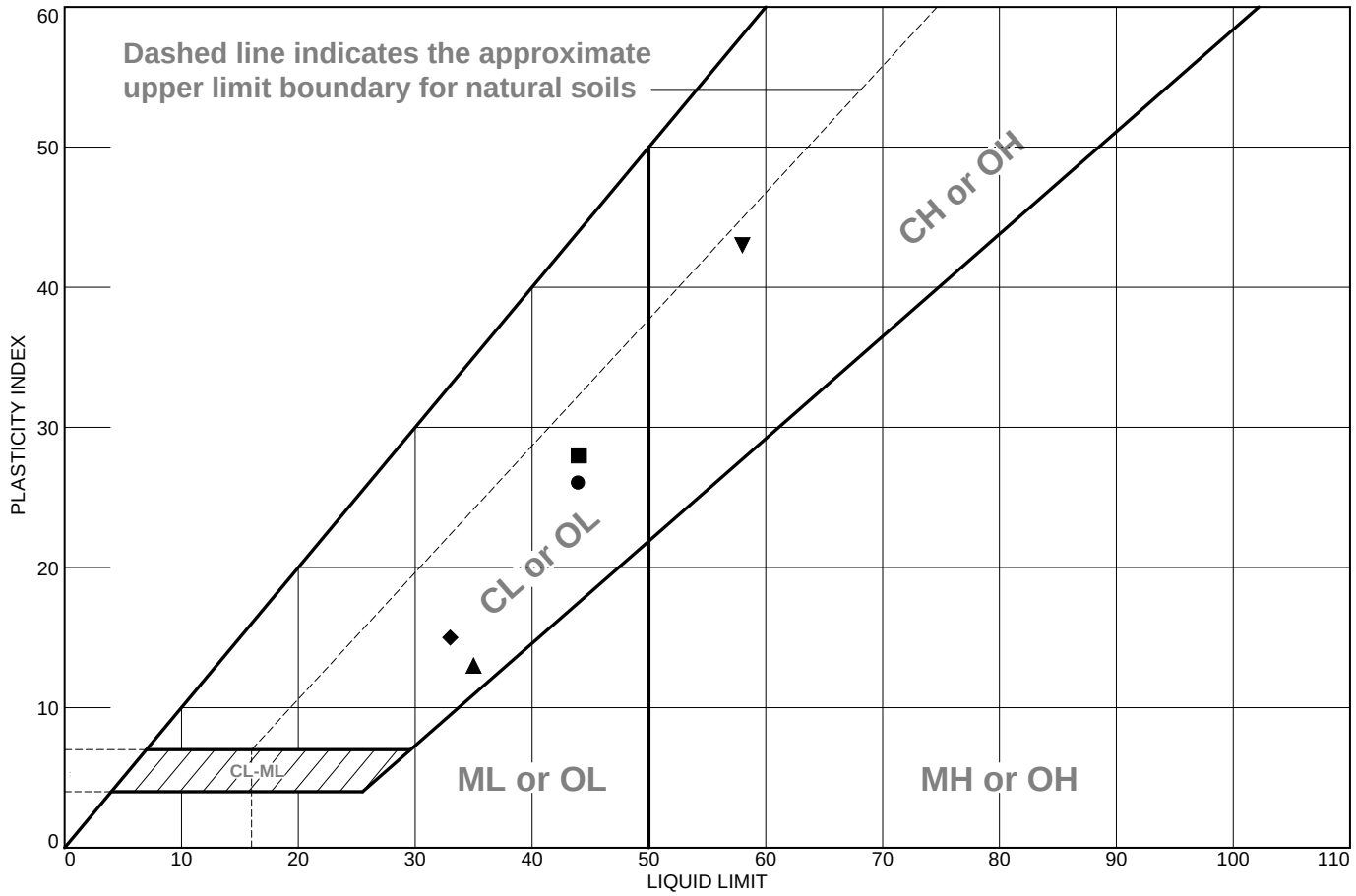
▼**Location:** H3034B-2 @ 95.0'-96.5' **Depth:** 95.0'-96.5' **Sample Number:** H3034B-2

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-35

Tested By: R. BRATTON

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay with sand	44	18	26	100	81	CL
■	Clayey sand with gravel	44	16	28	61	28	SC
▲	Lean clay with sand	35	22	13	91	85	CL
◆	Sandy lean clay	33	18	15	79	65	CL
▼	Fat clay with sand	58	15	43	98	74	CH

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3034B-2 @ 105.0'-106.5' **Depth:** 105.0'-106.5' **Sample Number:** H3034B-2

■**Location:** H3034B-3 @ 15.0'-16.5' **Depth:** 15.0'-16.5' **Sample Number:** H3034B-3

▲**Location:** H3034B-3 @ 25.0'-26.5' **Depth:** 25.0'-26.5' **Sample Number:** H3034B-3

◆**Location:** H3034B-3 @ 40.0'-41.5' **Depth:** 40.0'-41.5' **Sample Number:** H3034B-3

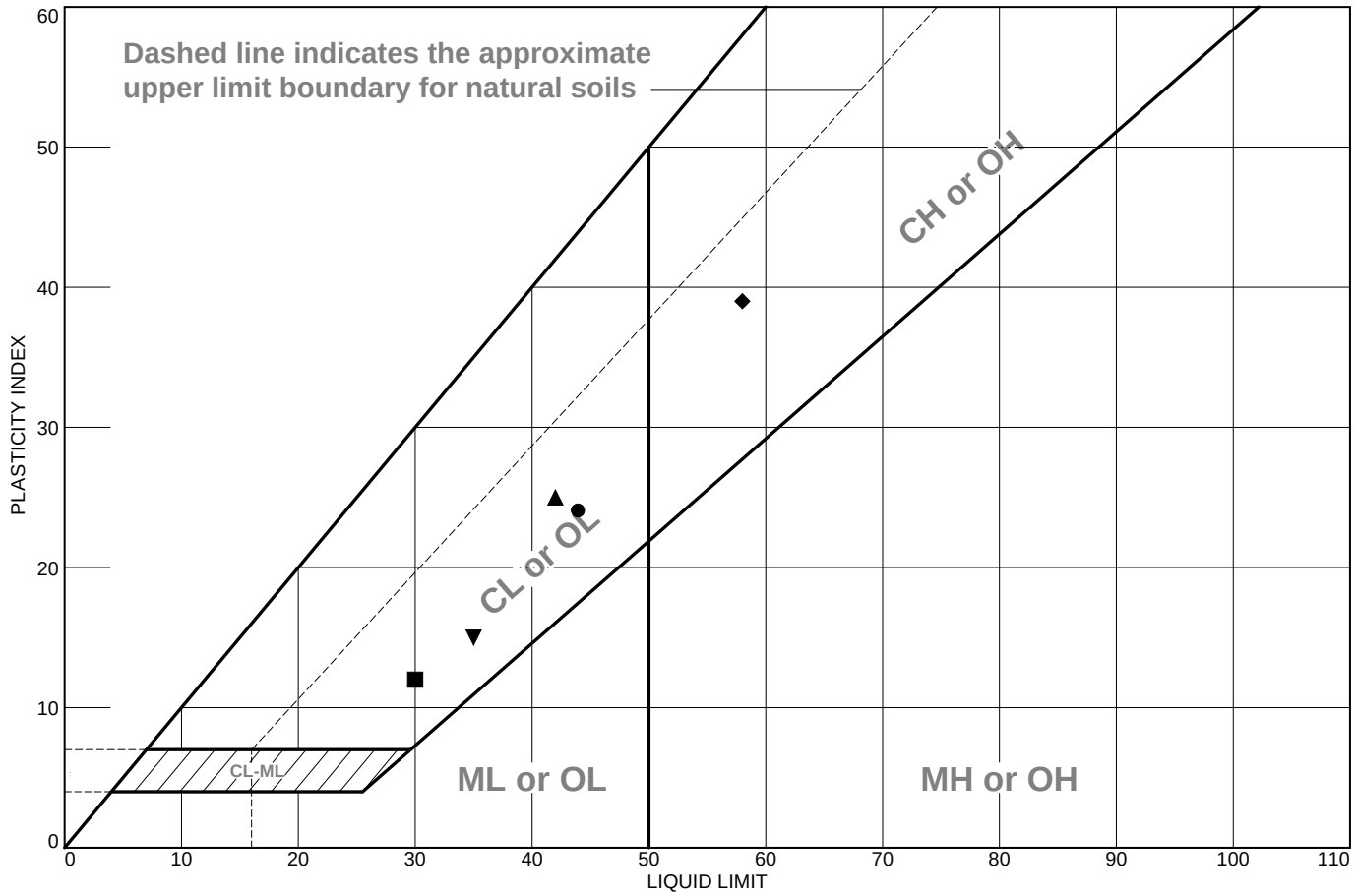
▼**Location:** H3034B-3 @ 50.0'-51.5' **Depth:** 50.0'-51.5' **Sample Number:** H3034B-3

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-36

Tested By: ○ R. BRATTON □ K. MARIN △ K. MARIN ◇ K. MARIN ▽ K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey gravel with sand	44	20	24	57	43	GC
■	Lean clay	30	18	12	96	89	CL
▲	Lean clay	42	17	25	100	98	CL
◆	Fat clay with sand	58	19	39	98	80	CH
▼	Lean clay	35	20	15	91	86	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3034B-3 @ 55.0'-56.5' **Depth:** 55.0'-56.5' **Sample Number:** H3034B-3

■**Location:** H3034B-3 @ 80.0'-81.5' **Depth:** 80.0'-81.5' **Sample Number:** H3034B-3

▲**Location:** H3034B-3 @ 82.0'-84.5' **Depth:** 82.0'-84.5' **Sample Number:** H3034B-3

◆**Location:** H3034B-3 @ 90.0'-91.5' **Depth:** 90.0'-91.5' **Sample Number:** H3034B-3

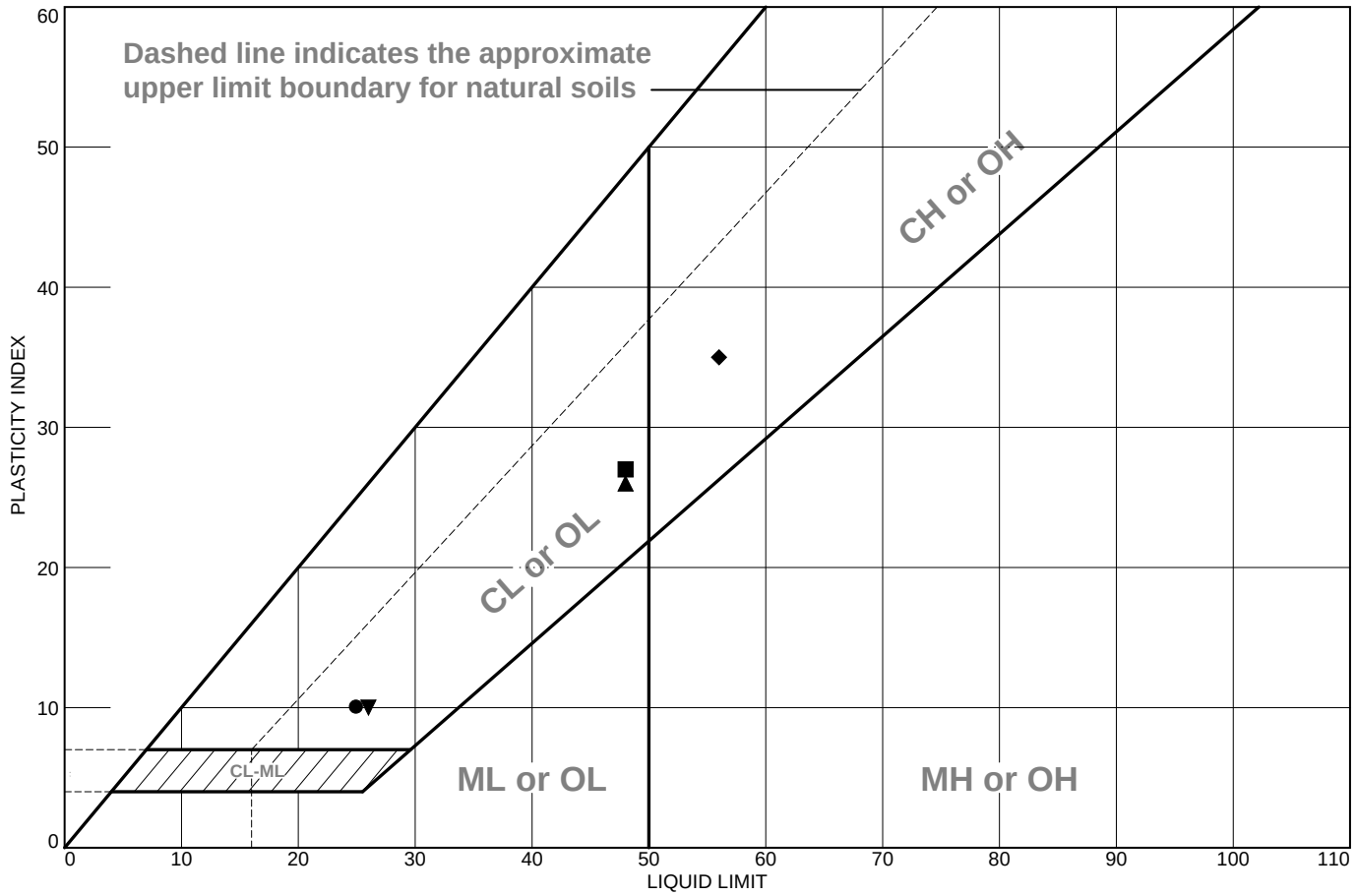
▼**Location:** H3034B-3 @ 105.0'-106.5' **Depth:** 105.0'-106.5' **Sample Number:** H3034B-3

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-37

Tested By: K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey gravel with sand	25	15	10	59	48	GC
■	Clayey sand	48	21	27	90	45	SC
▲	Sandy lean clay	48	22	26	74	60	CL
◆	Clayey gravel with sand	56	21	35	50	35	GC
▼	Lean clay with gravel	26	16	10	81	72	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

●**Location:** H3036B-1 @ 5.0' **Depth:** 5.0' **Sample Number:** H3036B-1

■**Location:** H3036B-1 @ 20.0' **Depth:** 20.0' **Sample Number:** H3036B-1

▲**Location:** H3036B-1 @ 35.0' **Depth:** 35.0' **Sample Number:** H3036B-1

◆**Location:** H3036B-1 @ 45.0' **Depth:** 45.0' **Sample Number:** H3036B-1

▼**Location:** H3036B-1 @ 75.0' **Depth:** 75.0' **Sample Number:** H3036B-1

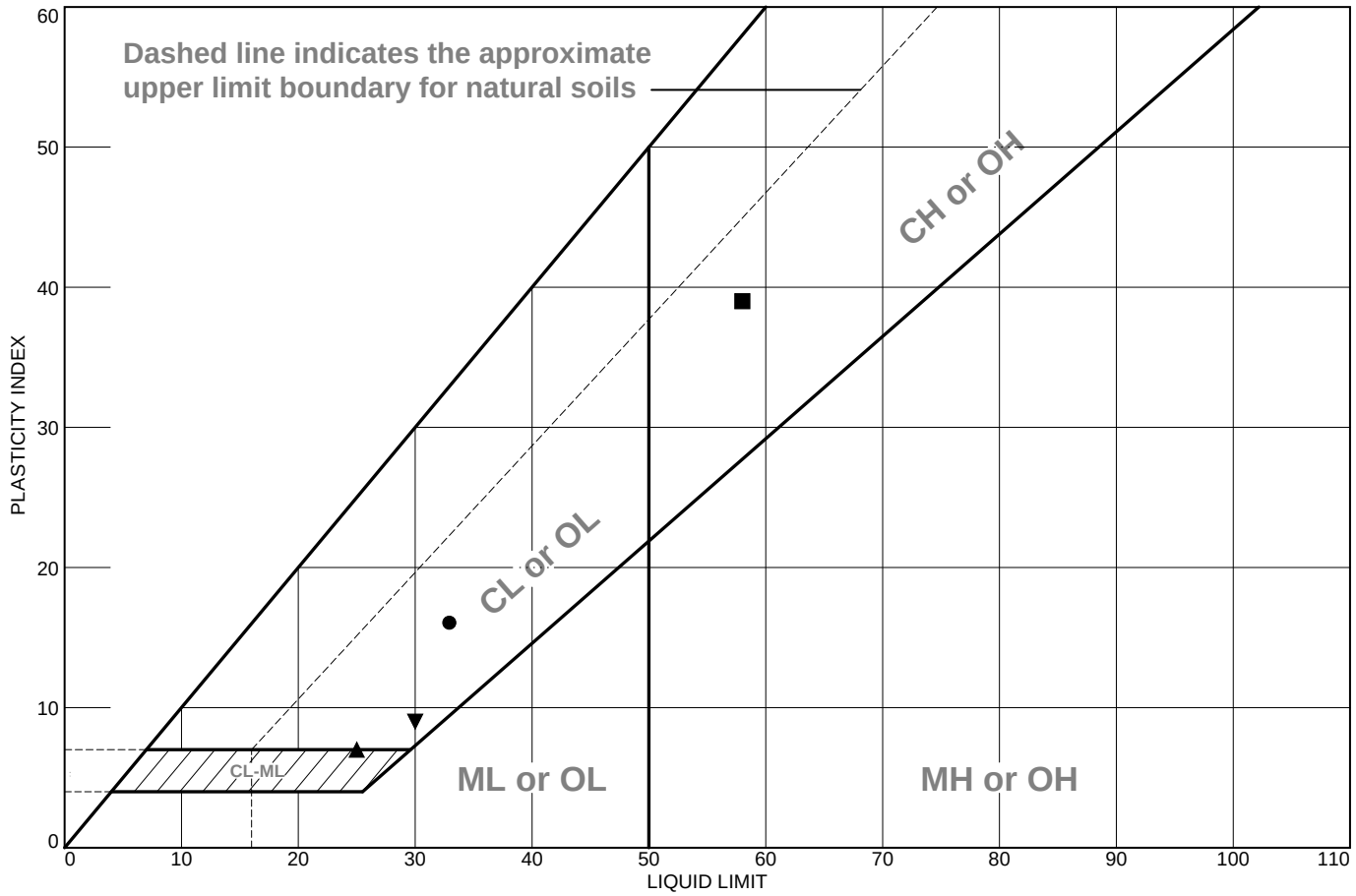
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-38

Tested By: K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean clay	33	17	16	94	59	CL
■	Fat clay with sand	58	19	39	94	76	CH
▲	Silty clay	25	18	7	91	86	CL-ML
◆	Silty sand with gravel	NV	NP	NP	52	28	SM
▼	Clayey sand	30	21	9	86	47	SC

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3036B-1 @ 90.0' **Depth:** 90.0' **Sample Number:** H3036B-1

■**Location:** H3036B-1 @ 105.0' **Depth:** 105.0' **Sample Number:** H3036B-1

▲**Location:** H3036B-2 @ 10.0' **Depth:** 10.0' **Sample Number:** H3036B-2

◆**Location:** H3036B-2 @ 20.0' **Depth:** 20.0' **Sample Number:** H3036B-2

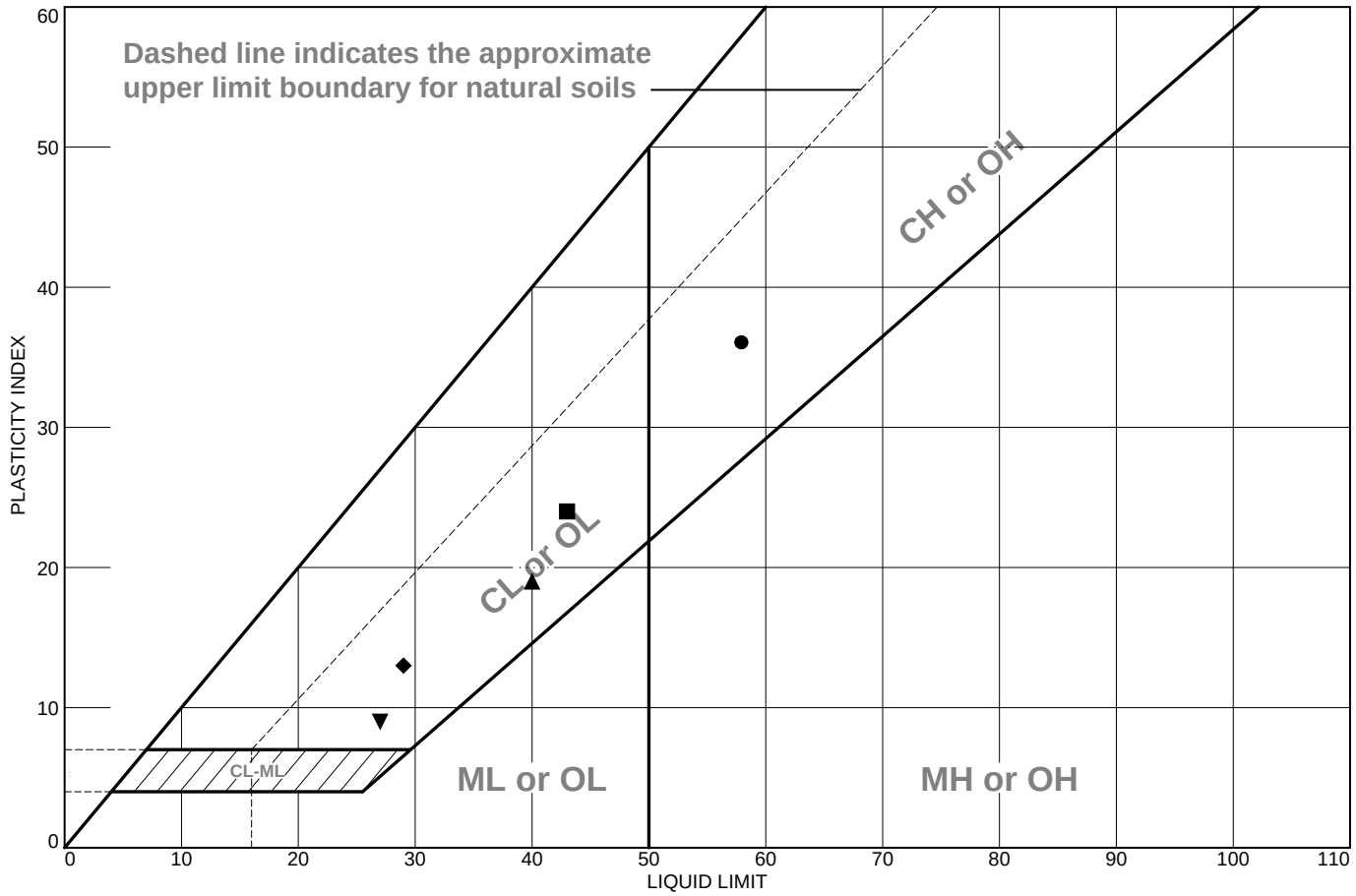
▼**Location:** H3036B-2 @ 30.0' **Depth:** 30.0' **Sample Number:** H3036B-2

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-39

Tested By: K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy fat clay with gravel	58	22	36	71	50	CH
■	Sandy lean clay with gravel	43	19	24	74	57	CL
▲	Sandy lean clay	40	21	19	84	66	CL
◆	Clayey gravel with sand	29	16	13	40	35	GC
▼	Lean clay with sand	27	18	9	98	74	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3036B-2 @ 35.0' **Depth:** 35.0' **Sample Number:** H3036B-2

■**Location:** H3036B-2 @ 50.0' **Depth:** 50.0' **Sample Number:** H3036B-2

▲**Location:** H3036B-2 @ 95.0' **Depth:** 95.0' **Sample Number:** H3036B-2

◆**Location:** H3036B-2 @ 105.0' **Depth:** 105.0' **Sample Number:** H3036B-2

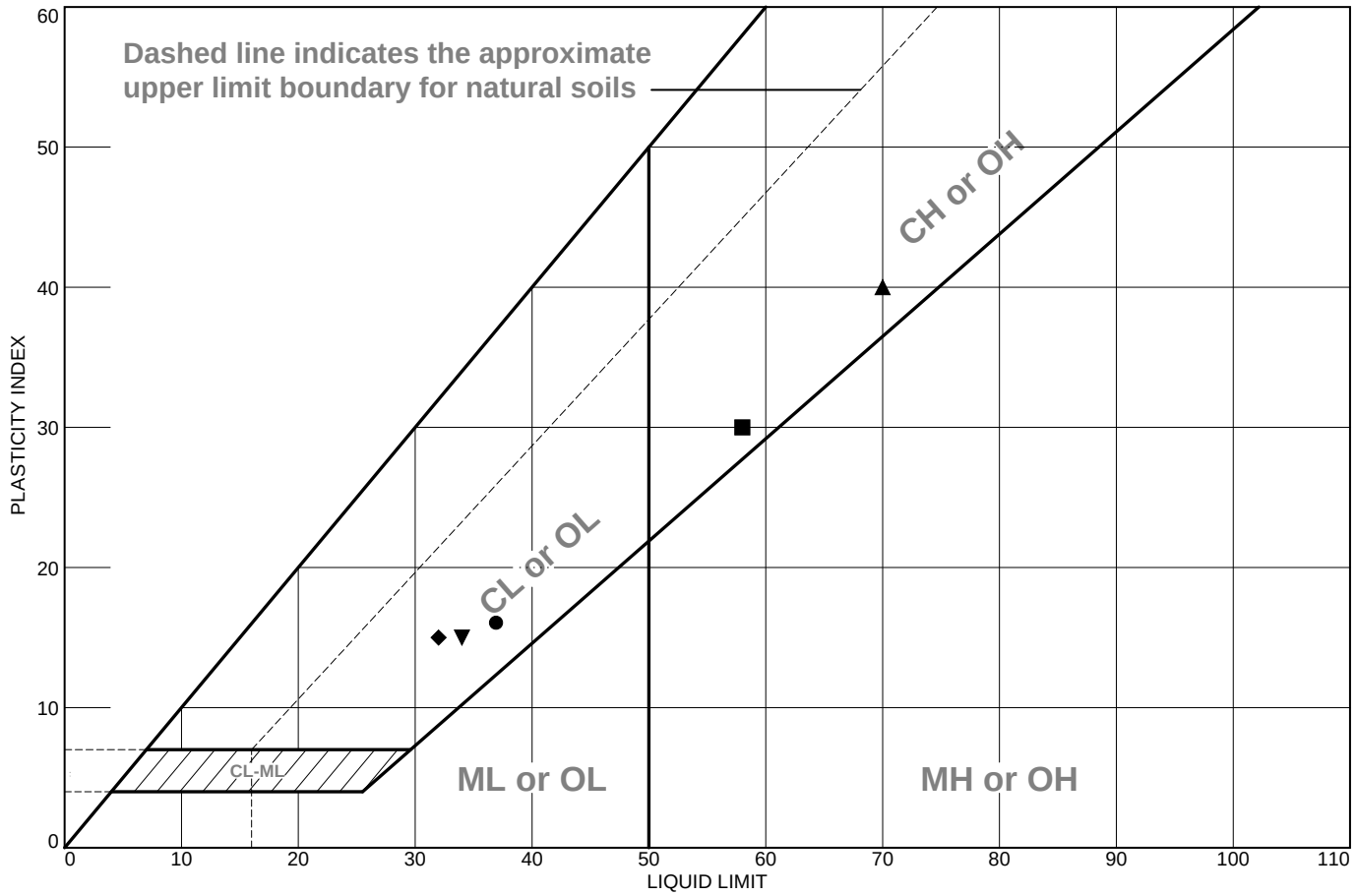
▼**Location:** H3036B-3 @ 10.0' **Depth:** 10.0' **Sample Number:** H3036B-3

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-40

Tested By: K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean clay	37	21	16	76	62	CL
■	Clayey gravel with sand	58	28	30	35	28	GC
▲	Sandy fat clay	70	30	40	76	63	CH
◆	Sandy lean clay	32	17	15	77	55	CL
▼	Lean clay with gravel	34	19	15	75	71	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3036B-3 @ 15.0' **Depth:** 15.0' **Sample Number:** H3036B-3

■**Location:** H3036B-3 @ 20.0' **Depth:** 20.0' **Sample Number:** H3036B-3

▲**Location:** H3036B-3 @ 25.0' **Depth:** 25.0' **Sample Number:** H3036B-3

◆**Location:** H3036B-3 @ 40.0' **Depth:** 40.0' **Sample Number:** H3036B-3

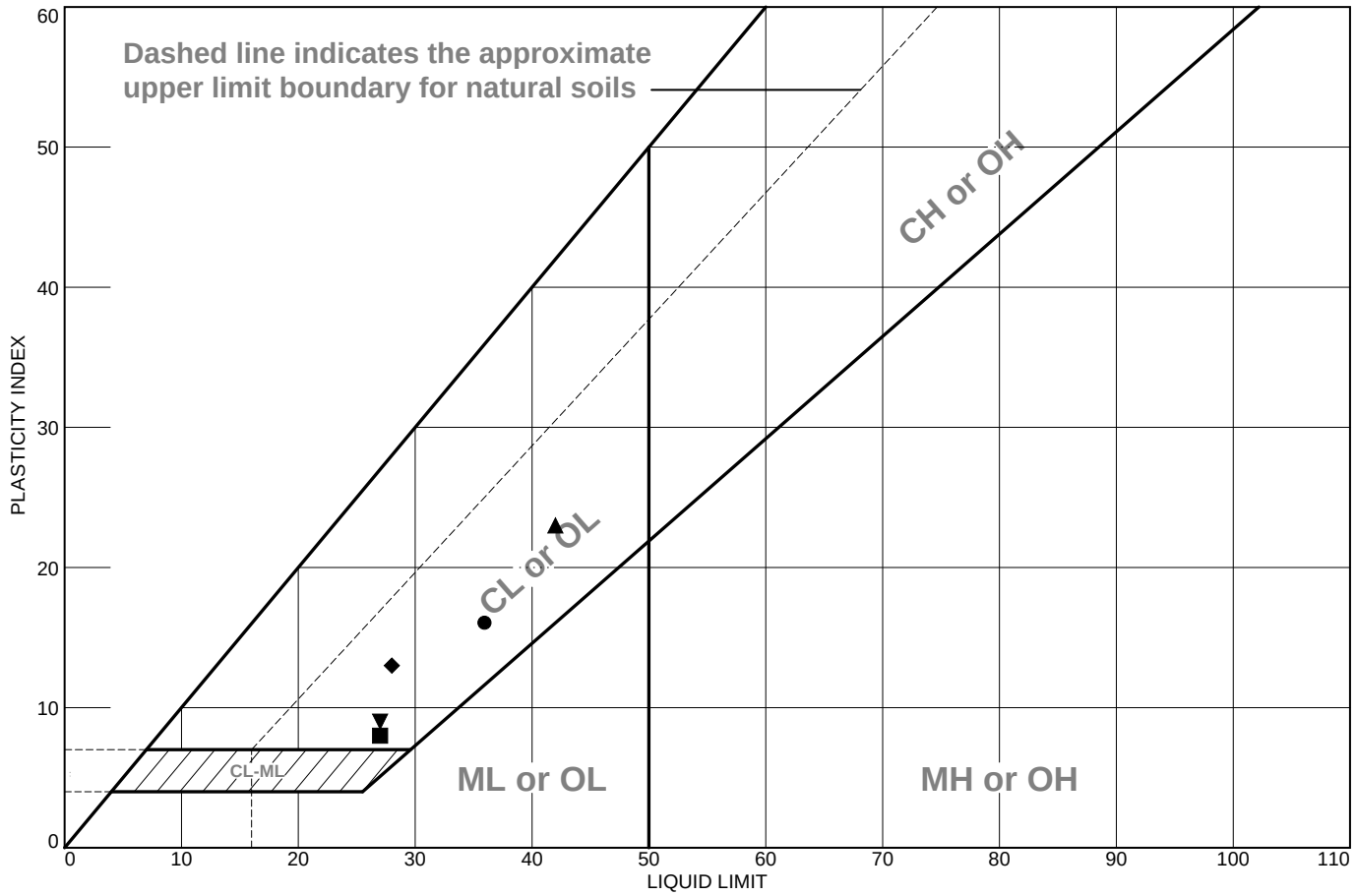
▼**Location:** H3036B-3 @ 70.0' **Depth:** 70.0' **Sample Number:** H3036B-3

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-41

Tested By: ○ C. BYER □ C. BYER △ C. BYER ◇ K. MARIN ▽ K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	36	20	16	97	96	CL
■	Lean clay with sand	27	19	8	99	85	CL
▲	Lean clay with sand	42	19	23	87	74	CL
◆	Clayey sand with gravel	28	15	13	59	45	SC
▼	Lean clay with sand	27	18	9	88	82	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

●**Location:** H3036B-3 @ 80.0' **Depth:** 80.0' **Sample Number:** H3036B-3

■**Location:** H3036B-3 @ 72.0'-74.0' **Depth:** 72.0'-74.0' **Sample Number:** H3036B-3

▲**Location:** H3036B-3 @ 90.0' **Depth:** 90.0' **Sample Number:** H3036B-3

◆**Location:** H3036B-4 @ 5.0' **Depth:** 5.0' **Sample Number:** H3036B-4

▼**Location:** H3036B-4 @ 15.0' **Depth:** 15.0' **Sample Number:** H3036B-4

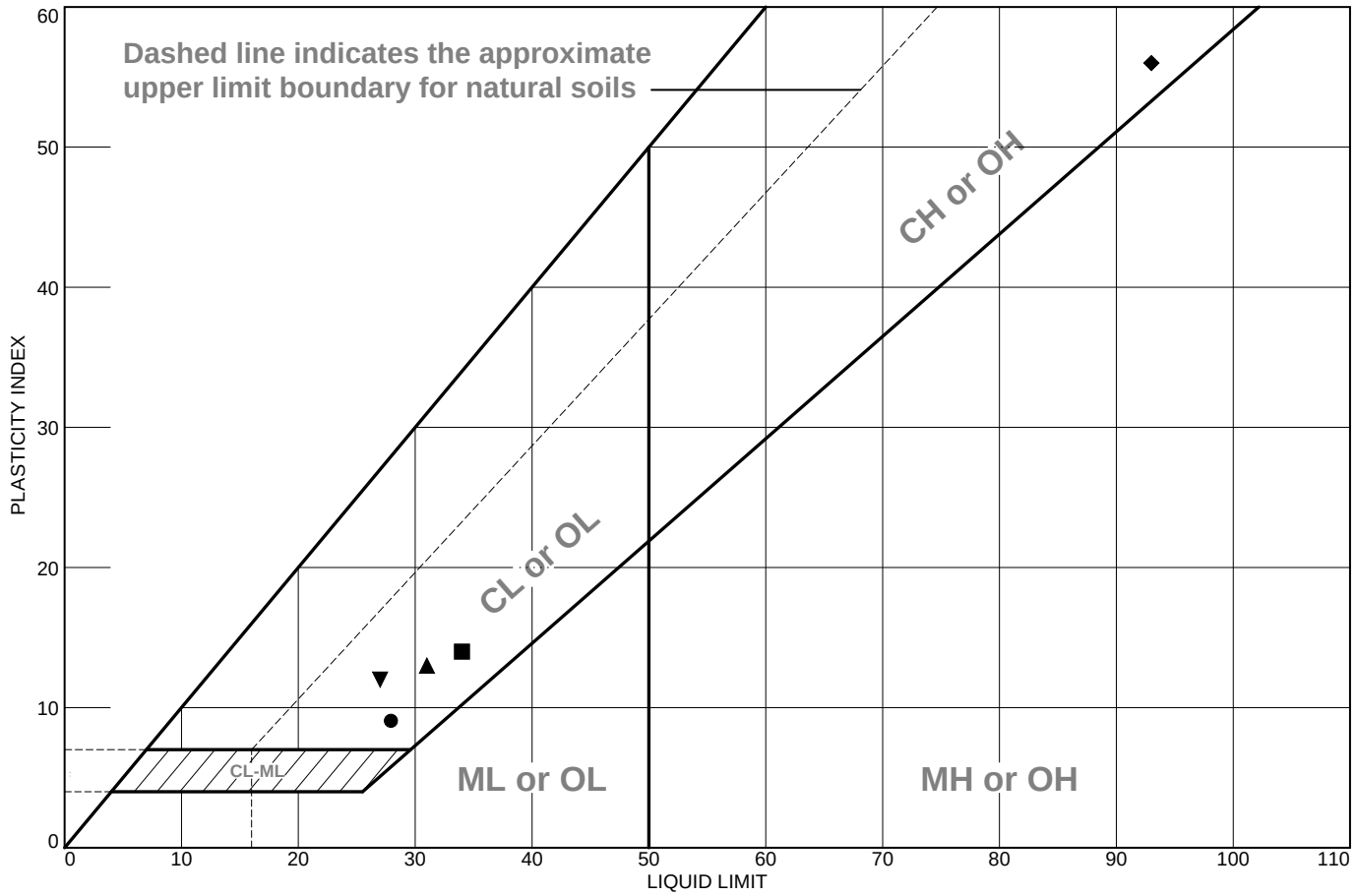
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-42

Tested By: K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	28	19	9	96	90	CL
■	Clayey gravel with sand	34	20	14	38	31	GC
▲	Clayey gravel with sand	31	18	13	43	31	GC
◆	Clayey gravel with sand	93	37	56	58	40	GC
▼	Clayey sand with gravel	27	15	12	59	49	SC

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3036B-4 @ 20.0' **Depth:** 20.0' **Sample Number:** H3036B-4

■**Location:** H3036B-4 @ 35.0' **Depth:** 35.0' **Sample Number:** H3036B-4

▲**Location:** H3036B-4 @ 45.0' **Depth:** 45.0' **Sample Number:** H3036B-4

◆**Location:** H3036B-4 @ 55.0' **Depth:** 55.0' **Sample Number:** H3036B-4

▼**Location:** H3036B-4 @ 70.0' **Depth:** 70.0' **Sample Number:** H3036B-4

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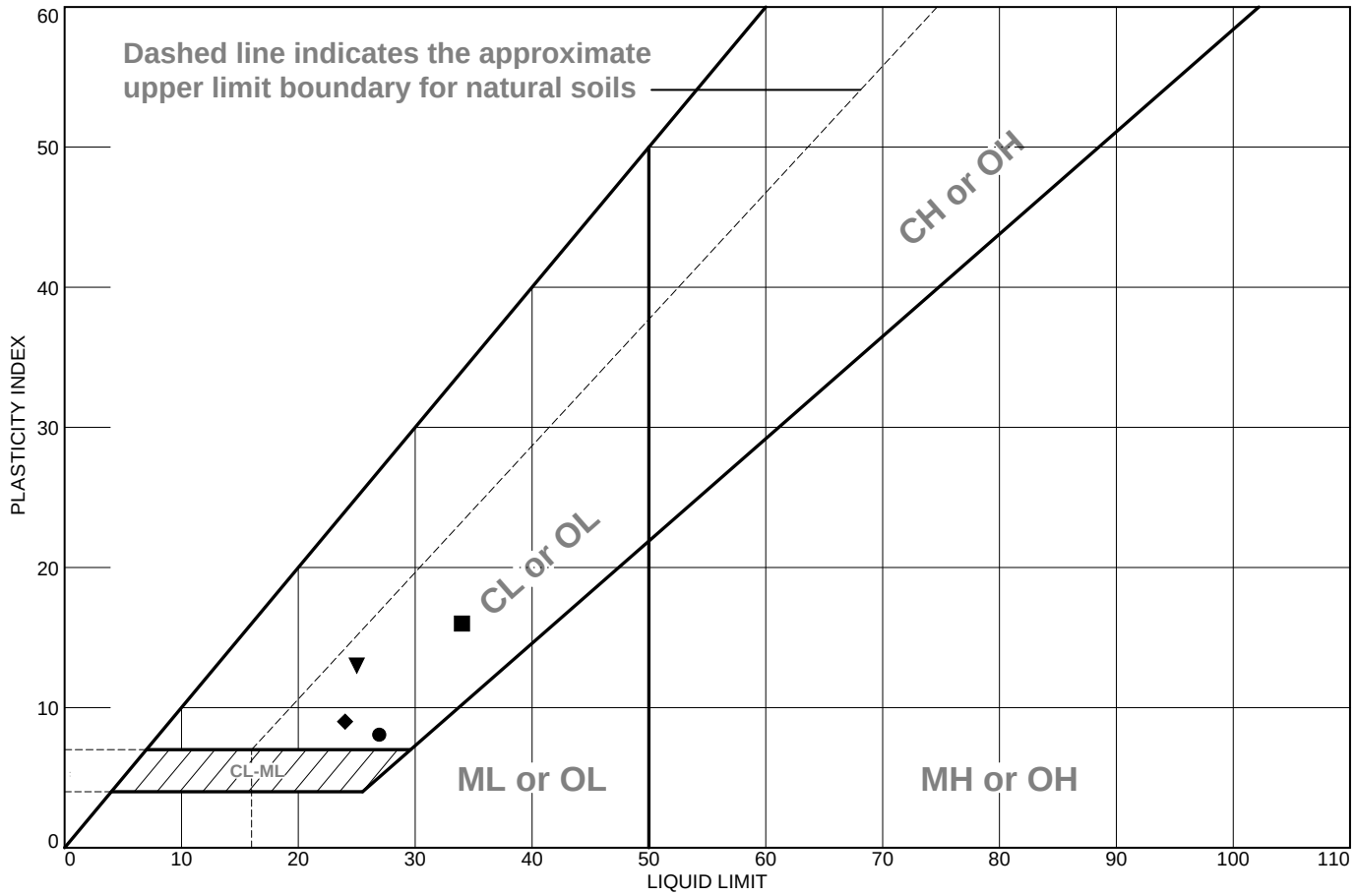
GES

Figure B-43

Tested By: ○ K. MARIN □ K. MARIN △ S. HALL ◇ S. HALL ▽ S. HALL

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey gravel with sand	27	19	8	38	33	GC
■	Lean clay with sand	34	18	16	80	72	CL
▲	Silty sand with gravel	NV	NP	NP	31	19	SM
◆	Clayey sand with gravel	24	15	9	50	36	SC
▼	Sandy lean clay	25	12	13	66	51	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3036B-4 @ 80.0' **Depth:** 80.0' **Sample Number:** H3036B-4

■**Location:** H3036B-4 @ 105.0' **Depth:** 105.0' **Sample Number:** H3036B-4

▲**Location:** H3036B-5 @ 5.0' **Depth:** 5.0' **Sample Number:** H3036B-5

◆**Location:** H3036B-5 @ 10.0' **Depth:** 10.0' **Sample Number:** H3036B-5

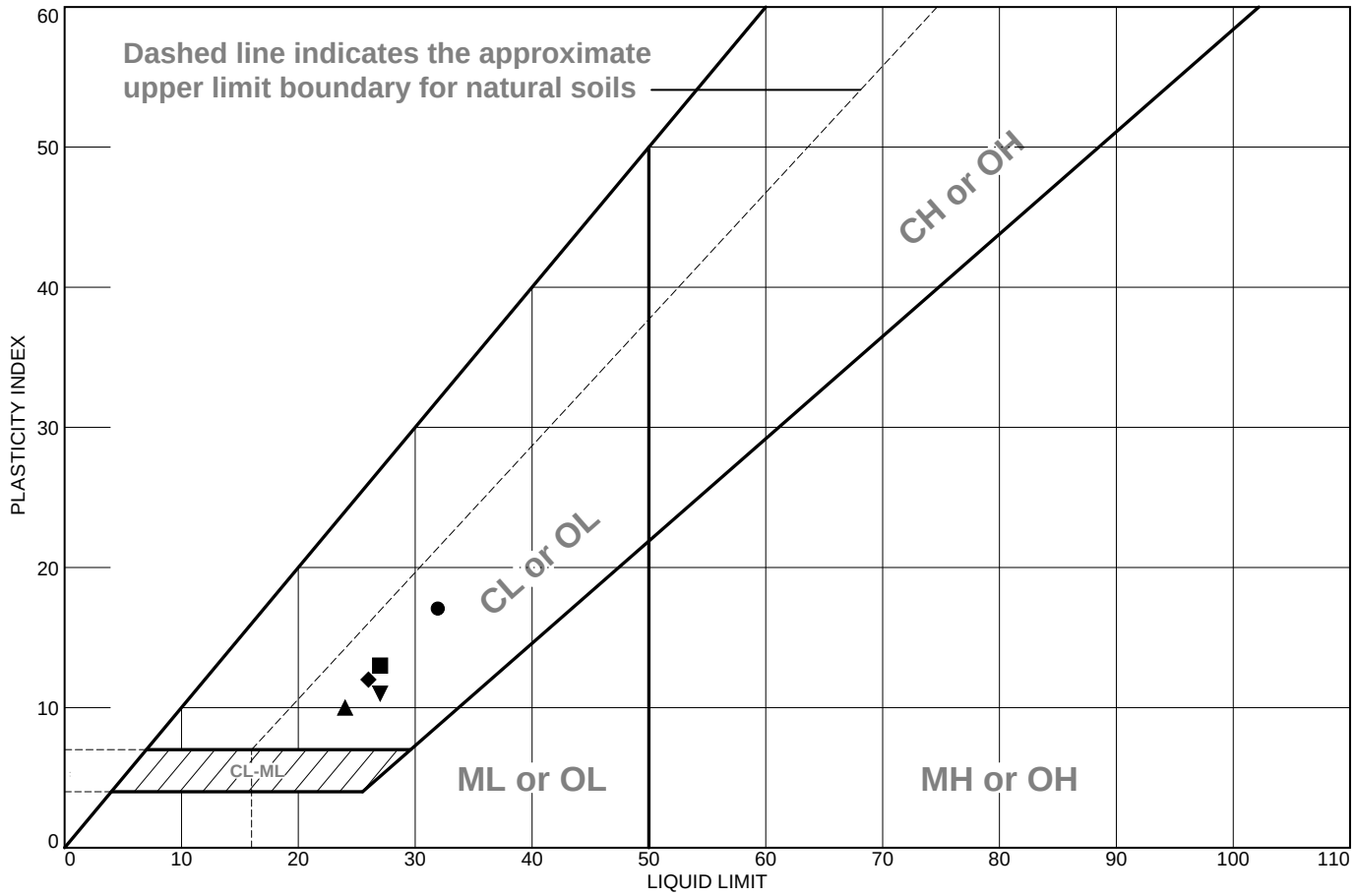
▼**Location:** H3036B-5 @ 25.0' **Depth:** 25.0' **Sample Number:** H3036B-5

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-44

Tested By: ○ S. HALL □ K. MARIN △ K. MARIN ◇ K. MARIN ▽ K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay with sand	32	15	17	84	72	CL
■	Sandy lean clay	27	14	13	72	56	CL
▲	Clayey sand	24	14	10	62	48	SC
◆	Clayey sand	26	14	12	65	48	SC
▼	Clayey sand with gravel	27	16	11	57	39	SC

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** H3036B-5 @ 35.0' **Depth:** 35.0' **Sample Number:** H3036B-5

■**Location:** H3036B-5 @ 45.0' **Depth:** 45.0' **Sample Number:** H3036B-5

▲**Location:** RW7B-1 @ 1.0'-4.0' **Depth:** 1.0'-4.0' **Sample Number:** RW7B-1

◆**Location:** RW7B-1 @ 10.0' **Depth:** 10.0' **Sample Number:** RW7B-1

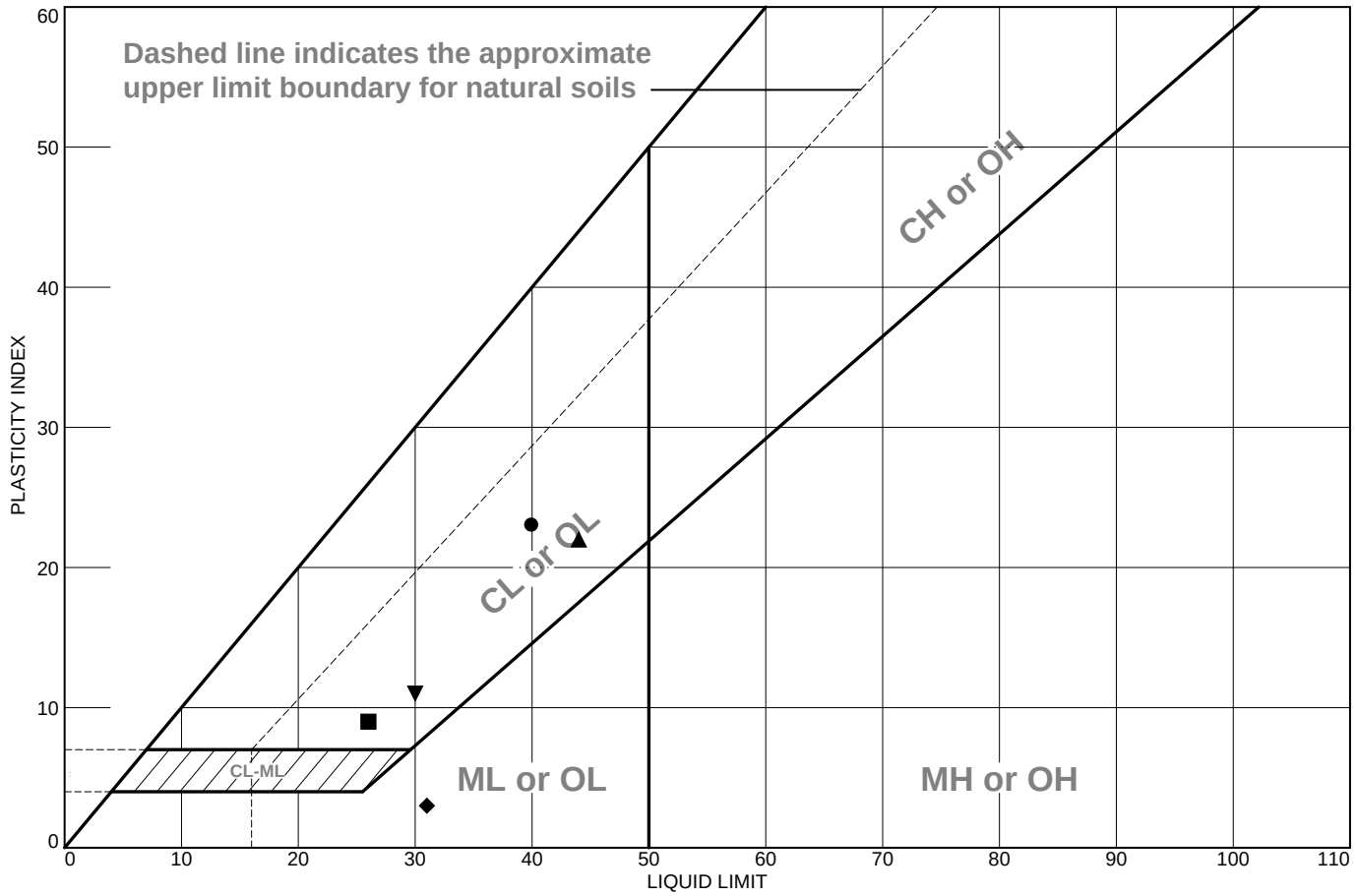
▼**Location:** RW7B-2 @ 1.0'-4.0' **Depth:** 1.0'-4.0' **Sample Number:** RW7B-2

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-45

Tested By: ○ S. HALL □ R. BRATTON △ S. HALL ◇ K. MARIN ▽ S. HALL

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey sand	40	17	23	31	17	SC
■	Sandy lean clay	26	17	9	93	68	CL
▲	Sandy lean clay	44	22	22	79	61	CL
◆	Silt with sand	31	28	3	89	75	ML
▼	Clayey gravel with sand	30	19	11	45	37	GC

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** RW7B-2 @ 10.0' **Depth:** 10.0' **Sample Number:** RW7B-2

■**Location:** RW7B-2 @ 20.0' **Depth:** 20.0' **Sample Number:** RW7B-2

▲**Location:** RW7B-2 @ 30.0' **Depth:** 30.0' **Sample Number:** RW7B-2

◆**Location:** RW7B-3 @ 5.0' **Depth:** 5.0' **Sample Number:** RW7B-3

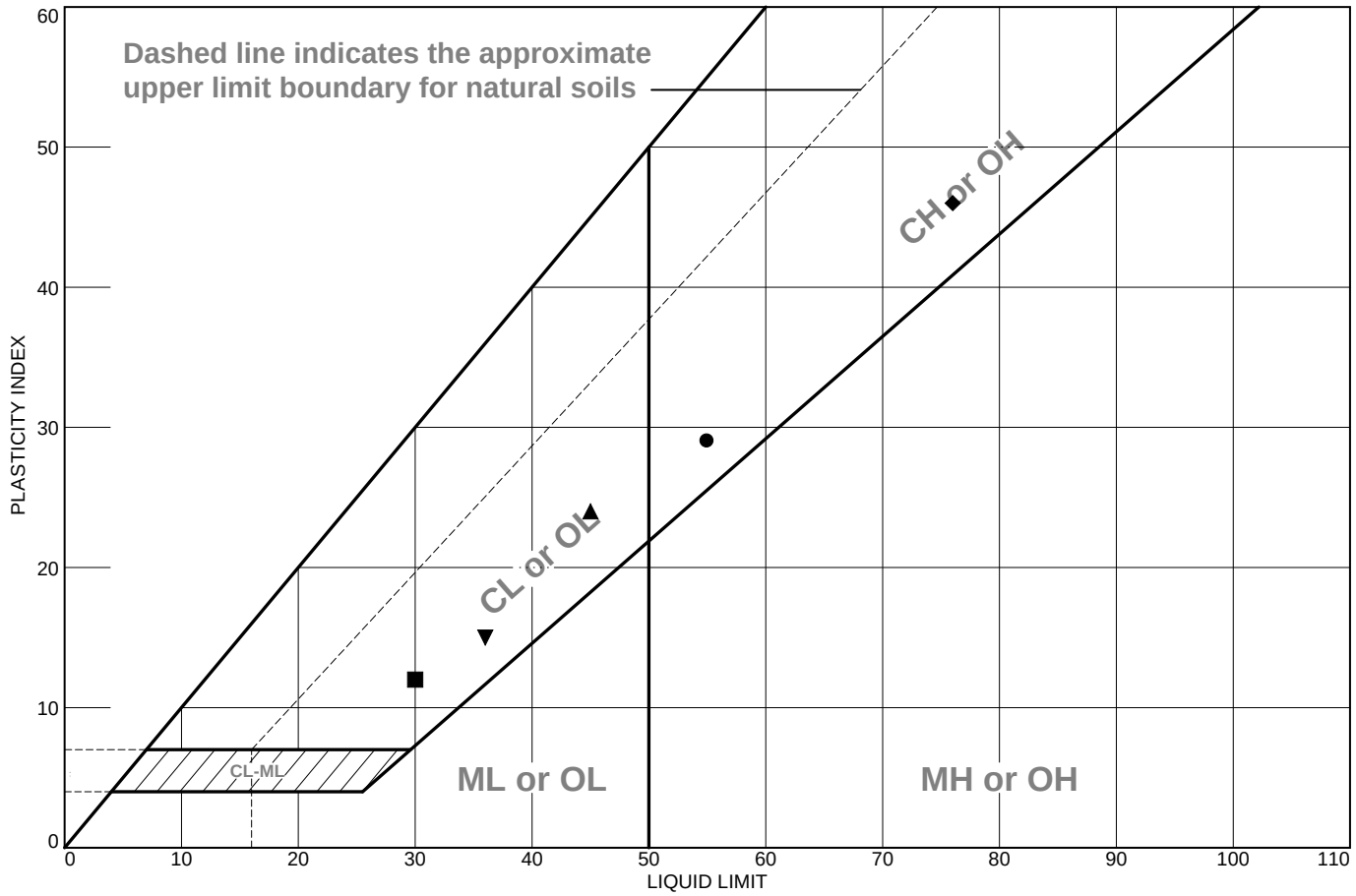
▼**Location:** RW7B-3 @ 15.0' **Depth:** 15.0' **Sample Number:** RW7B-3

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-46

Tested By: ○ R. BRATTON □ K. MARIN △ R. BRATTON ◇ S. HALL ▽ R. BRATTON

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey gravel with sand	55	26	29	42	29	GC
■	Clayey sand with gravel	30	18	12	50	38	SC
▲	Lean clay with sand	45	21	24	79	71	CL
◆	Clayey gravel with sand	76	30	46	53	39	GC
▼	Lean clay	36	21	15	99	95	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** RW7B-3 @ 25.0' **Depth:** 25.0' **Sample Number:** RW7B-3

■**Location:** RW7B-3 @ 40.0' **Depth:** 40.0' **Sample Number:** RW7B-3

▲**Location:** RW7B-3 @ 45.0' **Depth:** 45.0' **Sample Number:** RW7B-3

◆**Location:** RW7B-3 @ 55.0' **Depth:** 55.0' **Sample Number:** RW7B-3

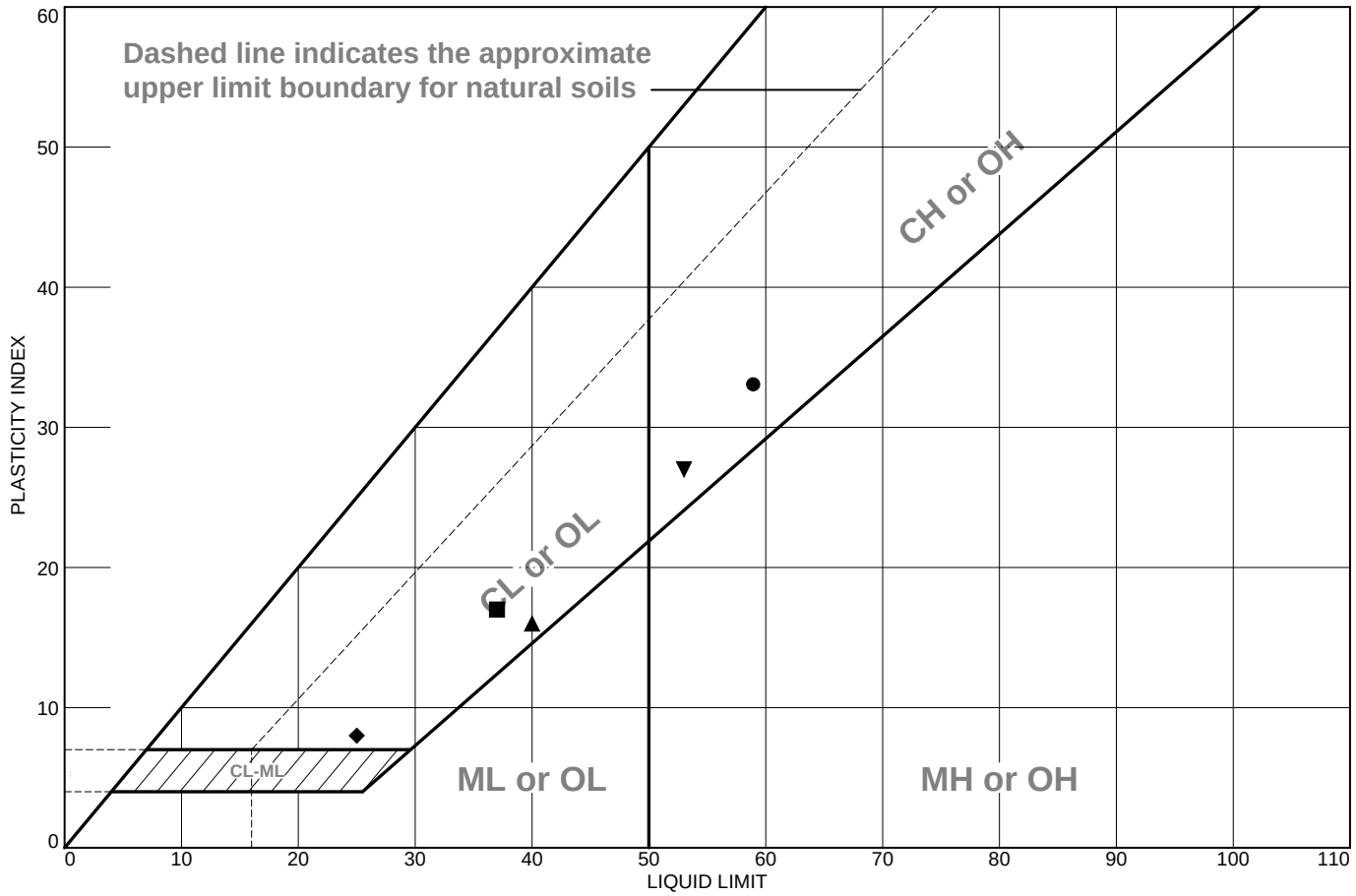
▼**Location:** RW7B-4 @ 10.0' **Depth:** 10.0' **Sample Number:** RW7B-4

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-47

Tested By: ○ S. HALL □ K. FERNANDO △ R. BRATTON ◇ R. BRATTON ▽ C. BYER

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Fat clay with sand	59	26	33	92	82	CH
■	Clayey gravel with sand	37	20	17	40	33	GC
▲	Sandy lean clay with gravel	40	24	16	68	58	CL
◆	Gravelly lean clay with sand	25	17	8	62	51	CL
▼	Fat clay	53	26	27	96	94	CH

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** RW7B-4 @ 25.0' **Depth:** 25.0' **Sample Number:** RW7B-4

■**Location:** RW7B-4 @ 35.0' **Depth:** 35.0' **Sample Number:** RW7B-4

▲**Location:** RW7B-4 @ 45.0' **Depth:** 45.0' **Sample Number:** RW7B-4

◆**Location:** RW7B-4 @ 70.0' **Depth:** 70.0' **Sample Number:** RW7B-4

▼**Location:** RW7B-4 @ 80.0' **Depth:** 80.0' **Sample Number:** RW7B-4

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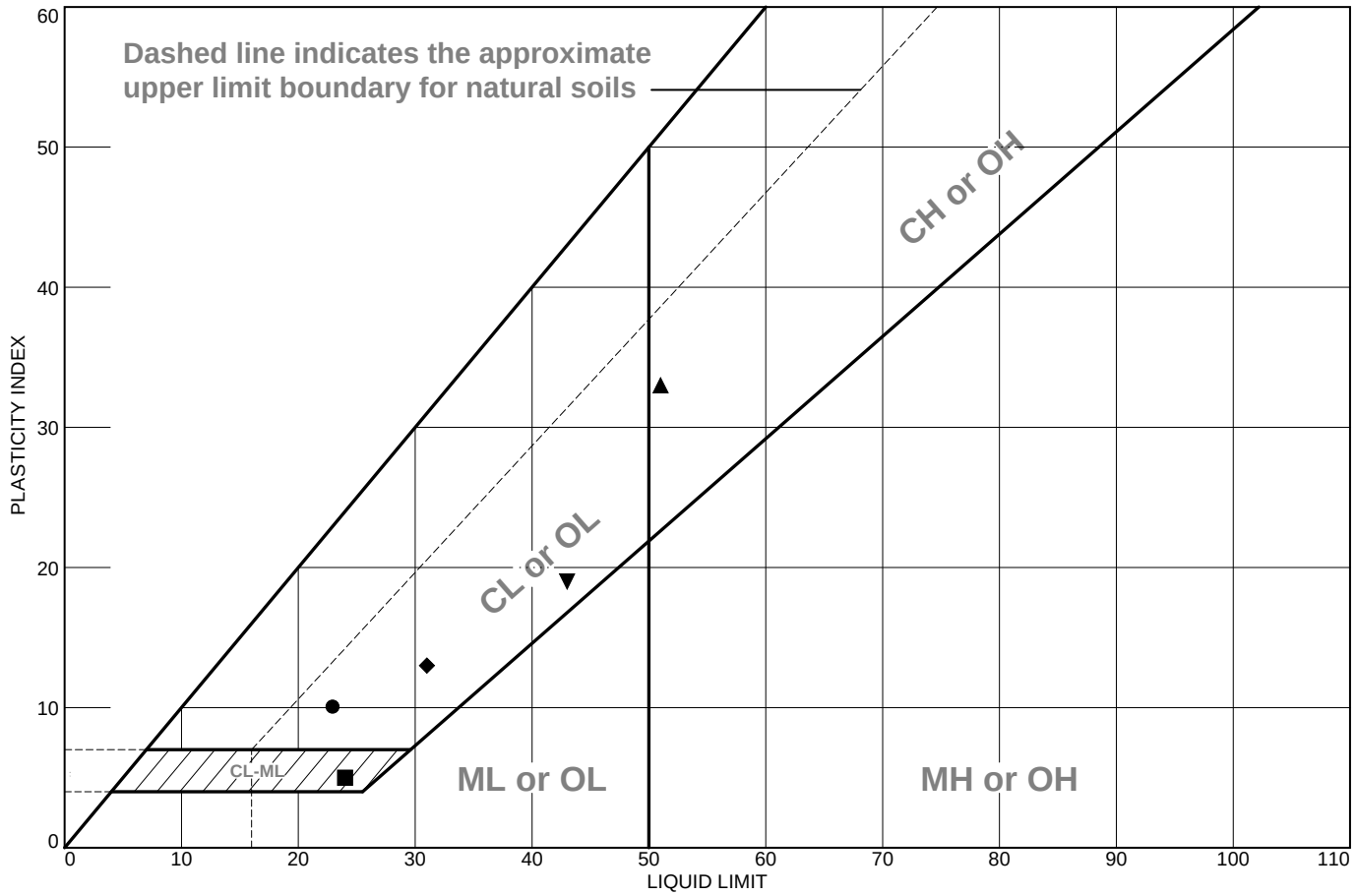
Figure B-48

Tested By: ○ C. BYER □ K. MARIN △ C. BYER ◇ C. BYER ▽ C. BYER

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey sand with gravel	23	13	10	62	49	SC
■	Silty clayey gravel with sand	24	19	5	31	16	GC-GM
▲	Fat clay with sand	51	18	33	92	82	CH
◆	Clayey sand with gravel	31	18	13	69	44	SC
▼	Clayey gravel with sand	43	24	19	53	40	GC

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** RW7B-5 @ 1.0'-4.0' **Depth:** 1.0'-4.0' **Sample Number:** RW7B-5

■**Location:** RW7B-5 @ 20.0'-21.5' **Depth:** 20.0'-21.5' **Sample Number:** RW7B-5

▲**Location:** RW7B-5 @ 30.0'-31.5' **Depth:** 30.0'-31.5' **Sample Number:** RW7B-5

◆**Location:** RW7B-5 @ 45.0'-46.5' **Depth:** 45.0'-46.5' **Sample Number:** RW7B-5

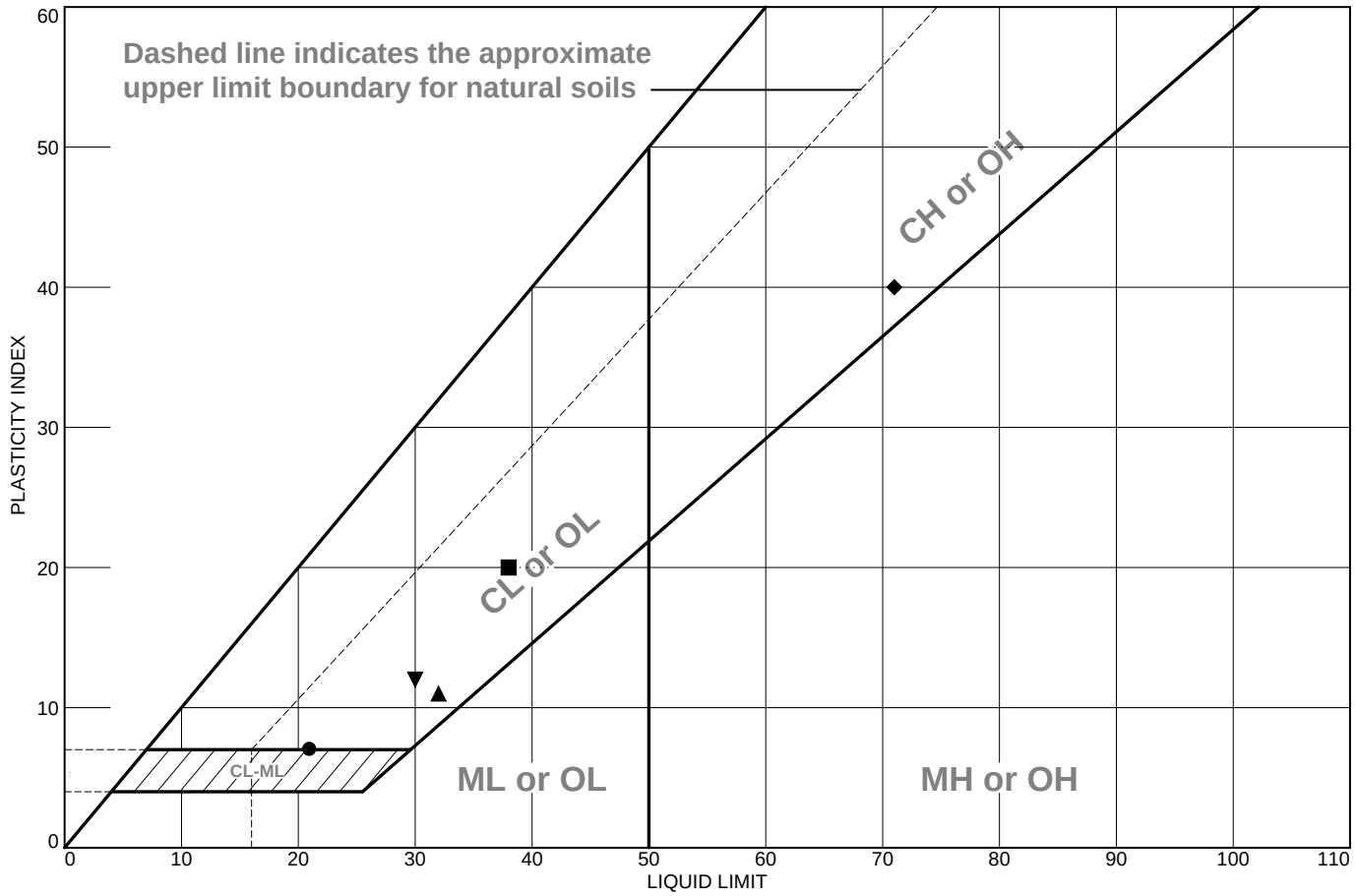
▼**Location:** RW7B-5 @ 55.0'-56.4' **Depth:** 55.0'-56.4' **Sample Number:** RW7B-5

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-49

Tested By: K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy silty clay	21	14	7	74	67	CL-ML
■	Sandy lean clay	38	18	20	90	68	CL
▲	Lean clay with sand	32	21	11	93	80	CL
◆	Clayey gravel with sand	71	31	40	63	47	GC
▼	Sandy lean clay	30	18	12	89	64	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** RW7B-5 @ 75.0'-76.0' **Depth:** 75.0'-76.0' **Sample Number:** RW7B-5

■**Location:** RW7B-6 @ 20.0' **Depth:** 20.0' **Sample Number:** RW7B-6

▲**Location:** RW7B-6 @ 40.0' **Depth:** 40.0' **Sample Number:** RW7B-6

◆**Location:** RW7B-6 @ 45.0' **Depth:** 45.0' **Sample Number:** RW7B-6

▼**Location:** RW7B-7 @ 10.0' **Depth:** 10.0' **Sample Number:** RW7B-7

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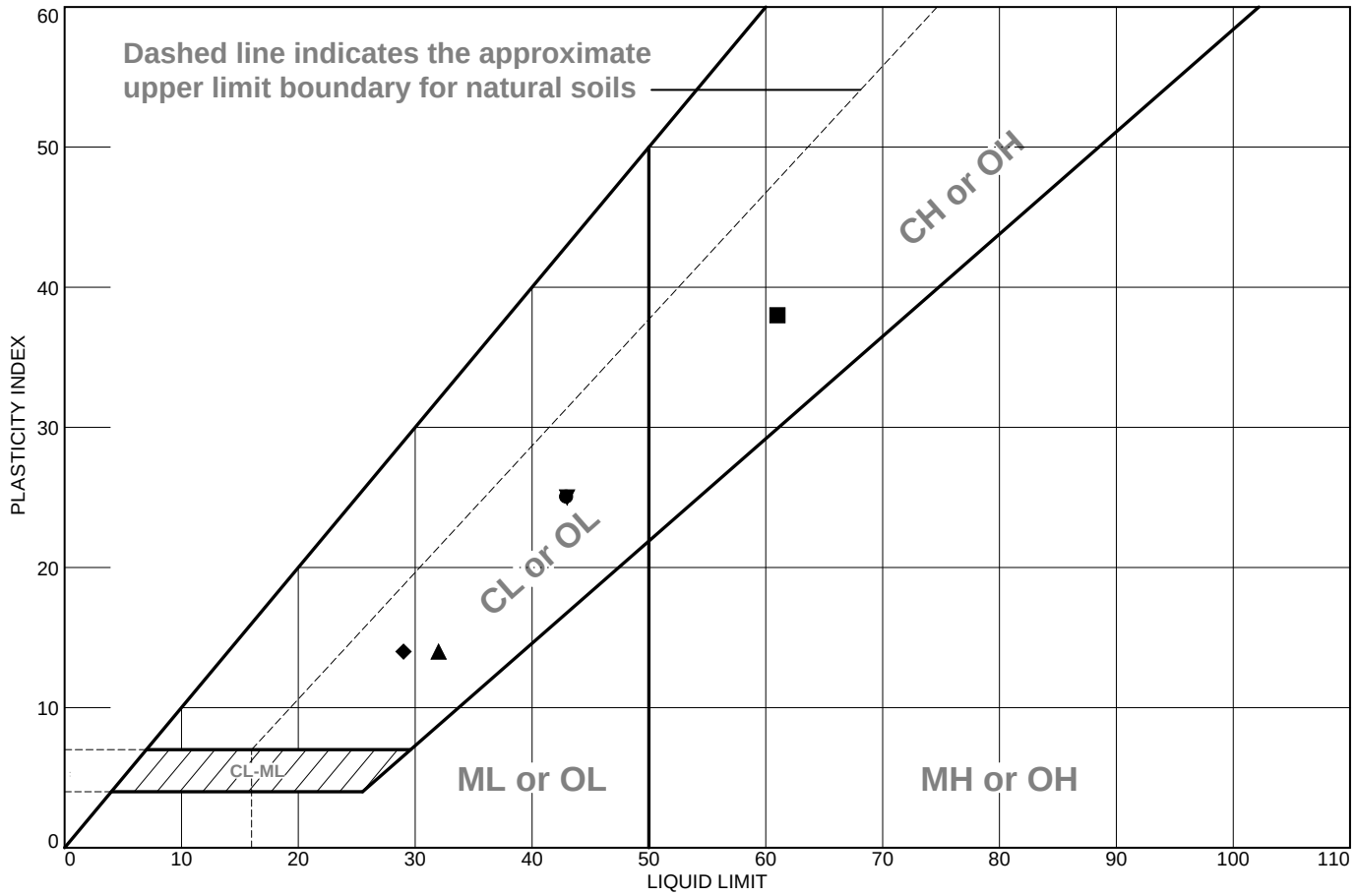
Figure B-50

Tested By: ○ K. MARIN □ S. HALL △ S. HALL ◇ S. HALL ▽ K. FERNANDO

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean clay	43	18	25	79	70	CL
■	Sandy fat clay	61	23	38	85	63	CH
▲	Lean clay with sand	32	18	14	92	72	CL
◆	Sandy lean clay with gravel	29	15	14	63	57	CL
▼	Clayey sand with gravel	43	18	25	68	43	SC

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

●**Location:** RW7B-7 @ 20.0' **Depth:** 20.0' **Sample Number:** RW7B-7

■**Location:** RW7B-7 @ 30.0' **Depth:** 30.0' **Sample Number:** RW7B-7

▲**Location:** RW7B-7 @ 40.0' **Depth:** 40.0' **Sample Number:** RW7B-7

◆**Location:** RW7B-8 @ 10.0'-11.5' **Depth:** 10.0'-11.5' **Sample Number:** RW7B-8

▼**Location:** RW7B-8 @ 15.0'-16.5' **Depth:** 15.0'-16.5' **Sample Number:** RW7B-8

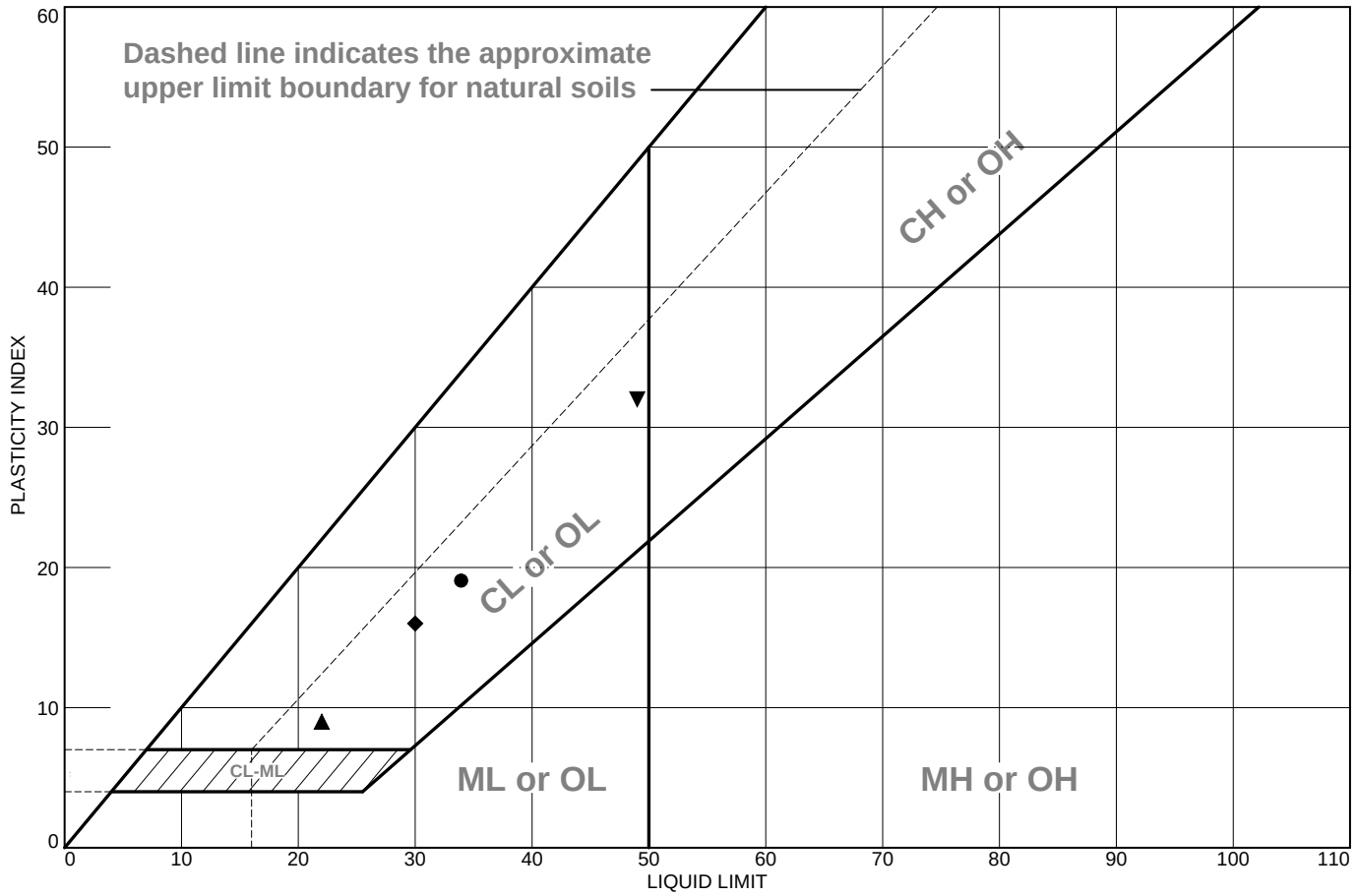
GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.
GES

Remarks:

Figure B-51

Tested By: ○ R. BRATTON □ S. HALL △ S. HALL ◇ R. BRATTON ▽ R. BRATTON

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay with sand	34	15	19	86	71	CL
■	Silty sand with gravel	NV	NP	NP	30	19	SM
▲	Clayey sand with gravel	22	13	9	56	41	SC
◆	Clayey sand	30	14	16	80	46	SC
▼	Clayey sand	49	17	32	47	32	SC

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** RW7B-8 @ 25.0'-25.75' **Depth:** 25.0'-25.75' **Sample Number:** RW7B-8

■**Location:** RW8B-1 @ 0.5'-5.0' **Depth:** 0.5'-5.0' **Sample Number:** RW8B-1

▲**Location:** RW8B-1 @ 20.0'-21.3' **Depth:** 20.0'-21.3' **Sample Number:** RW8B-1

◆**Location:** RW8B-1 @ 40.0'-41.5' **Depth:** 40.0'-41.5' **Sample Number:** RW8B-1

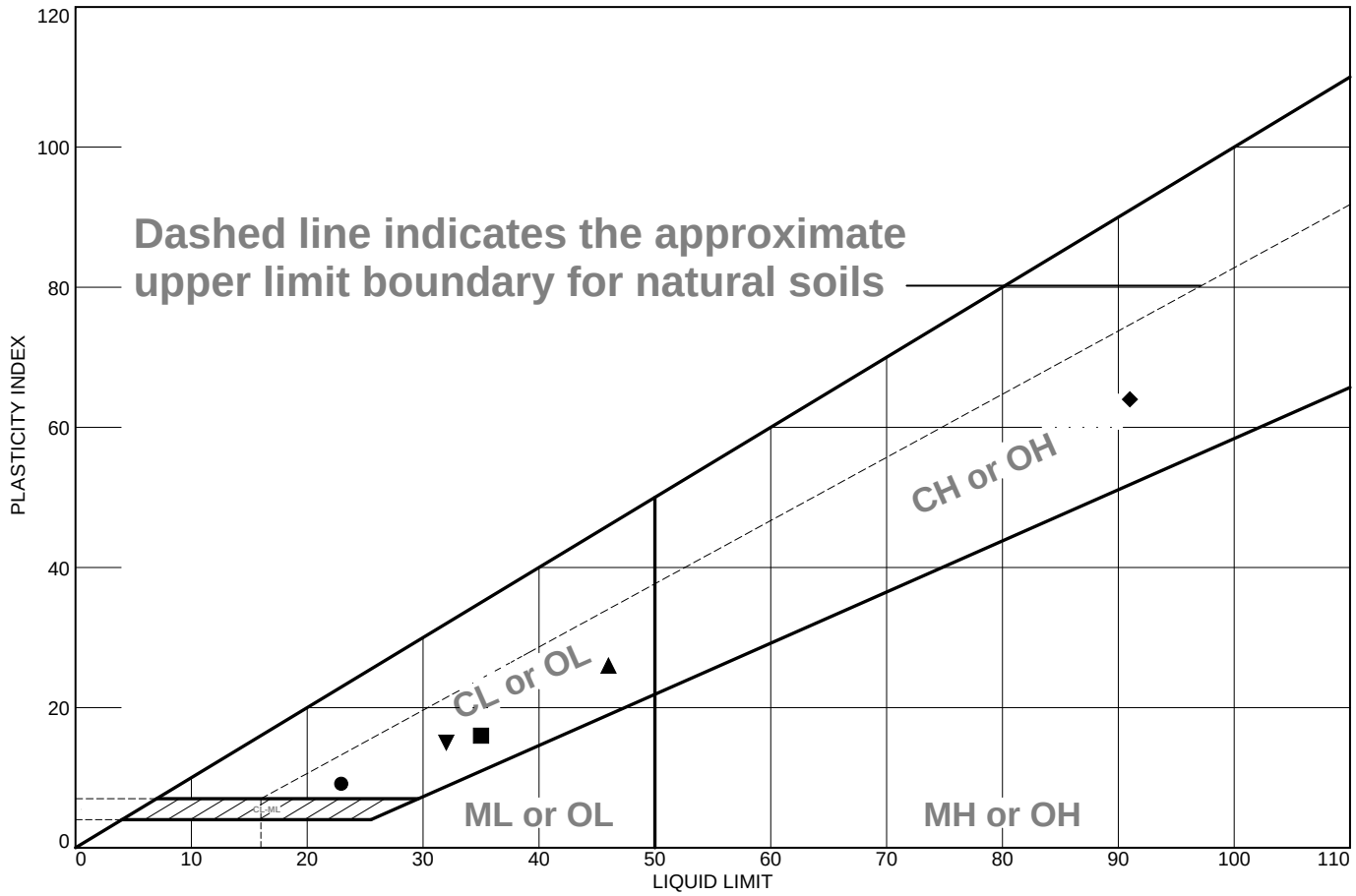
▼**Location:** RW8B-1 @ 50.0'-51.5' **Depth:** 50.0'-51.5' **Sample Number:** RW8B-1

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-52

Tested By: ○ R. BRATTON □ K. MARIN △ K. MARIN ◇ K. MARIN ▽ K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey gravel with sand	23	14	9	33	20	GC
■	Clayey sand with gravel	35	19	16	38	22	SC
▲	Sandy lean clay	46	20	26	85	69	CL
◆	Fat clay with gravel	91	27	64	83	80	CH
▼	Lean clay with sand	32	17	15	97	85	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** RW8B-2 @ 1.0'-5.0' **Depth:** 1.0'-5.0' **Sample Number:** RW8B-2

■**Location:** RW8B-2 @ 20.0'-21.5' **Depth:** 20.0'-21.5' **Sample Number:** RW8B-2

▲**Location:** RW8B-2 @ 30.0'-31.5' **Depth:** 30.0'-31.5' **Sample Number:** RW8B-2

◆**Location:** RW8B-2 @ 45.0'-46.5' **Depth:** 45.0'-46.5' **Sample Number:** RW8B-2

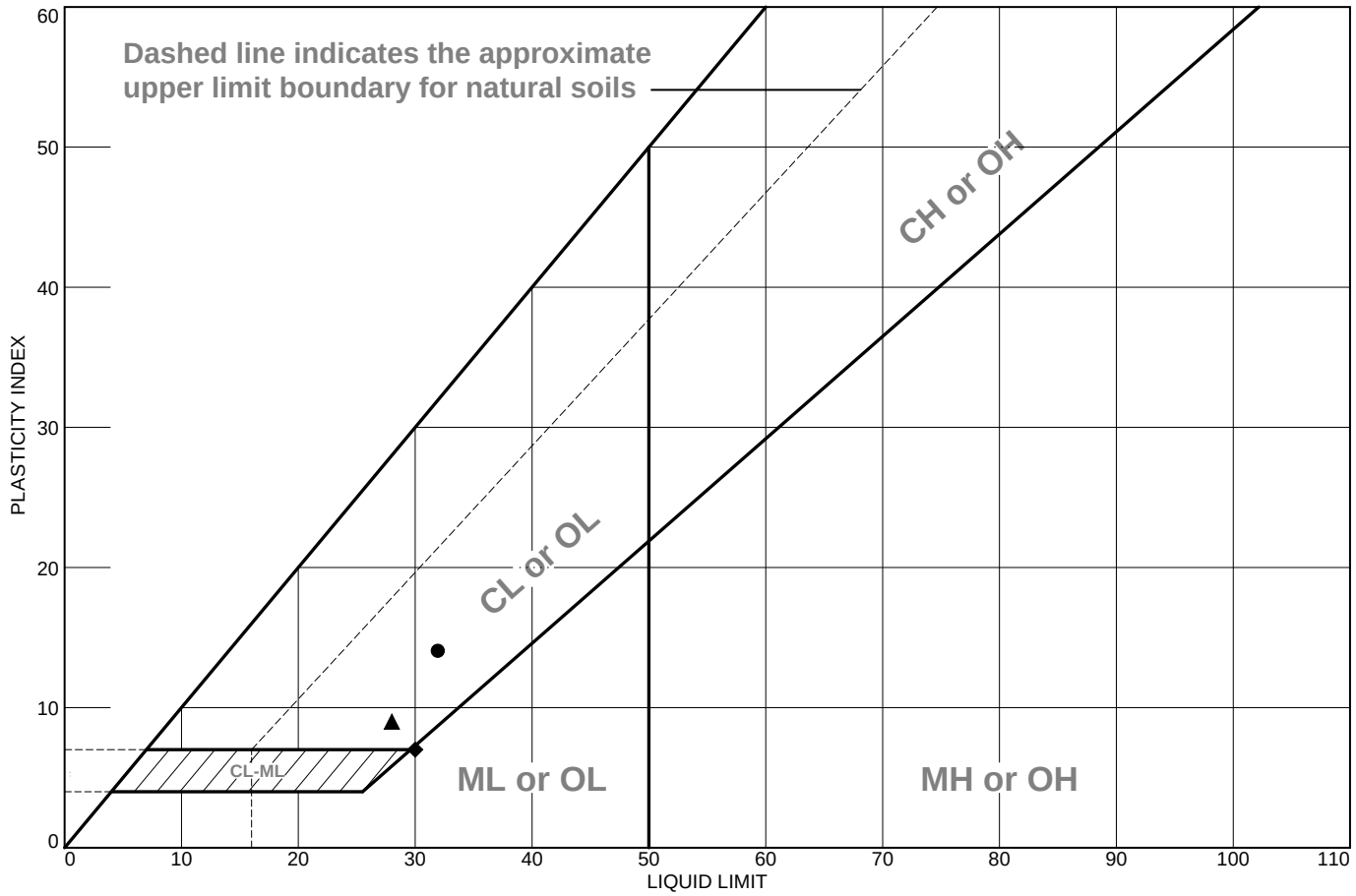
▼**Location:** RW8B-2 @ 70.0'-71.5' **Depth:** 70.0'-71.5' **Sample Number:** RW8B-2

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-53

Tested By: K. MARIN

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey gravel	32	18	14	51	47	GC
■	Silty gravel with sand	NV	NP	NP	26	16	GM
▲	Lean clay	28	19	9	96	89	CL
◆	Silty clay with sand	30	23	7	94	83	CL-ML
▼	Silt	NV	NP	NP	99	93	ML

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** RW8B-2 @ 85.0'-86.5' **Depth:** 85.0'-86.5' **Sample Number:** RW8B-2

■**Location:** RW10B-1 @ 5.0' **Depth:** 5.0' **Sample Number:** RW10B-1

▲**Location:** RW10B-1 @ 10.0' **Depth:** 10.0' **Sample Number:** RW10B-1

◆**Location:** RW10B-2 @ 5.0' **Depth:** 5.0' **Sample Number:** RW10B-2

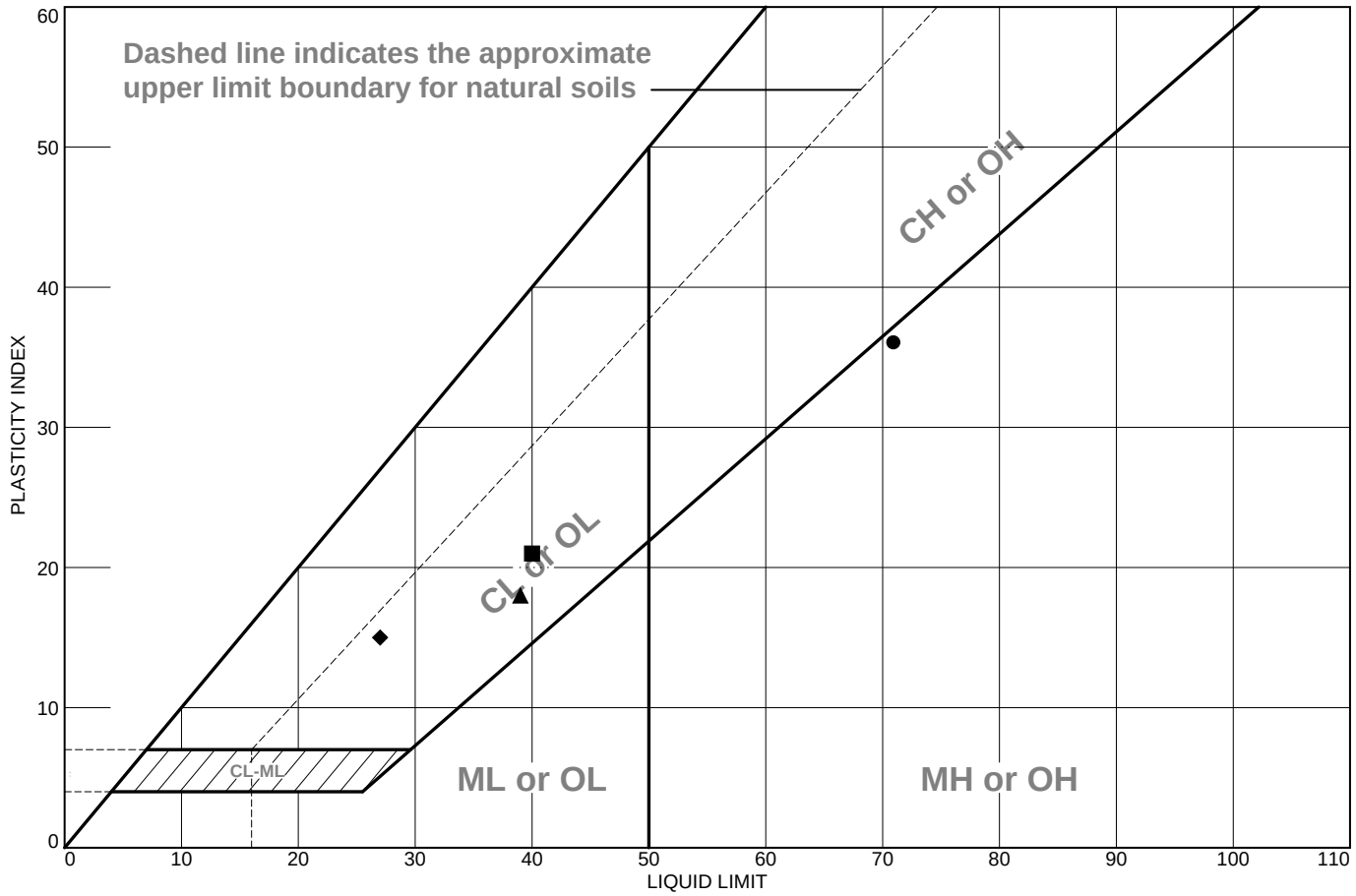
▼**Location:** RW10B-2 @ 10.0' **Depth:** 10.0' **Sample Number:** RW10B-2

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Figure B-54

Tested By: ○ K. MARIN □ K. FERNANDO △ K. FERNANDO ◇ K. FERNANDO ▽ K. FERNANDO

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy elastic silt	71	35	36	83	69	MH
■	Lean clay with sand	40	19	21	93	75	CL
▲	Lean clay	39	21	18	96	90	CL
◆	Lean clay with sand	27	12	15	90	73	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

●**Location:** RW10B-2 @ 25.0' **Depth:** 25.0' **Sample Number:** RW10B-2

■**Location:** RW10B-2 @ 40.0' **Depth:** 40.0' **Sample Number:** RW10B-2

▲**Location:** RW14B-1 @ 5.0'-6.5' **Depth:** 5.0'-6.5' **Sample Number:** RW14B-1

◆**Location:** RW14B-1 @ 15.0'-16.5' **Depth:** 15.0'-16.5' **Sample Number:** RW14B-1

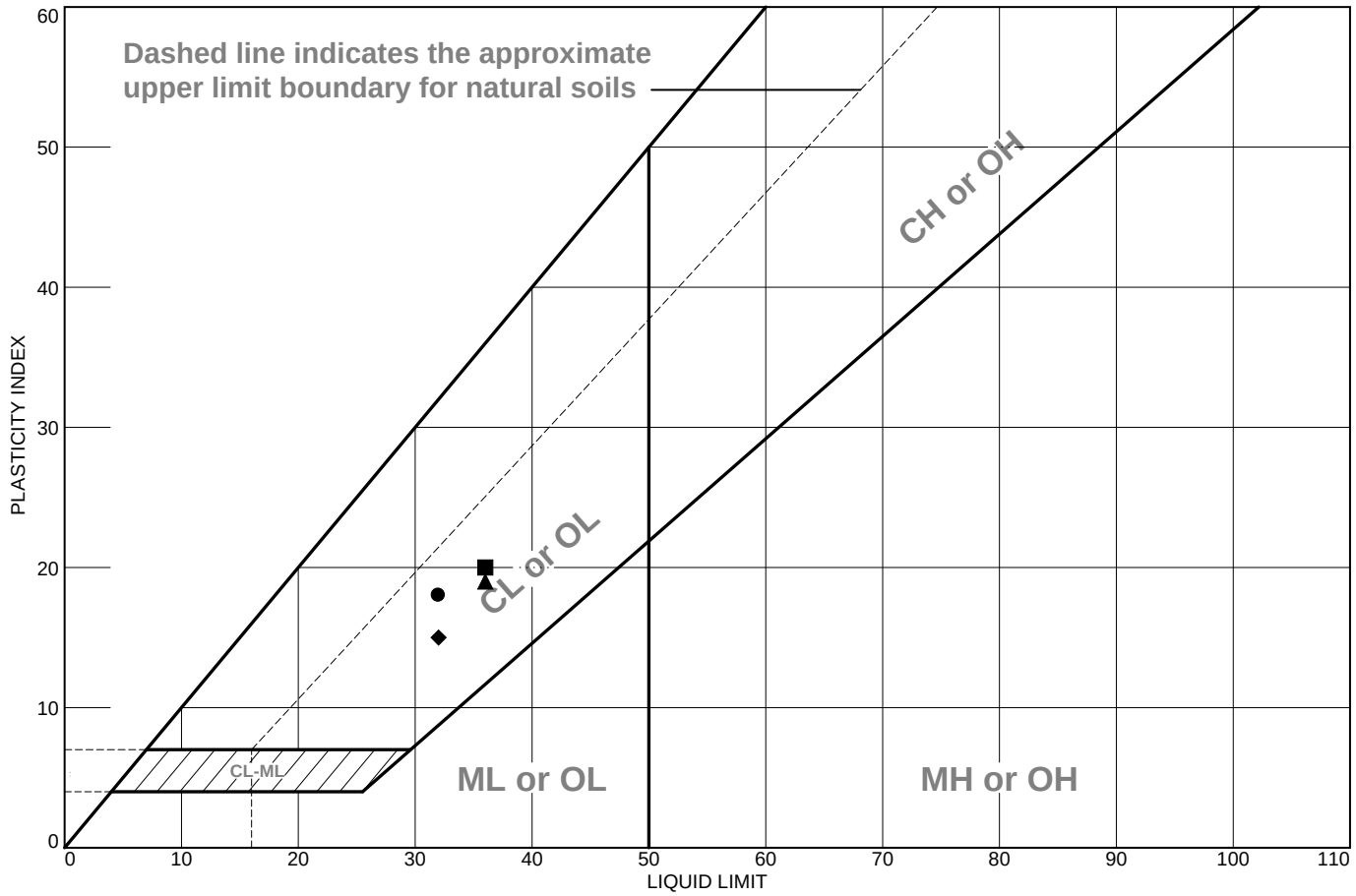
GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.
GES

Remarks:

Figure B-55

Tested By: ○ K. FERNANDO □ R. BRATTON △ R. BRATTON ◇ R. BRATTON

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay with sand	32	14	18	82	71	CL
■	Lean clay	36	16	20	97	93	CL
▲	Lean clay with sand	36	17	19	87	81	CL
◆	Lean clay with sand	32	17	15	77	72	CL

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Remarks:

●**Location:** RW14B-1 @ 25.0'-26.5' **Depth:** 25.0'-26.5' **Sample Number:** RW14B-1

■**Location:** RW14B-1 @ 35.0'-36.5' **Depth:** 35.0'-36.5' **Sample Number:** RW14B-1

▲**Location:** RW14B-1 @ 45.0'-46.5' **Depth:** 45.0'-46.5' **Sample Number:** RW14B-1

◆**Location:** RW14B-1 @ 55.0'-55.7' **Depth:** 55.0'-55.7' **Sample Number:** RW14B-1

GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.
GES

Figure B-56

Tested By: R. BRATTON

GEOTECHNICAL &
ENVIRONMENTAL
SERVICES, INC.

7150 PLACID STREET
LAS VEGAS NV, 89119
1-702-365-1001

SWELL TEST SUMMARY

Project Name: US 95 - CC 215 | Client: HDR
Project No.: 20184521E1 | Test Method: SNBC 1803.5.3.2
Sample Dates: 11/20/2018 | Report Date: 12/11/2018

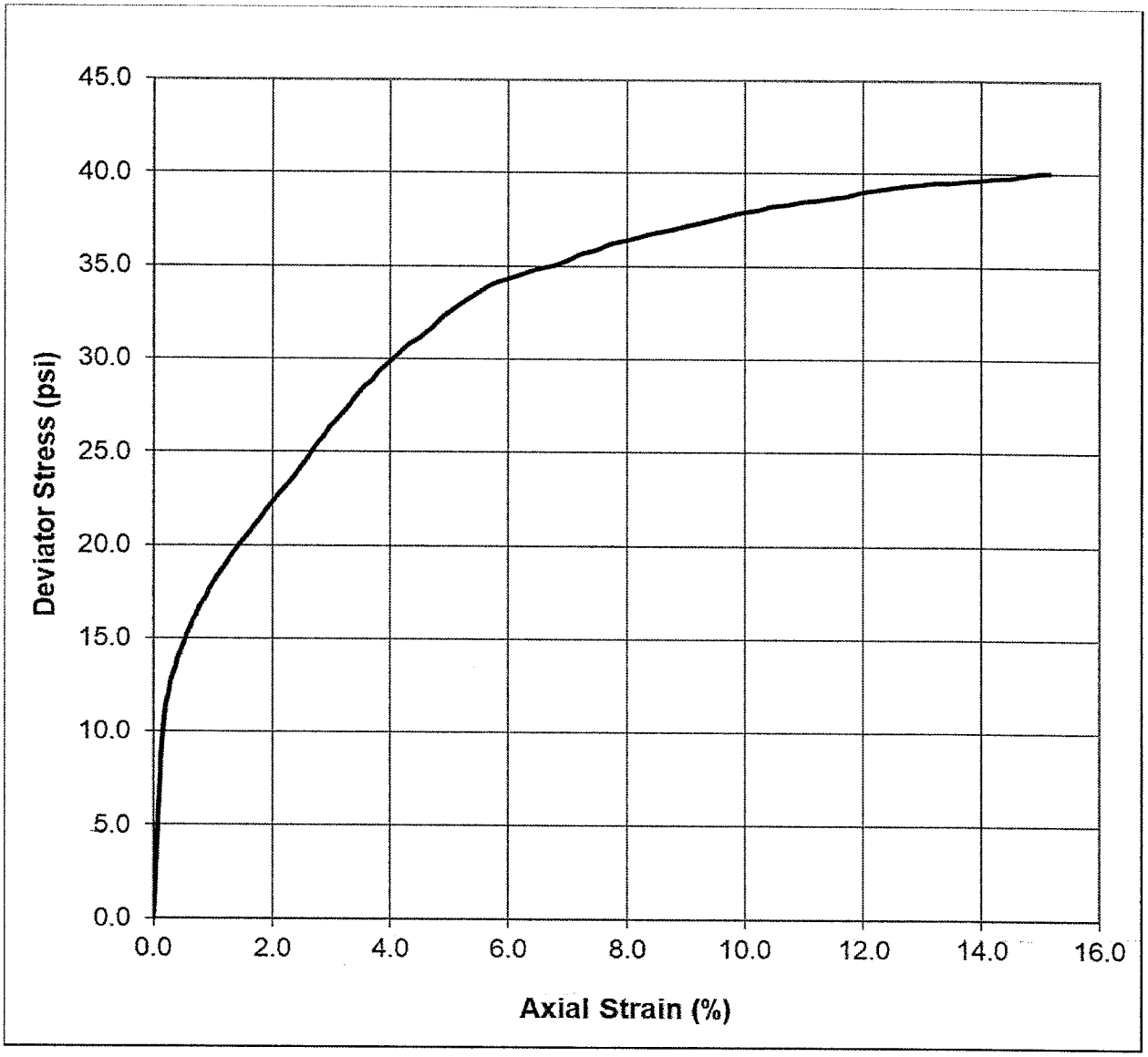
LAB NUMBER	SAMPLE LOCATION	SAMPLE DEPTH (feet)	SOIL TYPE (USCS)	TEST CONDITION	SURCHARGE LOAD (psf)	INITIAL DRY DENSITY[1] (pcf)	INITIAL MOISTURE CONTENT[2] (%)	FINAL MOISTURE CONTENT (%)	EXPANSION[3] (%)
15-508	H3034B-3	40.0-41.5	CH	In-Situ	60	101.5	15.9	24.1	6
18-501	RW7B-5	5.0-6.5	ML	In Situ	60	69.5	11.8	47.4	0
18-500	RW8B-1	20.0-21.3	SC	In-Situ	60	113.3	7.8	14.5	1
18-501	RW8B-2	1.0-5.0	GC	Remolded	60	131.6	6.5	9.4	0
18-497	RW9B-1	0.0-5.0	SC-SM	Remolded	60	127.5	7.9	10.8	3

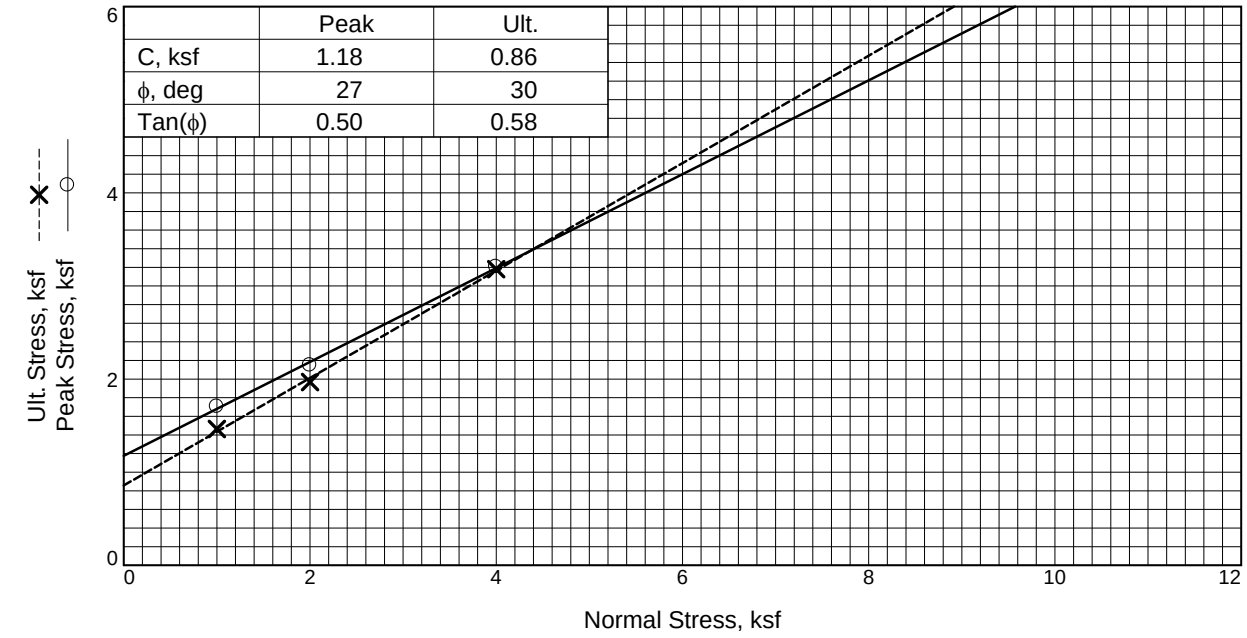
1 Remolded samples were remolded to approximately 90% of the estimated soil maximum dry density (ASTM D 1557).
2 Moisture content prior to oven drying.
3 Positive values refer to swell. Negative values refer to collapse.

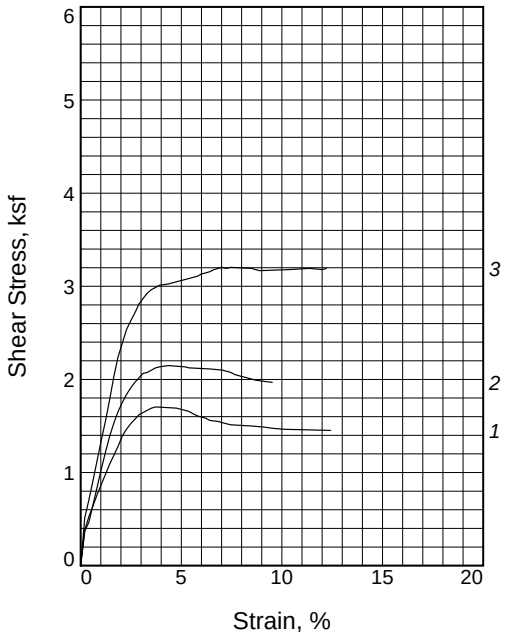
Data for Consolidated Undrained (CU) Triaxial Shear Testing

Job Name: Geotechnical & Environmental Services, Inc.
Job Number: DB18.1017.00
Sample Number: H3036 B3 @ 72'-74' (1.62 g/cc) (20 psi)
Project: CC215-US95 Interchange
Depth: 72'-74'

Plot of Deviator Stress vs. Axial Strain







Sample No.		1	2	3
Initial	Water Content, %	20.2	20.2	20.2
	Dry Density, pcf	105.1	107.4	98.6
	Saturation, %	96.7	102.9	81.5
	Void Ratio	0.5441	0.5113	0.6458
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	20.2	20.2	20.2
	Dry Density, pcf	105.1	107.4	98.6
	Saturation, %	96.7	102.9	81.5
	Void Ratio	0.5441	0.5113	0.6458
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Peak Stress, ksf		1.70	2.15	3.20
Strain, %		3.7	4.3	7.0
Ult. Stress, ksf		1.46	1.97	3.18
Strain, %		10.1	9.5	10.3
Strain rate, in./min.		0.050	0.040	0.050

Sample Type:
Description: Clayey gravel with sand

LL= 46 **PL=** 24 **PI=** 22
Assumed Specific Gravity= 2.60
Remarks:

Figure B-59

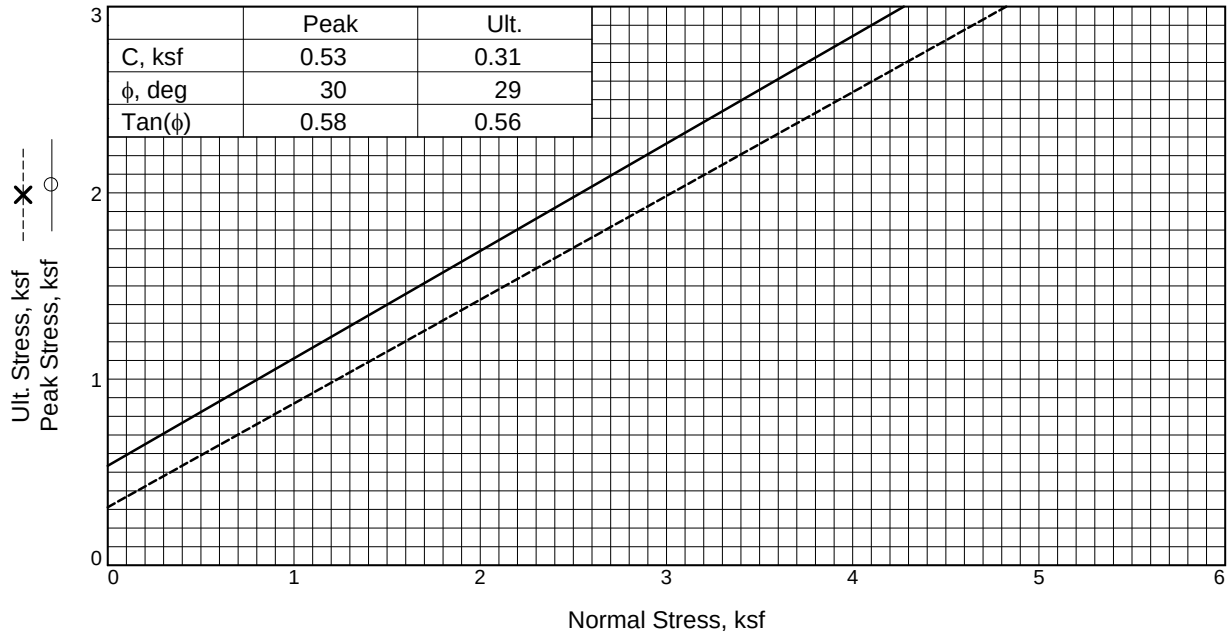
Client: HDR

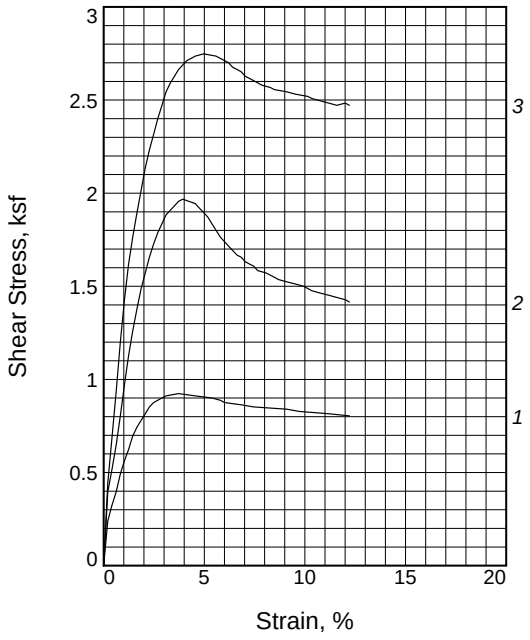
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3033B-2 @ 60.0'-61.5'
Sample Number: H3033B-2 **Depth:** 60.0'-61.5'
Proj. No.: 20184521E1 **Date Sampled:** 12/20/18

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Tested By: A. SANDERS





Sample No.		1	2	3
Initial	Water Content, %	17.8	17.8	17.8
	Dry Density, pcf	100.1	94.8	97.8
	Saturation, %	74.5	65.0	70.1
	Void Ratio	0.6215	0.7120	0.6601
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	17.8	17.8	17.8
	Dry Density, pcf	100.1	94.8	97.8
	Saturation, %	74.5	65.0	70.1
	Void Ratio	0.6215	0.7120	0.6601
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Peak Stress, ksf		0.92	1.97	2.75
Strain, %		3.7	3.9	5.0
Ult. Stress, ksf		0.83	1.49	2.52
Strain, %		9.7	10.1	10.1
Strain rate, in./min.		0.050	0.050	0.050

Sample Type:
Description: Sandy lean clay

LL= 33 **PL=** 18 **PI=** 15
Assumed Specific Gravity= 2.60
Remarks:

Figure B-60

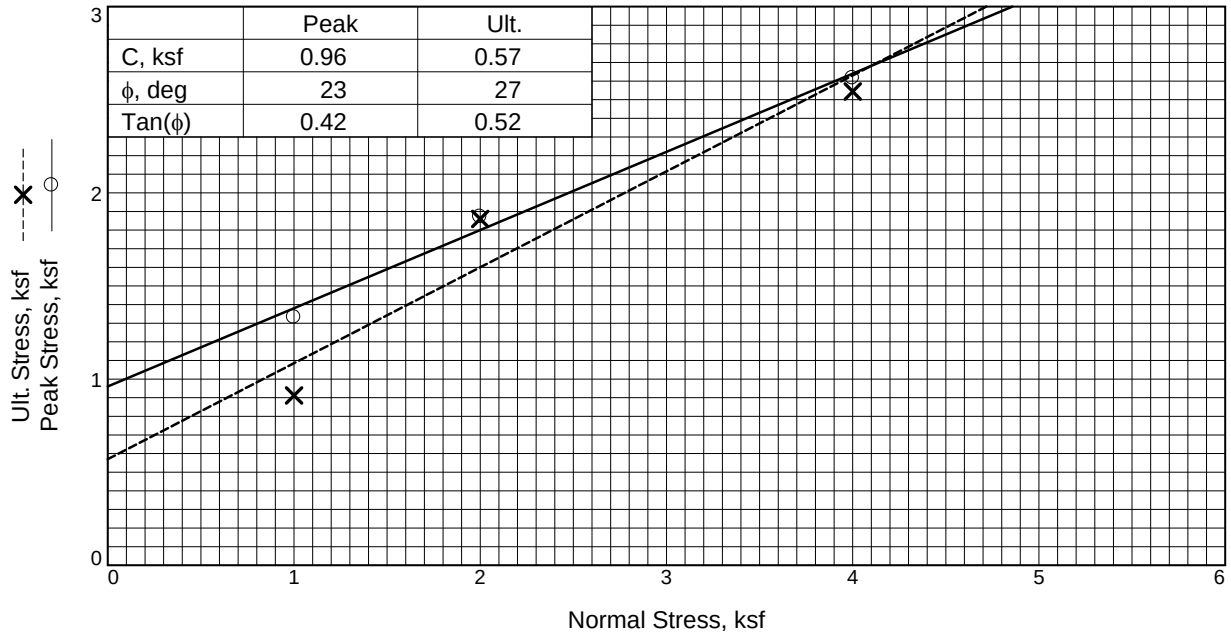
Client: HDR

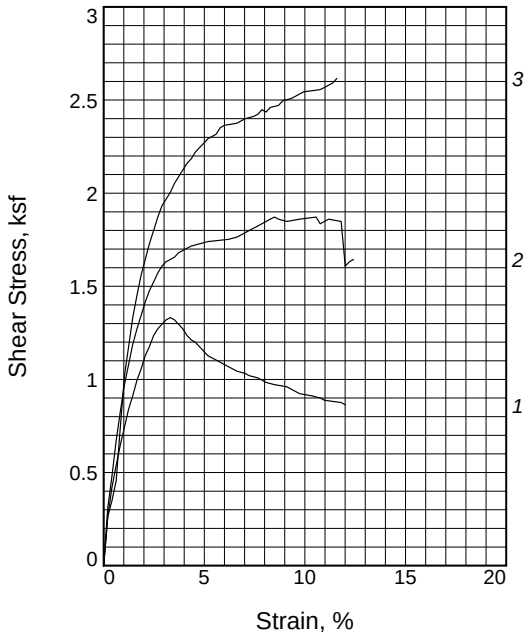
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3034B-3 @ 40.0'-41.5'
Sample Number: H3034B-3 **Depth:** 40.0'-41.5'
Proj. No.: 20184521E1 **Date Sampled:** 12/11/18

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Tested By: A. SANDERS





Sample No.		1	2	3
Initial	Water Content, %	15.6	15.6	15.6
	Dry Density, pcf	108.1	105.9	105.0
	Saturation, %	80.9	76.1	74.3
	Void Ratio	0.5012	0.5329	0.5454
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	15.2	16.1	15.6
	Dry Density, pcf	108.1	105.9	105.0
	Saturation, %	79.1	78.4	74.4
	Void Ratio	0.5012	0.5329	0.5454
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Peak Stress, ksf		1.33	1.87	2.62
Strain, %		3.3	10.6	11.6
Ult. Stress, ksf		0.91	1.86	2.54
Strain, %		10.3	9.7	9.9
Strain rate, in./min.		0.050	0.500	0.050

Sample Type:
Description: Clayey gravel with sand

LL= 56 **PL=** 21 **PI=** 35
Assumed Specific Gravity= 2.60
Remarks:

Figure B-61

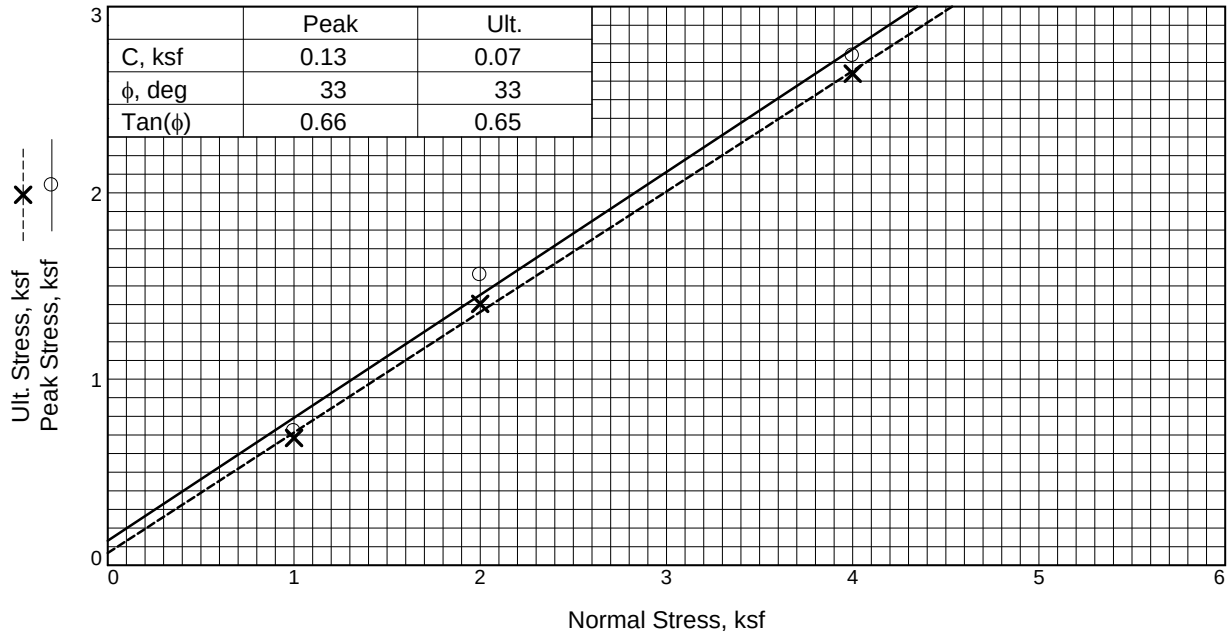
Client: HDR

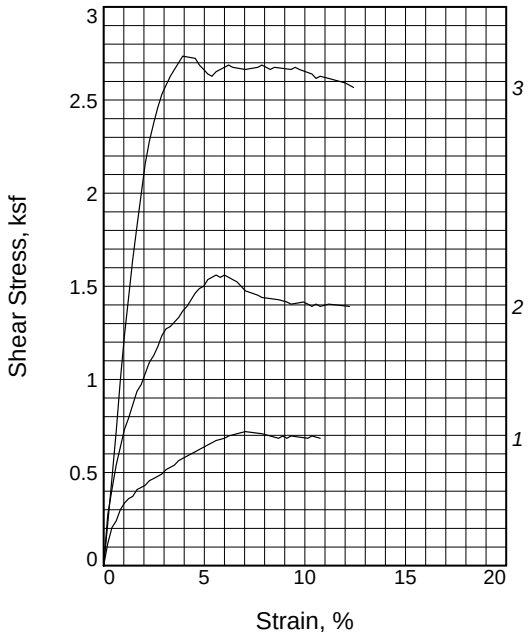
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3036B-1 @ 45.0'
Sample Number: H3036B-1 **Depth:** 45.0'
Proj. No.: 20184521E1 **Date Sampled:** 12/20/18

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Tested By: A. SANDERS





Sample No.		1	2	3
Initial	Water Content, %	20.0	20.0	20.0
	Dry Density, pcf	101.3	102.9	105.7
	Saturation, %	86.6	90.2	97.3
	Void Ratio	0.6016	0.5779	0.5355
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	19.5	20.0	20.0
	Dry Density, pcf	101.3	102.9	105.7
	Saturation, %	84.5	90.1	97.3
	Void Ratio	0.6016	0.5779	0.5355
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Peak Stress, ksf		0.72	1.56	2.74
Strain, %		7.0	6.0	3.9
Ult. Stress, ksf		0.68	1.40	2.64
Strain, %		10.1	10.1	10.3
Strain rate, in./min.		0.050	0.050	0.050

Sample Type:
Description: Clayey gravel with sand

LL= 27 **PL=** 19 **PI=** 8
Assumed Specific Gravity= 2.60
Remarks:

Figure B-62

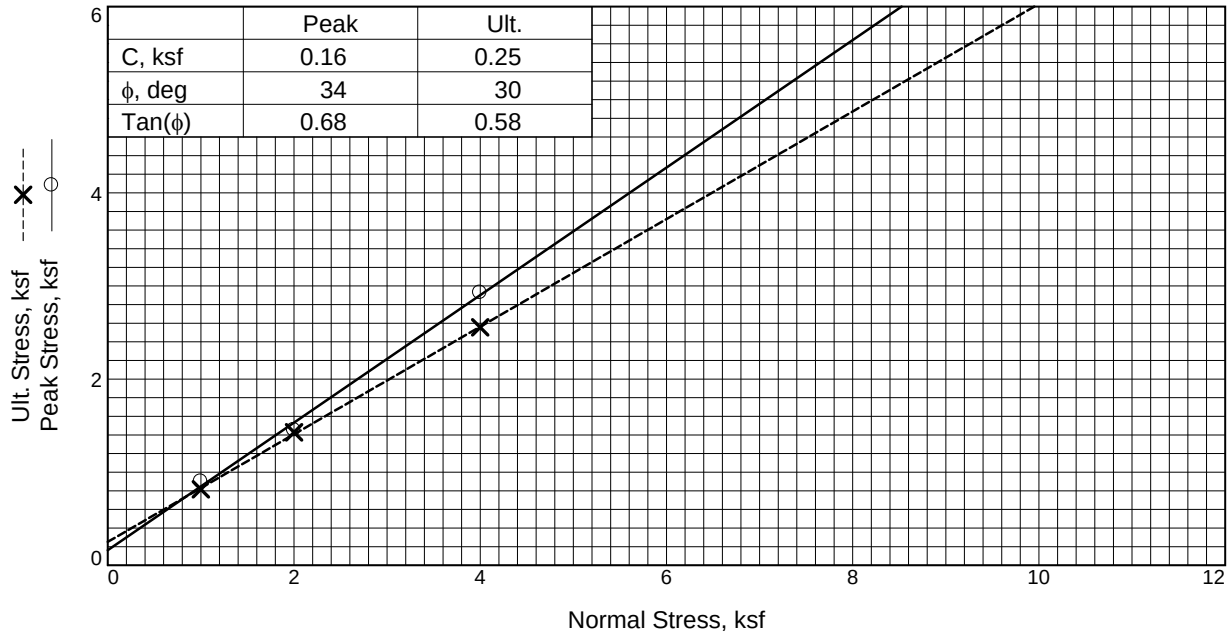
Client: HDR

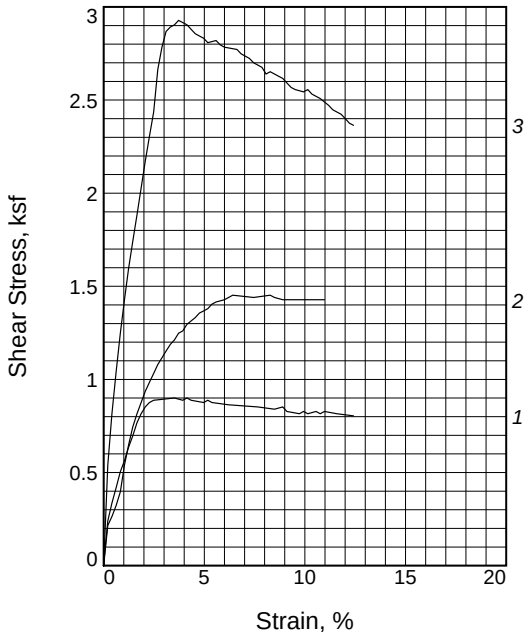
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3036B-4 @ 80.0'
Sample Number: H3036B-4 **Depth:** 80.0'
Proj. No.: 20184521E1 **Date Sampled:** 12/21/18

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Tested By: A. SANDERS





Sample No.		1	2	3
Initial	Water Content, %	11.9	11.9	11.9
	Dry Density, pcf	93.9	88.8	100.7
	Saturation, %	42.3	37.3	50.5
	Void Ratio	0.7287	0.8268	0.6113
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	11.9	11.9	11.9
	Dry Density, pcf	93.9	88.8	100.7
	Saturation, %	42.3	37.3	50.4
	Void Ratio	0.7287	0.8268	0.6113
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Peak Stress, ksf		0.90	1.45	2.93
Strain, %		4.1	8.3	3.7
Ult. Stress, ksf		0.82	1.43	2.56
Strain, %		10.1	11.0	10.1
Strain rate, in./min.		0.050	0.050	0.050

Sample Type:
Description: Fat clay with sand

LL= 59 **PL=** 26 **PI=** 33
Assumed Specific Gravity= 2.60
Remarks:

Figure B-63

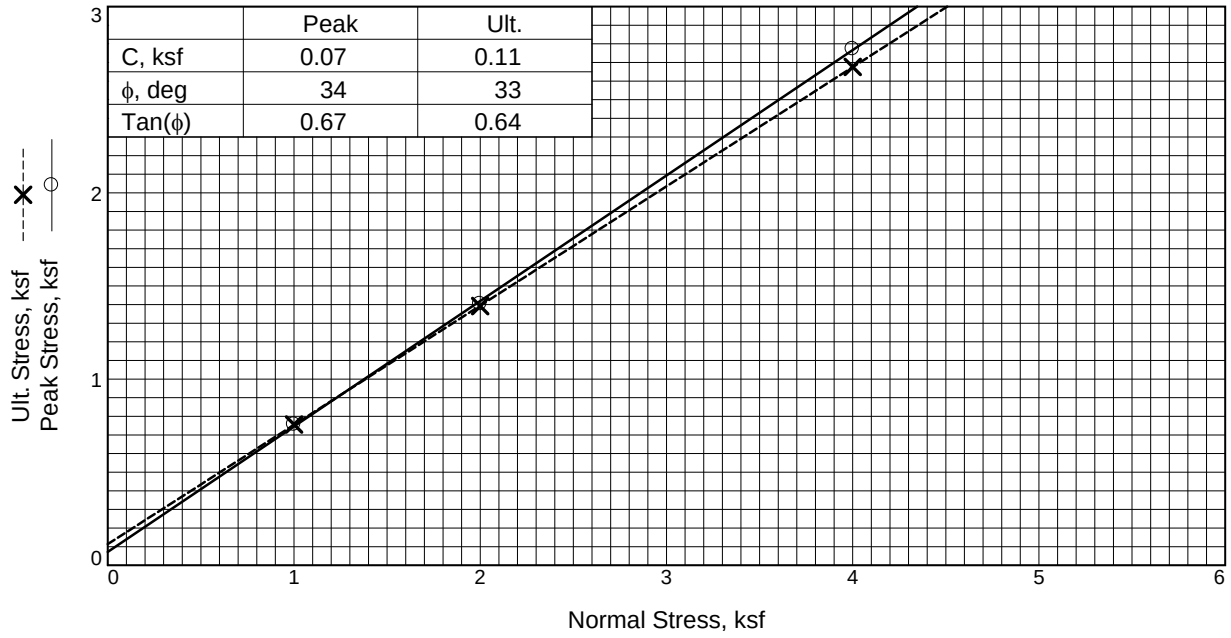
Client: HDR

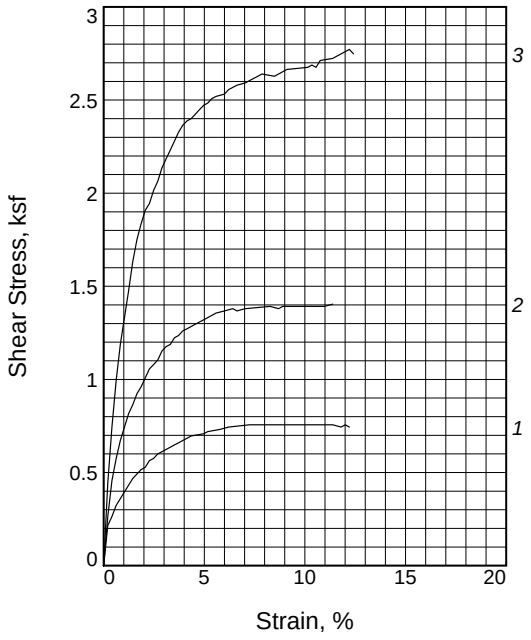
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: RW7B-4 @ 25.0'
Sample Number: RW7B-4 **Depth:** 25.0'
Proj. No.: 20184521E1 **Date Sampled:** 12/27/18

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Tested By: A. SANDERS





Sample No.		1	2	3
Initial	Water Content, %	11.7	11.7	11.7
	Dry Density, pcf	74.3	69.7	68.5
	Saturation, %	25.6	22.8	22.2
	Void Ratio	1.1831	1.3275	1.3682
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	11.7	11.7	11.7
	Dry Density, pcf	74.3	69.7	68.5
	Saturation, %	25.6	22.8	22.2
	Void Ratio	1.1831	1.3275	1.3682
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Peak Stress, ksf		0.76	1.40	2.77
Strain, %		7.2	11.4	12.2
Ult. Stress, ksf		0.76	1.39	2.68
Strain, %		9.3	11.0	10.1
Strain rate, in./min.		0.050	0.050	0.050

Sample Type:
Description: Silt

LL= 40 **PL=** 28 **PI=** 12
Assumed Specific Gravity= 2.60
Remarks:

Figure B-64

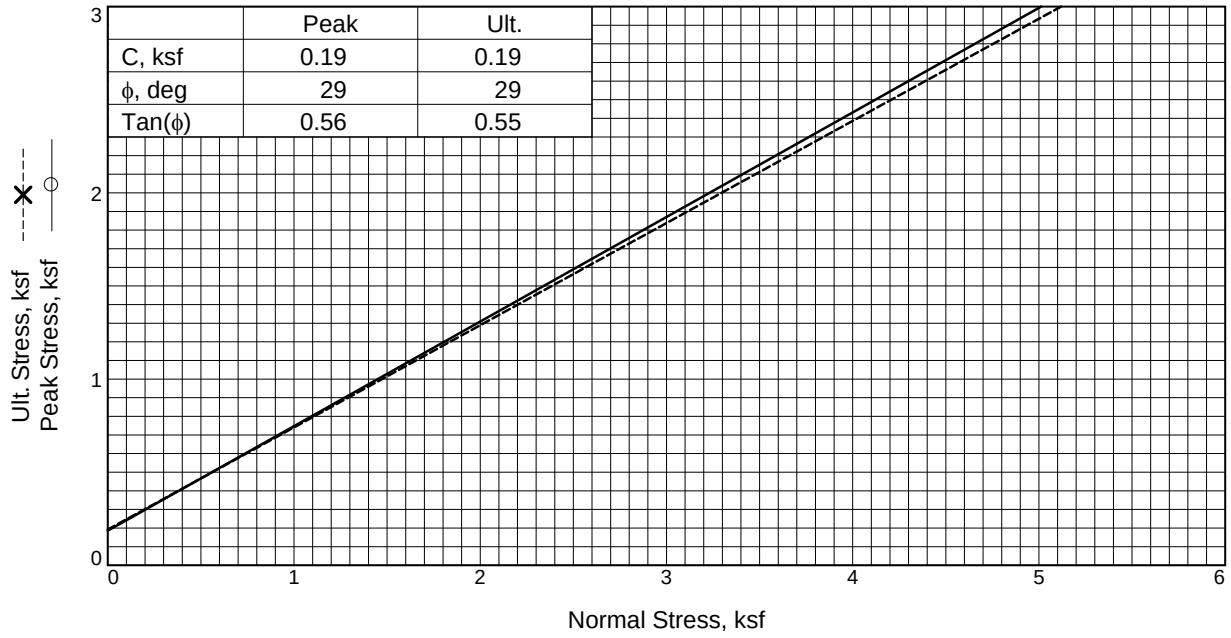
Client: HDR

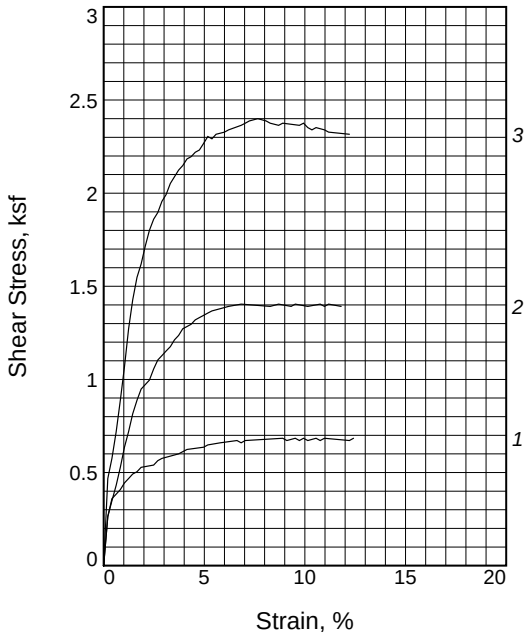
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: RW7B-5 @ 5.0'-6.5'
Sample Number: RW7B-5 **Depth:** 5.0'-6.5'
Proj. No.: 20184521E1 **Date Sampled:** 12/11/18

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Tested By: A. SANDERS





Sample No.		1	2	3
Initial	Water Content, %	6.6	6.6	6.6
	Dry Density, pcf	97.3	102.8	94.4
	Saturation, %	25.7	29.7	23.9
	Void Ratio	0.6686	0.5789	0.7197
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	6.6	6.6	6.6
	Dry Density, pcf	97.3	102.8	94.4
	Saturation, %	25.7	29.7	23.9
	Void Ratio	0.6686	0.5789	0.7197
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Peak Stress, ksf		0.68	1.40	2.40
Strain, %		12.4	11.2	7.7
Ult. Stress, ksf		0.67	1.39	2.35
Strain, %		10.1	10.1	10.1
Strain rate, in./min.		0.050	0.050	0.050

Sample Type:
Description: Sandy lean clay

LL= 38 **PL=** 18 **PI=** 20
Assumed Specific Gravity= 2.60
Remarks:

Figure B-65

Client: HDR

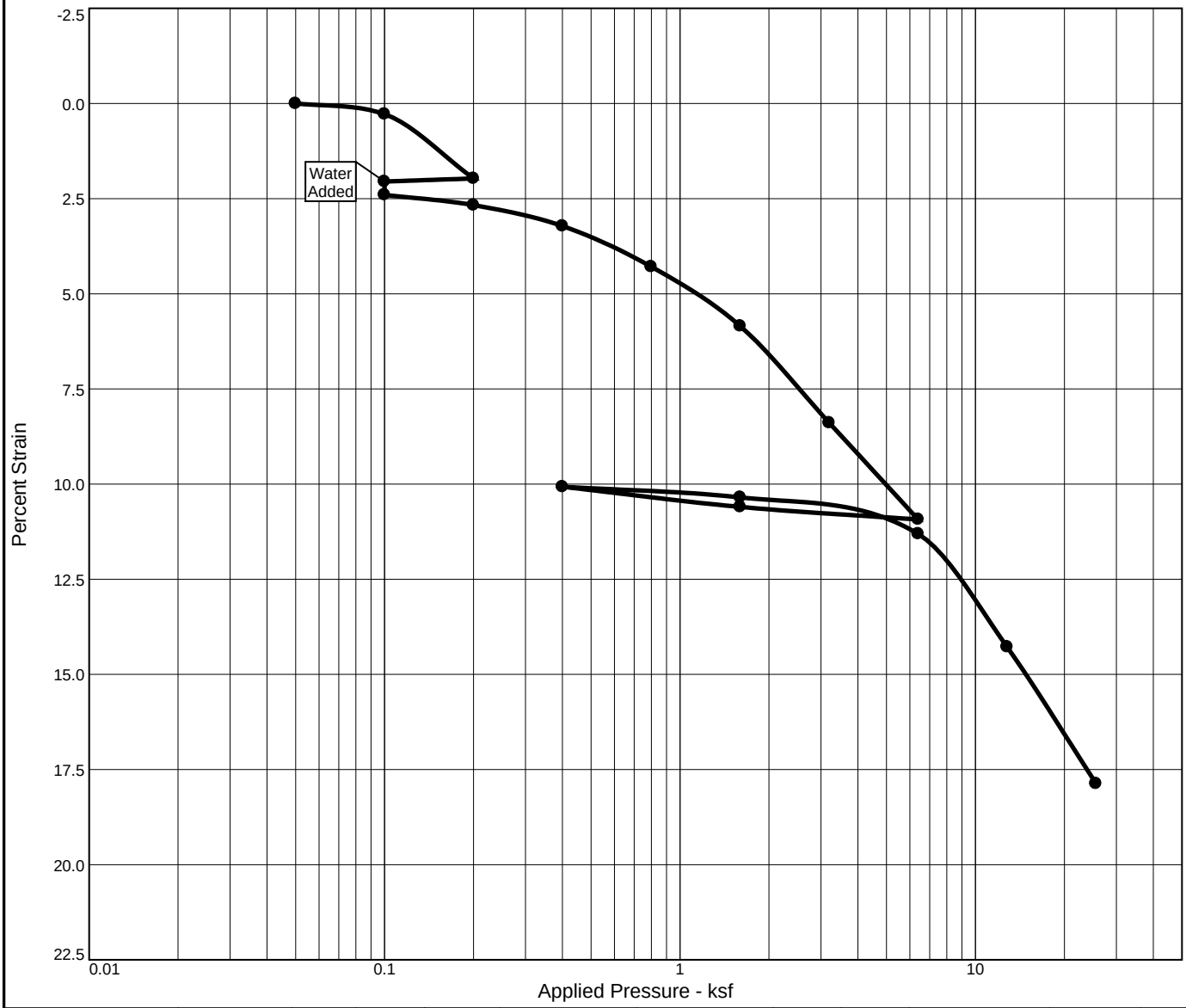
Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: RW7B-6 @ 20.0'
Sample Number: RW7B-6 **Depth:** 20.0'
Proj. No.: 20184521E1 **Date Sampled:** 1/10/18

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Tested By: A. SANDERS

CONSOLIDATION



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
82.3 %	26.1 %	91.7	35	17	2.60	4.8	1.8	0.22	0.01		0.4	0.825

MATERIAL DESCRIPTION	USCS	AASHTO
Lean clay with sand	CL	A-6(11)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3033B-2 @ 105.0'-106.5' **Depth:** 105.0'-106.5' **Sample Number:** H3033B-2

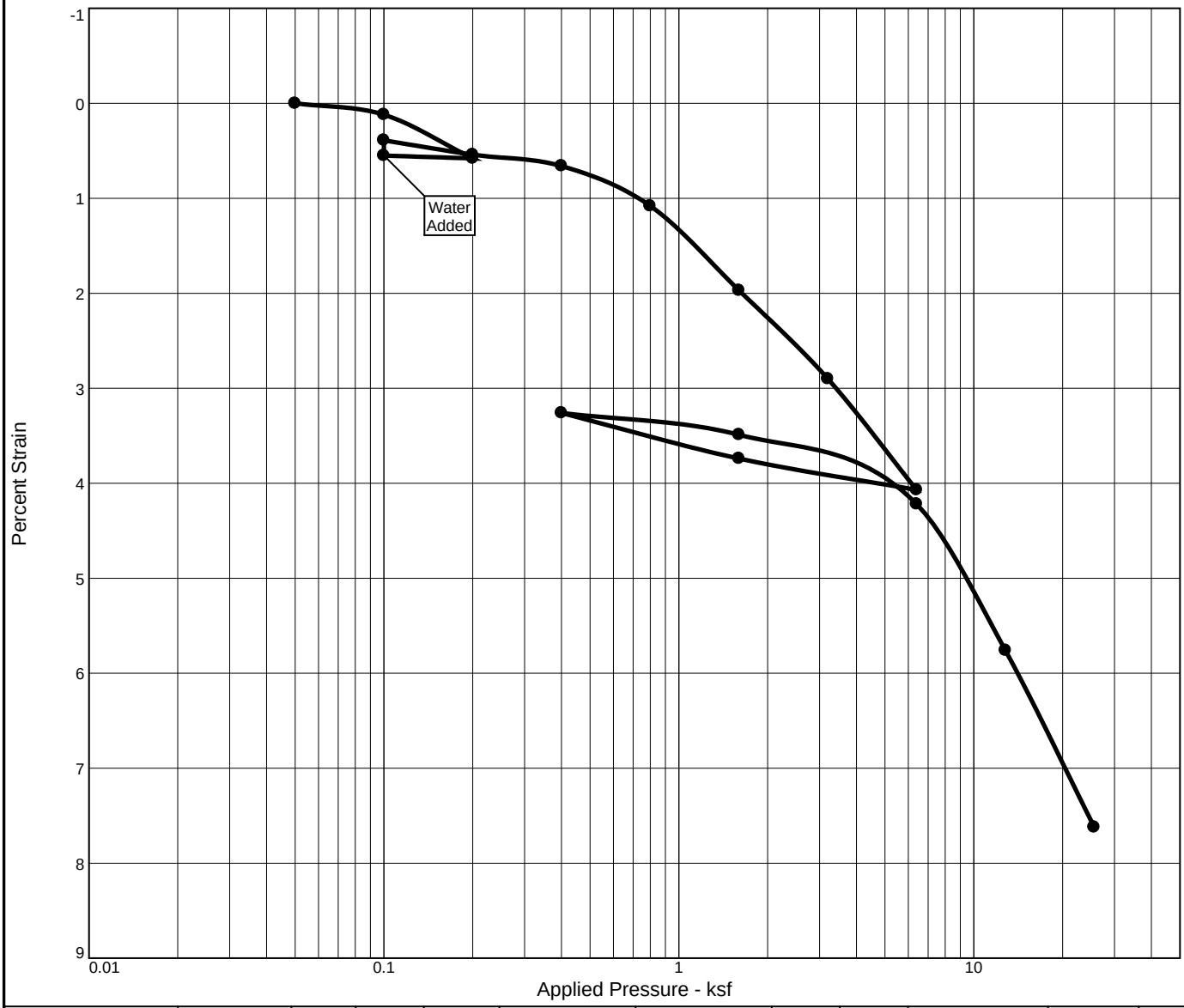
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-66

Tested By: A. SANDERS

CONSOLIDATION



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Swell %	e_o
Sat.	Moist.											
84.9 %	16.1 %	113.0	27	11	2.60	4.2	0.7	0.05	0.01	0.2	0.2	0.493

MATERIAL DESCRIPTION	USCS	AASHTO
Lean clay with sand	CL	A-6(6)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3034B-1 @ 74.0'-76.0' **Depth:** 74.0'-76.0' **Sample Number:** H3034B-1

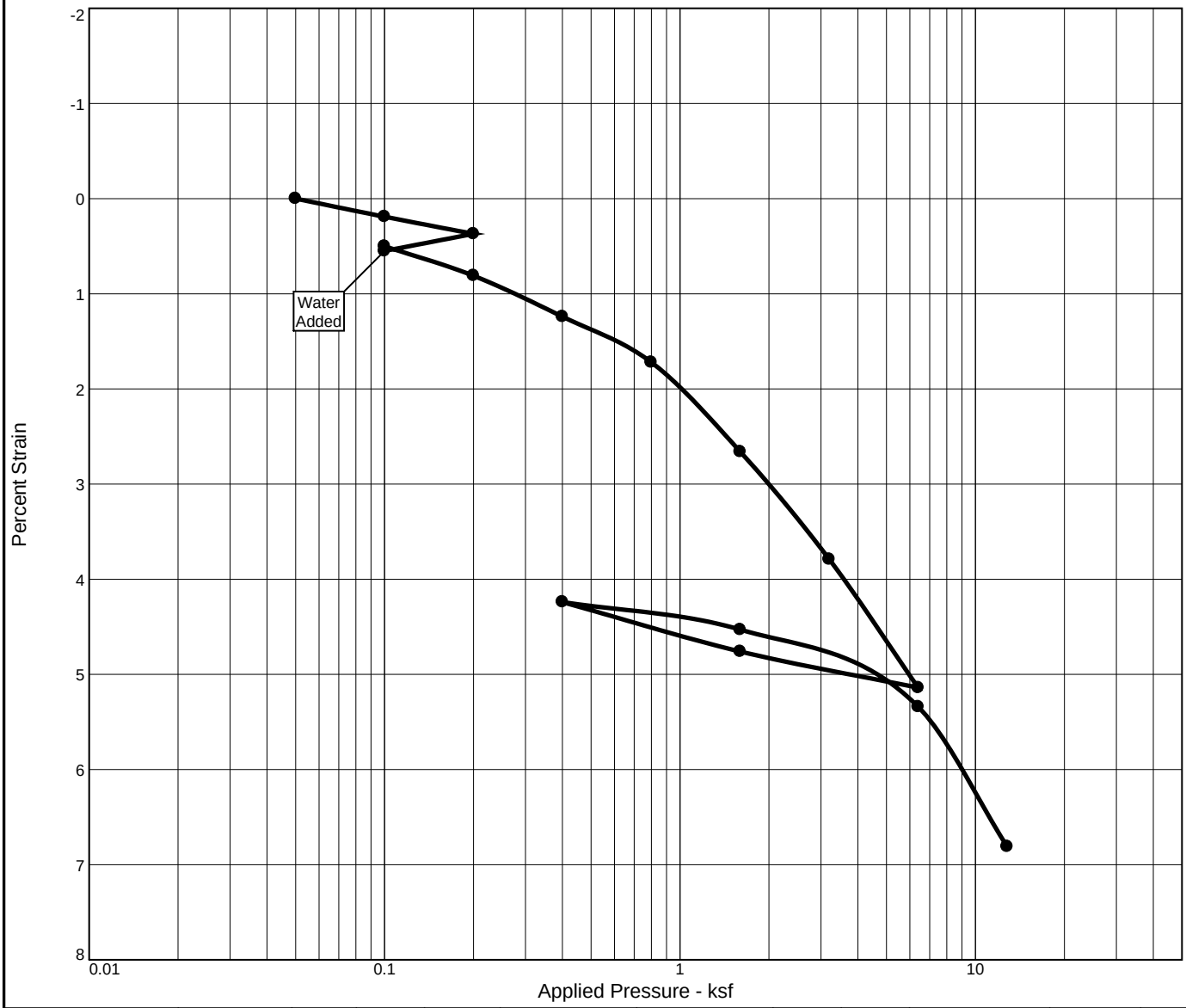
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-67

Tested By: A. SANDERS

CONSOLIDATION



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Swell %	e_o
Sat.	Moist.											
94.8 %	25.5 %	99.2	42	25	2.60	4.19	1.8	0.09	0.01	0.1	0.1	0.698

MATERIAL DESCRIPTION	USCS	AASHTO
Lean clay	CL	A-7-6(26)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3034B-3 @ 82.0'-84.5' **Depth:** 82.0'-84.5' **Sample Number:** H3034B-3

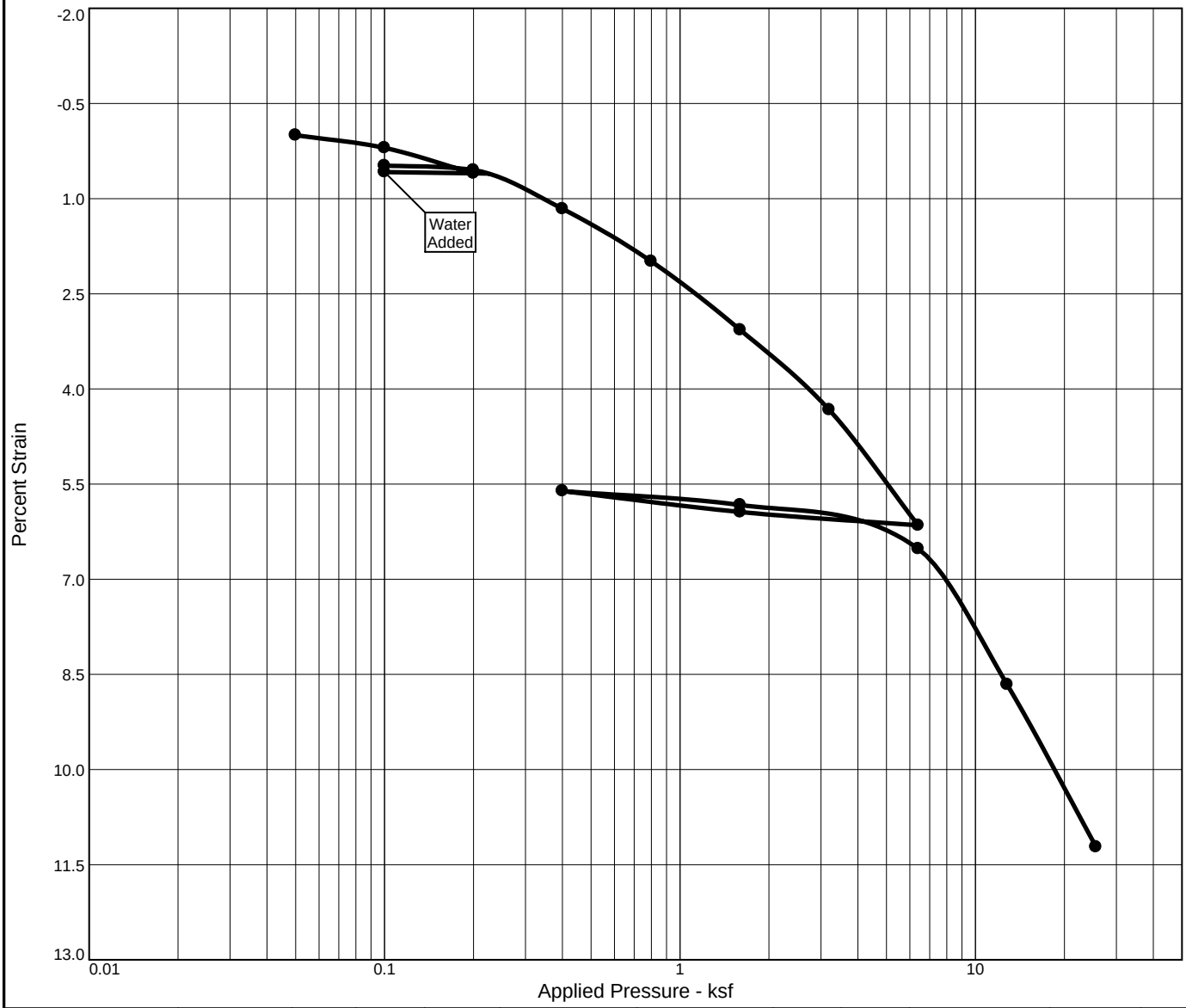
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-68

Tested By: A. SANDERS

CONSOLIDATION



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_s	Swell Press. (ksf)	Swell %	e_o
Sat.	Moist.											
85.8 %	21.3 %	101.3	27	8	2.60	3.7	1.7	0.14	0.01	0.2	0.1	0.645

MATERIAL DESCRIPTION	USCS	AASHTO
Lean clay with sand	CL	A-4(5)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3036B-3 @ 72.0'-74.0' **Depth:** 72.0'-74.0' **Sample Number:** H3036B-3

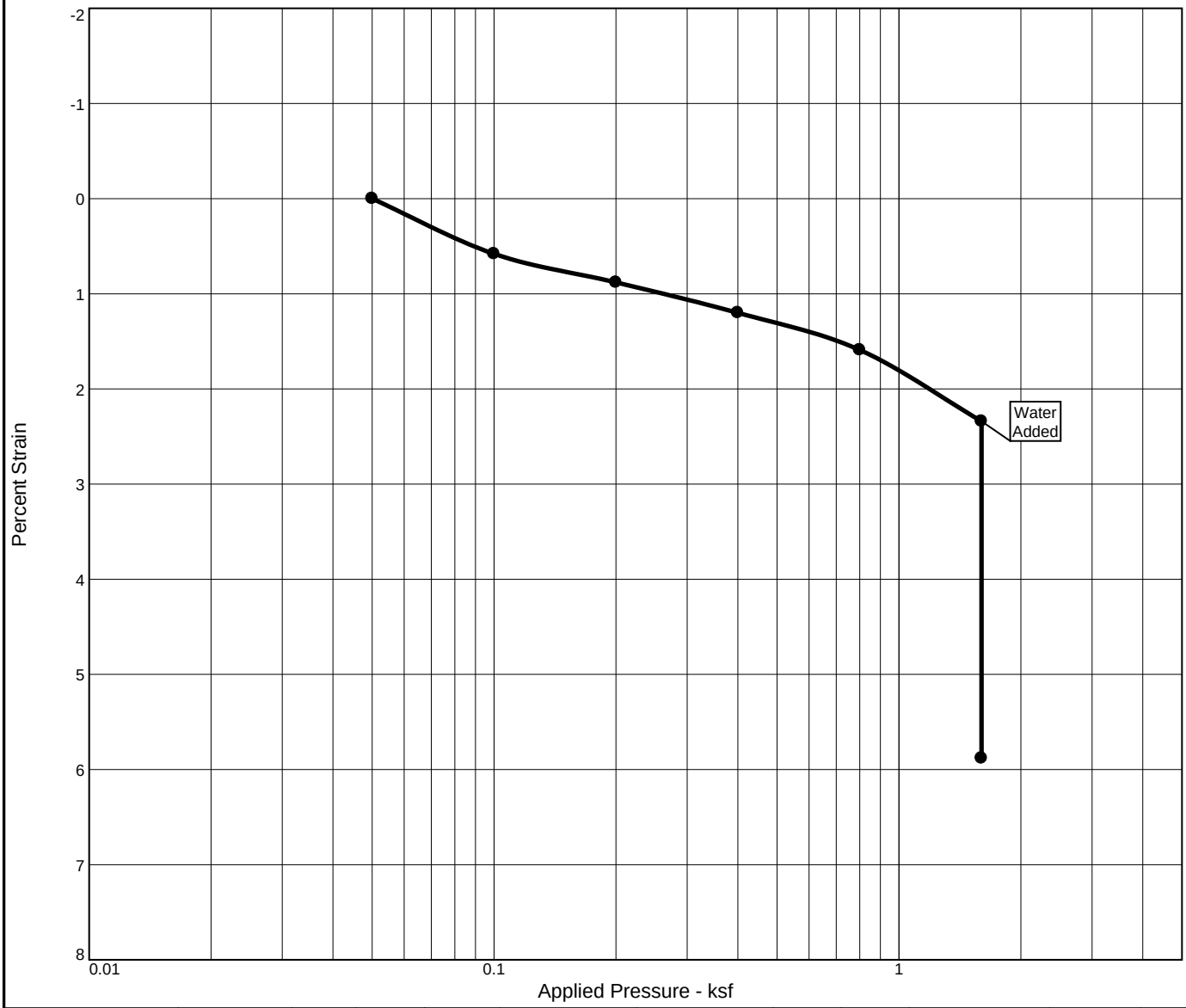
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-69

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
69.9 %	16.2 %	96.2	27	9	2.60	.55					3.5	0.603

MATERIAL DESCRIPTION	USCS	AASHTO
Lean clay	CL	A-4(7)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3034B-1 @ 10.0'-11.5' **Depth:** 10.0'-11.5' **Sample Number:** H3034B-1

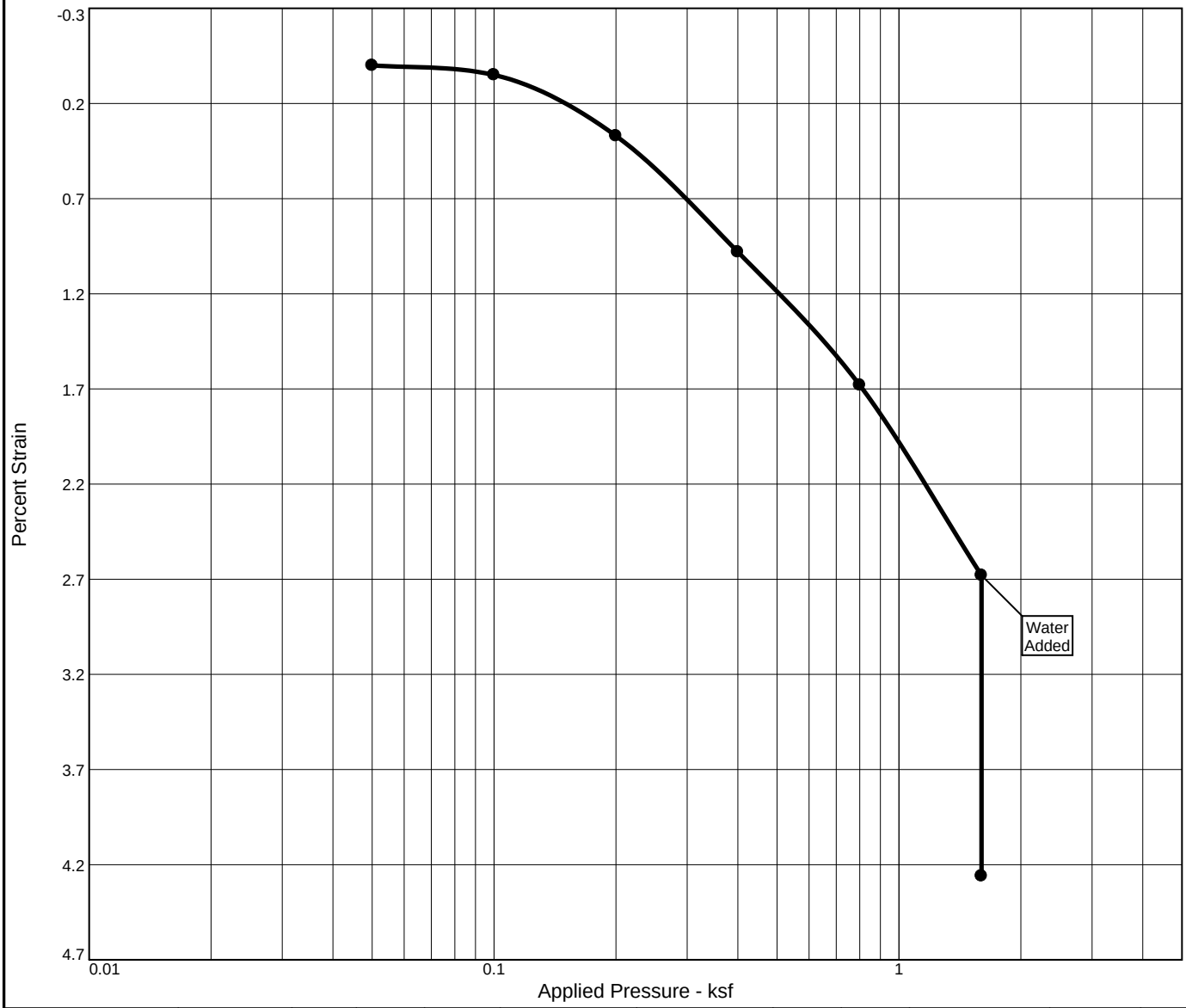
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-70

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
46.8 %	7.8 %	103.3	25	10	2.60	.25					1.6	0.432

MATERIAL DESCRIPTION	USCS	AASHTO
Clayey gravel with sand	GC	A-4(2)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3036B-1 @ 5.0' **Depth:** 5.0' **Sample Number:** H3036B-1

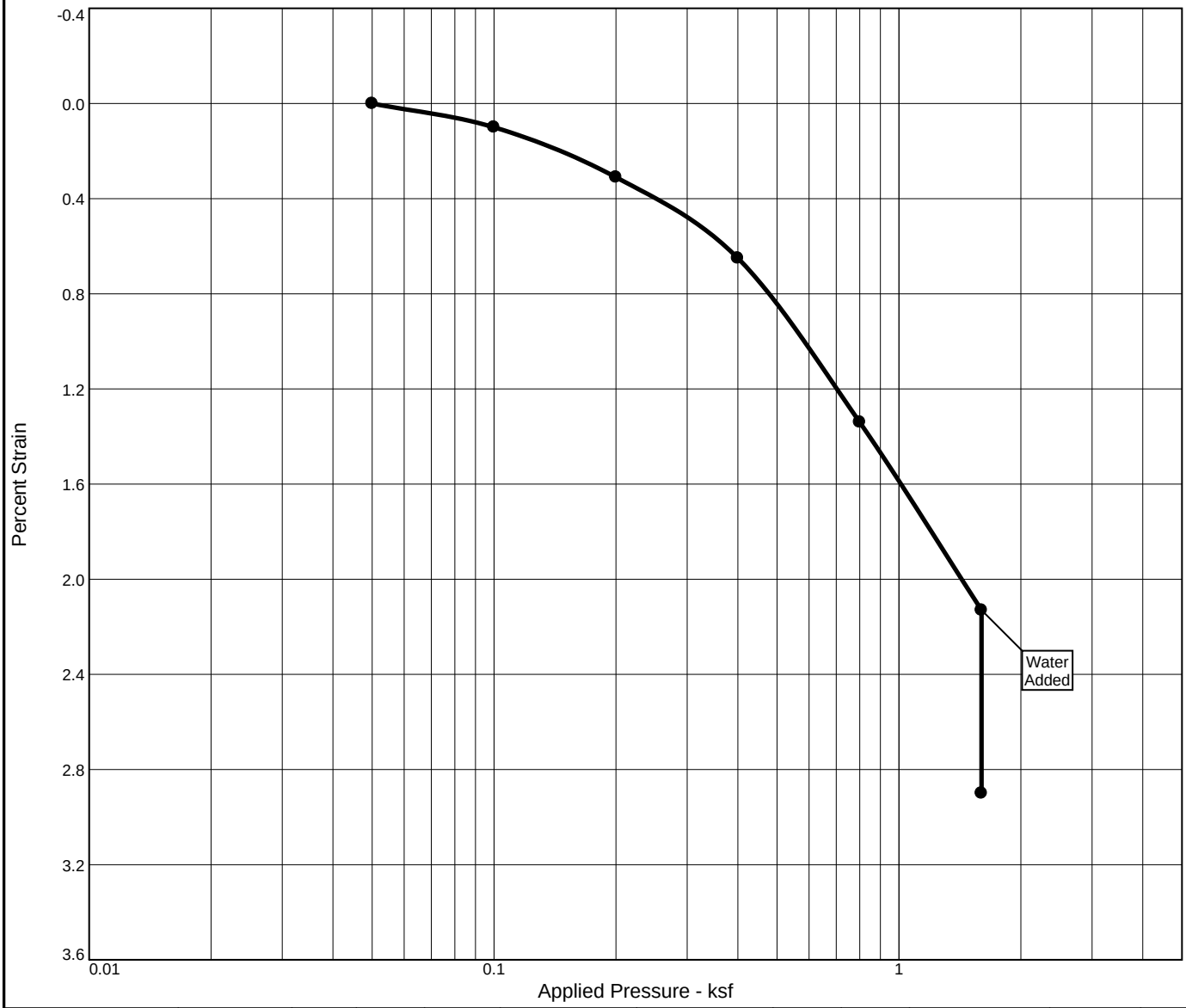
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-71

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
46.7 %	8.7 %	106.8	25	7	2.60	.53					0.8	0.485

MATERIAL DESCRIPTION	USCS	AASHTO
Silty clay	CL-ML	A-4(4)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3036B-2 @ 10.0' **Depth:** 10.0' **Sample Number:** H3036B-2

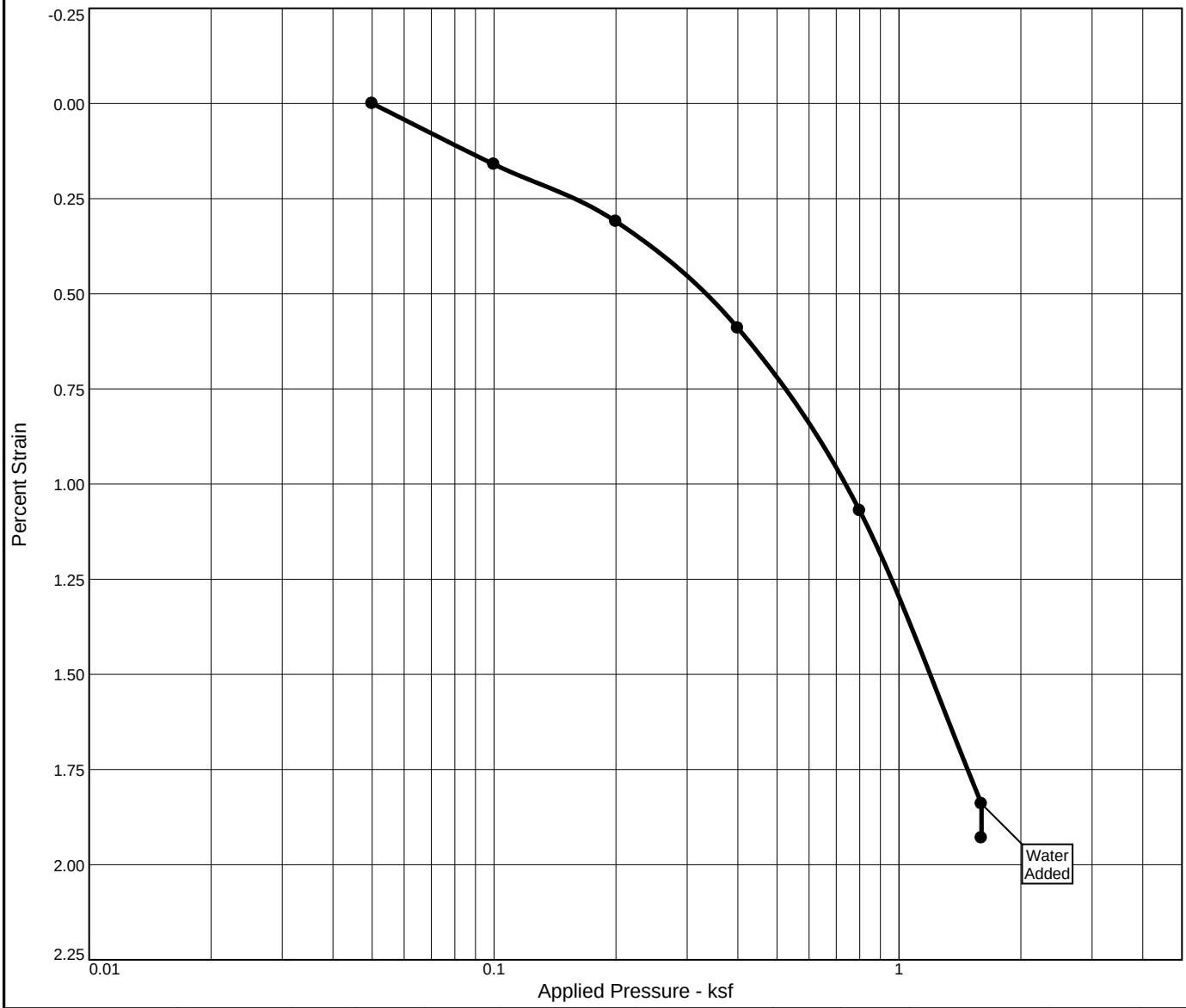
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-72

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
104.2 %	35.2 %	84.8	70	40	2.60	1.06					0.1	0.878

MATERIAL DESCRIPTION	USCS	AASHTO
Sandy fat clay	CH	A-7-5(24)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3036B-3 @ 25.0' **Depth:** 25.0' **Sample Number:** H3036B-3

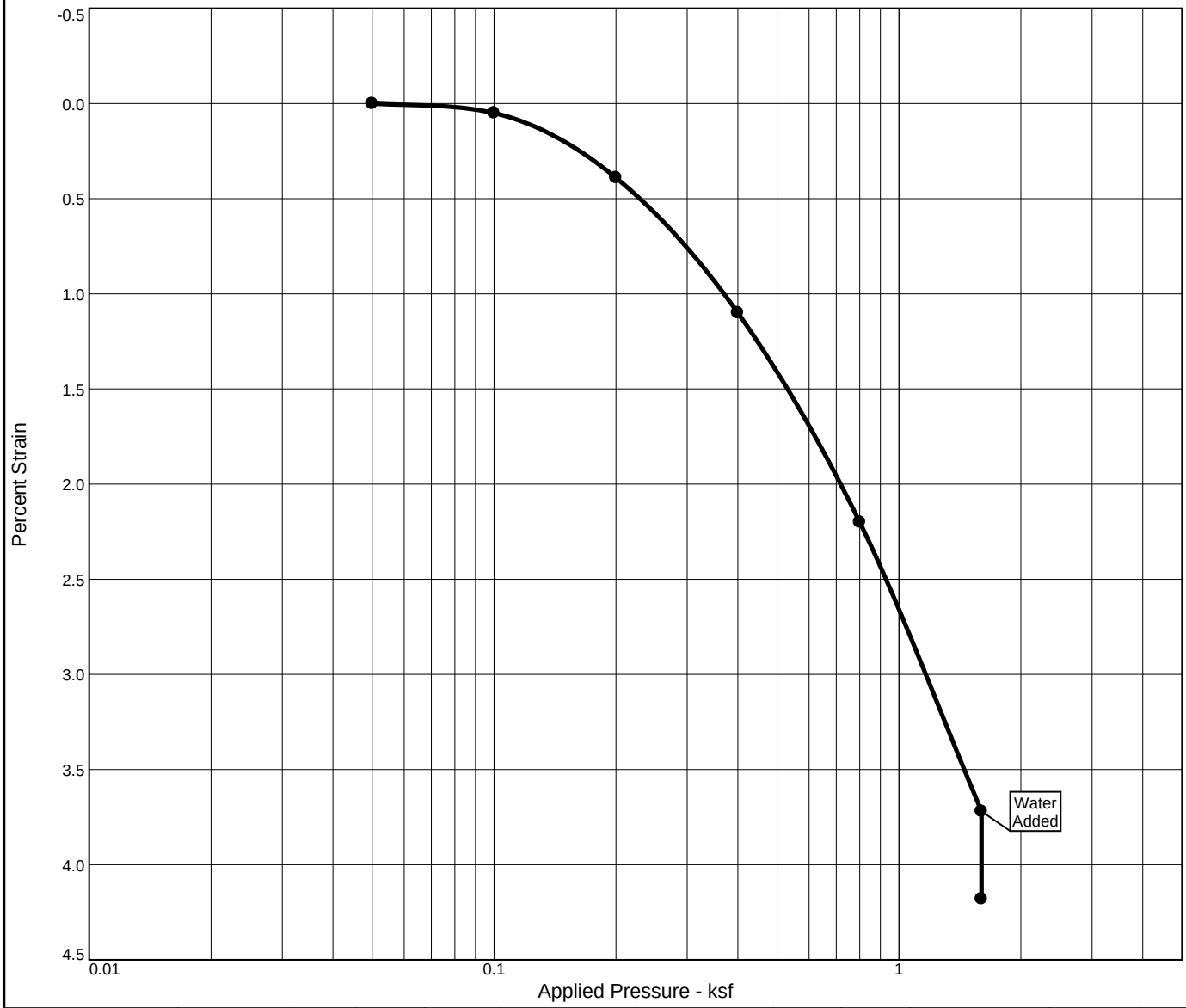
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-73

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
89.7 %	23.1 %	96.2	34	14	2.60	1.68					0.5	0.670

MATERIAL DESCRIPTION	USCS	AASHTO
Clayey gravel with sand	GC	A-2-6(1)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3036B-4 @ 35.0' **Depth:** 35.0' **Sample Number:** H3036B-4

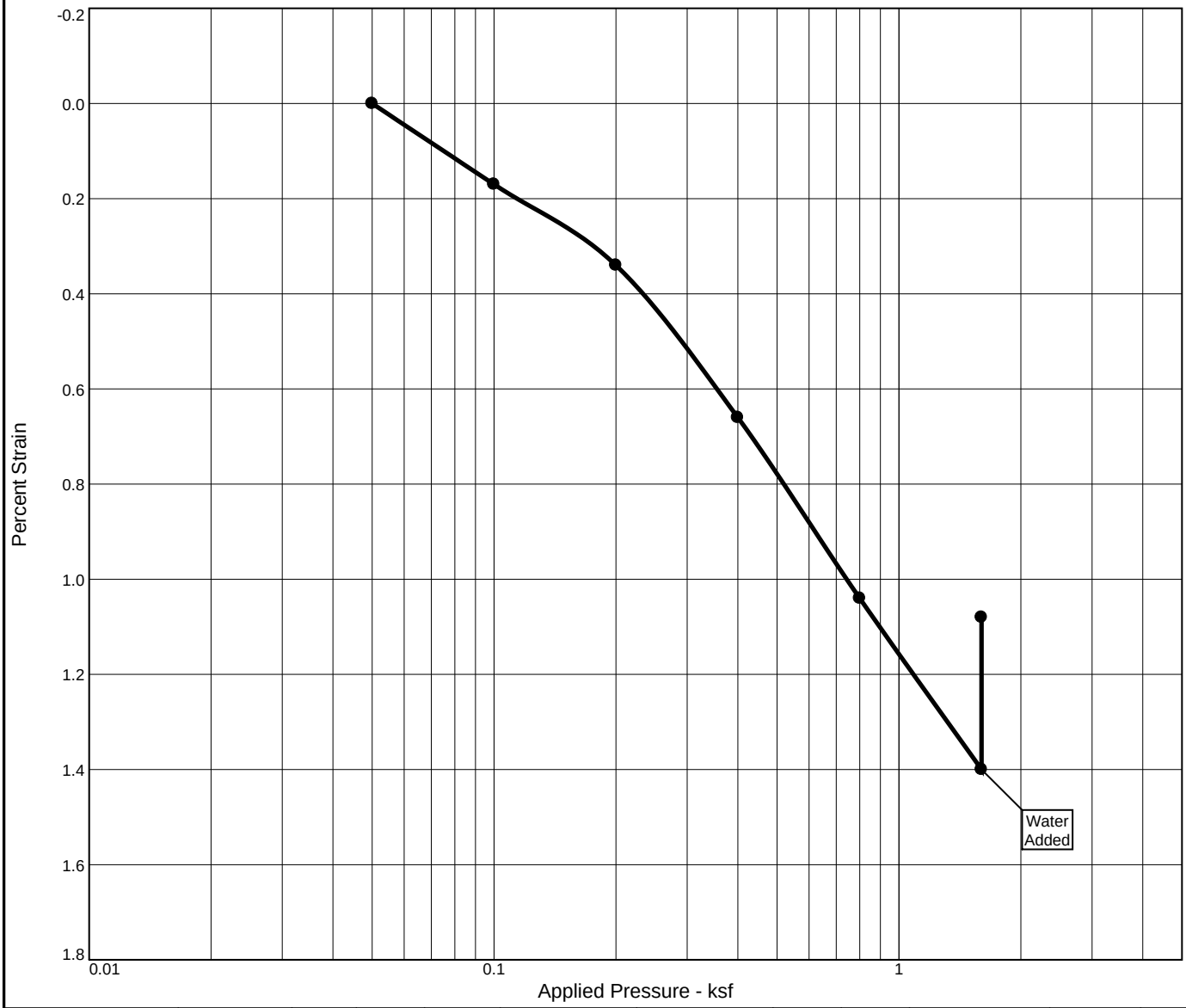
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-74

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Swell %	e_o
Sat.	Moist.											
92.1 %	25.0 %	92.5	62	39	2.60	2.15					0.3	0.705

MATERIAL DESCRIPTION	USCS	AASHTO
Sandy fat clay	CH	A-7-6(20)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3033B-2 @ 45.0'-46.5' **Depth:** 45.0'-46.5' **Sample Number:** H3033B-2

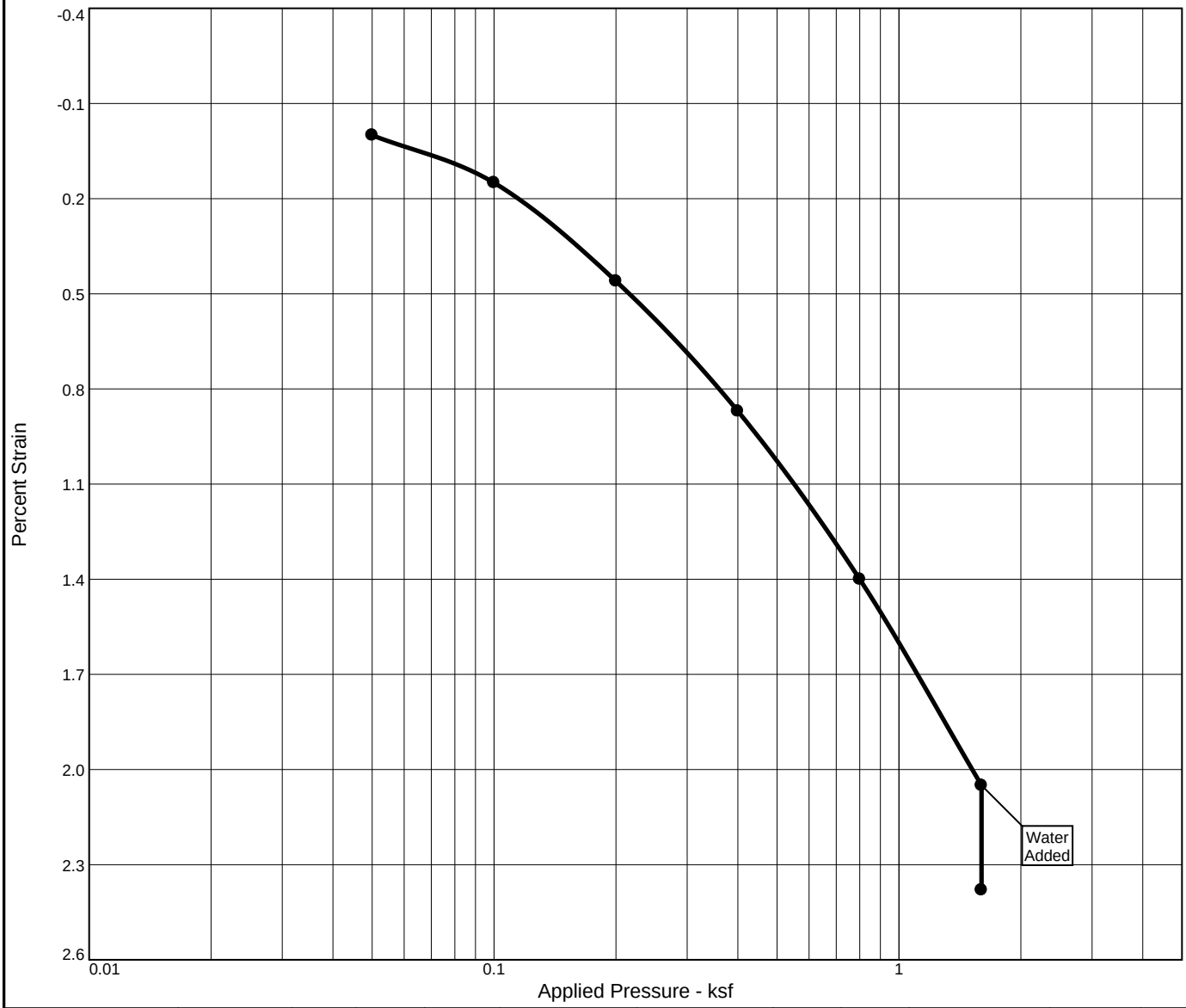
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-75

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
21.3 %	5.2 %	101.8	25	13	2.60	1.27					0.3	0.633

MATERIAL DESCRIPTION	USCS	AASHTO
Sandy lean clay	CL	A-6(3)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: H3036B-5 @ 25.0' **Depth:** 25.0' **Sample Number:** H3036B-5

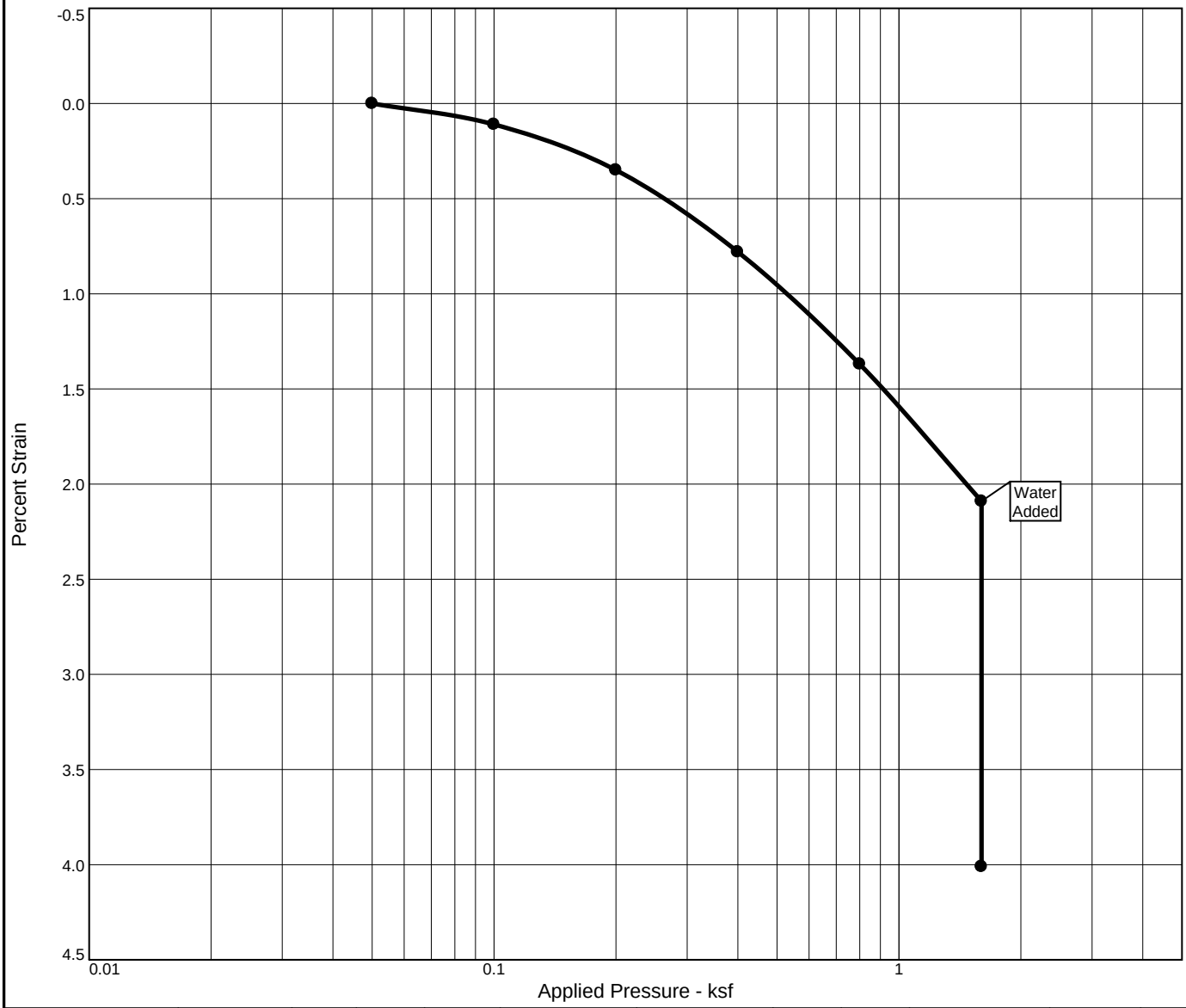
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-76

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
46.0 %	12.4 %	96.2	44	22	2.60	1.4					1.9	0.700

MATERIAL DESCRIPTION	USCS	AASHTO
Sandy lean clay	CL	A-7-6(11)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: RW7B-2 @ 30.0' **Depth:** 30.0' **Sample Number:** RW7B-2

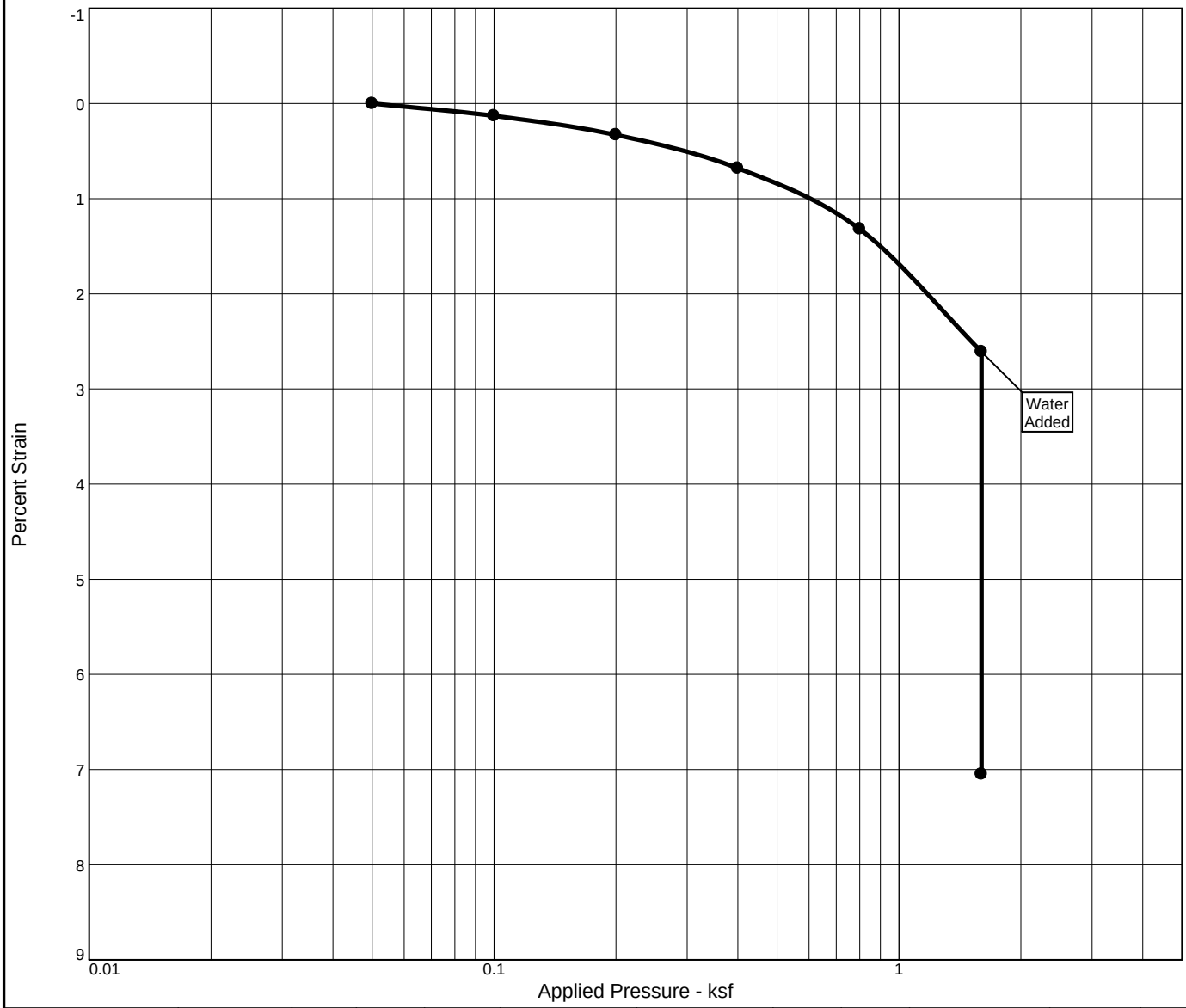
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-77

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
29.0 %	7.1 %	101.1			2.60	1.2					4.4	0.640

MATERIAL DESCRIPTION	USCS	AASHTO
Clayey gravel with sand	GC	A-2-7(3)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: RW7B-3 @ 25.0' **Depth:** 25.0' **Sample Number:** RW7B-3

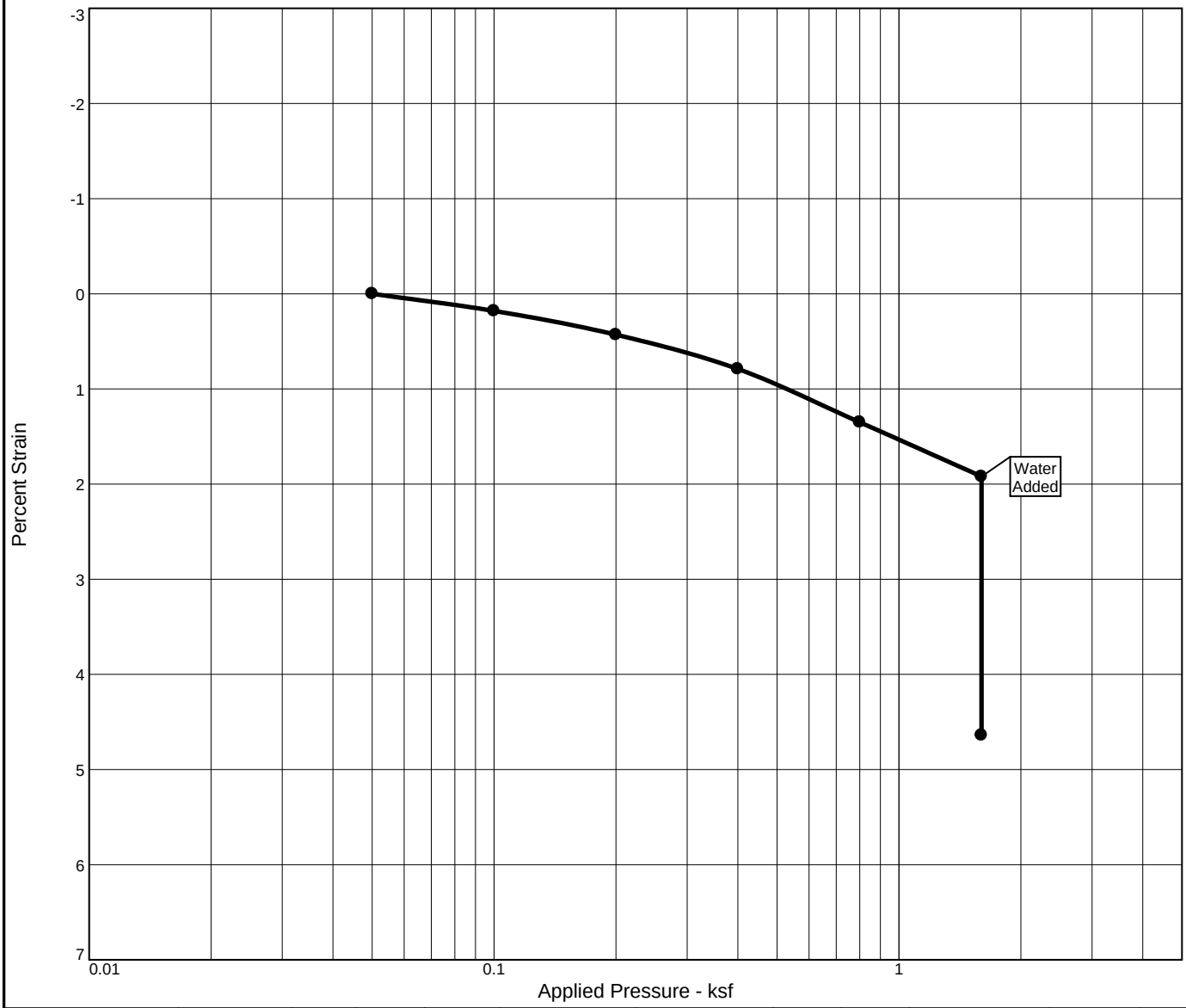
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-78

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
56.8 %	9.1 %	104.1	37	17	2.60	1.82					2.7	0.414

MATERIAL DESCRIPTION	USCS	AASHTO
Clayey gravel with sand	GC	A-2-6(1)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: RW7B-4 @ 35.0' **Depth:** 35.0' **Sample Number:** RW7B-4

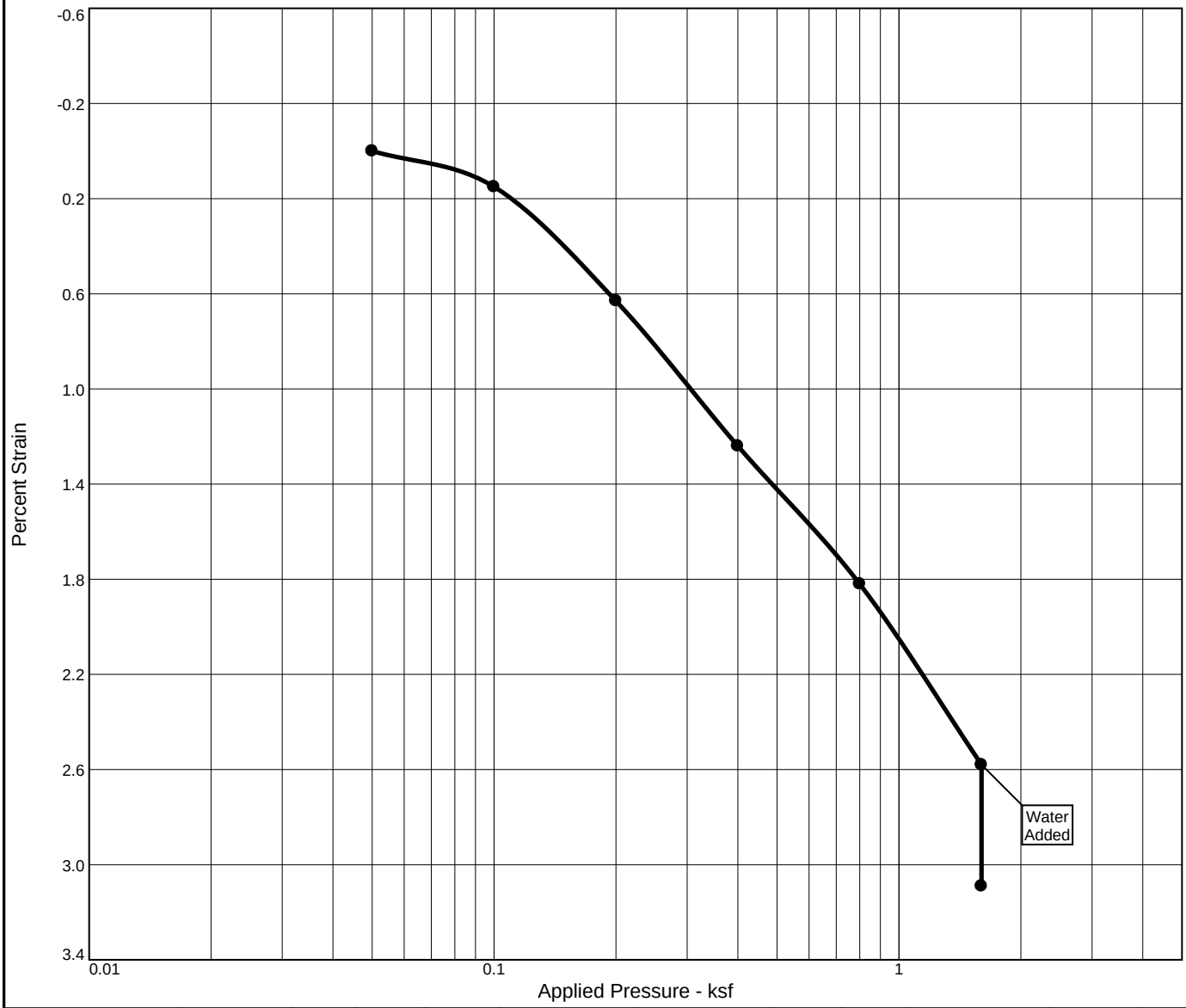
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-79

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
16.5 %	3.8 %	98.6	24	5	2.60	.24					0.5	0.596

MATERIAL DESCRIPTION	USCS	AASHTO
--	--	--

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: RW7B-6 @ 5.0' **Depth:** 5.0' **Sample Number:** RW7B-6

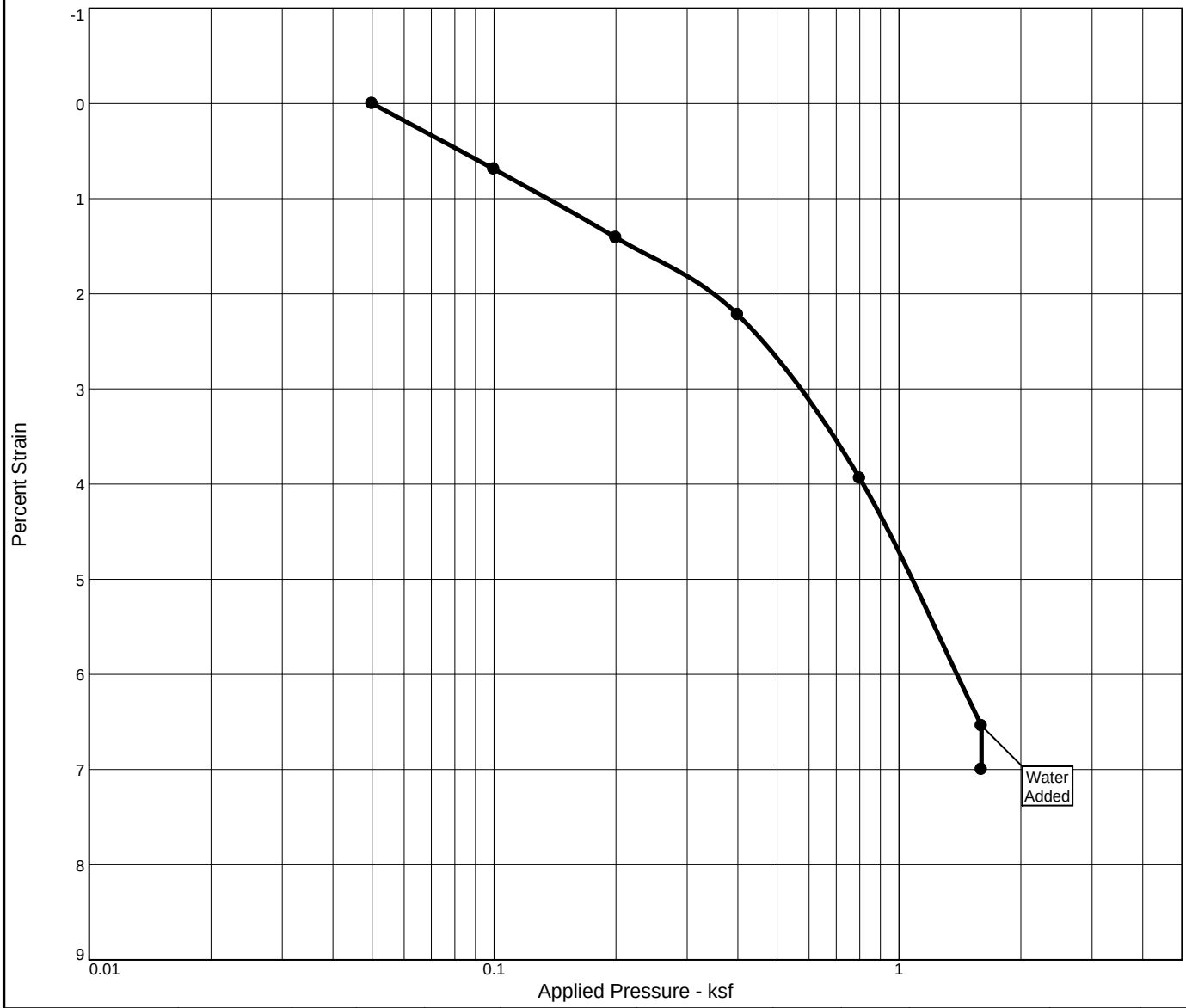
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-80

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
17.1 %	3.8 %	100.1	43	25	2.60	1.0					0.5	0.576

MATERIAL DESCRIPTION	USCS	AASHTO
Sandy lean clay	CL	A-7-6(16)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: RW7B-7 @ 20.0' **Depth:** 20.0' **Sample Number:** RW7B-7

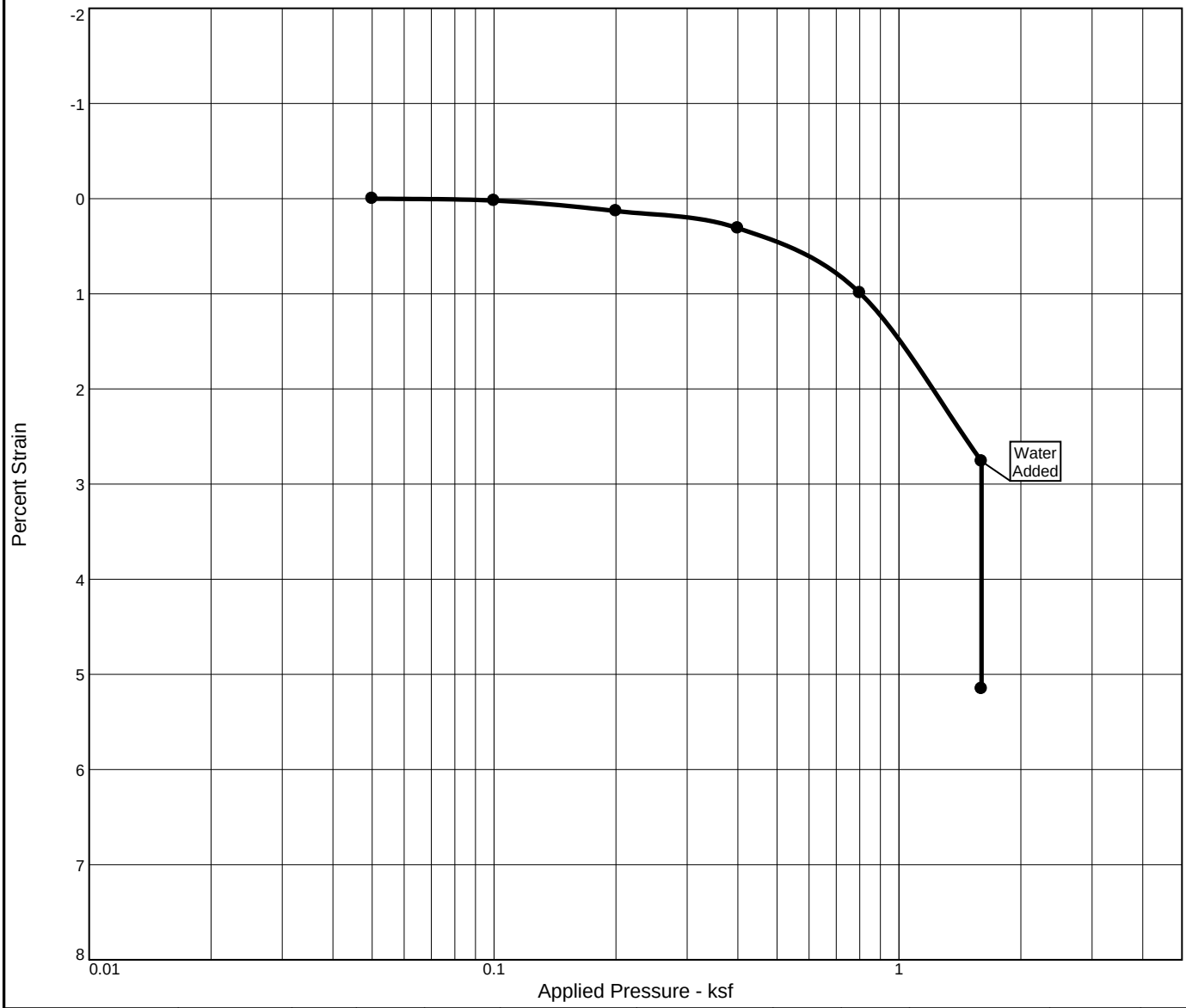
GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure B-81

Tested By: A. SANDERS

SWELL/COLLAPSE POTENTIAL



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (ksf)	P_c (ksf)	C_c	C_r	Swell Press. (ksf)	Clpse. %	e_o
Sat.	Moist.											
20.2 %	3.8 %	104.3	NV	NP	2.60	.52					2.4	0.488

MATERIAL DESCRIPTION	USCS	AASHTO
Silt	ML	A-4(0)

Project No. 20184521E1 **Client:** HDR

Project: US95-CC215 INTERCHANGE, PHASE 3D/E

Location: RW10B-2 @ 10.0' **Depth:** 10.0' **Sample Number:** RW10B-2

GES GEOTECHNICAL & ENVIRONMENTAL SERVICES, INC.

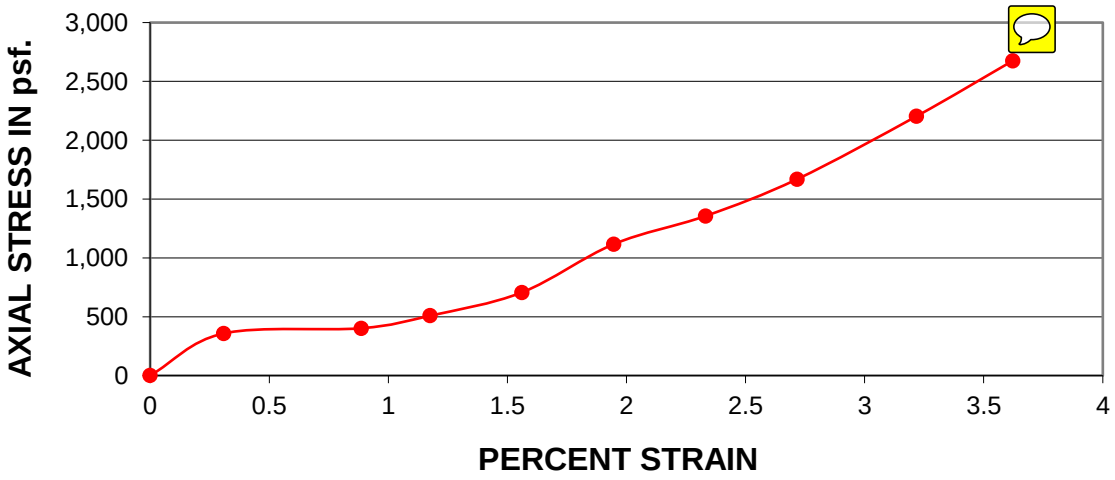
Remarks:

Figure B-82

Tested By: A. SANDERS

UNCONFINED COMPRESSIVE STRENGTH (ASTM D 2166)

Unconfined Compressive Strength :	4,370 psf
Shear Strength :	2,190 psf
Moisture Content :	12.7 %
Dry Density :	121.5 pcf
Initial Sample Diameter :	2.40 in.
Initial Sample Height :	5.19 in.



BORING NO.: H3033B-1 DEPTH: 15.0'-16.5' LAB NO.: 19-060

SAMPLED BY: F.A. TESTED BY: A. SANDERS DATE OF TEST: 02/13/19

SOIL DESCRIPTION : BROWN LEAN CLAY WITH SAND

REMARKS:

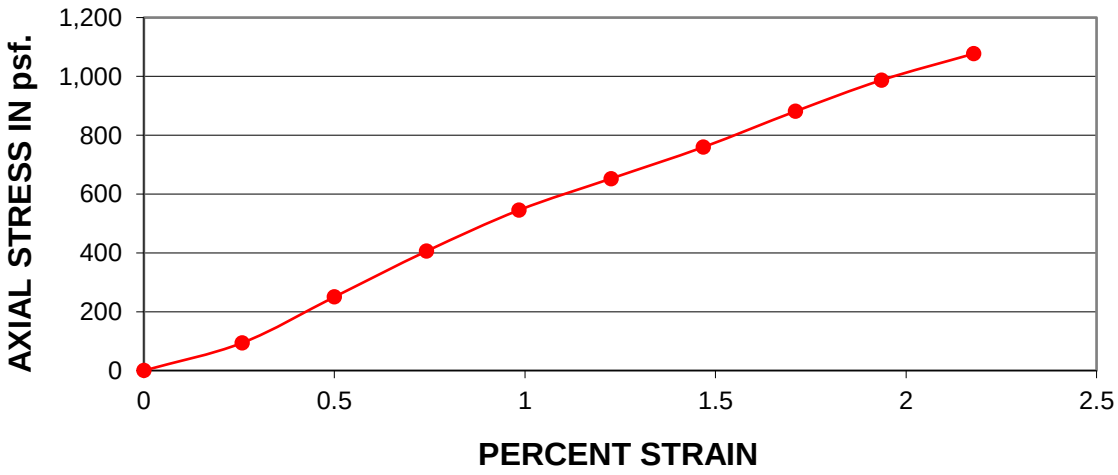
GEOTECHNICAL & ENVIRONMENTAL SERVICES INC
(702) 365 1001
7150 PLACID STREET
LAS VEGAS, NV 89119

PROJECT NAME: US95-CC215
CLIENT: HDR
PROJECT NO.: 20184521E1

FIGURE NO.: 83

UNCONFINED COMPRESSIVE STRENGTH (ASTM D 2166)

Unconfined Compressive Strength :	5,600 psf
Shear Strength :	2,800 psf
Moisture Content :	25.0 %
Dry Density :	101.2 pcf
Initial Sample Diameter :	2.39 in.
Initial Sample Height :	6.20 in.



BORING NO.: H3033B-1 DEPTH: 70.0'-71.5' LAB NO.: 19-060

SAMPLED BY: F.A TESTED BY: A. SANDERS DATE OF TEST: 02/13/19

SOIL DESCRIPTION : BROWN LEAN CLAY

REMARKS:

GEOTECHNICAL & ENVIRONMENTAL SERVICES INC
(702) 365 1001
7150 PLACID STREET
LAS VEGAS, NV 89119

PROJECT NAME: US95-CC215
CLIENT: HDR
PROJECT NO.: 20184521E1

FIGURE NO.: 84

Silver State Labs-Las Vegas
3626 E. Sunset Road, Suite 100
Las Vegas, NV 89120
(702) 873-4478 FAX: (702) 873-7967
www.ssalabs.com

Analytical Report

WO#: **19011325**
Date Reported: **2/1/2019**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 19011325-01
Matrix: SOIL
Client Sample ID: 19-060, H-3033 B-1@25.0'-26.5'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE			**SM 4500CL B**			Analyst: **IN**
CHLORIDE - SOILS						
Chloride	ND	50		mg/Kg	5	1/29/2019 1:54:00 PM
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE			**SM 4500 SO4 E**			Analyst: **IN**
WATER SOLUBLE SULFATE (SO4)						
Sulfate	0.0100	0.0100		%	1	1/29/2019 11:19:07 AM
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE			**SM 2540 C**			Analyst: **IN**
TOTAL SALTS (SOLUBILITY)						
Solubility	0.150	0.0100		%	1	1/29/2019 11:28:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
C	Value is below Minimum Compound Limit.
DF	Dilution Factor.
H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.
ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.

Original

Figure B-85

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Analytical Report

WO#: **19011325**
Date Reported: **2/1/2019**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 19011325-02
Matrix: SOIL
Client Sample ID: 19-060, H-3033 B-1@35.0'-36.5'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	ND	1.00		mg/L	1	2/1/2019 8:30:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **IN**
Chloride	ND	50		mg/Kg	5	1/29/2019 1:54:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **II**
Sodium Sulfate as Na2SO4	0.005	0		%	1	1/29/2019 6:00:18 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. PH - SOILS			**SM 9045C**			Analyst: **KFB**
pH	7.63	0		pH Units	1	1/30/2019 2:43:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	468	1.00		mV	1	2/1/2019 8:29:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. RESISTIVITY BY NDOT METHOD T235B			**NDOT T235 B**			Analyst: **SBK**
Resistivity	3910	0		Ohms-cm	1	2/1/2019 8:35:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **IN**
Sulfate	0.0100	0.0100		%	1	1/29/2019 11:19:07 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **IN**
Sodium	ND	0.0100		%	1	1/29/2019 1:50:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **IN**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Original

Figure B-86

Silver State Labs-Las Vegas
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Las Vegas, NV 89120
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Analytical Report

WO#: **19011325**
Date Reported: **2/1/2019**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 19011325-02
Matrix: SOIL
Client Sample ID: 19-060, H-3033 B-1@35.0'-36.5'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **IN**
Solubility	0.0100	0.0100		%	1	1/29/2019 11:28:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Original

Figure B-87

Silver State Labs-Las Vegas
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Las Vegas, NV 89120
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Analytical Report

WO#: **18120782**
Date Reported: **12/19/2018**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 18120782-02
Matrix: SOIL
Client Sample ID: 18-524 H3033 B2 @ 50.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	ND	1.00		mg/L	1	12/18/2018 4:17:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	ND	50		mg/Kg	5	12/17/2018 1:30:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.00500	0		%	1	12/17/2018 3:31:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. PH - SOILS			**SM 9045C**			Analyst: **SBK**
pH	8.70	0		pH Units	1	12/18/2018 4:47:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	329	1.00		mV	1	12/17/2018 1:34:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. RESISTIVITY BY NDOT METHOD T235B			**NDOT T235 B**			Analyst: **SBK**
Resistivity	3550	0		Ohms-cm	1	12/18/2018 3:27:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0100	0.0100		%	1	12/17/2018 1:30:06 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **SBK**
Sodium	ND	0.0100		%	1	12/17/2018 1:31:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Original

Figure B-88

Silver State Labs-Las Vegas
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Analytical Report

WO#: **18120782**
Date Reported: **12/19/2018**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 18120782-02
Matrix: SOIL
Client Sample ID: 18-524 H3033 B2 @ 50.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.0700	0.0100		%	1	12/17/2018 11:34:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Original

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Analytical Report

WO#: **18120782**
Date Reported: **12/19/2018**

CLIENT: GES **Collection Date:**
Project: 20184521E1
Lab ID: 18120782-01 **Matrix:** SOIL
Client Sample ID: 18-524, H3034 B1 @ 25.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE CHLORIDE - SOILS				**SM 4500CL B**		Analyst: **SBK**
Chloride	75	50		mg/Kg	5	12/17/2018 1:30:00 PM
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE WATER SOLUBLE SULFATE (SO4)				**SM 4500 SO4 E**		Analyst: **SBK**
Sulfate	0.0600	0.0100		%	1	12/17/2018 1:30:06 PM
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.120	0.0100		%	1	12/17/2018 11:34:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Original

Figure B-90

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Analytical Report

WO#: **18120782**
Date Reported: **12/19/2018**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 18120782-03
Matrix: SOIL
Client Sample ID: 18-524 H3034 B1 @ 40.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	ND	50		mg/Kg	5	12/17/2018 1:30:00 PM
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0200	0.0100		%	1	12/17/2018 1:30:06 PM
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**
Solubility	0.0500	0.0100		%	1	12/17/2018 11:34:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Original

Figure B-91

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Analytical Report

WO#: **18120994**
Date Reported: **12/21/2018**

CLIENT: GES
Collection Date:
Project: 20184521E2
Lab ID: 18120994-01
Matrix: SOIL
Client Sample ID: 18-536, H-3036-B3@15.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	ND	1.00		mg/L	1	12/20/2018 8:44:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	310	100		mg/Kg	10	12/19/2018 1:18:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.0480	0		%	1	12/19/2018 3:36:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. PH - SOILS			**SM 9045C**			Analyst: **SBK**
pH	7.65	0		pH Units	1	12/23/2018 4:59:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	359	1.00		mV	1	12/19/2018 3:38:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. RESISTIVITY BY NDOT METHOD T235B			**NDOT T235 B**			Analyst: **SBK**
Resistivity	481	0		Ohms-cm	1	12/20/2018 4:57:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0300	0.0100		%	1	12/19/2018 1:17:48 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **SBK**
Sodium	0.0200	0.0100		%	1	12/19/2018 1:19:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Original

Figure B-92

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Analytical Report

WO#: **18120994**
Date Reported: **12/21/2018**

CLIENT: GES
Collection Date:
Project: 20184521E2
Lab ID: 18120994-01
Matrix: SOIL
Client Sample ID: 18-536, H-3036-B3@15.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.180	0.0100		%	1	12/19/2018 10:55:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Original

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Analytical Report

WO#: **18120994**
Date Reported: **12/21/2018**

CLIENT: GES
Collection Date:
Project: 20184521E2
Lab ID: 18120994-02
Matrix: SOIL
Client Sample ID: 18-539, H-3036-B4@45.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	ND	50		mg/Kg	5	12/19/2018 1:18:00 PM
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	ND	0.0100		%	1	12/19/2018 1:17:48 PM
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**
Solubility	0.0300	0.0100		%	1	12/19/2018 10:55:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Original

Figure B-94

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Analytical Report

WO#: **19010545**
Date Reported: **1/16/2019**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 19010545-01
Matrix: SOIL
Client Sample ID: 19-024, RW7B2@1.0'-4.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	ND	1.00		mg/L	1	1/14/2019 11:11:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	240	50		mg/Kg	5	1/11/2019 1:17:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.0530	0		%	1	1/11/2019 2:54:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. PH - SOILS			**SM 9045C**			Analyst: **SBK**
pH	8.02	0		pH Units	1	1/14/2019 11:13:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	476	1.00		mV	1	1/14/2019 10:43:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. RESISTIVITY BY NDOT METHOD T235B			**NDOT T235 B**			Analyst: **SBK**
Resistivity	252	0		Ohms-cm	1	1/14/2019 10:42:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.130	0.0100		%	1	1/11/2019 1:35:01 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **SBK**
Sodium	0.0200	0.0100		%	1	1/11/2019 1:36:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Original

Figure B-95

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Analytical Report

WO#: **19010545**
Date Reported: **1/16/2019**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 19010545-01
Matrix: SOIL
Client Sample ID: 19-024, RW7B2@1.0'-4.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.330	0.0100		%	1	1/11/2019 11:03:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Original

Figure B-96

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Analytical Report

WO#: **18120908**
Date Reported: **12/21/2018**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 18120908-01
Matrix: SOIL
Client Sample ID: 18-528, RW7B-4 @ 15.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	3.20	1.00		mg/L	1	12/20/2018 8:44:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	86	50		mg/Kg	5	12/18/2018 1:11:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.0190	0		%	1	12/18/2018 3:13:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. PH - SOILS			**SM 9045C**			Analyst: **SBK**
pH	8.41	0		pH Units	1	12/18/2018 4:47:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	331	1.00		mV	1	12/18/2018 3:26:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. RESISTIVITY BY NDOT METHOD T235B			**NDOT T235 B**			Analyst: **SBK**
Resistivity	1440	0		Ohms-cm	1	12/18/2018 3:27:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0100	0.0100		%	1	12/18/2018 1:06:27 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **SBK**
Sodium	0.0100	0.0100		%	1	12/18/2018 1:12:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Revision v2

Figure B-97

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Analytical Report

WO#: **18120908**
Date Reported: **12/21/2018**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 18120908-01
Matrix: SOIL
Client Sample ID: 18-528, RW7B-4 @ 15.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.0500	0.0100		%	1	12/18/2018 10:59:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Revision v2

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Analytical Report

WO#: **19010397**
Date Reported: **1/14/2019**

CLIENT: GES
Project: 20184521E1
Lab ID: 19010397-01
Client Sample ID: 19-008, RW7B7@10'
Collection Date:
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	ND	1.00		mg/L	1	1/14/2019 11:11:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	130	50		mg/Kg	5	1/9/2019 1:06:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.0260	0		%	1	1/9/2019 4:10:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. PH - SOILS			**SM 9045C**			Analyst: **SBK**
pH	7.95	0		pH Units	1	1/14/2019 11:13:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	484	1.00		mV	1	1/14/2019 10:43:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. RESISTIVITY BY NDOT METHOD T235B			**NDOT T235 B**			Analyst: **SBK**
Resistivity	849	0		Ohms-cm	1	1/14/2019 10:42:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0400	0.0100		%	1	1/9/2019 1:04:45 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **SBK**
Sodium	0.0100	0.0100		%	1	1/9/2019 1:07:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Original

Figure B-99

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Analytical Report

WO#: **19010397**
Date Reported: **1/14/2019**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 19010397-01
Matrix: SOIL
Client Sample ID: 19-008, RW7B7@10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.0900	0.0100		%	1	1/9/2019 11:19:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Original

Figure B-100

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Analytical Report

WO#: **19020294**
Date Reported: **2/12/2019**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 19020294-01
Matrix: SOIL
Client Sample ID: 19-075. RW7B-8@0.0-5.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	ND	1.00		mg/L	1	2/11/2019 10:06:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	ND	50		mg/Kg	5	2/7/2019 1:16:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.0140	0		%	1	2/7/2019 3:45:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. PH - SOILS			**SM 9045C**			Analyst: **SBK**
pH	7.60	0		pH Units	1	2/11/2019 4:37:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	425	1.00		mV	1	2/11/2019 10:05:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. RESISTIVITY BY NDOT METHOD T235B			**NDOT T235 B**			Analyst: **SBK**
Resistivity	2730	0		Ohms-cm	1	2/11/2019 10:10:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0100	0.0100		%	1	2/7/2019 2:46:24 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **SBK**
Sodium	ND	0.0100		%	1	2/7/2019 2:47:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Original

Figure B-101

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Analytical Report

WO#: **19020294**
Date Reported: **2/12/2019**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 19020294-01
Matrix: SOIL
Client Sample ID: 19-075. RW7B-8@0.0-5.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.0700	0.0100		%	1	2/7/2019 11:18:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Original

Figure B-102

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Analytical Report

WO#: **18111272**
Date Reported: **12/4/2018**

CLIENT: GES
Project: 20184521E1
Lab ID: 18111272-01
Client Sample ID 18-500 / RW8B-1

Collection Date:
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	1.60	1.00		mg/L	1	11/29/2018 4:40:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	ND	50		mg/Kg	5	11/29/2018 2:04:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.00600	0		%	1	11/29/2018 3:36:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. PH - SOILS			**SM 9045C**			Analyst: **SBK**
pH	7.73	0		pH Units	1	11/29/2018 4:40:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	322	1.00		mV	1	11/29/2018 1:26:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. RESISTIVITY BY NDOT METHOD T235B			**NDOT T235 B**			Analyst: **SBK**
Resistivity	1410	0		Ohms-cm	1	11/30/2018 10:55:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0400	0.0100		%	1	11/29/2018 2:03:09 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **SBK**
Sodium	ND	0.0100		%	1	11/29/2018 2:05:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Revision v1

Figure B-103

Silver State Labs-Las Vegas
3626 E. Sunset Road, Suite 100
Las Vegas, NV 89120
(702) 873-4478 FAX: (702) 873-7967
www.ssalabs.com

Analytical Report

WO#: **18111272**
Date Reported: **12/4/2018**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 18111272-01
Matrix: SOIL
Client Sample ID 18-500 / RW8B-1

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.0900	0.0100		%	1	11/29/2018 1:45:00 PM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Revision v1

Figure B-104

Silver State Labs-Las Vegas
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Las Vegas, NV 89120
(702) 873-4478 FAX: (702) 873-7967
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Analytical Report

WO#: **18120188**
Date Reported: **12/7/2018**

CLIENT: GES
Project: 20184521E1
Lab ID: 18120188-01
Client Sample ID 18-501, RW8B-2@1.0'-5.0'

Collection Date:
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	ND	1.00		mg/L	1	12/5/2018 3:47:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	77	50		mg/Kg	5	12/5/2018 11:03:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.0250	0		%	1	12/5/2018 3:32:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. PH - SOILS			**SM 9045C**			Analyst: **SBK**
pH	8.19	0		pH Units	1	12/5/2018 3:49:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	343	1.00		mV	1	12/5/2018 3:45:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. RESISTIVITY BY NDOT METHOD T235B			**NDOT T235 B**			Analyst: **SBK**
Resistivity	833	0		Ohms-cm	1	12/5/2018 3:48:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0600	0.0100		%	1	12/5/2018 1:25:31 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **SBK**
Sodium	0.0100	0.0100		%	1	12/5/2018 1:26:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Revision v1

Figure B-105

Silver State Labs-Las Vegas
3626 E. Sunset Road, Suite 100
Las Vegas, NV 89120
(702) 873-4478 FAX: (702) 873-7967
www.ssalabs.com

Analytical Report

WO#: **18120188**
Date Reported: **12/7/2018**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 18120188-01
Matrix: SOIL
Client Sample ID 18-501, RW8B-2@1.0'-5.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.150	0.0100		%	1	12/5/2018 10:36:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Revision v1

Figure B-106

Silver State Labs-Las Vegas
3626 E. Sunset Road, Suite 100
Las Vegas, NV 89120
(702) 873-4478 FAX: (702) 873-7967
www.ssalabs.com

Analytical Report

WO#: **18120095**
Date Reported: **12/7/2018**

CLIENT: GES
Project: 20184521E1
Lab ID: 18120095-01
Client Sample ID 18-497, RW9B-1@0.0'-5.0'

Collection Date:
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 6. CORROSION SUITE W/RES-AASHTO,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	ND	1.00		mg/L	1	12/5/2018 3:47:00 PM
SOIL 6. CORROSION SUITE W/RES-AASHTO,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	58	50		mg/Kg	5	12/5/2018 11:03:00 AM
SOIL 6. CORROSION SUITE W/RES-AASHTO,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.0200	0		%	1	12/5/2018 3:32:00 PM
SOIL 6. CORROSION SUITE W/RES-AASHTO,SOL. PH - SOILS			**SM 9045C**			Analyst: **SBK**
pH	8.42	0		pH Units	1	12/5/2018 3:49:00 PM
SOIL 6. CORROSION SUITE W/RES-AASHTO,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	401	1.00		mV	1	12/4/2018 4:16:00 PM
SOIL 6. CORROSION SUITE W/RES-AASHTO,SOL. RESISTIVITY BY AASHTO T-288			**AASHTO T288**			Analyst: **SBK**
Resistivity, Minimum	1540	0		Ohms-cm	1	12/7/2018 8:24:00 AM
SOIL 6. CORROSION SUITE W/RES-AASHTO,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0400	0.0100		%	1	12/5/2018 1:25:31 PM
SOIL 6. CORROSION SUITE W/RES-AASHTO,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **SBK**
Sodium	0.0100	0.0100		%	1	12/5/2018 1:26:00 PM
SOIL 6. CORROSION SUITE W/RES-AASHTO,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Revision v1

Figure B-107

Silver State Labs-Las Vegas
3626 E. Sunset Road, Suite 100
Las Vegas, NV 89120
(702) 873-4478 FAX: (702) 873-7967
www.ssalabs.com

Analytical Report

WO#: **18120095**
Date Reported: **12/7/2018**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 18120095-01
Matrix: SOIL
Client Sample ID 18-497, RW9B-1@0.0'-5.0'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 6. CORROSION SUITE W/RES-AASHTO,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.0800	0.0100		%	1	12/4/2018 4:05:00 PM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Revision v1

Figure B-108

Silver State Labs-Las Vegas
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Analytical Report

WO#: **19010397**
Date Reported: **1/14/2019**

CLIENT: GES
Project: 20184521E1
Lab ID: 19010397-02
Client Sample ID: 19-008, RW10B2@10'
Collection Date:
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SULFIDE - SOILS			**SM 4500S2 F**			Analyst: **SBK**
Sulfide	ND	1.00		mg/L	1	1/14/2019 11:11:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	ND	50		mg/Kg	5	1/9/2019 1:06:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. SODIUM SULFATES - CALCULATION 0NLY.			**CALCULATION**			Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.0210	0		%	1	1/9/2019 4:10:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. PH - SOILS			**SM 9045C**			Analyst: **SBK**
pH	8.24	0		pH Units	1	1/14/2019 11:13:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. REDUCTION - OXIDATION POTENTIAL - SOILS			**SM 2580 B**			Analyst: **SBK**
Oxidation-Reduction Potential	473	1.00		mV	1	1/14/2019 10:43:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. RESISTIVITY BY NDOT METHOD T235B			**NDOT T235 B**			Analyst: **SBK**
Resistivity	1630	0		Ohms-cm	1	1/14/2019 10:42:00 AM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0300	0.0100		%	1	1/9/2019 1:04:45 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. WATER SOLUBLE SODIUM (NA)			**ASTM D2791**			Analyst: **SBK**
Sodium	0.0100	0.0100		%	1	1/9/2019 1:07:00 PM
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Original

Figure B-109

Silver State Labs-Las Vegas
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www.ssalabs.com

Analytical Report

WO#: **19010397**
Date Reported: **1/14/2019**

CLIENT: GES
Collection Date:
Project: 20184521E1
Lab ID: 19010397-02
Matrix: SOIL
Client Sample ID: 19-008, RW10B2@10'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 7. CORROSION SUITE W/RES-NDOT,SOL. TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **SBK**
Solubility	0.0500	0.0100		%	1	1/9/2019 11:19:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Original

Figure B-110

Silver State Labs-Las Vegas
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(702) 873-4478 FAX: (702) 873-7967
www.ssalabs.com

Analytical Report

WO#: **19020070**
Date Reported: **2/4/2019**

CLIENT: GES
Project: 20184521E1
Lab ID: 19020070-01
Client Sample ID 19-073, RW14B1 @ 30.0'

Collection Date:
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE CHLORIDE - SOILS			**SM 4500CL B**			Analyst: **SBK**
Chloride	61	50		mg/Kg	5	2/4/2019 1:25:00 PM
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE WATER SOLUBLE SULFATE (SO4)			**SM 4500 SO4 E**			Analyst: **SBK**
Sulfate	0.0400	0.0100		%	1	2/4/2019 2:00:35 PM
SOIL 4. SULFATE, SOLUBILITY & CHLORIDE TOTAL SALTS (SOLUBILITY)			**SM 2540 C**			Analyst: **SBK**
Solubility	0.0700	0.0100		%	1	2/4/2019 10:53:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.
DF	Dilution Factor.
MCL	Maximum Contaminant Level.
PQL	Practical Quantitation Limit.
C	Value is below Minimum Compound Limit.
H	Holding times for preparation or analysis exceeded.
ND	Not Detected at the PQL.

Original

Figure B-111

APPENDIX C

AUTO HAMMER CALIBRATION RESULTS

Abe Construction Services, Inc.

5111 Doolan Rd, Livermore, CA 94551
PHONE: 925-944-6363 FAX: 925-476-1588
EMAIL: SA.acs@att.net

January 25, 2018

Greg DeSart
Eagle Drill
Las Vegas, NV 89119

Re: SPT Hammer Energy Measurements
Eagle Drilling DIEDRICH D120
Las Vegas, NV
January 19, 2018

Job No. 18007

Dear Greg DeSart

This report presents the results of SPT (Standard Penetration Test) energy measurements obtained for Eagle Drilling's Diedrich D120 drill rig on January 19, 2018. Dynamic measurements were made with a PDA (Pile Driving Analyzer) during SPT sampling at depths ranging from 5 ft to 35 ft. The objective of the dynamic measurements was to determine the energy transfer ratio (ETR) or efficiency of the SPT system, which is used to normalize the SPT N values to a standard efficiency of 60% (N_{60}).

Drill Rig and SPT Hammer Description

The SPT samples were taken with an NW rod and a split spoon sampler using an automatic hammer which has a 140 lb ram, a 30-inch nominal drop height, and theoretical potential energy of 350 ft-lbs. Further details regarding the SPT equipment are beyond the scope of this report and should be obtained from the driller.

Dynamic Test Instrumentation

Dynamic measurements of strain and acceleration were taken on a 2-ft long section of the NW rod, which was attached to the top of the sample rod string just below the hammer. The rod section was instrumented with two strain bridges and two piezoresistive accelerometers. By averaging the measurements taken from opposite sides of the rod, the effects of non-uniform hammer impacts to the recorded signals were minimized.

Strain and acceleration signals were conditioned and converted to force and velocity records by a PAK Model, Pile Driving Analyzer® (PDA). This dynamic testing equipment is the same equipment that is routinely used for conventional pile driving analysis. The dynamic force and velocity records were the basis of the computed energy results presented in this report.

Calculation of Energy Transfer

The energy transferred to the instrumented rod section was computed from the dynamic force and velocity records by the EFV method, which uses both the force and velocity records to calculate the maximum transferred energy as:

$$EFV = \int F(t)\, V(t)\, dt$$

The integration is performed over the time period from which the energy transfer begins (non-zero) and terminates at the time when the energy transfer reaches a maximum value. This method is theoretically correct for all rod lengths regardless of the 2L/c stress wave travel time (L is the rod length and c is the stress wave speed in the rod) and the number of non-uniform rod corrections. This calculation is the method we use to compute the energy transfer ratio, ETR, which is computed as:

ETR= EFV / Rated Hammer Energy

Dynamic Test Results

The PDA calculated results are given in Appendix A and include the energy transfer (EFV), the energy transfer ratio (ETR), the hammer blow rate (BPM), the maximum impact force (FMX), and the maximum rod velocity (VMX). For each sample depth interval, the average, maximum, minimum and standard deviation of each value are given in Appendix A. Other information includes the sample depth interval and the total number of blows for the reported depth interval. The average ETR for the D120 drill rig hammer operating at an average rate of 38.9 BPM was 74.6% for 268 hammer blows with a standard deviation of 6.8%.

I appreciate the opportunity to be of assistance to you on this project. Please contact me if you have any questions regarding this report, or if I may be of further service.

Regards,

Steven K. Abe, P.E.

APPENDIX A

Dynamic Measurement Results

Eagle Drilling | DIEDRICH D120 Drill Rig

7150 Placid St Hole 4 | Test Date: 01/19/2018

ETR: Energy Transfer Ratio | VMX: Maximum Velocity

EFV: Energy of FV | FMX: Maximum Force

BL#	Depth ft	TYPE	ETR (%)	EFV k-ft	FMX kips	VMX f/s	BPM bpm
54	5	AV54	70.9	0.248	48.4	15.9	38.5
		STD	8.4	0.029	3.6	1.6	7.2
		MAX	76.5	0.268	51.4	18.8	40.6
		MIN	20.4	0.071	23.8	8.1	1.9
95	10	AV41	70.2	0.246	48.7	15.6	38.8
		STD	4.5	0.016	1.6	0.4	5.8
		MAX	76.4	0.267	51.5	16.4	40.1
		MIN	62.1	0.217	45.2	14.4	1.9
132	15	AV37	76.8	0.269	47	15.4	38.5
		STD	4.6	0.016	1.6	0.2	6.1
		MAX	83.9	0.294	50.6	15.8	39.7
		MIN	68.5	0.24	43.9	14.9	1.9
174	20	AV42	77.1	0.27	49.2	15	39.4
		STD	9.9	0.035	4.8	1.4	6.2
		MAX	81.5	0.285	52.1	15.6	52.7
		MIN	14.7	0.051	19.9	6.2	1.9
212	25	AV38	75.5	0.264	48.6	15.3	38.7
		STD	1.3	0.005	0.7	0.3	6.1
		MAX	77.3	0.271	50	15.8	40.3
		MIN	71.8	0.251	46.9	14.6	1.9
240	30	AV28	76.7	0.269	49	14.8	38.5
		STD	2.2	0.008	1.5	0.3	7
		MAX	80.8	0.283	51.8	15.4	40.2
		MIN	72.5	0.254	45.9	14.1	1.9
268	35	AV28	78.5	0.275	51	15.4	40.1
		STD	3	0.01	1.4	0.2	0.1
		MAX	84.1	0.294	54.5	15.7	40.2
		MIN	73.8	0.258	47.7	15	39.8
		Average	74.6	0.261	48.7	15.4	38.9
		Std. Dev.	6.8	0.024	2.9	1	6.1
		Maximum	84.1	0.294	54.5	18.8	52.7
		Minimum	14.7	0.051	19.9	6.2	1.9

Total number of blows analyzed: 268

Abe Construction Services, Inc.

5111 Doolan Rd, Livermore, CA 94551
PHONE: 925-944-6363 FAX: 925-476-1588
EMAIL: SA.acs@att.net

January 25, 2018

Greg DeSart
Eagle Drill
Las Vegas, NV 89119

Re: SPT Hammer Energy Measurements
Eagle Drilling MOBILE B90 Drill Rig
Las Vegas, NV
January 19, 2018

Job No. 18007

Dear Greg DeSart

This report presents the results of SPT (Standard Penetration Test) energy measurements obtained for Eagle Drilling's MOBILE B90 drill rig on January 19, 2018. Dynamic measurements were made with a PDA (Pile Driving Analyzer) during SPT sampling at depths ranging from 5 ft to 35 ft. The objective of the dynamic measurements was to determine the energy transfer ratio (ETR) or efficiency of the SPT system, which is used to normalize the SPT N values to a standard efficiency of 60% (N_{60}).

Drill Rig and SPT Hammer Description

The SPT samples were taken with an NW rod and a split spoon sampler using an automatic hammer which has a 140 lb ram, a 30-inch nominal drop height, and theoretical potential energy of 350 ft-lbs. Further details regarding the SPT equipment are beyond the scope of this report and should be obtained from the driller.

Dynamic Test Instrumentation

Dynamic measurements of strain and acceleration were taken on a 2-ft long section of the NW rod, which was attached to the top of the sample rod string just below the hammer. The rod section was instrumented with two strain bridges and two piezoresistive accelerometers. By averaging the measurements taken from opposite sides of the rod, the effects of non-uniform hammer impacts to the recorded signals were minimized.

Strain and acceleration signals were conditioned and converted to force and velocity records by a PAK Model, Pile Driving Analyzer® (PDA). This dynamic testing equipment is the same equipment that is routinely used for conventional pile driving analysis. The dynamic force and velocity records were the basis of the computed energy results presented in this report.

Calculation of Energy Transfer

The energy transferred to the instrumented rod section was computed from the dynamic force and velocity records by the EFV method, which uses both the force and velocity records to calculate the maximum transferred energy as:

$$EFV = \int F(t)\, V(t)\, dt$$

The integration is performed over the time period from which the energy transfer begins (non-zero) and terminates at the time when the energy transfer reaches a maximum value. This method is theoretically correct for all rod lengths regardless of the 2L/c stress wave travel time (L is the rod length and c is the stress wave speed in the rod) and the number of non-uniform rod corrections. This calculation is the method we use to compute the energy transfer ratio, ETR, which is computed as:

ETR= EFV / Rated Hammer Energy

Dynamic Test Results

The PDA calculated results are given in Appendix A and include the energy transfer (EFV), the energy transfer ratio (ETR), the hammer blow rate (BPM), the maximum impact force (FMX), and the maximum rod velocity (VMX). For each sample depth interval, the average, maximum, minimum and standard deviation of each value are given in Appendix A. Other information includes the sample depth interval and the total number of blows for the reported depth interval. The average ETR for the B90 drill rig hammer operating at an average rate of 35.2 BPM was 92.7% for 222 hammer blows with a standard deviation of 2.9%.

I appreciate the opportunity to be of assistance to you on this project. Please contact me if you have any questions regarding this report, or if I may be of further service.

Regards,

Steven K. Abe, P.E.

APPENDIX A

Dynamic Measurement Results

Eagle Drilling | MOBILE B90 Drill Rig

7150 Placid St Hole 2 | Test Date: 01/19/2018

ETR: Energy Transfer Ratio | VMX: Maximum Velocity

EFV: Energy of FV | FMX: Maximum Force

BL#	Depth	TYPE	ETR	EFV	FMX	VMX	BPM
	ft		(%)	k-ft	kips	f/s	bpm
29	5	AV29	90.2	0.316	35.1	15.8	35.9
		STD	2.9	0.01	2.2	1.3	6.5
		MAX	95.2	0.333	45.1	18.6	38
		MIN	81.3	0.285	31.5	13.7	1.9
52	10	AV23	93.4	0.327	41.1	15.8	35.2
		STD	3.3	0.012	2.5	0.6	7.1
		MAX	99.4	0.348	45.1	17.3	37.3
		MIN	81.5	0.285	36	14.9	1.9
82	15	AV30	95	0.333	39.3	16.1	34.8
		STD	2.9	0.01	2	0.6	6.2
		MAX	99.6	0.348	42.2	17.3	37.3
		MIN	84.6	0.296	34.5	15.2	1.9
137	20	AV55	92.5	0.324	40.6	16.4	35.4
		STD	1.6	0.006	3.3	0.8	5
		MAX	95.8	0.335	43.7	17.4	37
		MIN	87	0.304	31.6	14.3	1.9
176	25	AV39	94.5	0.331	40.6	14.9	35.1
		STD	1.2	0.004	2.9	0.6	5.5
		MAX	96.9	0.339	44.1	15.6	36.7
		MIN	92.6	0.324	34.6	13.5	1.9
194	30	AV18	92.9	0.325	34.6	13.9	32.9
		STD	1.7	0.006	3.6	0.9	7.7
		MAX	96.7	0.338	46.1	15.9	36.5
		MIN	87.8	0.307	31.7	12.6	1.9
222	35	AV28	90	0.315	38.6	13.7	36
		STD	2.3	0.008	4.6	1	0.5
		MAX	94.3	0.33	45.1	15.1	36.3
		MIN	87.1	0.305	32.7	12.1	34
		Average	92.7	0.324	39	15.4	35.2
		Std. Dev.	2.9	0.01	3.9	1.3	5.7
		Maximum	99.6	0.348	46.1	18.6	38
		Minimum	81.3	0.285	31.5	12.1	1.9

Total number of blows analyzed: 222

Abe Construction Services, Inc.

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January 25, 2018

Greg DeSart
Eagle Drill
Las Vegas, NV 89119

Re: SPT Hammer Energy Measurements
Eagle Drilling Diedrich D50
Las Vegas, NV
January 19, 2018

Job No. 18007

Dear Greg,

This report presents the results of SPT (Standard Penetration Test) energy measurements obtained for Eagle Drilling's Diedrich D50 drill rig on January 19, 2018. Dynamic measurements were made with a PDA (Pile Driving Analyzer) during SPT sampling at depths ranging from 5 ft to 35 ft. The objective of the dynamic measurements was to determine the energy transfer ratio (ETR) or efficiency of the SPT system, which is used to normalize the SPT N values to a standard efficiency of 60% (N_{60}).

Drill Rig and SPT Hammer Description

The SPT samples were taken with an NW rod and a split spoon sampler using an automatic hammer which has a 140 lb ram, a 30-inch nominal drop height, and theoretical potential energy of 350 ft-lbs. Further details regarding the SPT equipment are beyond the scope of this report and should be obtained from the driller.

Dynamic Test Instrumentation

Dynamic measurements of strain and acceleration were taken on a 2-ft long section of the NW rod, which was attached to the top of the sample rod string just below the hammer. The rod section was instrumented with two strain bridges and two piezoresistive accelerometers. By averaging the measurements taken from opposite sides of the rod, the effects of non-uniform hammer impacts to the recorded signals were minimized.

Strain and acceleration signals were conditioned and converted to force and velocity records by a PAK Model, Pile Driving Analyzer® (PDA). This dynamic testing equipment is the same equipment that is routinely used for conventional pile driving analysis. The dynamic force and velocity records were the basis of the computed energy results presented in this report.

Calculation of Energy Transfer

The energy transferred to the instrumented rod section was computed from the dynamic force and velocity records by the EFV method, which uses both the force and velocity records to calculate the maximum transferred energy as:

$$EFV = \int F(t)\, V(t)\, dt$$

The integration is performed over the time period from which the energy transfer begins (non-zero) and terminates at the time when the energy transfer reaches a maximum value. This method is theoretically correct for all rod lengths regardless of the 2L/c stress wave travel time (L is the rod length and c is the

stress wave speed in the rod) and the number of non-uniform rod corrections. This calculation is the method we use to compute the energy transfer ratio, ETR, which is computed as:

ETR= EFV / Rated Hammer Energy

Dynamic Test Results

The PDA calculated results are given in Appendix A and include the energy transfer (EFV), the energy transfer ratio (ETR), the hammer blow rate (BPM), the maximum impact force (FMX), and the maximum rod velocity (VMX). For each sample depth interval, the average, maximum, minimum and standard deviation of each value are given in Appendix A. Other information includes the sample depth interval and the total number of blows for the reported depth interval. The average ETR for the D50 drill rig hammer operating at an average rate of 36.1 BPM was 75.1% for 300 hammer blows with a standard deviation of 7.6%.

I appreciate the opportunity to be of assistance to you on this project. Please contact me if you have any questions regarding this report, or if I may be of further service.

Regards,

Steven K. Abe, P.E.

APPENDIX A

Dynamic Measurement Results

Eagle Drilling
7150 Placid St Hole 3

DIEDRICH D50 Drill Rig
Test Date: 01/19/2018

ETR: Energy Transfer Ratio
EFV: Energy of FV

VMX: Maximum Velocity
FMX: Maximum Force

BL#	Depth ft	TYPE	ETR (%)	EFV k-ft	FMX kips	VMX f/s	BPM bpm
55	5	AV55	78.6	0.275	53.3	15.2	36.4
		STD	7.2	0.025	1.4	0.7	6.7
		MAX	98.4	0.344	56.3	18.7	38.1
		MIN	66.7	0.233	49	13.5	1.9
91	10	AV36	72.7	0.254	49.1	16.4	36
		STD	10.3	0.036	6	1.9	6
		MAX	78.7	0.275	53.5	17.7	47.6
		MIN	13.5	0.047	16.3	5.9	1.9
132	15	AV41	71.6	0.251	46.5	15.9	37
		STD	1.7	0.006	1.2	0.4	0.2
		MAX	73.9	0.259	49	16.8	37.8
		MIN	66.6	0.233	43.7	15.1	36.7
191	20	AV59	74.8	0.262	47.4	17.7	35.5
		STD	2.3	0.008	1.7	0.4	6.3
		MAX	78.9	0.276	50.4	18.6	37.5
		MIN	70	0.245	43.5	17.1	1.9
230	25	AV39	76.4	0.267	47.7	18.3	36.3
		STD	3.4	0.012	1.2	0.7	5.6
		MAX	83.5	0.292	50.1	20.1	37.7
		MIN	69.6	0.244	45.2	17	1.9
260	30	AV30	74.6	0.261	42	16.5	35.6
		STD	11.7	0.041	5.9	2	6.4
		MAX	84.2	0.295	48.8	18.4	44.1
		MIN	14.2	0.05	14.7	6.7	1.9
300	35	AV40	75.6	0.265	45.4	17.8	36.2
		STD	10.4	0.036	4.8	1.8	5.3
		MAX	84.2	0.295	48.9	19.1	38.5
		MIN	14.1	0.049	16.6	7.5	3.4
		Average	75.1	0.263	47.8	16.8	36.1
		Std. Dev.	7.6	0.027	4.7	1.6	5.7
		Maximum	98.4	0.344	56.3	20.1	47.6
		Minimum	13.5	0.047	14.7	5.9	1.9

Total number of blows analyzed: 300